

## DATA SHEET

### BENEFITS

#### GUARANTEED COMPATIBILITY AND COMPLIANCE

- We guarantee compatibility with Ruckus switches and full compliance with industry standards. That's something you don't get from generic transceivers.
- Standards-based—802.3z, 802.3ah, 802.3u, 802.3ae, 802.3ak, and 802.3ba—and compliant as required
- Compliant with Restrictions on Hazardous Substances (RoHS), meeting RoHS 6 EU standards

#### FACTORY TESTED

- Every batch of Ruckus transceivers is factory tested, so you're assured that they function properly and reliably.

#### EASY TO DEPLOY AND UPGRADE

- Hot-swappable flexibility in the field for greater ease and lower total cost of ownership

#### LIFETIME SUPPORT

- Buy Brocade branded transceiver, and we'll support it for the life of the product. Single support source for switches and optics!

### HIGHLY RELIABLE, RUCKUS-QUALIFIED OPTICS

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

Extensive performance and reliability testing reflects an ongoing commitment to quality. Ruckus 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 Ruckus products. The speed, capacity, reliability, and low cost of ownership that Ruckus is known for is also provided in all optical components.

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

#### RUCKUS GLOBAL SERVICES

Ruckus Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Ruckus Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Ruckus investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

#### MAXIMIZING INVESTMENTS

To help optimize technology investments, Ruckus and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Ruckus sales partner or visit [www.ruckuswireless.com](http://www.ruckuswireless.com).

## ETHERNET OPTICS FAMILY FEATURES

The Ruckus Ethernet optics family includes several offerings designed to meet the performance and scalability requirements of service provider and enterprise environments.

100 MBE OPTICS	
<ul style="list-style-type: none"> <li>• 100 Megabit Ethernet (MbE) transceivers support link lengths from 2 km to 40 km</li> <li>• Both SMF and MMF fiber types</li> </ul>	<ul style="list-style-type: none"> <li>• RoHS 5 and 6 compliant</li> <li>• Enterprise switching and routing</li> </ul>
1 GBE OPTICS	
<ul style="list-style-type: none"> <li>• 1 GbE transceivers support link lengths from 300 m to 100 km</li> <li>• Both SMF and MMF fiber types</li> <li>• Coarse Wavelength Division Multiplexing (CWDM) support for distances of 80 km to 100 km</li> </ul>	<ul style="list-style-type: none"> <li>• RoHS 5 and 6 compliant</li> <li>• For core routers and security applications</li> </ul>
10 GBE OPTICS	
<ul style="list-style-type: none"> <li>• 10 GbE transceivers support link lengths of 26 m to 80 km</li> <li>• Protocol-independent</li> <li>• Less than one-third the power and size of MSA optic</li> <li>• Hot-swappable</li> <li>• Digital Optical Monitoring (DOM) support</li> </ul>	<ul style="list-style-type: none"> <li>• RoHS 5 and 6 compliant</li> <li>• Application delivery and acceleration</li> <li>• High-Performance Computing (HPC) interconnects</li> <li>• Service provider traffic management</li> </ul>
40 GBE QSFP+ OPTICS	
<ul style="list-style-type: none"> <li>• 40 GbE transceivers support link lengths up to 100 m</li> <li>• Hot-pluggable</li> <li>• Industry-standard QSFP+</li> </ul>	<ul style="list-style-type: none"> <li>• Digital Optical Monitoring (DOM) support</li> <li>• High-density 40 GbE connectivity options for data center, enterprise, and service provider applications</li> </ul>

## PRODUCT SUPPORT FOR FAST ETHERNET

	ICX 7000 Series		ICX 6000 Series	
FAST ETHERNET OPTICS	ICX 7450	ICX 6430	ICX 6450	ICX 6610
E1MG-100FX-OM	●	●	●	● <sup>1</sup>
E1MG-100FX-A	●			
E1MG-100FX-IR-OM	●			● <sup>1</sup>
E1MG-100FX-LR-OM	●			● <sup>1</sup>

<sup>1</sup> Available only with Ruckus ICX 6610-24F.

## PRODUCT SUPPORT FOR 1 GIGABIT ETHERNET

	ICX 7000 Series				ICX 6000 Series		
1 GBE FIBER OPTICS	ICX 7150	ICX 7250	ICX 7450	ICX 7750	ICX 6430	ICX 6450	ICX 6610
E1MG-SX-OM	●	●	●	●	⊙ <sup>1</sup>	●	●
E1MG-SX-A	●	●	●	●	⊙ <sup>1</sup>	●	●
E1MG-LX-OM	●	●	●	●	●	●	●
E1MG-LX-A	●	●	●	●			
E1MG-LHA-OM					●	●	●
E1MG-LHA-OM-T	●	●	●	●			
E1MG-BXD	●	●	●	●	●	●	●
E1MG-BXU	●	●	●	●	●	●	●
E1MG-TX	●	●	●	●	⊙ <sup>1</sup>	●	●
E1MG-TX-A	●	●	●	●	⊙ <sup>1</sup>	●	●
1G-SFP-TWX-0x01	●	●	●		⊙ <sup>1</sup>	●	

⊙ Optics supported for both stacking and regular data links.

<sup>1</sup> Stacking is not supported on the Ruckus ICX 6430 12-port compact switch.

## PRODUCT SUPPORT FOR 10 GIGABIT ETHERNET

	ICX 7000 Series				ICX 6000 Series	
10 GBE FIBER OPTICS	ICX 7150	ICX 7250	ICX 7450	ICX 7750	ICX 6450	ICX 6610
10G-SFPP-USR	⊙	⊙	⊙	●	⊙ <sup>1</sup>	●
10G-SFPP-USR-SA	⊙	⊙	⊙	●		
10G-SFPP-SR	⊙	⊙	⊙	●	⊙ <sup>1</sup>	●
10G-SFPP-SR-SA	⊙	⊙	⊙	●		
10G-SFPP-SR-S	⊙	⊙	⊙	●		
10G-SFPP-LR	⊙	⊙	⊙	●	●	●
10G-SFPP-LR-SA	⊙	⊙	⊙	●		
10G-SFPP-LR-S	⊙	⊙	⊙	●		
10G-SFPP-ER	●	●	●	●	●	●
10G-SFPP-ZR	●	●	●	●		
10G-SFPP-LRM			●		⊙ <sup>1</sup>	●
10G-SFPP-LRM-X-ADP	●	●		●		
10G-SFPP-BXD-S	⊙	⊙	⊙	●		
10G-SFPP-BXU-S	⊙	⊙	⊙	●		
10G-SFPP-TWX-XXXX	⊙	⊙	⊙	●	●	⊙
10G-SFPP-TWX-P-XXXX	⊙	⊙	⊙	●		
10GE-SFPP-AOC-XXXX		●	●	●		

⊙ Optics supported for both stacking and regular data links.

<sup>1</sup> Stacking is not supported on the Ruckus ICX 6450 12-port compact switch.

## PRODUCT SUPPORT FOR 40 GIGABIT ETHERNET

	ICX 7000 Series		ICX 6000 Series
40 GBE FIBER OPTICS	ICX 7450	ICX 7750	ICX 6610
40G-QSFP-SR4	⊙	⊙	
40G-QSFP-SR4-INT		●	
40G-QSFP-ESR4	●	●	
40G-QSFP-LR4	⊙	⊙	
40G-QSFP-LR4-INT		●	
40G-QSFP-LM4	●	⊙	
40G-QSFP-ER4	●	⊙	
40G-QSFP-SR-BIDI	●	⊙	
40G-QSFP-4SFP-C-XXXX		●	
40G-QSFP-QSFP-C-XXXX	⊙	⊙	
40G-QSFP-C-XXXXX	⊙	⊙	⊙
40G-QSFP-QSFP-AOC-XXXX	●	⊙	

⊙ Optics supported for both stacking and regular data links.

○ 40 GbE ports on the Ruckus ICX 6610 are supported for stacking only.

## KEY STANDARDS AND FEATURES

	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
<b>PART NUMBER</b>	<b>FAST ETHERNET</b>						
E1MG-100FX-OM E1MG-100FX-A	802.3u	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	1,310	MMF	2 km	Yes
E1MG-100FX-IR-OM	802.3			1,310	SMF	15 km	Yes
E1MG-100FX-LR-OM	802.3			1,310	SMF	40 km	Yes
<b>PART NUMBER</b>	<b>1 GBE FIBER</b>						
E1MG-SX-OM/ E1MG-SX-OM-T E1MG-SX-A	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 E1MG-LX-A	802.3z			1,310	MMF/SMF	550 m to 10 km	Yes
E1MG-LHA-OM/ E1MG-LHA-OM-T	802.3z			1,550	SMF	70 km	Yes
E1MG-BXD	802.3ah			TX: 1,490 RX: 1,310		10 km	No
E1MG-BXU	802.3ah			TX: 1,310 RX: 1,490		10 km	No
E1MG-CWDM80-XXXX	802.3z			1,470 to 1,610	80 km	No	
<b>PART NUMBER</b>	<b>1000BASE-T COPPER</b>						
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

## KEY STANDARDS AND FEATURES

	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
<b>PART NUMBER</b>	<b>10 GBE FIBER</b>						
10G-SFPP-USR	N/A	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	100 m	Yes
10G-SFPP-SR	802.3ae			850	MMF	26 m to 300 m	
10G-SFPP-LR	802.3ae			1,310	SMF	10 km	
10G-SFPP-ER	802.3ae			1,550	SMF	40 km	
10G-SFPP-ZR	802.3ae			1,550	SMF	80 km	
10G-SFPP-ZRD-T	802.3-2005 Clause 52 standard			102 C-band tunable wavelengths from 1,528 to 1,568 (50 GHz apart)	SMF	80 km	
10G-SFPP-LRM	802.3ae			1,310	MMF	220 m	

<b>PART NUMBER</b>	<b>10GBASE CABLE</b>						
10G-SFPP-TWX-XXXX	802.3ae	Direct-attached SFP+ Twinax active 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	Yes
10G-SFPP-TWX-P-XXXX	802.3ae	Direct-attached SFP+ Twinax passive copper cables				1 m, 3 m, 5 m	No

<b>PART NUMBER</b>	<b>40 GBE FIBER</b>						
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				1,264.5 to 1,337.5	SMF	10 km

<b>PART NUMBER</b>	<b>40 GBE COPPER</b>						
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

## RUCKUS ETHERNET OPTICS ORDERING INFORMATION

PART NUMBER	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-A	100BASE-FX SFP optic MMF, LC connector, optical monitoring-capable, TAA-compliant.
E1MG-100FX-LR-OM	100BASEFX-LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.

PART NUMBER	1 GBE SFP
E1MG-BXD	1000BASE-BXD SFP optic, SMF, 1,490 nm, LC connector. This optic can be connected only to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic, SMF, 1,310 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, 1,470 to 1,610 (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-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring-capable. For distances up to 10 km.
E1MG-LX-A	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring-capable. For distances up to 10 km, TAA-compliant.
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-SX-A	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring-capable, TAA compliant.
E1MG-TX	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).

PART NUMBER	10 GBE SFP+
10G-SFPP-USR	10 GbE Ultra-Short Reach (USR), SFP+ optic (LC), target range 100 m over MMF.
10G-SFPP-USR-SA	10 GbE Ultra-Short Reach (USR), SFP+ optic (LC), target range 100 m over MMF, standard temperature, TAA-compliant.
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), for up to 300 m over MMF.
10G-SFPP-SR-SA	10GBASE-SR, SFP+ optic (LC), for up to 300 m over MMF, standard temperature, TAA-compliant.
10G-SFPP-SR-S	10GBASE-SR, SFP+ optic (LC), for up to 300 m over MMF, standard temperature.
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF.
10G-SFPP-LR-SA	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF, standard temperature, TAA-compliant.
10G-SFPP-LR-S	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF, standard temperature.
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.



## RUCKUS ETHERNET OPTICS ORDERING INFORMATION

10G-SFPP-LRM	10GBASE-LRM, SFP+ optic (LC), 220 m over OM1/OM2/OM3 MMF.
10G-SFPP-LRM-1-ADP	10GBASE-LRM SFP+ optic (LC), for up to 220 m over MMF, 1-pack. Includes one LRM adapter device.
10G-SFPP-LRM-2-ADP	10GBASE-LRM SFP+ optic (LC), for up to 220 m over MMF, 2-pack. Includes one LRM adapter device.
10G-SFPP-BXD-S	10G-BXD SFP+ optic, SMF, 1,490 nm, LC connector. This optic can be connected only to a 10G-BXU SFP+ at the far end.
10G-SFPP-BXU-S	10G-BXU SFP+ optic, SMF, 1,310 nm, LC connector. This optic can be connected only to a 10G-BXD SFP+ at the far end.
10G-SFPP-TWX-XXXX	10 GbE SFP+ direct-attached active copper cable, 1 m, 3 m, or 5 m.
10G-SFPP-TWX-P-XXXX	10 GbE SFP+ direct-attached passive 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.

PART NUMBER	40 GBE QSFP+
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1x8 or 1x12), 100 m over MMF OM3. 150 m over MMF OM4 (not compliant with 10GBASE-SR4 modules per IEEE 802.3ae standard).
40G-QSFP-ESR4	40GBASE-ESR4 QSFP+ optic (MTP 1x8 or 1x12), 300 m over MMF, (10GBASE-SR compatible, breakout).
40G-QSFP-SR4-INT	40GBASE-SR4 QSFP+ optic (MTP 1x8 or 1x12), 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-SR-BIDI	40GE SR QSFP+ optic (LC), bidirectional, 100 m over OM3 MMF.
40G-QSFP-4SFP-C-XXXX	4x10 GbE direct-attached QSFP+ to four SFP+ copper breakout cable, 1 m, 3 m, or 5 m.
40G-QSFP-QSFP-C-XXXX	4x10 GbE direct-attached QSFP+ to QSFP+ copper breakout cable, 1 m, 3 m, or 5 m.

## LEGAL DISCLAIMER

Product features, functionality and specifications may change or be discontinued without notice. Nothing in this document shall be deemed to create a warranty of any kind, either express or implied, statutory or otherwise, including but not limited to, any implied warranties of merchantability, fitness for a particular purpose, non-infringement of third-party rights or availability with respect to any products and services.

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