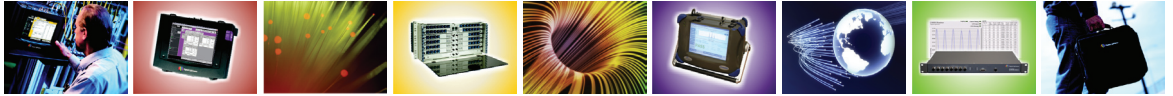




One Module - 29 Testing Solutions...



NextGeneration Multi-Rate (NGMR) Module for NIC Platform

SONET/SDH/OTN, NextGeneration and Ethernet Testing in the Industry's Most Flexible Module

SONET/SDH 52M - 10G Next Generation Multi-Rate Module

10Gig Ethernet LAN

10Gig Ethernet WAN

Virtual Concatenation

LCAS

Generic Framing Procedure (GFP)

OTU-1

OTU-2

One Module - 29 Solutions

No single module provides more telecom/datacom test solutions

The flexible NGMR module provides the testing capabilities you need today - and tomorrow. The NGMR provides SONET/SDH/OTN, NextGeneration and Ethernet testing and can be ordered in a number of hardware configurations based on the datarates needed. With license-based "test options", additional capabilities can be added as needed with only a license key. Protect your investment and simplify your network testing with the NGMR for the Digital Lightwave NIC Platform.

PLATFORMS



NIC®



NIC Plus®



NIC EP™

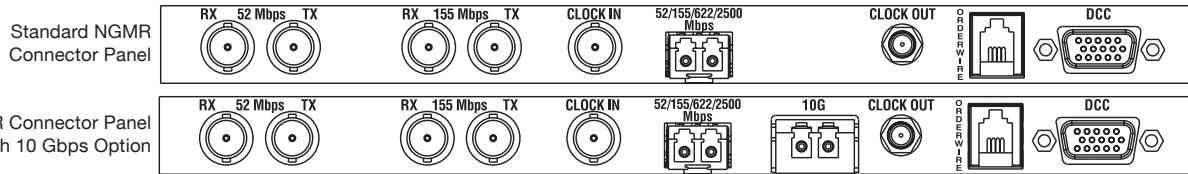
KEY FEATURES

- 52M/155M/622M/2.5G/2.6G/10G/10.7G/11.049G/11.095G interfaces
 - SONET/SDH/OTN, GigE and 10GigE testing enable telecom/datacom test capability with one module*
 - Supports NextGeneration Features - VCAT, LCAS and GFP (*see separate NextGeneration datasheets for more information*)
 - 1G Ethernet testing*
 - 10G Ethernet testing — 10G LAN (10.3G), 10G WAN (9.953G), 10G Ethernet FEC (11.049/11.095G)*
 - ODU-1 to ODU-2 Mapping*
 - Hot-swappable SFP/XFP optical transceiver modules
 - Investment protection! Existing NIC products can be upgraded with new NGMR module
- * Requires the addition of Test Options. See Ordering Information section.

NextGeneration Multi-Rate (NGMR) Module for NIC Platform

SONET/SDH/OTN, NextGeneration and Ethernet Testing in the Industry's Most Flexible Module

CONNECTOR PANEL LAYOUTS



NGMR GUI

M...	Chan	Seq #	Delay (ms)	Fr Delay	Ptr Delay	Operation
1	3	0	0.00000	0	0	
2	23	1	0.00000	0	0	
3	27	2	0.06242	0	391	
4	30	3	0.00000	0	0	
5	34	4	0.00000	0	0	
6	36	5	3.00000	24	0	
7	41	6	0.00000	0	0	
8	44	7	0.00000	0	0	
9	45	8	55.00000	440	0	
10	48	9	0.00000	0	0	
11	51	10	0.00000	0	0	
12	52	11	255.00000	2040	0	
13	56	12	0.00000	0	0	
14	59	13	0.00000	0	0	
15	61	14	0.12484	0	782	
16	64	15	0.00000	0	0	
Add						

SPECIFICATIONS

NOTE: For Ethernet Packet Specifications, see NIC Ethernet Modules Technical Specifications Datasheet

OPTICAL INTERFACES

Connector Type LC; Adapters available (e.g. LC to SC/ST/FC)

Modules All optical interfaces are hot-swappable modules:
SFP for 51/155/622Mbps and 1/2.5/2.66 Gbps
XFP for 10/10.7/11.049/11.095 Gbps (See Note 1)

Power Levels Typical specifications for SFP/XFP modules:

9.953/10.3/10.7/11.049/11.095 Gbps (1550nm Intermediate Range)
Optical Level (Rx) -1 dBm to -14 dBm with a BER of 1e-12
Optical Level (Tx) -1 dBm to +2 dBm
Input Pwr. Meas. -1 dBm to -14 dBm, accuracy ±1.5 dB

9.953/10.3/10.7/11.049/11.095 Gbps (1310nm Intermediate Range)
Optical Level (Rx) 0 dBm to -14 dBm with a BER of 1e-12
Optical Level (Tx) -6 dBm to -1 dBm
Input Pwr. Meas. -1 dBm to -14 dBm, accuracy ±1.5 dB

9.953/10.3/10.7/11.049/11.095 Gbps (850nm Intermediate Range)
Optical Level (Rx) -1 dBm to -8 dBm with a BER of 1e-12
Optical Level (Tx) -5 dBm to -1 dBm
Input Pwr. Meas. -1 dBm to -8 dBm, accuracy ±1.5 dB

52/155/622 Mbps and 1/2.5 Gbps/2.66 Gbps (1310nm & 1550nm)
Optical Level (Rx) -9 dBm to -27 dBm with a BER of 1e-10
Optical Level (Tx) -2 dBm to +3 dBm
Input Pwr. Meas. -9 dBm to -28 dBm, accuracy ±1.5 dB

52/155/622 Mbps and 1/2.5 Gbps/2.66 Gbps (850nm)
Optical Level (Rx) 0 dBm to -14 dBm with a BER of 1e-10
Optical Level (Tx) -2 dBm to +3 dBm
Input Pwr. Meas. 0 dBm to -14 dBm, accuracy ±1.5 dB
Line code Optical: NRZ, scrambled

SONET/SDH ELECTRICAL INTERFACES

Connector Type 75-ohm BNCs — 51 Mbps and 155 Mbps

Line code EC-3(STS-3)/STM-1e: CMI
EC-1(STS-1)/STM-0e: B3ZS

Electrical Level (Tx) 0.5 Vpk ±10%

Electrical Level (Rx) Terminate and monitor mode meet ITU-T G.772

Note 1: 1, 10.7, 11.049, and 11.095 Gbps rates available only with the addition of Test Options; see "Ordering Information"

NextGeneration Multi-Rate (NGMR) Module for NIC Platform

SONET/SDH/OTN, NextGeneration and Ethernet Testing in the Industry's Most Flexible Module

INTERFACE MISC. SPECIFICATIONS

Timing	Internal, external, recovered	Overhead Control	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
Internal Clock	Stratum III compliant (± 4.6 ppm)	Overhead Monitor	Section/RS, Line/MS OH: all bytes; Path/HP OH: all bytes; VT/LP OH: all bytes
External Clock	1.544/2.048 Mbps (BITS/SETS), 1.544/2.048 MHz via Bantam connector (balanced); 8KHz/1.544/2.048/10 MHz via 75-ohm TTC BNC (unbalanced)	Pointer Control	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
Frequency Offset	Tx timing ± 100 ppm, in 0.1 ppm increments	Pointer Monitor	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)
Interface Rates	OC-192/STM-64: 9.953 Gbps OC-48/STM-16: 2.488 Gbps OC-12/STM-4: 622.80 Mbps EC-3/OC-3/STM-1/STM-1e: 155.08 Mbps EC-1/OC-1/STM-0/STM-0e: 51.84 Mbps OTU-2: 10.71 Gbps (See Note 1) OTU-1: 2.66 Gbps (See Note 1) Ethernet 1G: 1.25Gbps Ethernet 10G LAN/WAN: 9.953/10.3/11.049/11.095 Unframed: 10.71/9.953/2.66/2.488 Gbps, 622.80/155.08/51.84 Mbps	Performance Monitoring	Calculates network performance with programmable in accordance with international standards GR-253, T1.231, G.821, G.826, G.828, G.829, M.2100, M.2101, M.2110, M.2120 (with graphs)
Input Freq. Meas.	± 200 ppm	Alarm Detection	SONET: LOS, Power Hot, Power Warm, 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 SDH: LOS, Power Hot, Power Warm, 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
FUNCTIONS		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 G.709 OTN: (See Note 1) Frame (OA1, OA2), MFAS, FEC errors, Uncorrectable FEC errors, OTU:BIP8, OTU:BEI, ODU:BIP8, ODU:BEI, BIT, TCM(1-6):BIP8, TCM(1-6):BEI
NextGen Support (See Note 1)	VCAT/LCAS High-Order: VC-3-Xv, VC-4-Xv (SDH); STS-1c-Xv, STS-3c-Xv (SONET); VCAT/LCAS Low-Order: VC-11-Xv, VC-12-Xv, VC-2-Xv (SDH), VT-1.5-Xv, VT-2-Xv, VT-6-Xv (SONET); GFP: Supports High-order SONET/SDH and high-order/low-order VCAT mappings (if equipped) for Bulk Fill, Framed and Transparent GFP mappings For more information on VCAT/LCAS/GFP test options, see separate NextGeneration datasheets		
SONET Mapping (See Note 2)	EC-1/3, OC-1/3/12/48/192: 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, Dual DS3 (optional). With PDH module: E4 Bulk/ATM, DS3 Bulk/ATM, DS1#1 Bulk/ATM, DS1#2 Bulk/ATM, E1#1 Bulk/ATM, E1#2 Bulk/ATM		
SDH Mapping (See Note 2)	STM-0e/1e, STM-0/1/4/16/64: 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		
OTN Mapping (See Note 1)	OTU-1/OTU-2: Unfr. BERT, Fr. BERT, Null Client, Sync SONET/SDH, Async SONET/SDH, 10G WAN (OTU-2), ODTU-12 feature enables mux/demux of 4 ODU-1 signals within ODU-2 on OTU-2 interface; OTU-2 supports GFP Framed and Bulk mappings, OTU-1 supports GFP Transparent, Framed and Bulk mappings		
Ethernet Mapping (See Note 1)	1G LAN (1G), 10G LAN (10.3G), 10G WAN (9.953G), FEC (11.049/11.095G)		
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		
Automatic Protection Switching	Support for SONET/SDH transmission/reception of 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		

Note 1: Requires the addition of Test Options, see "Ordering Information"
Note 2: Requires module configuration with ATM

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SONET/SDH/OTN, NextGeneration and Ethernet Testing in the Industry's Most Flexible Module

FUNCTIONS, CONTINUED

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-AIS, LP-TC-UNEQ, LP-TC-LOF G.709 OTN: (See Note 1) LOS, LOF, OOF, LOM, OOM, OTU:AIS, OTU:IAE, OTU:BDI, ODU:AIS, ODU:OCI, ODU:LCK, ODU:BDI, TCM(1-6):BDI
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 G.709 OTN: (See Note 1) Frame (OA1, OA2), MFAS, FEC errors, Uncorrectable FEC errors, OTU:BIP8, OTU:BEI, ODU:BIP8, ODU:BEI, BIT, TCM(1-6):BIP8, TCM(1-6):BEI
Error Injection Rate	BIT/Frame: Single, 10^{-10} to 10^{-3} , user-programmable; Other errors: Single, 10^{-10} to maximum, user-programmable
Periodic Burst Rate	G.709 OTN Errors: FRAME, MFAS, OTU:BIP8, OTU:BEI, ODU:BIP8, ODU:BEI, TCM(1-6):BIP8, TCM(1-6):BEI; G.709 OTN Alarms: OTU:IAE, OTU:BDI, ODU:BDI, TCM(1-6):BDI; Burst Size: 0 to 65535 Frames, 0 to 3209.35ms; Burst Period: 0 to 1048575 Frames, 0 to 51350.39ms
Intrusive Through Mode	Provides the ability to regenerate optical signal and optionally modify Section and Line overhead bytes
Service Disruption/ Automatic Protection	Supported for all mappings; SONET measures on: LOS, LOF, B1, SEF, AIS-L, AIS-P, AIS-V, BIT errors;
Switching Measurement	resolution is 125 microseconds; SDH measures on: LOS, LOF, B1, OOF, AIS-L, AIS-P, AIS-V, BIT errors; resolution is 125 microseconds; G.709 OTN measures on: LOS, LOF, OOF, OTU:AIS, OTU:BIP8, ODU:AIS, ODU:BIP8, BIT errors; OTU-1 resolution is 49 microseconds; OTU-2 resolution is 12 microseconds; Simultaneous measurements for all supported processors displayed in convenient table format
Round-Trip Delay	Supported for OTN and SONET/SDH signals; SONET/SDH resolution is 125 microseconds; OTU-1 resolution is 49 microseconds; OTU-2 resolution is 12 microseconds
Tandem Connection Monitor	In accordance with G.707/Annex D for High Order Path (via N1), Errors/Alarms: TC-IEC, TC-REI, TC-OEI, TC-AIS, TC-UNEQ, TC-RDI, TC-ODI, TC-LOF, TC-API

Note 1: Requires the addition of Test Options, see "Ordering Information"

ORDERING INFORMATION

Base Modules:

NGMR 155M to 52M, 1310nm SFP standard - **N11**(no ATM), **N12**(w/ATM)
NGMR 622M to 52M, 1310nm SFP standard - **N21**(no ATM), **N22**(w/ATM)
NGMR 2.5G to 52M, no ATM - **N31**(1310 SFP), **N31b**(1550 SFP)
NGMR 2.5G to 52M, with ATM - **N32**(1310 SFP), **N32b**(1550 SFP)
NGMR 2.5G to 52M, for use with Jitter Module - **N38**(no ATM), **N39**(w/ATM)
NGMR 2.5G only - **N33**(1310 SFP), **N33b**(1550 SFP)
NGMR 10G to 52M, no ATM, including SFP/XFP as indicated
- **N41**(1310/1310), **N41b**(1310/1550), **N41c**(1550/1550)
NGMR 10G to 52M, w/ATM, 10G to 52M, no ATM, with indicated SFP/XFP
- **N42**(1310/1310), **N42b**(1310/1550), **N42c**(1550/1550)
NGMR 10G to 52M, for use with Jitter Module - **N48**(no ATM), **N49**(w/ATM)
NGMR 10G only - **N44**(1310 XFP), **N44b**(1550 XFP)

Laser Options and Add-ons:

SFP Modules (850/1310/1550nm)
XFP Modules (850/1310/1550nm)
Special Order SFPs and XFPs available

Test Options*:

OTU-1 (2.66G) test option
OTU-2 (10.7G) test option
High-Order Virtual Concatenation test option
Low-Order Virtual Concatenation test option
Link Capacity Adjustment Scheme test option
Generic Framing Procedure (bulk/framed) test option
Generic Framing Procedure-Transparent test option
1G Ethernet (1G) test option (enables 10/100/1000 on N41e)
10G Ethernet FEC (11.049/11.095G) test option
10G Ethernet LAN (10.3G) test option
10G Ethernet WAN (9.9953G) test option
ODU-1 to ODU-2 Mapping test option
GFP over OTN Mapping test option

*Test Options can be included with initial purchase of NGMR module or can be added in the future by secure license key

For more information or a sales quote, contact any Digital Lightwave location or email dlisales@lightwave.com



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