/Inritsu

MD1230A Family

MD1230A Data Quality Analyzer
MD1231A IP Network Analyzer
MT7407A Multislot Chassis

A Total Communications Test Solution from Devices to Networks

MD1230A Family

Real time network data, such as voice and video, is increasingly important as IP networks grow and become faster. The need for performance enhancements for core networks also increases with the growth in the scale of networks. Quality assurance for these networks has become a critical issue today for network operators and equipment vendors. Network operations and maintenance staff must be able to monitor in-service traffic, latency and packet arrival time fluctuations (packet jitter) as well as perform prompt troubleshooting.

The development of network equipment and systems requires performance measurement as well as QoS evaluation.

The MD1230A Family achieves all this network monitoring and performance testing in one device with efficiency and cost savings.

The MD1230A Family comes in 3 chassis types matched to user needs. Measuring modules operate in all 3 chassis, so one or more chassis can be selected based on usage requirements without incurring extra module expense.

R&D Organization Network

ADSL Network

■ Network Troubleshooting

Nobody knows when a network failure might occur, so network monitoring that detects network failures before they occur is needed. Being able to quickly check for the cause of a failure and launch a recovery from it are also key requirements. The M1230A Family is the perfect tool for troubleshooting because it is equipped with powerful monitoring functions.

■ Network Design and Construction

Planning and installing a network means thinking about network size, devices and costs. The network characteristics must also be checked to verify planned network services. The MD1230A Family provides powerful measurement methods for verifying network devices as well as services.

■ Development and Verifying Network Devices

The MD1230A Family is actively involved in the development and ongoing evolution of network devices. It supports new interface technologies as well as important standards such as the RFC documents from the Internet Engineering Task Force (IETF). The MD1230A Family also supports critical routing protocol emulation functions for large-scale routers.

■ Manufacture and Inspection of Network Equipment

A strong desire exists for further cost reductions on the manufacturing line. Resources used originally for evaluating new devices may be wasted unnecessarily. The MD1230A Family can use RS-232C/GPIB/Ethernet remote commands and Tcl scripts in achieving measurement automation. These scripting capabilities enable re-use of previously developed testing resources, leading to important reductions in both time and labor.

FTTH Network

Development Team

Sales Team

Enterprise Network

Manufacturing Team

TOLLY TESTED

The Tolly Group Certifies MD1230A
The Tolly Group is an independent test lab in the networking industry.

Network Troubleshooting

Networks have become essential in our lives today. Costs are incurred when network troubles occur, often hurting the reputation of the company involved. Continuous network monitoring is performed to detect network problems, so network monitoring is an application required for finding and avoiding these failures before they occur.

Critical Network Analysis Functions

The MD1230A Family comes complete with many applications needed for network monitoring. Employing such applications, it is useful for the early detection and analysis of potential network problems.

● For Network Monitoring

The MD1230A Family must be connected to a network in order to monitor it. The MD1230A Family can be connected to the network using two different methods, both of which permit frame checking.

•**Through Mode:** 2-way Ethernet or POS traffic can be checked by inserting the MD1230A Family in the network to be checked. Varying upstream/downstream protocol sequences can also be checked simultaneously by using the frame capture functions.
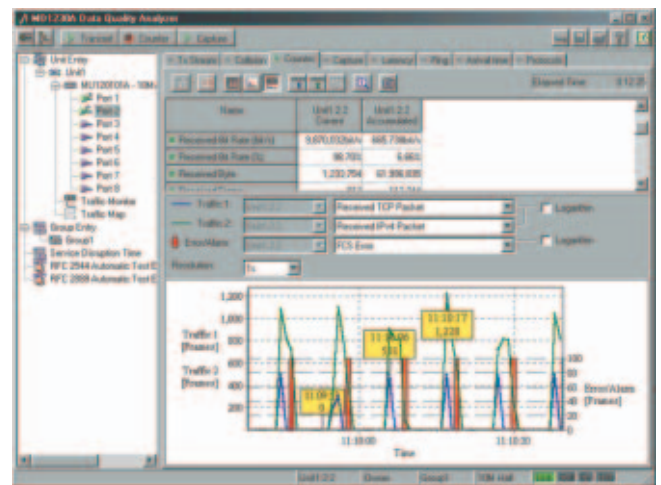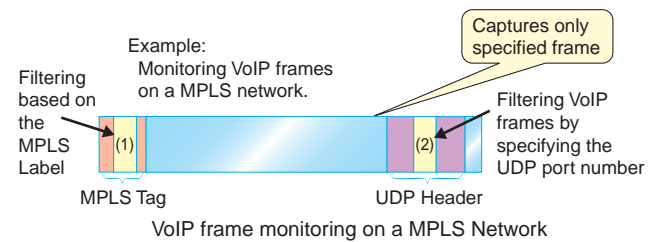
In service

Monitoring using Through mode
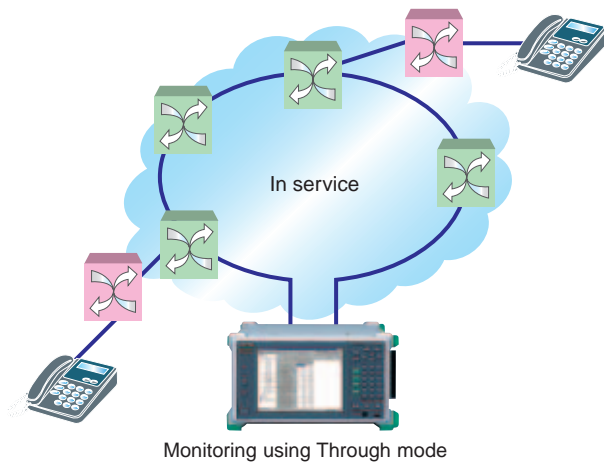
•**Monitor Mode:** Using the MD1230A Family monitor mode function ensures that the system only receives traffic. The real-time counter and capture functions are available for use in monitor mode.

Network

Monitoring

Monitoring using Monitor mode
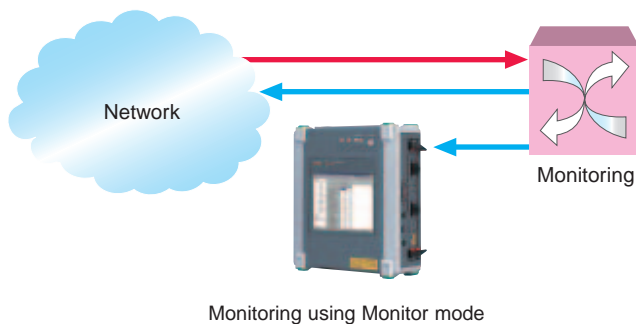
● Checking Network Traffic

The MD1230A Family can measure simultaneous real-time counts of transmitted bytes/frames, received bytes/frames, QoS frames in 8 priority levels, every error type, and SONET/SDH alarms among others. Specific frame traffic can also be measured for each port when the filter function is used. For example, specific MPLS VoIP frame traffic (with a specified UDP port number) can be extracted from a VPN service.

Captures only specified frame

Filtering based on the MPLS Label

Example: Monitoring VoIP frames on a MPLS network.

Filtering VoIP frames by specifying the UDP port number

(1)

(2)

MPLS Tag

UDP Header

VoIP frame monitoring on a MPLS Network

Counter Screen

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● Recording Traffic over Long Periods of Time

The counter function displays one-second values and total values after measurements start. Time of day is important in order to observe network traffic properly. The MD1230A Family is equipped with a time-based log for saving counters and latency measurements. The counter and latency values are saved in comma-separated value (.CSV) format at specified time intervals. This is a powerful application for checking time-of-day fluctuations in network traffic.
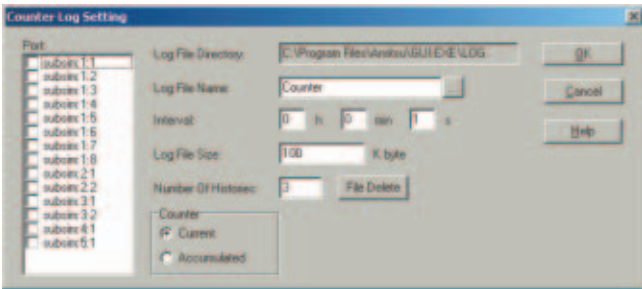
Counter log setting
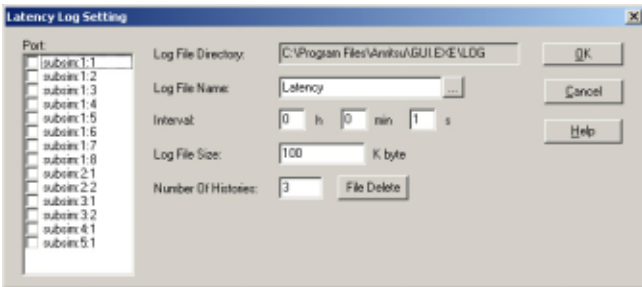
Latency log setting

● Checking Traffic for Each Flow

The MD1230A Family is equipped with two kinds of traffic flow functions. These functions are used together with the capture function, and by knowing the network relationships of the terminals it is then easy to ascertain which equipment is causing traffic congestion.

• **Traffic Monitor:** The number of packets in various Ethernet or IP data flows can be displayed, up to a maximum of 64 flows.
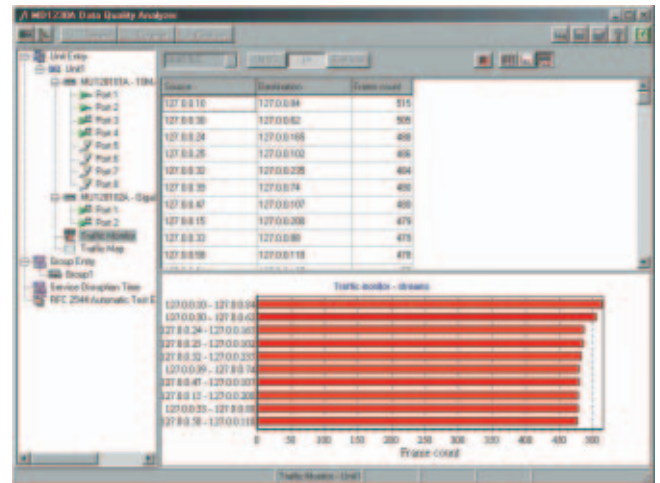
Traffic Monitor measurement

• **Traffic Map:** Traffic mapping helps you visualize the communicating partners.
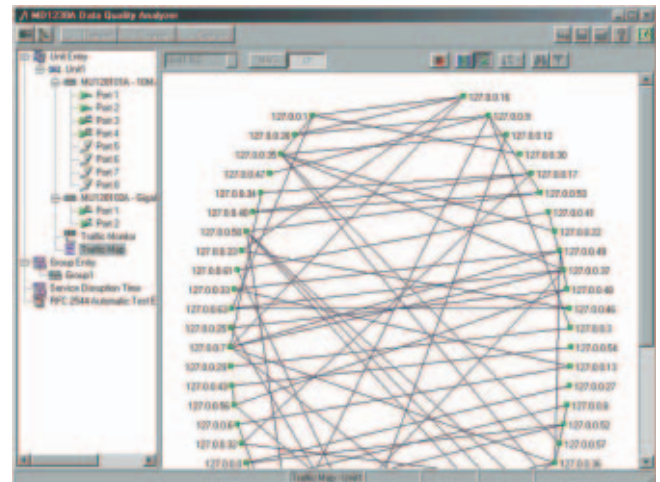
Traffic Map measurement

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Streaming Voice and Video Communications Cannot Be Browsed Easily

Packet delays in intervening network devices and lines are elements which cannot be ignored when the network is very complex. Packet delays cause fatal failures to critical real-time applications such as VoIP (Voice over IP) and streaming video delivery. The MD1230A Family provides powerful functions to measure network packet delays.

● Measuring Frame Arrival Time Intervals

Variable frame arrival time intervals are measured. Real-time applications must have frames arrive within a set time interval. The MD1230A Family can measure the arrival time fluctuations of received frames at the measurement port and can check voice and video data delay.
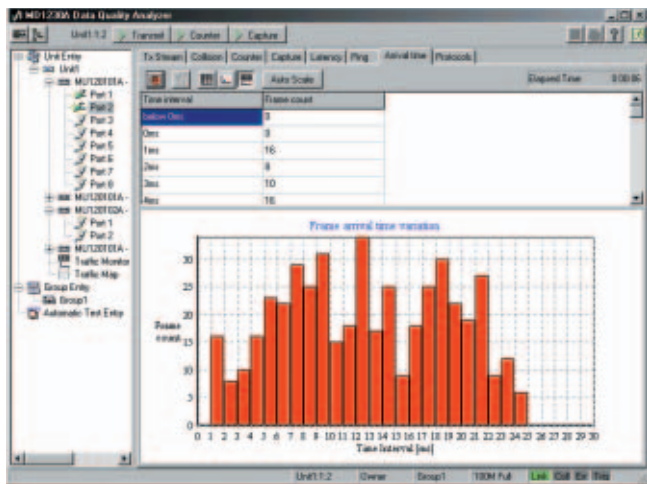

Frame Arrival Time measurement

● Checking Application Sequence (Optional 04 Decode Module)

The standard configuration of the MD1230A Family includes approximately 40 kinds of protocol analysis functions. This includes capturing and decoding application frames for TCP/IP or UDP/IP protocol level checking. Adding the optional Decode Module provides higher layer decodes for approximately 400 kinds of protocols, enabling in-depth test and analysis up to Layer 7.

● High Resolution Network Analysis (Option 20 Application Traffic Monitor)

Streaming video distribution systems frequently have problems due to the relationship between the burst nature of the picture encoder equipment and the performance of the network equipment. Traditional traffic monitoring every second is not sufficient to identify most of these problems because of the very short bursts in the traffic and the behavior of network equipment. The MD1230A Family Application Traffic Monitor can discover these momentary traffic peaks that are equalized and ignored by traditional measurements. It can check whether traffic is over the performance limits of a network device such as a switch by measuring the bandwidth peaks in a traffic flow with 1 msec. resolution.
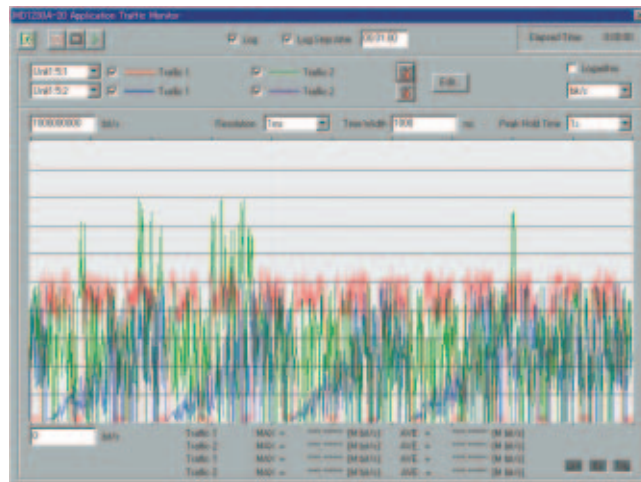
Traffic Monitoring with 1 msec. resolution

Network Failures and Troubleshooting

The cause of network failures must be ascertained quickly so that they can be removed. Troubleshooting can be performed on failures at the protocol level by using the MD1230A Family decode functions. When a network failure occurs, the network may experience sporadic instability until a full recovery is achieved due to the adverse effects of the initial failure on other network devices. The cause of the failure must be studied, which will then lead to countermeasures that ensure that these failures do not reoccur.

• Portable, Convenient Size

The MD1230A is a portable performance measurement and network troubleshooting instrument that comes with a built-in screen for measuring from 10 Mb to 10 Gb Ethernet and 155M to 10G POS. The MD1231A, which offers support from 10 Mb to 1 Gb Ethernet and 155M to 622M POS, is lighter than the MD1230A and provides rugged support for field troubleshooting.

### • Global Protocol Analysis Standard

Anritsu has licensed Sniffer® Technologies from Network Associates Inc. for use with MD1230A Family products. Employing the functionality of Sniffer® Technologies software with the 10 Gbps capture ability of MD1230A Family high-speed interfaces provides powerful support for construction, installation, and maintenance of modern networks.

MD1230A   MD1231A

Sniffer® Technologies software is employed.

• Decode Module (Option 04 Decode Module)

Network data where failures have occurred can be captured so that troubleshooting can be performed quickly using the protocol translation functions of the decode module. This supports, for example, CDP, DISL, DRiP, PAGP and Cisco CGMP as well as H.225, H.245, MGCP and SIP VoIP protocols. The decode module can also save and export .CAP file formats, enabling failure analysis using separate analysis applications that support the .CAP format.

• Packet Level Failure Analysis via Expert Analysis Functions (MX123002A/MU740701A-30 Expert Analysis Module)

The expert analysis module can automatically find areas where failures or damage might occur in frames captured by the MD1230A Family, and display countermeasure advice for them. Analysis work that used to require enormous expenditures of time and labor can now be reduced as the possible problem areas are narrowed.

Application Layer 7, 6
Session Layer 5
Connection Layer 4
Station Layer 3
DLC Layer 2
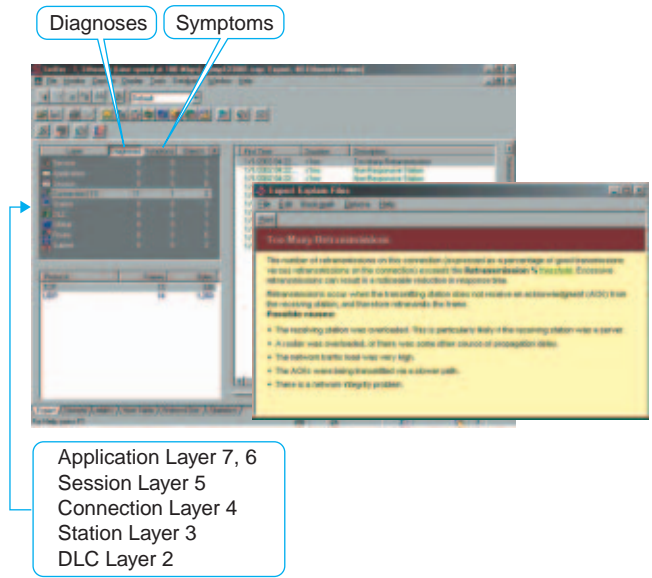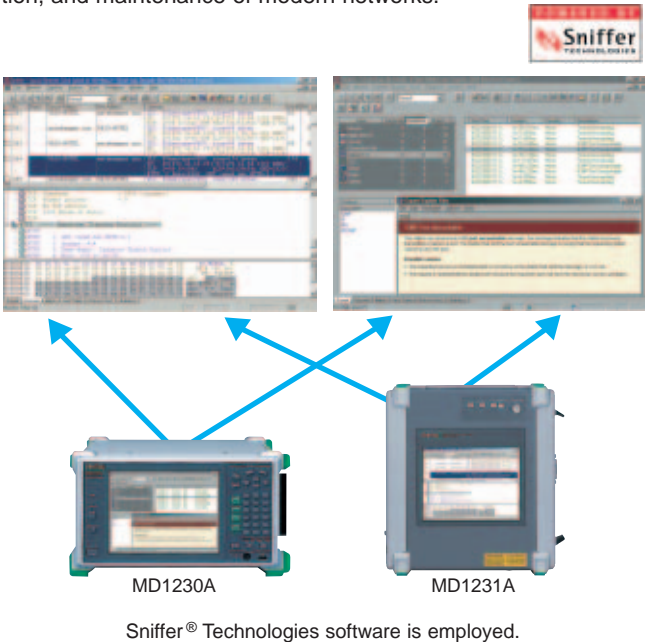
Symptoms displayed by expert analysis module

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Network Design and Construction

Network technology is evolving every day. The MD1230A Family stays one step ahead of progress being made in networks by helping designers select the perfect solutions from among the many new network devices that are becoming available.
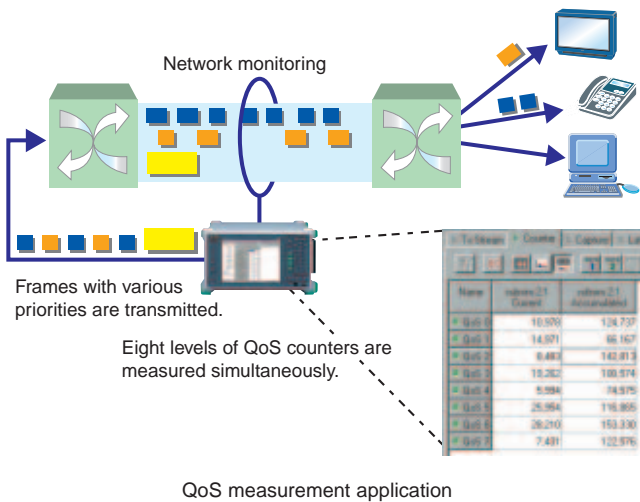
Enabling Suitable Network Design

Network devices must be selected first when building a new network. The MD1230A Family can test network devices for conformance with standard specifications. Functions that are difficult to assess in standard tests can also be measured using a variety of methods that enable a more solid network design.

● Verifying Network Load Provided

High-speed frame processing capabilities are required to test routers and switches. The MD1230A Family full wire rate transmission function permits the continuous sending of frames on multiple ports at a rate of 10 Gbps. Near-actual network conditions can also be recreated by combining transmitted packets with protocols such as IPv4, IPv6, TCP, and UDP. In addition, adding sequence numbers to the frames to be sent can check for duplicate and out-of-sequence frame delivery. The MD1230A Family can test the performance of switch or Router using the variety of the transmitted data.

● System QoS Verification

The MD1230A Family comes equipped with an 8-stage QoS counter. Priority controls can be checked through real-time counting of frames with the priority set in the VLAN tag or TOS fields. QoS of a total System can be verified with one test device because the transmission functions of the MD1230A Family create pseudo-application traffic.

Network monitoring

Frames with various priorities are transmitted.

Eight levels of QoS counters are measured simultaneously.

QoS measurement application

● Latency

Latency measurements verify the transmission time of a network. Voice communications are degraded because of arrival time variations when VoIP and other frames are received at irregular intervals. Latency can also be measured a long distance network by using the GPS option. Measurements are performed on multiple clients from the server side, enabling the location of weak points in these networks.

Server side

Internet

Client side
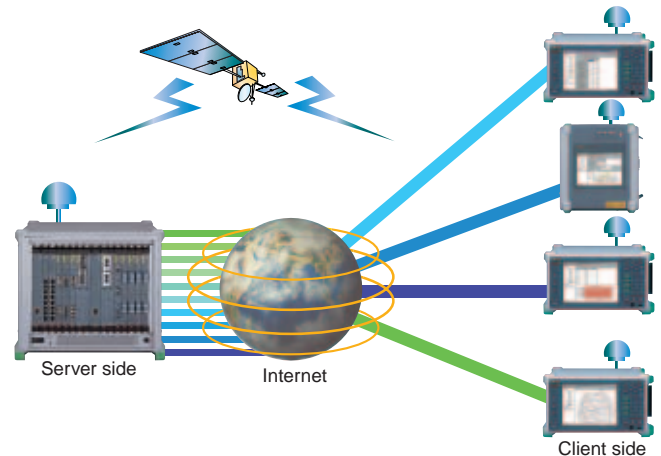
Long distance measurement using GPS

● Network Verification in 1-ms Units (Option 20 Application Traffic Monitor)

It is necessary to check whether traffic volumes on the entire network are operating according to design when a network is being built. The burst traffic generation of network devices can be checked by using the application traffic monitor. The application traffic monitor verify a short time peak traffic and the performance of traffic shapers with 1-ms resolution.

Verification with 1 second resolution

Verification with 1 msec. resolution
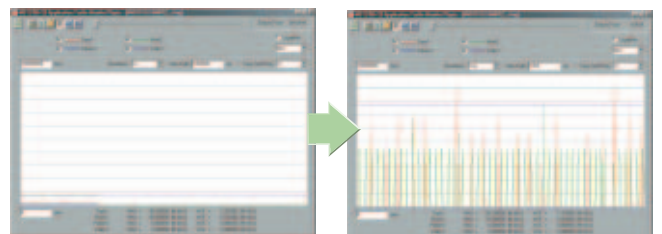
• Verifying Conformity to VoIP in CATV

VoIP telephone service via CATV networks requires QoS control, which is indispensable for ensuring the quality of audio signals. With the MD1231A, users can evaluate whether the transmission bandwidth for audio signals is acceptable even if a high load is applied to the CATV network. SIP, the call control protocol, can be displayed using the MD1230A Family frame capture function to troubleshoot originating call control.
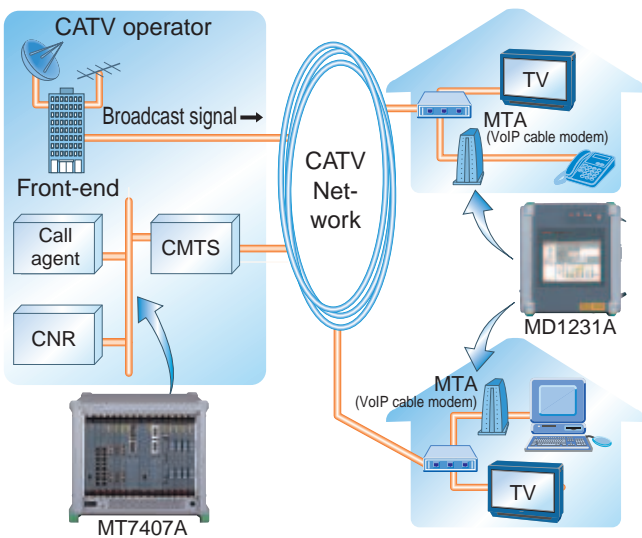
Measuring conformity to VoIP in a CATV network

• Measuring Network Switching Time

Communication switching time for Ethernet networks can be measured by using MD1230A Family service disruption time measurements. The line switching time for SONET/SDH lines can also be measured by using an APS (Automatic Protection Switch) measurements. Because the network switching time is measured in advance, countermeasures can be evaluated for communication interrupts caused by network device problems that occur.

• IPv6 Compatible Transmitting/Receiving Functions (Option 12 IPv6 Expansion)

IPv6 tests can be conducted easily by using the IPv6 expansion option. Some tests can be performed in mixed IPv4 and IPv6 environments because MD1230A Family support IPv6 over IPv4 tunneling frames. Moreover, IPv6 can also be used when performing tests using the RFC254 4 auto test function. IPv6 networks can be verified based on the results of both IPv4 and IPv6 testing.

• Measuring ADSL Throughput

The demand for throughput testing is increasing as ADSL is becoming more prevalent. Asymmetrical lines such as ADSL cannot have throughput measured accurately by combining upstream/downstream line measurements using loop back. Measurement results are also not reproducible due to variations in the performance of PCs used for downloading as well as TCP flow control in methods where transmission speeds are calculated from the time required to download large files from conventional FTP servers. Accurate upstream/downstream throughput can be measured using the MD1230A Family to generate traffic at user-defined transmission rates.

Installation

Developing and Verifying Network Devices

The MD1230A Family offers flexibility in supporting the latest interfaces and standards.

More Efficient Network Device Measurements

The MD1230A Family provides testing that conforms to the RFC2544 test standard for Ethernet and POS (Packet over SONET/SDH) automatically.
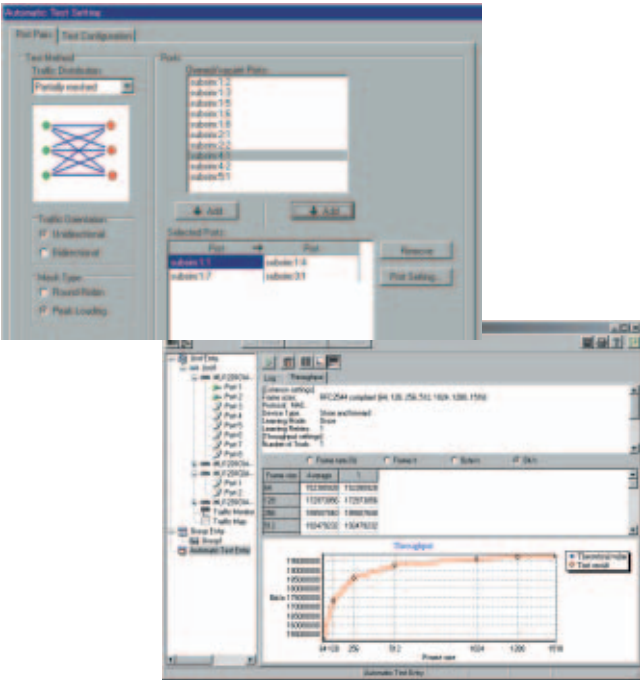
● RFC2544 Standard Measurements

Even Multi-function network devices must be evaluated for their core performance. Core performance is checked by the automatic RFC2544 measurements of the MD1230A Family. After setting up test conditions in advance, five performance parameters, (throughput, latency, frame loss rate, back-to-back frames, and system recovery) can be measured automatically with a single start button. Measurement results are graphically displayed, making them useful in preparing reports. The auto measurement functions of the MD1230A Family enable effective manpower utilization.

RFC2544 Auto measurement

● Standard Measurements Supporting Various Networks (Option 10 RFC2889 Benchmarking Test)

Standard measurement methods are also evolving for various network devices. The RFC2889 benchmarking test is one of these methods. The RFC2889 benchmarking test adds test items that support network switch functions such as address cache capacity measurement and error frame filtering that are not measured by the RFC2544 test. Basic standard evaluations of network devices can be performed with the RFC2544 test while the RFC2889 benchmarking tests perform more detailed evaluations.

MD1230A Family support RFC2889 automatic test as software option. It also can be measured automatically with a single start button.

RFC2889 Auto measurement

IPv6 Network Equipment Measurements

The shift to IPv6 network has begun. However, differences may exist between the results with IPv4 and IPv6 packets when RFC2544 tests are conducted. Tests in IPv6 environments can be performed easily when MD1230A Family functions are used.

● IPv6 Protocol Support Function (Option 12 IPv6 Expansion)

The MD1230A Family support NDP (Neighbor Discovery Protocol) in IPv6 network.
Then the MD1230A Family perform Address Autoconfiguration and Address Resolution using NDP to help your measurement in IPv6 network.
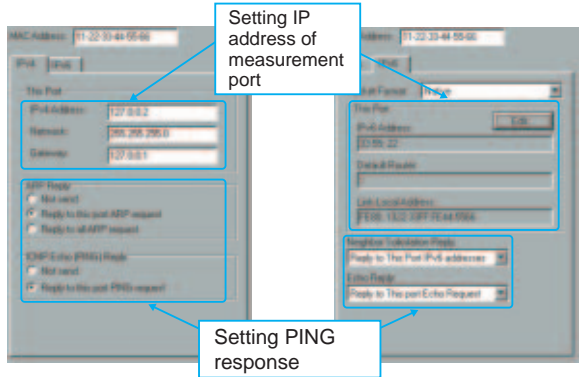

Setting IP address of measurement port

Setting PING response

IPv4 and IPv6 settings for a measurement port

● RFC2544 Tests with IPv6 (Option 12 IPv6 Expansion)

The MD1230A Family performs IPv6 compatible RFC2544 automatic tests. Tests in IPv6 environments can be performed and network device performance can be checked by performing RFC2544 automatic tests that utilize IPv6 packets.
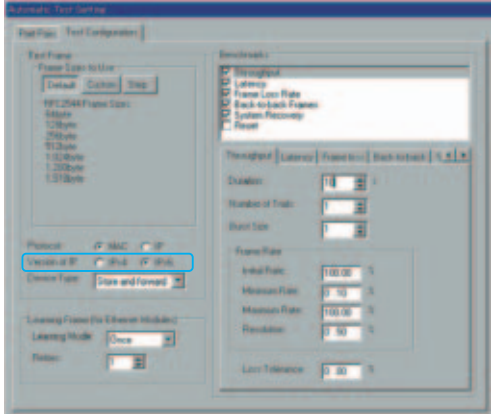
IPv6 setting on RFC2544 tests

Enhancing 10 Gigabit Ethernet Measurements

10 Gigabit Ethernet allows LANs (Local Area Networks) to operate up to 10 Gbps and realize high-speed networks at a lower cost than SONET/SDH. The MD1230A Family is perfect for 10 Gigabit Ethernet network and equipment measurements.

● 10 Gigabit Ethernet Modules

MD1230A Family 10 Gigabit Ethernet modules have 2 ports, enabling full bidirectional performance measurements using one module. Modules support various 10 Gigabit Ethernet standard by employing XENPAK transceivers.

MU120118A 10 Gigabit Ethernet Module

● XENPAK Module Development Tool (Option 13 XENPAK Test)

The XENPAK test option enables BER measurement of XAUI interfaces (3.125 GHz x 4 lanes). This test supports CJPAT and CRPAT patterns conforming to 10 Gigabit Ethernet specifications and PRBS23 and PRBS31 patterns. To perform a XAUI interface frequency variation tolerance test, the XAUI interface frequency can be changed by ±100 ppm.

● Link Fault Signaling Test (Option 16 Link Fault Signaling)

10 Gigabit Ethernet provides LFS (Link Fault Signaling) function which is standardized functions for notifications regarding physical link faults. The MD1230A Family support this LFS measurement functions such as transmitted and received LFS, LFS counter and capture. These functions make it a very effective means to develop 10 Gigabit Ethernet device.

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Transmitting Ethernet over SONET/SDH

EOS (Ethernet Over SONET/SDH) technology transfers Ethernet frames, which are widely used in the Local Area Network (LAN), via SONET/SDH transmission with its high reliability in the Wide Area Networks (WAN). EOS technology, therefore, is now drawing great attention as one of the next-generation network technologies. An EOS capable module in the MD1230A Family supports EOS technology measurements. This enables one IP measurement instrument to perform general measurements at several layers, including SONET/SDH, EOS, Ethernet and IP.

● EOS Measurement Application

By using EOS measurements in combination with the Gigabit Ethernet module, performance of the Ethernet layer and the GFP layer can be measured simultaneously.

EOS measurement application example
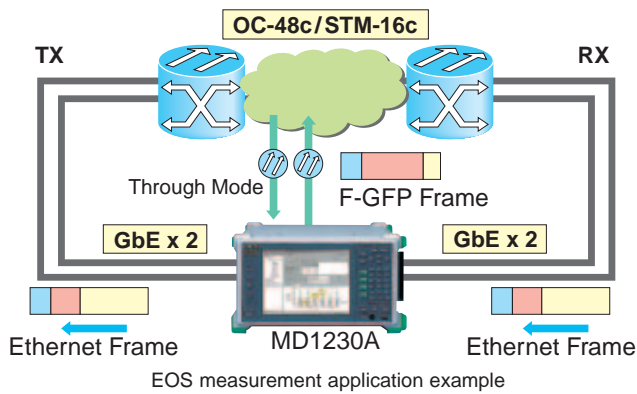
● Related Options

• EOS Mapping Option (MU120103B-01, MU120104B-01):
Support for frame-mapped GFP, LEX, LAPS (X.86) mapping and some contiguous concatenations are added by installing the EOS mapping software option. In combination with the default mappings such as PPP, MAPOS and Cisco HDLC, one MD1230A Family measurement instrument can perform a variety of EOS measurement by using these mappings.

**• Virtual Concatenation Option
 (MU120103B-02, MU120104B-02):** Support for virtual concatenation is added by installing the virtual concatenation software option.

Monitoring IP and SONET/SDH Network

The core network of today's wide area network services is still based on SONET/SDH. The MD1230A Family is not simply an Ethernet network tester, but has rich measurement functions for SONET/SDH as well. IP and SONET/SDH can be measured simultaneously, thus eliminating redundant equipment investments by using the MD1230A Family.

● APS (Automatic Protection Switch) Measurement

The MD1230A can measure SONET/SDH APS switching time. In addition, the associated K1/K2 sequence and received K1/K2 bytes may be captured.
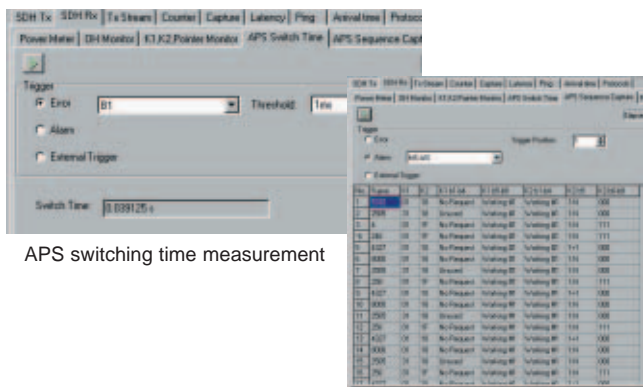
APS switching time measurement

K1/K2 sequence captured

APS measurement screen

● Overhead Monitor and Preset

The MD1230A Family can set SONET/SDH overhead bytes in transmitted data and can monitor the overhead in received signals in real time. The MD1230A Family can overwrite overhead values using a preset value in its through mode.

Overhead monitor

Overhead preset

Overhead monitor screen

12

Measuring BER on Ethernet

The MD1230A Family supports two BER measurement functions: unframed BER measurements and packet (framed) BER measurements. Tests for these different BER objectives can be performed without having to use other measuring instruments.

● Media Converter and WDM Device Development (Unframed BER Measurement)

The MD1230A Family comes with applications for performing unframed BER measurements on all interfaces. The MD1230A Family t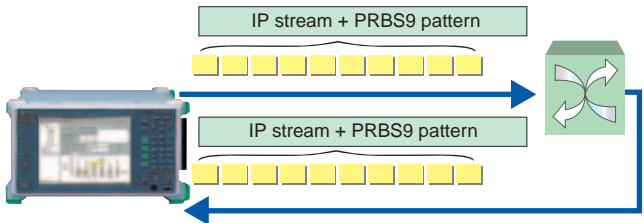akes good advantage of this capability for physical layer measurements in devices such as media converters and WDM transmitters. A PRBS signal can be generated continuously at the transmission side while errors are inserted randomly. The PRBS pattern is recovered and the bit error rate is measured at the receive side. At the receive side, error bits are detected, and a bit error rate is calculated based on the total amount of data.
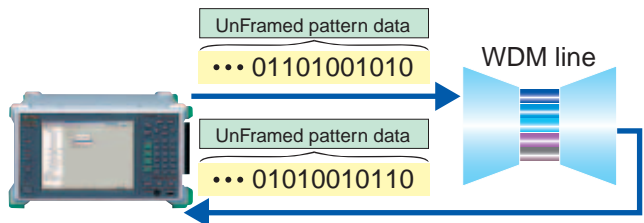
● Packet BER Measurement (Option 11 Packet BER Test)

Packet BER measurement is useful in measurements to determine whether network equipment caused a bit error or whether the frame transfer sequence is correct. MD1230A test frames containing PRBS9 patterns and sequence numbers added to the frame data field are sent through a network device such as a switch or router for measurement. The MD1230A test frames returned from the network device are compared at the receive side and a bit error rate is calculated. Because a sequence number is included in MD1230A test frames, out of order frames are counted at the receive side.

UnFramed pattern data

··· 01101001010

WDM line

UnFramed pattern data

··· 01010010110

Unframed BER measurement example

IP stream + PRBS9 pattern

IP stream + PRBS9 pattern

Packet BER measurement example

Measuring Routing Protocol

The MD1230A Family is able to perform performance testing and protocol emulation simultaneously.

● Rich Protocol Emulation Functions (Options 07, 08, 09, 14)

To verify routers, an actual network environment must be built. However, it is difficult to prepare a large-scale network in terms of time and physical requirements. The MD1230A Family provides routing protocol emulation functions as tools for measuring existing network and core router performance. The protocol emulation function establishes a virtual network for a router under test. The emulation function supports stream transmit, frame count and frame capture on the virtual network.

●**Multicast Emulation ［IGMP/MLD/IGAP］ (Option 14 IGAP Protocol):** MD1230A emulates many multicast hosts that join a multicast address. It is useful for multicast network verification.
●**Routing Protocol Emulation ［OSPF/BGP-4］ (Option 07 OSPF Protocol):** MD1230A emulates BGP4/OSPF network. It creates a virtual network for the router under test. In the case of BGP4, this function provides problem situations such as Link Flap and Route Flap. In the case of OSFP, this function provides flexible parameter setup and changeable parameters for emulation.
●**MPLS Protocol Emulation ［LDP/CR-LDP/RSVP-TE］ (Option 08 MPLS (LDP/CR-LDP) Protocol, Option 09 MPLS (RSVP) Protocol):** MD1230A emulates LSRs (Label Switched Routers) that are handling LDP/CR-LDP/PSVP-TE protocols. This function provides a virtual MPLS Domain with explicit routes. In the case of RSVP-TE, this function provides a QoS controlled network using the IntServ FLOWSPEC RSVP protocol object (RFC2210).

R & D

Utilizing the MD1230A Family for Other Measurements

There are a great variety of functions available with the MD1230A Family. These provide very effective means for developing network devices.
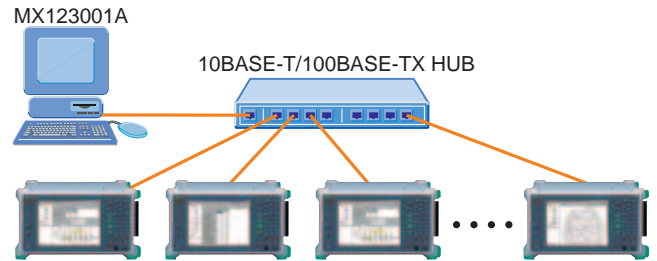
● Solving Gigabit Ethernet Link Problems (Option 15 Auto Negotiation Analysis)

One of the problems of Gigabit Ethernet networks is a failure of interconnection between other venders equipment because a link is not made properly. One potential cause of this problem is that auto negotiation cannot be performed properly between the devices. By using the auto negotiation analysis option of the MD1230A Family, this Gigabit Ethernet auto negotiation sequence can now be analyzed. (Only supported on MU120112A with an optical interface for 1000BASE-SX/LX/LH/ZX.)

• **Auto Negotiation Sequence Analysis**: Captures the auto negotiation sequence. Link establishment for ports can be checked by analyzing the auto negotiation sequence.
• **Code Data Transmission Functions:** Arbitrary code data can be transmitted. This allows the action of network equipment to be checked.
• **Link Timer Settings:** An auto negotiation uses the link timer parameter defined by the Gigabit Ethernet standard to establish link states between each device. MD1230A Family can set the link timer value in transmitted port from 0 to 100 ms. Thereby, the performance of equipment link establishment can be checked.

Auto Negotiation measurement example

● Control from External PC (MX123001A Data Quality Analyzer Control Software)

The MD1230A Family permits up to 8 users to access one measuring instrument simultaneously via an IP network connection using MX123001A software on external PC.
This feature allows for separate operations at each port using a port reservation function.
Since this function enables efficient use of each measurement port and thus supports cost reduction of measuring instrument requirements.

Controlling the MD1230A Family via a network

Manufacture and Inspection of Network Equipment

Network devices must be tested easily using few operations in order to enhance manufacturability at the factory where they are produced. The MD1230A Family provides various applications.

● Simultaneous Multiple Port Measurement

In order to test many ports at once, many measurement ports are needed. The MD1230A Family enables control of up to 8 instruments using Ethernet links between the units. The number of ports can be expanded to a maximum of 448 by using the MT7407A when measuring 10/100 Mb Ethernet.
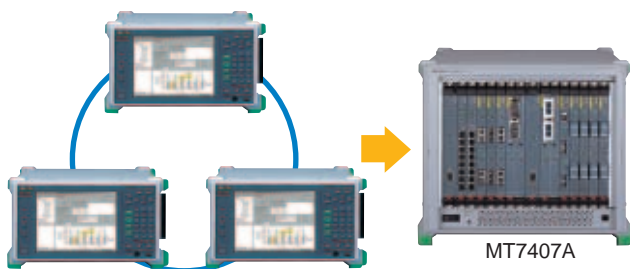[MT7407A can be connected up to 8 side (Side A and/or Side B)]

MT7407A

● Remote PC Control (MX123001A)

Up to eight remote PCs can control up to 8 linked MD1230A Family instruments over an Ethernet network using Windows compatible MX123001A Data Quality Analyzer Control Software (sold separately). Integrated management of devices is enabled when many MD1230A Family instruments are used in the manufacturing line (operates on Windows®98, Windows®2000 or Windows®XP).
[MT7407A can be connected up to 8 side (Side A and/or Side B)]

● Multi-User Functions (MX123001A)

The MD1230A Family supports multi-user functions. On network equipment production lines, the MD1230A Family supports reserving ports for each manufacturing process step, permitting system sharing.

10/100 MB HUB

User 1   User 2   User 3   ● ● ● ●   8 Remote Users

User 1   User 2   User 3
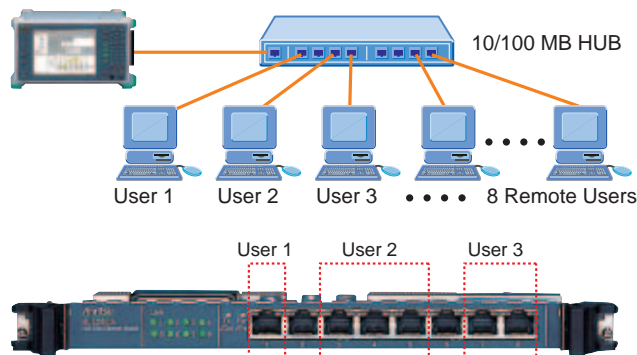
Example of MD1230A operation with two or more users

● Auto Measurement Using Remote Commands (Option 01 RS-232C Control, Option 02 GPIB Control, Option 03 Ethernet Control)

MD1230A Family functions can be executed by using remote commands. An auto test system can be configured by operating the MD1230A Family from user application software. RS-232C, GPIB or Ethernet may be selected for remote control sending/receiving. Resources can now be used effectively as they are embedded into systems built with conventional GPIB.

● Auto Measurements with Tcl Command (Option 06 Tcl Interface)

Programs can be created by the user by using the well-known Tcl (Tool Command Language) scripting language.
Original applications for manufacturing can be matched to the user development environment as Tcl supports multiple platforms.

Manufacturing

MD1230A Family

Model/Name			
	MD1230A Data Quality Analyzer	MD1231A IP Network Analyzer	MT7407A Multislot Chassis[1], [2], [3]
Dimension	320 (W) x 177 (H) x 350 (D) mm	300 (W) x 100 (H) x 350 (D) mm	426 (W) x 355 (H) x 501 (D) mm
Mass	≤15 kg (excluding modules)	≤5 kg (excluding modules)	≤20 kg (excluding options and modules)
Number of slots	5	2	14 (excluding control module slots)
Power	85 to 132 Vac/170 to 250 Vac (auto switching), ≤530 VA	85 to 132 Vac/170 to 250 Vac (auto switching), ≤150 VA	Depends on MU740702A, MU740702A specification: 85 to 132 Vac/170 to 250 Vac (auto switching), ≤530 VA
External interface	FDD, USB: 2 ports, PS/2, Ethernet, RS-232C, VGA, GPIB (option 02), GPS antenna (option 05)	Pointing device, USB: 2 ports, PS/2, Ethernet, GPIB (option 02), GPS antenna (option 05)	Ethernet

∗1: MX123001A (sold separately) is required for operation of MT7407A.
∗2: MU740701A controls a maximum of 7 modules.

∗3: When synchronizing multiple MT7407A, MT7407A-01 (sold separately) is required. Up to eight MU740701A control modules can be synchronized.

Interface Module Table

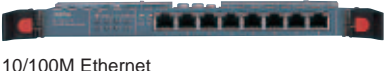| Interface	Model/Name	Remarks
10/100M Ethernet	MU120101A 10M/100M Ethernet Module	Supports 10M/100M Ethernet, 8 ports in 1 module.
	MU120111A 10/100M Ethernet Module	Supports 10M/100M Ethernet, and various protocol options.
Gigabit Ethernet	MU120102A Gigabit Ethernet Module	Supports 1000BASE-SX/LX/LH/ZX[1], 2 ports in 1 module.
	MU120112A Gigabit Ethernet Module	Supports 1000BASE-SX/LX/LH/ZX/T[1], and various protocol options.
10 Gigabit Ethernet	MU120118A 10 Gigabit Ethernet Module	Supports XENPAK[2] interfaces, 2 ports in 1 module.
POS (155M/622M)	MU120119A OC-3/12 STM-1/4 Module (1310 nm)	Supports OC-3/12 STM-1/4, Wavelength 1310 nm, with POS mapping
	MU120120A OC-3/STM-1Module (1310 nm)	Supports OC-3/STM-1, Wavelength 1310 nm, with POS mapping
POS (2.5G)	MU120103A 2.5G (1.31) Module	Supports OC-48/STM-16, Wavelength 1310 nm, with POS mapping
	MU120104A 2.5G (1.55) Module	Supports OC-48/STM-16, Wavelength 1550 nm, with POS mapping
POS (10G)	MU120105A 10G (1.31) Module	Supports OC-192/STM-64, Wavelength 1310 nm, with POS mapping
	MU120106A 10G (1.55) Module	Supports OC-192/STM-64, Wavelength 1550 nm, with POS mapping
EOS (2.5G)	MU120103B 2.5G (1.31) Module	Supports OC-48/STM-16, Wavelength 1310 nm, POS mapping, EOS mapping[3] and virtual concatenation[4]
	MU120104B 2.5G (1.55) Module	Supports OC-48/STM-16, Wavelength 1550 nm, POS mapping, EOS mapping[3] and virtual concatenation[4]

∗1: MU120102A/120112A requires GBIC modules (sold separately).
∗2: MU120118A requires XENPAK module (sold separately).
∗3: Option (sold separately).
∗4: Option (sold separately).

Module Table/Option Table

MD1230A Family Module Table

Model	Name	Power consumption[1]	MD1230A	MD1231A	MT7407A
MU120101A	10M/100M Ethernet Module	4.5	√	√	√
MU120102A	Gigabit Ethernet Module	3.5	√	√	√
MU120103A	2.5G (1.31) Module	5.0	√		√
MU120103B	2.5G (1.31) Module	8.0	√		√
MU120104A	2.5G (1.55) Module	5.0	√		√
MU120104B	2.5G (1.55) Module	8.0	√		√
MU120105A	10G (1.31) Module	10.0	√		√
MU120106A	10G (1.55) Module	10.0	√		√
MU120111A	10/100M Ethernet Module	5.5	√	√	√
MU120112A	Gigabit Ethernet Module	5.5	√	√	√
MU120118A	10 Gigabit Ethernet Module	17.0	√		√
MU120119A	OC-3/12 STM-1/4 Module (1310 nm)	3.5	√	√	√
MU120120A	OC-3/STM-1 Module (1310 nm)	3.5	√	√	√
MU740701A[2, 3]	IP Tester Control Module	2.0			√
MU740702A[2, 4]	Power Unit for IP Tester	[1]			√

[1]: The maximum output current of each MU740702A is 65A. The requirements of total power consumption of module installed should not exceed 65A for each side.
[2]: It is a module only for MT7407A. Up to two modules are inserted for one MT7407A.
[3]: One MU740701A supports up to 7 slots.
[4]: One MU740701A requires one MU740702A. When adding MU740702A, chassis hardware modification is required.

MD1230A Family Option Table

Name	MD1230A	MD1231A	MU740701A	MX123001A
RS-232C Control	MD1230A-01			MX123001A-07[1]
GPIB Control	MD1230A-02	MD1231A-02		MX123001A-09[1]
Ethernet Control	MD1230A-03	MD1231A-03		MX123001A-10[1]
Decode Module	MD1230A-04	MD1231A-04	MU740701A-04[2, 4]	MX123001A-01[2, 4]
GPS Module	MD1230A-05	MD1231A-05	MU740701A-05[3]	
Tcl Interface	MD1230A-06	MD1231A-06		MX123001A-06[1]
OSPF Protocol	MD1230A-07	MD1231A-07	MU740701A-07	
MPLS (LDP/CR-LDP) Protocol	MD1230A-08	MD1231A-08	MU740701A-08	
MPLS (RSVP) Protocol	MD1230A-09	MD1231A-09	MU740701A-09	
RFC2889 Benchmarking Test	MD1230A-10	MD1231A-10	MU740701A-10	
Packet BER Test	MD1230A-11	MD1231A-11	MU740701A-11	
IPv6 Expansion	MD1230A-12	MD1231A-12	MU740701A-12	
XENPAK Test	MD1230A-13		MU740701A-13	
IGAP Protocol	MD1230A-14	MD1231A-14	MU740701A-14	
Auto Negotiation Analysis	MD1230A-15	MD1231A-15	MU740701A-15	
Link Fault Signaling	MD1230A-16		MU740701A-16	
Application Traffic Monitor	MD1230A-20	MD1231A-20		MX123001A-20
Expert Analysis Module	MX123002A	MX123002A	MU740701A-30[4]	MX123003A[4]

[1]: PC on which MX123001A is installed can be operated by another PC.
[2]: When using a decode module with MT7407A, MU740701A-04 and MX123001A-01 are required.
   Each MU740701A module require one MU740701A-04 when using Decode module in both Side A and Side B.
[3]: When using GPS module with MT7407A, it is required MT7407A-01. However two MU740701A-05 can be inserted to MT7407A, it is enough only one MU740701A-05 for one MT7407A.
[4]: When using a Expert Analysis module with MT7407A, MX123001A-01, MX123003A, MU740701A-04 and MU740701A-30 are required. Each MU740701A module require one MU740701A-04 and one MU740701A-30 when using Expert Analysis module in both Side A and Side B.

Selection Guide

MD1230A Family Selection Guide

Module / Function	10M/100MbE		GbE		10 GbE	POS			EOS
	MU120101A	MU120111A	MU120102A	MU120112A	MU120118A	MU120103A /120104A	MU120105A /120106A	MU120119A /120120A*1	MU120103B /120104B
Bit Rate	10/125 Mbps		1.25 Gbps		Depends on XENPAK	2488.320 Mbps	9953.280 Mbps	155.52/622.08 Mbps	2488.320 Mbps
Optical Input Level (dBm)			Depends on GBIC		Depends on XENPAK	−18 to 0/ −28 to −9	−12 to 0/ −14 to −3	−28 to −8	−18 to 0/ −28 to −9
Optical Output Level (dBm)						−5 to 0/ −2 to +3	−4 to 0/ −1 to +2	−15 to −8	−5 to 0/ −2 to +3
Options (sold separately)									
OSPF Protocol		√		√					
MPLS (LDP/CR-LDP) Protocol		√		√					
MPLS (RSVP) Protocol		√		√					
RFC2889 Benchmarking Test		√	√	√					
Packet BER Test		√	√	√	√	√	√	√	√
IPv6 Expansion		√		√					
XENPAK Test					√				
IGAP Protocol		√		√					
Auto Negotiation Analysis				√*2					
Link Fault Signaling					√				
Application Traffic Monitor				√					
MU120119A/120120A Optical Power Meter								√	
MU120103B/120104B EOS Mapping									√
MU120103B/120104B Virtual Concatenation									√
Standard functions									
1000BASE-T GBIC				√					
RFC2544 Automatic Test	√	√	√	√	√	√	√	√	√
BGP-4 Emulation Function	√	√	√	√	√	√	√	√	√
BGP-4 Emulation Route Expansion		√		√					
IGMP	√	√	√	√	√	√	√	√	√
Through Mode Function	√	√	√	√	√	√	√	√	√
Monitor Mode Function	√	√	√	√	√	√	√	√	√
Address Swap Function		√		√					
Unframe BER Measurement Function		√	√	√	*3	√	√	√	√
TCP/UDP Port Number Increment		√	√	√	√	√	√	√	√
CRC32						√	√	√	√
CRC16									√

*1: For MU120120A, only 155.52 Mbps is supported.
*2: Supported optical interfaces are 1000BASE-SX/LX/LH/ZX.
*3: XENPAK test option supports this function on 10 GbE.

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Main Frame
MD1230A	Data Quality Analyzer
	Standard Accessories
	Power cord, 2.5 m: 1 pc
F0079	Fuse, 10 A: 1 pc
B0329G	Front cover (for 3/4MW4U): 1 pc
B0500A	Side cover: 1 pc
W2306AE	MD1230A Family operation manual CD-ROM[1]: 1 pc
	Main Frame Options
MD1230A-01	RS-232C Control[2]
MD1230A-02	GPIB Control[2]
MD1230A-03	Ethernet Control[2,3]
MD1230A-04	MD1230A Decode Module[4]
MD1230A-05	GPS Module
MD1230A-06	Tcl Interface[3]
MD1230A-07	OSPF Protocol[5]
MD1230A-08	MPLS (LDP/CR-LDP) Protocol[5]
MD1230A-09	MPLS (RSVP) Protocol[5]
MD1230A-10	RFC2889 Benchmarking Test[5]
MD1230A-11	Packet BER Test[5]
MD1230A-12	IPv6 Expansion[5]
MD1230A-13	XENPAK Test[6]
MD1230A-14	IGAP Protocol[5]
MD1230A-15	Auto Negotiation Analysis[7]
MD1230A-16	Link Fault Signaling[6]
MD1230A-20	Application Traffic Monitor[7,8]
MX123002A	MD1230A Expert Analysis Module[14]
	Plug-in Modules
MU120101A	10M/100M Ethernet Module
MU120102A	Gigabit Ethernet Module[9]
MU120103A	2.5G (1.31) Module[10]
MU120103B	2.5G (1.31) Module[10]
MU120104A	2.5G (1.55) Module[10]
MU120104B	2.5G (1.55) Module[10]
MU120105A	10G (1.31) Module
MU120106A	10G (1.55) Module
MU120111A	10/100M Ethernet Module
MU120112A	Gigabit Ethernet Module[9]
MU120118A	10 Gigabit Ethernet Module[11]
MU120119A	OC-3/12 STM-1/4 Module (1310 nm)
MU120120A	OC-3/STM-1 Module (1310 nm)
	Plug-in Module Options
MU120103B-01	EOS Mapping
MU120103B-02	Virtual Concatenation
MU120104B-01	EOS Mapping
MU120104B-02	Virtual Concatenation
MU120119A-01	Optical Power Meter
MU120120A-01	Optical Power Meter
	Softwares
MX123001A	Data Quality Analyzer Control Software
MX123001A-05	Data Quality Analyzer Control Software (5 licenses)
MX123001A-08	Data Quality Analyzer Control Software (8 licenses)
MX123001A-01	Remote Control Software for MD1230A-04[12]
MX123001A-15	Remote Control Software for MD1230A-04 (5 licenses)[12]
MX123001A-18	Remote Control Software for MD1230A-04 (8 licenses)[12]
MX123001A-20	Application Traffic Monitor Option[13]
MX123003A	Remote Control Software for MX123002A[15]
MX123003A-05	Remote Control Software for MX123002A (5 licenses)[15]
MX123003A-08	Remote Control Software for MX123002A (8 licenses)[15]
	Software Options
MX123001A-06	Tcl Interface[3]
MX123001A-07	RS-232C Control[2]
MX123001A-09	GPIB Control[2]
MX123001A-10	Ethernet Control[2,3]

Model/Order No.	Name
	Software Upgrade Service
MD1230A-40	Annual Software Upgrade Service for MD1230A[16]
MD1230A-41	Annual Software Maintenance for MD1230A-04[17]
MD1230A-42	Annual Software Maintenance for MX123002A[17]
	Maintenance Service
MD1230A-90	Extended Three Year Warranty Service
MU120101A-90	Extended Three Year Warranty Service
MU120102A-90	Extended Three Year Warranty Service
MU120103A-90	Extended Three Year Warranty Service
MU120103B-90	Extended Three Year Warranty Service
MU120104A-90	Extended Three Year Warranty Service
MU120104B-90	Extended Three Year Warranty Service
MU120105A-90	Extended Three Year Warranty Service
MU120106A-90	Extended Three Year Warranty Service
MU120111A-90	Extended Three Year Warranty Service
MU120112A-90	Extended Three Year Warranty Service
MU120118A-90	Extended Three Year Warranty Service
MU120119A-90	Extended Three Year Warranty Service
MU120120A-90	Extended Three Year Warranty Service
	Optional Accessories
G0105A	GBIC SX 850 nm[19]
G0106A	GBIC LX 1310 nm[19]
G0107A	GBIC LH 1310 nm[19]
G0108A	GBIC ZX 1550 nm[19]
G0124A	GBIC T (1000BASE-T)[20]
G0126A	XENPAK (10GBASE-LR)[21]
J1049A	Fixed Optical Attenuator (SC, 5 dB)[22]
J1049B	Fixed Optical Attenuator (SC, 10 dB)[22]
J1049C	Fixed Optical Attenuator (SC, 15 dB)[22]
MZ1221A	XAUI Extender
MZ1222A	XENPAK Interface
J1163A	XAUI cable, 0.5 m
J1164A	MDIO cable, 0.5 m
J0660B	Optical fiber cord (SM, SC-SC connector both ends), 2 m
J0773B	Optical fiber cord (GI, SC-SC connector both ends), 2 m
J1119B	Optical fiber cable (Duplex, MM), 2 m
J0775D	Coaxial cord (BNC-P620 · 3C-2WS · BNC-P620, 75 Ω), 2 m
J1165A	Coaxial cord (27CP-P-1.5-BNC-P-1.5C-CR10)[23]
J0845A	Balanced cable (BANTAM 3P/BANTAM 3P), 6 ft
J0162B	Balanced cable (Siemens 3p-Siemens 3p), 2 m
J0008	GPIB cable, 2 m
J1109B	LAN cable (Cross), 5 m
J1110B	LAN cable (Straight), 5 m
Z0321A	Keyboard (PS/2)
Z0541A	USB mouse
B0448	Soft case[24]
B0336C	Carrying case (for 3/4MW4U, 350D)[25]
B0530	Carrying case caster for B0336C[26]
B0533	Carrying case (for 3/4MW4U, 350D)[27]
B0501B	Blank panel
W1927AE	MD1230A Data Quality Analyzer operation manual
W1928AE	MX123001A Data Quality Analyzer Control Software operation manual
W1929AE	MD1230A-01/02/03 Remote Control operation manual
W2107AE	MD1230A-04 MD1230A Decode Module MX123001A-01 Remote Control Software for MD1230A-04 operation manual
W2122AE	MD1230A-06 Tcl Interface operation manual
W2134AE	MD1230A-20/MD1231A-20/MX123001A-20 Application Traffic Monitor operation manual
W2108AE	MX123002A MD1230A Expert Analysis Module MX123003A Remote Control Software for MX123002A operation manual

Model/Order No.	Name
W1931AE	MU120101A/11A 10M/100M Ethernet Module MU120102A/12A Gigabit Ethernet Module MU120118A 10 Gigabit Ethernet Module operation manual
W1932AE	MU120103A/B 2.5G (1.31) Module MU120104A/B 2.5G (1.55) Module MU120105A 10G (1.31) Module MU120106A 10G (1.55) Module operation manual
W2121AE	MU120119A OC-3/12 STM-1/4 Module (1310 nm) MU120120A OC-3/STM-1 Module (1310 nm) operation manual

*1: Includes W1927AE, W1928AE, W1929AE and W2122AE operation manuals. Printed versions sold separately.
*2: The MD1230A-01/02/03 options and MX123001A-07/09/10 options are required only for remote control using GPIB commands. Note that these options may be installed together, although only one of them can be used at a time.
*3: MD1230A-03 and MD1230A-06, MX123001A-06 and MX123001A-10 may be installed together, although only one of them can be used at a time.
*4: Purchase MD1230A-04 and the operation manuals (W2107AE) on CD-ROM. Printed versions sold separately.
*5: Some of these interface modules may not work in certain combinations depending on the modules and software versions. Please see the selection guide (Pages 17, 18).
*6: MD1230A-13 and MD1230A-16 support only MU120118A.
*7: MD1230A-15 and MD1230A-20 support only MU120112A.
*8: Purchase MD1230A-20 and the operation manuals (W2134AE) on CD-ROM. Printed versions sold separately. MD1230A-20 supports only two MU120112A.
*9: MU120102A/12A require GBIC modules (sold separately).
*10: MU120103A/04A support POS mapping. MU120103B/04B support POS mapping and EOS mapping.
However, EOS mapping is an option.
*11: MU120118A requires XENPAK modules (sold separately).
*12: MX123001A Data Quality Analyzer Control Software and MD1230A-04 MD1230A Decode Module are required.
*13: Software for external control of MD1230A-20 and MD1231A-20. It can be used even if there is no MX123001A.
*14: MD1230A-04 MD1230A Decode Module is required.
*15: MX123001A Data Quality Analyzer Control Software, MX123001A-01 Remote Control Software for MD1230A-04, MD1230A-04 MD1230A Decode Module and MX123002A MD1230A Expert Analysis Module are required.
*16: MD1230A-40 is provided free for the first year after purchase. It is required to receive software upgrade service starting with the second year after purchase.
*17: Annual Maintenance Service for MD1230A-04 and MX123001A-01. You have to purchase this software maintenance simultaneously with MD1230A-04 and MX123001A-01. Moreover, when continuing this software maintenance, annual renewal is required each year.
*18: Annual Maintenance Service for MX123002A and MX123003A. You have to purchase a this software maintenance simultaneously with and MX123002A and MX123003A. Moreover, when continuing this software maintenance, annual renewal is required each year.
*19: The GBIC module is sold per one piece on a per-unit basis. MU120102A/12A has two GBIC interface slots.
*20: The GBIC-T module is sold on a per-unit basis. MU120112A has two GBIC interface slots.
*21: The XENPAK module is sold on a per-unit basis. MU120118A has two XENPAK interface slots.
*22: Please check the optical power level.
*23: For connecting MD1231A Unit Sync (SMB connector).

*24: Soft case

*25: B0336C Carrying case
Dimensions and mass: 600 (W) x 805 (H) x 365 (D) mm, 8 kg

*26: The caster only for B0336C, 4 pcs/set
*27: B0533 Carrying case
Dimensions and mass: 413 (W) x 605 (H) x 420 (D) mm, 13 kg
Two spaces which contain the box of standard accesories are provided.

• MD1231A

Model/Order No.	Name	
	Main Frame	
MD1231A	IP Network Analyzer	
	Standard Accessories	
J0134	Power cord, 2.5 m:	1 pc
F0101	Fuse, 2 A:	1 pc
B0489	Front cover:	1 pc
W2306AE	MD1230A Family operation manual CD-ROM[1]:	1 pc
	Main Frame Options	
MD1231A-02	GPIB Control[2]	
MD1231A-03	Ethernet Control[2,3]	
MD1231A-04	MD1231A Decode Module[4]	
MD1231A-05	GPS Module	
MD1231A-06	Tcl Interface[3]	
MD1231A-07	OSPF Protocol[5]	
MD1231A-08	MPLS (LDP/CR-LDP) Protocol[5]	
MD1231A-09	MPLS (RSVP) Protocol[5]	
MD1231A-10	RFC2889 Benchmarking Test[5]	
MD1231A-11	Packet BER Test[5]	
MD1231A-12	IPv6 Expansion[5]	
MD1231A-14	IGAP Protocol[5]	
MD1231A-15	Auto Negotiation Analysis[6]	
MD1231A-20	Application Traffic Monitor[6,7]	
MX123002A	MD1230A Expert Analysis Module[11]	
	Plug-in Modules	
MU120101A	10M/100M Ethernet Module	
MU120102A	Gigabit Ethernet Module[8]	
MU120111A	10/100M Ethernet Module	
MU120112A	Gigabit Ethernet Module[8]	
MU120119A	OC-3/12 STM-1/4 Module (1310 nm)	
MU120120A	OC-3/STM-1 Module (1310 nm)	
	Plug-in Module Options	
MU120119A-01	Optical Power Meter	
MU120120A-01	Optical Power Meter	
	Softwares	
MX123001A	Data Quality Analyzer Control Software	
MX123001A-05	Data Quality Analyzer Control Software (5 licenses)	
MX123001A-08	Data Quality Analyzer Control Software (8 licenses)	
MX123001A-01	Remote Control Software for MD1230A-04[9]	
MX123001A-15	Remote Control Software for MD1230A-04 (5 licenses)[9]	
MX123001A-18	Remote Control Software for MD1230A-04 (8 licenses)[9]	
MX123001A-20	Application Traffic Monitor Option[10]	
MX123003A	Remote Control Software for MX123002A[12]	
MX123003A-05	Remote Control Software for MX123002A (5 licenses)[12]	
MX123003A-08	Remote Control Software for MX123002A (8 licenses)[12]	
	Software Options	
MX123001A-06	Tcl Interface[3]	
MX123001A-07	RS-232C Control[2]	
MX123001A-09	GPIB Control[2]	
MX123001A-10	Ethernet Control[2,3]	
	Software Upgrade Service	
MD1231A-40	Annual Software Upgrade Service for MD1231A[13]	
MD1231A-41	Annual Software Maintenance for MD1231A-04[14]	
MD1231A-42	Annual Software Maintenance for MX123002A[15]	
	Maintenance Service	
MD1231A-90	Extended Three Year Warranty Service	
MU120101A-90	Extended Three Year Warranty Service	
MU120102A-90	Extended Three Year Warranty Service	
MU120111A-90	Extended Three Year Warranty Service	
MU120112A-90	Extended Three Year Warranty Service	
MU120119A-90	Extended Three Year Warranty Service	
MU120120A-90	Extended Three Year Warranty Service	

Model/Order No.	Name
	Optional Accessories
G0105A	GBIC SX 850 nm[16]
G0106A	GBIC LX 1310 nm[16]
G0107A	GBIC LH 1310 nm[16]
G0108A	GBIC ZX 1550 nm[16]
G0124A	GBIC T (1000BASE-T)[17]
J1049A	Fixed Optical Attenuator (SC, 5 dB)[18]
J1049B	Fixed Optical Attenuator (SC, 10 dB)[18]
J1049C	Fixed Optical Attenuator (SC, 15 dB)[18]
J0660B	Optical fiber cord (SM, SC-SC connector both ends), 2 m
J0773B	Optical fiber cord (GI, SC-SC connector both ends), 2 m
J1119B	Optical fiber cable (Duplex, MM), 2 m
J0775D	Coaxial cord (BNC-P620 · 3C-2WS · BNC-P620, 75 Ω), 2 m
J1165A	Coaxial cord (27CP-P-1.5-BNC-P-1.5C-CR10)[19]
J1166A	Coaxial cord (27CP-P-1.5)[20]
J0845A	Balanced cable (BANTAM 3P/BANTAM 3P), 6 ft
J0162B	Balanced cable (Siemens 3p-Siemens 3p), 2 m
J0008	GPIB cable, 2 m
J1109B	LAN cable (Cross), 5 m
J1110B	LAN cable (Straight), 5 m
Z0321A	Keyboard (PS/2)
Z0541A	USB mouse
B0510	Soft case[21]
B0501B	Blank panel
W2096AE	MD1231A Data Quality Analyzer operation manual
W1928AE	MX123001A Data Quality Analyzer Control Software operation manual
W1929AE	MD1230A-01/02/03 Remote Control operation manual
W2107AE	MD1230A-04 MD1230A Decode Module, MX123001A-01 Remote Control Software for MD1230A-04 operation manual
W2122AE	MD1230A-06 Tcl Interface operation manual
W2134AE	MD1230A-20/MD1231A-20/MX123001A-20 Application Traffic Monitor operation manual
W2108AE	MX123002A MD1230A Expert Analysis Module, MX123003A Remote Control Software for MX123002A operation manual
W1931AE	MU120101A/11A 10M/100M Ethernet Module, MU120102A/12A Gigabit Ethernet Module, MU120118A 10 Gigabit Ethernet Module operation manual
W2121AE	MU120119A OC-3/12 STM-1/4 Module (1310 nm), MU120120A OC-3/STM-1 Module (1310 nm) operation manual

*1: Includes W2096AE, W1928AE, W1929AE and W2122AE operation manuals. Printed versions sold separately.

*2: The MD1231A-02/03 options and MX123001A-07/09/10 options are required only for remote control using GPIB commands. Note that these options may be installed together, although only one of them can be used at a time.

*3: MD1231A-03 and MD1231A-06, MX123001A-06 and MX123001A-10 may be installed together, although only one of them can be used at a time.

*4: Purchase MD1231A-04 and the operation manuals (W2107AE) on CD-ROM. Printed versions sold separately.

*5: Some of these interface modules may not work in certain combinations depending on the modules and software versions. Please see the selection guide (Pages 17, 18).

*6: MD1231A-15 and MD1231A-20 support only MU120112A.

*7: Purchase MD1231A-20 and the operation manuals (W2134AE) on CD-ROM. Printed versions sold separately. MD1231A-20 supports only two sets MU120112A.

*8: MU120102A/12A require GBIC modules (sold separately).

*9: MX123001A Data Quality Analyzer Control Software and MD1231A-04 MD1231A Decode Module are required.

*10: Software for external control of MD1230A-20 and MD1231A-20. It can be used even if there is no MX123001A.

*11: MD1231A-04 MD1231A Decode Module is required.

*12: MX123001A Data Quality Analyzer Control Software, MX123001A-01 Remote Control Software for MD1230A-04, MD1231A-04 MD1231A Decode Module and MX123002A MD1230A Expert Analysis Module are required.

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*13: MD1231A-40 is provided free for the first year after purchase. It is required to receive software upgrade service starting with the second year after purchase.

*14: Annual Maintenance Service for MD1231A-04 and MX123001A-01. You have to purchase this software maintenance simultaneously with MD1230A-04 and MX123001A-01. Moreover, when continuing this software maintenance, annual renewal is required each year.

*15: Annual Maintenance Service for MX123002A and MX123003A. You have to purchase this software maintenance simultaneously with MX123002A and MX123003A. Moreover, when continuing this software maintenance, annual renewal is required each year.

*16: The GBIC module is sold on a per-unit basis. MU120102A/12A has two GBIC interface slots.

*17: The GBIC-T module is sold on a per-unit basis. MU120112A has two GBIC interface slots.

*18: Please check the optical power level.

*19: For connecting MD1230A main frames or MT7407A.

*20: For connecting MD1231A main frames.

*21: B0510 Soft case

• MT7407A

Model/Order No.	Name	
	Main Frame	
MT7407A	Multislot Chassis	
	Standard Accessories for MT7407A	
J1211	Power Cord, 3 m:	1 pc
F0108	Fuse, 20 A:	1 pc
J1109B	LAN cable (cross), 5 m:	1 pc
W2306AE	MD1230A Family operation manual CD-ROM[1]:	1 pc
	Option for MT7407A	
MT7407A-01	Interface Board for IP Tester[2]	
	Standard Accessories for MT7407A-01	
J0775I	Coaxial cable, 0.1 m:	1 pc
	Plug-in Modules for MT7407A	
MU740701A	IP Tester Control Module[2]	
MU740702A	Power Unit for IP Tester[2, 3]	
	Standard Accessories for MU740701A	
J1221B	RS-232C cross cable:	1 pc
	Control Module Options	
MU740701A-04	MU740701A Decode Module[4]	
MU740701A-05	GPS Module[5]	
MU740701A-07	OSPF Protocol[6]	
MU740701A-08	MPLS (LDP/CR-LDP) Protocol[6]	
MU740701A-09	MPLS (RSVP) Protocol[6]	
MU740701A-10	RFC2889 Benchmarking Test[6]	
MU740701A-11	Packet BER Test[6]	
MU740701A-12	IPv6 Expansion[6]	
MU740701A-13	XENPAK Test[7]	
MU740701A-14	IGAP Protocol[6]	
MU740701A-15	Auto Negotiation Analysis[8]	
MU740701A-16	Link Fault Signaling[7]	
MU740701A-30	MU740701A Expert Analysis Module[9]	
	Plug-in Modules	
MU120101A	10M/100M Ethernet Module	
MU120102A	Gigabit Ethernet Module[10]	
MU120103A	2.5G (1.31) Module[11]	
MU120103B	2.5G (1.31) Module[11]	
MU120104A	2.5G (1.55) Module[11]	
MU120104B	2.5G (1.55) Module[11]	
MU120105A	10G (1.31) Module	
MU120106A	10G (1.55) Module	
MU120111A	10/100M Ethernet Module	
MU120112A	Gigabit Ethernet Module[10]	

Model/Order No.	Name
MU120118A	10 Gigabit Ethernet Module[12]
MU120119A	OC-3/12 STM-1/4 Module (1310 nm)
MU120120A	OC-3/STM-1 Module (1310 nm)
	Plug-in Module Options
MU120103B-01	EOS Mapping
MU120103B-02	Virtual Concatenation
MU120104B-01	EOS Mapping
MU120104B-02	Virtual Concatenation
MU120119A-01	Optical Power Meter
MU120120A-01	Optical Power Meter
	Softwares
MX123001A	Data Quality Analyzer Control Software
MX123001A-05	Data Quality Analyzer Control Software (5 licenses)
MX123001A-08	Data Quality Analyzer Control Software (8 licenses)
MX123001A-01	Remote Control Software for MD1230A-04[13]
MX123001A-15	Remote Control Software for MD1230A-04 (5 licenses)[13]
MX123001A-18	Remote Control Software for MD1230A-04 (8 licenses)[13]
MX123003A	Remote Control Software for MX123002A[14]
MX123003A-05	Remote Control Software for MX123002A (5 licenses)[14]
MX123003A-08	Remote Control Software for MX123002A (8 licenses)[14]
	Software Options
MX123001A-06	Tcl Interface[15]
MX123001A-07	RS-232C Control[16]
MX123001A-09	GPIB Control[16]
MX123001A-10	Ethernet Control[15,16]
	Software Upgrade Service
MT7407A-40	Annual Software Upgrade Service for MT7407A[17]
MU740701A-41	Annual Software Maintenance for MU740701A-04[18]
MU740701A-42	Annual Software Maintenance for MU740701A-30[19]
	Maintenance Service
MT7407A-90	Extended Three Year Warranty Service[20]
MU740701A-90	Extended Three Year Warranty Service[20]
MU740702A-90	Extended Three Year Warranty Service[20]
MU120101A-90	Extended Three Year Warranty Service
MU120102A-90	Extended Three Year Warranty Service
MU120103A-90	Extended Three Year Warranty Service
MU120103B-90	Extended Three Year Warranty Service
MU120104A-90	Extended Three Year Warranty Service
MU120104B-90	Extended Three Year Warranty Service
MU120105A-90	Extended Three Year Warranty Service
MU120106A-90	Extended Three Year Warranty Service
MU120111A-90	Extended Three Year Warranty Service
MU120112A-90	Extended Three Year Warranty Service

Model/Order No.	Name
MU120118A-90	Extended Three Year Warranty Service
MU120119A-90	Extended Three Year Warranty Service
MU120120A-90	Extended Three Year Warranty Service
	Optional Accessories
G0105A	GBIC SX 850 nm[21]
G0106A	GBIC LX 1310 nm[21]
G0107A	GBIC LH 1310 nm[21]
G0108A	GBIC ZX 1550 nm[21]
G0124A	GBIC T (1000BASE-T)[22]
G0126A	XENPAK (10GBASE-LR)[23]
J1049A	Fixed Optical Attenuator (SC, 5 dB)[24]
J1049B	Fixed Optical Attenuator (SC, 10 dB)[24]
J1049C	Fixed Optical Attenuator (SC, 15 dB)[24]
MZ1221A	XAUI Extender
MZ1222A	XENPAK Interface
J1163A	XAUI cable, 0.5 m
J1164A	MDIO cable, 0.5 m
B0532	Rack flange
B0531	Blank panel[25]
B0501B	Blank panel
J0660B	Optical fiber cord (SM, SC-SC connector both ends), 2 m
J0773B	Optical fiber cord (GI, SC-SC connector both ends), 2 m
J1119B	Optical fiber cable (duplex, MM), 2 m
J0775D	Coaxial cord (BNC-P620 · 3C-2WS · BNC-P620, 75 Ω), 2 m
J1165A	Coaxial cord (27CP-P-1.5-BNC-P-1.5C-CR10)[26]
J0845A	Balanced cable (BANTAM 3P/BANTAM 3P), 6 ft
J0162B	Balanced cable (Siemens 3p-Siemens 3p), 2 m
J0008	GPIB cable
J1109B	LAN cable (Cross), 5 m
J1110B	LAN cable (Straight), 5 m
W2238AE	MT7407A operation manual
W1928AE	MX123001A Data Quality Analyzer Control Software operation manual
W1929AE	MD1230A-01/02/03 Remote Control operation manual
W2107AE	MD1230A-04 MD1230A Decode Module MX123001A-01 Remote Control Software for MD1230A-04 operation manual
W2122AE	MD1230A-06 Tcl Interface operation manual
W1931AE	MU120101A/11A 10M/100M Ethernet Module MU120102A/12A Gigabit Ethernet Module MU120118A 10 Gigabit Ethernet Module operation manual
W1932AE	MU120103A/B 2.5G (1.31) Module MU120104A/B 2.5G (1.55) Module MU120105A 10G (1.31) Module MU120106A 10G (1.55) Module operation manual
W2121AE	MU120119A OC-3/12 STM-1/4 Module (1310 nm) MU120120A OC-3/STM-1 Module (1310 nm) operation manual

*1: Includes W2238AE, W1928AE, W1929AE and W2122AE operation manuals. Printed versions sold separately.
*2: Maximum two sets include one MT7407A. When two MU740701A modules are used, MT7407A requires two MU740702A units. Each MU740701A supports 7 slots.
*3: One MU740702A supports one MU740701A. When adding MU740702A chassis hardware modification is required.
*4: The Decode Module function doesn't operate with only MU740701A-04. MX123001A-01 (sold separately) is required.
*5: When using GPS module with MT7407A, it is required MT7407A-01. However two MU740701A-05 can be inserted to MT7407A, it is enough only one MU740701A-05 for one MT7407A.
*6: Some of these interface modules may not work in certain combinations depending on the modules and software versions. Please see the selection guide (Pages 17, 18).
*7: MU740701A-13 and MU740701A-16 supports only MU120118A.
*8: MU740701A-15 supports only MU120112A.
*9: The Expert Analysis module function doesn't operate with only MU740701A-30. MU740701A-04 MU740701A Decode Module, MX123001A Data Quality Analyzer Control Software, and MX123001A-01 Remote Control Software for MD1230A-04 are required.
*10: MU120102A/12A require GBIC modules (sold separately).
*11: MU120103A/04A support POS mapping. MU120103B/04B support POS mapping and EOS mapping. However, EOS mapping is an option.
*12: MU120118A requires XENPAK modules (sold separately).
*13: MX123001A Data Quality Analyzer Control Software and MU740701A-04 MU740701A Decode Module are required.
*14: MX123001A Data Quality Analyzer Control Software, MX123001A-01 Remote Control Software for MD1230A-04, MU740701A-04 MU740701A Decode Module and MU740701A-30 MU740701A Expert Analysis Module are required.
*15: MX123001A-06 and MX123001A-10 may be installed together, although only one of them can be used at a time.
*16: MX123001A-07/09/10 options are required only for remote control using GPIB commands. Note that these options may be installed together, although only one of them can be used at a time.
*17: MT7407A-40 is provided free for the first year after purchase. It is required to receive software upgrade service starting with the second year after purchase. One license supports two MU740701A.
*18: Annual Maintenance Service for MU740701A-04 and MX123001A-01. You have to purchase software maintenance simultaneously with MU740701A-04 and MX123001A-01. Moreover, when continuing this software maintenance, annual renewal is required each year.
*19: Annual Maintenance Service for MU740701A-30 and MX123003A. You have to purchase this software maintenance simultaneously with MU740701A-30 and MX123003A. Moreover, when continuing this software maintenance, annual renewal is required each year.
*20: Extended Three Year Warranty Service is divided into three orders for main frame, CPU module and power unit. Please choose your need order among them.
*21: The GBIC module is sold on a per-unit basis. MU120102A/12A has two GBIC interface slots.
*22: The GBIC-T module is sold on a per-unit basis. MU120112A has two GBIC interface slots.
*23: The XENPAK module is sold on a per-unit basis. MU120118A has two XENPAK interface slots.
*24: Please check the optical power level.
*25: For CPU module slot.
*26: For connecting MD1231A Unit Sync (SMB connector).

■ Software Upgrade Service

The MD1230A Family permits service upgrades for compatible software. A CD-ROM containing the latest applications can be sent to the user when the MD1230A Family is upgraded if the software upgrade (maintenance) option is purchased. The user can then perform measurements using the latest applications.

The following software upgrades are supported .

Model	Name	Contents
MD1230A-40 MD1231A-40 MT7407A-40	Annual Software upgrade service	An option for ensuring that the MD1230A Family is always using the latest software. The first year is free. Support of MX123001A is also included. Separate annual purchase is required from the second year onward.
MD1230A-41 MD1231A-41 MU740701A-41	Annual Software maintenance	An option for ensuring that the MD1230A Family Decode Module option is always using the latest protocol translation information. Support of MX123001A-01 is also included. Separate annual purchase is required starting with the first year and cannot be started mid-year.
MD1230A-42 MD1231A-42 MU740701A-42	Annual Software maintenance	An option for ensuring that the MD1230A Family Expert Analysis Module software is always using the latest applications. Support of MX123003A is also included. Separate annual purchase is required starting with the first year, and cannot be started mid-year.

/Inritsu

Specifications are subject to change without notice.