Agilent RouterTester 900

RouterTester 900 Packet over SONET/SDH Routing Test Cards

2-Port OC-48c POS Routing Test Card (E7909A)
2-Port OC-3c/OC-12c POS Routing Test Card (E7917A)

Technical Datasheet

Provides wire-speed traffic generation and realistic Internet-scale routing simulation for testing of core and edge network elements with Packet-over-SONET/SDH interfaces.

Agilent Technologies

Key Features

- **Dual-port interface cards**
- **Wire-speed traffic generation and analysis**
- **Full IP routing and MPLS signaling protocol support**
- **Compatible with RouterTester 900 chassis**
- **PPP- and SONET-layer test features**

Product Overview

The Agilent Technologies RouterTester provides cost-effective multi-port traffic generation and unprecedented performance analysis of today's networking devices – from wire-speed packet generation, to comprehensive conformance testing, through to simulation of Internet-scale topologies around routers and optical switches.

The POS Test Cards scale to provide hundreds of ports of connectivity to your SUT, providing an unparalleled Internet-scale test solution. Other RouterTester test modules can be combined with cards & chassis to create a system that tests multiple network interfaces simultaneously, including OC-3c/12c (STM-1/4c) ATM, OC-192c (STM-16c) POS, 10/100 Mb/s Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet.

RouterTester 900 POS Routing Test Card

Product Features

Dual-port interface cards

Provides two full-duplex ports per card. For the OC-3c/12c card, each port is individually selectable between 155 Mb/s (OC-3c/STM-1) or 622 Mb/s (OC-12c/STM-4c) rates. Each port provides a single-mode full-duplex SC or LC fibre connector to the interface on the system under test (SUT).

Wire-speed traffic generation and analysis

Each full-duplex port can generate, receive, and analyze IP packets in real time, at wire speed.

Full IP routing and MPLS signaling protocol support

RouterTester emulates the entire suite of routing protocols that are used in today's networks and Agilent will continue to evolve these protocols. Current protocols supported include BGP-4, OSPF, IS-IS and RIP, enabling the creation of highly scalable and realistic networks around the system under test. MPLS signaling protocols, such as RSVP-TE and LDP/CR-LDP, can be used to establish thousands of tunnels through the SUT. With RouterTester's IP Performance software application, packet-forwarding performance is measured while routes are simultaneously advertised and withdrawn.

Compatible with RouterTester 900 chassis

The POS Test Cards are fully compatible with the new form-factor RouterTester 900 4-slot chassis. This chassis provides optimum flexibility for both low port-count and high port-count systems, and allows test cards to be easily exchanged between chassis.

PPP- and SONET-layer test features

The POS Test Cards support capture of PPP headers and IP packets for protocol analysis, with up to 64 MB of capture RAM per port. The cards also feature SONET/SDH-layer alarm monitoring and generation for debugging and system configuration.

Configuration

The POS Routing Test Cards are components of a RouterTester 900 system. They require a chassis, system controller PC, and necessary software in order to function. Please see the "RouterTester Ordering and Configuration Guide" for more information.

Product Numbers

E7917A 2 Port OC-3c/OC-12c POS Routing Card

- Option 001: Single Mode Intermediate Reach Optics
- Option 002: Multimode Optics

E7909A RouterTester OC-48c POS Routing Card

- Option 001: Single Mode Intermediate Reach Optics

Technical Specifications

System Specifications

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Optical Interface		
Connector	Two duplex SC connectors	Two duplex LC connectors
Optical	Single Mode • 1310 nm receiver • 1310 nm Class 1 laser transmitter • Compliant with Telcordia GR-253-CORE intermediate reach and ITU-T G.957 S-4.1 short-haul specifications (for OC-12c/STM-4c) Multimode • 1310 nm receiver • 1310 nm LED transmitter • Compliant with ATM Forum 622.08 Mb/s Physical Layer Specification (AF-PHY-0046.000)	Single mode: • 1310 nm receiver • 1310 nm Class 1 laser transmitter • Compliant with Telcordia GR-253-CORE short reach (for OC-48c) and ITU-T G.957 intra-office (for STM-16c) specifications
Input Power	Single Mode • Minimum: -28 dBm • Maximum: -7 dBm Multimode • Minimum: -28 dBm • Maximum: -11 dBm	• Minimum: -28 dBm • Maximum: -3 dBm
Output Power	Single Mode • Minimum: -15 dBm • Nominal:-11 dBm • Maximum:-8 dBm Multimode • Minimum: -19.5 dBm • Nominal:-17 dBm • Maximum:-14 dBm	• Minimum: -10 dBm • Nominal: -5 dBm • Maximum: -3 dBm
Safety	Complies with IEC 825/CDRH Class 1	
Measurement System		
Result Types	Cumulative: measurements are reported from the start of the measurement interval Sampled: measurements are reported from the most recently completed sampling interval	
Measurement Interval	Range: 1 second to 7 days	
Sampling Interval	Range: 1 second to 1 hour	
Measurement Clock	10 ns resolution +/- 0.5 ppm/year clock drift 3ppm max. difference between cards	

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Interface Synchroniz-ation	• All measurements are synchronized across all cards and modules within the RouterTester system	
External Reference Clock		
Connector	SMB	
Input	0 dBm (nominal)	
Impedance	50 Ω to ground	
Frequency	19.44 MHz (nominal)	
Duty Cycle	50% +/- 5%	
Traffic Generation		
IP Streams per port	256	
IP Flows per stream	65536	
Max IP packet length	65526 bytes	
Min IP packet length	40 bytes	
Capture Subsystem		
Capture Memory	64 MB per port	32 MB per port

Link-Layer (POS) Specifications

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Framing		
Encapsulation	IP datagrams are encapsulated using: PPP in HDLC-like framing, as per IETF RFC 1662, or Cisco HDLC (Ethertype protocol field)	
FCS	16 or 32 bit length Negotiated between test port and device under test	32-bit length (only) Negotiated between test port and device under test
Frame spacing	Frames can be transmitted continuously with a minimum one flag octet between frames	
PPP configurable parameters	Restart Timer (default 3 sec) Max-terminate (default 2 sec) Max-configure (default 10 sec) Max-failure (default 5 sec)	
LCP negotiation parameters	Max-Receive-Unit (default 1500) Magic-Number (default is randomly chosen) FCS (default 32 bit)	

2-Port OC-3c/OC-12c POS Routing Test Card

IPCP negotiation parameters	IP address
Scrambling/ Descrambling	1 + X ^43, after HDLC framing. Scrambling can be enabled or disabled
Minimum frame size	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

HDLC Real-Time Transmit Statistics

Frames transmitted
Octets transmitted (before octet stuffing)
Octets transmitted (after octet stuffing)
HDLC transparency efficiency (percentage)

HDLC Real-Time Receive Statistics

Frames received
Octets received (before octet destuffing)
Octets received (after octet destuffing)
FCS errors
Aborted frames
Invalid frames

Physical Layer (SONET/SDH) Specifications

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Configuration Options		
Framing	SONET or SDH	
Scrambling	On/Off	
Descrambling	On/Off	
Clock source	Internal, Recovered, or External	
Adjustable SONET Clock	Not Applicable	-30 to +30 ppm
Port mode	Full duplex, Receive monitor, or Transmit loopback	
User-definable overhead fields	C2 (Path Signal) K1/K2 (Automatic Protection Switching) S1 (Synchronization Status) J0 or Z0 (Section Trace or Growth)	

Alarm Indications

Loss of Signal (LOS)
Loss of Frame (LOF)
Loss of Pointer (LOP)
AIS-L/MS-AIS
RDI-L/MS-RDI
AIS-P/AU-AIS
RDI-P/Path RDI

Alarm Generation

Loss of Frame (LOF)
Loss of Pointer (LOP)
AIS-L/MS-AIS
RDI-L/MS-RDI
AIS-P/AU-AIS
RDI-P/Path RDI

Real-time Statistics

Section BIP-8 (B1) Errors
Line BIP-8 (B2) Errors
Path BIP-8 (B3) Errors

Mechanical Specifications

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Physical		
Width	206mm	
Depth	313mm	
Height	30mm	
Weight	875g	
Electrical		
Power consumption	40W max	60W max
Environmental		
Operating temperature	0 °C to 40 °C	
Storage temperature	-40 °C to 70 °C	
Humidity	50% to 95% relative humidity at 5 °C to I40 °C	

Regulatory Compliance

Electromagnetic Compatibility

IEC 61326-1:1997 + A1:1998 / EN 61326-1:1997 + A1:1998 Class A, Annex B

This equipment is designed to operate in a controlled electromagnetic environment, ie where RF transmitters such as mobile telephones may not be used in close proximity

EMC Directive 89/336/EEC (including 93/68/EEC

Electrical Safety

CAN/CSA C22.2 No. 1010.1 (1993)

UL 3101, 3111 (First Editions)

This equipment has also been evaluated to IEC 61010 Edition 1 including amendments 1 + 2 (Safety requirements for electrical equipment for measurement, control and laboratory use) by CSA international

Low voltgae Directive 72/23/EEC

Optical Safety (when fitted with optical interfaces cards)

IEC 60825-1 : Edition 1.2 : 2001
CFR title 21 part 1040.10 and 1040.11

Front Panel

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Connectors		
Ext Clk	External 19.44 MHz clock input (SMB)	
Test Ports	Duplex SC Single mode or multimode	Duplex LC Single mode
LED Indicators		
Status	4-digit display to indicate card status and numerical identification	
LASR	Red when output laser is on	
SGNL	Green when a valid optical receive signal is detected	
TX	Green when an HDLC frame is transmitted	Not applicable
RX	Green when an HDLC frame is received	Not applicable
155	Green when the port is operating at OC-3c/STM-1 speed	Not applicable
622	Green when the port is operating at OC-12c/STM-4c	Not applicable
LOF/LOP	Yellow when a Loss of Frame or Loss of Pointer condition exists at the receiver	Not applicable
AIS/RDI	Yellow when a Line/MS AIS, Line/MS RDI, Path AIS or Path RDI condition exists at the receiver	Not applicable

Applicable Standards

	OC-3c/12c (STM-1/4c)	OC-48c (STM-16c)
Optical Transmitter and Receiver		
SONET	• OC-12c Single Mode: Telcordia GR-253-CORE Intermediate Reach Specifications (Issue 2, Rev 2, Jan 1999) - IR intermediate reach OC-12 interface specification) • OC-12c Multimode: ATM Forum 622.08 Mbps Physical Layer Specification (af-phy-0046.000, Jan 1996)	•Telcordia GR-253-CORE (Issue 2, Rev. 2, Jan. 99 1999 - SR short reach OC-48 interface specification)
SDH	•ITU-T G.957 (06/99) S-4.1 Short Haul Specifications	•ITU-T G.957 (06/99) I-16 intra-office STM-16 interface specification
SONET/SDH		
SONET	STS-3c/STS-12c as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 2, Rev 2, Jan 1999)	STS-48c as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 2, Rev 2, Jan 1999)
SDH	STM-1/STM-4c as per ITU-T Rec. G.707/G.708/G.709 (03/1996)	STM-16c as per ITU-T Rec. G.707/G.708/G.709 (03/1996)
SONET/SDH		
SONET	STS-3c/STS-12c as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 2, Rev 2, Jan 1999)	STS-48c as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 2, Rev 2, Jan 1999)
SDH	STM-1/STM-4c as per ITU-T Rec. G.707/G.708/G.709 (03/1996)	STM-16c as per ITU-T Rec. G.707/G.708/G.709 (03/1996)

Protocols	
Packet over SONET/SDH	•IETF RFC 2615, PPP over SONET/SDH
PPP/HDLC	•IETF RFC 1662, PPP in HDLC-like Framing
Link Control Protocol	•IETF RFC 1661, The Point-to-Point Protocol (PPP)
IP Control Protocol	•IETF RFC 1332, The PPP Internet Protocol Control Protocol (IPCP)

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Agilent's RouterTester system

Agilent's RouterTester system offers a powerful and versatile test platform to address the evolving test needs of metro/edge platforms, core routers and optical switches. RouterTester provides Network Equipment Manufacturers and Service Providers with the industry's leading tools for wire speed, multiport traffic generation and performance analysis of today's networking devices.

Warranty and Support

Hardware Warranty

All RouterTester and QA Robot hardware is warranted against defects in materials and workmanship for a period of 3 years from the date of shipment.

Software Warranty

All RouterTester and QA Robot software is warranted for a period of 90 days. The applications are warranted to execute and install properly from the media provided. This warranty only covers physical defects in the media, whereby the media is replaced at no charge during the warranty period.

Software Updates

With the purchase of any new system controller Agilent will provide 1 year of complimentary software updates. At the end of the first year you can enroll into the Software Enhancement Service (SES) for continuing software product enhancements.

Support

Technical support is available throughout the support life of the product. Support is available to verify that the equipment works properly, to help with product operation, and to provide basic measurement assistance for the use of the specified capabilities, at no extra cost, upon request.

Ordering Information

To order and configure the test system consult your local Agilent field engineer.

United States:
Agilent Technologies
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1-800-452-4844

Canada:
Agilent Technologies Canada Inc.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
1-877-894-4414

Europe:
Agilent Technologies
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547-2323

United Kingdom
07004 666666

Japan:
Agilent Technologies Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192-8510, Japan
Tel: (81) 426-56-7832
Fax: (81) 426-56-7840

Latin America:
Agilent Technologies
Latin American Region Headquarters
5200 Blue Lagoon Drive, Suite #950
Miami, Florida 33126
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Tel: (305) 269-7500
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19/F, Cityplaza One, 1111 King's Road,
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Fax: (61-3) 9272-0749
Tel: 0-800-738-378 (New Zealand)
Fax: (64-4) 802-6881

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