



Artisan Technology Group is your source for quality new and certified-used/pre-owned equipment

- FAST SHIPPING AND DELIVERY
- TENS OF THOUSANDS OF IN-STOCK ITEMS
- EQUIPMENT DEMOS
- HUNDREDS OF MANUFACTURERS SUPPORTED
- LEASING/MONTHLY RENTALS
- ITAR CERTIFIED SECURE ASSET SOLUTIONS

SERVICE CENTER REPAIRS

Experienced engineers and technicians on staff at our full-service, in-house repair center

*InstraView*SM REMOTE INSPECTION

Remotely inspect equipment before purchasing with our interactive website at www.instraview.com ↗

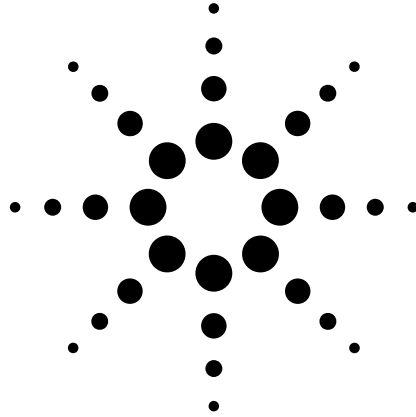
WE BUY USED EQUIPMENT

Sell your excess, underutilized, and idle used equipment. We also offer credit for buy-backs and trade-ins. www.artisanng.com/WeBuyEquipment ↗

LOOKING FOR MORE INFORMATION?

Visit us on the web at www.artisanng.com ↗ for more information on price quotations, drivers, technical specifications, manuals, and documentation

Contact us: (888) 88-SOURCE | sales@artisanng.com | www.artisanng.com



Agilent RouterTester

P48/2 Test Module

E7901A

Technical Datasheet



- **Enables Internet-scale testing of gigabit and terabit routers**
- **Two OC-48c/STM-16c (2.488 Gb/s) Packet over SONET/SDH (POS) interfaces per test module**
- **Generates and analyzes IP packets at wire-speed when used with RouterTester IP Performance Test Software**
- **Measurements between multiple modules are synchronized**
- **Verifies SONET/SDH interfaces**
- **Verifies PPP/HDLC interfaces**



Agilent Technologies

Technical Specifications

System Specifications

Physical Interface

Connector	<ul style="list-style-type: none"> 2 x Simplex (transmit and receive) SC female connectors (Interchangeable adapters available for other types)
Optical interface	<ul style="list-style-type: none"> 1310 nm single-mode PIN based receiver 1310 nm Class 1 single mode laser Compliant with: <ul style="list-style-type: none"> Telcordia Technologies GR-253-CORE (Issue 2, Rev. 2, Jan. 99 1999 - SR short reach OC-48 interface specification), and ITU-T G.957 (June, 1999) I-16 intra-office STM-16 interface specification

Input sensitivity	<ul style="list-style-type: none"> -18.5 dBm (min)
-------------------	---

Maximum input power	<ul style="list-style-type: none"> -3.0 dBm
---------------------	--

Average output power	<ul style="list-style-type: none"> -3.0 dBm (max), -9.5 dBm (min)
----------------------	--

Transmit clock source	<p>The transmit clock source can be:</p> <ul style="list-style-type: none"> Internally generated, Recovered from the received SONET/SDH signal, or Generated by an external reference clock
-----------------------	--

External Reference Clock

Connector	<ul style="list-style-type: none"> SMB connector
Specification	<ul style="list-style-type: none"> 0 dBm (nominal) terminated in 50 ohm to ground input
Signal	<ul style="list-style-type: none"> 19.44 MHz (nominal)
Duty cycle	<ul style="list-style-type: none"> 50 +/- 5%

Measurement System

Result types	<ul style="list-style-type: none"> Cumulative: measurements are reported from the start of the measurement interval Sampled: measurements are reported from the most recently completed sampling interval
Measurement interval	<ul style="list-style-type: none"> Range: 1 second to 7 days
Sampling interval	<ul style="list-style-type: none"> Range: 1 second to 1 hour
Measurement clock	<ul style="list-style-type: none"> 10 ns resolution +/- 0.5 ppm/year clock drift 3 ppm max. difference between systems
Module Synchronization	<ul style="list-style-type: none"> All measurements are synchronized across all modules within the test system

Packet over SONET/SDH Layer Specifications

Framing

Encapsulation	<p>IP datagrams are encapsulated using:</p> <ul style="list-style-type: none"> PPP in HDLC-like framing, as per IETF RFC 1662, or Cisco HDLC (Ethertype protocol field)
---------------	---

FCS	<ul style="list-style-type: none"> 32 bit FCS length Negotiated between test port and device under test
-----	---

Frame spacing	<ul style="list-style-type: none"> Frames can be transmitted continuously with a minimum one flag octet between frames
---------------	---

PPP	<ul style="list-style-type: none"> Supports the Link Control Protocol and the IP Control Protocol Rejected packets are counted by protocol type <p>Configurable parameters:</p> <ul style="list-style-type: none"> Restart Timer (default 3 seconds) Max-terminate (default 2) Max-configure (default 10) Max-failure (default 5) <p>LCP negotiation parameters:</p> <ul style="list-style-type: none"> Maximum-Receive-Unit (default 1500) Magic-Number (default is randomly chosen) FCS (32 bit supported only) <p>IPCP negotiation parameters:</p> <ul style="list-style-type: none"> IP Address
-----	---

Scrambling/Descrambling	<p>$1 + X^{43}$, after HDLC framing. Scrambling can be enabled or disabled</p>
-------------------------	---

Minimum frame size	<p>13 octets for HDLC, so as to encapsulate a minimum PPP frame size of 6 octets 29 octets for IP, so as to encapsulate a minimum-IP frame size of 20 octets</p>
--------------------	--

HDLC Real-Time Transmit Statistics

Frames transmitted	<ul style="list-style-type: none"> Count of total frames transmitted
Maximum frames transmitted	<ul style="list-style-type: none"> The maximum sample value measured during the current measurement interval
Octets transmitted (before octet stuffing)	<ul style="list-style-type: none"> Count of octets transmitted prior to the escape sequence transparency octets being inserted
Maximum octets transmitted (before octet stuffing)	<ul style="list-style-type: none"> The maximum sample value measured during the current measurement interval
Octets transmitted (after octet stuffing)	<ul style="list-style-type: none"> Count of octets transmitted, including transparency octets
Maximum octets transmitted (after octet stuffing)	<ul style="list-style-type: none"> The maximum sample value measured during the current measurement interval
HDLC transparency efficiency (percentage)	<ul style="list-style-type: none"> The maximum sample value measured during the current measurement interval

HDLC Real-Time Receive Statistics

Frames received	• Count of all HDLC frames received, including FCS errors, aborted frames and invalid frames
Maximum frames received	• The maximum sample value measured during the current measurement interval
Octets received (before destuffing)	• Count of octets received including all octets between flag sequence octets before removal of escape sequence octets
Maximum octets received (before destuffing)	• The maximum sample value measured during the current measurement interval
Octets received (after destuffing)	• Count of octets received after removal of flag and escape sequence octets
Maximum octets received (after destuffing)	• The maximum sample value measured during the current measurement interval
FCS errors	• Count of HDLC frames received with an invalid FCS
Aborted frames	• Count of HDLC frames that end with the frame abort sequence 0x7D 0x7E
Invalid frames	• Count of HDLC frames received with an address field or control field not equal to the preset values, or length too short (i.e. less than or equal to 8 octets)

SONET/SDH Layer Specifications

Framing Formats

SONET	• STS-48c as per ANSI T1.105 and Telcordia Technologies GR-253-CORE (Issue 2, Rev. 2, Jan. 1999 1999 - SR short reach OC-48 interface specification)
SDH	• STM-16c as per ITU-T Rec. G.708/G.709, 1993

Scrambling

Frame synchronous scrambler	• Can be enabled or disabled
-----------------------------	------------------------------

Section/Regenerator Section Overhead Octet Generation

A1, A2	• Set to 0xF628 (for all STS-Ns/STM-Ns)
J0/Z0	• In Section Growth mode (Default), J0 = 1 and each Z0 octet set based on position in the STS-N frame (e.g. Z0 ₂ =2, ... Z0 ₄₈ = 48 for STS-48c) • In Section Trace mode, J0 set to 64 byte message (ASCII string, CRLF terminated), Z0 unused, set to zero
B1	• Automatically calculated
E1, F1, D1...D3	• Unused, set to zero
Undefined octets	• Unused, set to zero

Line/Multiplexer Section Overhead Octet Generation

H1...H3	• Automatically calculated, including concatenation indicators
B2	• Automatically calculated (for all STS-Ns)
K1/K2	• User-definable 16 bit field, default zero
D4...D12	• Unused, set to zero
S1	• Least significant 4 bits can be set to predefined values, default zero
Z1, Z2	• Unused, set to zero
M1	• Automatically calculated
E2	• Unused, set to zero
All Other Line Overhead Octets	• Unused, set to zero

Path Overhead Octet Generation

J1	• Can be set to a 64 byte message (ASCII string, CRLF terminated)
B3	• Automatically calculated
C2	• Automatically calculated as per framing and scrambling format, or user defined
G1	• Path REI bits are automatically calculated (count of errors from B3); path RDI bits are set as per alarm generation
F2	• Unused, set to zero
H4	
Z3 (SONET)/F3 (SDH)	
Z4 (SONET)/K3 (SDH)	
Z5 (SONET)/N1 (SDH)	

Alarms

Alarm detection	• Alarm conditions are detected in real-time – Current alarm status is indicated on the user interface and front panel LEDs – Alarm events are reported in a trace log during the measurement interval • Number of errored seconds is reported per alarm type (count of 1s intervals in which the alarm is detected at least once)
Alarm generation	• Alarm conditions can be invoked, one type at a time
SONET alarm types	• LOS • LOF • LOP • AIS-L • RDI-L • AIS-P • RDI-P

P48/2 Test Module

SDH alarm types	<ul style="list-style-type: none"> • LOS • LOF • LOP • MS-AIS • MS-RDI • AU-AIS • Path-RDI
-----------------	---

Error Monitoring

Section BIP-8 (B1) errors	• Number of occurrences reported
Line BIP-8 (B2) errors	• Number of errored seconds reported
Path BIP-8 (B3) errors	

Overhead Octet Real-Time Decode

Automatic Protection Switching (APS) octets (K1/K2)	• Received 16 bit value is displayed in hex
---	---

Synchronization status (S1) value	• Received octet values are decoded for display
-----------------------------------	---

Path signal label (C3) value	
------------------------------	--

Section trace (J0) message	• Trace messages are decoded and displayed as 64 byte strings (ASCII text, CRLF terminated)
Path trace (J1) message	

Mechanical Specifications

Module Details

Size	• 441 mm (width) x 390 mm (depth) x 44 mm (height)
------	--

Weight	• 4.8 kg
--------	----------

Supply voltage	• 100 to 240 Volts AC only
----------------	----------------------------

Supply frequency	• 50 to 60 Hz
------------------	---------------

Power consumption	• 150 watts maximum
-------------------	---------------------

Input current	• Less than 3.0 amps RMS, measured at 85 VAC
---------------	--

Input protection	• Non-user serviceable, internally located 5 amp, anti-surge AC input line fuse
------------------	---

Inrush current	• 35 amps peak (Vin = 230 VAC, one cycle, 25°C.). Current internally limited by thermistor
----------------	--

Power factor	• 0.95 W/VA (Per EN61000-3-2)
--------------	-------------------------------

Rear connectors	<ul style="list-style-type: none"> • Ethernet: <ul style="list-style-type: none"> – RJ-45 • Clock line connectors (input/output): <ul style="list-style-type: none"> – SMA • Event lines (input/output): <ul style="list-style-type: none"> – Twin BNC • External trigger input/external trigger output: <ul style="list-style-type: none"> – BNC
-----------------	---

Front Panel LED Indicators

Power	• Green when module has power
-------	-------------------------------

Status	• Yellow to indicate module start-up, green to indicate that a test application is running, red to indicate a module error
--------	--

Module	• Numerical module identifier
--------	-------------------------------

Laser	• Red when output laser is on
-------	-------------------------------

Signal	• Green when a valid optical receive signal is detected (opposite of LOS condition)
--------	---

LOF/LOP	• Yellow when a Loss of Frame or Loss of Pointer condition exists at the receiver
---------	---

AIS/RDI	• Yellow when a Line/MS AIS, Line/MS RDI, Path AIS or Path RDI condition exists at the receiver
---------	---

Tx	• Green when a HDLC frame is transmitted. Does not indicate integrity of the transmitted SONET SPE
----	--

Rx	• Green when a HDLC frame is received. Indicates integrity of the SONET SPE and HDLC framing
----	--

Environmental Operating Conditions

Operating temperature	• 0° C to 50° C
-----------------------	-----------------

Storage temperature	• -40° C to 70° C
---------------------	-------------------

Humidity	• 50% to 95% relative humidity at 5° C to 140° C
----------	--

Regulatory Compliance

Electrical (Electromagnetic Compliance - EMC)

- As per EN 61326-1:1997: Electrical equipment for measurement, control and laboratory use

Emission standards

- CISPR 11:1992 + A2: 1996 (electrical disturbance): Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical radio frequency equipment. This equipment meets Group 1, Class A limits
- EN 61000-3-2:1995 / IEC 1000-3-2:1995, Section 2: Limits for harmonic current emissions
- EN 61000-3-3:1994 / IEC 1000-3-3:1994, Section 3: Limitation of voltage fluctuations and flicker

Immunity standards

- EN 61000-4-2:1997 / IEC 1000-4-2:1995, Section 2: Electrostatic discharge test
- EN 61000-4-3:1995 / IEC 1000-4-3:1995, Section 3: Radiated electromagnetic field test
- EN 61000-4-4:1995 / IEC 1000-4-4:1995, Section 4: Electrical fast transient/burst test
- EN 61000-4-5:1995 / IEC 1000-4-5:1995, Section 5: Surge immunity test
- EN 61000-4-6:1996 / IEC 1000-4-6:1996, Section 6: Radiated electromagnetic field test
- EN 61000-4-8:1993 / IEC 1000-4-8:1993, Section 8: Power frequency magnetic field immunity test
- EN 61000-4-11:1994 / IEC 1000-4-11:1994, Section 11: Voltage dips, short interruptions, voltage variations immunity test

Electrical (safety)

- CSA22.2 No. 1010.1, NRTL/C, EN 61010-1:1993 + A2: 1995/IEC 1010-1:1990 + A1: 1992 + A2: 1995 Safety requirements for electrical equipment for measurement, control, and laboratory use

Optical (safety)

- Complies with IEC 825/CDRH Class 1, and 21 CFR 1040 - Class 1 Laser Products

Applicable Standards

Optical transmitter and receiver	<ul style="list-style-type: none"> Telcordia Technologies GR-253-CORE (Issue 2, Rev. 2, Jan. 99 1999 - SR short reach OC-48 interface specification) ITU-T G.957 (June, 1999) I-16 intra-office STM-16 interface specification
SONET/SDH	<ul style="list-style-type: none"> SONET STS-48c as per ANSI T1.105 and Telcordia Technologies/Telcordia Technologies GR-253-CORE (Issue 2, Rev. 2, Jan. 1999 - SR short reach OC-48 interface specification) SDH STM-4c as per ITU-T Rec. G.707/G.708/G.709, (03/1996)
Packet Over SONET/SDH	<ul style="list-style-type: none"> IETF RFC 2615, PPP over SONET/SDH
PPP/HDLC	<ul style="list-style-type: none"> IETF RFC 1662, PPP in HDLC-like Framing
Link Control Protocol	<ul style="list-style-type: none"> IETF RFC 1661, The Point-to-Point Protocol (PPP)
IP Control Protocol	<ul style="list-style-type: none"> IETF RFC 1332, The PPP Internet Protocol Control Protocol (IPCP)



Artisan Technology Group is your source for quality new and certified-used/pre-owned equipment

- FAST SHIPPING AND DELIVERY
- TENS OF THOUSANDS OF IN-STOCK ITEMS
- EQUIPMENT DEMOS
- HUNDREDS OF MANUFACTURERS SUPPORTED
- LEASING/MONTHLY RENTALS
- ITAR CERTIFIED SECURE ASSET SOLUTIONS

SERVICE CENTER REPAIRS

Experienced engineers and technicians on staff at our full-service, in-house repair center

*InstraView*SM REMOTE INSPECTION

Remotely inspect equipment before purchasing with our interactive website at www.instraview.com ↗

WE BUY USED EQUIPMENT

Sell your excess, underutilized, and idle used equipment. We also offer credit for buy-backs and trade-ins. www.artisanng.com/WeBuyEquipment ↗

LOOKING FOR MORE INFORMATION?

Visit us on the web at www.artisanng.com ↗ for more information on price quotations, drivers, technical specifications, manuals, and documentation

Contact us: (888) 88-SOURCE | sales@artisanng.com | www.artisanng.com