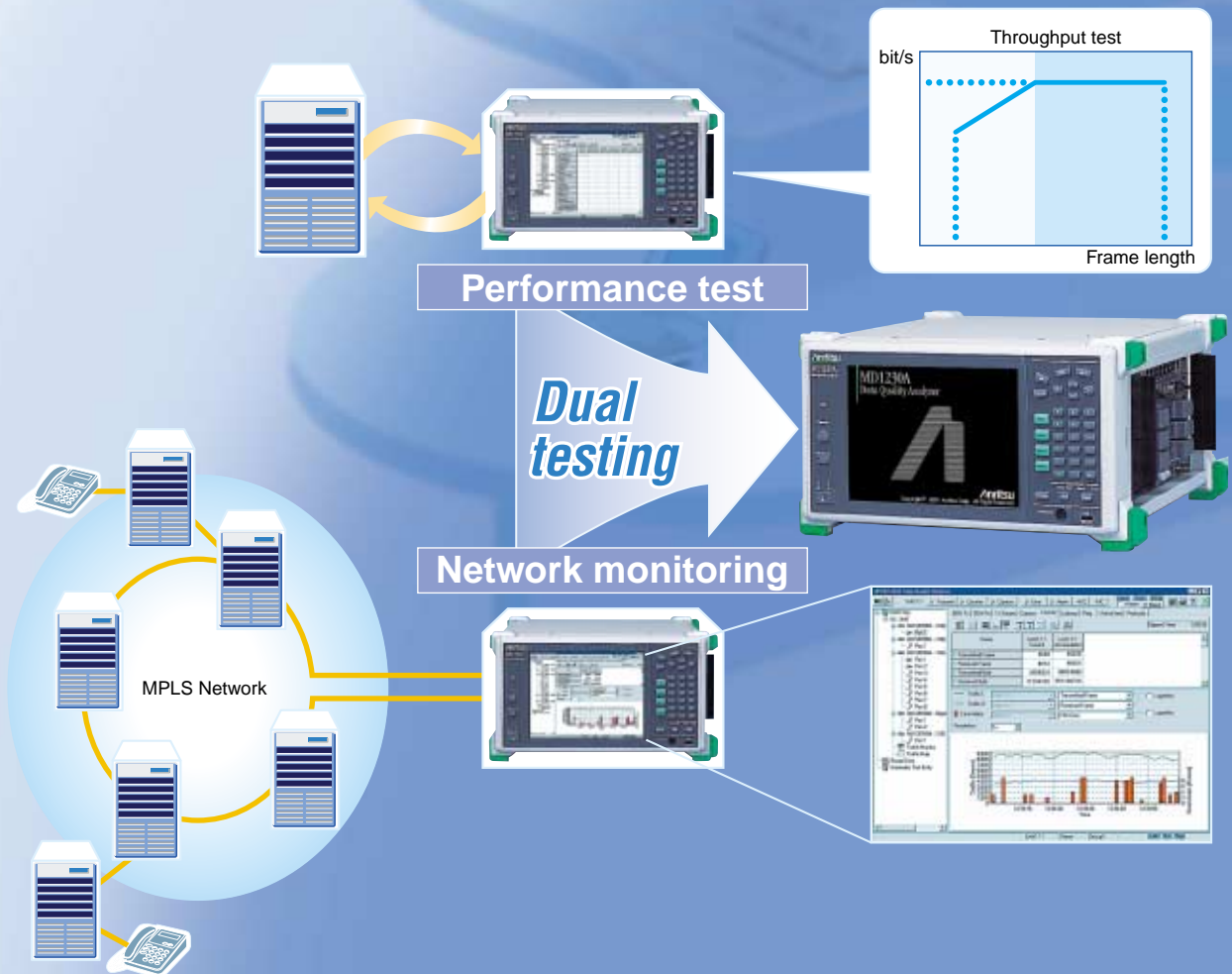# Anritsu

MD1230A

Data Quality Analyzer

Complete performance testing and monitoring with one unit

Integrated Performance Testing and Monitoring

IP Networks are spreading rapidly throughout society in conjunction with the expansion of networks carrying voice, video, and mission-critical data. And now maintenance of network quality has become an important theme. Development of network equipment and systems requires the measurement of network performance and QoS evaluations. In addition, network operations and maintenance require monitoring of in-service traffic, latency, and frame arrival time variation (frame jitter) as well as prompt troubleshooting. The MD1230A integrates both performance testing and network monitoring into one instrument.

Throughput test
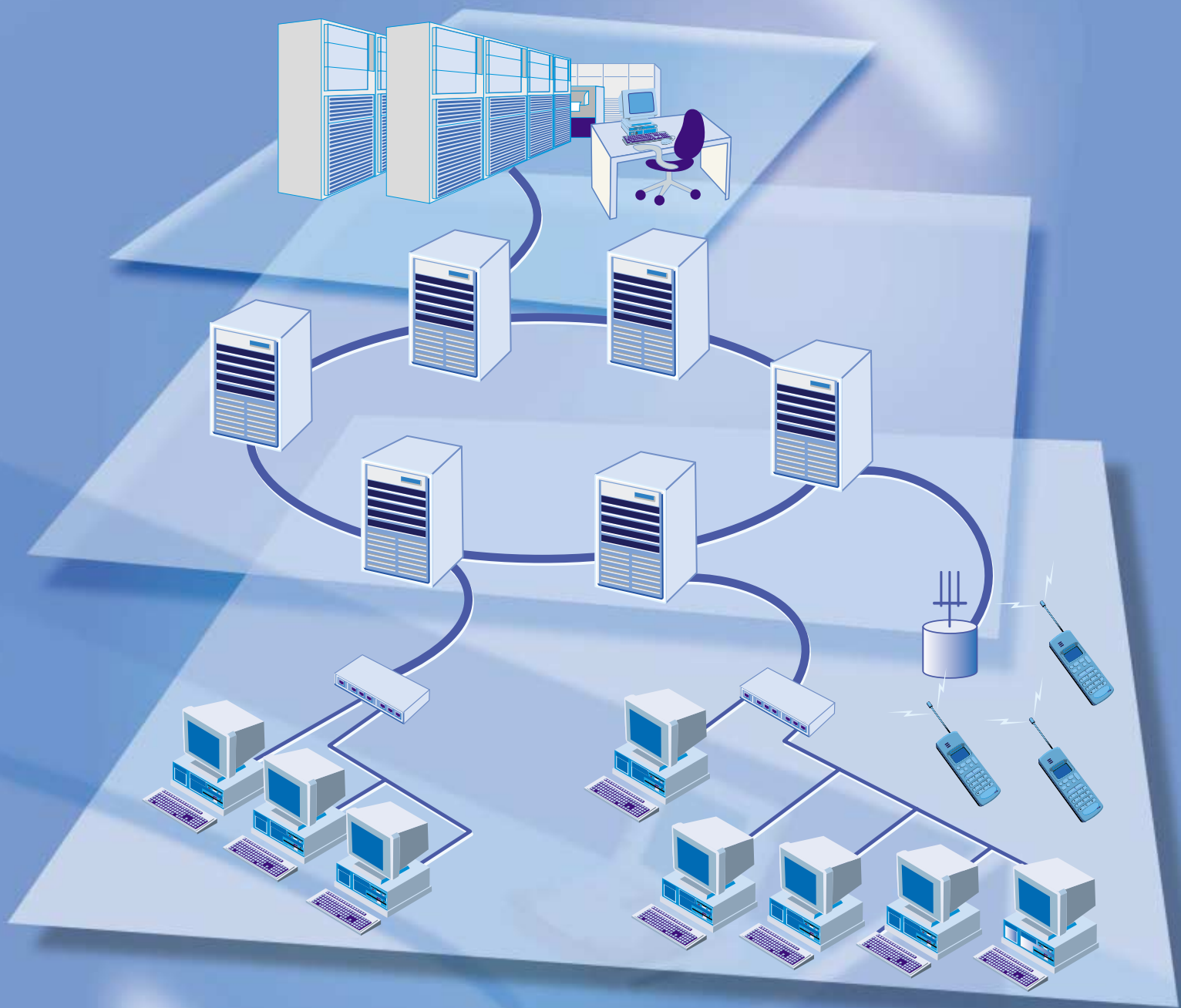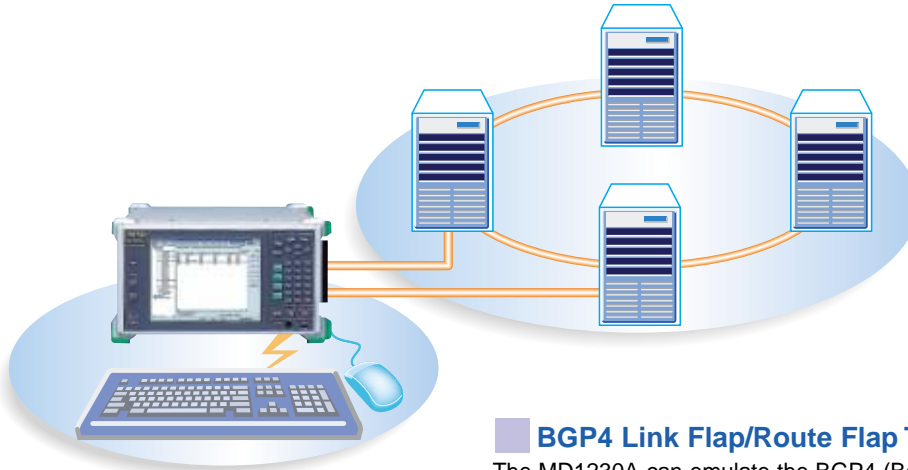
bit/s

Frame length

Performance test

Dual testing

MD1230A
Data Quality Analyzer

Network monitoring

MPLS Network

Applications

R&D

RFC2544 Test

The six standard RFC1242 and RFC2544 tests : Throughput, Latency, Frame Loss Rate, Back-to-Back-Frame, System Recovery, and Reset, can be performed automatically with the results displayed graphically or in table form. The test efficiency has been improved through automation.

QoS Performance Test

The MD1230A supports selection of two types of QoS: the VLAN tag user priority field specified by IEEE802.1D, and the least 3 bits of the DSCP field specified by RFC2474. 8 priority levels that correspond to QoS 0 to 7 counters that allows for simultaneous measurement of 8 priority levels for traffic. This mechanism permits verification of a QoS priority scheduling mechanism.

BGP4 Link Flap/Route Flap Test

The MD1230A can emulate the BGP4 (Border Gateway Protocol version 4) speaker for a maximum of 8 devices. It can also perform link flap tests for neighboring routers and route flap tests for up to 800 routes. (However, it cannot use routes advertised by the DUT in the route flap test.)

SONET/SDH APS Switching Test

SONET/SDH networks use various redundancy systems to prevent transmission downtime (service loss) due to fiber breaks and equipment failures. At a fault, switching to the standby system is executed in accordance with the APS (Automatic Protection Switching) procedure.
The MD1230A can measure APS switching time, and it can even perform in-service capture of the K1/K2 bytes controlling the APS operation to verify the operation.

Manufacturing
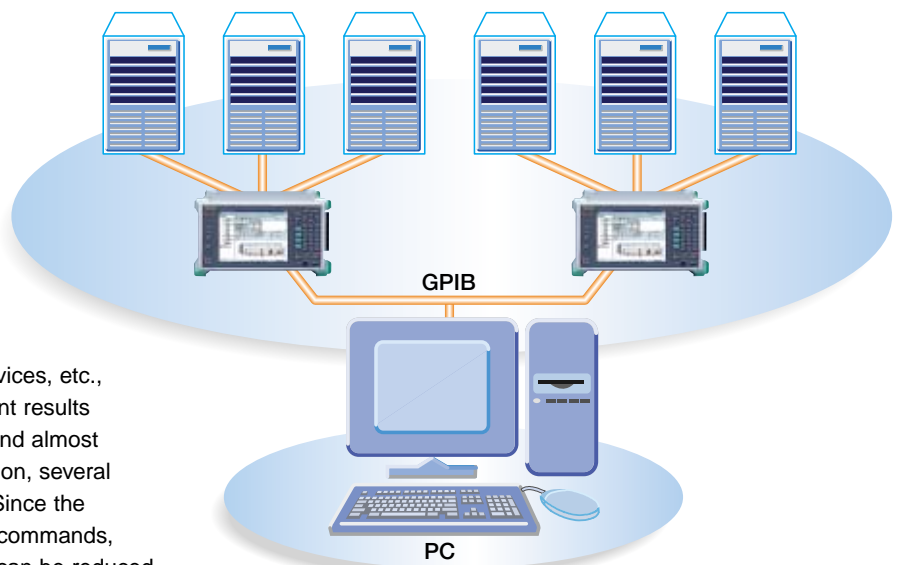
Automated Testing using GPIB Commands (MD1230A Option 02)

Preset test items for production lines of network devices, etc., can be executed automatically and the measurement results saved. The MD1230A supports GPIB commands and almost all its functions can be executed via GPIB. In addition, several MD1230As can be controlled from one controller. Since the automated control programs use well-known GPIB commands, end-user cost of application software development can be reduced.

GPIB

PC

4

Maintenance
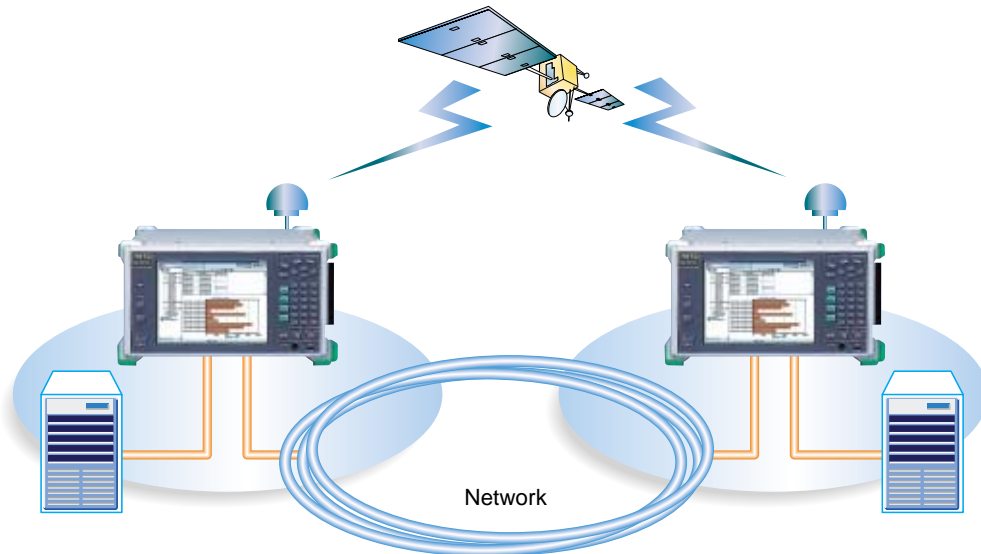
VPN QoS Traffic Monitoring

Since traffic can be measured according to 8 priority levels based on the VLAN tag user priority field specified by IEEE802.1D and the least 3 bits of the DSCP field specified by RFC2474, it is also possible to measure QoS traffic for other packets not generated by the MD1230A.

If user-defined filters are used, VoIP traffic (specified UDP port number), to which specific MPLS are appended, can be measured in real time.

SONET/SDH Overhead Monitoring

The MD1230A supports monitoring of SONET/SDH overhead and is also able to monitor various types of alarms and errors.

Frame Capture for Troubleshooting

If the MD1230A is inserted into a network, it can perform in-service monitoring and data capture, at line rates up to 10Gbit/s, to quickly identify causes of network faults.

Protocol Analysis

Layer 2 to Layer 4 protocol decode can be performed on captured packets. Any problems with frame transportation are basically covered by the MD1230A protocol decode function of Layer 2 to Layer 4.

Remote Latency (MD1230A Option 05)

The MD1230A has a GPS clock input option which can be used to perform time synchronization with remote MD1230A units to measure frame latency of a long distance. Moreover, the capture function can be triggered when a measured frame latency exceeds the user setting. The MD1230A is an effective tool for testing guaranteed data delivery services that may posses potential routing or traffic congestion errors.

MD1230A
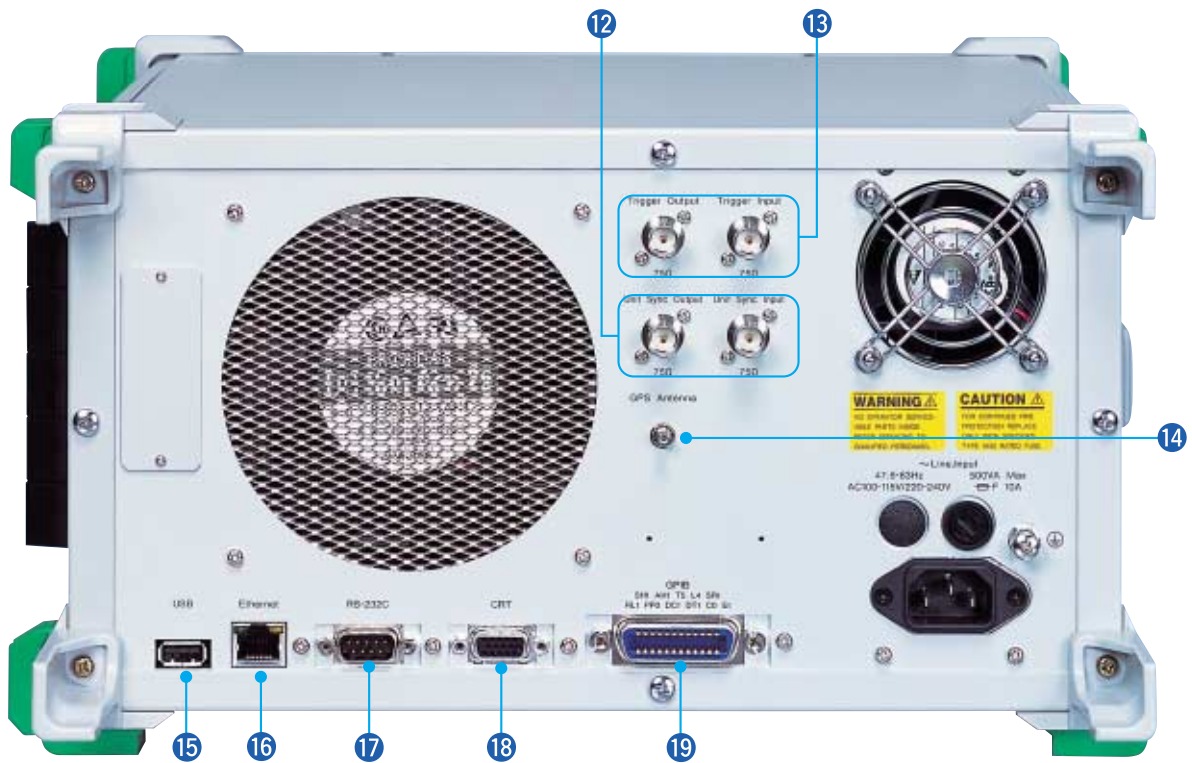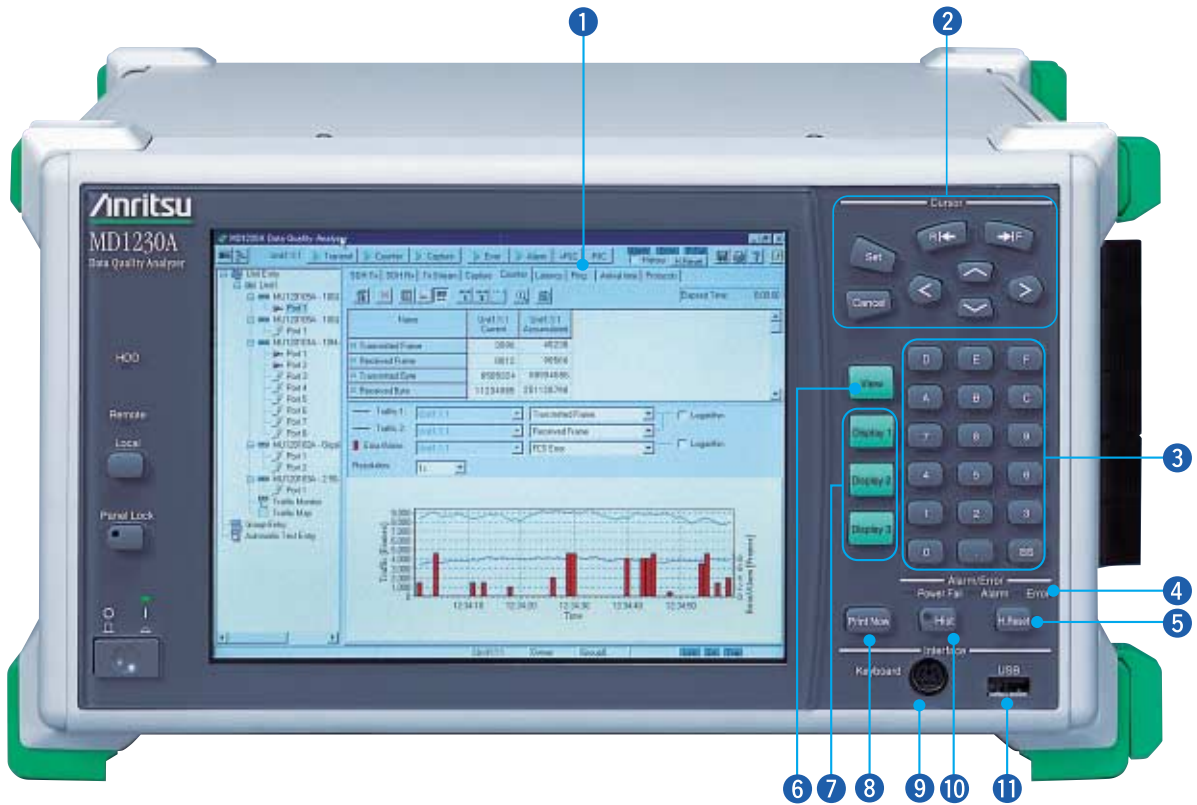
❶ **Display:** 8.4-inch TFT-LCD, SVGA (800 x 600)

❷ **Cursor keys**

　Set: Sets data

　Cancel: Cancel data setting

　|←R, F→|: Fetches setting screen

　∧∨<>**:** Scrolls screen cursor and setting items

❸ **Input keys:** Input numeric data

❹ **Alarm/Error:** Displays receiver alarms, errors and power failure

❺ **H. Reset:** Resets history function ❿

❻ **View:** Switches between tree view showing ports as tree and graphical view showing interface module panel

❼ **Display 1 to 3:** A maximum of three screens can be saved. Pressing the Display 1 to 3 keys fetches the pre-set screen composition.

❽ **Print Now:** Prints screen contents at external printer

❾ **Keyboard:** For connecting PS/2 keyboard

❿ **Hist:** When on, each LED lights whenever an alarm or error occurs after power-on. when off, it displays current alarm and error conditions at each LED.

⓫ **Front USB:** For connecting USB devices such as USB mouse

⓬ **Unit Sync Input/Unit Sync Output:** Clock signal I/O for time synchronizing several MD1230As connected in daisy chain

⓭ **Trigger Input, Trigger Output:** External trigger I/O

⓮ **GPS Antenna:** For connecting GPS antenna

⓯ **Rear USB:** For connecting USB devices

⓰ **Ethernet:** Ethernet connector

⓱ **RS-232C:** RS-232C interface

⓲ **CRT:** VGA connector for external monitor

⓳ **GPIB:** GPIB interface when GPIB option installed.

⓴ **Module slots:** For installing up to five interface modules

㉑ **3.5" Froppy Disk Drive**

㉒ **DCS Input:** Input for SONET/SDH sync data and clock

For developing, manufacturing and maintaining network equipment and systems

- **Physical interface for 10 Mbit/s to 10 Gbit/s**
- **Expandable up to 320 ports (10/100Base-Tx)**
- **Powerful and flexible filter and trigger conditions**
- **Support for MPLS, IPv6, BGP4, etc., protocol decoding**
- **Real-time measurement of in-service traffic**
- **Full wire rate transmission of user edited data streams**
- **Compact and lightweight unit with built-in Windows® 98***

∗ Windows®98 is a registered trademark of Microsoft Corporation in the USA and other countries.

Physical Interface for 10 Mbit/s to 10 Gbit/s

The MD1230A uses a variety of interface modules shown in the table below.   In the future, new interface modules will be added to those already available. The Gigabit Ethernet Module has a Giga-Bit Interface Converter (GBIC) that can be changed to support 1000BASE-SX/LX/LH/ZX ports.

10/100M Ethernet Module	8 ports
Gigabit Ethernet Module	2 ports
2.5G (1.31) Module	1 port
2.5G (1.55) Module	1 port
10G (1.31) Module	1 port
10G (1.55) Module	1 port

Expandable to 320 Ports (10/100Base-Tx)

Any combination of five interface modules can be installed in the MD1230A.

A maximum of eight MD1230A chassis can be networked together via Ethernet with one unit acting as a controller for all units. Furthermore, time synchronization is performed by connecting a clock to the daisy chain. Latency between any ports can be measured. The number of ports can be expanded up to a maximum of 320 by using the 10M/100M Ethernet module.

| Module	10M/100M Ethernet	Gigabit Ethernet	2.5G	10G
No. of ports/module	8	2	1	1
No. of modules/unit	5	5	5	5
No. of ports/unit	40	10	5	5
No. of ports for 8 connections	320	80	40	40

HUB
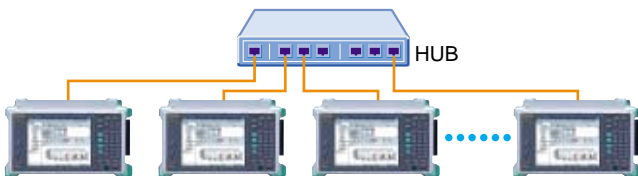
Powerful and Flexible Filter/Trigger Conditions

The MD1230A has powerful and flexible filter and trigger functions that can be set independently for each port as shown in the following table.

Trigger condition	Filter condition	Condition	Remarks
√	√	Destination MAC address	10M/100M Ethernet and Gigabit Ethernet support those conditions. MAC address mask permits portion match.
√	√	Source MAC address	
√	√	Destination IP address	2.5G (1.31), 2.5G (1.55), 10G (1.31), 10G (1.55) support those conditions. IP address mask permits portion match
√	√	Sorce IP address	
√	√	User-defined 32 bit pattern	Two sets of user-defined 32 bit pattern conditions per port. Sets offset and pattern match at any frame position. Pattern mask permits portion match.
√	√	User-defined 32 bit pattern	
√	√	Error condition	Good frame, FCS error, undersize, fragment, oversize, oversize/FCS error, dribble error, alignment error, IP header checksum error, TCP header checksum error, UDP header checksum error
√	√	Ext. trigger input	Rising edge of pulse
√	—	Traffic over	When traffic setting overflows
√	—	Latency over	When latency setting overflows

As an example, when filtering only VoIP frames on an MPLS network, the MPLS label is specified as a 32 bit pattern (1), and VoIP frames are specified at the UDP header port number field as a 32 bit pattern (2). As a result, if only VoIP frames are captured on the specified MPLS network, the number of packets can be counted.

MPLS tag   UDP header
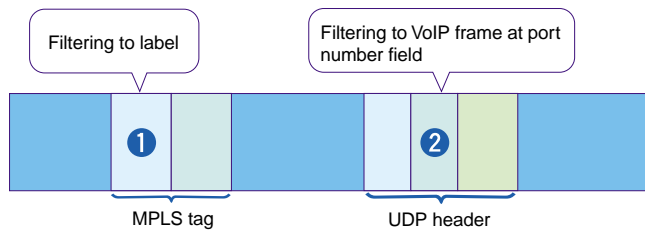
Support for MPLS, IPv6, BGP4, etc., Protocol Decode

The MD1230A real time capture buffers do not drop frames even at the full wire rate of 10 Gbit/s. The in-service capture function is an especially powerful and useful tool for troubleshooting the causes of network faults. Captured frames can be searched on the basis of specified conditions and interesting frames can be selected and displayed. Each port has an independent capture buffer and is unaffected by other ports.

In addition to the real time capture buffer, each of the Ethernet, PPP, LCP, MPLS, VLAN, ARP, IPv4, ICMP, IPv6, TCP, UDP, IGMP, RIP, BGP4 and DHCP protocols can be decoded and displayed for captured frames. When 10M/100M/Gigabit Ethernet is uses IPX protocol can also be decoded.

Real-time Measurement of In-service Traffic

• **Traffic Monitoring**

The MD1230A can measure both send and receive byte/frame counts, QoS frame counts in 8 priority ranks, Counts of each error type, count of SONET/SDH alarms, etc., in real time. In addition, when the above-described filter function is used, specific frame traffic can be measured for each port.

The powerful frame filtering operations can be used to capture and verify performance of VPN services where the UDP port number specifies MPLS VoIP frames.

• **Traffic Map**

Traffic mapping displays the Ethernet data flow pairs or IP data flow pairs to visualize the data flow communicating partners.
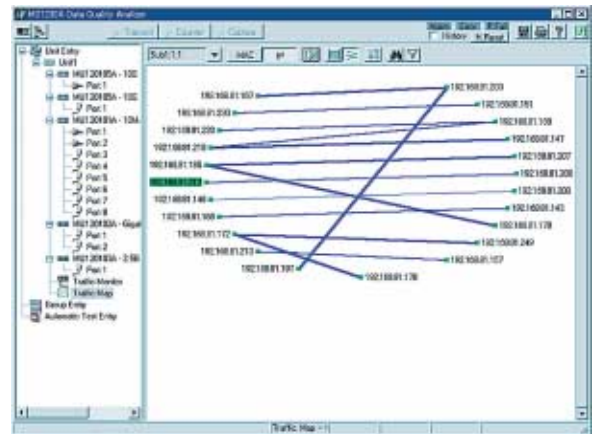
• **Traffic Monitor**

Traffic monitoring graphically displays the traffic for Ethernet data flow, IP data flow, and traffic for each protocol in real time. Ethernet of IP data flow frame counts can be displayed for up to 64 communicating partners.

• Latency

The MD1230A is able to measure the latency of simplex data transfer. When up to eight MD1230A units are daisy chained, latency can be measured by interconnecting a clock signal for time synchronization. In addition, when a GPS antenna is connected, latency can be measured between remote locations.
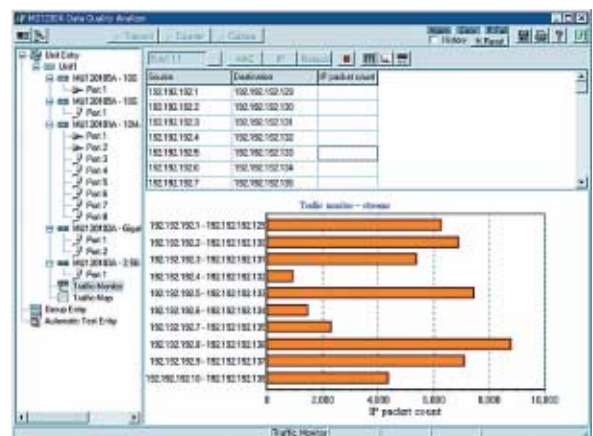
• Frame Arrival Time Variation

In applications like Voice over IP (VoIP) and Video on Demand (VoD), the frame must arrive within the correct time slot. In other words, it is important to evaluate variation in the frame arrival time at the receive side. The MD1230A can perform these types of important timing measurements

▌ Full Wire Rate Transmission of User Edited Data Stream

The MD1230A can send a maximum of 256 data streams per port at the full wire rate. Data editing is a simple three-step procedure described below.

• Step 1: Setting Frame Data

The frame editor is used to edit the frame data for any of the Ethernet, PPP, Cisco HDLC, ARP, IPv4, IPv6, IPX, MPLS, VLAN, TCP, UDP, IGMP, RIP and DHCP protocols. When a specific protocol frame header is selected, each frame data field can be edited in accordance with the frame format specifications that are also displayed.

The IP or MAC address can either be partially or completely set to automatically increment, decrement, or set randomly. When using IPv6, only the least significant 32 bits of the address field can be set for automatic random, increment, or decrement operations.
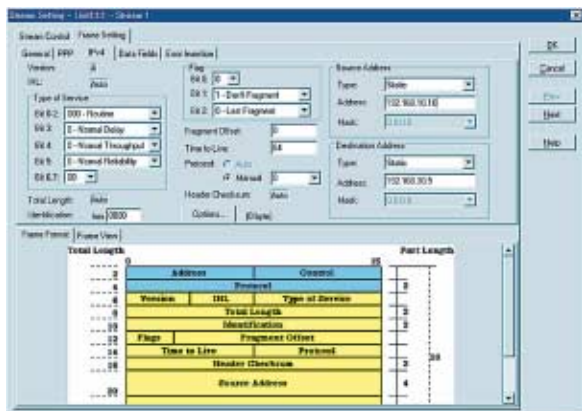
• Step 2: Setting Stream Control

The interval gap of the frame set defined in step 1 is set and the data stream is defined. Commonly, an actual network load is not static or constant, but rather a dynamic or burst load. To simulate this type of load, the MD1230A has a multi-burst function. In addition, a random frame interval can be simulated by setting the frame interval to random within a specified packet interval range.
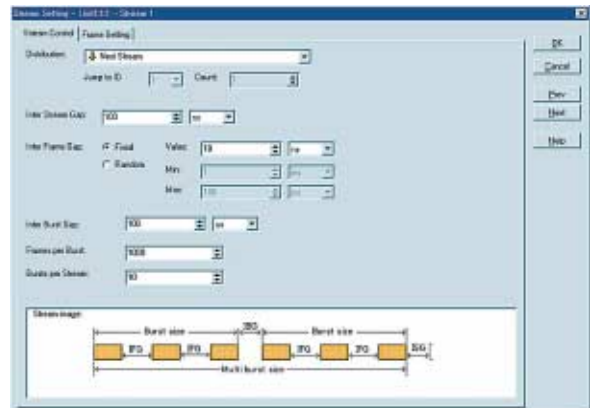
• Step 3: Combining Data Stream

Up to 256 data streams defined in step 2 can be combined per port. Any number of data streams can also be repeated a specified number of times.
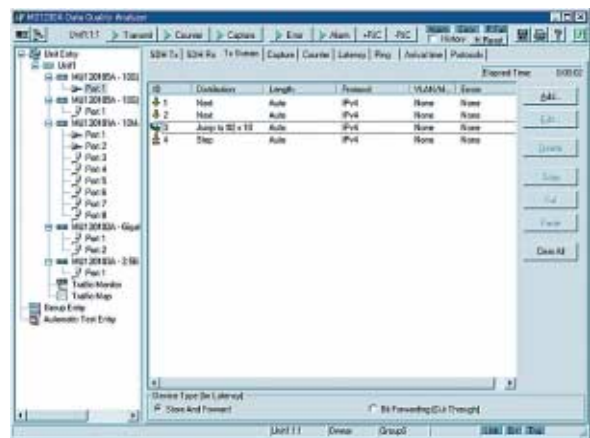
Compact and Lightweight Unit with built-in Windows®98

For easy and familiar operability, the MD1230A uses the built-in Windows®98. In addition, it also has a USB port for connecting a printer or external storage media. A PS/2 keyboard connector and USB connector on the front panel support connection of a keyboard and USB mouse.

The MD1230A's easy operability, compact size and lightweight offer the perfect solution for convenient on-site network troubleshooting.

Protocol Emulation

●PPP

Link establishment is performed using LCP. IP address notification is also supported by using MRU (Max Receive Unit) negotiation and IPCP.

●ARP

The port MAC address is sent in response to the ARP request. In addition to the mode that responds to all ARP requests, it is also possible to select either a mode that responds only to ARP requests corresponding to the port IP address, or a mode that does not respond to any ARP request. Furthermore, the ARP request and response packets can both be counted.

●PING (ICMPv4)

PING for port IP addresses can be used. In addition, when continuous ping is used for a specified port address, the number of ping request frames and the number of ping response frames can both be counted.

●IGMP

The user-set host group address for host membership queries from routers is notified by the host membership report. The maximum reported host group address count is 255 consecutive host group addresses. Even if there is no host membership query, the host group address set by the user can be periodically notified by the host membership report.

●BGP4

The MD1230A can emulate up to 8 BGP speakers. A maximum of 100 routes can be advertised per BGP speaker. Link flaps and route flaps can be generated at the user-specified frequency.

Remote Control from PC

When the MX123001A Data Quality Analyzer Control Software (sold separately CD-ROM) is installed in a PC running Windows®98, up to eight MD1230A units can be controlled via an Ethenet network.

Windows®98
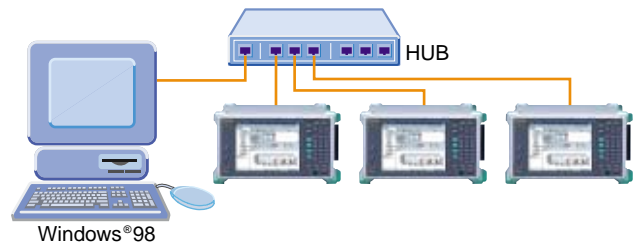
Multi-user Functions

The MD1230A supports multi-user functions. Multiple users can reserve their own individual port addresses, eliminating any interference from other users gaining access via the same port address. On network equipment production lines, the MD1230A supports the reservation of port address assignments for each manufacturing process step, permitting system sharing.

In addition, when the MD123001A Data Quality Analyzer Control Software (sold separately) is installed on several computers within a product engineering environment, multiple designers and researchers can use the same MD1230A, increasing engineering efficiency.

Automated Measurement using GPIB Commands (Option)

Almost all the MD1230A functions can be executed by GPIB commands. An automated test system can be configured by operating the MD1230A from the user's application software. In addition, the interface for sending and receiving GPIB commands can be selected from any of the optional GPIB (MD1230A Option 02), RS-232C (MD1230A Option 01) and Ethernet interfaces (MD1230A Option 03).

Performance Test & Network Monitoring

Specifications

● MD1230A (main frame)

Sync clock input	Frequency: 64 kHz + 8 kHz ±50 ppm, 2.048 MHz ±50 ppm, 1.544 MHz ±50 ppm, 2.048 Mbit/s ±50 ppm, 1.544 Mbit/s ±50 ppm
	Interface
	  2M: ITU-T G.703 Table 10, HDB3
	  1.5M: B8ZS, AMI ANSI T1.403
	Level (64k): 0.63 to 1.1 Vo-p
	Code (64k): AMI with 8 kHz violation
	Connector
	  BNC (75 Ω): 2 MHz, 2 Mbit/s
	  Siemens (120 Ω, balanced): 2 MHz, 2 Mbit/s, 64 kHz + 8 kHz
	  Bantam (100 Ω, balanced): 1.5 MHz, 1.5 Mbit/s

Trigger output	Level: TTL (active high), impedance: 75 Ω (BNC)
Trigger input	Usable as capture buffer trigger Level: TTL (Active high), connector: 75 Ω (BNC)
Sync I/O	MD1230A time sync signal, impedance: 75 Ω (BNC)
Interfaces	RS-232C, GPIB (Option 02), Ethernet (10BASE-T/100BASE-TX), USB port x 2 , PS/2 keyboard connector, GPS antenna (option 05), video output (VGA)
Built-in memory	Measurement conditions: 10 sets, Measurement results: 10 sets
External storage	3.5" FDD
OS	Windows® 98 Second Edition
Auto test	RFC2544 Tests (throughput, latency, frame loss rate, back-to-back frame, system recovery, reset)
Traffic monitor	Ethernet frame count for max. 64 flow, IP packet count for max. 64 flow, frame count for each protocol
Traffic map	Ethernet data flow for max. 64 flow, IP data flow for max. 64 flow
LEDs	Power fail, errors, alarms, remote, local, HDD, power
Dimensions and mass	320 (W) x 177 (H) x 350 (D) mm, ≤15 kg (excluding options and modules)
Power supply	85 to 132 Vac/170 to 250 Vac (auto switching), 47.5 to 63 Hz, ≤530 VA
Relative humidity	0˚ to +40˚C (except when HDD or FDD are active.)
EMC	EN61326: 1997/A1: 1998 (Class A), EN61000-3-2: 1995/A2: 1998 (Class A), EN61326: 1997/A1: 1998 (Annex A)
LVD	EN61010-1: 1993/A2: 1995 (Installation Category ll, Pollution degree 2)

● Ethernet Module

Model	MU120101A	MU120102A
Ports	10BASE-T/100BASE-TX Number of ports: 8 Connector: RJ-45 Link speed: 10/100 Mbit/s Duplex mode: Full, half Auto negotiation: On/off Flow control: On/off	1000BASE-SX/LX/LH/ZX *[1] Number of ports: 2 Connector: SC Link speed: 1000 Mbit/s Duplex mode: Full Auto negotiation: On/off Flow control: On/off
LEDs	Link, Tx/collision, Rx/error	Link, Tx, Rx/error

Frame settings	MAC address: Fixed, increment, decrement, random (changeable parts specified in nibble units)
	VLAN tag *[2]: Fixed, increment, decrement, random
	MPLS label *[2]: Up to 10 MPLS labels can be appended. Fixed setting
	Protocol editing: IPv4, IPv6, TCP, UDP, IGMP, ICMPv4, RIP, DHCP, IPX, ARP, pause control
	Data field:
	  Can set any 4 parts in data field
	  All 1s, all 0s, alternate 1/0 (each bit, each 2 bits, each nibble, each byte, each 2 bytes), increment, decrement, random, user
	  programmed, single PRBS 9, time stamp, sequence number, test frame	

Frame length	18 bytes to 10000 bytes (settable as auto, fixed, increment, or random)	48 bytes to 64 kbytes (settable as auto,fixed, increment, or random)

Stream settings	Stream transport mode:
	  Continuous, continuous burst, stop after this stream, next stream, jump to stream.
	  Jump to stream for count (loop count: 1 to 16000000, frame count per burst: 1 to 16000000, burst count per stream: 1 to 16000000)	

Model	MU120101A	MU120102A
Stream settings	Inter frame gap 　10BASE-T: 　8000 ns to 170 s, resolution at 800 ns, settable as fixed, random 　100BASE-TX: 　800 ns to 170 s, resolution at 80 ns, settable as fixed Inter burst gap 　10BASE-T: 　8000 ns to 170 s, resolution at 800 ns, settable as fixed 　100BASE-TX: 　800 ns to 170 s, resolution at 80 ns, settable as fixed Inter stream gap 　10BASE-T: 　8000 ns to 170 s, resolution at 800 ns, settable as fixed 　100BASE-TX: 　800 ns to 170 s, resolution fixed at 80 ns, settable as fixed	Inter frame gap: 　64 ns to 120 s, resolution at 16 ns, settable as fixed, random Inter burst gap: 　64 ns to 120 s, resolution at 16 ns, settable as fixed Inter stream gap: 　64 ns to 120 s, resolution at 16 ns, settable as fixed
Number of stream	256 streams/port	
Error insertion	Collision, FCS error, dribble bit error, undersize error, oversize error, Fragments error, oversize/FCS error, IP header checksum error, TCP/UDP header checksum error	FCS error, undersize error, oversize error, Fragments error, oversize/FCS error, IP header checksum error, TCP/UDP header checksum error
Counter	Transmitted frame, received frame, transmitted bytes, received bytes, fragments, undersize, oversize, oversize/bad CRC, FCS error, line error, flow control, alignment error, dribble bit error, collision, capture trigger, capture filter, transmitted ARP reply, transmitted ARP request, transmitted ping reply, transmitted ping request, received ARP reply, received ARP request, received ping reply, received ping request, QoS 0 to 7, user defined 1, user defined 2, transmitted IP, received IP, IP checksum error, TCP checksum error, UDP checksum error	Transmitted frame, received frame, transmitted bytes, received bytes, fragments, undersize, oversize, oversize/bad CRC, FCS error, line error, flow control, byte alignment error, capture trigger, capture filter, transmitted ARP reply, transmitted ARP request, transmitted ping reply, transmitted ping request, received ARP reply, received ARP request, received ping reply, received ping request, QoS 0 to 7, user defined 1, user defined 2, transmitted IP, received IP, IP checksum error, TCP checksum error, UDP checksum error
Latency	Maximum, minimum, average measure	
Frame arrival time variation measurement	Time resolution: 1 μs, 10 μs, 100 μs, 1 ms, 10 ms, 100 ms, 1 s	
QoS counter setting	Using QoS described below, 8-level priority frame count: IEEE802.1D VLAN tag user priority field, least 3 bits of RFC2474 DSCP field	
Capture buffer	8 Mbytes/port	32 Mbytes/port
Capture filter	At following conditions for each port, capture filter condition settings: 　Destination MAC address, source MAC address, 32-bit pattern (settable bit length and offset) x 2, error conditions	
Capture trigger	At following conditions for each port, capture trigger condition settings: 　Destination MAC address, source MAC address, 32-bit pattern (settable bit length and offset) x 2, error conditions, traffic over, latency over, external trigger input	
Protocol decode	Ethernet, MPLS, VLAN, ARP, IPX, IPv4, ICMP, IPv6, TCP, UDP, IGMP, RIP, BGP4, DHCP	
Protocol emulate	ARP, PING, IGMP, BGP4	

∗1: 1000BASE-SX/LX/LH/ZX can be chosen by exchanging GBIC that is a optional accessories.

∗2: Both VLAN tag and MPLS labels can not be used simultaneously.

MU120101A

MU120102A

● POS Module

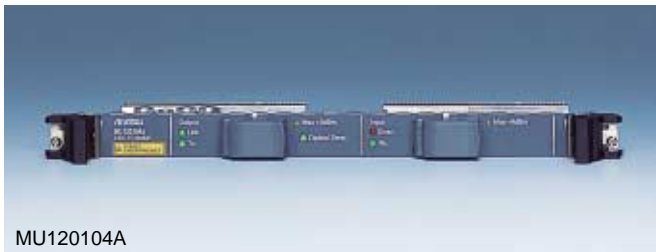| Model	MU120103A	MU120104A	MU120105A	MU120106A
Ports	OC-48/STM-16 Wavelength: 1260 to 1360 nm Number of port: 1 Connector: SC Bit rate: 2488.320 Mb/s (NRZ) Output level: −5 to 0 dBm Input sensitivity: −18 to 0 dBm	OC-48/STM-16 Wavelength: 1500 to 1580 nm Number of port: 1 Connector: SC Bit rate: 2488.320 Mb/s (NRZ) Output level: −1.0 to +2.0 dBm Input sensitivity: −28 to −9 dBm	OC-192/STM-64 Wavelength: 1290 to 1330 nm Number of port: 1 Connector: SC Bit rate: 9953.280 Mbit/s (NRZ) Output level: −6 to 0 dBm Input sensitivity: −11 to −1.0 dBm	OC-192/STM-64 Wavelength: 1530 to 1565 nm Number of port: 1 Connector: SC Bit rate: 9953.280 Mbit/s (NRZ) Output level: −1.0 to +2.0 dBm Input sensitivity: −14 to −3.0 dBm
LEDs	Link, Tx, Rx/error, optical send			
Clocks	Internal (MU120103A/MU120104A: ±50 ppm variable, MU120105A/MU120106A: ±100 ppm), receive signal, lock (64 kHz +8 kHz, 1.5 MHz, 2 MHz, 1.5 Mbit/s, 2 Mbit/s)			

SDH/SONET settings	Frame: SDH/SONET
	Alarm addition: LOS, LOF, MS-AIS, MS-RDI, MS-TIM, AU-AIS, AU-LOP, HP-SLM, HP-TIM, HP-RDI, HP-UNEQ
	Timing: Single, single burst frame, alternative [alarm frame (0 to 8000), Normal frame (0 to 8000)], all
	Error insertion: FAS, bits all, B1, B2, B3, MS-REI, HP-REI
	Timing:
	   Single, single burst bit (1 to 64000), rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, 1E-9),
	   programmed rate [AE-B ∗A: 1.0 to 9.9 (0.1 steps), B: 3 to 10]
	APS (K1/K2)
	   Sequence generation: 2 to 64 words, repeat (8000 frames)			

Mapping	STM-16C — VC4∗ 16C < PPP / CiscoHDLC / Bulk		STM-64C — VC4∗ 64C < PPP / CiscoHDLC / Bulk	

Frame settings	PPP scramble: On/off
	PPP FCS: CRC32
	MPLS label: Up to 10 MPLS labels can be appended. Fixed setting
	Protocol editing: IPv4, IPv6, TCP, UDP, IGMP, ICMPv4, RIP, DHCP
	Data field:
	   Can set any 4 parts in data field.
	   All 1s, all 0s, alternate 1/0 (each bit, each 2 bits, each nibble, each byte, each 2 bytes), increment, decrement, random, user
	   programmable, single PRBS 9, time stamp, sequence number, test frame			

Frame length	8 bytes to 64 kbytes (settable as auto, fixed, increment, or random)			

Stream settings	Stream transport mode:
	   Continuous, continuous burst, stop after this stream, next stream, jump to stream.
	   Jump to stream for count (loop count: 1 to 16000000, frame count per burst: 1 to 16000000, burst count per stream: 1 to 16000000)
	
	Inter frame gap:
	   3.2 ns to 120 s, resolution at 3.2 ns, settable as fixed, random
	Inter burst gap:
	   3.2 ns to 120 s, resolution at 3.2 ns, settable as fixed
	Inter stream gap:
	   3.2 ns to 120 s, resolution at 3.2 ns, settable as fixed
			Inter frame gap:
			   0.8 ns to 120 s, resolution at 0.8 ns, settable as fixed, random
			Inter burst gap:
			   0.8 ns to 120 s, resolution at 0.8 ns, settable as fixed
			Inter stream gap:
			   0.8 ns to 120 s, resolution at 0.8 ns, settable as fixed	

Number of streams	256 streams/port			
Error insertion	FCS error, abort frame, fragment, undersize, IP header checksum error, TCP/UDP header checksum error			

Counter	SONET/SDH:
	   B1, B2, B3, HP-IEC, MS-REI, HP-REI, LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-SLM, HP-TIM, HP-RDI, HP-UNEQ,
	Justification: NDF, +PJC, −PJC
	PPP/IP/TCP/UDP:
	   Transmitted frame, received frame, transmitted bytes, received bytes, received bytes before staffing, transmitted bytes after staffing
	   fragment, undersize, oversize, FCS error, abort error, capture trigger, capture filter, transmitted ping reply, transmitted ping request,
	   received ping reply, received ping request, QoS 0 to 7, user defined 1, user defined 2, transmitted IP, received IP, IP checksum error,
	   TCP checksum error, UDP checksum error			

Latency	Maximum, minimum, average			
Alarm arrival time variation measurement	Time resolution: 1 µs, 10 µs, 100 µs, 1 ms, 10 ms, 100 ms, 1 s			
QoS counter settings	Using least 3 bits of RFC2474 DSCP field, 8-stage priority packet count			
Capture buffer	64 Mbytes		256 Mbytes	
Capture filter	At following conditions for each port, capture filter condition settings: Destination IP address, source IP address, 32-bit pattern (settable bit length and offset) x 2, error conditions			

Capture trigger	At following conditions for each port, capture trigger condition settings: Destination IP address, source IP address, 32-bit pattern (settable bit length and offset) x 2, error conditions, traffic over, latency over, external trigger input
Protocol decode	PPP, LCP, IPCP, MPLS, IPv4, ICMPv4, IPv6, TCP, UDP, IGMP, RIP, BGP4, DHCP
Protocol emulate	PING, IGMP, BGP4

MU120103A

MU120105A

MU120104A

MU120106A

Ordering Information

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

Model/Order No.	Name	
	Main frame	
MD1230A	Data Quality Analyzer	
	Standard accessories	
F0079	Power cord:	1 pc
B0329G	Fuse, 10 A:	2 pcs
B0500A	Front cover (for 3/4MW4U):	1 pc
W1930AE	Side cover:	1 pc
	MD1230A operation manual CD-ROM*1	1 pc
	Options	
MD1230A-01	RS-232C controller	
MD1230A-02	GPIB controller	
MD1230A-03	Ethernet controller	
MD1230A-05	GPS module	
	Plug-in modules	
MU120101A	10M/100M Ethernet Module	
MU120102A	Gigabit Ethernet Module*2	
MU120103A	2.5G (1.31) Module	
MU120104A	2.5G (1.55) Module	
MU120105A	10G (1.31) Module	
MU120106A	10G (1.55) Module	
	Software	
MX123001A	Data Quality Analyzer Control Software	
	Maintenance service *3	
MD1230A-90	Extension service 3 years	
MU120101A-90	Extension service 3 years	
MU120102A-90	Extension service 3 years	
MU120103A-90	Extension service 3 years	
MU120104A-90	Extension service 3 years	
MU120105A-90	Extension service 3 years	
MU120106A-90	Extension service 3 years	

Model/Order No.	Name
	Optional accessories
G0105A	GBIC SX 850 nm*4
G0106A	GBIC LX 1310 nm*4
G0107A	GBIC LH 1310 nm*4
G0108A	GBIC ZX 1550 nm*4
J0660B	Optical fiber cord (SM, SC·PC-SC·PC 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
J1110B	LAN cable (Straight), 5 m
J1109B	LAN cable (Cross), 5 m
J0755D	Coaxial cord (BNC-P620·3C-2WS·BNC-P620, 75 Ω), 2 m
J0162B	Balanced cable (Siemens 3p-Siemens 3p), 2 m
J0845A	Balanced cable (BANTAM 3P/BANTAM 3P), 6 ft
J0008	GPIB cable, 2 m
B0448	Soft case
B0336C	Carrying case (for 3/4MW4U, 350D)
Z0321A	Keyboard (PS/2)
Z0541A	Mouse
J1049A	Fixed optical attenuator (SC, 5 dB)
J1049B	Fixed optical attenuator (SC, 10 dB)
J1049C	Fixed optical attenuator (SC, 15 dB)
B0501B	Blank panel
W1927AE	MD1230A operation manual
W1928AE	MX123001A software operation manual
W1929AE	MD1230A remote control operation manual

*1: Includes W1927AE, W1928AE and W1929AE operation manuals. Printed version sold separately.
*2: MU120102A requires two GBIC modules(sold separately).
*3: Please ask your local Anritsu Field Office or Sales Representative for price and availability.
*4: GBIC module is sold per one piece. MU120102A has two GBIC interface.

/INNritsu

ANRITSU CORPORATION
MEASUREMENT SOLUTIONS
5-10-27, Minamiazabu, Minato-ku, Tokyo 106-8570, Japan
Phone: +81-3-3446-1111
Telex: J34372
Fax: +81-3-3442-0235

● **U.S.A.**
ANRITSU COMPANY
North American Region Headquarters
1155 East Collins Blvd., Richardson, Tx 75081, U.S.A.
Toll Free: 1-800-ANRITSU (267-4878)
Phone: +1-972-644-1777
Fax: +1-972-671-1877

● **Canada**
ANRITSU ELECTRONICS LTD.
Unit 102, 215 Stafford Road West
Nepean, Ontario K2H 9C1, Canada
Phone: +1-613-828-4090
Fax: +1-613-828-5400

● **Brasil**
ANRITSU ELETRÔNICA LTDA.
Praia de Botafogo 440, Sala 2401 CEP 22250-040,
Rio de Janeiro, RJ, Brasil
Phone: +55-21-5276922
Fax: +55-21-537-1456

● **U.K.**
ANRITSU LTD.
200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

● **Germany**
ANRITSU GmbH
Grafenberger Allee 54-56, 40237 Düsseldorf, Germany
Phone: +49-211-96855-0
Fax: +49-211-96855-55

● **France**
ANRITSU S.A.
9, Avenue du Québec Z.A. de Courtabœuf 91951 Les
Ulis Cedex, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

● **Italy**
ANRITSU S.p.A.
Via Elio Vittorini, 129, 00144 Roma EUR, Italy
Phone: +39-06-509-9711
Fax: +39-06-502-24-25

● **Sweden**
ANRITSU AB
Botvid Center, Fittja Backe 1-3 145 84 Stockholm,
Sweden
Phone: +46-853470700
Fax: +46-853470730

● **Spain**
ANRITSU ELECTRÓNICA, S.A.
Europa Empresarial Edificio Londres, Planta 1, Oficina
6 C/ Playa de Liencres, 2 28230 Las Rozas. Madrid,
Spain
Phone: +34-91-6404460
Fax: +34-91-6404461

● **Singapore**
ANRITSU PTE LTD.
10, Hoe Chiang Road #07-01/02, Keppel Towers,
Singapore 089315
Phone: +65-282-2400
Fax: +65-282-2533

● **Hong Kong**
ANRITSU COMPANY LTD.
Suite 719, 7/F., Chinachem Golden Plaza, 77 Mody
Road, Tsimshatsui East, Kowloon, Hong Kong, China
Phone: +852-2301-4980
Fax: +852-2301-3545

● **Korea**
ANRITSU CORPORATION
14F Hyun Juk Bldg. 832-41, Yeoksam-dong,
Kangnam-ku, Seoul, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604~5

● **Australia**
ANRITSU PTY LTD.
Unit 3/170 Forster Road Mt. Waverley, Victoria, 3149,
Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

● **Taiwan**
ANRITSU COMPANY INC.
6F, 96, Sec. 3, Chien Kou North Rd. Taipei, Taiwan
Phone: +886-2-2515-6050
Fax: +886-2-2509-5519