

Transceivers for SmartEdge and SM Family Line Cards

Release 12.1

INSTALLATION

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1 Transceiver Installation and Reference

A transceiver is required to make a transceiver port operable on a SmartEdge® or SM family line card.

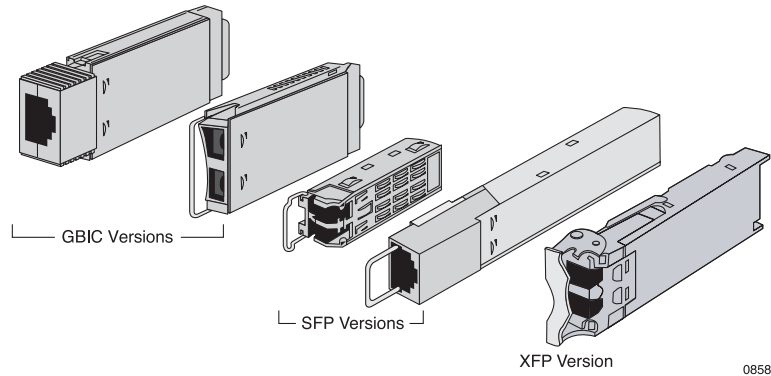


Figure 1 SmartEdge and SM Family Transceiver Types

Table 1 Transceiver Types for Line Cards

Line Card	Transceiver ⁽¹⁾	Supported Versions
ENET 10/100 MIC (12-port)	SFP	FX, LX10
ENET FX-100 MIC (12-port)	SFP	FX, LX10, TX
ENET 1 Gb MIC (2-port)	SFP	SX, LX
ATM OC-3c/STM-1c (8-port) ⁽²⁾	SFP	SR-0, IR-1
ATM OC-12c/STM-1c (2-port) ⁽³⁾	SFP	SR-0, IR-1, LR-1
POS OC-3c/STM-1c (8-port)	SFP	SR-0, IR-1 ⁽²⁾
POS OC-12c/STM-4c (4-port)	SFP	SR-0, IR-1, LR-1 ⁽³⁾
POS OC-48c/STM-16c (4-port)	SFP	SR-1, IR-1, LR-2
Channelized OC-3/STM-1 (8/4-port) / OC-12/STM-4 (2/1-port) ⁽²⁾⁽³⁾	SFP	OC-3: SR-0, IR-1 OC-12: SR-0, IR-1, LR-1
Gigabit Ethernet 1020 (10-port)	SFP	SX, LX, ZX, TX, BX-D-20, BX-U-20, CWDMmnnn, DWDMmnn ⁽⁴⁾
Gigabit Ethernet (5-port)	SFP	SX, LX, ZX, TX, BX-D-20, BX-U-20, CWDMmnnn, DWDMmnn ⁽⁴⁾
Gigabit Ethernet DDR (10-port)	SFP	SX, LX, ZX, TX, BX-D-20, BX-U-20, CWDMmnnn, DWDMmnn ⁽⁴⁾
Gigabit Ethernet DDR (20-port) ⁽⁵⁾	SFP	SX, LX, ZX, TX, BX-D-20, BX-U-20, CWDMmnnn, DWDMmnn ⁽⁴⁾⁽⁶⁾
10 Gigabit Ethernet (1-port) ⁽⁷⁾	XFP	SR, LR, ER, ZR, DWDMmnn ⁽⁸⁾
10 Gigabit Ethernet DDR (4-port) ⁽⁵⁾⁽⁷⁾	XFP	SR, LR, ER, ZR, DWDMmnn, OTN-DWDMmnn ⁽⁹⁾⁽⁸⁾
10 Gigabit Ethernet DDR (1-port) ⁽¹⁰⁾⁽⁷⁾	XFP	SR/SW, LR/LW, ER/EW, ZR/ZW, SR-1, IR-2, LR-2, DWDMmnn ⁽⁸⁾ , OTN-DWDMmnn ⁽⁸⁾

**Table 1 Transceiver Types for Line Cards**

Line Card	Transceiver ⁽¹⁾	Supported Versions
10 Gigabit Ethernet/OC-192c DDR (1-port) ⁽¹¹⁾⁽⁷⁾	XFP	SR/SW, LR/LW, ER/EW, ZR/ZW, SR-1, IR-2, LR-2, DWDMnn ⁽⁸⁾ , OTN-DWDMnn ⁽⁸⁾
OC-192c/STM-64c (1-port) ⁽⁷⁾	XFP	SR-1, IR-2, LR-2

(1) If the transceiver has not been qualified for use in the line card, the system displays a warning message.

(2) Use part number RDH90159/1 (SFP-OC3-SR-IR) when ordering the SFP transceivers with OC-3- IR-1 or OC-3 SR-1 (single mode, up to 2 km) functionality.

(3) Use part number RDH90174/1 (SFP-OC12-IR) when ordering the SFP transceivers with OC-12- IR-1 (single mode, up to 15 km) functionality.

(4) The range of GE-DWDM ITU channels is 17 to 60; see ITU DWDM Transmit Frequencies and Wavelengths for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(5) This card is not supported on the SmartEdge 400 and SmartEdge 800 routers.

(6) When this 1000Base-TX SFP transceiver is used in the 20-port GE DDR card, a maximum of 10 transceivers can be inserted into the card. These transceivers are inserted into the card such that only one port from each of the following slot pairs is populated: 1-11, 2-12, 3-13, 4-14, 5-15, 6-16, 7-17, 8-18, 9-19, and 10-20. If both ports in a slot pair are populated, the SFP cages of the line card can be damaged.

(7) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(8) The 10GE-DWDM and OTN-DWDM XFP transceivers support ITU channels 20, 33, 35,36,37,53,and 55; see ITU DWDM Transmit Frequencies and Wavelengths for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(9) The OTN-DWDM XFP transceivers can only be installed in ports 1 and 4 of the 4-port 10GE DDR card.

(10) This line card is supported on the SM 240 and SM 480 routers.

(11) This line card is supported on the SmartEdge 400, 600, 800, 1200, and 1200H routers.

Caution!

Risk of data loss. Because the 10 Gigabit Ethernet/OC-192c DDR (1-port) line card has multi-rate capability, it is important that you choose the proper XFP transceiver for the intended application.



1.1 Installation Procedure

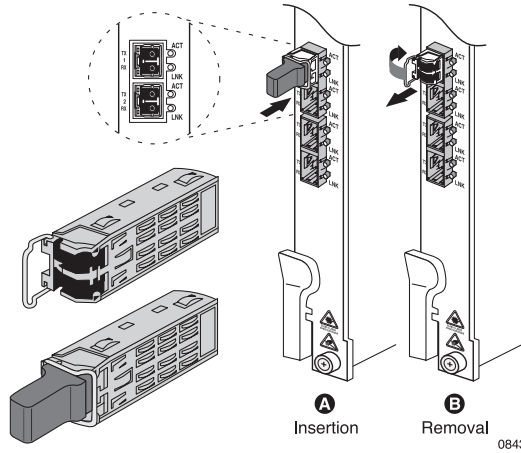


Figure 2 Installing an SFP Transceiver

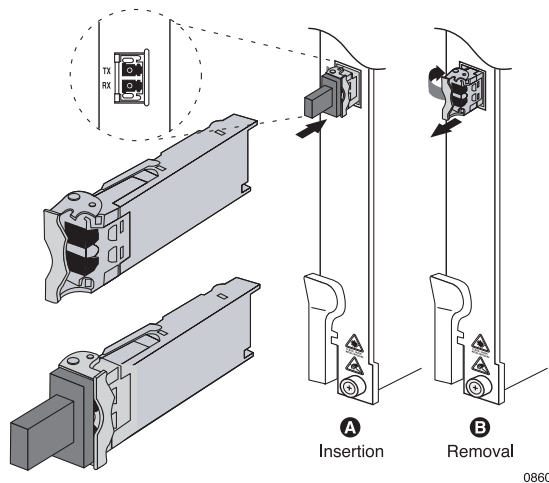


Figure 3 Installing an XFP Transceiver

Warning!

If a long-range XFP (ER, ZR, DWDM, or OTN) is connected directly by a loopback fiber cable without an attenuator, the receiver may not be able to handle the strong TX signal and could be damaged permanently.

To install a transceiver:

1. Prepare for installation by putting on an antistatic wrist strap and attach it to an appropriate grounded surface. Do not attach the wrist strap to a painted surface; an ESD convenience jack is located on the front of the chassis.



2. For an optical SFP or XFP transceiver, ensure that the latching mechanism is closed. For a copper SFP, the latching mechanism must be open when installing.
3. Align the transceiver connectors with the Tx and Rx labels on the front panel of the line card, and slide the transceiver into the opening for the port until the rear connector is seated with an audible click.

The labels for the Tx and Rx connectors on a transceiver vary by vendor.

4. If you have not already done so, remove the dust cover from the optical transceiver.
5. After the transceiver has been installed, verify the operational status as described in the “Hardware Control and Troubleshooting” chapter in the appropriate hardware guide for the chassis.
6. Connect and route the cables by using the procedures in the “Installing the Hardware” chapter in the appropriate hardware guide for the chassis.

Caution!

Risk of electrostatic discharge (ESD) damage. The transceivers contain electrostatic-sensitive devices. To reduce the risk of ESD damage, always use an ESD wrist or ankle strap when handling any transceiver. Avoid touching its connector pins.

Warning!

Risk of personal injury. Mechanical and electrical shock hazards are present throughout the system. To reduce the risk, only qualified personnel are allowed to install and service the system and its components. Do not attempt to access any component inside the chassis; no user-serviceable components exist inside it.

Caution!

Risk of electrostatic discharge (ESD) damage. The transceivers contain electrostatic-sensitive devices. To reduce the risk of ESD damage, always use an ESD wrist or ankle strap when handling any transceiver. Avoid touching its connector pins.



Warning!

Risk of severe damage to your eyes. All versions of the optical cards and components are Class 1 products, which use lasers to convert electrical signals to optical signals that can damage your eyes. To reduce the risk when handling these optical cards and components, keep the connectors covered until you are ready to connect the fiber-optic cables. When you remove a cover, do not stare into or directly view the laser beam emerging from the connector.

Caution!

Risk of data loss. You can corrupt the system if you attempt to install transceivers that are not purchased from Ericsson because these items have not been tested.

Caution!

Risk of damage to fiber-optic cables. These cables are very fragile and easily broken. To reduce the risk, never step on a cable; never bend or twist it when connecting it to or disconnecting it from a line card.

For information about configuring line cards, ports, channels, and circuits, see related documentation listed in Reference List on page 31.

1.2 Transceiver Order Numbers

Table 2 Transceiver Order Numbers

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
SFP-GE-SX	RDH90155/1	INE1010673	VAUIAAWEAA	SFP optical transceiver, GE Short-Reach, MMF using LC connector
SFP-GE-LX	RDH90154/1	INE1010672	VAUIAAXEAA	SFP optical transceiver, GE Long-Reach, SMF using LC connector
SFP-GE-ZX	RDH90157/1	INE1010675	IPUIASHCAA	SFP optical transceiver, GE Extended-Reach, 1550 nm, SMF using LC connector



Table 2 Transceiver Order Numbers

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
SFP-GE-TX	RDH90156/1	INE1010674	SN5PTY0EAA	SFP copper transceiver, GE 100TX or 1000TX, CAT 5/6 using RJ-45 connector ⁽¹⁾⁽²⁾
SFP-GE-CWDM1470	RDH90152/1470	INE1010620	IPUIATACAA	SFP optical transceiver, GE CWDM, 1470 nm, SMF using LC connector
SFP-GE-CWDM1490	RDH90152/1490	INE1010621	IPUIATBCAA	SFP optical transceiver, GE CWDM, 1490 nm, SMF using LC connector
SFP-GE-CWDM1510	RDH90152/1510	INE1010622	IPUIATCCAA	SFP optical transceiver, GE CWDM, 1510 nm, SMF using LC connector
SFP-GE-CWDM1530	RDH90152/1530	INE1010623	IPUIATDCAA	SFP optical transceiver, GE CWDM, 1530 nm, SMF using LC connector
SFP-GE-CWDM1550	RDH90152/1550	INE1010624	IPUIASGCAA	SFP optical transceiver, GE CWDM, 1550 nm, SMF using LC connector
SFP-GE-CWDM1570	RDH90152/1570	INE1010625	IPUIATECAA	SFP optical transceiver, GE CWDM, 1570 nm, SMF using LC connector
SFP-GE-CWDM1590	RDH90152/1590	INE1010626	IPUIATHCAA	SFP optical transceiver, GE CWDM, 1590 nm, SMF using LC connector
SFP-GE-CWDM1610	RDH90152/1610	INE1010627	IPUIATJCAA	SFP optical transceiver, GE CWDM, 1610 nm, SMF using LC connector
SFP-GE-DWDMITU17	RDH90153/17	INE1010628	IPUIATKCAA	SFP optical transceiver, GE DWDM, ITU Channel 17, SMF using LC connector
SFP-GE-DWDMITU18	RDH90153/18	INE1010629	IPUIATLCAA	SFP optical transceiver, GE DWDM, ITU Channel 18, SMF using LC connector
SFP-GE-DWDMITU19	RDH90153/19	INE1010630	IPUIATMCAA	SFP optical transceiver, GE DWDM, ITU Channel 19, SMF using LC connector
SFP-GE-DWDMITU20	RDH90153/20	INE1010631	IPUIATNCAA	SFP optical transceiver, GE DWDM, ITU Channel 20, SMF using LC connector
SFP-GE-DWDMITU21	RDH90153/21	INE1010632	IPUIATPCAA	SFP optical transceiver, GE DWDM, ITU Channel 21, SMF using LC connector
SFP-GE-DWDMITU22	RDH90153/22	INE1010633	IPUIATRCAA	SFP optical transceiver, GE DWDM, ITU Channel 22, SMF using LC connector
SFP-GE-DWDMITU23	RDH90153/23	INE1010634	IPUIATSCAA	SFP optical transceiver, GE DWDM, ITU Channel 23, SMF using LC connector
SFP-GE-DWDMITU24	RDH90153/24	INE1010635	IPUIATTCAA	SFP optical transceiver, GE DWDM, ITU Channel 24, SMF using LC connector
SFP-GE-DWDMITU25	RDH90153/25	INE1010636	IPUIATUCAA	SFP optical transceiver, GE DWDM, ITU Channel 25, SMF using LC connector
SFP-GE-DWDMITU26	RDH90153/26	INE1010637	IPUIATVCAA	SFP optical transceiver, GE DWDM, ITU Channel 26, SMF using LC connector
SFP-GE-DWDMITU27	RDH90153/27	INE1010638	IPUIATWCAA	SFP optical transceiver, GE DWDM, ITU Channel 27, SMF using LC connector



Table 2 Transceiver Order Numbers

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
SFP-GE-DWDMITU28	RDH90153/28	INE1010639	IPUIATXCAA	SFP optical transceiver, GE DWDM, ITU Channel 28, SMF using LC connector
SFP-GE-DWDMITU29	RDH90153/29	INE1010640	IPUIATYCAA	SFP optical transceiver, GE DWDM, ITU Channel 29, SMF using LC connector
SFP-GE-DWDMITU30	RDH90153/30	INE1010641	IPUIATZCAA	SFP optical transceiver, GE DWDM, ITU Channel 30, SMF using LC connector
SFP-GE-DWDMITU31	RDH90153/31	INE1010642	IPUIAT0CAA	SFP optical transceiver, GE DWDM, ITU Channel 31, SMF using LC connector
SFP-GE-DWDMITU32	RDH90153/32	INE1010643	IPUIAT1CAA	SFP optical transceiver, GE DWDM, ITU Channel 32, SMF using LC connector
SFP-GE-DWDMITU33	RDH90153/33	INE1010644	IPUIASFCAA	SFP optical transceiver, GE DWDM, ITU Channel 33, SMF using LC connector
SFP-GE-DWDMITU34	RDH90153/34	INE1010645	IPUIASKCAA	SFP optical transceiver, GE DWDM, ITU Channel 34, SMF using LC connector
SFP-GE-DWDMITU35	RDH90153/35	INE1010646	IPUIAT2CAA	SFP optical transceiver, GE DWDM, ITU Channel 35, SMF using LC connector
SFP-GE-DWDMITU36	RDH90153/36	INE1010647	IPUIAT3CAA	SFP optical transceiver, GE DWDM, ITU Channel 36, SMF using LC connector
SFP-GE-DWDMITU37	RDH90153/37	INE1010648	IPUIAS8CAA	SFP optical transceiver, GE DWDM, ITU Channel 37, SMF using LC connector
SFP-GE-DWDMITU38	RDH90153/38	INE1010649	IPUIAT4CAA	SFP optical transceiver, GE DWDM, ITU Channel 38, SMF using LC connector
SFP-GE-DWDMITU39	RDH90153/39	INE1010650	IPUIAT5CAA	SFP optical transceiver, GE DWDM, ITU Channel 39, SMF using LC connector
SFP-GE-DWDMITU40	RDH90153/40	INE1010651	IPUIAT6CAA	SFP optical transceiver, GE DWDM, ITU Channel 40, SMF using LC connector
SFP-GE-DWDMITU41	RDH90153/41	INE1010652	IPUIAT7CAA	SFP optical transceiver, GE DWDM, ITU Channel 41, SMF using LC connector
SFP-GE-DWDMITU42	RDH90153/42	INE1010653	IPUIAT8CAA	SFP optical transceiver, GE DWDM, ITU Channel 42, SMF using LC connector
SFP-GE-DWDMITU43	RDH90153/43	INE1010654	IPUIAT9CAA	SFP optical transceiver, GE DWDM, ITU Channel 43, SMF using LC connector
SFP-GE-DWDMITU44	RDH90153/44	INE1010655	IPUIAUACAA	SFP optical transceiver, GE DWDM, ITU Channel 44, SMF using LC connector
SFP-GE-DWDMITU45	RDH90153/45	INE1010656	IPUIAUBCAA	SFP optical transceiver, GE DWDM, ITU Channel 45, SMF using LC connector

**Table 2 Transceiver Order Numbers**

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
SFP-GE-DWDMITU46	RDH90153/46	INE1010657	IPUIAUCCAA	SFP optical transceiver, GE DWDM, ITU Channel 46, SMF using LC connector
SFP-GE-DWDMITU47	RDH90153/47	INE1010658	IPUIAUDCAA	SFP optical transceiver, GE DWDM, ITU Channel 47, SMF using LC connector
SFP-GE-DWDMITU48	RDH90153/48	INE1010659	IPUIAUECAA	SFP optical transceiver, GE DWDM, ITU Channel 48, SMF using LC connector
SFP-GE-DWDMITU49	RDH90153/49	INE1010660	IPUIAUFCAA	SFP optical transceiver, GE DWDM, ITU Channel 49, SMF using LC connector
SFP-GE-DWDMITU50	RDH90153/50	INE1010661	IPUIAUGCAA	SFP optical transceiver, GE DWDM, ITU Channel 50, SMF using LC connector
SFP-GE-DWDMITU51	RDH90153/51	INE1010662	IPUIAUHCAA	SFP optical transceiver, GE DWDM, ITU Channel 51, SMF using LC connector
SFP-GE-DWDMITU52	RDH90153/52	INE1010663	IPUIAUJCAA	SFP optical transceiver, GE DWDM, ITU Channel 52, SMF using LC connector
SFP-GE-DWDMITU53	RDH90153/53	INE1010664	IPUIAUKCAA	SFP optical transceiver, GE DWDM, ITU Channel 53, SMF using LC connector
SFP-GE-DWDMITU54	RDH90153/54	INE1010665	IPUIAULCAA	SFP optical transceiver, GE DWDM, ITU Channel 54, SMF using LC connector
SFP-GE-DWDMITU55	RDH90153/55	INE1010666	IPUIAUMCAA	SFP optical transceiver, GE DWDM, ITU Channel 55, SMF using LC connector
SFP-GE-DWDMITU56	RDH90153/56	INE1010667	IPUIAUNCAA	SFP optical transceiver, GE DWDM, ITU Channel 56, SMF using LC connector
SFP-GE-DWDMITU57	RDH90153/57	INE1010668	IPUIAUPCAA	SFP optical transceiver, GE DWDM, ITU Channel 57, SMF using LC connector
SFP-GE-DWDMITU58	RDH90153/58	INE1010669	IPUIAURCAA	SFP optical transceiver, GE DWDM, ITU Channel 58, SMF using LC connector
SFP-GE-DWDMITU59	RDH90153/59	INE1010670	IPUIAUSCAA	SFP optical transceiver, GE DWDM, ITU Channel 59, SMF using LC connector
SFP-GE-DWDMITU60	RDH90153/60	INE1010671	IPUIAUTCAA	SFP optical transceiver, GE DWDM, ITU Channel 60, SMF using LC connector
SFP-FE-FX	RDH90150/1	INE1010618	SOUAT7UAA	SFP optical transceiver, FE Short-Reach, up to 2 km MMF, 1310 nm, using LC connector
SFP-FE-LX10	RDH90151/1	INE1010619	SOUAT8UAA	SFP optical transceiver, FE Long-Reach, up to 10 km SMF, 1310 nm, using LC connector
SFP-OC48-SR	RDH90170/1	N/A	SOOTAKZTAA	SFP optical transceiver, OC-48 Short-Reach, SMF using LC connector



Table 2 Transceiver Order Numbers

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
SFP-OC48-IR	RDH90171/1	N/A	SOOTAK0TAA	SFP optical transceiver, OC-48 Intermediate-Reach, SMF using LC connector
SFP-OC48-LR2	RDH90172/1	N/A	SOOTAK1TAA	SFP optical transceiver, OC-48 Long-Reach, SMF using LC connector
N/A	RDH90191/1	N/A	IPUIBH72AA	SFP optical transceiver, OC-12, MMF using LC connector
SFP-OC12-IR ⁽³⁾	RDH90174/1	N/A	SOOTAK3TAA	SFP optical transceiver, OC-12 Intermediate-Reach, SMF using LC connector
SFP-OC12-LR	RDH90175/1	N/A	SOOTAK4TAA	SFP optical transceiver, OC-12 Long-Reach, SMF using LC connector
N/A	RDH90183/1	N/A	SOOTAK5TAA	SFP 1000BASE-BX10 Bidirectional optical transceiver. 1310nm TX, 1490nm RX, SMF using LC connector
N/A	RDH90184/1	N/A	SOOTAK6TAA	SFP 1000BASE-BX10 Bidirectional optical transceiver. 1490nm TX, 1310nm RX, SMF using LC connector
SFP-ATM-OC3-MM-SR	RDH90158/1	INE1010912	SOOTAG9NAA	SFP optical transceiver, OC-3 Short-Reach, MMF using LC connector
SFP-OC3-SR-IR ⁽⁴⁾	RDH90159/1	INE1010913	SOOTAHBNA	SFP optical transceiver, OC-3, supports both Short-Reach (nominal 2km, SMF, LC connector) and Intermediate-Reach (nominal 15km, SMF, LC connector)
XFP-10GE-SR	RDH90164/1	INE1010819	IPUIANVCAA	XFP optical transceiver, 10GE Short-Reach, SMF using LC connector
XFP-10GE-LR	RDH90165/1	INE1010818	IPUIANWCAA	XFP optical transceiver, 10GE Long-Reach, SMF using LC connector
XFP-10GE-ER	RDH90166/1	INE1010817	IPUIASDCAA	XFP optical transceiver, 10GE Extended-Reach, SMF using LC connectors
XFP-10GE-DWDMITU20	RDH90141/20	N/A	IPUIBKM2AA	XFP optical transceiver, 10GE DWDM, ITU Channel 20, SMF using LC connector
XFP-10GE-DWDMITU33	RDH90141/33	N/A	IPUIBKT2AA	XFP optical transceiver, 10GE DWDM, ITU Channel 33, SMF using LC connector
XFP-10GE-DWDMITU35	RDH90141/35	N/A	IPU3AERDAA	XFP optical transceiver, 10GE DWDM, ITU Channel 35, SMF using LC connector
	RDH901011/35		IPUIBKU2AA	
XFP-10GE-DWDMITU36	RDH90141/36	N/A	IPU3AESDAA	XFP optical transceiver, 10GE DWDM, ITU Channel 36, SMF using LC connector
	RDH901011/36		IPUIBKV2AA	
XFP-10GE-DWDMITU37	RDH90141/37	N/A	IPU3AETDAA	XFP optical transceiver, 10GE DWDM, ITU Channel 37, SMF using LC connector
	RDH901011/37		IPUIBMT2AA	
XFP-10GE-DWDMITU53	RDH90141/53	N/A	IP9IAC3HAA	XFP optical transceiver, 10GE DWDM, ITU Channel 53, SMF using LC connector
	RDH901011/53		IPUIBMU2AA	

**Table 2 Transceiver Order Numbers**

Part Number	ABC Part Number	INE Part Number	CLEI Code	Transceiver Description
XFP-10GE-DWDMITU55	RDH90141/55	N/A	IP9IAC4HAA	XFP optical transceiver, 10GE DWDM, ITU Channel 55, SMF using LC connector
	RDH901011/55		IPUIBMV2AA	
N/A	RDH90190/35	N/A	IPUIBH82AA	OTN XFP optical transceiver, 10GE DWDM, ITU Channel 35, SMF using LC connector
N/A	RDH90190/36	N/A	IPUIBH92AA	OTN XFP optical transceiver, 10GE DWDM, ITU Channel 36, SMF using LC connector
N/A	RDH90190/37	N/A	IPUIBJA2AA	OTN XFP optical transceiver, 10GE DWDM, ITU Channel 37, SMF using LC connector
N/A	RDH90190/53	N/A	IPUIJB2AA	OTN XFP optical transceiver, 10GE DWDM, ITU Channel 53, SMF using LC connector
N/A	RDH90190/55	N/A	IPUIJC2AA	OTN XFP optical transceiver, 10GE DWDM, ITU Channel 55, SMF using LC connector
XFP-OC192-SR1	RDH90169/1	INE1012463	SOOTAHPNAA	XFP optical transceiver, 10GE OC-192 Short-Reach, 1310 nm, SMF using LC connector
XFP-OC192-IR2	RDH90167/1	INE1012461	SOOTAHNRNAA	XFP optical transceiver, 10GE OC-192 Intermediate-Reach, 1550 nm, SMF using LC connector
XFP-OC192-LR2 ⁽⁵⁾	RDH90168/2	INE1013629	SOOTAHSNAA	XFP optical transceiver, 10GE OC-192 Long-Reach, 1550 nm, SMF using LC connector

(1) 100TX supported with software release 6.2 and later; for ROA1283240/1 and ROA1283143/1.

(2) 1000TX can be manually configured through CLI to operate as a 100TX transceiver.

(3) Use part number RDH90174/1 (SFP-OC12-IR) when ordering the SFP transceivers with OC-12- IR-1 (single mode, up to 15 km) functionality.

(4) Use part number RDH90159/1 (SFP-OC3-SR-IR) when ordering the SFP transceivers with OC-3- IR-1 or OC-3 SR-1 (single mode, up to 2 km) functionality.

(5) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

1.3 SFP Transceiver Specifications

Table 3 Copper and Optical FE MIC Card Specifications — FX, LX10, and TX (for SmartEdge 100 only)

Specification	FX	LX10	TX
Number of ports	12	12	12
Protocol	100Base-FX	100Base-LX10	10 Mbps: 10Base-T 100 Mbps: 100Base-TX
Line code	4B/5B	4B/5B	10 Mbps: Manchester coding 100 Mbps: 4B/5B
Speed	100 Mbps	100 Mbps	10 or 100 Mbps



Table 3 Copper and Optical FE MIC Card Specifications — FX, LX10, and TX (for SmartEdge 100 only)

Specification	FX	LX10	TX
Negotiate flow control ⁽¹⁾	No	No	Yes (including flow-control settings) ⁽²⁾
Interface type	Optical	Optical	Electrical
Impedance	—	—	100 ohm differential
Connector type ⁽³⁾	LC	LC	RJ-45
Cable type	MMF	SMF	2-pair, category 5 shielded-twisted pair ⁽⁴⁾
Transceiver type	SFP	SFP	—
Protection	None	None	None
Compliance	These versions comply with IEEE 802.3, 802.3u		

(1) These MICs support lossless flow control up to 6.2 mi (10.0 km) for packets with up to 1,500 bytes.

(2) The extent of the support for flow control is dependent on the release of the SmartEdge OS.

(3) Transceivers are described in the Transceivers for SmartEdge 100 Optical Ports document.

(4) The shielded cable must be grounded at both ends.

**Table 4** Copper and Optical GE MIC Card Specifications — SX, LX, and TX

Specification	SX	LX	TX ⁽¹⁾
Number of ports ⁽²⁾	2	2	2
Protocol	1000Base-SX	1000Base-LX10	10 Mbps: 10Base-T 100 Mbps: 100Base-TX 1000 Mbps: 1000Base-TX
Line code	8B/10B	8B/10B	PAM-5
Speed	1.0 Gbps	1.0 Gbps	10 Mbps 100 Mbps 1000 Mbps
Negotiate flow control ⁽³⁾	Yes	Yes	Yes
Interface type	Optical	Optical	Electrical
Connector type ⁽⁴⁾	LC	LC	RJ-45
Cable type	MMF	SMF	4-pair, category 5 shielded-twisted pair ⁽⁵⁾
Transceiver type	SFP	SFP	—
Protection	None	None	None
Compliance	These versions comply with IEEE 802.3, 802.3u		

(1) The 12-port copper FE MIC uses RJ-45 connectors instead of copper-based SFP transceivers.

(2) Each optical port has separate connectors for transmit (Tx) and receive (Rx) circuits.

(3) The extent of the support for flow control is dependent on the release of the SmartEdge OS. These MICs support lossless flow control up to 6.2 mi (10.0 km) for packets with up to 9,600 bytes.

(4) Transceivers are described in *Transceivers for SmartEdge and SM Family Line Cards*.

(5) The shielded cable must be grounded at both ends.

Table 5 ATM OC-3c/STM-1c MIC Card Specifications — IR-1

Specification	IR-1
Speed	155.52 Mbps
Interface type	Telcordia IR-1, SDH/STM-1 S-1.1
Connector type ⁽¹⁾	SFP
Protection	None
Compliance	Telcordia GR-253, ANSI T1.102, ITU G.957

(1) Transceivers are described in the *Transceivers for SmartEdge 100 Optical Ports* document.

Table 6 ATM or POS OC-3c/STM-1c Card SFP Specifications — SR-0 and IR-1

Specification	SR-0	IR-1 ⁽¹⁾
Speed	155.52 Mbps	155.52 Mbps
Protection (facility) ⁽²⁾	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching
Interface	SR-0	SONET OC-3 IR-1 / SDH STM I-1



Table 6 ATM or POS OC-3c/STM-1c Card SFP Specifications — SR-0 and IR-1

Specification	SR-0	IR-1 ⁽¹⁾
Link power budget ⁽³⁾	6.0 dB	13.0 dB
Nominal wavelength	1310 nm	1310 nm
Connector type	LC	LC
Cable type	MMF	SMF
Transceiver type	SFP	SFP
Compliance	SFF-8472 and INF-8074i ANSI-T1.105.06 SR-0	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957
Transmitter		
Optical output power	−14.0 dBm (max) −20.0 dBm (min)	−8.0 dBm (max) −15.0 dBm (min)
Center wavelength range	1270 to 1360 nm	1270 to 1360 nm
Extinction ratio (min)	10.0 dB	8.2 dB
Spectral width (max)	7.7 nm (RMS)	4.0 nm (RMS)
Receiver		
Wavelength range	1260 to 1360 nm	1270 to 1580 nm
Sensitivity (min)	−29.0 dBm	−28.0 dBm
Overload level (max)	−14.0 dBm	−8.0 dBm

(1) Use part number RDH90159/1 (SFP-OC3-SR-IR) when ordering the SFP transceivers with OC-3- IR-1 or OC-3 SR-1 (single mode, up to 2 km) functionality.

(2) Protection features for various types of cards and ports depend on the release of the SmartEdge OS; the system supports a mix of protected and unprotected ports.

(3) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

Table 7 ATM or POS OC-12c/STM-4c Card SFP Specifications — SR-0, IR-1, and LR-1

Specification	SR-0	IR-1 ⁽¹⁾	LR-1
Speed	622.08 Mbps	622.08 Mbps	622.08 Mbps
Protection (facility) ⁽²⁾	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching
Interface	SR -0	SONET OC-12 IR-1 / SDH STM I-4	SONET OC-12 LR-1 / SDH STM L-4.1
Link power budget	6.0 dB ⁽³⁾	13.0 dB ⁽³⁾	24.0 dB ⁽⁴⁾
Nominal wavelength	1310 nm	1310 nm	1310 nm
Connector type	LC	LC	LC
Cable type	MMF	SMF	SMF
Transceiver type	SFP	SFP	SFP

**Table 7 ATM or POS OC-12c/STM-4c Card SFP Specifications — SR-0, IR-1, and LR-1**

Specification	SR-0	IR-1 ⁽¹⁾	LR-1
Compliance	SFF-8472 and INF-8074i ANSI-T1.105.06 SR-0	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957
Transmitter			
Optical output power	–14.0 dBm (max) –20.0 dBm (min)	–8.0 dBm (max) –15.0 dBm (min)	+2.0 dBm (max) –3.0 dBm (min)
Path penalty	–	–	1 dB (max)
Center wavelength range	1270 to 1380 nm	1270 to 1360 nm	1280 to 1335 nm
Extinction ratio (min)	10.0 dB	8.2 dB	10.0 dB
Side-mode suppression ratio (min)	–	N/A	30.0 dB
Spectral width (max)	200.0 nm (RMS)	2.5 nm (RMS)	1.0 nm ⁽⁵⁾
Receiver			
Wavelength range	1270 to 1580 nm	1270 to 1580 nm	1260 to 1580 nm
Sensitivity	–26.0 dBm	–28.0 dBm	–28.0 dBm (max)
Overload level	–14.0 dBm	–8.0 dBm	–8.0 dBm (min)

(1) Use part number RDH90174/1 (SFP-OC12-IR) when ordering the SFP transceivers with OC-12- IR-1 (single mode, up to 15 km) functionality.

(2) Protection features for various types of cards and ports depend on the release of the SmartEdge OS; the system supports a mix of protected and unprotected ports.

(3) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(4) The link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(5) Measured 20 dB down from center wavelength.

Table 8 POS OC-48c/STM-16c Card SFP Transceiver Specifications — SR-1, IR-1, and LR-2

Specification	SR-1	IR-1	LR-2
Speed	2488.32 Mbps	2488.32 Mbps	2488.32 Mbps
Protection (facility) ⁽¹⁾⁽²⁾	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching
Interface	SONET OC-48 SR-1 / SDH STM I-16	SONET OC-48 IR-1 / SDH STM S-16	SONET OC-48 LR-2 / SDH STM L-16.2
Link power budget	8.0 dB ⁽³⁾	13 dB ⁽³⁾	24.0 dB ⁽⁴⁾
Nominal wavelength	1310 nm	1310 nm	1550 nm
Connector type	LC	LC	LC
Cable type	SMF	SMF	SMF
Transceiver type	SFP	SFP	SFP
Compliance	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957



Table 8 POS OC-48c/STM-16c Card SFP Transceiver Specifications — SR-1, IR-1, and LR-2

Specification	SR-1	IR-1	LR-2
Transmitter			
Optical output power	−3.0 dBm (max) −10.0 dBm (min)	0.0 dBm (max) −5.0 dBm (min)	3.0 dBm (max) −2.0 dBm (min)
Path penalty	—	—	2.0 dB (max)
Center wavelength range	1270 to 1360 nm	1270 to 1360 nm	1500 to 1580 nm
Extinction ratio (min)	8.2 dB	8.2 dB	8.2 dB
Side-mode suppression ratio (min)	—	30.0 dB	30.0 dB
Spectral width (max)	4.0 nm (RMS) ⁽⁵⁾	1.0 nm ⁽⁶⁾	1.0 nm ⁽⁶⁾
Receiver			
Wavelength range	1270 to 1580 nm	1270 to 1580 nm	1500 to 1580 nm
Sensitivity	−18.0 dBm	−18.0 dBm	−28.0 dBm
Overload level	−3.0 dBm	0.0 dBm	−9.0 dBm
Optical reflectance	−14.0 dB (max)	−27.0 dB (max)	−27.0 dB (max)

(1) Protection features for various types of cards and ports depend on the release of the SmartEdge OS; the system supports a mix of protected and unprotected ports.

(2) POS APS is not supported on the 4-port POS OC-48c/STM-16c card.

(3) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(4) The link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(5) Root mean square (RMS) value.

(6) Measured 20 dB down from center wavelength.

Table 9 Channelized OC-3/STM-1 Card SFP Specifications — SR-0 and IR-1

Specification	SR-0	IR-1 ⁽¹⁾
Speed	155.52 Mbps	155.52 Mbps
Protection (facility) ⁽²⁾	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching
Interface	SR-0	SONET OC-3 IR-1 / SDH STM I-1
Link power budget ⁽³⁾	9.0 dB	13.0 dB
Nominal wavelength	1310 nm	1310 nm
Connector type	LC	LC
Cable type	MMF	SMF
Transceiver type	SFP	SFP
Compliance	SFF-8472 and INF-8074i ANSI-T1.105.06 SR-0	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957
Transmitter		
Optical output power	−14.0 dBm (max) −20.0 dBm (min)	−8.0 dBm (max) −15.0 dBm (min)

**Table 9 Channelized OC-3/STM-1 Card SFP Specifications — SR-0 and IR-1**

Specification	SR-0	IR-1 ⁽¹⁾
Center wavelength range	1270 to 1360 nm	1270 to 1360 nm
Extinction ratio (min)	10.0 dB	8.2 dB
Spectral width (max)	7.7 nm (RMS)	4.0 nm (RMS)
Receiver		
Wavelength range	1260 to 1360 nm	1270 to 1580 nm
Sensitivity (min)	−29.0 dBm	−28.0 dBm
Overload level (max)	−14.0 dBm	−8.0 dBm

(1) Use part number RDH90159/1 (SFP-OC3-SR-IR) when ordering the SFP transceivers with OC-3 SR-1 (single mode, up to 2 km) or OC-3 IR-1 functionality.

(2) Protection features for various types of cards and ports depend on the release of the SmartEdge OS; the system supports a mix of protected and unprotected ports.

(3) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

Table 10 Channelized OC-12/STM-4 Card SFP Specifications — SR-0, IR-1, and LR-1

Specification	SR-0	IR-1 ⁽¹⁾	LR-1
Speed	622.08 Mbps	622.08 Mbps	622.08 Mbps
Protection (facility) ⁽²⁾	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching 	<ul style="list-style-type: none"> None 1+1 APS: Bidirectional; revertive or nonrevertive switching
Interface	SR -0	SONET OC-12 IR-1 / SDH STM I-4	SONET OC-12 LR-1 / SDH STM L-4.1
Link power budget	6.0 dB ⁽³⁾	13.0 dB ⁽³⁾	24.0 dB ⁽⁴⁾
Nominal wavelength	1310 nm	1310 nm	1310 nm
Connector type	LC	LC	LC
Cable type	MMF	SMF	SMF
Transceiver type	SFP	SFP	SFP
Compliance	SFF-8472 and INF-8074i ANSI-T1.105.06 SR-0	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957	SFF-8472 and INF-8074i Telcordia GR-253 ITU G.957
Transmitter			
Optical output power	−14.0 dBm (max) −20.0 dBm (min)	−8.0 dBm (max) −15.0 dBm (min)	+2.0 dBm (max) −3.0 dBm (min)
Path penalty	–	–	1 dB (max)
Center wavelength range	1270 to 1380 nm	1270 to 1360 nm	1280 to 1335 nm
Extinction ratio (min)	10.0 dB	8.2 dB	10.0 dB
Side-mode suppression ratio (min)	–	–	30.0 dB
Spectral width (max)	200.0 nm (RMS)	2.5 nm (RMS)	1.0 nm ⁽⁵⁾
Receiver			



Table 10 Channelized OC-12/STM-4 Card SFP Specifications — SR-0, IR-1, and LR-1

Specification	SR-0	IR-1 ⁽¹⁾	LR-1
Wavelength range	1270 to 1580 nm	1270 to 1580 nm	1260 to 1580 nm
Sensitivity (min)	-26.0 dBm	-28.0 dBm	-28.0 dBm
Overload level (max)	-14.0 dBm	-8.0 dBm	-8.0 dBm

(1) Use part number RDH90174/1 (SFP-OC12-IR) when ordering the SFP transceivers with OC-12- IR-1 (single mode, up to 15 km) functionality.

(2) Protection features for various types of cards and ports depend on the release of the SmartEdge OS; the system supports a mix of protected and unprotected ports.

(3) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(4) The link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(5) Measured 20 dB down from center wavelength.

Table 11 Gigabit Ethernet Card SFP Transceiver Specifications — SX, LX, ZX, and TX

Specification	SX	LX	ZX	TX ⁽¹⁾⁽²⁾⁽³⁾
Speed	1 Gbps	1 Gbps	1 Gbps	100 Mbps 1 Gbps
Interface	1000Base-SX	1000Base-LX	1000Base-ZX	100Base-TX 1000Base-TX
Link power budget ⁽⁴⁾	7.5 dB	8.0 dB	21.0 dB	–
Nominal wavelength	850 nm	1310 nm	1550 nm	–
Connector type	LC	LC	LC	RJ-45
Cable type	MMF	SMF	SMF	Copper
Transceiver type	SFP	SFP	SFP	–
Compliance	IEEE 802.3 and 802.3z	IEEE 802.3 and 802.3z	–	IEEE 802.3, 802.3ab, and 802.3z
Transmitter				
Optical output power	-9.5 dBm (min) 0.0 dBm (max)	-11.0 dBm (min) -3.0 dBm (max)	-3.0 dBm (min) 5.0 dBm (max)	–
Center wavelength range	830 to 860 nm	1270 to 1355 nm	1540 to 1560 nm	–
Extinction ratio (min)	9.0 dB	9.0 dB	9.0 dB	–
Center wavelength	850 nm	1310 nm	1550 nm	–
Spectral width (max)	0.85 nm (RMS)	4.00 nm (RMS)	1.00 nm ⁽⁵⁾	–
Receiver				
Wavelength range ⁽⁶⁾	770 to 860 nm	1265 to 1600 nm	1260 to 1620 nm	–

**Table 11 Gigabit Ethernet Card SFP Transceiver Specifications — SX, LX, ZX, and TX**

Specification	SX	LX	ZX	TX ⁽¹⁾⁽²⁾⁽³⁾
Sensitivity (min)	–17.0 dBm	–19.0 dBm	–23.0 dBm	–
Overload level (max)	–3.0 dBm	–3.0 dBm	–3.0 dBm	–

(1) 100TX supported with software release 6.2 and later; for ROA1283240/1 and ROA1283143/1.

(2) 1000TX can be manually configured through CLI to operate as a 100TX transceiver.

(3) When this 1000Base-TX SFP transceiver is used in the 20-port GE DDR card, a maximum of 10 transceivers can be inserted into the card. These transceivers are inserted into the card such that only one port from each of the following slot pairs is populated: 1-11, 2-12, 3-13, 4-14, 5-15, 6-16, 7-17, 8-18, 9-19, and 10-20. If both ports in a slot pair are populated, the SFP cages of the line card can be damaged.

(4) Link power budget is calculated using (minimum output power) – (minimum sensitivity).

(5) Measured 20 dB down from the center wavelength peak.

(6) Receiver sensitivity is degraded 1.0 dB for wavelengths ≥ 1570 nm.

Table 12 Gigabit Ethernet Card SFP Transceiver Specifications — BX-D-20 and BX-U-20

Specification ⁽¹⁾	BX-D-20	BX-U-20
Speed	1 Gbps	1 Gbps
Interface	1000Base-BX-D-20	1000Base-BX-U-20
Link power budget ⁽²⁾	13.0 dB	13.0 dB
Nominal wavelength	1490 nm	1310 nm
Connector type	LC	LC
Cable type	SMF	SMF
Transceiver type	SFP	SFP
Compliance	IEEE 802.3 and 802.3ah	IEEE 802.3 and 802.3ah
Transmitter		
Optical output power	–7.0 dBm (min) 0.0 dBm (max)	–7.0 dBm (min) 0.0 dBm (max)
Extinction ratio (min)	6.0 dB	6.0 dB
Center wavelength	1490 nm	1310 nm
Spectral width (max)	1.00 nm ⁽³⁾	3.50 nm (RMS)
Receiver		
Center wavelength	1310 nm	1490 nm
Sensitivity (min)	–18.7 dBm	–18.7 dBm
Overload level (max)	0.0 dBm	0.0 dBm

(1) The Bidirectional SFP transceivers must be used in pairs, one BX-D-20 and one BX-U-20; otherwise, the links will not work.

(2) Link power budget is calculated using (minimum output power) – (minimum sensitivity).

(3) Measured 20 dB down from the center wavelength peak.

Table 13 Gigabit Ethernet SFP Transceiver Specifications — CWDM and DWDM

Specification	CWDM	DWDM ⁽¹⁾
Speed	1 Gbps	1 Gbps



Table 13 Gigabit Ethernet SFP Transceiver Specifications — CWDM and DWDM

Specification	CWDM	DWDM ⁽¹⁾
Interface	1000Base-CWDMnnnn ⁽²⁾	1000Base-DWDMITUnn ⁽³⁾
Link power budget ⁽⁴⁾	23.0 dB	26.0 dB
Nominal wavelength	1471 to 1611 nm	See Table 21 for ITU frequency and wavelength data
Connector type	LC	LC
Cable type	SMF	SMF
Transceiver type	SFP	SFP
Compliance	ITU G.694.2	ITU G.694.1
Transmitter		
Optical output power	0.0 dBm (min) 5.0 dBm (max)	0.0 dBm (min) 4.0 dBm (max)
Path penalty	1.0 dB	2.0 dB
Center wavelength range	1471 to 1611 nm	See Table 21 for ITU frequency and wavelength data
Extinction ratio (min)	9.0 dB	8.2 dB
Center wavelength	1471 to 1611 nm	See Table 21 for ITU frequency and wavelength data
Spectral width (max) ⁽⁵⁾	1.00 nm	0.30 nm
Receiver		
Wavelength range ⁽⁶⁾	1260 to 1620 nm	1260 to 1620 nm
Sensitivity (min)	−24.0 dBm	−28.0 dBm
Overload level (max)	−7.0 dBm	6.0 dBm

(1) The ranges of DWDM ITU channels are application specific.

(2) The nominal wavelengths of CWDM SFP transceivers are 1471, 1491, 1511, 1531, 1551, 1571, 1591, and 1611; specified in ITU G.694.2.

(3) The range of GE-DWDM ITU channels is 17 to 60; see Table 21 for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(4) The link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(5) Measured 20 dB down from the center wavelength peak.

(6) Receiver sensitivity is degraded 1.0 dB for wavelengths ≥ 1570 nm.

Table 14 Fast Ethernet Card SFP Transceiver Specifications — FX and LX10

Specification	FX	LX10
Speed	1 Gbps	1 Gbps
Interface	100Base-FX	100Base-LX10
Link power budget ⁽¹⁾	13.5 dB	12.2 dB
Nominal wavelength	1310 nm	1310 nm
Connector type	LC	LC
Cable type	MMF	SMF
Transceiver type	SFP	SFP

**Table 14 Fast Ethernet Card SFP Transceiver Specifications — FX and LX10**

Specification	FX	LX10
Compliance	SFF-8472 and INF-8074i	SFF-8472 and INF-8074i
Transmitter		
Optical output power	–19.0 dBm (min) –14.0 dBm (max)	–15.0 dBm (min) –8.0 dBm (max)
Center wavelength range	1270 to 1380 nm	1260 to 1360 nm
Extinction ratio (min)	10.0 dB	5.0 dB
Center wavelength	1310 nm	1310 nm
Spectral width (max)	140.0 nm (RMS)	7.7 nm (RMS)
Receiver		
Wavelength range	1270 to 1380 nm	1260 to 1360 nm
Sensitivity	–32.5 dBm (min) –14.0 dBm (max)	–28.0 dBm (min) –8.0 dBm (max)
Overload level (max)	0.0 dBm	0.0 dBm

(1) Link power budget is calculated using (minimum output power) – (minimum sensitivity).



1.4 XFP Transceiver Specifications

Table 15 10 Gigabit Ethernet (10GE) Card XFP Transceiver Specifications — SR, LR, ER, and ZR

Specification	SR	LR	ER	ZR ⁽¹⁾
Speed	10 Gbps	10 Gbps	10 Gbps	10 Gbps
Interface	10GE-SR	10GE-LR	10GE-ER	10GE-ZR
Link power budget ⁽²⁾	7.3 dB (OMA = -3.8 dBm) ⁽³⁾	9.4 dB (OMA = -5.2 dBm) ⁽³⁾	15.0 dB (OMA = -1.7 dBm) ⁽³⁾	24.0 dB
Nominal wavelength	850 nm	1310 nm	1550 nm	1550 nm
Connector type	LC	LC	LC	LC
Cable type	MMF	SMF	SMF	SMF
Transceiver type	XFP	XFP	XFP	XFP
Compliance	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	—
Transmitter				
Optical output power	-7.3 dBm (min) -1.0 dBm (max)	-8.2 dBm (min) 0.5 dBm (max)	-4.7 dBm (min) 4.0 dBm (max)	0.0 dBm (min) 4.0 dBm (max)
Transmitter dispersion penalty	3.9 dB	3.2 dB	3.0 dB	3.0 dB
Center wavelength range	840 to 860 nm	1260 to 1355 nm	1530 to 1565 nm	1530 to 1565 nm
Extinction ratio (min)	3.0 dB	3.5 dB	3.0 dB	9.0 dB
Center wavelength	850 nm	1310 nm	1550 nm	1550 nm
Spectral width	802.3ae-2002	—	—	—
Receiver				
Wavelength range	840 to 860 nm	1270 to 1565 nm	1270 to 1565 nm	1270 to 1565 nm
Sensitivity (min)	-11.1 dBm	-12.6 dBm	-14.1 dBm	-22.1 dBm
Overload level (max)	-1.0 dBm	0.5 dBm	-1.0 dBm	-7.0 dBm

(1) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(2) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(3) Informative value only. This estimate is a worst case with the OMA as specified and extinction ratio as specified for the transmitter.

**Table 16 10 Gigabit Ethernet (10GE) Card XFP Transceiver Specifications — LAN-PHY**

Specification	SR	LR	ER	ZR ⁽¹⁾
Speed	10.3125 Gbps	10.3125 Gbps	10.3125 Gbps	10.3125 Gbps
Interface	10GE-SR	10GE-LR	10GE-ER	10GE-ZR
Link power budget ⁽²⁾	7.3 dB (OMA = –3.8 dBm) ⁽³⁾	9.4 dB (OMA = –5.2 dBm) ⁽³⁾	15.0 dB (OMA = –1.7 dBm) ⁽³⁾	24.0 dB
Nominal wavelength	850 nm	1310 nm	1550 nm	1550 nm
Connector type	LC	LC	LC	LC
Cable type	MMF	SMF	SMF	SMF
Transceiver type	XFP	XFP	XFP	XFP
Compliance	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	–
Transmitter				
Optical output power	–7.3 dBm (min) –1.0 dBm (max)	–8.2 dBm (min) 0.5 dBm (max)	–4.7 dBm (min) 4.0 dBm (max)	0.0 dBm (min) 4.0 dBm (max)
Transmitter dispersion penalty	3.9 dB	3.2 dB	3.0 dB	3.0 dB
Center wavelength range	840 to 860 nm	1260 to 1355 nm	1530 to 1565 nm	1530 to 1565 nm
Extinction ratio (min)	3.0 dB	3.5 dB	3.0 dB	9.0 dB
Center wavelength	850 nm	1310 nm	1550 nm	1550 nm
Spectral width	802.3ae-2002	–	–	–
Receiver				
Wavelength range	840 to 860 nm	1270 to 1565 nm	1270 to 1565 nm	1270 to 1565 nm
Sensitivity (min)	–11.1 dBm	–12.6 dBm	–14.1 dBm	–22.1 dBm
Overload level (max)	–1.0 dBm	0.5 dBm	–1.0 dBm	–7.0 dBm

(1) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(2) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(3) Informative value only. This estimate is a worst case with the OMA as specified and extinction ratio as specified for the transmitter.



Table 17 10 Gigabit Ethernet (10GE) Card XFP Transceiver Specifications — WAN-PHY

Specification	SW	LW	EW	ZW ⁽¹⁾
Speed	9.953 Gbps	9.953 Gbps	9.953 Gbps	9.953 Gbps
Interface	10GE-SW	10GE-LW	10GE-EW	10GE-ZW
Link power budget ⁽²⁾	7.3 dB ₍₃₎ (OMA = -3.8 dBm)	9.4 dB ₍₃₎ (OMA = -5.2 dBm)	15.0 dB ₍₃₎ (OMA = -1.7 dBm)	24.0 dB
Nominal wavelength	850 nm	1310 nm	1550 nm	1550 nm
Connector type	LC	LC	LC	LC
Cable type	MMF	SMF	SMF	SMF
Transceiver type	XFP	XFP	XFP	XFP
Compliance	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	—
Transmitter				
Optical output power	-7.3 dBm (min) -1.0 dBm (max)	-8.2 dBm (min) 0.5 dBm (max)	-4.7 dBm (min) 4.0 dBm (max)	0.0 dBm (min) 4.0 dBm (max)
Transmitter dispersion penalty	3.9 dB	3.2 dB	3.0 dB	3.0 dB
Center wavelength range	840 to 860 nm	1260 to 1355 nm	1530 to 1565 nm	1530 to 1565 nm
Extinction ratio (min)	3.0 dB	3.5 dB	3.0 dB	9.0 dB
Center wavelength	850 nm	1310 nm	1550 nm	1550 nm
Spectral width	802.3ae-2002	—	—	—
Receiver				
Wavelength range	840 to 860 nm	1270 to 1565 nm	1270 to 1565 nm	1270 to 1565 nm
Sensitivity (min)	-11.1 dBm	-12.6 dBm	-14.1 dBm	-22.1 dBm
Overload level (max)	-1.0 dBm ⁽⁴⁾	0.5 dBm	-1.0 dBm ⁽⁵⁾	-7.0 dBm

(1) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(2) The link power budget is calculated using (minimum output power) – (minimum sensitivity).

(3) Informative value only. This estimate is a worst case with the OMA as specified and extinction ratio as specified for the transmitter.

(4) The SR receiver tolerates, without damage, continuous exposure to an optical input signal having an overload level equal to the stated value, plus at least 1.0 dB, unless otherwise noted.

(5) The ER receiver tolerates, without damage, continuous exposure to an optical input signal having an overload level equal to the stated value, plus at least 5.0 dB.

**Table 18 10 Gigabit Ethernet (10GE) Card XFP Transceiver Specifications — DWDM**

Specification	DWDM ⁽¹⁾
Speed	10.3125 Gbps
Interface	DWDMnn ⁽²⁾⁽³⁾
Link power budget ⁽⁴⁾	20.5 dB
Nominal wavelength	See ITU DWDM Transmit Frequencies and Wavelengths table for ITU frequency and wavelength data
Connector type	LC
Cable type	SMF
Transceiver type	XFP
Compliance	ITU G.959.1 P1L1-2D2, ITU-T G698.1, and ITU 694.1 GR-253 LR-2
Transmitter	
Optical output power	–1.0 dBm (min) +3.0 dBm (max)
Path penalty	2.5 dB
Center wavelength range	See the ITU DWDM Transmit Frequencies and Wavelengths table for ITU frequency and wavelength data
Extinction ratio (min)	8.2 dB
Spectral width (max)	0.3 nm ⁽⁵⁾
Receiver	
Wavelength range	1270 nm to 1600 nm
Sensitivity (min)	–24.0 dBm
Overload level (max)	–7.0 dBm

(1) The ranges of DWDM ITU channels are application specific.

(2) 10GE-DWDM XFPs support only ITU channels 35, 36, 37, 53, and 55; see Table 21 for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(3) In Release 11.1.2 and later, OTN-DWDM XFPs also support only ITU channels 20 and 33.

(4) Link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(5) Measured 20 dB down from the center wavelength peak.

Table 19 10 Gigabit Card XFP Transceiver Specifications — OTN-DWDM

Specification	OTN-DWDM ⁽¹⁾⁽²⁾⁽³⁾
Speed	11.0957 Gbps
Interface	OTN-DWDMnn ⁽⁴⁾⁽⁵⁾
Link power budget ⁽⁶⁾	25 dB
Nominal wavelength	See Table 21 for ITU frequency and wavelength data for ITU frequency and wavelength data
Connector type	LC
Cable type	SMF
Transceiver type	XFP


Table 19 10 Gigabit Card XFP Transceiver Specifications — OTN-DWDM

Specification	OTN-DWDM ⁽¹⁾⁽²⁾⁽³⁾
Compliance	ITU G.707, ITU G.709, ITU G.798, ITU G.8251, and ITU G.959.1 SFF INF-8077i, SFF 8477 IEEE 802.3ae-2004
Transmitter	
Optical output power	0.0 dBm (min) +3.0 dBm (max)
Center wavelength range	See the ITU DWDM Transmit Frequencies and Wavelengths table for ITU frequency and wavelength data
Extinction ratio (min)	9.0 dB
Spectral width (max)	1.0 nm ⁽⁷⁾
Receiver	
Wavelength range	1527 nm to 1567 nm
Sensitivity (min)	-28.0 dBm
Overload level (max)	+5.0 dBm

(1) The OTN-DWDM XFP transceivers can vary slightly, depending on the manufacturer.

(2) The OTN-DWDM XFP transceiver is an 80km device by default.

(3) The OTN-DWDM XFP transceiver has FEC (Forward Error Correction) enabled by default.

(4) In Release 6.1.4 and later, OTN-DWDM ITU XFP transceivers support only five C-Band ITU channels: 35, 36, 37, 53, and 55. See the ITU DWDM Transmit Frequencies and Wavelengths table for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(5) In Release 11.1.2 and later, OTN-DWDM XFPs also support only ITU channels 20 and 33.

(6) Link power budget is calculated using (minimum output power) – (minimum sensitivity).

(7) Measured 20 dB down from the center wavelength peak.

Table 20 OC-192c/STM-64c Card XFP Transceiver Specifications — SR-1, IR-2, and LR-2

Specification ⁽¹⁾	SR-1	IR-2	LR-2 ⁽²⁾
Speed	9.953 Gbps	9.953 Gbps	9.953 Gbps
Interface	SR-1/I-64.1	IR-2/S-64.2b	LR-2/P1L1-2D2
Link power budget ⁽³⁾	4.0 dB	10.5.0 dB	22.0 dB
Nominal wavelength	1310 nm	1550 nm	1550 nm
Connector type	LC	LC	LC
Cable type	SMF	SMF	SMF
Transceiver type	XFP	XFP	XFP
Compliance	Telcordia GR-253 SR-1 GR-1377-CORE ITU G.691 I-64.1	Telcordia GR-253 IR-2 GR-1377-CORE ITU G.691 S-64.2b	Telcordia GR-253 LR-2 GR-1377-CORE ITU G.691 P1L1-2D2
Transmitter			
Optical output power	-6.0 dBm (min) -1.0 dBm (max)	-1.5 dBm (min) 2.0 dBm (max)	0.0 dBm (min) 4.0 dBm (max)

**Table 20 OC-192c/STM-64c Card XFP Transceiver Specifications — SR-1, IR-2, and LR-2**

Specification ⁽¹⁾	SR-1	IR-2	LR-2 ⁽²⁾
Path penalty	1.0 dB	2.0 dB	2.0 dB
Center wavelength range	1270 to 1565 nm	1270 to 1565 nm	1270 to 1565 nm
Extinction ratio (min)	6.0 dB	8.2 dB	8.2 dB
Center wavelength	1310 nm	1310 nm	1550 nm
Spectral width (max) ⁽⁴⁾	1.0 nm	1.0 nm	1.0 nm
Side-mode suppression ratio (min)	30.0 dB	30.0 dB	30.0 dB
Receiver			
Wavelength range	1270 to 1565 nm	1270 to 1565 nm	1270 to 1565 nm
Sensitivity (min)	−11.0 dBm	−14.0 dBm	−24.0 dBm
Overload level (max)	0.5 dBm	−1.0 dBm	−7.0 dBm
Optical reflectance	−14.0 dB	−27.0 dB	−27.0 dB

(1) To display static transceiver data, enter the show hardware command (in any mode) with the **card** and **detail** keywords, or, for dynamic data, enter the show port command (in any mode) with the detail keyword. Measured or reported values may meet or exceed performance parameters that are specified in this table.

(2) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(3) Link power budget is calculated using (minimum output power) – (minimum sensitivity) – (path penalty).

(4) Measured 20 dB down from the central wavelength peak.

1.5 ITU DWDM Specifications

Table 21 ITU DWDM Frequencies and Wavelengths

ITU ⁽¹⁾⁽²⁾⁽³⁾	Frequency (THz)	Wavelength (nm)		ITU	Frequency (THz)	Wavelength (nm)
17	191.7	1563.86		40	194.0	1545.32
18	191.8	1563.05		41	194.1	1544.53
19	191.9	1562.23		42	194.2	1543.73
20	192.0	1561.42		43	194.3	1542.94
21	192.1	1560.61		44	194.4	1542.14
22	192.2	1559.79		45	194.5	1541.35
23	192.3	1558.98		46	194.6	1540.56
24	192.4	1558.17		47	194.7	1539.77
25	192.5	1557.36		48	194.8	1538.98
26	192.6	1556.56		49	194.9	1538.19
27	192.7	1555.75		50	195.0	1537.40
28	192.8	1554.94		51	195.1	1536.61
29	192.9	1554.13		52	195.2	1535.82
30	193.0	1553.33		53	195.3	1535.04
31	193.1	1552.52		54	195.4	1534.25
32	193.2	1551.72		55	195.5	1533.47



Table 21 ITU DWDM Frequencies and Wavelengths

ITU ⁽¹⁾⁽²⁾⁽³⁾	Frequency (THz)	Wavelength (nm)	ITU	Frequency (THz)	Wavelength (nm)
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12			

(1) The ranges of DWDM ITU channels are application specific.

(2) The range of GE-DWDM ITU channels is 17 to 60.

(3) The 10GE-DWDM and OTN-DWDM XFP transceivers support ITU channels 20, 33, 35, 36, 37, 53, and 55.

1.6 Cable Specifications

Table 22 Transceiver Cable Specifications

Transceiver Type	Cable Description ⁽¹⁾	Transceiver Connectors ⁽²⁾	Cable Connectors	Maximum Length ⁽³⁾	
				Miles	Kilometers
1000Base-LX	SMF fiber 9/125 μm	SC female	SC male	6.2	10.0
1000Base-LX10	SMF fiber 9/125 μm	SC female	SC male	43.5	70.0
SFP transceivers				Feet	Meters
1000Base-SX	MMF fiber 62.5/125 μm	LC female	LC male	1640.4	500.0
	MMF fiber 50/125 μm	LC female	LC male	656.2	200.0
				Miles	Kilometers
100Base-FX	MMF fiber 62.5/125 μm	LC female	LC male	1.2	2.0
100Base-LX10	SMF fiber 9/125 μm	LC female	LC male	6.2	10.0
1000Base-LX	SMF fiber 9/125 μm	LC female	LC male	6.2	10.0
1000Base-ZX	SMF fiber 9/125 μm	LC female	LC male	49.7,	80.0 ⁽⁴⁾
1000Base-CWDMnnn ⁽⁵⁾	SMF fiber 9/125 μm	LC female	LC male	49.7	80.0 ⁽⁴⁾
1000Base-DWDMnn ⁽⁶⁾	SMF fiber 9/125 μm	LC female	LC male	49.7	80.0 ⁽⁴⁾
1000Base-BX-D-20	SMF fiber 9/125 μm	LC female	LC male	1.2	2.0
1000Base-BX-U-20	SMF fiber 9/125 μm	LC female	LC male	1.2	2.0
SFP transceivers —ATM or SONET/SDH OC-n (OC-3c/STM-1c, OC-12c/STM-4c, or OC-48c/STM-16c) line cards				Miles	Kilometers
OCn-SR-MM	MMF fiber 62.5/125 μm	LC female	LC male	1.2	2.0
OCn-SR ⁽⁷⁾⁽⁸⁾	SMF fiber 9/125 μm	LC female	LC male	1.2	2.0
OCn-IR ⁽²⁾⁽³⁾	SMF fiber 9/125 μm	LC female	LC male	9.3	15.0
OCn-LR	SMF fiber 9/125 μm	LC female	LC male	24.9	40.0
XFP transceivers —10-Gbps SFP transceivers—10GE line cards				Feet	Meters

**Table 22 Transceiver Cable Specifications**

10GE-SR-MM 10GE-SR/SW	MMF fiber 50/125 µm	LC female	LC male	984.4	300.0
				Miles	Kilometers
10GE-LR/LW	SMF fiber 9/125 µm	LC female	LC male	6.2	10.0
10GE-ER/EW	SMF fiber 9/125 µm	LC female	LC male	24.9	40.0
10GE-ZR/ZW ⁽⁹⁾	SMF fiber 9/125 µm	LC female	LC male	49.7	80.0 ⁽⁴⁾
10GE-DWDMnn ⁽¹⁰⁾	SMF fiber 9/125 µm	LC female	LC male	49.7	80.0 ⁽⁴⁾
OTN-DWDMnn ⁽¹⁰⁾	SMF fiber 9/125 µm	LC female	LC male	49.7	80.0 ⁽⁴⁾
XFP transceivers —SONET OC-192c/STM-64c line cards				Miles	Kilometers
OCn-SR	SMF fiber 9/125 µm	LC female	LC male	6.2	10.0
OCn--IR	SMF fiber 9/125 µm	LC female	LC male	24.9	40.0
OCn-LR	SMF fiber 9/125 µm	LC female	LC male	49.7	80.0 ⁽⁴⁾
OCn-DWDMITUnn ⁽⁶⁾	SMF fiber 9/125 µm	LC female	LC male	49.7	80.0 ⁽⁴⁾

(1) To display static transceiver data, enter the show hardware command (in any mode) with the **card** and **detail** keywords, or, for dynamic data, enter the show port command (in any mode) with the detail keyword. Measured or reported values may meet or exceed performance parameters that are specified in this table.

(2) The SC connectors on the transceiver are type SC/PC; cable and card connectors must match.

(3) Actual distance may vary, depending on link quality, which is affected by the loss budget, number and quality of splices, and age of the fiber cables.

(4) When the port-level lossless flow control is enabled, the distance reach is limited to 47.5 mi (70.0 km).

(5) The nominal wavelengths of CWDM SFP transceivers are 1471, 1491, 1511, 1531, 1551, 1571, 1591, and 1611; specified in ITU G.694.2.

(6) The range of GE-DWDM ITU channels is 17 to 60; see ITU DWDM Transmit Frequencies and Wavelengths for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

(7) Use part number RDH90159/1 (SFP-OC3-SR-IR) when ordering the SFP transceivers with OC-3- IR-1 or OC-3 SR-1 (single mode, up to 2 km) functionality.

(8) Use part number RDH90174/1 (SFP-OC12-IR) when ordering the SFP transceivers with OC-12- IR-1 (single mode, up to 15 km) functionality.

(9) Use part number RDH90168/2 (XFP-OC192-LR2) when ordering the XFP transceivers with 10GE ZR functionality.

(10) The 10GE-DWDM and OTN-DWDM XFP transceivers support ITU channels 20, 33, 35,36,37,53,and 55; see ITU DWDM Transmit Frequencies and Wavelengths for the frequency and wavelength of each ITU channel; specified in ITU G.694.1.

1.7 Alarms

You can enable or disable the notification of alarms that are generated by supported SFPs and XFPs by using the **system alarm transceiver** command.

Generation of SFP or XFP alarms is disabled by default. Use the **system alarm transceiver suppress** command to explicitly disable generation of SFP or XFP alarms.



You can use the `no system alarm transceiver suppress` command to enable generation of SFP or XFP alarms.

Note: This command also enables or disables any dependencies on these alarms, such as SNMP traps and log messages.

1.8 Diagnostics and Monitoring

When transceiver alarms are enabled, the following warnings and alarms are reported if the corresponding thresholds of supported SFPs and XFPs are exceeded:

Timestamp	Type	Source	Severity	Description
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Receive Power High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Receive Power Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Temperature High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Temperature Low Alarm
Jun 1 23:57:21	ge-10-port	2/1	Major	Transceiver Voltage High Alarm
Jun 1 23:57:21	ge-10-port	2/1	Major	Transceiver Voltage Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Bias Current High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver Bias Current Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver TX Power High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver TX Power Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver AUX 1 High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver AUX 1 Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver AUX 2 High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver AUX 2 Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC5 High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC5 Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC3 High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC3 Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC2 High Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Major	Transceiver L-VCC2 Low Alarm
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Receive Power High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Receive Power Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Temperature High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Temperature 5 Low Warning
Jun 1 23:57:21	ge-10-port	2/1	Minor	Transceiver Voltage High Warning
Jun 1 23:57:21	ge-10-port	2/1	Minor	Transceiver Voltage Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Bias Current High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver Bias Current Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver TX Power High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver TX Power Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver AUX 1 High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver AUX 1 Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver AUX 2 High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver AUX 2 Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver L-VCC5 Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver L-VCC3 High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver L-VCC3 Low Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver L-VCC2 High Warning
Jun 1 23:57:21	10ge-1-port	1/1	Minor	Transceiver L-VCC2 Low Warning



The following examples of the `show port [slot/port] transceiver` command display all the measured and threshold values for SFPs and XFPs that support digital diagnostic monitoring.

Example 1 displays the `show port [slot/port] transceiver` of a DWDM SFP transceiver.

```
[local]Redback#show port 11/3 transceiver
```

Port	:	11/3				
SFP / Media Type	:	SX / MM				
Redback Approved	:	YES				
Diagnostic Monitoring	:	YES				
CLEI Code	:	VAUIAAWEAA				
Serial Number	:	F72247020031				
Wavelength	:	850.00 nm [nm]				

	Measured	High Alarm	High Warning	Low Alarm	Low Warning
Tx Pwr [dbm]	-3.55	-1.00	-2.00	-9.50	-9.00
Rx Pwr [dbm]	-40.00	0.00	-1.00	-13.01*	-12.00
Temperature [C]	33	95	90	-5	0
Laser Bias current [mA]	7.61	16.00	15.00	2.00	3.00
VCC [V]	3.30	3.63	3.58	2.97	3.02


```
Active Alarms      :      Link down
                   :      Transceiver Receive Power Low Alarm
```

The asterisk (*) indicates that the port is reporting an alarm for the indicated parameter.

Example 2 displays the `show port [slot/port] transceiver` of an OTN-DWDM ITU XFP transceiver.

```
[local]Redback#show port 4/1 transceiver
```

Port	:	4/1				
SFP / Media Type	:	DWDM / SM				
Redback Approved	:	YES				
Diagnostic Monitoring	:	YES				
CLEI Code	:	IPUIBJC2AA				
Serial Number	:	UDE03CT				
Wavelength	:	1307.50 [nm]				
Additional Features	:	OTN				
Power Level	:	Normal				

	Measured	High Alarm	High Warning	Low Alarm	Low Warning
Tx Pwr [dbm]	-2.05	1.50	1.00	-7.50	-6.00
Rx Pwr [dbm]	-40.00	2.50	2.00	-20.01	-18.01
Temperature [C]	30	83	80	-13	-10
Laser Bias current [mA]	37.01	80.00	75.00	15.00	20.00
AUX1 +3.3V Supply Voltage [V]	3.30	3.63	3.50	3.00	3.10
AUX2 N/A [V]	N/A	N/A	N/A	N/A	N/A


```
Active Alarms      :      Link down
                   :      Transceiver Receive Power Low Alarm
```



Reference List

- [1] *Configuring Cards*, 10/1543-CRA 119 1170/1
- [2] *Configuring ATM, Ethernet, and POS Ports*, 9/1543-CRA 119 1170/1
- [3] *Configuring Channels and Clear-Channel and Channelized Ports*, 11/1543-CRA 119 1170/1
- [4] *Configuring Circuits*, 12/1543-CRA 119 1170/1
- [5] *Command List*, 1/190 77-CRA 119 1170/1