

NIC Platform 40G/100G Multi-Protocol Test Module



KEY FEATURES

- Multiple protocol support.
- Software-deliverable protocol support to meet roll-out schedules.
- 40G SONET/SDH compliant with ITU-T G.707 Amend. 2.
- 40G/100G Ethernet compliant with IEEE 802.3ba.
- 40G OTL3.4 / 100G OTL 4.10 OTN compliant with ITU-T G.709.
- Compliant with CFP MSA draft 1.0.
- Physical layer testing including unframed BERT, PCS BERT and skew measurement.
- Interoperable with lower speed NIC modules for end to end circuit testing. Full featured multi-stream Ethernet testing.
- Support for full ODU multiplexing structure.
- Support for GFP mappings.
- Easy to use GUI for lab and field testing.
- Field portable and rack-mount chassis options.
- Support for automation environments using SCPI interface.
- Remotely controllable for network and lab use.
- Available in portable and rack-mount configurations.
- Upgrade current NIC hardware to 100G bit-rates.

100G Testing. Just How You Remember It.

Daunted by the complexity of 100G Ethernet and OTN networks?

The NIC CSA 100G Service Analyzer Module delivers the tools you need to fully deploy 40G and 100G networks with the famed easy to use features and usability of the NIC platform.

Upgrade existing NIC chassis' to support high speed 100G testing or equip new portable or network embedded chassis' with your choice of features.

License SONET/SDH, OTN and Ethernet options when they are required by your rollout, where and when you need them.

However you need to use it rest assured that the NIC takes the complexity out of delivering your 100G network.

OPTICAL INTERFACE

Interface Type	CFP
Bit rates:	STM-256/OC-768 39.813 Gbps OTU-3 43.018 Gbps 40G Base-R 41.250 Gbps OTU-4 111.809 Gbps 100G Base-R 103.125 Gbps

INTERFACE SPECIFICATIONS

Timing	Internal, external, recovered
Internal Clock	Stratum III compliant (± 4.6 ppm)
External Clock	1.544Mb/s, 2.048Mhz (BITS/SETS), 1.544Mhz, 2.048 Mb/s via Bantam connector (120 ohm balanced); 8KHz/1.544/2.048/10 MHz via 75-ohm TTC BNC (unbalanced)
Frequency Offset	Tx timing ± 100 ppm, in 0.1 ppm increments
Input Freq. Meas.	± 100 ppm

UNFRAMED BERT

Configuration	4 Lane BERT, 10 Lane BERT.
Bit Rates	40G (4 Lane), 41G (4 Lane), 43G (4 Lane), 103G (10 Lane), 112G (10 Lane).
Test Patterns	PRBS 9, PRBS 9 inverted, PRBS 11, PRBS 11 inverted, PRBS 15, PRBS 15 inverted, PRBS 20, PRBS 20 inverted, PRBS 23, PRBS 23 inverted, PRBS 31, PRBS 31 inverted. Patterns configured independently per lane.
Test Pattern Seeding	Synchronous, independent.

Error Detection	Bit error count across all lanes. Bit error count per lane. Current bit error rate lane. Average bit error rate per lane.
Error Generation	Bit errors on selected lane. Bit errors on defined lane group. Bit errors on all lanes.
Alarm Generation & Measurement	LOS, Loss of pattern sync.

FRAMED PCS BERT

Configuration	41Gbps, 4 Virtual Lanes, 4 Optical Lanes. 103G, 20 Virtual Lanes, 10 Optical Lanes.
Lane Mapping	Any virtual lanes to any physical lane. Rotated lane mapping.
Lane Skew	Lane skew measurement per lane. Lane skew generation across any optical lanes. Skew limits range from 0 to 65,000. De-skew tolerance from 0 to 65,000. 41G resolution - 3 bits, 103G resolution - 64 bits.
Test Patterns	PRBS 9, PRBS 9 inverted, PRBS 11, PRBS 11 inverted, PRBS 15, PRBS 15 inverted, PRBS 20, PRBS 20 inverted, PRBS 23, PRBS 23 inverted, PRBS 31, PRBS 31 inverted. Patterns configured independently per lane.
Test Pattern Seeding	Synchronous, independent.
Error Generation	Bit errors, BIP-8 errors, Block error, Invalid Sync Header errors, Invalid Alignment Marker errors.
Error Generation Modes	Per selected lane, per lane group, all lanes.

Error Detection	Bit error count across all lanes, bit error count per lane, bit current error rate per lane, average bit error rate per lane. BIP-8 error count across all lanes, BIP-8 error count per lane, current BIP-8 error rate per lane, average BIP-8 error rate per lane. Invalid Sync Header error count across all lanes, Invalid Sync Header error count per lane, current Invalid Sync Header error rate per lane, average Invalid Sync Header error rate per lane. Invalid Alignment Marker error count across all lanes, Invalid Alignment Marker error count per lane, current Invalid Alignment Marker error rate per lane, average Invalid Alignment Marker error rate per lane. Block error count, current block error rate, average block error rate.
Alarm Generation	Pattern Sync Loss per lane, Loss of Block Lock, Loss of Alignment Marker.
Alarm Measurement	Pattern Sync Loss per lane, Loss of Block Lock, Loss of Alignment Marker, Excessive Skew.

ETHERNET PCS

Interface	40G Base-R, 100G Base-R.
Lane Mapping	Any virtual lanes to any physical lane. Rotated lane mapping.
Lane Skew	Lane skew measurement per lane. Lane skew generation across any optical lanes. Skew limits range from 0 to 65,000. De-skew tolerance from 0 to 65,000. 41G resolution - 3 bits, 103G resolution - 64 bits.
PCS Error Generation	BIP-8 errors, Block error, Invalid Sync Header errors, Invalid Alignment Marker errors.
PCS Error Generation Modes	Per selected lane, per lane group, all lanes.

PCS Error Detection	BIP-8 error count across all lanes, BIP-8 error count per lane, current BIP-8 error rate per lane, average BIP-8 error rate per lane. Invalid Sync Header error count across all lanes, Invalid Sync Header error count per lane, current Invalid Sync Header error rate per lane, average Invalid Sync Header error rate per lane. Invalid Alignment Marker error count across all lanes, Invalid Alignment Marker error count per lane, current Invalid Alignment Marker error rate per lane, average Invalid Alignment Marker error rate per lane. Block error count, current block error rate, average block error rate.
PCS Alarm Generation	Pattern Sync Loss per lane, Loss of Block Lock, Loss of Alignment Marker.
PCS Alarm Measurement	Pattern Sync Loss per lane, Loss of Block Lock, Loss of Alignment Marker, Excessive Skew.

ETHERNET PACKET SPECIFICATIONS

Frame Type	Statistics and generation of Ethernet frames with UDP/IP, IPv4	Error Measurements	FCS, IP checksum, code errors, collisions, sequence, Bit, line code, runt, oversized/undersized frame error counts: current rates, average rates, and errored seconds
Results/Statistics	Received optical power, LOS, link state, jabber, collision (10/100/1000 electrical only) code violation error counts, current rate, average rate, errored seconds; each port accumulates statistics in real time; event log result analysis with time stamp; user-defined test duration time	Error Insertion	FCS, IP checksum, sequence: single, 1e-2 to 1e-7; bit: single, 1e-3 to 1e-10; line code: single
All Ports Results	Displays all activity, alarms and errors for all ports simultaneously in single screen for easier testing analysis with the option to rearrange rows and columns	APS Measurements	Maximum, minimum, average, and current protection switch times in ms; user-definable guard band thresholds for filtering receive traffic
LED Indicators	LOS, link state and pattern sync alarms, FCS, code, and payload BIT errors, sequence errors.	Advanced Ping Functionality	Selectable MAC source, IP source and IP destination, number of Ping attempts, Timeout (1-5 sec.), Packet size (64-16000 bytes), Time to live (1-255); Last 4 responses displayed in Ping response win-dow; Full statistics of Ping operation displayed in the Ping Statistics section
Traffic Stream Generation/Analysis	32 independently configurable traffic generation and analysis stream.	IP Reflection	User-selectable, can reflect all unicast packets or only packets created by Digital Lightwave test instrument
Configurable Stream Parameters	Destination port, transmitted bandwidth 0.01% to 100%; Frame length: 64 to 16000 bytes, acceptable bit-error rate, acceptable out-of-sequence rate, acceptable loss rate; MAC source/IP source/ destination addresses, UDP source/destination Addresses, VLAN tagging 802.1q.p, 4 sVLAN stacked tags, VLAN enabled/ disabled, VLAN ID 0 to 4095, VLAN QoS levels 0 to 7, UDP payload pattern (all ones, all zeros, PRBS 31, user-defined 32-bit), IP TOS, IP TTL, and IP Fragment Flag	Port-to-Port Testing	Ping, bi-directional bit-error-rate and stream testing; RFC 2544 testing for throughput, frame loss, and latency
Flow Control	Generation of pause frames with a user specified time of 0 to 65535 Quantas; response to pause packets can be enabled or disabled	RFC 2544 Throughput Test	Measurements are provided for 64, 128, 256, 512, 1024, 1280, and 1518 byte frame standard lengths plus custom lengths, user-defined trial duration time (1 to 600 secs), acceptable loss rate (0 to 100%); resolution rate (1 to 100%) parameters; Results: passing rate %, number of transmitted/received packets, and min/max/average latency values in microseconds
Per-Port Tx Statistics	Transmitted packets, packets per second, transmitted bytes, Mbps, % bandwidth of transmitted packets/bytes	RFC 2544 Frame Loss Test	Measurements are provided for 64, 128, 256, 512, Test 1024, 1280, & 1518 byte frame standard lengths plus custom lengths, User-defined trial duration time (1 to 600 secs); Results: Tested frame rate %, number of transmitted/received frames, % loss
Per-Port Receive Statistics	Received Mbps and bandwidth % rates, received packets/bytes count, received jumbo frames, received pause packets, pause end packets, pause Quantas taken, count of received IP, ICMP, TCP, UDP, and IGMP packets, count of received VLAN tagged frames and VLAN tagged frames per QoS levels 0 to 7, latency (minimum, maximum and average), broadcast, multicast and unicast packets, packet-size distribution.	RFC 2544 Back-to-Back Burst Test	Measurements are provided for 64, 128, 256, 512, Test 1024, 1280, & 1518 byte frame standard lengths plus custom lengths, User-defined trial duration time (1 to 600 secs); Results: Number of packets that can be forwarded in a burst per user-specified parameters and number of repetitions
Per-Stream Transmit Statistics	Transmitted bandwidth %, transmitted packet bytes count	Test Patterns	PRBS 9, PRBS 9 inverted, PRBS 11, PRBS 11 inverted, PRBS 15, PRBS 15 inverted, PRBS 20, PRBS 20 inverted, PRBS 23, PRBS 23 inverted, PRBS 31, PRBS 31 inverted, user-defined (32-bit), all 0's, all 1's
Per-Stream Receive Statistics	Received bandwidth %, Received packets/byte count, out-of-sequence packets, bit errors, latency (minimum, maximum, and average in ms)		
Alarm Detection	Link fault, pattern sync, jabber.		

OTN

Configuration	OTL3.4 43Gbps, 4 Virtual Lanes, 4 Optical Lanes. OTL4.10 112Gbps, 20 Virtual Lanes, 10 Optical Lanes.	Error Detection	Frame (OA1, OA2), MFAS, Correctable FEC errors, Uncorrectable FEC errors, OTU(SM): BIP8, OTU(SM):BEI, ODU(PM):BIP8, ODU(PM):BEI, BIT, TCM(1-6):BIP8, TCM(1-6):BEI
Lane Mapping	Any virtual lanes to any physical lane. Rotated lane mapping.	Error Generation	Frame (OA1, OA2), MFAS, Correctable FEC errors, Uncorrectable FEC errors, OTU(SM): BIP8, OTU(SM):BEI, ODU(PM):BIP8, ODU(PM):BEI, BIT, TCM(1-6):BIP8, TCM(1-6):BEI
Lane Skew	Lane skew measurement per lane. Lane skew generation across any optical lanes. Skew limits range from 0 to 65,000. De-skew tolerance from 0 to 65,000. 43G resolution - 3 bits, 112G resolution - 64 bits.	Error Generation Rate	BIT/Frame: Single, 10 ⁻¹⁰ to 10 ⁻³ , user-programmable; Other errors: Single, 10 ⁻¹⁰ to maximum, user-programmable.
Multi-lane Alarm Generation	LOL, LOFOTL, OOFOTL, Generic AIS.	Periodic Burst Generation	Burstable Errors: FRAME, MFAS, OTU(SM):BIP8, OTU(SM):BEI, ODU(PM):BIP8, ODU(PM):BEI, TCM(1-6):BIP8, TCM(1-6):BEI
Multi-lane Alarm Measurement	LOL, LOFOTL, OOFOTL, Generic AIS, Excessive Skew.		
OTN Mapping	Null Client, Synchronous SONET/SDH, Asynchronous SONET/SDH, GFP, 10G Ethernet, 10G Fibre Channel.		
Test Patterns	PRBS 9, PRBS 9 inverted, PRBS 11, PRBS 11 inverted, PRBS 15, PRBS 15 inverted, PRBS 20, PRBS 20 inverted, PRBS 23, PRBS 23 inverted, PRBS 31, PRBS 31 inverted, user-defined (32-bit), all 0's, all 1's		Burstable Alarms: OTU(SM):IAE, OTU(SM):BDI, ODU(PM):BDI, TCM(1-6):BDI Burst Size: 0 to 65535 Frames. Burst Period: 0 to 1048575 Frames.

Some OTN mappings and payloads may require additional modules.

<p>Error Generation Rate</p>	<p>BIT/Frame: Single, 10⁻¹⁰ to 10⁻³, user-programmable; Other errors: Single, 10⁻¹⁰ to maximum, user-programmable</p>	<p>Alarm Generation</p>	<p>LOS, LOF, OOF, LOM, OOM, OTU(SM):AIS, OTU(SM):IAE, OTU(SM):BDI, ODU(PM):AIS, ODU(PM):OCI, ODU(PM):LCK, ODU(PM):BDI, TCM(1-6):BDI</p>
<p>Periodic Burst Generation</p>	<p>Burstable Errors: FRAME, MFAS, OTU(SM):BIP8, OTU(SM):BEI, ODU(PM):BIP8, ODU(PM):BEI, TCM(1-6):BIP8, TCM(1-6):BEI</p> <p>Burstable Alarms: OTU(SM):IAE, OTU(SM):BDI, ODU(PM):BDI, TCM(1-6):BDI</p> <p>Burst Size: 0 to 65535 Frames; OTU-1: 0 to 3209.35ms; OTU-2: 0 to 798.964ms.</p> <p>Burst Period: 0 to 1048575 Frames; OTU-1: 0 to 51350.392ms; OTU-2:..</p>	<p>Intrusive Through Mode</p>	<p>Provides the ability to regenerate optical signal and optionally modify OTN overhead bytes and generate errors and alarms</p>
<p>Alarm Detection</p>	<p>LOS, Power Hot, Power Warm, Power Low, LOF, OOF, OOM, LOM, OTU(SM):AIS, OTU(SM):IAE, OTU(SM):BDI, OTU(SM):SAPI, OTU(SM):DAPI, OTU(SM):BIAE, ODU(PM):AIS, ODU(PM):OCI, ODU(PM):LCK, ODU(PM):BDI, ODU(PM), SAPI, ODU(PM):DAPI, TCM(1-6):BDI, TCM(1-6):SAPI, TCM(1-6):DAPI, TCM(1-6):BIAE, OPU: PLM.</p>	<p>Service Disruption Measurement</p>	<p>Criteria: OOF, OTU(SM):AIS, OTU(SM):BIP8, ODU(PM):AIS, ODU(PM):BIP8, BIT errors;</p> <p>Resolution (one frame duration): OTU-1 is 49µs; OTU-2 is 12µs.</p>
<p>OTN overhead monitor</p>	<p>OTU OH: all bytes ODU OH: all bytes OPU OH: all bytes</p> <p>OTU OH: OA1, OA2, GCC0-1, GCC0-2, Res-1, Res-2, SAPI (trace), DAPI (trace), operator specific (trace) ODU OH: Forward FTFL, Backward FTFL, SAPI (trace), DAPI (trace), operator specific (trace), STAT, GCC1-1, GCC1-2, GCC2-1, GCC2-2, APS/PCC-1, APS/PCC-2, APS/PCC-3, APS/PCC-3, TCM/ACT, Res-1, Res-2, Res-3, Res-4, Res-5, Res-6, Res-7, Res-8, Res-9 OPU OH: PT (PSI-0) justification control</p>	<p>Round-Trip Delay</p>	<p>Supported for OTN; OTU-1 resolution is 49 microseconds; OTU-2 resolution is 12 microseconds</p>
		<p>Overhead Capture</p>	<p>Up to 255 overhead bytes can be captured and displayed in HEX and ASCII values, and can be printed or saved to a report file.</p> <p>Any one of the following bytes can be captured:</p> <p>OTU(SM):FAS OA1(1-3), OTU(SM):FAS OA2(1-3), OTU(SM):MFAS, OTU(SM):TTI, OTU(SM):BIP, OTU(SM):BEI, OTU(SM):GCC0(1-2), OTU(SM):RES(1-2), ODU(PM):TCM(1-6) TTI, OPU:RES(1-3), OPU:PSI, ODU(PM):TCM(1-6) BIP, OPU: JC(1-3), OPU:NJO, ODU(PM):TCM(1-6)BEI, ODU(PM):RES(1-9), ODU(PM):TCM ACT, ODU(PM):FTFL, ODU(PM):TTI, ODU(PM):BIP, ODU(PM):BEI, ODU(PM):EXP(1-2), ODU(PM):GCC1(1-2), ODU(PM):GCC2(1-2), ODU(PM):APS PCC(1-4)</p> <p>Triggers: selected OTN errors or alarms, specified byte values, OPU justifications, manual</p>

SONET/SDH

<p>Configuration</p>	<p>STL256.4 40Gbps, 4 Virtual Lanes, 4 Optical Lanes.</p>	<p>Test Patterns</p>	<p>PRBS 9, PRBS 9 inverted, PRBS 11, PRBS 11 inverted, PRBS 15, PRBS 15 inverted, PRBS 20, PRBS 20 inverted, PRBS 23, PRBS 23 inverted, PRBS 31, PRBS 31 inverted, user-defined (32-bit), all 0's, all 1's</p>
<p>Lane Mapping</p>	<p>Any virtual lanes to any physical lane. Rotated lane mapping.</p>	<p>Automatic Protection Switching</p>	<p>Support for SONET/SDH transmission/reception of switching linear and ring-mode command sequences for K1/K2 bytes (per G.841); Measurement accuracy is one-frame duration; Results displayed in summary column format and decoded tabular format</p>
<p>Lane Skew</p>	<p>Lane skew measurement per lane. Lane skew generation across any optical lanes. Skew limits range from 0 to 65,000. De-skew tolerance from 0 to 65,000. Resolution - 3 bits.</p>	<p>Overhead Control</p>	<p>Section/RS, Line/MS OH: A1, A2, J0(Trace)/Z0/C1, D1-D12, E1, E2, F1, K1, K2, S1, M0/M1, Z1, Z2, E2; Path/HP OH: C2, F2, G1, H4, J1 (Trace), Z3/F3, Z4/K3, Z5/N1(TCM); VT/LP OH: V5, J2 (Trace), Z6/N2(TCM), Z7/K4</p>
<p>Multi-lane Alarm Generation</p>	<p>LOL, LOFSTL, OOFSTL, Generic AIS.</p>	<p>Overhead Monitor</p>	<p>Section/RS, Line/MS OH: all bytes; Path/HP OH: all bytes; VT/LP OH: all bytes</p>
<p>Multi-lane Alarm Measurement</p>	<p>LOL, LOFSTL, OOFSTL, Generic AIS, Excessive Skew.</p>	<p>Pointer Control</p>	<p>SONET STS/VT and SDH AU/TU: Increment/decrement single, increment/decrement burst 2-8, new value with NDF, new value without NDF, Pointer sequences (per standards), Payload frequency offset ±100 ppm</p>
<p>SONET Mapping</p>	<p>EC-1/3, STS-192c Bulk, STS-48c Bulk, STS-12c Bulk/ATM, STS-3c Bulk/ATM, STS-1 Bulk/ATM, VT-6 Bulk/ATM, VT-2 Bulk/ATM, VT-1.5 Bulk/ATM, Unframed Bulk Wlth PDH module: E4 Bulk/ATM, DS3 Bulk/ATM, DS1#1 Bulk/ATM, DS1#2 Bulk/ATM, E1#1 Bulk/ATM, E1#2 Bulk/ATM. ATM mappings require ATM module. Virtual Concatenation mappings require MSA module.</p>	<p>Pointer Monitor</p>	<p>SONET STS/VT and SDH AU/TU: Positive Pointer Justification counts, Negative Pointer Justification counts, Pointer Justification seconds, NDF counts, Pointer value (decimal and hexadecimal formats)</p>
<p>SDH Mapping</p>	<p>AU-4-64c Bulk, AU-4-16c Bulk, AU-4-4c Bulk/ATM, AU-4/C-4 Bulk/ATM, AU-4/C-3 Bulk/ATM, AU-4/C-2 Bulk/ATM, AU-4/C-12 Bulk/ATM, AU-4/C-11 Bulk/ATM, AU-3/C-3 Bulk/ATM, AU-3/C-2 Bulk/ATM, AU-3/C-12 Bulk/ATM, AU-3/C-11 Bulk/ATM, Unframed Bulk. With PDH module: E4 Bulk/ATM, E3 Bulk/ATM, E1#1 Bulk/ATM, E1#2 Bulk/ATM, DS3 Bulk/ATM, DS1#1 Bulk/ATM, DS1#2 Bulk/ATM. ATM mappings require ATM module. Virtual Concatenation mappings</p>	<p>Performance Monitoring</p>	<p>Calculates network performance in accordance with ITU/Telcordia standards GR-253, T1.231, G.821, G.826, G.828, G.829, M.2100, M.2101, M.2110, M.2120</p>
<p>Payloads</p>	<p>Test patterns, GFP-F, GFP-T</p>		

Some SONET/SDH/OTN mappings & payloads may require additional modules.

Alarm Detection	SONET: LOS, Optical Power Hot, Optical Warm, Optical Power Low, Frequency Wide, OPU Generic AIS, LOF, AIS-L, APS(K1/ K2 Change), SEF, RDI-L, PATT SYNC, PLM-P, CONCAT, AIS-P, LOP-P, UNEQ-P, RDI-P, TIM-P, TIM-S, AIS-V, LOP-V, LOM-V, UNEQ-V, RDI-V, RFI-V, TIM-V, PLM-V, TC-RDI-P, TC-ODI-P, TC- AIS-P, TC-UNEQ-P, TC-LOF-P, TC-TIM-P, TC- RDI-V, TC-ODI-V, TC-AIS-V, TC-UNEQ-V, TC- LOF-V, TC-TIM-V, SS MISMATCH	Error Injection	SONET: B1, B2, REI-L, B3, REI-P, BIT, TC-IEC-P, TC-REI-P, TC-OEI-P, TC-BIP-V, TC-REI-V, TC-OEI-V SDH: B1, B2, MS-REI, B3, HP-REI, BIT, HP-TC-IEC, HP-TC-REI, HP-TC-OEI, LP-TC-BIP, LP-TC-REI, LP-TC-OEI
SDH:	LOS, Optical Power Hot, Optical Power Warm, Optical Power Low, Frequency Wide, OPU Generic AIS, LOF, MS-AIS, APS(K1/K2 Change), OOF, MS-RDI, PATT SYNC, HP-PLM, CONCAT, AU-AIS, AU-LOP, HP-UNEQ, HP-RDI, HP-TIM, RS-TIM, TU-AIS, TU-LOP, TU-LOM, LP-UNEQ, LP-RDI, LP-RFI, LP-TIM, LP-PLM, HP-TC-RDI, HP-TC-ODI, HP-TC-AIS, HP-TC- UNEQ, HP-TC-LOF, HP-TC-TIM, LP-TC-RDI, LP-TC-ODI, LP-TC-AIS, LP-TC-UNEQ, LP-TC- LOF, LP-TC-TIM, SS MISMATCH	Error Injection Rate	BIT/Frame: Single, 10-10 to 10-3, user-programmable; Other errors: Single, 10-10 to maximum, user-programmable
Error Detection	SONET: BPV/LCV, Frame (A1, A2), B1, B2, REI-L, B3, REI-P, BIP-V, REI-V, BIT, TC-IEC-P, TC- REI-P, TC-OEI-P, TC-BIP-V, TC-REI-V, TC-OEI-V, NDF-P, NDF-V SDH: BPV/LCV, Frame (A1, A2), B1, B2, MS-REI, B3, HP-REI, LP-BIP, LP-REI, BIT, HP-TC-IEC, HP-TC-REI, HP-TC-OEI, LP-TC-BIP, LP-TC-REI, LP- TC-OEI, AU-NDF, TU-NDF	Intrusive Through Mode	Provides the ability to regenerate optical signal and optionally modify Section and Line overhead bytes
Alarm Generation	SONET: LOS, LOF, AIS-L, RDI-L, LOP-P, AIS-P, RDI-P, UNEQ-P, UNEQ-V, RDI-V, RFI-V, AIS-V, LOP-V, LOM-V, TC-RDI-P, TC-ODI-P, TC-AIS-P, TC-UNEQ-P, TC-LOF-P, TC-RDI-V, TC-ODI-V, TC-AIS-V, TC-UNEQ-V, TC-LOF-V SDH: LOS, LOF, MS-AIS, MS-RDI, AU-LOP, AU- AIS, HP-RDI, HP-UNEQ, LP-UNEQ, LP-RDI, LP-RFI, TU-AIS, TU-LOP, TU-LOM, HP-TC-RDI, HP- TC-ODI, HP-TC-AIS, HP-TC-UNEQ, HP-TC-LOF, LP-TC-RDI, LP-TC-ODI, LP-TC- UNEQ, LP-TC-LOF	Service Disruption Automatic Protection Switching Measurement	Supported for all mappings. SONET triggers: B1 error, SEF, AIS-L, AIS-P, AIS-V, PRBS, LOS, LOF, B1, SEF, AIS-L, AIS-P, AIS-V, BIT errors. SDH triggers: LOS, LOF, B1, OOF, AIS-L, AIS-P, AIS-V, BIT errors. Resolution: 125 microseconds; Supported; SONET/SDH resolution is 125 microseconds;
		Round-Trip Delay	
		Tandem Connection Monitoring	In accordance with G.707/Annex D for High Order , Errors/Alarms: TC-IEC, TC-REI, TC-OEI, TC-AIS, TC-UNEQ, TC-RDI, TC-ODI, TC-LOF, TC-API

ORDERING INFORMATION

PART NO.	DESCRIPTION
G10	CSA 100G Service Analyzer Module For NIC Platform
OTU3_G	OTU-3 (G.709 OTN) Test Option
OTU4_G	OTU-4 (G.709 OTN) Test Option
40GE_G	40G Ethernet Test Option
100GE_G	100G Ethernet Test Option
CFP_40G	40G CFP Module
CFP_100G_ETH	100G CFP Module Supporting 100G Base-R
CFP_100G_OTN	100G CFP Module Supporting 100G OTU-4



Digital Lightwave®
www.lightwave.com

Corporate Offices
5775 Rio Vista Drive
Clearwater, FL 33760, USA

Toll free: +1.800.548.9283
T: +1.727.442.6677
F: +1.727.536.3541

Latin America
Capulin #1, Tabla
Honda
Tlalnepantla C.P. 54126
Mexico
T: +52.55.2207-1500
F: +1.727.442.5660

Europe
P.O. Box 193
Shepperton TW17 7AU
United Kingdom
T: +44.(0).193.224.1335
F: +44.(0).193.224.1335