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Product Lifecycle Management System

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TestPoint

Broadband
Test Solutions



TS-10



TS-30



TS-170

YOUR TEST
REQUIREMENTS JUST GOT **BIGGER?**



Product Summary

 **Innocor**

A JDSU Division

Version 2.6.0

CHASSIS

The TS-10 provides a fixed interface configuration. The TS-30 and TS-170 are slot-based and all modules support hot insertion.

TS-10

The TS-10 is a lightweight, easy to carry platform equipped with a handle.



Chassis Specifications

Height	5.6 cm; 2.25 inches	Depth	42.5 cm; 17 inches
Width	35 cm; 14 inches	Weight	3.7 kg; 8.1 lbs
Operating Temperature	0-35°C	Operating Humidity	0-85%

TS-30

The TS-30 provides 3 slots. It either comes with a rackmount kit or a handle and bumpers. The Group Controller module or any test module may use slot 0.



Chassis Specifications

Height	8.75 cm; 3.5 inches	Depth	37.5 cm; 15 inches
Width	42.5 cm; 17 inches	Weight	7.7 kg; 17 lbs
Operating Temperature	0-35°C	Operating Humidity	0-85%

TS-170

The TS-170 provides 17 slots. Test modules may occupy 16 of the 17 slots. Slot 0 is reserved for the optional Group Controller module. The TS-170 comes with a rackmount kit.



Chassis Specifications

Height	26.25 cm; 10.5 inches	Depth	52.5 cm; 21 inches
Width	42.5 cm; 17 inches	Weight	22.7 kg; 50 lbs
Operating Temperature	0-35°C	Operating Humidity	0-85%

MODULES & CONFIGURATIONS

The TS-10 is available in configurations. The TS-30/170 chassis are equipped with modules. Modules and configurations support the same feature set. Here is a list of modules and configurations including available options:

- **40Gbps** (TS-30/170 only)
 - OC-768c/STM-256 (VC-4-256c) / OTU3
- **10Gbps**
 - 10GbE LAN/WAN / OC-192c/STM-64 (VC-4-64c) / 10G FC / FEC (OTU2, 11.049G, 11.095G, 11.270G, ODU2) / GFP-F / cHDL
- **Multi-Rate**
 - OC-3/12/48 / STM-1/4/16 / FEC (OTU1, ODU1) / Ethernet (Optical GbE, 10/100/1000BASE-T, 100BASE-FX) / 1G/2G FC / EoPDH (DS1/E1 with VCAT/LCAS, DS3/E3, GFP-F, bit/byte-HDLC) / RPR / EoS (GFP-F/T, HO VCAT) / ATM
- **1Gbps V1 / 1Gbps V2**
 - 2 ports / 1G/2G FC / 4G FC on 1Gbps V2 only / Ethernet is available on 1Gbps V1 (Optical GbE, 10/100/1000BASE-T, 100BASE-FX) and planned on 1Gbps V2
- **OC-192/STM-64**
 - OC-192/STM-64 / OTU2
- **Group Controller** (TS-30/170 only)
 - Single point of management access / External clocking capabilities

SYSTEM

Connectivity and GUI

- Requires PC and 10/100BASE-T LAN connection. Static IP and DHCP (dynamic IP) support
- GUI interface via web browser and Java plug-in. No PC software required
- TS-30/170: PC connects to modules via the Group Controller (one LAN cable) or directly to each module's faceplate
- TS-30/170: Group Controller supports multiple concurrent users

Automation

- Via Command Line Interface (CLI) ASCII commands. Connection to CLI via Telnet, socket connections, or serial port
- Automation toolkits available in: Python / C / TCL

Management Functions

- GUI installation tool provided for field software upgrades
- Each module has non-volatile storage for: software loads / configuration files / event logs / test results / capture files
- Result files (event logs / test results / RFC 2544 results) can be automatically transferred to the controlling PC
- TS-30/170: Group Controller module provides external clocking ports: T1 / E1 / GPS (including 10MHz) / and other rates

40Gbps Module



STANDARD OFFERING

3-slot module equipped with 1 physical port providing:

- **SONET/SDH:** OC-768/STM-256

OPTIONS

- **Digital Wrapper and FEC:** OTU3

LINE RATES

Reports PPM offset on receive interface

- 39.813 Gbps (SONET/SDH)
- 43.018 Gbps (OTU3)

CONNECTIVITY

- **Terminal:** Source and sink traffic (all rates)

40Gbps

HIGH LEVEL FEATURE SUMMARY

- Fits into existing TS-30 and TS-170 TestPoint chassis
- OTN testing at OTU3
- SONET/SDH at OC-768/STM-256
- PRBS traffic framed and unframed
- Clock rate variations
- Reports incoming optical power

INTERFACE SPECIFICATIONS

Fixed Optics	
Optical Connector	LC
Wavelength	1550 nm
Optical Output Power (Rx power read)	0 to +3 dBm
Optical Overload (min)	+3 dBm
Sensitivity (min)	-6 dBm
Clock Out	LVPECL signal, AC coupled on SMA connector
LAN (Ethernet) Port	RJ-45 (10/100BASE-T)
Operator Port	RJ-11 into RS-232 serial cable

10Gbps Module



TS-10 10Gbps Configuration



10Gbps

HIGH LEVEL FEATURE SUMMARY

- Multiple rates on one module/configuration
- Traffic generation capabilities with strong lower layer features
- 10 Gigabit Ethernet LAN and WAN (10GBASE-CX4 is planned)
- BERT on SONET/SDH (STS-192c/VC-4-64c) and cHDL
- 10 Gigabit Fibre Channel
- OTN related rates: OTU2, 11.049G, 11.095G, 11.270G, ODU2 (10.037G)
- GFP-F mapped directly into OTU2 and in SONET/SDH (STS-192c/VC-4-64c)
- 64B/66B PCS (and MAC) capture feature
- 64B/66B PCS block editing and playback feature
- 128 traffic streams (MAC/Stacked VLAN, MPLS, IPv4, IPv6, TCP, UDP)
- PRBS at all rates
- RFC 2544 (10GbE)
- Latency, sequencing, packet jitter
- Intrusive monitor mode on OTN and SONET/SDH
- Clock rate variations
- ARP and Ping on 10GbE

INTERFACE SPECIFICATIONS

XFP			
Optical Connector	LC	LC	LC
Wavelength	850 nm	1310 nm	1550 nm
Optical Output Power (Rx power read)	-4 to -1.1 dBm	-6 to -1 dBm	-1 to +2 dBm
Optical Overload (min)	-1 dBm	0.5 dBm	2 dBm
Sensitivity (min)	-11.1 dBm	-11 dBm	-13.5 dBm
Fixed Optics			
Optical Connector	SC	SC	
Wavelength	1310 nm	1550 nm	
Optical Output Power (Rx power read)	-4 to +1 dBm	-1 to +2 dBm	
Optical Overload (min)	-1 dBm	-1 dBm	
Sensitivity (min)	-15 dBm	-16 dBm	
Clock Out	LVPECL signal, AC coupled on SMA connector		
LAN (Ethernet) Port	RJ-45 (10/100BASE-T)		
Operator Port	RJ-11 into RS-232 serial cable		

STANDARD OFFERING

There is 1 physical port equipped with fixed optics or XFP. Protocols include:

- **10GbE LAN**
- **10GbE WAN**
- **SONET/SDH BERT:** PRBS into OC-192/STM-64 (STS-192c/VC-4-64c)

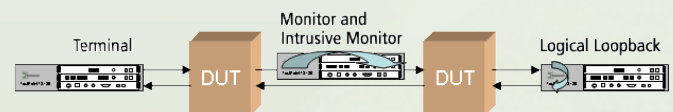
OPTIONS

- **Digital Wrapper and FEC:** 3 rates: OTU2 (10.709 Gbps); 11.049G (no fixed stuff); 11.095G (with fixed stuff)
- **10 Gigabit Fibre Channel:** 10G FC
- **GFP:** GFP-F directly in OTU2; or in OC-192/STM-64 (STS-192c/VC-4-64c); or in OC-192/STM-64 wrapped in OTU2
- **cHDL:** Cisco-HDL in OC-192/STM-64 (STS-192c/VC-4-64c); or in OC-192/STM-64 wrapped in OTU2
- **Extended Rates:** 2 rates: 11.270G (10G FC client); ODU2 (10.037Gbps)

LINE RATES

Reports PPM offset on receive interface

- 9.95328 Gbps (10GbE WAN and OC-192/STM-64 BERT)
- 10.037 Gbps (ODU2)
- 10.3125 Gbps (10GbE LAN)
- 10.51875 Gbps (10G FC)
- 10.709 Gbps (OTU2)
- 11.049 Gbps (10GbE LAN with FEC, no stuff bytes)
- 11.095 Gbps (10GbE LAN with FEC, stuff bytes)
- 11.270 Gbps (10G FC with FEC, no stuff bytes)



CONNECTIVITY

- **Terminal:** Source and sink traffic (all rates)
- **Transparent Monitor:** Transparently monitors signal and retransmits unaltered (10 GbE, OTN related rates, SONET/SDH)
- **Intrusive Monitor:** Can inject layer 1 errors and pass traffic unaltered (OTN related rates, SONET/SDH)
- **Logical Loopback:** Used to switch MAC and IP addresses to loop traffic back (10GbE LAN)

Multi-Rate Module



TS-10 Multi-Rate Configuration



Multi-Rate

HIGH LEVEL FEATURE SUMMARY

- Multiple rates on one module/configuration
- Traffic generation capabilities with strong lower layer features
- SONET/SDH on OC-3/12/48 STM-1/4/16 with GFP-F/T and ATM support
- OTN testing at OTU1 (2.666G), and ODU1 (2.498G)
- Optical Gigabit Ethernet, 10/100/1000BASE-T, and 100BASE-FX
- Support of Ethernet over PDH for DS1, E1, DS3, E3 (GFP-F, HDLC payload)
- RPR intrusive monitor mode on OC-48/STM-16
- 8B/10B PCS (and MAC) capture feature
- 128 traffic streams (MAC/Stacked VLAN, MPLS, IPv4, IPv6, TCP, UDP)
- 1G/2G Fibre Channel
- RFC 2544 (Ethernet)
- Clock rate variations
- PRBS at all rates
- Latency, sequencing, packet jitter
- ARP and Ping on Ethernet

INTERFACE SPECIFICATIONS

OC-48/STM-16 (SFP)			
Optical Connector	LC	LC	
Wavelength	1310 nm	1550 nm	
Optical Output Power (Rx power read)	-9.5 to -3 dBm	-5 to 0 dBm	
Optical Overload (min)	-3 dBm	0 dBm	
Sensitivity (min)	-18 dBm	-19 dBm	
OC-12/3/STM-4/1 (SFP)			
Optical Connector	LC	LC	
Wavelength	1310 nm	1550 nm	
Optical Output Power (Rx power read)	-15 to -8 dBm	-15 to -8 dBm	
Optical Overload (min)	-7 dBm	0 dBm	
Sensitivity (min)	-34 dBm	-28 dBm	
Ethernet/FC (SFP)			
Optical Connector	LC	LC	LC
Wavelength	850 nm	1310 nm	1550 nm
Optical Output Power (Rx power read)	-9.5 to -3.5 dBm	-9.5 to -3 dBm	-5 to 0 dBm
Optical Overload (min)	-3.5 dBm	-3 dBm	0 dBm
Sensitivity (min)	-20 dBm	-22 dBm	-23 dBm
Electrical Connector	RJ-45; supports full-duplex 10-BASE-T, 100-BASE-TX, 1000-BASE-T		
Clock Out	LVPECL signal, AC coupled on SMA connector		
LAN (Ethernet) Port	RJ-45 (10/100BASE-T)		
Operator Port	RJ-11 into RS-232 serial cable		

STANDARD OFFERING

There are 3 physical ports on the multi-rate. One is active at a time. The ports are OC-48/STM-16, OC-3/12 STM-1/4, and Ethernet/Fibre Channel. At least one SONET/SDH port must be licensed.

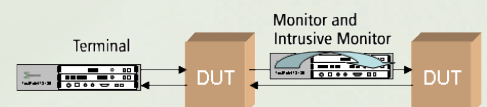
OPTIONS

- **OC-48/STM-16:** Channelized (HO)
- **OC-3/12 STM-1/4:** Channelized (HO)
- **Digital Wrapper and FEC:** OTU1 (2.666 Gbps) on the OC-48/STM-16 port
- **Ethernet:** Optical GbE, 10/100/1000BASE-T, 100BASE-FX
- **Fibre Channel:** 1G and 2G FC
- **Ethernet over PDH:** DS1/E1 and DS3/E3 into OC-3/12/48 STM-1/4/16. PDH VCAT/LCAS is available on DS1/E1. MAC traffic on GFP-F/bit-HDLC/byte-HDLC (byte-HDLC on DS1/E1 only).
- **Ethernet over SONET/SDH:** GFP-F on OC-3/12/48 STM-1/4/16; GFP-T and Higher-Order VCAT on OC-48/STM-16.
- **RPR:** Intrusive monitor mode on OC-48/STM-16 (STS-48c/VC-4-16c)
- **ATM:** On OC-3/12/48 STM-1/4/16
- **Extended Rate:** ODU1 (2.498Gbps)

LINE RATES

- 10/100/1000 Mbps (BASE-T)
- 125 Mbps (100BASE-FX)
- 155.52 Mbps (OC-3/STM-1)
- 622.08 Mbps (OC-12/STM-4)
- 1.0625 Gbps (1G FC)
- 1.25 Gbps (GbE)
- 2.125 Gbps (2G FC)
- 2.488 Gbps (OC-48/STM-16)
- 2.498 Gbps (ODU1)
- 2.666 Gbps (OTU1)

CONNECTIVITY



- **Terminal:** Source and sink traffic (all rates)
- **Transparent Monitor:** Transparently monitors signal and retransmits unaltered (all SONET/SDH rates and OTU1)
- **Intrusive Monitor:** Intrusively injects errors while forwarding incoming traffic (RPR option only)

1Gbps V2 Module



TS-10 1Gbps V2 Configuration



1 Gbps V1 / 1 Gbps V2

STANDARD OFFERING

Two independent test ports are provided equipped with one or more options.

OPTIONS

- **Fibre Channel:** 1G and 2G FC
- **4G Fibre Channel:** 4G FC (1Gbps V2 only)
- **Ethernet:** Optical GbE; 10/100/1000BASE-T; 100BASE-FX (Ethernet is available on 1Gbps V1 and planned on 1Gbps V2)

LINE RATES

- 10/100/1000 Mbps (BASE-T)
- 125 Mbps (100BASE-FX)
- 1.0625 Gbps (1G FC)
- 1.25 Gbps (Optical GbE)
- 2.125 Gbps (2G FC)
- 4.250 Gbps (4G FC on 1Gbps V2)

CONNECTIVITY

- **Terminal:** Source and sink traffic (all rates)

HIGH LEVEL FEATURE SUMMARY

- Two different hardware versions: 1Gbps V1 and 1Gbps V2
- 1G/2G/4G Fibre Channel on 1Gbps V2; 1G/2G Fibre Channel on 1Gbps V1
- Ethernet is available on 1Gbps V1 (Optical Gigabit Ethernet, 10/100/1000BASE-T, 100BASE-FX) and planned on 1Gbps V2
- 2 independent ports
- Latency, sequencing, packet jitter
- 128 Ethernet traffic streams (MAC/Stacked VLAN, MPLS, IPv4, IPv6, TCP, UDP)
- ARP and Ping on Ethernet
- PRBS at all rates
- SFP information display and auto-detection
- RFC 2544 on Ethernet
- Clock rate variations

INTERFACE SPECIFICATIONS

1Gbps V2

FC/Optical GbE (SFP)			
Optical Connector	LC	LC	LC
Wavelength	850 nm	1310 nm	1550 nm
Optical Output Power (Rx power read)	-9.5 to -2.5 dBm	up to -3 dBm	-5 to 0 dBm
Optical Overload (min)	0 dBm	0 dBm	0 dBm
Sensitivity (min)		-18(4G); -21(2G); -22(1G) dBm	-23 dBm
Electrical Connector	RJ-45; supports full-duplex 10-BASE-T, 100-BASE-TX, 1000-BASE-T		
Clock Out	LVPECL signal, AC coupled on SMA connector		
LAN (Ethernet) Port	RJ-45 (10/100BASE-T)		
Operator Port	RJ-11 into RS-232 serial cable		

Note: 1550 nm SFP does not provide 4G FC support

1Gbps V1

FC/Optical GbE (SFP)			
Optical Connector	LC	LC	LC
Wavelength	850 nm	1310 nm	1550 nm
Optical Output Power (Rx power read)	-9.5 to -3.5 dBm	-9.5 to -3 dBm	-5 to 0 dBm
Optical Overload (min)	-3.5 dBm	-3 dBm	0 dBm
Sensitivity (min)	-20 dBm	-22 dBm	-23 dBm
Electrical Connector	RJ-45; supports full-duplex 10-Base-T, 100-Base-TX, 1000-Base-T		
Clock Out	LVPECL signal, AC coupled on SMA connector		
LAN (Ethernet) Port	RJ-45 (10/100Base-T)		
Operator Port	RJ-11 into RS-232 serial cable		

OC-192/STM-64 Module



TS-10 OC-192/STM-64 Configuration



OC-192/STM-64

HIGH LEVEL FEATURE SUMMARY

- Multiple rates on one module/configuration
- Traffic generation capabilities with strong lower layer features
- Channelized SONET/SDH on OC-192/STM-64
- OTN testing at OTU2 (10.709G)
- PRBS traffic
- Clock rate variations

STANDARD OFFERING

Equipped with 1 physical port providing:

- **OC-192/STM-64:** Channelized (HO)

OPTIONS

- **Digital Wrapper and FEC:** OTU2 (10.709 Gbps)

LINE RATES

- 9.95328 Gbps (OC-192/STM-64)
- 10.709 Gbps (OTU2)

CONNECTIVITY

- **Terminal:** Source and sink traffic (all rates)
- **Monitor:** Transparently monitors signal and retransmits unaltered (all rates when equipped with Digital Wrapper and FEC)

INTERFACE SPECIFICATIONS

Optical Connector	SC	SC
Wavelength	1310 nm	1550 nm
Optical Output Power (Rx power read)	-4 to +1 dBm	-1 to +2 dBm
Optical Overload (min)	-1 dBm	-1 dBm
Sensitivity (min)	-15 dBm	-16 dBm
Clock Out	LVPECL signal, AC coupled on SMA connector	
LAN (Ethernet) Port	RJ-45 (10/100BASE-T)	
Operator Port	RJ-11 into RS-232 serial cable	

Group Controller Module



Group Controller

GLOBAL TEST FUNCTIONS

Test functions may be performed individually on each module or globally via the Group Controller. Global test functions include:

- Providing per-slot test status (major, minor, history indicators)
- Concurrent test start/stop on multiple modules
- Concurrent save and restore of the test configuration on multiple modules
- Enabling and disabling of event logs on multiple modules
- Concurrent clearing of errors, events, LEDs on multiple modules
- Selectable module reset within chassis

CLOCKING

Group Controller clocking is distributed to modules via the backplane.

- Internal (+/- 4.6 ppm accuracy)
- T1 (100 Ohm Bantam) / E1 (75 Ohm BNC)
- External clock input (50 Ohm SMA):
8 KHz / 1.544 MHz / 2.048 MHz / 5.0 MHz / 10.0 MHz / 19.44 MHz / 77.76 MHz / 155.52MHz

FEATURE SUMMARY

- Module is optional and connects into slot 0 (TS-30/170)
- Single point of management access (one LAN cable) into TestPoint chassis. The alternative is to connect directly to each module's faceplate. Static IP and DHCP (dynamic IP) support
- Multi-user support within a chassis. Supports one GUI user per module. One user may control multiple modules in one session
- Global test functions to control multiple modules simultaneously
- External clocking capabilities to modules via backplane
- Timestamp synchronization source for one-way latency measurements (10Gbps only)



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