

XCELLON-FLEX™ 4X40GE QSFP+ FULL EMULATION LOAD MODULE

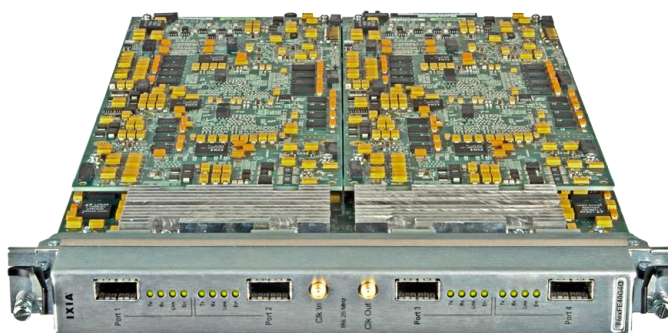
DATA SHEET

The advancement of high-density, high-performance network switches, routers, aggregation devices, network appliances, and servers has accelerated since the standardization of 40GE. Ixia has consistently kept pace with the testing demands of network equipment manufacturers (NEMs), service providers, enterprises, and governments by continually increasing port density and protocol scalability.

Xcellon™ is Ixia's high-performance architecture for testing next-generation networks and devices. Wired and wireless networks are converging over IP, and service providers must ensure quality delivery of the bandwidth-hungry, media-rich services that their customers demand. Cloud computing and data center convergence are changing the dynamics of business IT, while security threats are becoming more sophisticated by the day. All of these developments point to the need for more capable and scalable test solutions.

HIGHLIGHTS

- Compatible with XM2, XG12, XGS2-SD, XGS2-HS, XGS12-SD, and XGS12-HS chassis
- Excellent 40GE QSFP+ port density
- High-performance multicore processor for each 40GE QSFP+ port for high L2/3 and L4-7 protocol performance and scale
- Data center ready – with PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, and PCS Lanes testing for compliance to the IEEE802.3ba standard



Xcellon-Flex: 4-ports of 40GE QSFP+ interfaces in a single-slot load module

Ixia's Xcellon-Flex 4x40GE Full Emulation load module offers the industry's leading 40GE QSFP+ port density, with 4 ports on a single slot load module, scaling up to 48 ports in a single XG12, XGS12, or XGS12-HS chassis. The 4x40GE Full Emulation load module has a rich L1-7 feature set and is well-suited for mid-range protocol emulation and scale testing at an affordable price. The load module is ideal for manufacturers of large-port-count, converged data center switches.

Used in conjunction with Ixia's test applications IxNetwork™ and IxLoad™, Xcellon-Flex is best-in-class for economical, medium-performance L2-7 testing at 40GE speeds.

Together, Ixia's IxNetwork and the Xcellon-Flex load module support a comprehensive portfolio of routing and service emulations for next-generation networks, including:

- **Routing & Switching:** BGP4/BGP4+, OSPFv2/OSPFv3, ISISv4/v6, RIP/RIPng, EIGRP/EIGRPv6, PIM-SM/SSM, BFD, STP/RSTP/MSTP/PVST+/RPVST+, LACP, PoLACP
- **Data Center / SDN:** PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS
- **MPLS:** RSVP-TE/P2MP, LDP/MLDP, L3 MPLS VPN/6VPE, LDP L2VPN (PWE/VPLS), BGP VPLS, Multicast VPN Rosen Draft, NG Multicast VPN, EVPN/PBB-EVPN, MPLS OAM
- **Access:** DHCPv4/v6, PPPoX/L2TP, ANCP, IPv6 Autoconfiguration, DHCPv4/v6 over EoGRE, IGMP/MLD, Carrier Ethernet: Link OAM, CFM/Y.1731, PBB/PBB_TE, E-LMI, 1588v2 (PTP), ESMC, TWAMP
- **Authentication:** 802.1x, WebAuth, EAPoUDP, Cisco NAC

KEY FEATURES

- Excellent 40GE QSFP+ port density
- High L2/3 and L4-7 protocol scalability
- PCS Lanes testing for compliance to IEEE802.3ba standard
- Compatible with XM2, XM12HP, XG12, XGS12-SD, and XGS12-HS chassis
- Data center ready
- High performance multicore processor for each 40GE QSFP+ port
- Supports the IxNetwork test application that provides:
 - Service modeling at Internet scale
 - Rapid isolation of service violations
 - TrueView convergence time measurement
 - Carrier-class scaling
 - End-to-end test automation provides complete graphical user interface (GUI)-based test automation capabilities that support conditional test execution, device interaction via telnet, SNMP, and SYSLOG, and integrated statistics polling
 - Basic and advanced traffic wizards, with “Quick Flow Groups” that provide advanced traffic generation and analysis tools, making it easy to configure complex scenarios

- Easy-to-use protocol wizards that quickly and precisely build complex network topologies
- Dynamic traffic control per flow group, with the ability to change rate and frame size on the fly
- Advanced measurements including four latency modes, delay variation (jitter), inter-arrival time, sequence checking, misdirected packets, packet loss duration, and Rx rates
- Real-time statistics viewer with summary-level, group-level, and per-flow statistics, as well as sophisticated results filtering and sorting powered by Flow Detective
- Multi-field ingress tracking to concurrently track flows based on QoS, source/destination address, MPLS labels, VLAN IDs, and many other common protocol fields
- Egress tracking providing a unique ingress/egress results view that compares sent traffic with received traffic, so as to accurately verify DUT packet field modifications; QoS remarking is easily verified
- IxNetwork statistics viewer, a powerful tool for viewing and analyzing real-time results and generating test reports
- Automated QuickTests for industry-standard test methodologies, including RFC 2544 and many more
- Easy one-click TCL, HLTAPI, or HLPAPI automation using ScriptGen, with complete API support – providing complete automation of IxNetwork functions

For more information on IxNetwork, please visit the IxNetwork product portal at:

<http://www.ixiacom.com/products/ixnetwork>

For more information on IxLoad, please visit the IxLoad product portal at:

<http://www.ixiacom.com/products/ixload>

LOAD MODULE SPECIFICATIONS

FEATURE	XCELLON-FLEX 4X40GE QSFP+ FULL EMULATION LOAD MODULE
Load module model	FlexFE40G4Q
Number of ports per load module	4-ports of 40GE QSFP+
Chassis slots per module	1
Maximum ports per chassis:	<ul style="list-style-type: none"> ● XGS12-SD: 48-ports 40GE QSFP+ ● XGS12-SD rackmount: 48-ports 40GE QSFP+ ● XG12 rackmount (6000W): 48-ports 40GE QSFP+ ● XM12 High Performance (4000W): 24-ports 40GE QSFP+ ● XM2 Desktop: 4-ports 40GE QSFP+ⁱ

FEATURE	XCELLON-FLEX 4X40GE QSFP+ FULL EMULATION LOAD MODULE
QSFP+ media support	<ul style="list-style-type: none"> • 40GBASE-SR4 and 40GRBASE-LR4 pluggable, optical transceivers • 40GBASE-SR4 active optical fiber cables (AOC) • 40GBASE-CR4 passive, copper direct attached cables up to 5 meters in length
Multi-core processor technology	Yes
Interface protocols	<ul style="list-style-type: none"> • IEEE802.3ae10GE LAN • IEEE802.3ba 40GBASE-R LAN
Data center protocols (see optional upgrades for DCBX, FCoE, FCF)	PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS
Layer 2-3 routing protocol emulation support	Yes
Capture buffer per port	256MB
Transmit engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures
Stream definitions per port	256 ⁱⁱ
Number of transmit flows per port (sequential values)	Billions
Number of transmit flows per port (PGID)	1 million
Table UDF	1 million entries
User defined field features	Fixed, increment, or decrement by user-defined step, value lists, cascade, random, and chained
Data field per stream	Fixed, increment (byte/word), decrement (byte/word), random, repeating, user-specified
Frame length controls	Fixed, random, weighted random, or increment by user-defined step
Error generation	CRC (good/bad), undersize, oversize

FEATURE	XCELLON-FLEX 4X40GE QSFP+ FULL EMULATION LOAD MODULE
IPv4, IPv6, UDP, TCP checksum	Hardware checksum generation and verification
Receive engine	Wire-speed packet filtering, capturing, real-time latency, and inter-arrival time for each packet group, data integrity, and sequence checking
Trackable receive flows	64K per port
Filters	48-bit source/destination address, 2x128-bit user-definable pattern and offset, frame length range, CRC error, data integrity error, sequence checking error (small, big, reverse)
Statistics and rates (counter size: 64 bits)	Link state, line speed, frames sent, valid frames received, bytes sent/received, fragments, undersize, oversize, CRC errors, VLAN tagged frames, 6 user-defined stats (UDS), capture trigger (UDS 3), capture filter (UDS 4), 8 QoS counters, data integrity frames, data integrity errors, sequence checking frames, sequence checking errors, ARP, and ping requests and replies
Flow control	<ul style="list-style-type: none"> • IEEE802.03x PAUSE frame control • IEEE802.1Qbb (PFC)
Link fault signaling at 40GE	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 measurements	2.5ns resolution in packet timestamp
Intrinsic latency adjustment	Ability to remove inherent latency from 40GE port electronics when used with MSA-compliant 40GE transceivers
Transmit line clock adjustment	Ability to adjust the parts per million (ppm) line frequency over a range of -100 to +100 ppm
40GE physical coding sublayer (PCS) test features:	IEEE 802.3ba-compliant PCS transmit and receive side test capabilities
Per PCS lane, transmit lane mapping	Supports all combination of PCS lane mapping: Default, Increment, Decrement, Random, and Custom
Per PCS lane, skew insertion capability	User-selectable from zero up to 3 microseconds of PCS Lane skew insertion on the transmit side.

FEATURE	XCELLON-FLEX 4X40GE QSFP+ FULL EMULATION LOAD MODULE
Per PCS lane, lane marker, or lane marker and payload error injections	User-selectable ability to inject errors into the PCS Lane Marker and simultaneously into PCS Lane Marker and Payload fields. This includes the ability to inject sync bit errors into the Lane Marker and Payload. User can control the PCS lane, number or errors, and period count; and manage the repetition of the injected errors.
Per PCS lane, receive lanes statistics	PCS Sync Header and Lane Marker Lock, Lane Marker mapping, Relative lane deskew up to 52 microseconds, Sync Header and PCS Lane Marker Error counters, indicators for Loss of Synch Header and Lane Marker, BIP8 errors

APPLICATION SUPPORT

XCELLON-FLEX 4X40GE QSFP+ FULL EMULATION LOAD MODULE
<p>IxExplorer™: Layers 1, 2, and 3 wire-speed traffic generation, capture, and analysis.</p> <p>IxExplorer Tcl API: Custom user script development for layer 1-3 testing.</p> <p>IxNetwork: Provides 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, MPLS, VPLS, high-availability, IP multicast, switching, carrier Ethernet, broadband, and DCB protocols.</p> <p>IxNetwork Tcl API: Custom user script development for layer 2-7 testing.</p>

PRODUCT ORDERING INFORMATION

944-1065 - FlexFE40G4Q 4x40GE QSFP+ Load Module

Xcellon-FlexFE40G4Q 40 Gigabit Ethernet Full Emulation Load Module, 4-ports of QSFP 40 GE with L2-3 support. The load module is compatible with the XGS12-SD 12-slot, standard performance rack mount chassis bundle (940-0011), XGS12-HS 12-slot, high-speed performance rackmount chassis bundle (940-0006), XG12 12-slot, rackmount chassis (940-0005), XGS2-SD 2-slot, 3RU standard performance chassis bundle (940-0010), XGS2-HS 2-slot, 3RU high-speed performance chassis bundle (940-0012) and the XM2 desktop chassis (941-0023); **REQUIRES:** One or more of QSFP+ 40GBASE-SR4 (948-0031), or 40GBASE-LR4 (948-0032) optical transceivers and MT 12-fiber MMF cable, 3-meter length (942-0041).

XCELLON-FLEX QSFP+ 40GE TRANSCEIVER AND CABLE OPTION:**948-0031**

QSFP+ 40GE, 40GBASE-SR4 optical transceiver, pluggable, MMF, 850nm. This transceiver is compatible with the following Ixia load modules and CFP-to-QSFP interface adapters: Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1109), Xcellon Flex10G/40GSQ 10/40 Gigabit Ethernet Accelerated Performance load module (944-1062), Xcellon-FlexFE40G4Q 40 Gigabit Ethernet Full Emulation load module (944-1065), HSE40GEQSFP1-01, 40-Gigabit Ethernet load module (944-0092). CFP-to-QSFP+ Interface Adapter, 1-port (948-0022), and the CFP-to-QSFP Dual Interface Adapter, 2-port (948-0023).

948-0032

QSFP+ 40GE, 40GBASE-LR4, optical transceiver, pluggable, SMF, 1310nm. This is compatible with the following Ixia load modules: Xcellon-FlexAP10/4016SQ 10/40 Gigabit Ethernet Accelerated Performance load module (944-1062), Xcellon-FlexFE40G4Q 40 Gigabit Ethernet Full Emulation load module (944-1065), Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), and Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP (944-1109).

942-0041

MT 12-Fiber Multimode cable for 40GBASE-SR4 optical transceivers with MT Flat F-F connectors, 850nm, three meter length.

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i The XM2 portable chassis (941-0003) supports up to 1 FlexFE40G4Q load module. No other load module may be installed in the XM2 portable chassis when a FlexFE40G4Q load module is installed.

ii In the Data Center Bridging mode the number of transmit streams per port on the FlexFE40G4Q load module is 256 streams.