

MU120121A 10/100/1000M Ethernet Module

MU120122A Gigabit Ethernet Module

Features

Power Protocol Modules

The MU120121A 10/100/1000M Ethernet Module and MU120122A Gigabit Ethernet Module are the highest-performance modules in the MD1230A Family.

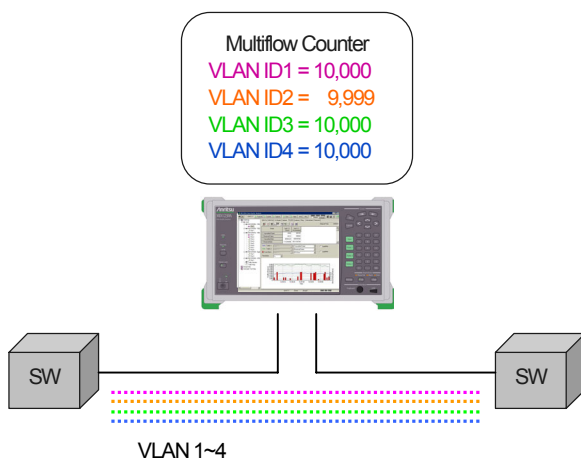
These modules have important new features: Transmit Clock Modulation and Multiflow Counters. And these modules provide the same functions and options as the MU120112A Gigabit Ethernet Module.

By incorporating an independent CPU on each port, Power Protocol CPU Modules support huge networks and much quicker responses.

Multiflow Counter^{*1}

Multiflow Counter can count frames according to IDs. IDs have an offset from top of frame, top of IP header, or top of TCP/UDP header, and allow counting frames according to VLAN ID or TCP port number. Counter capacity is 65,536, and 32 counters can operate in real time.

This function allows you to understand the distribution of frames according to IDs such as VLAN type.



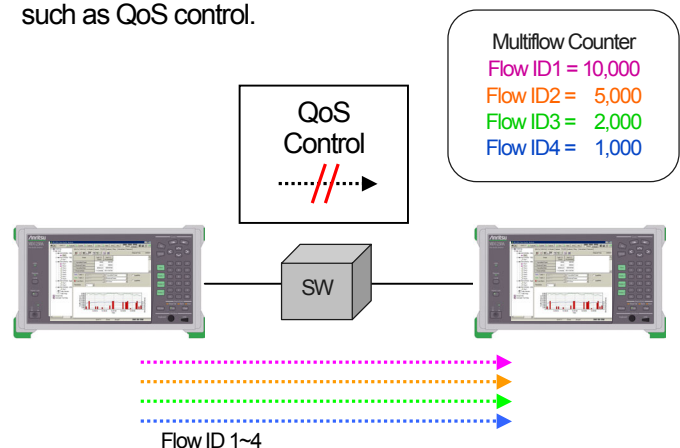
*1 Multiflow Counter is supported by Port1 and Port2 only.

*2 Option-20 Application Traffic Monitor is not supported by this module.

New TxStream Feature

Power Protocol Modules can generate a MD1230A Test Frame incorporating a Flow ID. An ID-implanted Test Frame can be used by the Multiflow Counter.

By generating headers with ID-implanted test frames, you can investigate the behavior of DUT mechanisms such as QoS control.



Power Protocol Modules support multi-layer tagged frames and generate hardware random patterns. This lets you investigate the behavior of DUT mechanisms such as multi-layer tagged VLANs and L2 switching.

High Speed CPU on Each Port

MU120121A/22A incorporate 600MHz Power PC G4® processors on each port. They provide fast response and information for huge networks, so you can investigate the behavior of large routers

Support Auto MDI / MDI-X detection

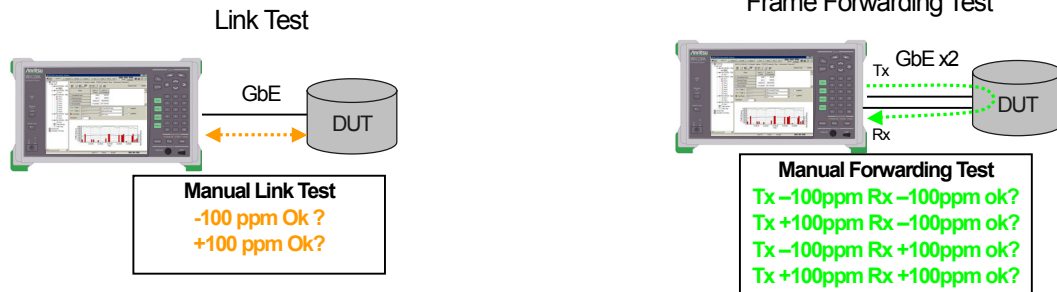
Power Protocol Modules can detect straight and cross cables automatically, so you needn't worry if you change DUT type (host or router). This provides an easier testing environment.

Variable Clock

SONET/SDH systems are described strictly regarding clocks. However, the IEEE 802.3 Ethernet Specification describes the reference clock roughly, from -100ppm to +100ppm. This therefore becomes a problem because

various DUTs may have different clocks.

Power Protocol Modules have variable clocks from -100ppm to +100ppm^{*3} for a reference clock. You can check the link test and frame forwarding test using the different clock rates.



*3 Clock accuracy is -4ppm~+4ppm

Specifications

Model	MU120121A	MU120122A
Name	10/100/1000M Ethernet Module	Gigabit Ethernet Module
Corresponding Specification	Electrical: 10BASE-T, 100BASE-TX, 1000BASE-T	Electrical: 10BASE-T, 100BASE-TX, 1000BASE-T Optical: 1000BASE-SX/LX/LE/LR (depend on SFP Module)
Connector	RJ-45	SFP (LC), RJ-45
Number of Ports	4	SFP: 2, RJ-45: 2
Bit Rate	10, 100, 1000 Mbit/s	10, 100, 1000 Mbit/s
Duplex Mode	Full/Half	Electrical: Full/Half, Optical: Full
Auto Negotiation	On/Off	On/Off
Flow Control	On/Off	On/Off
LED	Tx/Collision, Rx/Error, 10 M, 100 M, 1000 M, Duplex	Electrical: Tx/Collision, Rx/Error, 10 M, 100 M, 1000 M, Duplex Optical: Link, Tx, Rx, Error
Clock Variation	On/Off, Resolution 1 ppm, -100 ppm to +100 ppm settable. Clock Accuracy: -4 ppm to +4 ppm	
Mode	Normal, Monitor, Through ^{*1} , Address Swap	
Frame Generation (TxStream)		
Number of Streams	256 Streams/Port	
Stream Setting	Stream Transport Mode: Continuous, Continuous Burst, Stop after this Stream, Next Stream, Jump to Stream, Jump to Stream for Count (Loop Count: 1 to 16,000,000)	
	Frame per Burst	1 to 16,777,215
	Burst per Stream	1 to 1,099,511,627,775
Gap Setting	Inter Frame Gap	Electrical: 1000BASE-T: Resolution of 8 ns, 80 ns to 120 s Settable as Fixed or Random, 100BASE-TX: Resolution of 80 ns, 800 ns to 1200 s Settable as Fixed or Random, 10BASE-T: Resolution of 800 ns, 8 μs to 12000 s Settable as Fixed or Random. Optical: Resolution of 8 ns, 64 ns to 120 s Settable as Fixed or Random.
	Inter Burst Gap	Electrical: 1000BASE-T: Resolution of 8 ns, 80 ns to 120 s Settable as Fixed, 100BASE-TX: Resolution of 80 ns, 800 ns to 1200 s Settable as Fixed, 10BASE-T: Resolution of 800 ns, 8 μs to 12000 s Settable as Fixed. Optical: Resolution of 8 ns, 64 ns to 120 s Settable as Fixed.
	Inter Stream Gap	Electrical: 1000BASE-T: Resolution of 8 ns, 80 ns to 120 s Settable as Fixed, 100BASE-TX: Resolution of 80 ns, 800 ns to 120 s Settable as Fixed, 10BASE-T: Resolution of 800 ns, 8 μs to 12000 s Settable as Fixed. Optical: Resolution of 8 ns, 64 ns to 120 s Settable as Fixed.
Frame Setting	Electrical: Preamble Size: 2 to 255 byte, Optical: Preamble Size: 4 to 255 byte	
	MAC Address: Fixed, Increment, Decrement, Random (Changeable portion specified in 4 bits units)	
	VLAN tag ^{*2} : Up to 10 layer VLAN tags can be appended. VLAN ID can be set Increment, Decrement, Random.	
	MPLS label ^{*2} : Up to 10 MPLS labels can be appended. Fixed setting.	
	Protocol Editing: None, ARP, IPv4, IGMP/IPv4, ICMP/IPv4, TCP/IPv4, UDP/IPv4, RIP/UDP/IPv4, DHCP/UDP/IPv4, IPv6, IPX, IS-IS, MAC Control Frame (Pause Frame)	
	Support by IPv6 Expansion (Opt12): ICMPv6/IPv6, TCP/IPv6, UDP/IPv6, IPv6 over IPv4, ICMPv6/IPv6 over IPv4, TCP/IPv6 over IPv4, UDP/IPv6 over IPv4	
	Supported by PIM-SMv2 Protocol (Opt21): PIM Register Message	
	Supported by MLDA Protocol (Opt22): ICMPv6 MLDA Type Message	
	Supported by Spanning Tree/Link Aggregation (Opt23): STP Configuration BPDU, STP TCN BPDU, RST BPDU, MST BPDU, LACPDU, Marker PDU, Marker Response PDU	
	IPv4/IPv6 : IP Destination/Source Address can be set Fixed, Increment, Decrement, Random independently. TCP/UDP: Either Destination Port Number or Source Port Number can be set Increment, Random. Data Field: Can set any portions of data field as All0, All1, Alternate1/0 (Each bit, Each 2bits, Each 4bits, Each 1 Byte, Each 2 Bytes), Increment, Decrement, Random. Only Data Field 1 can set Programmable, Single PRBS9, Time Stamp ^{*3} , Sequence Number ^{*3} , Hardware Random Pattern ^{*3} , Test Frame. Settable Flow ID number when Test Frame is used. Programmable Header Pattern: 1 user defined pattern can be set.	

Model		MU120121A	MU120122A
Frame Size		48 to 10,000 byte, Settable as Auto, Fixed, Increment*4, or Random*4	
Error Inser- tion	Ethernet	FCS Error, Undersize, Oversize, Fragment, Oversize & FCS Error	
	IP	Dribble Bit Error, Alignment Error, Collision	
	TCP/UDP	IPV4 Header Checksum Error	
	Data	TCP/UDP Checksum Error	
Unframed BER Setting		Supported by Option 11 Packet BER Test: PRBS Error Test Pattern (Electrical): All0, All1, User 16, PRBS23, PRBS31 Test Pattern (Optical): All0, All1, User 16, PRBS23, PRBS31, CJPAT, CRPAT Error Insertion: Bit All Insertion Timing: Single, Rate (1.0E-9, 1.0E-8, 1.0E-7, 1.0E-6, 1.0E-5, 1.0E-4, 1.0E-3), Programmable Rate (1.0E-10 to 9.9E-3)	
Measurement Function			
Counter	Ethernet	Transmitted/Received Frame Count, Transmitted/Received Frame Rate, Transmitted/Received Bit Count, Transmitted/Received Bit Rate, Transmitted/Received Byte Count, Transmitted/Received Rate, FCS Error, Undersize, Fragment, Oversize, Oversize & FCS Error	
	IPv4	Dribble Bit, Alignment Error, Line Error, Collision Flow Control, Transmitted/Received ARP Request, Transmitted/Received ARP Reply	Line Error, Flow Control, Transmitted/Received ARP Request, Transmitted/Received ARP Reply Electrical: Dribble Bit, Alignment Error, Collision Optical: Byte Alignment Error
	IPv6(Opt12)	Transmitted/Received IPv4 Packet Count, Transmitted/Received IPv4 Packet Rate, Transmitted/Received Ping Request, Transmitted/Received Ping Reply, IP Header Checksum Error	
	TCP/UDP	Transmitted/Received IPv6 Packet Count, Transmitted/Received IPv6 Packet Rate, Transmitted/Received ICMPv6 (NS) Count, Transmitted/Received ICMPv6 (NA) Count, Transmitted/Received ICMPv6 (Echo Request) Count, Transmitted/Received ICMPv6 (Echo Reply) Count	
	Data	Received TCP Packet Count, Received TCP Packet Rate, Received UDP Packet Count, Received UDP Packet Rate, TCP Checksum Error*5, UDP Checksum Error*5	
	Packet BER Test (Opt11)	Capture Trigger, Capture Filter, User Defined 1 Count/Rate, User Defined 2 Count/Rate, QoS 0 to 7 Frame Count/Rate QoS Counter Setting: The target of QoS is IPv4 (ToS) or VLAN tag (Priority).	
	Unframed BER Test	Transmitted/Received Test Frame Count, Sequence Error, Received PRBS Error Frame Count/Rate, Received PRBS Error Bit Count/Rate	
	Multi Flow Counter	Bit Error Count/Rate, Pattern Sync. Loss Count/Second	
Latency	(Port 1,2 only) Settable as up to 16 bits filter to count each value at a special bit in frames. (Max 65,536 values) ex) VLAN ID, Flow ID at test frame and so on. 32 of 65,536 counters are supported for real time count.		
Frame Arrival Time (Packet Jitter)	When Test Frames are received, the latency is indicated. The result includes 1s sampling value, max, min, avg. and number of samples.		
Frame Arrival Time (Packet Jitter)		32 counters indicate the result. Resolution : 1 μ s, 10 μ s, 100 μ s, 1 ms, 10 ms, 100 ms, 1 s.	
Capture	Capture Buffer	32 MByte/Port	
	Capture Filter/Trigger	At following conditions for each port, Capture Filter/Trigger condition settings: Condition: Destination MAC Address, Source MAC Address, 128-bit pattern 1, 128-bit pattern 2, Error Only capture trigger can be set following: Traffic Over, Latency Over, External Trigger, Manual Trigger	
	Decode Protocol	Ethernet (Type II, IEEE802.3, Mac Control), VLAN, MPLS, LLC, LACP, BPDU (STP, RST, MST), ARP, IP, IPv6 (include Extended Header), IPX, OSINL, IS-IS, IGMP (include IGAP), ICMP, ICMPv6 (include NDP, MLD, MLDA) TCP, UDP, OSPF, OSPFv3, DVMRP, LDP (CR-LDP), BGP4, RIP, DHCP, RSVP (RSVP-TE), BGP4+, PIM-SMv2, PPP (include LCP, IPCP, IPV6CP, OSINLCP,	
	Extended Decode Protocol	By Sniffer® Technologies (Opt04) or MX123002A Expert Analysis Module, the number of decode protocols can be increased up to 400. MD1230 Family includes Ethereal® Convert Function.	
Protocol Emulation		AARP, ICMP, OSPF (Opt07), BGP-4, ICMPv6 (Opt12), OSPFv3 (Opt18)*6, BGP4+ (Opt19)*6, IGMP, IGAP (Opt14), MLD (Opt12), MLDA (Opt22)*6, PIM-SMv2 (Opt21)*7, MPLS (LDP/CR-LDP) (Opt08), MPLS (RSVP-TE) (Opt09)	
Traffic Monitor		Traffic Monitor can measure up to 64 streams in real-time. Target : MAC Address, IPv4 Address, IPv6 Address, Protocol Number (include Ether Type and IP Protocol Number)	
Traffic Map		Traffic Monitor can measure up to 64 streams in real-time. Target : MAC Address, IPv4 Address, IPv6 Address	
Service Disruption Time		Time of frame disruption.	
Auto Negotiation Analysis (Opt15)		—	10B Code data transmitted function, Auto negotiation sequence capture function, Link timer value variable function
RFC2544 Automatic Test		Following 6 types of tests can be supported. (MD1230 Family supports continuous test [1] to [5].) [1] Throughput, [2] Latency, [3] Frame loss rate, [4] Back-to-back frames, [5] System recovery, [6] Reset	
RFC2889 Automatic Test (Opt10)		Following 10 types of tests can be supported. [1] Fully meshed throughput, frame loss, and forwarding rate, [2] Partially meshed one-to-many/many-to-one, [3] Partially meshed multiple devices, [4] Partially meshed unidirectional traffic, [5] Congestion control, [6] Forward pressure and maximum forwarding rate, [7] Address caching capacity, [8] Address learning rate, [9] Error-frame filtering, [10] Broadcast frame forwarding and latency	

*1: On MU120121A, the Through mode can be used with port 1 and port 2, and with port 3 and port 4.

*2: VLAN tag and MPLS labels cannot both be used simultaneously.

*3: When a sequence number or time stamp or hardware random pattern is used, the check sum field of the TCP/UDP packet contains an error code.

*4: Increment and Random settings can be specified for the frame size only when None is selected for the protocol.

*5: The packets fragmented in the IP layer are not counted as error packets.

*6: Option 12 IPv6 Expansion is required.

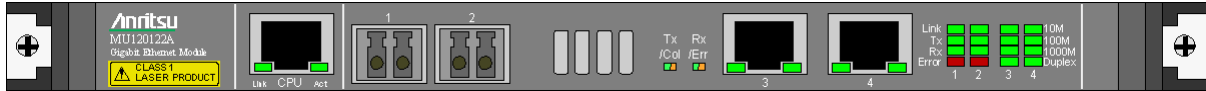
*7: Option 12 IPv6 Expansion is required when IPv6 addresses are used. Option 21 supports only IPv4 addresses.

Appearance

MU120121A 10/100/1000M Ethernet Module



MU120122A Gigabit Ethernet Module



Ordering Information

Model/Order No.	Name
MU120121A	Plug-in Modules 10/100/1000M Ethernet Module
MU120122A	Gigabit Ethernet Module
	Maintenance Service
MU120121A-90	Extended Tree Years Warranty Service
MU120122A-90	Extended Tree Years Warranty Service

Model/Order No.	Name
	Optional Accessories
G0136	SFP SX 850 nm
G0137	SFP LX 1310 nm
G0138	SFP LE 1310 nm
G0139	SFP LR 1550 nm
J1271	Optical Fiber Cord(Duplex, SM, LC-LC Connector), 2m
J1272	Optical Fiber Cord(Duplex, SM, LC-SC Connector), 2m
J1273	Optical Fiber Cord(Duplex, GI, LC-LC Connector), 2m
J1274	Optical Fiber Cord(Duplex, GI, LC-SC Connector), 2m
J1275	LAN Cable (CAT5E, Straight), 1m
J1275B	LAN Cable (CAT5E, Straight), 5m
J1275C	LAN Cable (CAT5E, Cross), 1m
J1275D	LAN Cable (CAT5E, Cross), 5m

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