

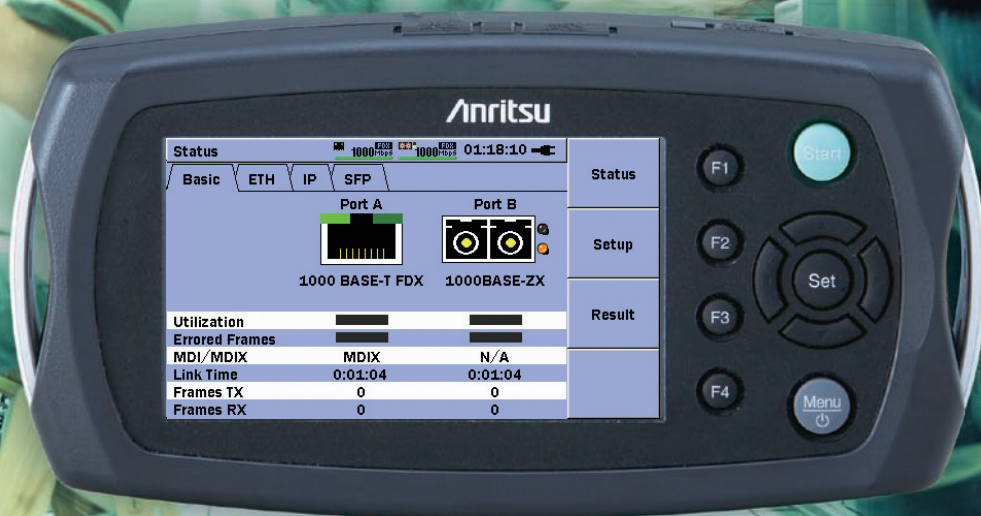
# Network Master Series

## MT9090A

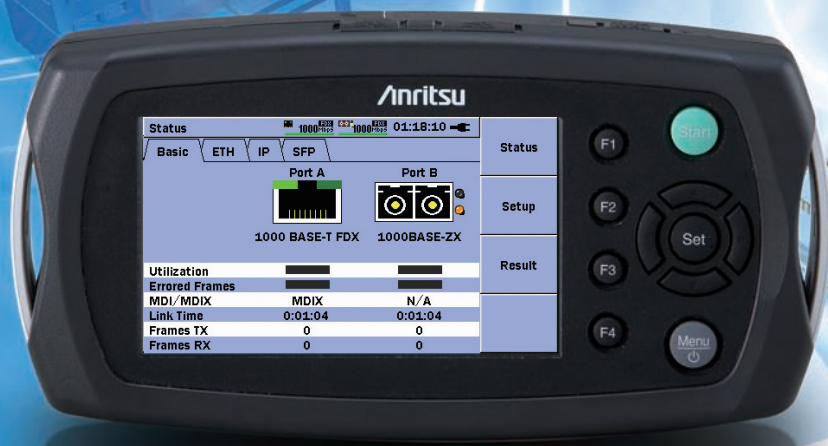
Mainframe

## MU909060A1/A2/A3

Gigabit Ethernet Modules



Network Master



# Gigabit Ethernet Testing Redefined!

## MT9090A/MU909060A1/A2/A3 OVERVIEW

The Ethernet technology is widely deployed and used for numerous applications. Therefore easy testing of Ethernet links is very important. When outfitted with the Gigabit Ethernet module, the very compact battery-powered, easy-to-use Anritsu Network Master is a comprehensive solution for Gigabit Ethernet testing and for installation and troubleshooting Ethernet communication lines. The instrument gives the user facilities for easy bandwidth verification, connectivity testing and service availability verification. The small size and low weight of the instrument makes it very easy to carry around for the field technician working with the Ethernet lines and despite the small size the instrument is equipped with a large display. The user can easily read and interpret information from the tested lines off the large color display with easy-to-understand colors and graphical symbols. And the graphical user interface makes it a simple task to configure and operate the instrument.

## Key Features

- Versatile, purpose-built solution for Gigabit Ethernet field testing
- Comprehensive Ethernet testing for installation, maintenance and troubleshooting
- Ping test and Electrical cable diagnostics
- Option for automated RFC 2544 testing
- Test Automator simplify operation and ensure proper set-up
- Pdf report generation for documentation of test results
- High resolution, widescreen color display that is easy to read indoors or out
- Rugged design provides years of service for the users
- Modular platform ensures maximum return on investment
- Compact and lightweight design for maximum portability in the field
- High performance without a high price



# Designed for Field Operations

The Network Master Gigabit Ethernet tester is purpose built for testing Ethernet links in the field. Its hardware and user interface are optimized for simplicity, making it easy to use for any skill level, and it is rugged enough to function in harsh environments.

## Quick Startup

The Network Master Gigabit Ethernet tester is ready for measurement in about 15 seconds so productive work can start immediately.

## Long Battery Life

Since AC power is not always available where you need it, the Network Master Gigabit Ethernet tester provides up to 3 hours of testing on a single charge, depending on configuration and setup. This coupled with an optional car cigarette lighter cord guarantees the instrument is ready when you are.

## Portable

With its lightweight design and user friendly dimensions, the Network Master Gigabit Ethernet tester is perfect for the outside plant environment and can easily be managed with one hand. The standard softcase with shoulder strap further increases portability when traveling from the truck to the testing site.

## Rugged

With no fans or vents to allow dust and moisture to enter the unit, the Network Master Gigabit Ethernet tester was designed for the challenging outside plant environment.

## 4.3 inch Wide Screen Display for Easy Viewing

The high resolution, full color, 4.3 inch wide screen display is the perfect format for viewing Ethernet measurement results. It also provides excellent readability both indoors and outdoors.

Status	Basic	ETH	IP	SFP	Status
1000BASE-T FDX	Port A	Port B	1000BASE-ZX		
Utilization					
Errored Frames					
MDI/MDIX	MDIX	N/A			
Link Time	0:01:04	0:01:04			
Frames TX	0	0			
Frames RX	0	0			

MU909060A1

Status	Basic	ETH	IP	SFP	Status
1000BASE-T FDX	Port A	Port B	1000BASE-T FDX		
Utilization					
Errored Frames					
MDI/MDIX	MDIX	MDIX			
Link Time	0:01:04	0:01:04			
Frames TX	0	0			
Frames RX	0	0			

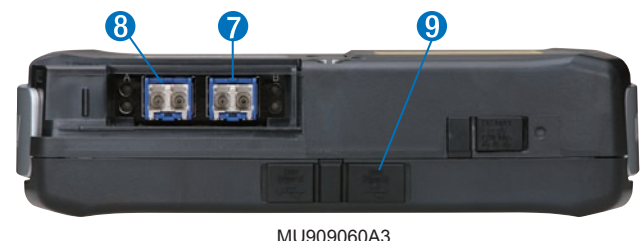
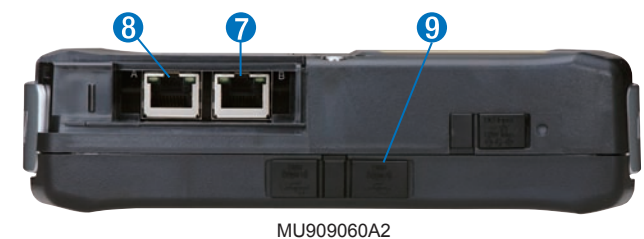
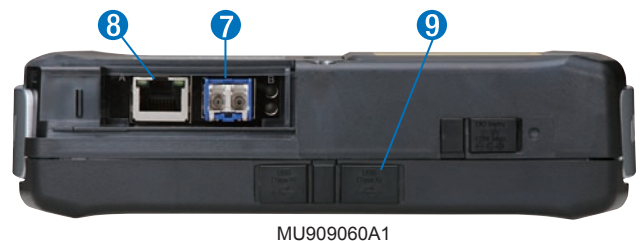
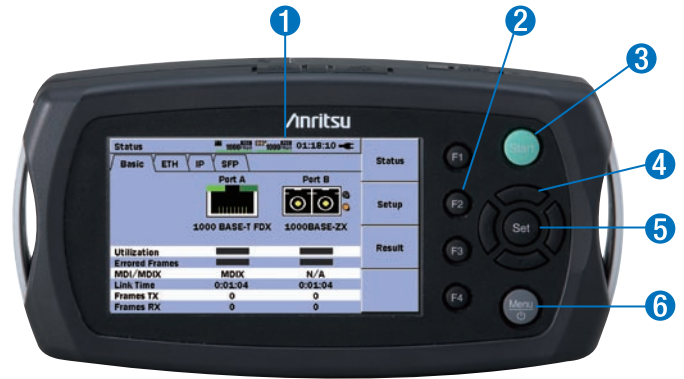
MU909060A2

Status	Basic	ETH	IP	SFP	Status
1000BASE-ZX	Port A	Port B	1000BASE-ZX		
Utilization					
Errored Frames					
MDI/MDIX	N/A	N/A			
Link Time	0:01:04	0:01:04			
Frames TX	0	0			
Frames RX	0	0			

MU909060A3

## No Experience Required

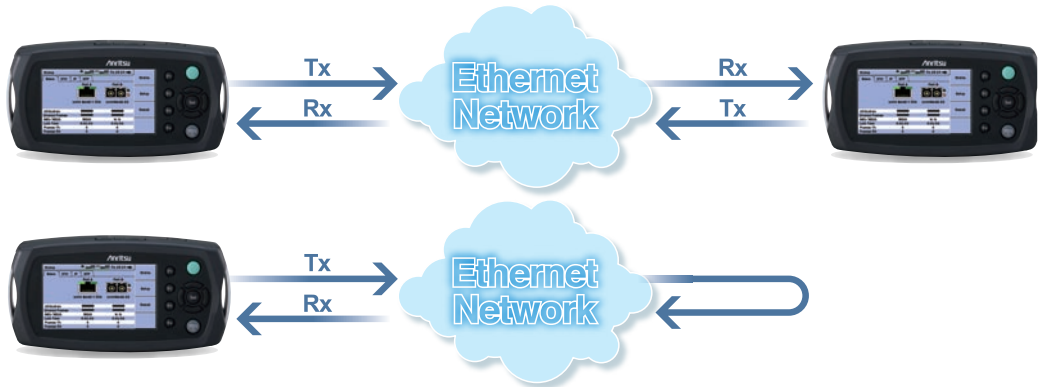
The expertise is built into the Network Master Gigabit Ethernet tester. With its Test Automator and PASS/FAIL indicators the instrument makes it easy to test and troubleshoot Ethernet connections.



- 4.3 inch high resolution, indoor/outdoor color display
- Dedicated function keys for performing tasks
- START key for fast testing
- Arrow keys for cursor movement and menu navigation
- SET to select/accept
- Menu key for easy access to set-ups and mass storage
- Ethernet test port B
- Ethernet test port A
- Dual USB ports for quick and easy data transfer

# Purpose-Built for Gigabit Ethernet Testing

For installation, commissioning and QoS verification the Network Master Gigabit Ethernet tester provides powerful and flexible traffic generation capabilities, allowing you to easily test the network under various conditions, including generation of VLAN tagged traffic. The instrument also provides facilities for BER testing of the lines, performance statistics and QoS statistics.














Out-of-service testing with two instruments or a far-end loop back/reflector.


## In-service Troubleshooting

For fast troubleshooting the Network Master Gigabit Ethernet provides essential information on the tested transmission system, including:

- Display of current line status
- Electrical cable test facility

Status										 Off		 1000 °C		16:49:42				Status
Basic		ETH		IP		SFP										Setup		
Port A										Port B							Result	
Link Partner abilities:																		
Auto Negotiation Complete:																Result		
Pause Capable:																		
Asymmetric Pause Request:																		
Remote Fault:																		
Local Clock:										N/A		N/A						
Speed FDX										10 100 1000		10 100 1000						
Speed HDX										10 100		10 100						

The status page provides an immediate overview of the tested line.

Cable 1					<div><div></div><div>1000Mbps</div><div>Off</div></div>		13:12:31		<div><div></div><div></div><div></div></div>		Back
		Port A 1000 Mbps FDX MDI									
Approximated Cable length : < 50m											
Pair	3		2		1		4				Summary
Pin	1/2		3/6		4/5		7/8				
Status	Normal		Normal		Normal		Normal				
RX/TX	BI_DB		BI_DA		BI_DD		BI_DC				
Polarity	+		-		+		-				
Length (m)	OK		OK		OK		OK				
Amp	0.00		0.00		0.00		0.00				
Skew (ns)	0		0		0		0				

The instruments cable test facility makes it easy to identify failures on electrical cables like short circuits or breaks of a wire pair

## RFC 2544 Test Option

The IETF RFC 2544 "Benchmarking Methodology for Network Interconnect Devices" defines a number of tests to be used for describing the performance characteristics of these network devices. When the instrument is equipped with the RFC 2544 test option, testing of performance parameters, such as throughput and frame loss, latency, packet jitter and burstability in compliance with RFC 2544 is straightforward. The Network Master Gigabit Ethernet tester automates the testing procedure while still allowing you to configure the test to be as thorough as needed. To get full information on the performance of both sides of a line, the end-to-end test mode allows two Network Master Gigabit Ethernet testers to work together in a master-slave setup whereby the user can control both units and inspect the results of the test from both units on the master instrument.

Throughput 1

Off

1000Mbps

11:37:08

Back


Test Mode

Duration

Destination

Frame Size

Select Test Mode



Mode: Single Ended Network Test

Port

Select Port: Port B

Throughput 1		<div><div></div><div>Off</div><div>1000Mbps</div></div>		16:50:48		<div><div></div><div></div><div></div></div>		Back
Repetition:Step		Repetition:1 Step:2						
1: 1		Tx (Port B)						
1: 2		Tx Utilization(Mbps) 900						
		Tx Frame Size(bytes) 64						
		Tx Total Frames 13.4 M						
		Tx Frame Rate(Fps) 1.34 M						
		Rx (Port B)						
		Rx Total Frames 13.4 M						
		Rx Utilization(%) 90						
		Rx Throughput(Mbps) 623						
		Rx Frames Lost min 0						
		Rx Frames Lost max 0						
		Rx Frames Lost avg 0						
		Rx Loss Rate min(%) 0						
		Rx Loss Rate Max(%) 0						
		Rx Loss Rate avg(%) 0						
		Summary						

## Multistream Option

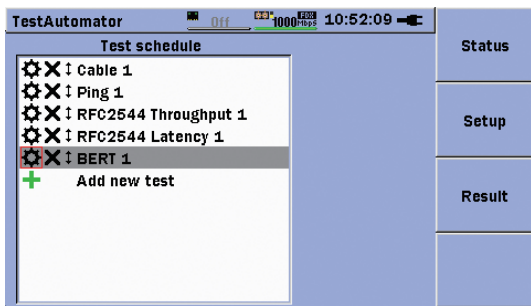
The Ethernet Multistream option for the Network Master Gigabit Ethernet tester allows testing a congested networks ability to transport high priority traffic rather than lower priority traffic. The user can activate up to 8 streams with different priority settings on the Ethernet line and detect how they are affected by frame loss through the network.

# Despite its size...it is not a toy!

People prefer to choose products that are innovative and supplied by established companies. When you need to install and maintain Ethernet lines and networks, the same criteria should apply. With many years of experience in digital line testing, Anritsu delivers the features that matter. Having a long history in the test and measurement business, we understand the importance of performance, portability, reliability, easy operation, and of course price.

## Installation and Maintenance Simplified

Since the Network Master Gigabit Ethernet tester is purposely built for easy testing of Ethernet links in the field, its hardware and user interface are optimized for simplicity. The instrument is easy to setup using its keys and screen. The user can also store setups relevant for a given application and via a USB port distribute the setup to other instruments with the Gigabit Ethernet module. A Test Automator is provided making it easy to set up a sequence of tests.



The Test Automator makes it easy to set up a sequence of tests

## Report Generation

With the powerful and flexible report generator you can create.pdf files for selected measurement results. With these files you can provide professional documentation of test results to your customers.

## Easy “drag and drop” File Transfers

When the Network Master is connected to a PC via a USB cable, the internal memory can be directly accessed. Data can be selected, dragged and dropped into the PC memory, greatly simplifying file transfers. The instrument also supports the use of USB memory sticks.

## Screen Capture Function

Screen shots are sometimes useful for adding to reports so the Network Master features the ability to save screen shots as Bitmap images.

## Free and Simple Software Upgrades

Firmware upgrades are easily performed via USB and available from the Anritsu website for registered users or through Anritsu customer support.

## Simple Data Storage

With its large internal data storage plus support for external USB memory devices, the Network Master is more than capable. Add to this auto file saving and naming for easy, error-free documenting of your network.



## Modular Design

The MT9090A Network Master series features a modular design allowing modules to be easily changed in the field. Users can switch between the Gigabit Ethernet modules, go from Ethernet testing to tests with Drop Cable Fault locator modules or perform optical channel analysis with the available CWDM channel analyzer module. Operation is quite similar between modules so the user is immediately familiar with operation.



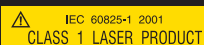
# Specifications

The specification table below applies to the Anritsu Network Master mainframe equipped with the Gigabit Ethernet module.

Ethernet interfaces	Interfaces	<ul style="list-style-type: none"> <li>Electrical interfaces: 10/100/1000 Mbps RJ 45 (10BASE-T, 100BASE-TX, 1000BASE-T)</li> <li>Optical interfaces: 100 or 1000 Mbps LC connector (100BASE-FX, 100BASE-LX, 1000BASE-SX, 1000BASE-LX or 1000BASE-ZX)</li> </ul>			
	Interface configurations	<ul style="list-style-type: none"> <li>MU909060A1: Gigabit Ethernet module with one SFP port and 1 electrical RJ-45 port. One optical module can be installed</li> <li>MU909060A2: Gigabit Ethernet module with 2 electrical RJ-45 ports.</li> <li>MU909060A3: Gigabit Ethernet module with two SFP ports. Two electrical or optical modules can be installed</li> </ul>			
	Duplex modes	Full duplex. Electrical 10/100 Mbps also Half duplex			
	Test configurations	Monitor/generate, Pass Through, Reflector			
Optical modules*1	Description	Min. input sensitivity and wavelength		Output power and wavelength	
	1000BASE-SX 850 nm Multi mode	-17 dBm	Min. 770 nm, Max. 860 nm	-9.5 to -1.5 dBm	830 to 860 nm
	1000BASE-LX 1310 nm Single mode	-20 dBm	Min. 1260 nm, Max. 1580 nm	-10 to -3 dBm	1285 to 1343 nm
	1000BASE-ZX 1550 nm Single mode	-22 dBm	Min. 1260 nm, Max. 1580 nm	-3 to +5 dBm	1480 to 1580 nm
	100BASE-FX 1310 nm Multi mode	-31 dBm	Min. 1260 nm, Max. 1570 nm	-20 to -14 dBm	1270 to 1335 nm
	100BASE-LX 1310 nm Single mode	-28 dBm	Min. 1260 nm, Max. 1570 nm	-15 to -8 dBm	1261 to 1360 nm
Generate	Supported encapsulations	EtherType II (DIX v.2), IEEE 802.3 with 802.2 (LLC1), IEEE 802.3 with SNAP			
	Traffic generation	<ul style="list-style-type: none"> <li>Variable line rate traffic generation, up to full line rate</li> <li>Traffic shaping: Constant, burst</li> <li>Frame sizes may be set to constant, stepped or random length</li> <li>Configurable Ethernet (MAC) and IP source and destination addresses (supports IPv4 and IPv6), UDP/TCP address and DSCP/TOS byte</li> <li>Request IP source address from a DHCP server (on/off)</li> <li>Adjustable frame size from 38 bytes to 10,000 bytes</li> <li>User-defined VLAN ID and VLAN priority</li> <li>User-defined traffic mix of unicast and broadcast frames</li> <li>Generate and respond to pause frames</li> <li>Answer incoming ARP request (On/Off)</li> <li>Optional Ethernet (MAC) and IP address swapping (reflector configuration)</li> </ul>			
Measurements	Status	Link status, Signal and Frames present (utilization), Errored frames, Rx/Tx frame count, Link time, Remote fault, Speed, Full/Half duplex, MDI/MDIX, Interface type, Link partner abilities (Pause capable and Asymmetric pause capable), Local clock (1000 Mbps), DHCP lease time, Optical level for optical interfaces			
	Frame statistics	<ul style="list-style-type: none"> <li>Total frames, Unicast/multicast/broadcast frames</li> <li>Number of fragmented frames, oversized frames, and undersized (runts) frames, FCS errored frames, Collisions (10/100 Mbps half duplex)</li> <li>Preamble violations, IFG violations (10/100 Mbps non-SFP), Severe IFG violations (SFP)</li> </ul>			
	Event log	The instrument logs major events during a test with a 1 sec. resolution time stamp. Logged events include: Link / no link and test start/stop			
	Report generation	Generation of test result reports as pdf-files. The report may be customized with a user logo and comments.			
Dedicated tests	Electrical cable test	NB: The electrical cable test is not available when using electrical SFP modules. <ul style="list-style-type: none"> <li>Detection of MDI/MDIX mode, Link speed and status, Cable status and distance to fault (if any), Polarity. For 1000 Mbps also skew</li> <li>Pin mapping: Tx/Rx for 10/100 Mbps, DA, DB, DC, DD for 1000 Mbps</li> </ul>			
	BER test	Generation and detection of test patterns. Count of errors in received test pattern. Pattern generation: Unframed, Framed with IP header or Framed with IP and TCP/UDP header Test patterns supported: PRBS 9, PRBS 11, PRBS 15, PRBS 20, PRBS 23, PRBS 29, PRBS 31, HF test pattern, CRPAT, JTPAT, SPAT Detection of sequence errors and loss of sequence synchronization.			
	Ping test	For connectivity and configuration check <ul style="list-style-type: none"> <li>Round Trip Time (RTT)</li> <li>Supports IPv4 and IPv6 addressing</li> <li>Answer incoming Ping requests (On/Off)</li> </ul>			
	RFC 2544 installation and commissioning tests (option)	Single ended network test and Switch/Router test modes: Throughput and utilization, Frame loss, Latency, Packet jitter, Back-to-back frames (burstability) End to end network test mode (two Network Master Gigabit Ethernet testers in a master-slave setup): Throughput and utilization, Frame loss, Back-to-back frames (burstability) Router latency test mode: IP ping based latency, IP ping based packet jitter			
	Multistream test (option)	Number of streams: Up to 8 streams can be activated on the Ethernet line Available information per stream: Frame loss count/rate, Frames and bytes received, Frames and bytes transmitted			
	Reflector delay	Maximum internal delay when instrument is in reflector configuration: 2.44 µs @1000 Mbps, 5.16 µs @100 Mbps, 31.93 µs @10 Mbps			
	Internal memory	Internal memory for storage of results, setups and screen shots: 40 Mbyte			
Miscellaneous	Stored configurations	The user can save a number of configuration files for later recall. The configuration files can be transferred to other instruments via the instruments USB port.			
	Test automator	The user can create a macro to run several tests in sequence. The user can also load, save, import and export test macros			
	Service interface	Two USB 1.1 (One type A for USB memory stick, one type B for USB mass storage)			
	Display	4.3 inch color LCD (480×272 pixels), with LED back light, transmissive			
	Language	English, Japanese			
	Battery	<ul style="list-style-type: none"> <li>Dedicated battery pack or 4 AA Ni-MH</li> <li>Operating time: Up to 3 hours, depending on configuration and test setup</li> <li>Charging time: Max. 4 hours while power off, Temperature: +10° to +30°C</li> <li>Indicator for battery level in display when the unit is turned on</li> </ul>			
	Power supply	AC adapter: 9 VDC, 100 to 240 VAC, frequency: 50/60 Hz			
	Dimensions and mass	MT9090A: 190 (W) × 96 (H) × 18 (D) mm, <200 g MU909060A1/A2/A3: 190 (W) × 96 (H) × 30 (D) mm, <600 g			
	Environmental	<ul style="list-style-type: none"> <li>Operational Temperature Range: 0° to +40°C, humidity ≤85%, No condensation</li> <li>Storage Temperature Range: -25° to +60°C, humidity ≤80%, No condensation</li> <li>Vibration: IEC 60 068-2-6 Fc and IEC 60 068-2-6 Fh, Dust and Drip proof: IP 51</li> </ul>			
	EMC	EN 300 386			
	Laser safety	IEC Pub 60825-1: 2001 Class1: MU909060A1/A3 with optical modules*2			

\*1: Correct functioning can only be guaranteed with optical modules from Anritsu for the Network Master Gigabit Ethernet tester. Modules with extended temperature range (up to +85°C) must be used.

\*2: Class 1 of IEC 60825-1 and the 21CFR1040.10.



THIS PRODUCT COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE NO 50 DATED JULY 26 2001



# Ordering Information

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

The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

## 1) Select Mainframe

Includes battery pack, AC charger/adaptor, standard soft case and strap

Model/Order No.	Description
MT9090A	Mainframe (with color LCD)

## 2) Select Base Module

Includes operation manual on in hard copy

Model/Order No.	Description
MU909060A1	Gigabit Ethernet Tester Module (with one SFP slot and one RJ-45 port)
MU909060A2	Gigabit Ethernet Tester Module (with two RJ-45 ports)
MU909060A3	Gigabit Ethernet Tester Module (with two SFP slots)

## 3) Select Module Option

One module can be installed in MU909060A1. Two modules can be installed in MU909060A3

Model/Order No.	Description
G0240A	1000 Mbps SX SFP, 850 nm multimode, LC connector (optical)
G0241A	1000 Mbps LX SFP, 1310 nm single mode, LC connector (optical)
G0242A	1000 Mbps ZX SFP, 1550 nm single mode, LC connector (optical)
G0243A	100 Mbps FX SFP, 1310 nm multimode, LC connector (optical)
G0244A	100 Mbps LX SFP, 1310 nm single mode, LC connector (optical)
G0246A	10/100/1000 Mbps SFP, RJ-45 connector (electrical)

## 4) Select Software Option

Model/Order No.	Description
MU909060A1-001	RFC 2544 Test (for MU909060A1)
MU909060A2-001	RFC 2544 Test (for MU909060A2)
MU909060A3-001	RFC 2544 Test (for MU909060A3)
MU909060A1-002	Multistream (for MU909060A1)
MU909060A2-002	Multistream (for MU909060A2)
MU909060A3-002	Multistream (for MU909060A3)

## 5) Select Accessories

Must be added as separate line items

Model/Order No.	Description
G0203A	AC Adapter (Replacement)
G0202A	NiMH Battery Pack (Replacement)
B0600A	Hard Case
B0601A	Standard Soft Case
Z1023A	Strap
B0602A	Deluxe Soft Case (for MT9090A)
J1402A	Car Plug Cord
W3173AE	Quick Start Guide
W3166AE	Operation Manual (Hardcopy – English version)
Z1234A	Operation Manual (CD – English and Japanese)
MT9090A-ES310	3 Years Extended Warranty Service (for MT9090A)
MU909060A1-ES210	2 Years Extended Warranty Service (for MU909060A1)
MU909060A2-ES210	2 Years Extended Warranty Service (for MU909060A2)
MU909060A3-ES210	2 Years Extended Warranty Service (for MU909060A3)
MU909060A1-ES310	3 Years Extended Warranty Service (for MU909060A1)
MU909060A2-ES310	3 Years Extended Warranty Service (for MU909060A2)
MU909060A3-ES310	3 Years Extended Warranty Service (for MU909060A3)

## 6) Post Installed Software Option

The following software options can be field installed by the customer in already purchased Network Master Gigabit Ethernet testers.

Model/Order No.	Description
MU909060A1-301	RFC 2544 Test (for MU909060A1) - field installed by customer
MU909060A2-301	RFC 2544 Test (for MU909060A2) - field installed by customer
MU909060A3-301	RFC 2544 Test (for MU909060A3) - field installed by customer
MU909060A1-302	Multistream (for MU909060A1) - field installed by customer
MU909060A2-302	Multistream (for MU909060A2) - field installed by customer
MU909060A3-302	Multistream (for MU909060A3) - field installed by customer



**Standard Soft Case**



**Deluxe Soft Case**

Full Network Master operation without removal from the case. Providing excellent protection for use in harsh conditions.



**Hard Case**

**MU909020A OCA Module for MT9090A**

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


**MU909011A Fault Locator Module for MT9090A**

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


**CMA 3000 All-in-one Field Tester**

Test of many interfaces including Ethernet

**CMA5000a Multi-Layer Network Test Platform**

A wide selection of test modules including Gigabit Ethernet and 10 Gbps Ethernet



# Anritsu

Specifications are subject to change without notice.

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