

BROCADE OPTICS FAMILY



IP NETWORK

Highly Reliable, Brocade-Qualified Optics

HIGHLIGHTS

- Rigorously tested for performance and reliability by Brocade
- Hot-swappable flexibility in the field for greater ease and lower total cost of ownership
- Standards-based—802.3z, 802.3ah, 802.3u, 802.3ae, 802.3ak, and 802.3ba—and compliant as required
- Compliant with Requirements to Reduce Hazardous Substances (RoHS), meeting either RoHS 5 or RoHS 6 EU standards

Brocade offers a unique set of high-performance, reliable, and cost-effective optical transceivers that help enterprises and service providers meet the challenges of diverse network topologies. To ensure maximum quality, Brocade selects and tests the most reliable, highest-performing optical transceivers on the market, and then warrants their availability, capacity, and performance in Brocade® products.

Extensive performance and reliability testing reflects an ongoing commitment to quality. Brocade tests transceivers using the industry's most advanced tools

and instruments to help ensure that they provide the right mix of functionality and performance when used in conjunction with Brocade products. The speed, capacity, reliability, and low cost of ownership that Brocade is known for is also provided in all optical components.

By using Brocade-qualified components, organizations can be assured that their warranty and service requirements will be met and that their Brocade products will continually provide the uptime, performance, and reliability required by today's leading enterprise service providers.

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OPTICS FAMILY FEATURES

The Brocade optics family includes several offerings designed to meet the performance and scalability requirements of service provider and enterprise environments. The new 100 Gigabit Ethernet (GbE) CFP optics deliver even greater performance capacity to support cloud services for these environments.

100 MbE Optics

- 100 Megabit Ethernet (MbE) transceivers support link lengths from 2 km to 40 km
- Both SMF and MMF fiber types
- RoHS 5 and 6 compliant
- Enterprise switching and routing

1 GbE Optics

- 1 GbE transceivers support link lengths from 300 m to 100 km
- Both SMF and MMF fiber types
- Coarse Wavelength Division Multiplexing (CWDM) support for distances of 80 km to 100 km
- RoHS 5 and 6 compliant
- For core routers and security applications

10 GbE Optics

- 10 GbE transmissions support link lengths of 26 m to 80 km
- Protocol independent
- Less than one-third the power and size of MSA optic
- Hot swappable
- Digital Optical Monitoring (DOM) support
- RoHS 5 and 6 compliant
- Application delivery and acceleration
- High-Performance Computing (HPC) interconnects
- Service provider traffic management

POS Pluggable OC12, OC48, and OC192 XFP Optics

- Pluggable XFP optic
- Ranges from 500 m to 80 km

40 GbE QSFP+ Optics

- 40 GbE transmissions support link lengths up to 100 m
- Hot pluggable
- Industry-standard QSFP+
- Digital Optical Monitoring (DOM) support
- High-density 40 GbE connectivity options for data center, enterprise, and service provider applications

100 GbE CFP Optics

- 100 GbE transmissions support link lengths up to 40 km
- Hot pluggable
- Low voltage
- Industry-standard CFP
- Diagnostic features per CFP MSA for laser bias, temperature, supply voltage
- Carrier, service provider, and cloud services
- Enterprise campus core routing
- RoHS 6 compliant

PRODUCT SUPPORT FOR FAST ETHERNET

	Brocade ICX® Switches	FastIron® Series		FastIron X Series	BigIron® Series	NetIron® Series		
Fast Ethernet Optics	ICX 6610	LS/WS/GS	FCX	SX	RX	XMR/MLX®	CES/CER/CER-RT	Brocade 6910
E1MG-100FX-OM	• ¹	•	•	• ²	•	•	•	•
E1MG-100FX-IR-OM	• ¹	•	•	• ²	Software v2.6.0	Software v3.9.0	•	•
E1MG-100FX-LR-OM	• ¹	•	•	• ²	Software v2.6.0	Software v3.9.0	•	•

¹ Available only with Brocade ICX 6610-24F.

² Available only with SX-FI424HF and SX-FI-24HF.

PRODUCT SUPPORT FOR 1 GIGABIT ETHERNET

	EdgeIron Series		Brocade ICX Switches			FastIron Series			FastIron X Series	BigIron Series	NetIron Series			ServerIron® Series	TurboIron®	Brocade VDX® Switches
1 GbE Fiber Optics	CF	G	ICX 6610	ICX 6430/6450	ICX 6650	LS/GS	WS	FCX	SX	RX	XMR/MLX	CES/CER/CER-RT	Brocade 6910	ADX®	24X	VDX 6710/6720/6730/8770
E1MG-SX-OM	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E1MG-SX-OM-T													•			
E1MG-LX-OM	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E1MG-LX-OM-T													•			
E1MG-LHA-OM	•	•	•	•		•	•	•	• ²	•	•	•	•		•	
E1MG-LHA-OM-T													•			
E1MG-LHB	•	•	•	•		•	•		• ²	•	•	•	•			
E1MG-BXD			•			•		•	•	•	•	•	•		•	
E1MG-BXU			•			•		•	•	•	•	•	•		•	
E1MG-CWDM80-XXXX		•	•			•	•		•	•	•	•	•			
E1MG-TX			•	•	•	•	•	• ³	•	•	•	• ¹		•	•	
XBR-000190																•
1G-SFP-C-0x01				•												

¹ Qualified for 10/100/1000 Mbps speed.

² Not qualified on SX-FI-24HF.

³ Only qualified on FCX-624S-F.

PRODUCT SUPPORT FOR 10 GIGABIT ETHERNET

	Brocade ICX Switches			FastIron Series		FastIron X Series	BigIron Series	NetIron Series		ServerIron Series	TurboIron	Brocade VDX Switches
10 GbE Fiber Optics	ICX 6610	ICX 6450	ICX 6650	LS	FCX	SX	RX	XMR/MLX	CER/CES/ CER-RT	ADX	24X	VDX 6710/ 6720/ 6730/ 8770
10G-XFP-SR, LR				•	•	• ¹	• ³	• ³	•	•		
10G-XFP-ER				•	•	• ¹	• ³	• ³	•			
10G-XFP-ZR				•	•	• ¹	• ³	• ³	•			
10G-XFP-ZRD				•	•	• ¹	• ³	• ³	•			
10G-XFP-1310-LRM					•							
10G-SFPP-USR	•	•	•		•	• ²		•	•		•	•
10G-SFPP-SR, LR	•	•	•		•	• ²	•	• ³	•	• ⁴	•	•
10G-SFPP-ER	•	•	• (7.5.00c)		• ⁵	• ²	•	• ³	•		•	•
10G-SFPP-ZR								•	•			
10G-SFPP-ZRD-T								• ⁶ (5.5)				
10G-SFPP-LRM	•	•			• ⁵	• ²			•	• ⁴	•	
10G-SFPP-TWX-XXXX	•	•	•		•	• ²		•	•		•	•
10G-SFPP-AOC-XXXX								• (5.5a)	•			

¹ SX-FI42XGW module supports WAN mode.

² Available only with SX-FI-8XG, SX-FI-2XG, SX-FI-2XGMR-XL, and SX-FI-2XGMR-XL-PREM6 modules.

³ The Brocade MLX and NetIron XMR modules (BR-MLX-10Gx8-X, BR-MLX-10Gx8-M, BR-MLX-10Gx4-X, BR-MLX-10Gx4-X-ML, NI-MLX-10Gx4, NI-MLX-10Gx2, NI-XMR-10Gx4, NI-XMR-10Gx2) and the Brocade BigIron RX 10 GbE modules support WAN mode.

⁴ Available only with Brocade ADX 1000F.

⁵ Available only with the FCX-2SFPP module.

⁶ Available only with the Brocade MLXe 8×10 GbE and 24×10 GbE modules.

PRODUCT SUPPORT FOR POS

NetIron Series	
POS Optics	XMR/MLX
OC12-SFP-MM	•
OC12-SFP-IR1	•
OC12-SFP-LR1	•
OC12-SFP-LR2	•
OC48-SFP-SR1	•
OC48-SFP-IR1	•
OC48-SFP-LR1	•
OC48-SFP-LR2	•
OC192-XFP-SR1	•
OC192-XFP-IR2	•
OC192-XFP-LR2	•

PRODUCT SUPPORT FOR 40 GIGABIT ETHERNET

	Brocade ICX Switches		Brocade VDX Switches	Brocade MLX Series
40 GbE Fiber Optics	ICX 6650	ICX 6610	VDX 8770	MLXe
40G-QSFP-SR4	•	•	•	•
40G-QSFP-SR4-INT	•			
40G-QSFP-LR4				•
40G-QSFP-4SFP-C-XXXX	•			
40G-QSFP-QSFP-C-XXXX				

PRODUCT SUPPORT FOR 100 GIGABIT ETHERNET

Brocade MLX Series	
100 GbE Fiber Optics	MLX/MLXe
100G-CFP- SR10	•(5.4)
100G-CFP-10X10-2KM-OM	•(5.2.00b)
100G-CFP-10X10-10KM-OM	•(5.2.00b)
100G-CFP-LR4-10KM	•
100G-CFP-ER4-40KM	•(5.4)

KEY STANDARDS AND FEATURES

	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
Fast Ethernet							
E1MG-100FX-OM	802.3u	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	1310	MMF	2 km	Yes
E1MG-100FX-IR-OM	802.3			1310	SMF	15 km	Yes
E1MG-100FX-LR-OM	802.3			1310	SMF	40 km	Yes
1 GbE Fiber							
E1MG-SX-OM/ E1MG-SX-OM-T	802.3z	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	220 m to 550 m	Yes
E1MG-LX-OM/ E1MG-LX-OM-T	802.3z			1310	MMF/SMF	550 m to 10 km	Yes
E1MG-LHA-OM/ E1MG-LHA-OM-T	802.3z			1550	SMF	70 km	Yes
E1MG-LHB	802.3z			1550		150 km w/0.18 dB/km cable, 91 km w/standard 0.3 dB/km cable	No
E1MG-BXD	802.3ah			TX:1490, RX:1310		10 km	No
E1MG-BXU	802.3ah			TX:1310, RX:1490		10 km	No
E1MG-CWDM80-XXXX	802.3z			1470 to 1610		80 km	No
1000BASE-T Copper							
E1MG-TX, XBR-000190	802.3z	CSA 60950-1-03/UL	EN 60950-1	N/A	Cat5	100 m	N/A
1G-SFP-TWX-0x01	802.3z	Direct-attached SFP copper cables				1 m, 5 m	No
10 GbE Fiber							
10G-XFP-SR	802.3ae	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	26 m to 300 m	Yes
10G-XFP-LR	802.3ae			1310	SMF	10 km	
10G-XFP-ER	802.3ae			1550		40 km	
10G-XFP-ZR	802.3ae			1550		80 km	
10G-XFP-ZRD	802.3ae			1528.77 to 1561.42		80 km	
10G-XFP-1310-LRM	802.3aq			1310	MMF	220 m	
10G-SFPP-USR	N/A			850	MMF	100 m	
10G-SFPP-SR	802.3ae			850	MMF	26 m to 300 m	
10G-SFPP-LR	802.3ae			1310	SMF	10 km	
10G-SFPP-ER	802.3ae			1550	SMF	40 km	
10G-SFPP-ZR	802.3ae			1550	SMF	80 km	
10G-SFPP-ZRD-T	802.3-2005 Clause 52 standard			102 C-band tunable wavelengths from 1528 to 1568 (50 GHz apart)	SMF	80 km	
10G-SFPP-LRM	802.3ae			1310	MMF	220 m	
10GBASE Cable							
10G-SFPP-TWX-XXXX	802.3ae	Direct-attached SFP+ Twinax copper cables				1 m, 3 m, 5 m	No
10G-SFPP-AOC-XXXX	N/A	Direct-attached SFP+ active optical cables				7 m, 10 m	No

KEY STANDARDS AND FEATURES (CONTINUED)

40 GbE Fiber							
40G-QSFP-SR4	802.3ba	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	OM3 MMF OM4 MMF	100 m 150 m	Yes
40G-QSFP-SR4-INT (compatible with 10GBASE-SR)	802.3ba				OM3 MMF OM4 MMF	100 m 150 m	Yes
40G-QSFP-LR4	802.3ba					1264.5 to 1337.5	
40 GbE Copper							
40G-QSFP-4SFP-C-XXXX	N/A	Direct-attached QSFP+ to 4 SFP+ copper cables				1 m, 3 m, 5 m	No
40G-QSFP-QSFP-C-XXXX	N/A	Direct-attached QSFP+ to QSFP+ copper cables				1 m, 3 m, 5 m	No
100 GbE Fiber							
100G-CFP-SR10	802.3ba	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	OM3 MMF OM4 MMF	100 m 150 m	Yes
100G-CFP-LR4-10KM	802.3ba			1294.53 to 1310.19	SMF	10 km	Yes
100G-CFP-10x10-2KM-OM	10×10 MSA			1523 to 1595	SMF	2 km	Yes
100G-CFP-10x10-10KM-OM	10×10 MSA			1523 to 1595	SMF	10 km	Yes
100G-CFP-ER4-40KM	802.3ba			1294.53 to 1310.19	SMF	40 km	Yes

ORDERING INFORMATION

Part Number	Description
100 MbE SFP Transceivers	
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring capable.
E1MG-100FX-IR-OM	100BASEFX-IR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 15 km.
E1MG-100FX-LR-OM	100BASEFX-LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.
1 GbE Optics	
E1MG-BXD	1000BASE-BXD SFP optic, SMF, 1490 nm, LC connector. This optic can be connected only to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic, SMF, 1310 nm, LC connector. This optic can be connected only to an E1MG-BXD at the far end.
E1MG-CWDM80-XXXX	CWDM SFP optic, 80 km, 1470 to 1610 (total of eight wavelengths supplied by eight optics, each 20 nm apart in wavelength), LC connector.
E1MG-LHA-OM	1000BASE-LHA SFP optic SMF, LC connector, optical monitoring capable. For distances up to 70 km.
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, MMF, LC connector, optical monitoring capable (70 km), industrial temperature.
E1MG-LHB	1000BASE-LHB SFP optic, SMF, LC connector, 150 km maximum reach.
E1MG-LX-OM	1000BASE-LX SFP optic SMF, LC connector, optical monitoring capable. For distances up to 10 km.
E1MG-LX-OM-T	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable, industrial temperature.
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable.
E1MG-SX-OM-T	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable, industrial temperature.
E1MG-TX, XBR-000190	1000BASE-T SFP copper, RJ-45 connector.
1G-SFP-C-0x01	1 GbE direct-attached SFP copper cable, 1 m or 5 m (where x=1 for 1 m; x=5 for 5 m).

10 GbE XFP	
10G-XFP-SR	850 nm serial pluggable XFP optic (LC), target range 300 m over MMF.
10G-XFP-LR	1310 nm serial pluggable XFP optic (LC) for up to 10 km over SMF.
10G-XFP-ER	1550 nm serial pluggable XFP optic (LC) for up to 40 km over SMF.
10G-XFP-ZR	1550 nm serial pluggable XFP optic (LC) for up to 80 km over SMF.
10G-XFP-ZRD-XXXX-AA	10GBASE-ZR DWDM, XFP optic, 80 km, 1528.77 to 1561.42 (total of 41 wavelengths supplied by 41 optics, each 100 GHz apart in frequency).
10G-XFP-1310-LRM	10GBASE-LRM, XFP optic, 1310 nm serial pluggable optic (LC) for use on OM1/OM2/OM3 MMF up to 220 m.
10 GbE SFP+	
10G-SFPP-USR	10 GbE Ultra-Short Reach (USR), SFP+ optic (LC), target range 100 m over MMF.
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF.
10G-SFPP-ER	10GBASE-ER, SFP+ optic (LC), for up to 40 km over SMF.
10G-SFPP-ZR	10GBASE-ZR, SFP+ optic (LC), for up to 80 km over SMF.
10G-SFPP-ZRD-T	10 GbE tunable DWDM SFP+ optic (LC), for up to 80 km over SMF.
10G-SFPP-LRM	10GBASE-LRM, SFP+ optic (LC), 220 m over OM1/OM2/OM3 MMF.
10G-SFPP-TWX-XXXX	10 GbE SFP+ direct-attached copper cable, 1 m, 3 m, or 5 m.
10G-SFPP-AOC-XXXX	10 GbE SFP+ direct-attached active optical cable, 7 m or 10 m.
OC12-POS-SFP	
OC12-SFP-MM	POS OC-12 (STM-4) pluggable SFP optic (LC connector). Range up to 500 m over MMF.
OC12-SFP-IR1	POS OC-12 (STM-4) SR-1/IR-1 pluggable SFP optic (LC connector). Range up to 15 km over SMF. No attenuator needed for SR-1 applications.
OC12-SFP-LR1	POS OC-12 (STM-4) LR-1 pluggable SFP optic (LC connector). Range up to 40 km over SMF.
OC12-SFP-LR2	POS OC-12 (STM-4) LR-2 pluggable SFP optic (LC connector). Range up to 80 km over SMF.
OC48-POS-SFP 2.5 Gbps	
OC48-SFP-SR1	POS OC-48 (STM-16) SR-1 pluggable SFP optic (LC connector). Range up to 2 km over SMF.
OC48-SFP-IR1	POS OC-48 (STM-16) LR-1 pluggable SPF optic (LC connector). Range up to 15 km over SMF.
OC48-SFP-LR1	POS OC-48 (STM-16) LR-2 pluggable SFP optic (LC connector). Range up to 40 km over SMF.
OC48-SFP-LR2	POS OC-48 (STM-16) LR-2 pluggable SFP optic (LC connector). Range up to 80 km over SMF.
OC192-POS-XFP	
OC192-XFP-SR1 POS	OC-192 (STM-64) SR-1 pluggable XFP optic (LC connector). Range up to 2 km over SMF.
OC192-XFP-IR2	POS OC-192 (STM-64) IR-2 pluggable XFP optic (LC connector). Range up to 40 km over SMF.
OC192-XFP-LR2	POS OC-192 (STM-64) LR-2 pluggable XFP optic (LC connector). Range up to 80 km over SMF.
40 GbE QSFP+	
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF (not compliant with 10GBASE-SR4 modules per IEEE 802.3ae standard).
40G-QSFP-SR4-INT	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF (10GBASE-SR compatible, breakout-capable).
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF.
40G-QSFP-4SFP-C-XXXX	4×10 GbE direct-attached QSFP+ to four SFP+ copper breakout cable, 1 m, 3 m, or 5 m.
40G-QSFP-QSFP-C-XXXX	4×10 GbE direct-attached QSFP+ to QSFP+ copper breakout cable, 1 m, 3 m, or 5 m.

ORDERING INFORMATION (CONTINUED)

100 GbE CFP	
100G-CFP-SR10	100 GbE CFP optic (MP024), SR10, for distances up to 100 m over MMF
100G-CFP-LR4-10KM	100 GbE CFP optic (SC), LR4, for distances up to 10 km over SMF.
100G-CFP-10x10-2KM-OM	100 GbE CFP optic (LC), 10×10, for distances up to 2 km over SMF.
100G-CFP-10x10-10KM-OM	100 GbE CFP optic (LC), 10×10, for distances up to 10 km over SMF.
100G-CFP-ER4-40KM	100 GbE CFP optic (LC), ER4, for distances up to 40 km over SMF.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

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Brocade helps organizations easily address their information technology requirements by offering flexible network acquisition and support alternatives to meet their financial needs. Organizations can select from purchase, lease, and Brocade Network Subscription options to align network acquisition with their unique capital requirements and risk profiles.

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