



## *Enabling Australia's Field Technicians to build, troubleshoot and maintain better communications networks.*



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**FREECALL 1800 680 680**

## TestPoint OC-192/STM-64



### Key Features

- Channelized OC-192/STM-64
- OTN testing at OTU2 (10.709G)
- Clock rate variation injection
- PRBS traffic
- Injection of multiple errors/alarms simultaneously
- Full SONET/SDH byte diagram with two injection banks
- OTN full overhead capture and triggers



This TestPoint single slot module provides OC-192/STM-64 SONET/SDH test functionality with channelization down to STS-1/VC-3(AU-3). It supports a hardware option for Digital Wrapper and Forward Error Correction (FEC) at G.709 OTU2 (10.709 Gbps).

### Applications

- SONET/SDH: OC-192/STM-64
- Digital Wrapper and FEC: OTU2 (ITU-T G.709); OC-192/STM-64 client

### Compliance

- CSA Certificate of Compliance to CAN/CSA C22.2 No 60950-1 (2003) & ANSI/UL 60950-1 (2003) with CSA Mark for Canada & USA
- CSA CB Certificate of Compliance to EN60950-1, IEC 60950-1 and National Deviations with CE Marking
- Class 1 Laser Product, with compliance to EN 60825, IEC 60825 and FDA/CDRH requirements

NOTE: The 10Gbps is available in either modules (TS-30/TS-170) or in configurations (TS-10). The term module is used in this document.

## 2

### 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-12 into RS-232 serial cable	

### STANDARD OFFERING

Equipped with one 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)

### CLOCKING

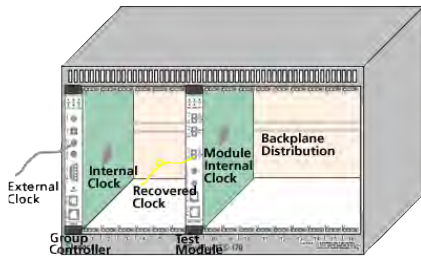
Internal (+/- 4.6 ppm accuracy)

Recovered

External via Group Controller (TS-30/170)

Clock rate variations +/-30 ppm: SONET/SDH, OTU2

Clock out (LVPECL, AC coupled on SMA)



### CONNECTIVITY

Terminal: Source and sink traffic (all rates)

Monitor: Transparently monitors signal and retransmits unaltered (all rates when equipped with Digital Wrapper and FEC)

### Applications

Descriptions of the following applications follow:

· SONET/SDH: OC-192/STM-64

· Digital Wrapper and FEC: OTU2 (ITU-T G.709); OC-192/STM-64 client

### SONET/SDH

#### Channelization

OC-192: STS-192c / STS-48c / STS-12c / STS-3c / STS-1  
 STM-64: VC-4-64c / VC-4-16c / VC-4-4c / VC-4 / VC-3 (AU-3)

#### Alarms

Monitoring is performed on all paths concurrently in the event log.

Sonet SDH		Count	Ratio
LOS	LOS	B1	0 0.0000E00 B1
LOF	LOF	B2	0 0.0000E00 B2
OOF	OOF	B3	0 0.0000E00 B3
AIS-L	MS-AIS	REI-L	0 0.0000E00 MS-REI
RDI-L	MS-RDI	REI-P	0 0.0000E00 HP-REI
AIS-P	AU-AIS		
LOP-P	AU-LOP		
RDI-P	HP-RDI		
UNEQ-P	HP-UNEQ		

LOS / LOF / OOF / AIS-L/MS-AIS / RDI-L/MS-RDI / LOP-P/AU-LOP / AIS-P/AU-AIS / RDI-P/HP-RDI / UNEQ-P/HP-UNEQ

#### Errors

Monitoring is performed on all paths concurrently in the event log.

Single / Rates for REI-L/MS-REI / REI-P/HP-REI / B1 / B2 / B3

#### Overheads

Pointer adjustments: Increment/Decrement (single, rates) / NDF count / Pointer Value / SS Bits

Trace Messages: J0 / J1; 1, 16 or 64 bytes

Decoded Bytes: K1 / K2 / S1 / C2

Byte Diagram: User editable Overhead Fields (includes B1, B2, B3 xor masks) in two alternating overhead banks. Interleaving and Injection Counts in Frames / Continuous Injection support

#### Traffic

PRBS 23 or 31 / 4-Byte Sequence

#### Disruption time

Measurement:  $\mu$ sec Resolution

Triggers: LOS / LOF / PRBS Sync

### Digital wrapper and FEC

Supports OTU2.

#### Alarm

LOS <input type="checkbox"/> AIS <input type="checkbox"/>		BIP8 <input type="text" value="0"/> BIP8 Ratio 0.0000E00		FEC Errors Correctable Bytes <input type="text" value="0"/> Correctable Bits <input type="text" value="0"/> BEI <input type="text" value="0"/> BER 0.0000E00																																																																																	
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<table border="1"> <thead> <tr> <th>ODU</th> <th>AIS</th> <th>LCK</th> <th>OCI</th> <th>BIAE</th> <th>BDI</th> <th>BIP8</th> <th>BIP8 Ratio</th> <th>BEI</th> <th>BEI Ratio</th> </tr> </thead> <tbody> <tr> <td>TCM 1</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>TCM 2</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>TCM 3</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>TCM 4</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>TCM 5</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>TCM 6</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> <tr> <td>PM</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>0</td> <td>0.0000E00</td> <td>0</td> <td>0.0000E00</td> </tr> </tbody> </table>						ODU	AIS	LCK	OCI	BIAE	BDI	BIP8	BIP8 Ratio	BEI	BEI Ratio	TCM 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	TCM 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	TCM 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	TCM 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	TCM 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	TCM 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00	PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	0.0000E00	0	0.0000E00
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LOS / OOF / LOF / OOM / LOM / OTU-AIS (PN-11) / OTU-IAE / OTU-BDI / OTU-BIAE / ODU-AIS (PM/TCM1-6) / ODU-LCK (PM/TCM1-6) / ODU-OCI (PM/TCM1-6) / ODU-BDI (PM/TCM1-6) / ODU-BIAE (TCM1-6)

#### Errors

Single / rates for OTU-BIP8 / OTU-BEI / ODU-BIP8 (PM/TCM1-6) / ODU-BEI (PM/TCM1-6)

#### Overheads

Multi Frame Structures: OTU-TTI / ODU-TTI (PM/TCM1-6) / ODU-FTFL / PSI

Justification Events: Sync (line-client locked) on transmit. Reporting of justification event ratio and line-client ppm offset.

Byte Diagram: User editable Overhead Fields / MFAS invert. Injection Count in Frames / Continuous Injection

Overhead PRBS: 3 independent PRBS 15 engines for GCCO-2 / RES (OTU, ODU, OPU) / TCM1-6 / TCM/ACT / EXP

Error Suppression: To optionally suppress incoming errors/alarms: FEC / TCM1-6 Errors / PM Errors / Client Errors

#### Captures

FAS	MFAS	SM	GCCO	RES	RES	TCM/ACT	TCM6
F6 F6 F6 28 28 28	99	00 32 01	00 00	00 00	00 00 00	00	00 32 01
F6 F6 F6 28 28 28	9A	00 B5 01	00 00	00 00	00 00 00	00	00 B5 01
F6 F6 F6 28 28 28	9B	00 C5 01	FF FF	00 00	00 00 00	00	00 C5 01
F6 F6 F6 28 28 28	9C	00 43 01	00 00	00 00	00 00 00	00	00 43 01
F6 F6 F6 28 28 28	9D	00 4B 01	00 00	00 00	00 00 00	00	00 4B 01

Triggers: Manual / OOF / LOF / OOM / LOM / OTU-IAE / OTU-BDI / OTU-BIAE / OTU-BIP8 / OTU-BEI / ODU-AIS (PM/TCM1-6) / ODU-LCK (PM/TCM1-6) / ODU-OCI (PM/TCM1-6) / ODU-BDI (PM/TCM1-6) / ODU-BIP8 (PM/TCM1-6) / ODU-BEI (PM/TCM1-6) / ODU-BIAE (TCM1-6) / Positive Justification / Negative Justification / Overhead PRBS Bit Error / Pattern Match (equal, not equal) with Bit-Mask

Pattern Match Fields: FAS / MFAS / GCCO-2 / OTU RES / SM TTI / ODU RES1-3 / TCM/ACT / FTFL / EXP / APS/PCC / TCM1-6 TTI / PM TTI / OPU RES1-3

Trigger Point: Start / Middle / End  
 Display: Trigger Point / Hex values for all overhead fields  
 Size: Overhead of 256 frames  
 File Type: ASCII (csv)

#### Client

OC-192/STM-64 signal

#### FEC

Settings: Standard FEC / All-Zeros FEC. Enable / Disable error correction

Injection: Single and rates. Control of Errored Sub-Row (including all) / Errored Bytes per Sub-Row / Errored Bits per Byte / Skipped Rows between Errors. Up to 16 symbol errors.

Detection: Number of Correctable Byte Errors / Number of Correctable Bit Errors / Bit Error Rate / Number of Uncorrectable Sub-Rows

### Ordering Information

N530-0120 OC-192/STM-64 Module Channelized OC-192 / STM-64  
 N550-0226 TS-10 with OC-192 / STM-64 Configuration

#### Module Options:

OPT 0120-01 OC-192/STM-64 1310nm optics

OPT 0120-02 OC-192/STM-64 1550nm optics

OPT 0120-03 G.709 Digital Wrapper / FEC

#### TS-10 Configuration Options:

OPT 0226-01 1310nm optics for TS-10 with OC-192/STM-64 Configuration

OPT 0226-02 1550nm optics for TS-10 with OC-192/STM-64 Configuration

OPT 0226-03 G.709 Digital Wrapper / FEC for TS-10 with OC-192/STM-64 Configuration

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<b>NORTH AMERICA</b> TEL: 1 866 228 3762 FAX: +1 301 353 9216	<b>LATIN AMERICA</b> TEL: +55 11 5503 3800 FAX: +55 11 5505 1598	<b>ASIA PACIFIC</b> TEL: +852 2892 0990 FAX: +852 2892 0770	<b>EMEA</b> TEL: +49 7121 86 2222 FAX: +49 7121 86 1222	<a href="http://www.jdsu.com/test">www.jdsu.com/test</a>
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