34 IXIA Xcellon-Flex Load Modules

This chapter provides details about Xcellon-Flex family of load modules—specifications and features.

The Xcellon-Flex family of high speed load modules delivers high-density, high-performance test solutions. Xcellon, the architecture behind these load modules, features aggregation of multi-core CPUs and high memory to meet testing needs for high-scale performance.

The Xcellon-Flex family consists of the following load modules:

- 10GbE Accelerated Performance
- 10GbE Full Emulation
- A 10/40 Gigabit Ethernet Accelerated Performance
- A 40 Gigabit Ethernet Full Emulation

The card names are FlexAP10G16S, FlexFE10G16S, FlexAP1040SQ, and FlexFE40QP.

The Accelerated Performance load module provides architecture for layer 2-7 performance testing, providing ultra-high-scale session and protocol emulation per port. The Full Emulation load module is for layer 2-3 mid-range protocol emulation and scale capacity testing for switches and routers. The Xcellon-Flex Combo 10/40GE Accelerated Performance load module provides both 10GE SFP+ and/or 40GE QSFP+ ports in a single chassis slot. It uses aggregation technology to combine CPU power and memory, and provides ultra-high networking protocol scalability. The 4x40GE Full Emulation load module has a rich layer 2-7 feature set and is well suited for mid-range protocol emulation and scale testing. The load module is ideal for manufacturers of large-port-count, converged data center switches.

The Xcellon-Flex family load module is shown in the following figure:

Figure 34-1. Xcellon-Flex Module-FlexAP10G16S

The Xcellon-Flex family load module is shown in the following figure:

Figure 34-2. Xcellon-Flex Module-FlexFE10G16S

Figure 34-3. Xcellon-Flex Module-FlexAP1040SQ

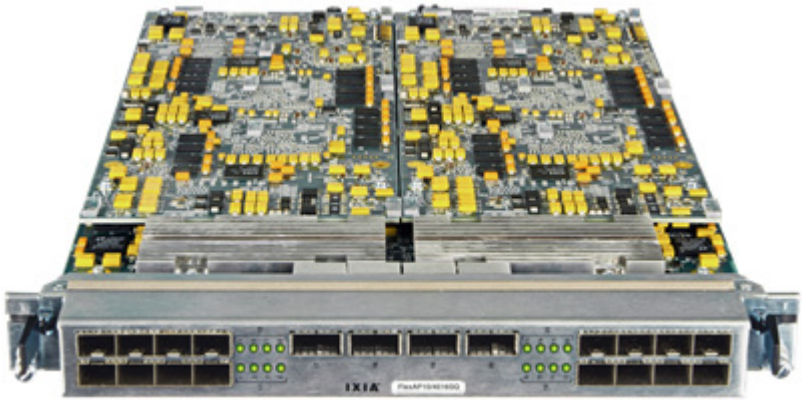
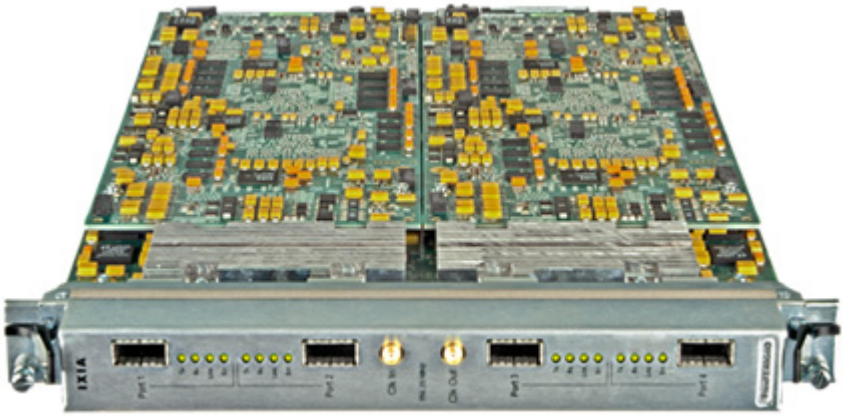


Figure 34-4. Xcellon-Flex Module-FlexFE40QP



Part Numbers

The part numbers are shown in *Table 34-1*.

Table 34-1. Part Numbers for Xcellon-Flex Modules

Model Number	Part Number	Description
FlexAP10G16S	944-1060	10 Gigabit Ethernet Accelerated Performance Load Module, 16-Port LAN, SFP+ interface with full performance L2-L7 support.
FlexFE10G16S	944-1061	10 Gigabit Ethernet Full Emulation Load Module, 16-port LAN, SFP+ interface with L2-3 support.
FlexAP1040SQ	944-1062	10/40 Gigabit Ethernet Accelerated Performance Load Module, 16-Ports of SFP+ interfaces and 4-ports of QSFP+ 40GE interfaces with full performance L2-7 support, for XM12-02 (941-0009) High Performance rackmount chassis and XM2-02 (941-0003) portable chassis, requires one or more SFP+ transceiver options: 10GBASE-SR/SW (948-0013), or 10GBASE-LR/LW (948-0014).
FlexFE40QP	944-1065	40 Gigabit Ethernet Full Emulation Load Module, 4-ports of QSFP+ 40GE with L2-3 support.

Specifications

The load module specifications are contained in *Table 34-2*.

Table 34-2. Xcellon-Flex Load Module Specifications

Feature	Everest 10GE Full Feature	Everest 10GE Reduced Feature	Everest Combo	Everest 40GE Only
Load Modules	FlexAP10G16S	FlexFE10G16S	FlexAP1040SQ	FlexFE40QP
Number of ports per module	16	16	4	4
Number of chassis slots per module	1	1	1	1
Maximum ports per chassis	XM12 High Performance: 128 XM2Desktop: 16	XM12 High Performance: 128 XM2Desktop: 16	XM12 High Performance: 96-ports 10GE SFP+ and 24-ports 40GE QSFP XM2Desktop: 16-ports 10GE SFP+ or 4-ports 40GE QSFP	XM12 High Performance: 24-ports 40GE QSFP+ XM2Desktop: 4-ports 40GE QSFP+
Note: XM12 High Performance chassis is required for the simultaneous operation of 128 ports in a single chassis. If a standard XM12 chassis (941-0002) is used with these load modules, conversion to the High Performance model is required. A field replaceable power supply upgrade kit (943-0005) is available for this purpose. When one or more FlexAP10G16S or FlexFE10G16S load modules is installed in an XM12 High Performance chassis, the maximum total number of load modules that may be installed at one time in a single chassis is 8. The XM2 portable chassis (941-0003) supports up to 16 ports (1 load module) of the FlexAP10G16S FlexFE10G16S modules. No other load module is installed in the XM2 chassis when a FlexAP10G16S or FlexFE10G16S load module is installed.				
Supported transceivers				
Per-port CPU speed and memory				
Capture buffer size	256 MB	64 MB	256MB (10GE), 1GB(40GE)	256 MB

Feature	Everest 10GE Full Feature	Everest 10GE Reduced Feature	Everest Combo	Everest 40GE Only
Frame Size	Minimum Frame Size at Line Rate: 48 - No UDF 60 - UDF enabled Minimum Frame Size - may not be at Line Rate: 48 Maximum Frame Size: P0: 9216B others 2500B	Minimum Frame Size at Line Rate: 48 - No UDF 60 - UDF enabled Minimum Frame Size - may not be at Line Rate: 48 Maximum Frame Size: P0: 9216B others 2500B	Minimum Frame Size at Line Rate: 48 - No UDF 60 - UDF enabled Minimum Frame Size - may not be at Line Rate: 48 Maximum Frame Size: P0: 9216B others 2500B	Minimum Frame Size at Line Rate: 60 Minimum Frame Size - may not be at Line Rate: 60 Maximum Frame Size: P0: 9216B others 2500B
Streams per port	512	256	512	256
Table UDF	1 million entries	256 K entries	1 million entries	1 million entries
Advanced scheduler streams per port	512	256	512	256
Latency	20 ns resolution	20 ns resolution	20 ns resolution	2.5 ns resolution
Ambient Operating Temperature Range	5-30	5-30	5-30	5-30
Tranceiver Type	SFP+	SFP+	SFP+	QSFP+
Direct Attach Copper	Yes	Yes	No	Yes
LED	2 LED per Port	2 LED per Port	1 LED per Port	4 LED per Port
ppm Adjust range	+/-100ppm	+/-100ppm	+/-100ppm	+/-100ppm
ppm Adjust port/ card	Card	Card	Card	Card
10GbE Interface protocols	10GbE LAN	10GbE LAN	IEEE802.3ae 10GE LAN, IEEE802.3ba 40GBASE-R LAN	IEEE802.3ae 10GE LAN, IEEE802.3ba 40GBASE-R LAN
Data Center Protocol Upgrades (optional feature)	FCoE, Priority-based Flow Control (IEEE 802.1Qbb) and LLDP/DCBX support			Priority-based Flow Control (IEEE 802.1Qbb)
Multi-core processors	Yes	Yes	Yes	Yes
Aggregation capability	Yes	Yes	Yes	No
Layer 2-3 routing protocol emulation	Yes	Yes	Yes	Yes
Layer 4-7 application traffic testing	Yes	No	Yes	Yes

Feature	Everest 10GE Full Feature	Everest 10GE Reduced Feature	Everest Combo	Everest 40GE Only
Number of transmit flows per port (sequential values)	Billions	Billions	Billions	Billions
Number of transmit flows per port (arbitrary values)	1 million	32 K		
Number of transmit flows per port (PGID)			1 million	1 million
Trackable receive flows	1 million	64 K	1 million	64 K
Table UDF	1 million entries	256 K entries	1 million entries	1 million entries
Packet flow statistics	Track 1 million flows	Track 64 K flows		
Transmit engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures			Wire-speed packet filtering, capturing, realtime latency and inter-arrival time for each packet group, data integrity, and sequence checking
Receive engine	Wire-speed packet filtering, capturing, real-time latency and inter-arrival time for each packet group, data integrity, and sequence checking			
User defined field features	Fixed, increment or decrement by user defined step, value lists, range lists (supported in all 10 GE mode), cascade, random, and chained			
Filters	48-bit source/destination address, 2x128-bit user-definable pattern and offset, frame length range, CRC error, data integrity error, and sequence checking error (small, big, reverse)			
Data field per stream	Fixed, increment (byte/word), decrement (byte/word), random, repeating, and userspecified			
Error generation	CRC (good/bad/none), undersize, oversize			
Latency self-calibration	Ability to calibrate and remove inherent latency			

Feature	Everest 10GE Full Feature	Everest 10GE Reduced Feature	Everest Combo	Everest 40GE Only
Link Fault Signaling	Link state indicator for No Fault, Local Fault, and Remote Fault.	Link state indicator for No Fault, Local Fault, and Remote Fault.	FlexAP1040SQ (10GE): Link state indicator for No Fault, Local Fault, and Remote Fault. FlexAP1040SQ (40GE): Generate local and remote faults with controls for the number of faults and order of faults, and the ability to select the option to have the transmit port ignore link faults from a remote link partner.	Generate local and remote faults with controls for the number of faults and order of faults, and the ability to select the option to have the transmit port ignore link faults from a remote link partner.
Transmit line clock adjustment	Ability to adjust the parts per million (ppm) line frequency over a range of the following: • LAN mode: +/-100 ppm			
IPv4, IPv6, UDP, TCP	Hardware checksum generation and verification			
Frame length controls	Fixed, random, weighted random, or increment by user-defined step			
Operating temperature range	41°F to 86°F (5°C to 30°C), ambient air **Note**: When an Xcellon-Flex load module is installed in an XM12 chassis, the maximum operating temperature of the chassis is 30°C (86°F) ambient air temperature.			
40 GE 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 combinations of PCS lane mapping: Default, Increment, Decrement, Random, and Custom

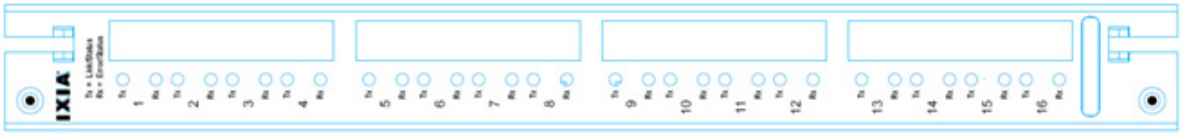
Feature	Everest 10GE Full Feature	Everest 10GE Reduced Feature	Everest Combo	Everest 40GE Only
Per PCS lane, lane marker, or lane marker and payload error injections				Ability to inject errors into the PCS Lane Marker and simultaneously into PCS Lane Marker and Payload fields by the user. This includes the ability to inject sync bit errors into the Lane Marker and Payload. User can control the PCS lane, number or errors, 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 skew measurement (up to 104 microseconds), Sync Header and PCS Lane Marker Error counters, indicators for Loss of Synch Header and Lane Marker, BIP8 errors.

Mechanical Specification of FlexAP10G16S/FlexFE10G16S Load Modules

Front Panel

The Front panel of FlexAP10G16S/FlexFE10G16S load module is shown in the following figure:

Figure 34-5. Front panel of FlexAP10G16S/FlexFE10G16S



Led Panel

Table 34-3. Led panel of FlexAP10G16S/FlexFE10G16S Load Module Specifications

Feature	Specification
LED1	TX
	10GE Link up = Solid Green
	10GE TX Active = Blinking Green
	10GE TX Error = Blinking Red
	Inactive = Off
LED2	RX
	Loopback = Solid Green
	10GE RX Active = Blinking Green
	10GE RX Error = Blinking Red
	Link Down = Solid Red
	Port Inactive = Off

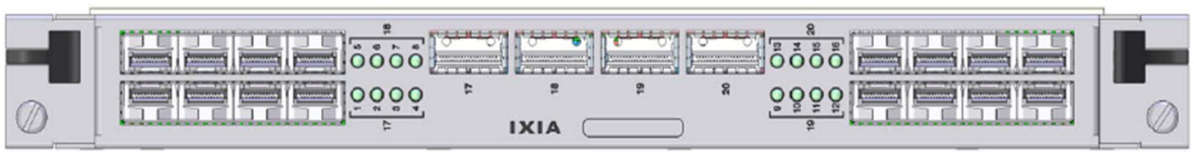
When port is in aggregation mode (the PCPU resource is used by other port), TX/RX LEDs are inactive (i.e. off). The aggregation egress port will have normal TX/RX LED operation.

Mechanical Specification of FlexAP1040SQ Load Modules

Front Panel Production – 944-1062-02

The Front panel of FlexAP1040SQ load module is shown in the following figure:

Figure 34-6. Front panel of FlexAP1040SQ



Led Panel Production – 944-1062-02

The Led panel of FlexAP1040SQ load module is shown in the following figure:

Figure 34-7. Led panel of FlexAP1040SQ

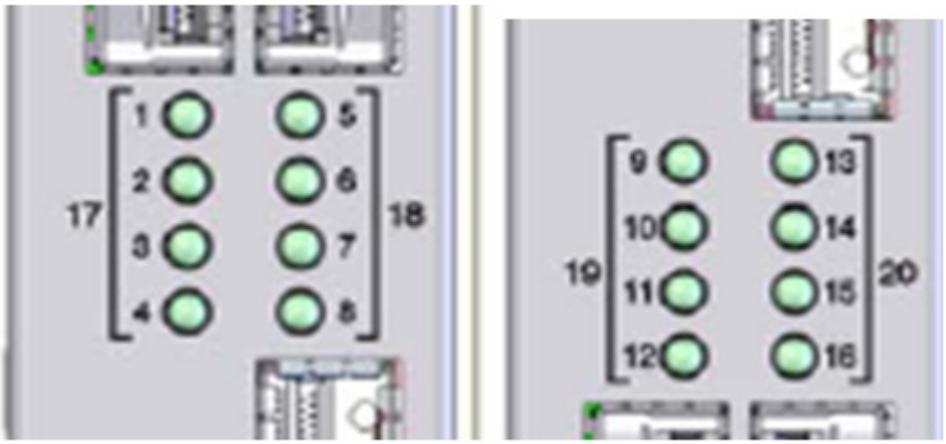


Table 34-4. Led panel of FlexAP1040SQ Load Module Specifications

Feature	Specification
10GE Mode	1 LED/Port where LED number matches port number
Blinking Green	Tx/Rx Activity
Blinking Red	Rx Error
Solid Red	Link down
Solid Green	Link up
Solid Yellow	Loopback
Off	Port is inactive

When port is in aggregation mode (the PCPU resource is used by other port), TX/RX LEDs are inactive (i.e. off). The aggregation egress port will have normal TX/RX LED operation.

Feature	Specification
40GE Mode	LED/Port aligned from top/down defined as follows: • Tx • Rx • Link • Error

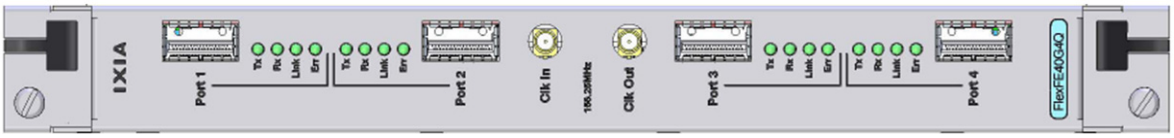
Definition matches the 40G Only definition.

Mechanical Specification of FlexAP40QP4 Load Modules

Front Panel

The Front panel of FlexAP40QP4 load module is shown in the following figure:

Figure 34-8. Front panel of FlexAP40QP4



Led Panel

Table 34-5. Led panel of FlexAP40QP4 Load Module Specifications

Feature	Specification
	LED/Port aligned from top/down defined as follows: • Tx • Rx • Link • Error
LED1	TX
	10GE TX Active = Blinking Green
	10GE TX Error = Blinking Red
	Inactive = Off
LED2	RX
	10GE RX Active = Blinking Green
	10GE RX Error = Blinking Red
	Port Inactive = Off
LED3	Link
	Link up = Solid Green
	Link Down = Solid Red
	Internal Loopback = Solid Yellow
	Line Loopback = Solid Blue
	Port Inactive = Off
LED4	Error
	Remote Faults = Blinking Yellow
	Local Faults = Solid Red
	Port Inactive = Off