The RxT SDH/SONET Module, is a rugged, battery-operated handheld test solution for testing SDH, SONET, circuits from 2.5 Gbps to 52/155 Mbps. Both in-service and out-of-service configurations cover installation, maintenance, and troubleshooting applications.

Auto-configuration takes the guesswork out of configuring the instrument to the circuit under test. Experienced users will appreciate advanced features like overhead monitoring and control, APS timing measurement, and pointer test sequences. All measurements conform to industry standards, and circuit impairments are displayed in a variety of ways, giving operators insight into the possible causes of circuit impairments.

Features

- Bit error ratio testing and performance analysis
- Pointer monitoring and test sequence generation
- Auto-configuration
- APS timing measurement
- Comprehensive payload mapping selection from VC4-16c/OC-48c (contiguous concatenation) to VC12/VT2, VC11/VT1.5, including PDH/T-Carrier payloads (1.5M, 2M, 34M, and 45M/DS1, E1, DS3, and T3)

Benefits

- SDH/SONET feature-rich
- Lightweight
- Flexible modular design
- Eliminates the need for multiple instruments
- Intuitive and easy-to-use
- Cost-effective and future-proof
- Part of the RxT forward compatibility solution

Applications

- Installation, maintenance, and troubleshooting
- Out-of-service testing
- In-service monitoring through protected monitoring points or optical splitters
- Round trip delay

STM-16 / OC-48 Optical Ring

Through mode
SDH/SONET specifications

Operation Modes
Point-to-point: Tx and Rx are set to the same rate
Through mode operation (2.5G and below)
  - Line through
  - Passes entire signal through with no manipulation of overhead or injection of errors or alarms

SDH Optical (ITU-T G.707)
Port/Connector: 2.5 Gbps/622 Mbps/155/52 Mbps (optional): SFP field interchangeable, duplex LC
Rates: STM-16 (2.5 Gbps), STM-4 (622 Mbps), STM-1 (155 Mbps), STM-0 (52 Mbps)
Payloads: VC4-16c, VC4-4c, VC4 Bulk, VC3 Bulk, 45M, 34M, 2M Async, 1.5M Async, VC12 Bulk, VC11 Bulk
ITU-T mapping
Alarm generation:
  - FC (failure counts), BER, LOPS (loss of pattern sync), %LOPS, SEFS (severely errored frame seconds), %SEFS, ES (errored seconds), %ES, SES (severely errored seconds), %SES, UAS (unavailable seconds), %UAS, EFS (error free seconds), %EFS
SDH Optical pointer:
  - Justification, increase, decrease, select increment, decrement, or alternate the pointer value
SONET Optical (Telcordia GR-253-CORE)
Port/Connector: 2.5 Gbps/622 Mbps/155/52 Mbps (optional): SFP field interchangeable, duplex LC
Rates: OC-48 (2.5 Gbps), OC-12 (622 Mbps), OC-3 (155 Mbps), OC-1/STS-1 (52 Mbps)
Payloads: STS-48c, STS-12c, STS-3c, STS-1, DS3, DS1 Async, VT1.5 Bulk
SDH/SONET Overhead Features
  - GR-253 bit performance
  - FC (failure counts), BER, LOPS (loss of pattern sync), %LOPS, SEFS (severely errored frame seconds), %SEFS, ES (errored seconds), %ES, SES (severely errored seconds), %SES, UAS (unavailable seconds), %UAS, EFS (error free seconds), %EFS

SDH/SONET Module
Signal to module and vice versa
Port/Connector: 10 Gbps/10.7 Gbps/10.3125 Gbps
Rates: OC-192, OC-48, OC-12, OC-3, OC-1/STS-1 (52 Mbps)
Payloads: STS-48c, STS-12c, STS-3c, STS-1, DS3, DS1 Async, VT1.5 Bulk
ITU-T mapping
Alarm generation:
  - LOS, LOF, AIS-L/MS-AIS, AIS-P/MS-AIS, PRDI-P, SRDI-P, CRDI-P, LOPS, LOF-OP, AIS-OP, SRDI-OP, CRDI-OP, %SEFS, ES (errored seconds), %ES, SES (severely errored seconds), %SES, UAS (unavailable seconds), %UAS, EFS (error free seconds), %EFS
SONET pointer: Justification, increase, decrease, select increment, decrement, or alternate the pointer value

Test Patterns
STM-16 (VC4-16c):
  - 231-1, 229-1, 220-1, 215-1, 211-1, All 0s, All 1s, Alt 1010, 1-8, 1-16
STM-16 (VC4-4c):
  - 230-1, 229-1, 215-1, 211-1, All 0s, All 1s, Alt 1010, 1-8, 1-16
STM-4:
  - 230-1, 229-1, 215-1, 211-1, All 0s, All 1s, Alt 1010, 1-8, 1-16
User: 10 user patterns defined up to 16 bits
Test pattern inversion

Measurements Common to SDH/SONET
Continuous measurement
Elapsed time
Optical power level measurement
Event log with timestamp
Frequency: Received, max, min (freq. deviation in ppm), ± clock slips
Automatic tributary scan
80 characters/line report of alarms/errors per tributary
In-service and out-of-service for 1.5M (DS1), 2M (E1), 34M (E3), 45M (DS3), VC3 Bulk (STS-1 SFE), and VC4 Bulk inside STM-0/1/4/16 and OC-1/3/12/48 with full report

SDH/SONET Overhead Features
Monitor and transmit section/regenerator section, line/multiplex section, and path overhead bytes
ASCII decode of 16-byte or 64-byte HP/STS or LP/VT path trace bytes (J1/J2)
Programming K1/K2 APS signaling bytes per ITU-T G.783/G.841
J0 Section trace generation: 1 byte SAPI format or 16 bytes E.164 ASCII sequence + CRC-7
S1 synchronization status messages decode and generation
Path overhead monitor
Programming of path overhead bytes
J1/J2 Path trace generation: 16 bytes E.164 ASCII sequence + CRC-7 or 64 bytes E.164 ASCII sequence
C2 signal label byte programming in binary or hexadecimal
G1 bit 5: RDI generation
User programmable path user bytes (F2, F3)
Programmable K3, K4 bytes (bits 1-4) for APS signaling
V5 byte: Signal label generation (bits 5-7), Extended signal label generation/decode (H4 byte), Enhanced RDI generation/detection
Pointer monitor: H1, H2, V1, V2 bytes
Pointer adjustment: Programming of pointer value, NDF, and SS bits
Pointer test control
  - Mode: Single
  - Select increment, decrement, or alternate the pointer value

Pointer Test Sequences
  - AU/STS or TU/VT pointer
  - Sequences: Single, burst, phase, transient burst, periodic, 87-3, 26-1, opposite (increase + decrease), custom
  - Movement: Increase, decrease, increase + decrease
  - Anomalies: Added, cancel, none

Automatic Protection Switch Time Measurement
Resolution: 1 ms
Accuracy: 1 ms
Pass/Fail indicator
User selectable switch and gate time
APS bytes capture
Capture and decode states of K1/K2 bytes
- Store hundreds of messages
- Ring and linear decoding
125 µs resolution
Optional trigger with wildcards
Timestamp in frames or ms
Duration in absolute or elapsed time
Save or print results
Load and decode past results

SFP Optical Transceivers
Complies to ITU-T G.957, Telcordia GR-253-CORE
Jitter compliance to ITU-T G.825

<table>
<thead>
<tr>
<th>Lambda (nm)</th>
<th>Output Power (dBm)</th>
<th>Distance (km)</th>
<th>Rx Wavelength (nm)</th>
<th>Input Sensitivity (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM-16/4/1/0, OC-48/12/3/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1310 SR</td>
<td>-10 to -3</td>
<td>&lt; 2</td>
<td>1266 to 1580</td>
<td>-18 to -3</td>
</tr>
<tr>
<td>1310 IR</td>
<td>-5 to 0</td>
<td>&lt; 15</td>
<td>1260 to 1580</td>
<td>-18 to 0</td>
</tr>
<tr>
<td>1310 LR</td>
<td>-2 to +3</td>
<td>&lt; 40</td>
<td>1280 to 1335</td>
<td>-27 to -9</td>
</tr>
<tr>
<td>1550 IR</td>
<td>-5 to 0</td>
<td>&lt; 40</td>
<td>1430 to 1580</td>
<td>-18 to 0</td>
</tr>
<tr>
<td>1550 LR</td>
<td>-2 to +3</td>
<td>&lt; 80</td>
<td>1500 to 1580</td>
<td>-28 to -9</td>
</tr>
</tbody>
</table>

Data rates supported: 2488, 622, 155, 52 Mbps SONET and SDH

<table>
<thead>
<tr>
<th>Lambda (nm)</th>
<th>Output Power (dBm)</th>
<th>Distance (km)</th>
<th>Rx Wavelength (nm)</th>
<th>Input Sensitivity (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM-4/1/0, OC-12/3/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1310 IR</td>
<td>-15 to -8</td>
<td>&lt; 15</td>
<td>1261 to 1360</td>
<td>-28 to -8</td>
</tr>
<tr>
<td>1310 LR</td>
<td>-3 to +2</td>
<td>&lt; 40</td>
<td>1280 to 1335</td>
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</tr>
<tr>
<td>1550 LR</td>
<td>-3 to +2</td>
<td>&lt; 80</td>
<td>1480 to 1580</td>
<td>-28 to -8</td>
</tr>
</tbody>
</table>

Data rates supported: 622, 155, 52 Mbps SONET and SDH

Clock source
Internal:
- 155.520 Mbps ± 4.5 ppm
- 622.080 Mbps ± 4.5 ppm
- 2.48832 Gbps ± 4.5 ppm
Loop: Recovered from received signal
External: Synchronization to external 1.544 MHz or 2.048 MHz via external clock input

155 Mbps Electrical (STM-1E/STS-3)
Included with Rxt 2380SW-155E
Port/Connector: 75Ω unbalanced BNC (f)
External clock: MSA 2120, 1.544 Mbps, 2.048 Mbps or 2.048 MHz
Line coding: CMI

Transmitter
Clock source
Internal: Bit rate 155.520 Mbps ± 4.5 ppm
Loop: Recovered from received signal
External: Synchronization to external 1.544 MHz or 2.048 MHz via external clock input
Pulse shape: Conforms to ITU-T G.703
Framing: Conforms to ITU-T G.707
Mapping: Conforms to ITU-T G.707
Payloads
VC4 Bulk, VC3 Bulk, VC12 Bulk, VC11 Bulk, 45M, 34M, 2M Async, 1.5M Async
Framed, unframed

Receiver
Frequency recovery range: 155.520 Mbps ± 50 ppm
Input sensitivity
- Terminate: 12.7 dB cable loss
Jitter tolerance: Conforms to ITU-T G.825
Impedance: 75Ω unbalanced

52 Mbps (STS-1)
Port/Connector: 75Ω unbalanced BNC (f)
Line coding: B3ZS

Transmitter
Clock source
Internal: Bit rate 51.840 Mbps ± 4.5 ppm
Loop: Recovered from received signal
Pulse shape: Conforms to Telcordia GR-253
Framing: Conforms to ITU-T G.707 Annex A

Receiver
Frequency recovery range: 51.840 Mbps ± 50 ppm
Input sensitivity
- Terminate: 10.8 dB cable loss
- Monitor: +3 dB to -26 dB resistive loss
Impedance: 75Ω unbalanced

Multiple User Profiles
Up to 10 different test configuration profiles may be saved
Test profiles saved and loaded with the press of a button
Profiles can be shared across multiple chassis for fast and efficient test set configuration and operation
Upload and download test results from realGATE™

Results and Reports
Test reports can be saved in PDF format for easy retrieval, sharing, and analysis of data.
Upload and download test results from realGATE™

realACCESS™ Enabled
Remote web access option allow users to drive all RXT SDH/SONET’s testing capability from a remote location using any computing device with industry-standard web browser (requires RXT1000SW-REM)

Product Description
Size: 208 W x 152 L x D 30 mm (8.2 W x 6.0 L x 1.2 H in)
Module Weight: 0.86 kg (1.9 Lb)

Environmental:
Operating Temperature: 0˚ to 40˚C (32˚ to 104˚F)
Storage Temperature: -20˚ to 70˚C (-4˚ to 158˚F)
Humidity: 5% to 90% non-condensing
Ordering Information

RxT-2380 .............. RxT 2.5G – SDH/SONET Test Set
1.5M, 2M, 34M, 45M and 52Mbps Test Set with RJ45 connector for 1.5M/2M and BNC connectors for 34M/45M/52M. Offers Performance (BER) Test, Histogram Analysis, Pointer Test Sequences, APS Switching Timing, Tandem Connections Monitoring. Includes: RxT Platform (RXT1000A-GW), RxT Carrier (RXT2000A), SDH/SONET Module (SSMTT-38), stylus (SA142), hand and shoulder straps, Li-ion battery pack (SA991), AC/DC charger (SA1580), soft carrying case (SA605), calibration statement, and one year basic warranty.

RxT2380-EW1 ........ RxT test set Warranty Extension:
1 Additional Year

RxT2380-EW2 ........ RxT test set Warranty Extension:
2 Additional Years

Software Options

RxT2380SW-155ME .... 155M Electrical Interface Testing (STM-1e). Includes one 155M Electrical SFP with SMG(F) Connectors, 75 ohm. (SA326 Conversion cables are recommended. Requires 2 cables per SFP Module)

RxT2380SW-155M .... 155M/52M Optical Interface Testing (STM-1/0, OC-3/1)
Requires SA581 or SA582 series SFPs.

RxT-2380SW-622M .... 622M/155M/52M Optical Interface Testing (STM-4/1, OC-12, 3/1)
Requires SA581 or SA582 series SFPs.

RxT-2380SW-25G .... 2.5G/622M/155M/52M Optical Interface Testing (STM-16/4/1, OC-48/12/3/1)
Requires SA581 series SFPs.

SFP Transceiver Options

SA582-1310-IR ....... 622M/155M/52M, 1310 nm Intermediate Reach Tx/Rx SFP, LCUPC/SMF Connector
SA582-1310-LR ....... 622M/155M/52M, 1310 nm Long Reach Tx/Rx SFP, LCUPC/SMF Connector
SA582-1550-LR ....... 622M/155M/52M, 1550 nm Intermediate Reach Tx/Rx SFP, LCUPC/SMF Connector
SA581-1310-SR ....... 2.5G/622M/155M/52M, 1310 nm Short Reach Tx/Rx SFP, LCUPC/SMF Connector
SA581-1310-IR ....... 2.5G/622M/155M/52M, 1310 nm Intermediate Reach Tx/Rx SFP, LCUPC/SMF Connector
SA581-1310-LR ....... 2.5G/622M/155M/52M, 1310 nm Long Reach Tx/Rx SFP, LCUPC/SMF Connector
SA581-1550-IR ....... 2.5G/622M/155M/52M, 1550 nm Intermediate Reach Tx/Rx SFP, LCUPC/SMF Connector
SA581-1550-LR ....... 2.5G/622M/155M/52M, 1550 nm Long Reach Tx/Rx SFP, LCUPC/SMF Connector

Recommended Accessories

SA562 ............... Optical Patch Cord, SMF, LC-SC duplex, 6’
SA563 ............... Optical Patch Cord, SMF, LC-FC duplex, 6’
SA326 ............... Conversion Cable, BNC(m) 75 ohm to SMG(m) 75 ohm, 6’.

Note: 1. Certain limitations apply, contact support for details and availability
2. Field upgradable to PDH/T-Carrier.
Check with your sales rep for availability.