Keysight NOVUS-S 10/25GE8SFP28 High-Density 100/50/25/10GE Load Module

Evolve your high-speed multi-rate ethernet testing, and enables 5G RAN transport validation

The new 5G flexible RAN architecture introduces the Ethernet-based fronthaul for carrying time-sensitive radio data over switched networks. The new Keysight Novus-S 10/25GE8SFP28 load module provides the right mix of required interface speeds, time-sensitive networking (TSN) capabilities, and high-scale control and data plane traffic to validate these networks.

Network equipment manufacturers (NEMs) are rapidly developing multi-rate switch/routing devices for 5G fronthaul network to capture market share. These products are expected to support high data rates while meeting the demands for time-critical radio data over Ethernet.

Bandwidth requirements for enterprises, cloud service providers, and global data centers continue to grow rapidly. Cloud service providers and hyper-scale data centers are deploying high-density 100GE, 50GE, and 25GE networking infrastructure solutions to meet these demands.

As data centers, cloud service providers, and large enterprises implement this same high-density network equipment in their own networks, they too need the same type of test solution to verify performance and functionality before deployment.

Highlights

- Validate 5G RAN transport network infrastructure.
- Validate 100GE, 50GE, 25GE, and 10GE over copper, multimode and single-mode fiber interconnect media.
- Emulate Time Sensitive Networking (TSN) over 25GE interfaces.
- Leverage excellent interoperability, functional, and performance test platform for 100GBASE-SR4,100GBASE-LR4, 100GBASE-CR4, 50GBASE-CR2, 25GBASE-CR, 25GBASE-SR, 25GBASE-LR with auto-negotiation, FEC, and link training.
- Generate broad range of traffic and analysis with full L2/3 protocol coverage.

KEYSIGHT

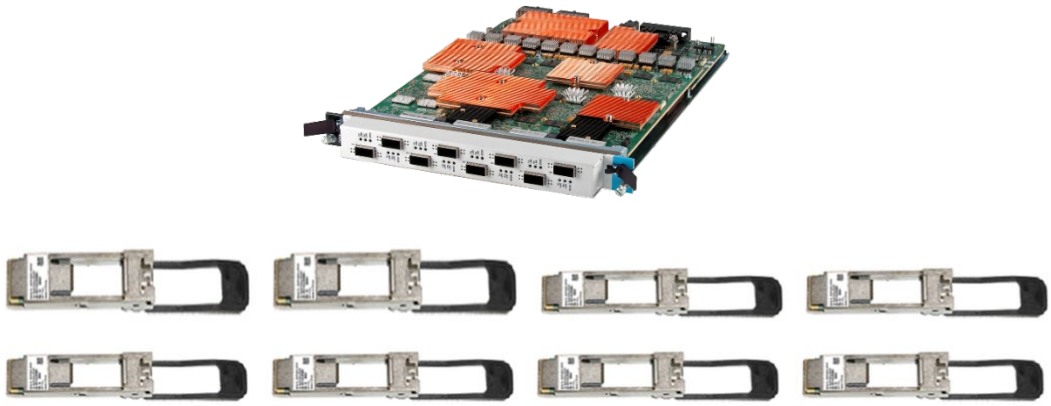


Figure 1. Novus-S 10/25GE8SFP28, 8-ports, 1-slot load module. Adapters shown are included with the load module.

Key Features

- Multi-vendor interoperability of 100GE, 50GE, 25GE, and 10GE testing between different speeds that run over these optics and media: Pluggable optical transceivers, active optical cables (AOC), and passive copper direct attach cable (DAC) media.
- 8x25GE, 8x10GE SFP28 interface speed support across all the ports of the load module with the pluggable QSA56 adaptors. The adaptors are included with the load module.
- Optional, dual-speed, 8x100GE, and 8x50GE QSFP28 support across all the ports of the load module for multimode 100GBASE-SR4, single mode 100GBASE-LR4, 100GBASE-CR4 passive copper, multimode 50GBASE-SR, single mode 50GBASE-LR and 50GBASE-CR2 passive copper.
- Ability to read and write SFP28 or QSFP28 transceiver registers and to export the transceiver register information to a csv file.
- Line-rate hardware packet capture and decode tools to detect and de-bug data transmission errors.
- An excellent test platform for full line rate 100GE and 50GE speed support over QSFP28 and 25Gb/s or 10Gb/s over SFP28 to evaluate hardware switch fabrics with NRZ encoding.
- Benchmark the data plane and protocol emulation performance and scale of ultra-high-density 100/50/25/10GE-capable network equipment; use industry-standard RFC benchmark tests in large test beds with many ports in a single test.
- Support for advanced features such as: Ethernet Forward Error Correction both RS-FEC and FC-FEC, auto-negotiation, and link training on 100GE, 50GE, and 25GE speeds.
- Coherent optical transceiver support for optics with up to 4.5 watts of power consumption in all front panel ports of all the Novus QSFP28 load modules.
- Medium to high-scale L2/3 protocol emulation to validate performance and scalability of L2/3 routing/switching and data center test cases using Keysight's IxNetwork application.
- Support for TSN Frame preemption (802.1Qbu / 802.13br), Time aware shaper (802.1Qbv) and a variety of 1588v2 profiles.
- Application support including: IxExplorer, IxNetwork, and the related Tcl and REST API and other automation APIs.

Specifications

Product Description	Novus-S 10/25GE8SFP28
Part Number	944-1164
Hardware Load Module Specifications	
Slot / Number of Ports	A 1-slot load module with: 8x100GE native QSFP28 ports (requires 905-1063 or 905-1064 option) 8x50GE native QSFP28 ports (requires 905-1063 or 905-1064 option) 8x25GE SFP28 ports with QSA56 adaptors 8x10GE SFP28 ports with QSA56 adaptors
Physical Interfaces	8-ports of native QSFP28 + 8 each QSA56 adaptors to support up to 8-ports of native SFP28 pluggable optics and copper DACs
Supported Port Speeds	25GE/port: 25GE-capable fiber and passive copper cable media 10GE/port: 10GE-capable fiber and passive copper cable media Optional 100GE/50GE port speed option using 100GE and/or 50GE-capable fiber and passive copper cable media
Number of users	Up to 8-users per load module
CPU and Memory	Multicore processor with 2GB of CPU memory per port for 100/50/25/10GE speed modes.
IEEE Interface Protocols	IEEE 802.3 100GBASE-R LAN IEEE 802.3bj IEEE 802.3bm IEEE 802.3by IEEE 802.3ba IEEE 802.3ae
Advanced Layer 1 Support	100GE: Auto-negotiation (AN), Clause 73 for passive copper DAC Link training for 100GE copper cable media, Clause 73 Ethernet Forward Error Correction RS-FEC, Clause 91 FEC statistics: ◦ RS-FEC Corrected and Uncorrected Codeword Counts Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability 50GE: Auto-negotiation (AN), Clause 73 for passive copper DAC. Compatible with 25G/50G Consortium v 1.6 (uses 25G CID) Link Training (LT) for 50GE copper DAC media (Clause 93, 110); note: Clause 72 link training patterns are not supported Ethernet Forward Error Correction: ◦ FC-FEC, Clause 74 for BASE-R PHYs ◦ RS-FEC, Clause 91 for 50GBASE-R PHYs ◦ FEC statistics: - RS-FEC Corrected and Uncorrected Codeword Count

	- FC-FEC Corrected and Uncorrected Block Count - FC-FEC Corrected Error Bits
Product Description	**Novus-S 10/25GE8SFP28**
	Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability 25GE: Auto-negotiation (AN), Clause 73 for passive copper DAC. Compatible with 25G/50G Consortium v 1.6 (uses 25G CID) Link Training (LT) for 25GE copper DAC media (Clause 93, 110); note: Clause 72 link training patterns are not supported Ethernet Forward Error Correction: ◦ FC-FEC, Clause 74 for BASE-R PHYs ◦ RS-FEC, Clause 108 for 25GBASE-R PHYs ◦ FEC statistics: - RS-FEC corrected and uncorrected codeword count - FC-FEC corrected and uncorrected block count - FC-FEC corrected error bits Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability 10GE: Independent SFP28 ports with 10GE speed support
Transceiver Support	100GE: requires 100/50GE speed option 100GBASE-SR4, 50GBASE-SR2 and 4x25GBASE-SR QSFP28 for multimode fiber Pluggable transceiver: 100GBASE-SR4 QSFP28 for multimode fiber Pluggable transceiver: 100GBASE-LR4 QSFP28 for single-mode fiber Pluggable transceiver: 100G PSM4 QSFP28 for single mode fiber - 100GE support requires a point-to-point cable - 50GE: requires the 100/50GE speed option Pluggable transceiver: 100GE CWDM4 QSFP28 for single mode fiber - Supports 1x100GE, 2x50GE and 4x25GE Ethernet speeds per front panel port on the Novus load modules using a single, point-to-point, single mode, fiber cable with LC connectors - There is no physical fan-out cable capability on CWDM4 optics Pluggable transceiver: 50GBASE-SR2 multimode fiber Active Optical Cable (AOC) media, 850nm, 3-meter length Pluggable transceiver: 100GBASE-SR4 QSFP28 for multimode fiber Pluggable transceiver: 100GBASE-LR4 QSFP28 for single-mode fiber 25/10GE Pluggable transceiver: 25/10GE SFP28-LR for single mode fiber 25/10GE support requires an LC-duplex single mode fiber cable Pluggable transceiver: 25/10GE SFP28-SR for multimode fiber 25/10GE support requires an LC-duplex multimode fiber cable
Transceiver Register Management Support	Read and write SFP28 or QSFP28 transceiver registers Ability to export transceiver register information to a csv file

Cable Media	100GBASE-SR4 multimode fiber AOC and MT-MT 12-fiber point-to-point cables for QSFP28 100GBASE-CR4, passive, copper DAC up to 5 meters in length; note: requires RS-FEC to be enabled
Product Description	**Novus-S 10/25GE8SFP28**
	50GBASE-CR2 passive, copper DAC, point-to-point, up to 3 meters in length; note: requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled 50GBASE-SR2 multimode fiber Active Optical Cable (AOC) media, 850nm, 3-meter length 25GBASE-SR requires an LC-duplex multimode fiber, point-to-point cable 25GBASE-LR requires an LC-duplex single mode fiber, point-to-point cable 25GBASE-CR requires a passive copper DAC point-point, up to 3 meters in length; note: requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled per IEEE 802.3by standard 10GBASE-SR requires a LC-duplex multimode fiber, point-to-point cable 10GBASE-LR requires a LC-duplex single mode fiber, point-to-point cable This card supports passive copper CA-N cables for up to 2 meters in length with RS-FEC turned ON or FC-FEC turned ON or No-FEC turned at all
Load Module Dimensions	17.3” (L) x 1.3” (W) x 12.0” (H) 440mm (L) x 33mm (W) x 305mm (H)
Load Module Weights	Module only: 11.8 lbs. (5.35 kg) Shipping: 19.24 lbs. (8.73 kg) includes eight QSA56 adaptors
Temperature (Ambient Air)	Operating: 41°F to 95°F (5°C to 35°C) Storage: 41°F to 122°F (5°C to 50°C)
Humidity (Ambient Air)	Operating: 0% to 85%, non-condensing Storage: 0% to 85%, non-condensing
Chassis Capacity: Maximum Number of Cards and Ports per Chassis Model	
12 slot rack-mount chassis (XGS12-SD/HSL)	12 load modules per chassis for up to: 96-ports of 100GE, 50GE, 25GE and 10GE in a single 12-slot, chassis
2-slot rack-mount chassis (XGS2-SD/HSL)	2 load modules per chassis for up to: 16-ports of 100GE, 50GE, 25GE, and 10GE in a single 2-slot, chassis
Transmit Feature Specifications	
Transmit Engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures
Max. Streams per Port High Stream Mode (HS)	**100GE**: 64 **100GE (HS mode)**: 128 **50GE**: 64 **25GE**: 64 **10GE**: 64
Max. Streams per Port in Data Center Ethernet High Stream Mode (HS)	**100GE**: 64 **100GE (HS mode)**: 128 **50GE**: 64 **25GE**: 64 **10GE**: 64
Stream Controls	Rate and frame size change on the fly, sequential, and advanced stream scheduler
Minimum Frame Size	60 bytes at full line rate

	49 bytes at less than full line rate

Product Description	Novus-S 10/25GE8SFP28
Maximum Frame Size	14,000 bytes
Maximum Fame Size in Data Center Ethernet	9,216 bytes
Priority Flow Control	8 line-rate-capable queues, each supporting up to 2,500-byte frame lengths 1 queue supporting up to 9,216-byte frame lengths
Frame Length Controls	Fixed, increment by user-defined step, weighted pairs, uniform, repeatable random, IMIX, and Quad Gaussian
User Defined Fields (UDF):	Fixed, increment or decrement by user-defined step, sequence, value list, and random configurations; up to ten, 32-bit-wide UDFs are available
Value Lists (Max.)	1M / UDF
Sequence (Max.)	**100GE** 8K/UDF; **50GE** 8K/UDF; **25GE** 8K/UDF; **10GE** 8K/UDF
Error Generation	Generate good CRC or force bad CRC, undersize and oversize standard Ethernet frame lengths, and bad checksum
Hardware Checksum Generation	Checksum generation and verification for IPv4, IP over IP, ICMP/GRE/TCP/UDP, L2TP, GTP
Link Fault Signaling	Reports, no fault, remote fault, and local fault port statistics; generate local and remote faults with controls for the number of faults and order of faults, plus the ability to select the option to have the transmit port ignore link faults from a remote link partner
Latency Measurement Resolution	2.5 nanoseconds
Intrinsic Latency Compensation	Removes inherent latency error from the 100GE port electronics
Transmit Line Clock Adjustment	Ability to adjust the parts-per-million line frequency over a range of -100 ppm to +100 ppm across all ports on the load module.
Receive Feature Specifications	
Receive Engine	Wire-speed packet filtering, capturing, real-time latency, and inter-arrival time for each packet group, with data integrity, sequence and advanced sequence checking capability
Trackable Receive Flows per Port	**100GE**: Limited Statistics Mode 32K, Full Statistics Mode 4K; **50GE**: Limited Statistics Mode 32K, Full Statistics Mode 4K; **25GE**: Limited Statistics Mode 32K, Full Statistics Mode 4K; **10GE**: Limited Statistics Mode 32K, Full Statistics Mode 4k
Minimum Frame Size	60 bytes at full line rate 64 bytes at full line rate into the capture buffer 49 bytes at less than full line rate
Filters (User-Defined Statistics, UDS)	2 SA/DA pattern matchers, 2x16-byte user-definable patterns with offsets capability for start of: frame, IP, or protocol; up to 6 UDS counters are available
Hardware Capture Buffer (Standard)	There are two hardware capture buffers on the card; user can select which port and/or resource group each capture buffer may be assigned for capture purposes as shown below:

100GE	50GE	25GE	10GE
2GB	2GB	1GB	1GB

Product Description	Novus-S 10/25GE8SFP28
Hardware Capture Buffer (Extended to all 8-ports)	Extended capture allows capture across all 8-ports* 100GE: 2GB; 50GE: 2GB; 25GE: 1GB; 10GE: 1GB *Note: Only supported for XGS12-SD/SDL/HSL chassis. Once the feature is enabled, slots 1, 2, 11 and 12 will become inactive
Statistics and Rates	Link state, line speed, frames sent, valid frames received, bytes sent/received, fragments, undersize, oversize, CRC errors, VLAN tagged frames, 6 user-defined stats, capture trigger (UDS 3), capture filter (UDS 4), 8 QoS counters, data integrity frames, data integrity errors, sequence and advanced sequence checking frames, sequence checking errors, ARP, and PING requests and replies, FEC statistics: RS-FEC Corrected and Uncorrected Block Counts, FEC Corrected Error Bits, FEC Sync
Latency / Jitter Measurements	Cut-through, store and forward, forwarding delay, up to 16 time bins latency/jitter, MEF jitter, and inter-arrival time
100GE Receive-side PCS Lanes Port Statistics Counters	PCS Sync Errors, Illegal Codes, Remote Faults, Local Faults, Illegal Ordered Set, Illegal Idle, Illegal SOF, Out Of Order SOF, Out Of Order EOF, Out Of Order Data, Out Of Order Ordered Set
100GE Physical Coding Sublayer (PCS) Receive-side Statistics and Indicators	IEEE 802.3ba-compliant PCS transmit and receive side test capabilities include: Per PCS lane, receive lanes statistics - PCS Sync Header and Lane Marker Lock, Lane Marker mapping, Relative lane deskew up to 104 microseconds for 100GE, Sync Header and PCS Lane Marker Error counters, indicators for Loss of Synch Header and Lane Marker, and BIP8 errors.
Time Sensitive Networking (TSN)	Support for Time Synchronization (802.1AS, 802.1AS 2020), Stream Reservation (802.1Qat), Credit Based Shaper (802.1Qav), Time Aware Shaper (802.1Qbv) – 10/25GE only, Frame Preemption (802.3br, 802.1Qbu) – 10/25GE only, Redundancy (802.1CB), Filtering and Policing (802.1Qci) – 10/25GE only, Configuration Management (802.1Qcc)—10/25GE only.
Layer 2-3 Protocol Support	
Routing and Switching	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, EIGRP/EIGRPv6, RIP/RIPng, BFD, Seamless BFD, IGMP/MLD, PIM-SM/SSM, STP/RSTP/MSTP, PVST+/RPVST+, Link Aggregation (LACP), LISP
Software Defined Network	OpenFlow, Segment Routing (MPLS and IPv6), BGP Link State (BGP-LS), PCEP, VXLAN, EVPN VXLAN, OVSDB, GENEVE, BGP FlowSpec, BGP SR TE Policy, eCPRI
MPLS	RSVP-TE P2P/P2MP, LDP/LDPv6/mLDP, LDP L2VPN (PWE/VPLS), BGP VPLS/VPWS, L3VPN/6VPE, 6PE, BGP RFC3107, MPLS-TP, MPLS OAM, EVPN/PBB-EVPN, Multicast VPN Rosen Draft, NG Multicast VPN
Broadband and Authentication	PPPoX/L2TPv2, DHCPv4/DHCPv6, ANCP, IPv6 Autoconfiguration (SLAAC), IGMP/MLD, 802.1x, Bonded GRE HG
Industrial Ethernet	Link OAM (IEEE 802.3ah), CFM/Y.1731, PBB/PBB-TE, ELMI, SyncE ESMC, IEEE 1588v2 (PTP)
Data Center Ethernet	DCBX/LLDP, FCoE/FIP, PFC (IEEE 802.1Qbb), TRILL, Cisco FabricPath, SPBM, VEPA
5G RAN Transport	eCPRI, TSN, Static MACsec, 1588v2 (PTP), ITU-T G.8275.1 and G.8275.2, SyncE ESMC

Application Support

NOVUS-10/25GE8SFP28

IxExplorer: Layer 2-3 wire-speed traffic generation and analysis with HSE PCS Lanes Rx-side testing. Note: Not all Keysight loads modules support Layer 1 BERT and/or the complete set of Tx PCS Lanes test capabilities.

IxNetwork: Wire-rate traffic generation with service modeling that builds realistic, dynamically controllable data-plane traffic. IxNetwork offers the industry's best test solution for functional and performance testing by using comprehensive emulation for routing, switching, MPLS, IP multicast, broadband, authentication, Carrier Ethernet, and data center Ethernet protocols.

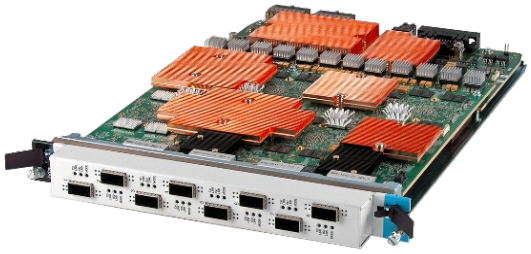
Tcl API: Custom user script development for Layer 1-3 testing.

Ordering Information

Load module

944-1164

IXIA NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module, 1-slot with 8-ports adaptor based SFP28 physical interface, L2-3 support with complete protocol coverage. The load module is compatible with the XGS2-SD 2-slot, 3RU standard performance rack-mountable chassis bundle (940-0010), XGS12-SD 12-slot, 11RU standard performance rack-mountable chassis bundle (940-0011), XGS2-SDL 2-slot, 3RU standard performance rack-mountable chassis bundle (940-0013), XGS12-SDL 12-slot, 11RU standard performance rack-mountable chassis bundle (940-0015), XGS2-HSL 2-slot, 3RU high performance rack-mountable chassis bundle (940-0014), and XGS12-HSL 12-slot, 11RU high performance rack-mountable chassis bundle (940-0016).



Speed options—100/50GE

905-1063

Ixia, NOVUS 100GE and 50GE FACTORY INSTALLED speed option for a new purchase of the NOVUS 10GE/25GE8SFP28 (944-1164), 8-port, SFP28 10GE/25GE load module.

Note: This option is REQUIRED ON NEW PURCHASES to enable the 1x100GE and 1x50GE speeds per port on all ports of this load module.

905-1064

Ixia, NOVUS 100GE and 50GE FIELD UPGRADE speed option for the NOVUS 10GE/25GE8SFP28 (944-1164), 8-port, SFP28 10GE/25GE load module.

Note: This FIELD UPGRADE option enables the 1x100GE and 1x50GE speeds per port and it applies to all ports on this load module.

TSN ENABLEMENT options

905-1065

IXIA TSN FACTORY INSTALLED OPTION for enabling TSN capability for the new purchase of the NOVUS-S 10GE/25GE8SFP28 (944-1164), 8-port, SFP28 10GE/25GE load modules. REQUIRES 930-2120 IxNetwork, Optional Software, AVB/TSN Protocols Emulation.

Note: This enables support for Frame preemption (802.1Qbu and 802.3br) on 25G link speeds only. Note: This option is REQUIRED ON NEW PURCHASES to enable TSN on the NOVUS-S 10GE/25GE8SFP28 (944-1164), 8-port, SFP28 10GE/25GE load modules.

905-1066

IXIA TSN FIELD UPGRADE OPTION for enabling TSN capability on the NOVUS-S 10GE/25GE8SFP28 (944-1164), 8-port, SFP28 10GE/25GE load modules. REQUIRES 930-2120 IxNetwork, Optional Software, AVB/TSN Protocols Emulation.

Note: This enables support for Frame preemption (802.1Qbu and 802.3br) on 25G link speeds only.

10GE and 25GE cables and transceivers

SFP28-SR-XCVR

Ixia, SFP28 Dual-Rate 25GBASE-SR 25GE and 10GBASE-SR 10GE pluggable optical transceiver, MMF (multimode), 850nm (948-0059). Compatible with the IXIA NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE 1-slot, load module. Each transceiver REQUIRES one of the eight QSA28 port adapters that are included with the Novus-S (944-1164) load module.

SFP28-LR-XCVR

Ixia, SFP28 Dual-Rate 25GBASE-LR 25GE and 10GBASE-LR 10GE pluggable optical transceiver, SMF (single mode), 1310nm (948-0058). Compatible with the IXIA NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE 1-slot, load module. Each transceiver REQUIRES one of the eight QSA28 port adapters that are included with the Novus-S (944-1164) load module.

SFP28-2M-CBL

Ixia, SFP28-to-SFP28 25GBASE-CR1 25GE and SFP28 10GBASE-CR 10GE passive copper, Direct Attach Cable (DAC), point-to-point cable, 2-meter length (942-0128). Compatible with the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10GE/25GE load module, 1-slot with 8-ports adaptor based SFP28 physical interface (944-1164)

100GE transceivers and cables

QSFP28-SR4-XCVR

IXIA QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850nm, 100m reach.

COMPATIBLE VISIBILITY PRODUCTS: Vision X Family- MVX-SWCH (991-2033), MVX-NS12PC (991-2030), MVX-PS8PC (991-2032), Vision 7300/7303 - M7300-12PC (992-0072), BD-7816AC-32PC (991-0147) or BD-7816DC-32PC (991-0148), Vision E100 (991-0151) and iBypass 100G modules (MIBP100G-SR4/MIBP100G-SR4) (Tool ports).

COMPATIBLE TEST PRODUCTS: Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), NOVUS100GE8Q28+FAN QSFP28 100GE load module (944-1140). NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) and the NOVUS-10GE/25GE8SFP28 (944-1164) load modules.

Note 1: This transceiver supports both 25GE speed (XM-4x25GE 905-1004 and UPG-XM-4x25GE 905-1005), and the 50GE speed (XM-1x50GE 905-1009 and UPG-XM-1x50GE) capability options on the Multis XM100GE4QSFP28+ENH load module.

Note 2: This transceiver supports the 25GE speed (NOVUS 25GE FAN-OUT Option 905-1007, and the NOVUS 25GE FAN-OUT-UPG FIELD UPGRADE Option 905-1008), and 50GE speed (NOVUS 2x50GE FAN-OUT option 905-1011, and NOVUS 2x50GE FAN-OUT-UPG FIELD UPGRADE Option 905-1012) on the NOVUS100GE8Q28+FAN load module.

Note 3: This transceiver supports 1x40GE and 4x10GE speeds (NOVUS 1x40GE/4x10GE FAN-OUT OPTION 905-1025 and the NOVUS 1x40GE/4x10GE FAN-OUT-UPG FIELD UPGRADE 905-1026) on the NOVUS100GE8Q28+FAN load module.

Note 4: Physical fan-out for 25GE and 10GE speeds support fan-out cable 942-0067 and 942-0068.

QSFP28-LR4-XCVR

QSFP28 100GBASE-LR4 100GE pluggable optical transceiver, SMF (single mode fiber), 1310nm, 10km reach. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

QSFP28-PSM4-XCVR

Ixia QSFP28 100GBASE-PSM4 100GE pluggable optical transceiver, SMF (single mode fiber), 1310nm, 2km reach. MPO Connector (948-0037). COMPATIBLE VISIBILITY PRODUCTS: Vision X Family- MVX-SWCH (991-2033), MVX-NS12PC (991-2030), MVX-PS8PC (991-2032), Vision 7300 Family- M7300-12PC (992-0072), and Vision E100. COMPATIBLE TEST PRODUCTS: IXIA NOVUS100GE8Q28+FAN (944-1140), NOVUS-M100GE8Q28+FAN (944-1147), NOVUS-R100GE8Q28+FAN (944-1156), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

948-0078

Ixia, QSFP28 CWDM4 optical transceiver, SMF (single mode) 4 lambdas, LC receptacle, 2km reach for all Novus 100GE QSFP28 load modules (948-0078). Note this optical transceiver only supports the 1x100GE, 2x50GE and 4x25GE Ethernet speeds per front panel port on the Novus load modules using a single, point-to-point, single mode, fiber cable. There is no physical fan-out cable capability.

QSFP28-DR1-XCVR

Ixia QSFP28 100GE 100GBASE-DR1 pluggable optical transceiver, SMF (single mode), 1310nm, 500m reach (948-0055). This optical transceiver is compatible with all Novus load modules: NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147), and the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164). Note: This QSFP28 transceiver converts PAM4 signaling to NRZ signaling.

QSFP28-PSM4-CBL

IXIA MT-to-4x25GE LC fan-out, SMF, 3-meter cable for 25GE fan-out (942-0127). REQUIRES IXIA QSFP28-PSM4-XCVR 100GE PSM4, pluggable optical transceiver, SMF (single mode fiber), 1310nm, 2km reach, MPO connector (948-0037). COMPATIBLE VISIBILITY PRODUCTS: Vision X Family- MVX-SWCH (991-2033), MVX-NS12PC (991-2030), MVX-PS8PC (991-2032), Vision 7300 Family- M7300-12PC (992-0072), and Vision E100. COMPATIBLE TEST PRODUCTS: IXIA NOVUS100GE8Q28+FAN (944-1140), NOVUS-M100GE8Q28+FAN (944-1147), and NOVUS-R100GE8Q28+FAN (944-1156) Load Modules.

942-0088

QSFP28 passive, copper, Direct Attach Cable (DAC), 3-meter length for Xcellon-Multis XM100GE4QSFP28+ENH 100GE load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147), the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

942-0092

QSFP28 Active Optical Cable (AOC), multimode fiber, 850nm, 3-meter length. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), NOVUS100GE8Q28+FAN (944-1147), and the CloudStorm 2-port, QSFP28 100GE (944-1231 and 944-1232) load modules, and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

50GE cables and transceivers

QSFP28-SR4-XCVR

QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850nm, 100m reach, and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

QSFP28-LR4-XCVR

QSFP28 100GBASE-LR4 100GE pluggable optical transceiver, SMF (single mode fiber), 1310nm, 10km reach. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

942-0088

QSFP28 passive, copper, Direct Attach Cable (DAC), 3-meter length for Xcellon-Multis XM100GE4QSFP28+ENH 100GE load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147), the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).

942-0092

QSFP28 Active Optical Cable (AOC), multimode fiber, 850nm, 3-meter length. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), NOVUS100GE8Q28+FAN (944-1147), and the CloudStorm 2-port, QSFP28 100GE (944-1231 and 944-1232) load modules, and the NOVUS-S 10/25GE8SFP28, 8-port, SFP28 10/25GE load module (944-1164).