

Network Master™ Series

MT1100A
Network Master Flex

MU110010A 10G Multirate Module

MU110011A 100G Multirate Module

MU110012A 40/100G Module CFP2



Redefining Transport Testing

All-in-one Support for R&D, Manufacturing and I&M of 100 Gbps Core and Metro Networks

Today's core and metro communications networks are implementing 100 GigE and OTN technologies rapidly to provide sufficient bandwidth supporting the explosive increase in mobile communications data. These high-bit-rate networks demand very high reliability due to the large data volumes and variety of client signals in use.

Consequently, every stage from R&D through to manufacturing, installation, and maintenance, requires precision testing and verification of network equipment and transport devices.

The all-in-one Network Master Flex MT1100A supports all the latest communications network technologies.

Selecting and installing up to two modules from a range of three module options supports all-in-one R&D, manufacturing, installation and maintenance tests of network and transport equipment operating at bit rates from 1.5 Mbps to 100 Gbps. The large, 12.1-inch color LCD touch panel with easy-to-use GUI plus remote operation of a full range of test functions over an Internet connection greatly improves test efficiency and helps cut costs.



400G

100G

Core and Metro Networks

OTN flex mapping

**All
-in-one**

**100G
4 ports**

**OTN
flex
mapping**

All-in-one Transport Tester

- Supports testing from 1.5 Mbps to 100 Gbps
- Support for various transport commissioning tests

Supports Up to 400 Gbps (100G × 4)

- Install any two modules from choice of three module options
- Test up to four independent 100 Gbps ports simultaneously to increase manufacturing efficiency for 100 Gbps transport equipment
- Support 400 Gbps (100G × 4) R&D by simulating client signals

OTN Flexible Mapping

- Various OTN mappings up to 100 Gbps
- Supports both multi-stage mappings and ODUflex
- Supports mapped client-signal tests

Main Applications

R&D

- Research and development of 400 Gbps networks and transport equipment

Manufacturing

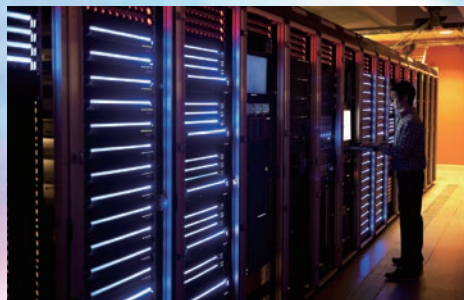
- Quality and assurance tests of 100 Gbps transport equipment

Commissioning

- Verification of Service Level Agreement (SLA) at commissioning of 1.5 Mbps to 100 Gbps lines

Maintenance

- Troubleshooting 1.5 Mbps to 100 Gbps line faults



MT1100A

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All-in-one

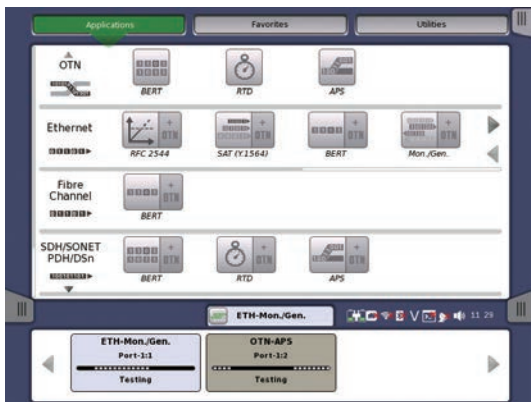
The all-in-one MT1100A has the functions required for developing, manufacturing, installing and maintaining networks at bit rates from 1.5 Mbps to 100 Gbps. With four 100 Gbps ports, it supports R&D of the latest OTN 400 Gbps technologies using client signals, including Ethernet, Fibre Channel, SDH/SONET and PDH/DSn, now in development.

OTN Testing with Client Signals

The MT1100A can map Ethernet, Fibre Channel, and SDH/SONET client signals onto OTN signals. Mapped OTN client-signal tests under near-to-live conditions support faster troubleshooting.

Easy-to-Use GUI

The user interface is optimized for troubleshooting by field technicians and to reduce training time. It has a logical structure and self-explanatory graphical symbols. Tests are started by launching an intuitive application, and main results are displayed as GO/NO-GO indications. User-programmed application favorites including all required test parameters make operation fast and easy.



Simultaneous Testing and In-band Monitoring with Dual Port

Configuring the MT1100A with two ports at all supported rates reduces test times by completing independent tests simultaneously on two lines using a single tester. Or separate measurement test applications can be run independently at the same time. Support for dual ports is also important at analysis of in-service lines when analyzing the performance of both directions of a line simultaneously.

12.1-inch Touch Screen for Easy Viewing and Operation

The large 12.1-inch, high-resolution, full color, touch screen is perfect for viewing results. And the touch screen makes instrument operations easy.

Fast Measurement Overview

The Measurement Summary function allows a rapid overview of measurements using GO/NO-GO indications with user-defined thresholds. Statistical histograms facilitate error tracking over time.

Flexible Connectivity

WLAN, *Bluetooth* and LAN connectivity ensure quick and simple tester access in any situation. While remote operation allows an experienced engineer to assist colleagues in the field.

Report Generation

The powerful and flexible report generator creates PDF or XML files for selected measurements to output results in a professional format.

Remote Operation and Control

Remote operation from a distance is simple using the Remote Operation function, allowing operation as if on-site. The remote scripting function cuts the manual operation time, eliminating human testing errors.

Portable

The high portability and robustness of the MT1100A ensure quick location of faults wherever you are. This light, small instrument is just a fraction larger than its 9-inch screen, offering easy access in the tightest locations. The small size coupled with large GUI makes it easy to quickly configure, locate, solve, and report on network issues.

Long Battery Life

Since AC power is not always available when needed. The battery-operated MT1100A (operating time depends on configuration) is convenient for instant on-site troubleshooting with no need to search for a power outlet.

The *Bluetooth*® mark and logos are owned by Bluetooth SIG, Inc. and are used by Anritsu under license.

R&D for 400 Gbps Networks

R&D into faster 400 Gbps networks is being driven by the explosive growth in smartphone mobile data traffic. The MT1100A can send and receive a variety of 100G x 4 client signals, offering strong support for R&D of 400 Gbps networks and transport equipment.

Features

- World-first portable transport testers supporting simultaneous installation of four independent 100 Gbps ports
- Each 100 Gbps port supports 40 GigE/100 GigE and OTU3/3e1/3e2/4 interfaces
- Detailed client-signal analysis using Ethernet frame capture
- Support various OTN mappings including ODUflex
- FEC Performance tests using ITU-T O.182 recommended Poisson-distribution error insertion
- Display test results for four ports on one screen

Recommended modules: MU110012A x 2



Higher 100 Gbps Transport Equipment Manufacturing Efficiency

Manufacturing of 100 Gbps WDM, switches and optical transceiver modules is growing rapidly. With all the functions needed for testing transport equipment, the 4-port, all-in-one MT1100A with automatic testing using SCPI commands is the ideal platform for maximizing equipment investment through higher test efficiency and lower cost per port.

Features

- Supports OTN, Ethernet, Fibre Channel, SDH/SONET and PDH/DSn at bit rates from 1.5 Mbps to 100 Gbps using combination of modules
- RFC 2544-based transmission equipment performance tests
- Color display of threshold settings and Pass/Fail evaluation results
- Automatic repeat testing using VNC or SCPI remote commands

Recommended modules: MU110012A x 2 (for four 40 Gbps/100 Gbps ports)



Quick Network Commissioning Tests

Efficient and accurate network commissioning tests in a limited time window are a key issue for network operators. With its all-in-one support for transport tests, including OTN, SyncE (ITU-T G.826x), PTP (IEEE 1588 v2), ITU-T Y.1564, etc., plus simultaneous multiple-line tests using two ports, the MT1100A helps cut costs by slashing test times.

Features

- All-in-one support for network commissioning transport tests up to 100 Gbps
- Large, 12.1-inch touch-panel GUI with battery operation
- Frame loopback using remote-controlled MT1100A as Ethernet reflector
- One-way latency tests using operation at Master side at remote control Master/Slave setup
- Built-in GPS supporting SyncE, IEEE 1588 v2, and one-way latency time syncing tests
- Remote operation over VNC for operations-center support of on-site engineers
- Halved measurement times using simultaneous 2-port, multi-line testing

Recommended modules: MU110011A



Fast and Flexible Troubleshooting

Today's data centers have a mix of interfaces ranging from old legacy network equipment to the latest 100 Gbps core networks. With excellent built-in troubleshooting functions as well as dual ports for simultaneous two-way monitoring, the MT1100A locates problems quickly.

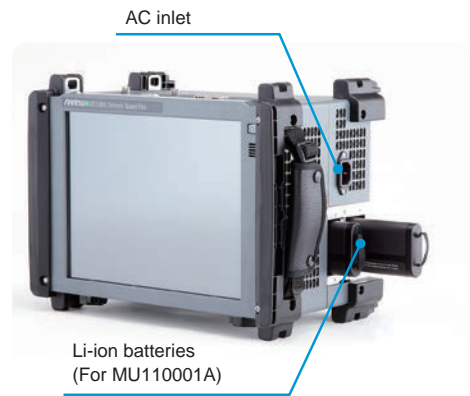
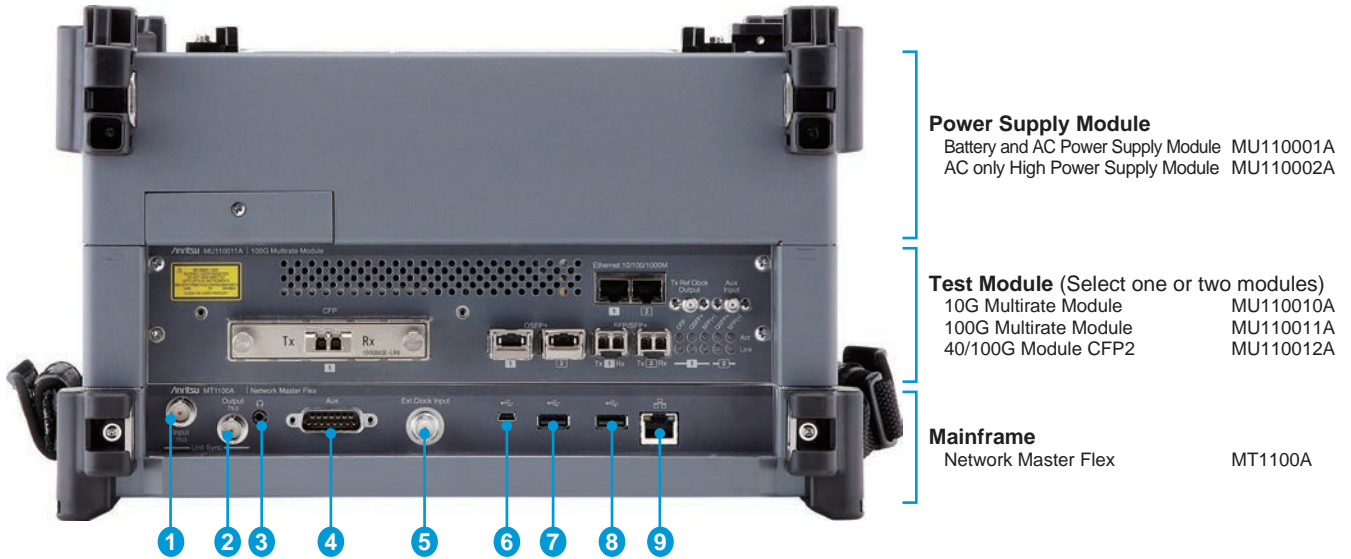
Features

- Dual ports supporting bit rates from 1.5 Mbps to 100 Gbps for two-way monitoring and equipment insertion tests
- Top talker, network attack, and fast error-frame capture using IP Channel Statistics (up to 10 Gbps)
- Ethernet frame capture and Wireshark analysis
- Live line monitoring at Through testing
- Battery operation for fast on-site troubleshooting anywhere
- Long-term monitoring using remote operation over VNC

Recommended modules: MU110010A + MU110012A
(two ports for 1.5 Mbps to 100 Gbps ports)

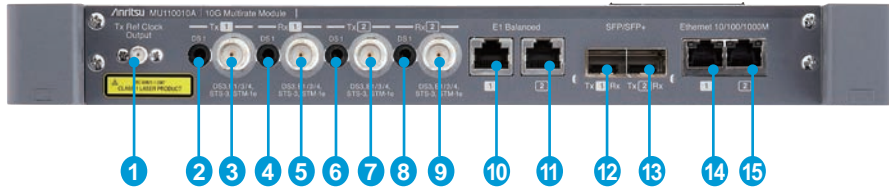


Connector Panel Overview



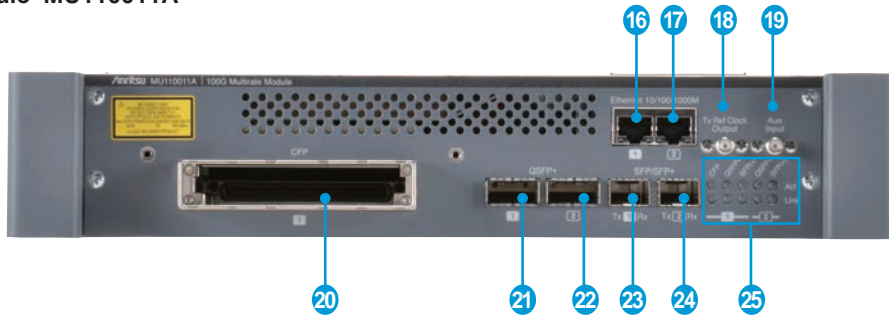
- 1 Unit Sync. Input (for future use)
- 2 Unit Sync. Output (for future use)
- 3 Audio
- 4 AUX (for G0325A, GPS receiver)
- 5 External Clock Input
- 6 USB Mini-B
- 7 USB A
- 8 USB A
- 9 Ethernet Service Interface

10G Multirate Module MU110010A



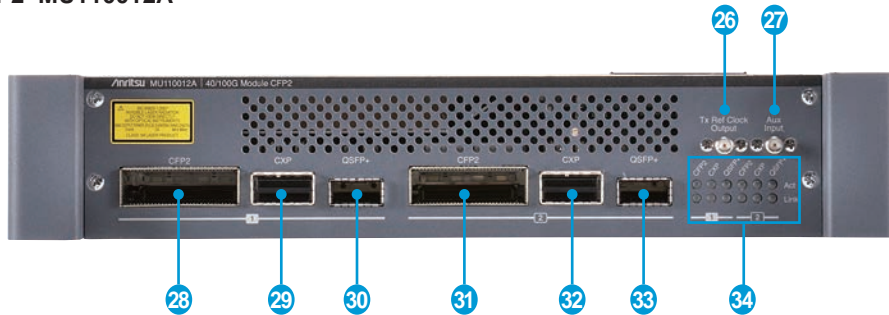
- 1 Tx Reference Clock Output
- 2 Port1, Tx Mini-bantam (DS1)
- 3 Port1, Tx BNC (E1, E3, E4, DS3, STM-1e, STS-3)
- 4 Port1, Rx Mini-bantam (DS1)
- 5 Port1, Rx BNC (E1, E3, E4, DS3, STM-1e, STS-3)
- 6 Port2, Tx Mini-bantam (DS1)
- 7 Port2, Tx BNC (E1, E3, E4, DS3, STM-1e, STS-3)
- 8 Port2, Rx Mini-bantam (DS1)
- 9 Port2, Rx BNC (E1, E3, E4, DS3, STM-1e, STS-3)
- 10 Port1, Tx/Rx RJ48 (E1 balanced)
- 11 Port2, Tx/Rx RJ48 (E1 balanced)
- 12 Port1, Tx/Rx SFP/SFP+ (OTN, Ethernet, Fibre Channel, SDH/SONET optical)
- 13 Port2, Tx/Rx SFP/SFP+ (OTN, Ethernet, Fibre Channel, SDH/SONET optical)
- 14 Port1, Tx/Rx RJ45 (Ethernet electrical)
- 15 Port2, Tx/Rx RJ45 (Ethernet electrical)

100G Multirate Module MU110011A



- 16 Port1, Tx/Rx RJ45 (Ethernet electrical)
- 17 Port2, Tx/Rx RJ45 (Ethernet electrical)
- 18 Tx Reference Clock Output
- 19 AUX Input (for future use)
- 20 Tx/Rx CFP (OTN, Ethernet, SDH/SONET optical)
- 21 Port1, Tx/Rx QSFP+ (OTN, Ethernet optical)
- 22 Port2, Tx/Rx QSFP+ (OTN, Ethernet optical)
- 23 Port1, Tx/Rx SFP/SFP+ (OTN, Ethernet, Fibre Channel, SDH/SONET optical)
- 24 Port2, Tx/Rx SFP/SFP+ (OTN, Ethernet, Fibre Channel, SDH/SONET optical)
- 25 Act, Link Indicators

40/100G Module CFP2 MU110012A



- 26 Tx Reference Clock Output
- 27 AUX Input (for future use)
- 28 Port1, Tx/Rx CFP2 (OTN, Ethernet optical)
- 29 Port1, Tx/Rx CXP (Ethernet optical)
- 30 Port1, Tx/Rx QSFP+ (OTN Ethernet optical)
- 31 Port2, Tx/Rx CFP2 (OTN, Ethernet optical)
- 32 Port2, Tx/Rx CXP (Ethernet optical)
- 33 Port2, Tx/Rx QSFP+ (OTN Ethernet optical)
- 34 Act, Link Indicators

Comprehensive OTN Testing for Core and Metro Networks Installation and Maintenance

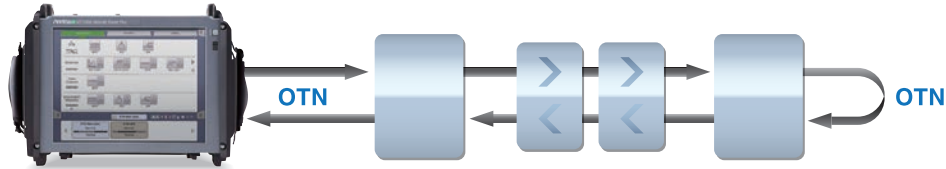
OTN carries client signals, but current OTN transport testers only support OTN testing at the OTN line rate with bulk test signals. This means that problems in the carried client signals are invisible when testing an in-service OTN system. Using the MT1100A, OTN lines can be tested at the client signal level with signals like Ethernet, Fibre Channel and SDH/SONET, because the OTN mapping function is mandatory for modern OTN transponders. The MT1100A can also test OTN lines at the line rate with bulk signals. The user can identify problems at all levels in the OTN signal, solving OTN issues efficiently, reducing system downtime, and reducing operating expenses for network operators.

OTN Testing with Client Signals

The MT1100A is a powerful and full toolset for testing OTN signals. It supports complete Bit Error Rate (BER) tests with bulk signals at the OTN level as well as tests all the way to the Ethernet, Fibre Channel and SDH/SONET client signals mapped onto the OTN signal.

OTN tests features include:

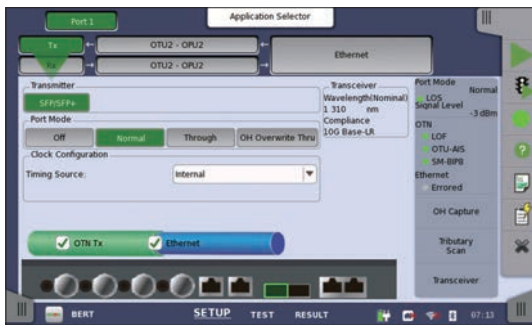
- Supports OTU1, OTU2, OTU1e, OTU2e, OTU1f, OTU2f, OTU3, OTU3e1, OTU3e2, OTU4
- Supports multi-stage mapping and ODUflex
- OTN tests with bulk signals at OTN level
- Comprehensive OTN error and alarm statistics
- OTN error performance measurement in accordance with G.8201 or M.2401
- ITU-T O.182-compliant FEC test
- Test of Ethernet, Fibre Channel or SDH/SONET client signals mapped onto OTN signal
- Delay measurement
- OTN header edit and capture
- OTN TCM monitoring and generation
- Service disruption analysis using APS application
- OTN tributary scan (up to 10 Gbps)
- Full flexibility to monitor insert/overwrite client overhead and payload within OTN signal



Looping-back test signal from MT1100A at far end supports easy OTN line quality tests

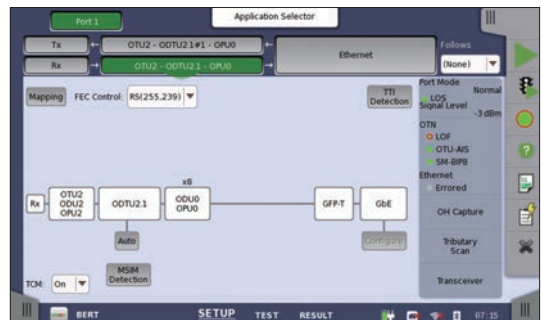
Out-of-service OTN Error and Alarm Statistics

The MT1100A supports powerful statistical measurements for BER tests as well as OTN level alarms and errors for installing/commissioning and troubleshooting out-of-service OTN lines. G.8201 or M.2401 error-performance parameters are calculated during measurement. Stress testing of network elements is supported by inserting errors and alarms, and adjusting overhead bytes in the signal transmitted by the instrument.



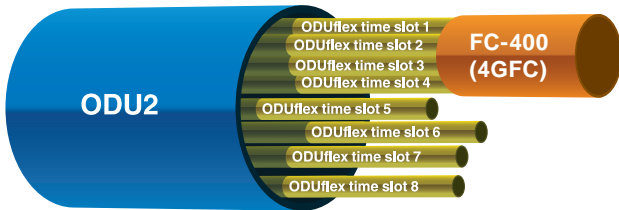
Testing Ethernet, Fibre Channel, or SDH/SONET Client Signals Mapped onto OTN Signal (Part of ODU Multiplexing Option)

The MT1100A tests OTN links carrying Ethernet or SDH/SONET client signals, allowing the operator to test embedded client signals. For example, an RFC 2544 or Y.1564 test can be performed with an Ethernet signal carried over the OTN signal, allowing the service engineer to run tests emulating the real-world requirements of end users.



ODUflex Test (with ODU Flex Option)

ODUflex is a new feature of OTN supporting flexible allocation of client-signal bandwidth to make best use of OTN capacity. The MT1100A with ODU Flex option supports ODUflex tests, allowing operators to verify this new technology on their networks.



ODU Flex Option divides capacity of ODU2 into 8 1.25G ODUflex time slots. In the above example, an FC-400 (4GFC) Fibre Channel signal occupies 4 ODUflex time slots.



OTN Statistics Summary



OTU Level Statistics

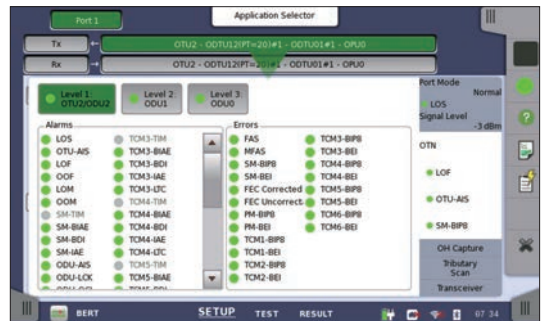
ITU-T O.182-compliant FEC Test

Anritsu proposed the FEC performance tests using Poisson-distributed random errors adopted by ITU-T Recommendation O.182. This method supports reproducible and accurate FEC error correction tests by generating truly random signal errors. High-speed networks cannot be tested accurately without using the ITU-T O.182 Poisson error distribution.

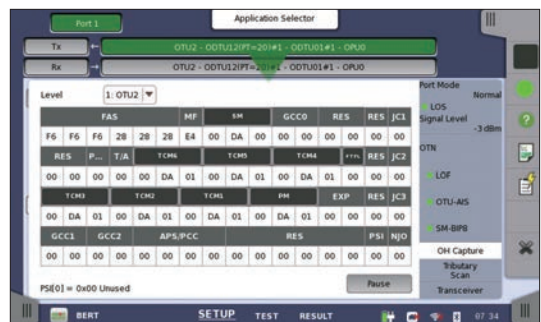


OTN Tributary Scan

The tributary scan feature supports quick inspection of the OTN signal by examining it for major problems and highlighting them in an easy-to-understand manner. (up to 10 Gbps)



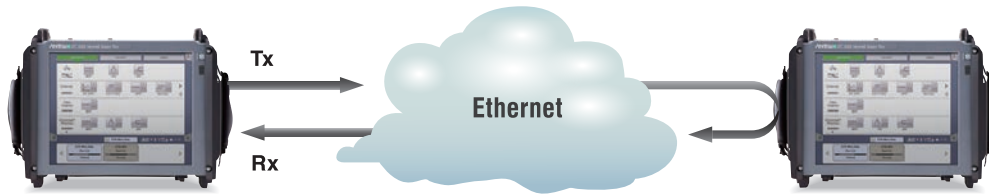
OTU Alarms and Errors View



OTU Header Capture

Carrier Ethernet Installation and Troubleshooting

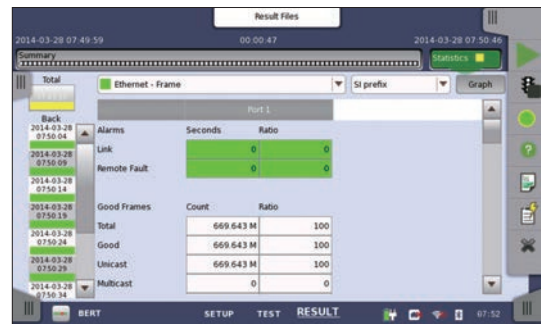
Ethernet technology is used by many applications today, including Carrier Class Ethernet, VLAN, Q-in-Q, Ethernet OAM and MPLS and, recently, PBB-TE and MPLS-TP. Network operators must handle all these technologies, leading to long and complex test procedures. The MT1100A with Ethernet option is a comprehensive solution for easy testing, installing, and faster troubleshooting of Ethernet lines up to 100 Gbps using functions for verifying bandwidth, and testing connectivity, Quality of Service (QoS), and service availability, cutting additional truck rolls, tech support calls, and customer churn to improve operating expenses.



Single-end test using MT1100A as Ethernet reflector

Ethernet test features include:

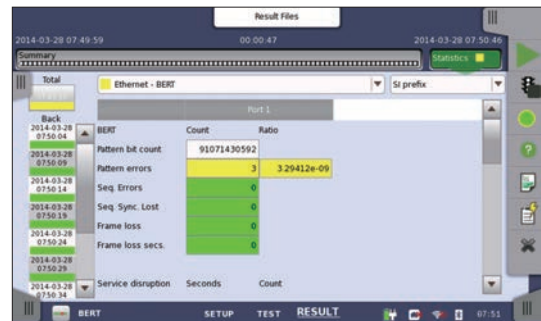
- Supports 100 Gbps, 40 Gbps, 10 Gbps, 1 Gbps, 100 Mbps, and 10 Mbps Ethernet tests
- Traffic generation up to full line rate
- Support for IPv4 and IPv6
- Ethernet Service Activation Test (Y.1564)
- Automated RFC 2544 tests of Throughput, Frame Loss, Latency or Packet Jitter, Burstability
- BER tests – include Frame Loss and Sequence Error tests
- Service disruption measurements
- Comprehensive statistics
- Filters – to extract relevant parts of traffic
- Thresholds – to highlight abnormalities
- Simultaneous monitoring in both line directions
- IP Channel Statistics to identify error streams, top talkers, network attacks (up to 10 Gbps)
- Ethernet OAM tests
- 10G WAN-PHY tests
- Synchronous Ethernet test (ITU-T G.826x and IEEE 1588 v2) (up to 10 Gbps)
- Ethernet Multistream
- Stacked VLAN (Q-in-Q)
- MPLS tests
- MPLS-TP and PBB/PBB-TE tests
- Ping
- Traceroute
- Frame capture for protocol analysis with Wireshark
- Electrical cable tests and optical signal level displays



Ethernet Statistics



Ethernet BER Tests Statistics Summary



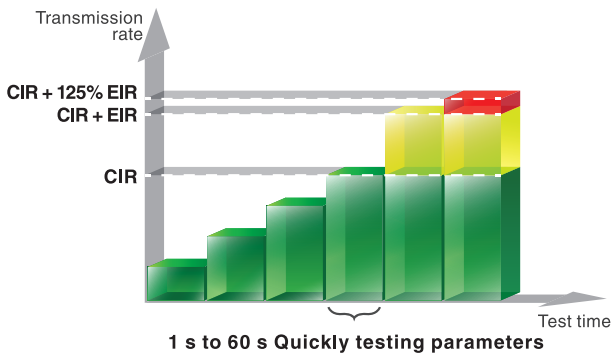
Ethernet BER Tests Results

Ethernet Service Activation Test (Y.1564)

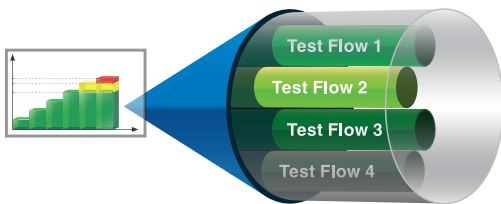
With the ability to simultaneously test multiple traffic streams, ITU-T Y.1564 is a new test methodology when deploying Ethernet networks. Today's common RFC 2544 standard completes tests one at the time and does not run all traffic streams simultaneously. ITU-T Y.1564 has the following two test phases.

- Service Configuration Test:**
 This section is completed quickly, within seconds per stream. It confirms the end-to-end configuration while quickly checking the Information Rate (IR), Frame Transfer Delay (FTD), Frame Delay Variation (FDV), Frame Loss Ratio (FLR), Committed Burst Size (CBS) and Excess Burst Size (EBS) sequentially for all configured traffic streams.
- Service Performance Test:**
 This section is completed based on the M.2110 standard for 15 minutes, 2 hours, 24 hours, or a user-selectable period. It transmits all configured traffic streams simultaneously at the CIR, confirming that all traffic can traverse the network under full load while checking IR, FTD, FDV, FLR and Availability (AVAIL). Simultaneous testing in the Service Performance Test section greatly reduces the total test time compared to RFC 2544.

Y.1564 Service Configuration Test



Y.1564 Service Performance Test

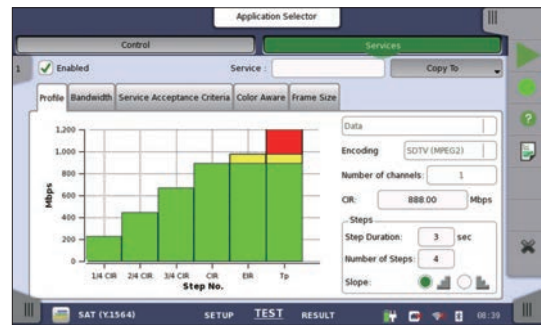


The MT1100A Ethernet Service Activation Test application supports user tests in accordance with Y.1564 for up to 8 services. Testing is typically performed with two testers running the Service Activation Test in a local-remote setup. However, it can be run using one tester and a far-end loopback device.



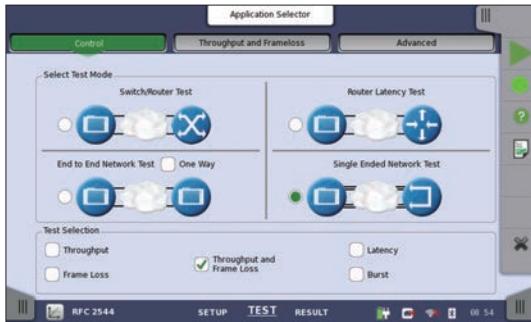
Running Service Activation Test in local – remote configuration using two MT1100A testers

Running the Service Activation Test in a local-remote configuration with two MT1100A testers supports control from the local instrument. Relevant data is transferred to the remote and results from both testers are displayed on the local instrument after the test is completed. Easy-to-understand graphics show passed and failed tests. When further analysis is required, the display can be expanded to show all test details. For measurements of Frame Transfer Delay (FTD) between two MT1100A testers, the GPS option provides synchronization for true one-way FTD measurement.



RFC 2544 Test

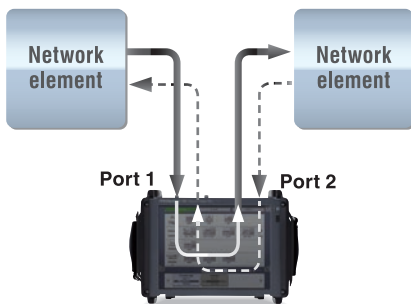
RFC 2544 testing of Throughput, Frame Loss, Latency, Packet Jitter and Burstability is straightforward with the MT1100A. It automates the procedure while still allowing thorough test configuration. For full information on performance at both line sides, the end-to-end test mode allows two MT1100A testers to work together in a local-remote configuration where the user controls both testers and reads results from both locally.



Rep.	Step	Total Frames	Frame Rate	Frame Size	Num. Line Load (Mbps)	Dist. Line Load (Mbps)	Line (%) (Mbps)
0	1	148 80952	14880 9...	64	10000 00000/10000 00000		
		148 80952					100 0000/10000 011
0	2	133 92857	13392 8...	64	9000 00000/9000 00343		
		133 92857					90 0001/9000 0140
0	3	119 04761	11904 7...	64	8000 00000/8000 01216		
		119 04761					80 0002/8000 0215
0	4	104 16666	10416 6...	64	7000 00000/7000 00804		
		104 16666					70 0002/7000 0156

Pass-through Mode

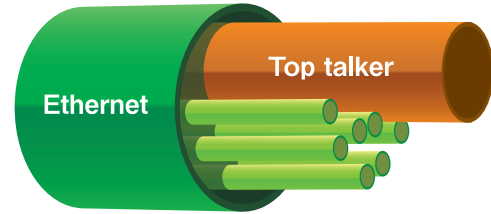
Configuring the MT1100A to Pass-through mode supports detailed troubleshooting, especially in bi-directional networks requiring traffic monitoring from both ends.



Pass-through monitoring by inserting MT1100A in network

IP Channel Statistics – Multiflow Counters

Up to 230 flows can be selected and filtered by MAC and IP Source/Destination addresses, VLAN and MPLS to monitor selected streams and display detailed information. This allows the user to identify error streams, top talkers, and network attacks, as well as troubleshoot network issues more deeply. (Up to 10 Gbps)

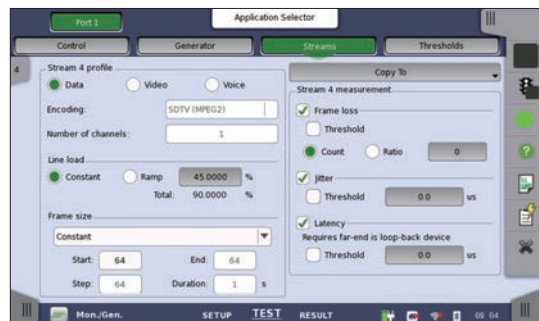
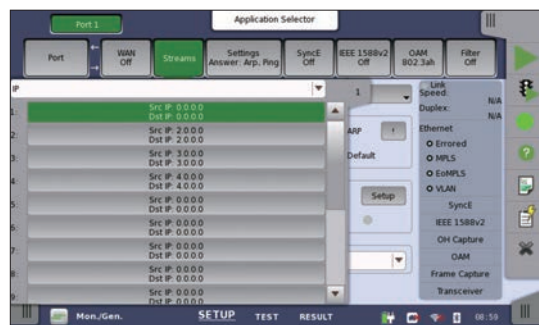


Ethernet OAM

To improve the performance of Ethernet-based networks and provide Carrier Class service, many network providers have enhanced their systems with Ethernet OAM (Operation, Administration and Maintenance), supporting the ability to detect network faults and measure performance. Ethernet OAM is defined by three standards covering different network sections. The ITU-T Y.1731 and IEEE 802.1ag standards are similar and support end-to-end network functionality, while the IEEE 802.3 (previously IEEE 802.3ah) standard supports first (or last) mile functionality. The MT1100A tests the network using all supported OAM functions.

Ethernet Multistream

The MT1100A Ethernet Multistream function allows simulation and testing of a congested network's ability to prioritize high-priority traffic over low-priority traffic. The user can set different priorities for up to 16 streams per port to measure how frame loss affects network performance. The Multistream function displays clear information on Packet Jitter and Latency per stream, helping troubleshoot problematic issues for VoIP services, etc.

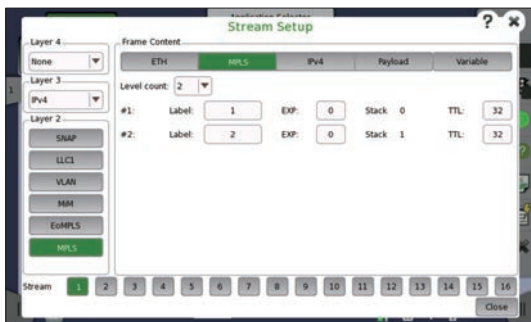


Stacked VLAN

Stacked VLAN (Q-in-Q) is used increasingly by several types of Ethernet-based networks, allowing operators to split traffic from different customers on one line or to shape traffic by priority. The MT1100A supports up to 8 levels of VLAN tags, offering a powerful network test tool.

MPLS

MPLS (Multi-Protocol Label Switching) supports efficient traffic routing on packet-based networks. Inserting up to 8 levels of MPLS labels using the MT1100A offers a powerful tool for testing MPLS traffic. The tester also supports EoMPLS (Ethernet over MPLS) – or PWE3 (Pseudo Wire Emulation Edge-to-Edge) – defining the layer-2 transport protocol across an MPLS network.



MPLS-TP and PBB/PBB-TE

The MPLS-TP (Multi-Protocol Label Switching – Transport Profile) technology is based on standard MPLS and aims to give service providers reliable connection-oriented packet-based transport over the network. It supports various protocols, including Ethernet. Using MPLS-TP offers service providers QoS, end-to-end Carrier Class OAM, and protection switching.

The Provider Backbone Bridge Traffic Engineering (PBB-TE) technology is designed to provide Carrier Class Ethernet-based transport networks. It is connection oriented and includes an OAM function offering similar functions to SDH/SONET networks.

The MT1100A is a powerful tool for testing MPLS-TP and PBB-TE networks including OAM functions.

Protocol Analysis

For advanced Ethernet troubleshooting the MT1100A supports a frame capture function for capturing frames of live traffic on the monitored line. Captured frames are analyzed using the Wireshark protocol analysis software.

Mobile Backhaul Installation and Verification

Synchronous Ethernet is an essential technology in mobile backhaul networks and faults in Synchronous Ethernet seriously jeopardize the performance of mobile networks and can cause system downtime. Consequently, mobile operators need a test tool to verify the correct functioning of Synchronous Ethernet.

The Synchronous Ethernet test function of the MT1100A supports comprehensive testing and analysis of both Synchronous Ethernet technologies: SyncE (ITU-T G.826x), and PTP (IEEE 1588 v2). The user can quickly identify problems at all levels in Synchronous Ethernet, solving issues quickly, reducing system downtime and customer churn, and improving operating expenses for mobile operators. (up to 10 Gbps)



Powerful Storage Area Networking (SAN) Testing

Many operators need to support Fibre Channel links in Storage Area Networks (SAN) together with other transport technologies like OTN, Ethernet, and SDH/SONET. Having one tool for all technologies is important for efficient testing. The multi-protocol MT1100A with Fibre Channel option is the perfect tool for deploying Fibre Channel with support for testing links at rates up to 10 Gbps and it also supports other technologies like OTN, Ethernet, SDH/SONET and PDH/DSN. The all-in-one MT1100A gives the user less equipment to maintain and learn, helping to reduce operating expenses.

Fibre Channel test features include:

- 1GFC, 2GFC, 4GFC, 8GFC, and 10GFC tests
- Optional mapping to OTN
- Latency measurement
- BER tests including service disruption measurement
- Line alarm and error monitor

Latency

High latency is a problem for many applications, including SAN, and network operators and service providers urgently need a tool like the MT1100A with Fibre Channel option to test latency on Fibre Channel lines and equipment.

Fibre Channel BER Tests

The MT1100A with Fibre Channel option supports BER tests to measure the performance of Fibre Channel lines and equipment. Service disruption measurement is also supported.

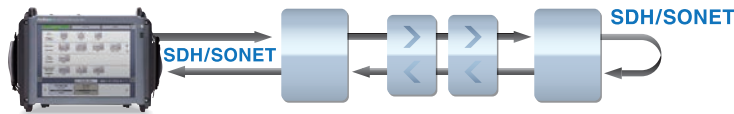


Quick and Easy Tests of SDH/SONET and PDH/DSn Networks

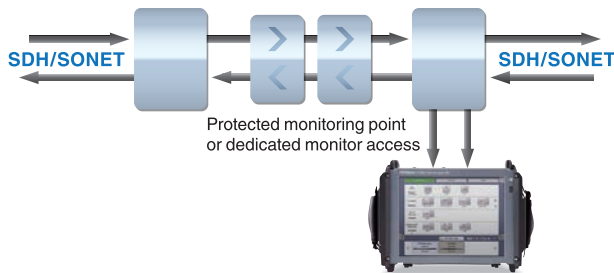
Legacy technologies in transport networks can't just be eliminated because of the huge capital investment, but keeping legacy technologies operational can require several testers. With its SDH/SONET and PDH/DSn test options, the MT1100A is a powerful and easy-to-use tool for testing SDH/SONET up to STM-64/OC-192. PDH/DSn systems (E1, E3, E4, DS1 and DS3) can be tested directly or embedded into SDH/SONET. The MT1100A can support new and legacy technologies, leaving the user less equipment to maintain and learn, and reducing operating expenses.

SDH/SONET and PDH/DSn test features include:

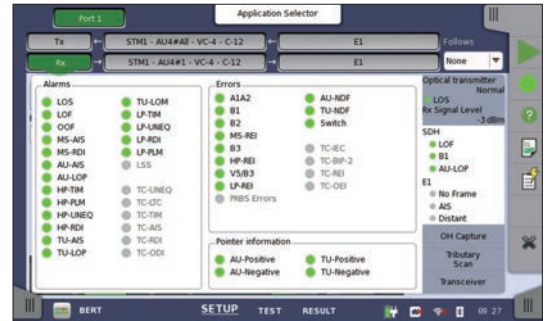
- Powerful testing of SDH (STM-256, STM-64, STM-16, STM-4, STM-1), SONET (OC-768, OC-192, OC-48, OC-12, OC-3, STS-3) systems and embedded PDH (E1, E3, E4) and DSn (DS1, DS3) systems
- Powerful testing of PDH (E1, E3, E4) and DSn (DS1, DS3) systems
- Simultaneous bi-directional monitoring of SDH/SONET and PDH/DSn lines
- SDH/SONET mapping and de-mapping of PDH/DSn signals
- Comprehensive error and alarm statistics
- SDH/SONET overhead byte testing and monitoring
- SDH/SONET tributary scan
- SDH/SONET pointer event generation and monitoring
- SDH/SONET and PDH/DSn delay measurements
- Analysis of service disruption with APS application



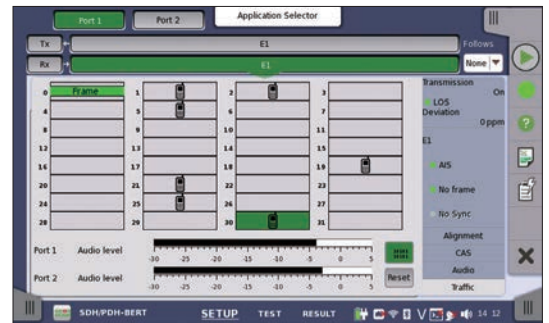
Looping-back test signal from MT1100A at far end supports SDH/SONET line quality tests



MT1100A supports bi-directional in-service monitoring of SDH/SONET lines



MT1100A gives quick overview of errors and alarms for both sides of SDH/SONET line



See the usage of 64 kbps traffic channels in a bidirectional E1 line with the MT1100A traffic display

Optical Modules Selection Guide

Optical interface tests can be run using the MT1100A just by inserting an optical module supporting the relevant standard into the SFP/SFP+ slot. The following table lists the lineup of CFP, CFP2, CXP, QSFP+, and SFP/SFP+ application parts, and the corresponding standards.

Model/Order No.	Name	Form Factor	100M Ethernet	156M SDH/SONET	622M SDH/SONET	1GFC	1G Ethernet	2GFC	2.5G SDH/SONET	2.7G OTN	4GFC	8GFC	10G SDH/SONET, 10G WAN-PHY	10G LAN-PHY Ethernet	10GFC	10G OTN	40G SDH/SONET	40G Ethernet	40G OTN	100G Ethernet	100G OTN	
G0311A	1G 850 nm SX SFP	SFP				850 nm, MM, 0.5 km																
G0312A	1G 1310 nm LX SFP	SFP				1310 nm, SM, 10 km																
G0313A	1G 1550 nm ZX SFP	SFP				1550 nm, SM, 80 km																
G0332A	100M FX 1310 nm MM SFP	SFP	1310 nm, MM, 2 km																			
G0333A	10G SR/SW 850 nm SFP+	SFP+											850 nm, MM, 0.3 km									
G0315A	10G LR/LW 1310 nm SFP+	SFP+											1310 nm, SM, 10 km									
G0316A	10G ER/EW 1550 nm 40 km SFP+	SFP+											1550 nm, SM, 40 km									
G0318A	10G ZR/ZW 1550 nm 80 km SFP+	SFP+											1550 nm, SM, 80 km									
G0319A	Up to 2.7G 1310 nm 15 km SFP	SFP				1310 nm, SM, 15 km																
G0320A	Up to 2.7G 1310 nm 40 km SFP	SFP				1310 nm, SM, 40 km																
G0321A	Up to 2.7G 1550 nm 80 km SFP	SFP				1550 nm, SM, 80 km																
G0328A	1G/2G/4G FC 850 nm SFP	SFP				850 nm, MM, 0.5 km																
G0322A	1G/2G/4G FC 1310 nm SFP	SFP				1310 nm, SM, 10 km																
G0323A	1G/2G/4G FC 1550 nm SFP	SFP				1550 nm, SM, 40 km																
G0329A	10G LR 1310 nm SFP+	SFP+											1310 nm, SM, 10 km									
G0334A	40G LR4 1310 nm QSFP+	QSFP+																1310 nm, SM, 10 km				
G0335A	40G LR4 1310 nm CFP	CFP																1310 nm, SM, 10 km				
G0336A	40G FR 1550 nm CFP	CFP																1550 nm, SM, 2 km				
G0337A	100G LR4 1310 nm CFP	CFP																			1310 nm, SM, 10 km	
G0338A	100G LR4 1310 nm CFP2	CFP2																			1310 nm, SM, 10 km	
G0339A	100G 850 nm CXP	CXP																			850 nm, MM, 0.1 km	

Specifications

Network Master Flex MT1100A Mainframe

User Interface	
Display	12.1-inch active matrix TFT display (800 × 600 pixels) and touch screen

Service Interface	
USB Interface	MT1100A operates as host: USB 2.0 type A (2 ports) MT1100A operates as device: USB 2.0 type Mini-B (1 port)
Ethernet Interface	Ethernet 10M/100M/1000M, Connector: RJ45
WLAN Interface*	IEEE 802.11 b/g/h
Bluetooth Interface*	Bluetooth 2.1 + EDR

*: Available for certified countries and regions including USA, Canada, Japan and all EU countries. Please contact Anritsu for updated information.

Other Interfaces	
Unit synchronization Input	(Not used)
Unit Synchronization Output	(Not used)
Audio Interface	For connection of optional head set Connector: 3.5-mm diameter jack
AUX Connector	For connection of G0325A GPS receiver
Built-in Loudspeaker	Monitors speech of voice channel Output level: user-controlled from user Interface
Ext. Clock Input	For connection of external clock signals: SETS (E1: 2.048 Mbps), BITS (DS1: 1.544 Mbps), or 2.048 MHz TTL signal in accordance with ITU-T G.703 Connector: BNC

Miscellaneous	
Dimensions and Mass	320 (W) × 225 (H) × 46 (D) mm (with protector), ≤2.5 kg
Environmental	Temperature and Humidity Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing)
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1

Battery and AC Power Supply Module MU110001A

Battery	14.4 V rechargeable and replaceable intelligent Li-ion battery Operation time: 1 hour (typ.) (with MU110011A, 100 Gbps Ethernet operation) Charging time: 6 hours (typ.) (25°C) Remaining capacity indication: %
Power Supply	100 V(ac) to 240 V(ac), 50 Hz/60 Hz 380 VA (Max.)
Dimensions and Mass	320 (W) × 225 (H) × 82 (D) mm (without protector), ≤3.0 kg (without battery)
Environmental	Temperature and Humidity Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing, without battery) -20° to +50°C, ≤80% RH (non-condensing, with battery)
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1

AC only High Power Supply Module MU110002A

Power Supply	100 V(ac) to 240 V(ac), 50 Hz/60 Hz 700 VA (Max.)
Dimensions and Mass	320 (W) × 225 (H) × 72 (D) mm (without protector), ≤3.0 kg
Environmental	Temperature and Humidity Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing)
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1

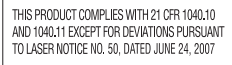
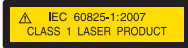
10G Multirate Module MU110010A

Test Port	SFP/SFP+: 2 slots SFF-8431, SFF-8472 compliant, IEEE 802.3ae-2002, IEEE 802.3-2008 compliant RJ45: 2 sockets IEEE 802.3-2008 10BASE-T, 100BASE-TX, 1000BASE-T compliant Auto MDI-X 10 Mbps/100 Mbps full/half duplex, 1000 Mbps full duplex BNC: 4 ports ITU-T G.703 compliant RJ48: 2 sockets ITU-T G.703 compliant RTT Bantam: 4 ports ANSI DS1.102 compliant
Tx Ref. Clock Output	Frequency: Selectable from 1/16, or 1/64 against the bit rate of the lane. (Available only when an SFP+ port is selected) Level: 250 mVp-p (Min.), 550 mVp-p (Max.) Termination: 50Ω/AC (Single ended) Connector: SMA
Dimensions and Mass	320 (W) × 225 (H) × 37 (D) mm, ≤1.4 kg
Environmental	Temperature and Humidity Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing)
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1
Laser Safety*2	IEC 60825-1: 2007 CLASS 1 21CFR1040.10 and 1040.11*1

*1: Excludes deviations caused by conformance to Laser Notice No. 50 dated June 24, 2007

*2: Safety measures for laser products

This product complies with optical safety standards in 21CFR1040.10, 1040.11 and IEC 60825-1; the following descriptive labels are affixed to the product.



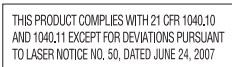
100G Multirate Module MU110011A

Test Port	CFP: 1 slot CFP MSA Hardware Specification, Rev. 1.4 compliant CFP MSA Management Interface Specification V2.2 R06a compliant (Not supported to MSA 100GLH) IEEE 802.3ba-2010 compliant QSFP+: 2 slots SFF-8436, SFF-8472 compliant IEEE 802.3ba-2010 compliant SFP/SFP+: 2 slots SFF-8431, SFF-8472 compliant IEEE 802.3ae-2002, IEEE 802.3-2008 compliant RJ45: 2 sockets IEEE 802.3-2008 10BASE-T, 100BASE-TX, 1000BASE-T compliant Auto MDI-X 10 Mbps/100 Mbps full/half duplex, 1000 Mbps full duplex
Tx Ref. Clock Output	Frequency Selectable from 1/16, or 1/64 against the bit rate of the lane. (RJ45 port cannot be selected) Level: 250 mVp-p (Min.), 550 mVp-p (Max.) Termination: 50Ω/AC (Single ended) Connector: SMA
AUX Connector	Termination: 50Ω/AC (Single ended) Connector: SMA
Dimensions and Mass	320 (W) × 225 (H) × 60 (D) mm, ≤3.0 kg
Environmental	Temperature and Humidity Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing)
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1
Laser Safety*2	CFP: 100GBASE-LR4, 40GBASE-LR4, 40GBASE-FR QSFP+: 40GBASE-LR4 SFP: 4GFC(SX), 4GFC(LX), 4GFC(EX), OC-48 LR-1/STM L-16.1, OC-48 LR-2/STM L-16.2, 100BASE-FX, 100BASE-LX SFP+: 1000BASE-SX/LX/ZX, 10GBASE-LR, 10GBASE-ER, 10GBASE-ZR IEC 60825-1: 2007 CLASS 1 21CFR1040.10 and 1040.11*1 CFP: 100G BASE-SR10 QSFP+: 40GBASE-SR4 IEC 60825-1: 2007 CLASS 1M 21CFR1040.10 and 1040.11*1

*1: Excludes deviations caused by conformance to Laser Notice No. 50 dated June 24, 2007

*2: Safety measures for laser products

This product complies with optical safety standards in 21CFR1040.10, 1040.11 and IEC 60825-1; the following descriptive labels are affixed to the product.



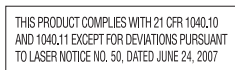
40/100G Module CFP2 MU110012A

Test Port	<p>CFP2: 2 slots CFP MSA CFP2 Hardware Specification, Rev. 1.0 compliant CFP MSA Management Interface Specification V2.2 R06a compliant (Not supported to MSA 100GLH) IEEE 802.3ba-2010 compliant</p> <p>CXP: 2 slots InfiniBand Architecture 1.2.1 Annex A6: CXP compliant SFF-8642, IEEE 802.3ba-2010 compliant</p> <p>QSFP+: 2 slots SFF-8436, SFF-8472 compliant IEEE 802.3ba-2010 compliant</p>
Tx Ref. Clock Output	<p>Frequency</p> <p>Selectable from 1/16, or 1/64 against the bit rate of the lane.</p> <p>40 GigE: QSFP+ 100 GigE: CXP OTU3: QSFP+ OTU3e1: QSFP+ OTU3e2: QSFP+</p> <p>Selectable from 1/40, or 1/160 against the bit rate of the lane.</p> <p>100 GigE: CFP2 OTU4: CFP2</p> <p>Level: 250 mVp-p (Min.), 550 mVp-p (Max.) Termination: 50Ω/AC (Single ended) Connector: SMA</p>
AUX Connector	<p>Termination: 50Ω/AC (Single ended) Connector: SMA</p>
Dimensions and Mass	320 (W) × 225 (H) × 69 (D) mm, ≤3.0 kg
Environmental	<p>Temperature and Humidity</p> <p>Operating: 0° to +40°C, ≤80% RH (non-condensing) Storage: -20° to +60°C, ≤80% RH (non-condensing)</p>
EMC	EN61326-1, EN61000-3-2
LVD	EN61010-1
Laser Safety*2	<p>CFP2: 100GBASE-LR4 QSFP+: 40GBASE-LR4 IEC 60825-1: 2007 CLASS 1 21CFR1040.10 and 1040.11*1</p> <p>CXP: 100G BASE-SR10 QSFP+: 40GBASE-SR4 IEC 60825-1: 2007 CLASS 1M 21CFR1040.10 and 1040.11*1</p>

*1: Excludes deviations caused by conformance to Laser Notice No. 50 dated June 24, 2007

*2: Safety measures for laser products

This product complies with optical safety standards in 21CFR1040.10, 1040.11 and IEC 60825-1; the following descriptive labels are affixed to the product.



Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the table below are Order Names. The actual name of the item may differ from the Order Name.

1. Mainframe

Model/Order No.	Name
Mainframe	
MT1100A	Network Master Flex
Standard accessories for MT1100A	
Z1746A	Stylus
Z1870A	Utilities ROM
W3734AE	MT1100A Quick Reference Guide (English)
W3734AW	MT1100A Quick Reference Guide (Japanese)
Z1861A	Carrying Strap
Z1862A	Module Combination Kit
B0699A	Soft Case

2. Power Supply Module

Model/Order No.	Name
MU110001A*1	Battery and AC Power Supply Module
MU110002A*1	AC only High Power Supply Module
Standard accessories for MU110001A	
G0327A	Li-ion Battery
Z1862A	Module Combination Kit
Standard accessories for MU110002A	
Z1862A	Module Combination Kit

*1: Select MU110001A or MU110002A.
One test module should be MU110010A when installing two modules in one mainframe.

3. Test Module*2

Model/Order No.	Name
MU110010A	10G Multirate Module
MU110011A	100G Multirate Module
MU110012A	40/100G Module CFP2

*2: One or two modules of MU110010A/11A/12A can be installed in one mainframe.

4. Basic Options

Model/Order No.	Name
MU110010A-001	Up to 2.7G Dual Channel
MU110010A-002	FC 1G 2G 4G Dual Channel
MU110011/12A-003	Up to 10G Dual Channel
MU110011/12A-004	Up to 10G FC Dual Channel

5. Protocol Options*3

Model/Order No.	Name
Ethernet	
MU110010A-011	Ethernet 10G Single Channel
MU110010A-012	Ethernet 10G Dual Channel
MU110011A/12A-013	Ethernet 40G Single Channel
MU110011A/12A-014	Ethernet 40G Dual Channel
MU110011A/12A-015	Ethernet 100G Single Channel
MU110012A-016	Ethernet 100G Dual Channel
OTN	
MU110010A-051	OTN 10G Single Channel
MU110010A-052	OTN 10G Dual Channel
MU110011A/12A-053	OTN 40G Single Channel
MU110011A/12A-054	OTN 40G Dual Channel
MU110011A/12A-055	OTN 100G Single Channel
MU110012A-056	OTN 100G Dual Channel
MU110010A/11A/12A-061	ODU Multiplexing
MU110010A/11A/12A-062	ODU Flex
SDH/SONET	
MU110010A-081	STM-64 OC-192 Single Channel
MU110010A-082	STM-64 OC-192 Dual Channel
MU110011A/12A-083	STM-256 OC-768 Single Channel
MU110011A/12A-084	STM-256 OC-768 Dual Channel
Fibre Channel	
MU110010A-091	FC 8G 10G Single Channel
MU110010A-092	FC 8G 10G Dual Channel
Other options	
MT1100A-003	Connectivity for WLAN/Bluetooth

*3: "channel" means physical port or client signal test mapped in OTN.
Refer to data sheet for OTN and client signals.

6. Optional Accessories

Model/Order No.	Name
G0311A	1G 850 nm SX SFP
G0312A	1G 1310 nm LX SFP
G0313A	1G 1550 nm ZX SFP
G0315A	10G LR/LW 1310 nm SFP+
G0316A	10G ER/EW 1550 nm 40 km SFP+
G0318A	10G ZR/ZW 1550 nm 80 km SFP+
G0319A	Up to 2.7G 1310 nm 15 km SFP
G0320A	Up to 2.7G 1310 nm 40 km SFP
G0321A	Up to 2.7G 1550 nm 80 km SFP
G0322A	1G/2G/4G FC 1310 nm SFP
G0323A	1G/2G/4G FC 1550 nm SFP
G0328A	1G/2G/4G FC 850 nm SFP
G0329A	10G LR 1310 nm SFP+
G0332A	100M FX 1310 nm MM SFP
G0333A	10G SR/SW 850 nm SFP+
G0334A	40G LR4 1310 nm QSFP+
G0335A	40G LR4 1310 nm CFP
G0336A	40G FR 1550 nm CFP
G0337A	100G LR4 1310 nm CFP
G0338A	100G LR4 1310 nm CFP2
G0339A	100G 850 nm CXP
B0697A	Hard Case
Z1860A	Battery Charger
J1570A	Head Set
G0325A	GPS Receiver
Z1871A	Utilities in USB Stick
J1571A	Optical Cable SM LC/PC to SC/PC 3 m
J1575A	Optical Cable SM LC/PC to FC/PC 3 m
J1579A	Optical Cable SM LC/PC to LC/PC 3 m
J1581A	Optical Cable MM LC/PC to LC/PC 3 m
J1583A	Optical Attenuator 10 dB LC/PC to LC/PC
J1584A	RJ45 Cable 3 m
J1585A	RJ48 to Crocodile Clips Cable 3 m
J1586A	RJ48 to Crocodile Clips Cable 20 dB ATT 3 m
J1588A	BNC Cable 2.5 m
J1589A	BNC to 1.6/5.6 Cable 2.5 m
J1591A	RJ48 to Two 3-pin Banana Plug Cable 2.5 m
J1597A	RJ48 Balanced PDH Cable Crossed 3 m
J1598A	Bantam Cable 3 m
J0775D	Coaxial Cord, 2.0 m (75Ω)
B0692A	ESD Box
W3735AE	MT1100A Operation Manual (English)
W3735AW	MT1100A Operation Manual (Japanese)
W3708AE	MT1000A/MT1100A Remote Scripting Operation Manual (English)
W3708AW	MT1000A/MT1100A Remote Scripting Operation Manual (Japanese)

7. Extended Warranties

Model/Order No.	Name
MT1100A-ES210	2 Years Extended Warranty Service
MT1100A-ES310	3 Years Extended Warranty Service
MU110001A-ES210	2 Years Extended Warranty Service
MU110001A-ES310	3 Years Extended Warranty Service
MU110002A-ES210	2 Years Extended Warranty Service
MU110002A-ES310	3 Years Extended Warranty Service
MU110010A-ES210	2 Years Extended Warranty Service
MU110010A-ES310	3 Years Extended Warranty Service
MU110011A-ES210	2 Years Extended Warranty Service
MU110011A-ES310	3 Years Extended Warranty Service
MU110012A-ES210	2 Years Extended Warranty Service
MU110012A-ES310	3 Years Extended Warranty Service

MT1000A Network Master Pro

All-in-one easy-to-use, dual-port transport tester supporting from 1.5 Mbps to 10 Gbps including OTN, Ethernet, Fibre Channel, SDH/SONET and PDH/DSn.



MT9090A Series

MU909011A3 Drop Cable Fault Locator Module

Compact fault locator instrument for an easy and accurate verification of drop cable installation.



MU909011A3

MU909020A Optical Channel Analyzer Module

Compact CWDM channel analyzer to verify power levels, drift and channel presence of CWDM networks.



MU909020A

MU909014/15 μ OTDR Module

Compact OTDR for full automatic verification of optical networks, FTTH-PON, Metro and Core.



MU909014/15

MU909060A Gigabit Ethernet Module

Dedicated field test solution for installation and troubleshooting Ethernet links in the access network.



MU909060A

CMA5 Series Light Source/Optical Power Meter

For Optical Fiber Installation and Maintenance.



MT9083 Series ACCESS Master Mini-OTDR

All-in-one test tool for fiber construction and maintenance.



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