

Installing the GBIC, SFP, SFP+, QSFP, XFP, CXP, CFP and CPAK Optical Modules in Cisco NCS 2000 Platforms

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Installing the GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK Optics Modules in Cisco NCS 2000 Platforms

This document provides compatibility information and installation procedures for Small Form-factor Pluggable (SFP), Enhanced Small-Form-factor Pluggable (SFP+), 10 Gbps Small Form-factor Pluggable (XFP) modules used with the Cisco NCS 2002 and CIsco NCS 2006 nodes. This document also contains removal instructions, cabling, and technical specifications. Use this document in conjunction with platform-specific Cisco user documentation when working with GBICs, SFP, SFP+, XFP, CXP, CFP, or CPAK modules or any other system components.

The GBICs, SFP, SFP+, XFP, CXP, CFP, or CPAK modules are referred to as pluggable port modules (PPMs) in Cisco Transport Controller (CTC).

Changes to This Document

The following table lists new and changed content made to this document since it was first published.

Table 1: Revision History

Date	Change Summary
June 2023	Release 11.13 updates. New pluggable added. • QSFP-100G-ERL-S
August 2021	Release 11.12 updates. New pluggables added. • QSFP-100G-FR-S • CPAK-100G-FR

Date	Change Summary
May 2021	Release 12.2 updates. New pluggables added. • QSFP-100G-SR4-S • QSFP-100G-LR4-S • QSFP-100G-FR-S • QSFP-100G-SM-SR • ONS-CFP2D-400G-C • ONS-QSFP28-LR4 • QDD-400G-LR8-S • QSFP-100G-CWDM4-S • QDD-400G-DR4-S • QDD-400-AOC1M • QDD-400-AOC2M • QDD-400-AOC3M • QDD-400-AOC5M • QDD-400-AOC7M • QDD-400-AOC10M • QDD-400-AOC15M • QDD-400-FR4-S
December 2020	Release 12.1 updates. New pluggable added. • QSFP-100G-FR-S
June 2020	Release 11.1.1.2 updates. New pluggables added. • SFP-10G-BXD-I • SFP-10G-BXU-I
October 2019	Release 11.1 updates, added specifications for: • QSFP-4X10G-MER
March 2019	Release 11.0 updates, added specifications for: • QSFP-40G-SR-BD • QSFP-40/100-SRBD

Date	Change Summary
December 2017	Release 10.8 updates • Added specifications for the ONS-QC-16GFC-LW= pluggable.
October 2017	Release 10.7 updates • Added specifications for the QSFP-100G-SM-SR= pluggable.
April 2017	Release 10.6.2 updates • Added specifications for the QSFP-MLR pluggable.
November 2016	Release 10.6.1 updates • Added details for the CFP2 pluggable. • Added specifications for the QSFP-28-LR4, QSFP-100G-SR4-S, QSFP-100G-LR4-S, QSFP-4x10G-LR-S pluggables.
June 2016	Release 10.6 updates • Added specifications for the CPAK-100G-SR4= pluggable.
March 2015	Release 10.3 updates • Added specifications for QSFP-40G-SR4= and QSFP-4x10G-LR= pluggables.
November 2013	This is the first release of this publication.

Introduction

The GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules are hot-swappable I/O devices that plug into a line card port to link the port with the fiber optic network. For all cards, the type of GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules that is plugged into the card is displayed in Cisco Transport Controller (CTC).

Compatibility by Card

PPM Compatibility by Card

Table 2: Feature History

Feature Name	Release Information	Feature Description
Pluggables Support	Cisco NCS 2000 Release 11.12	• QSFP-100G-SM-SR pluggable is supported on 400G-XP-LC card. • CPAK-100G-FR pluggable is supported on 200G-CK-LC and MR-MXP cards
QSFP-100G-ERL-S Pluggable Support	Cisco NCS 2000 Release 11.13	• This release introduces support for the QSFP-100G-ERL-S pluggable. It provides 100GE client-side interface support for up to 25 km over a standard pair of G.652 Single-Mode Fiber (SMF) with duplex LC connectors. Currently, the QSFP-100G-ERL-S pluggable is supported on the 400G-XP-LC card.

The following table lists Cisco NCS 2002 and Cisco NCS 2006 cards with their compatible PPMs.

Important notes for the following table:

- The LED based SFPs—ONS-SI-155-SR-MM, ONS-SE-200-MM, ONS-SI-100-FX, and 15454-SFP-200 do not support the optical power transmitted (OPT) and laser bias current (LBC) optical parameters.
- The ONS-XC-10G-S1 XFP with TAN 10-2012-02 supports 10G-1200-SM-LL-L, 10GE BASE-LR, 10GE BASE-LW, OC192 SR1, STM64 I-64.1, and OTU-2 at 10.7G. The ONS-XC-10G-S1 XFP with TAN 10-2012-03 supports 10G-1200-SM-LL-L, 10GE BASE-LR, 10GE BASE-LW, OC192 SR1, STM64 I-64.1, and OTU-2 at 10.7G, 11.05G, and 11.09G.
- The LO-TX-POWER alarm is raised and the traffic is dropped when TX and RX connectors of the ONS-XC-10G-C XFP connected to the trunk port of an OC192-XFP, ADM-10G, OTU2_XP, GE_XP, GE_XPE, 10GE_XP, 10GE_XPE, AR-XP, or AR-MXP card are swapped. Set the trunk port to OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state and then back into the IS (ANSI) or Unlocked (ETSI) state to clear the LO-TXPOWER alarm.
- Use cables having threaded coaxial connectors with ONS-SC-E3-T3-PW and ONS-SC-EOP3 SFPs to achieve a stable mechanical contact and avoid performance degradation.
- Y-cable is not supported with CPAK-100G-FR pluggable on 200G-CK-LC card.

Table 3: Compatibility by Card—Cisco NCS 2002 and Cisco NCS 2006 Platforms

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
TNC and TNCE cards	ONS-SC-OSC-ULH=	10-2469-01
	ONS-SC-OSC-18.0=	10-2737-01
	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01
	ONS-SE-155-1470= through ONS-SE-155-1610=	10-1996-01 through 10-2003-01
100G-LC-C (100G-ME-C) cards	ONS-CXP-100G-SR10=	10-2790-01
100G-CK-C (100ME-CKC) cards	CPAK-100G-LR4=	800-39910-09, 800-43011-02 (for CR)
	CPAK-100G-SR10=	10-2924-01
200G-CK-LC cards	CPAK-100G-SR4=	800-103176-01
	CPAK-100G-LR4=	800-39910-09, 800-43011-02 (for CR)
	CPAK-100G-SR10=	10-2924-01
	CPAK-100G-FR [12]	800-106219-01
100GS-CK-LC	CPAK-100G-LR4=	800-39910-09, 800-43011-02 (for CR)
	CPAK-100G-SR10=	10-2924-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
10x10G-LC card	ONS-SC+-10G-C=	10-2841-01. **Note** When an ONS-SC+-10G-C pluggable is used along with the 10x10G-LC card, the maximum operating temperature of the shelf must not exceed 50 degrees Celsius.
	ONS-SC+-10G-ER=	10-2619-01
	ONS-SC+-10G-LR=	10-2618-01
	ONS-SC+-10G-SR=	10-2620-01
	ONS-SC+-10G-ZR=	10-2730-01
	ONS-SC+-10G-30.3= through ONS-SC+-10G-61.4=	10-2690-01 through 10-2729-01
	ONS-SC+-10G-EP30.3= through ONS-SC+-10G-EP61.8=	10-2797-01 through 10-2836-01 10-2871-01 through 10-2911-01
	ONS-CXP-100G-SR10=	10-2790-01
	SFP-10G-BXU-I	10-2951-01
	SFP-10G-BXD-I	10-2952-01 **Note** The SFP-10G-BXU-I and SFP-10G-BXD-I pluggables are supported on the 10x10G-LC card from the software. Hardware compliance will be done in the future release.
CFP-LC	ONS-CC-100G-LR4=	10-2736-01
	ONS-CC-100GE-LR4=	10-2795-01
	ONS-CC-40G-LR4=	10-2744-01
	ONS-CC-40G-FR=	10-2839-01
	CFP-40G-SR4=	84-1520-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
MR-MXP	QSFP-40G-SR4=	10-2672-02
	QSFP-40G-LR4	10-2842-02
	QSFP-4x10G-LR=	800-43283-01
	ONS-SC+-10G-LR=	10-2618-01
	ONS-SC+-10G-SR=	10-2620-01
	ONS-SC+-10G-C=	10-2841-01
	QSFP-MLR	10-3205-01
	ONS-SC+-10G-EP30.3= through ONS-SC+-10G-EP61.8=	10-2797-01 through 10-2836-01 10-2871-01 through 10-2911-01
	CPAK-100G-SR4=	800-103176-01
	CPAK-100G-LR4=	800-39910-09, 800-43011-02 (for CR)
	CPAK-100G-SR10=	10-2924-01
	QSFP-40G-SR-BD	10-2945-02
	CPAK-100G-FR	800-106219-01
WSE	ONS-SC+-10G-C=	10-2841-01
	ONS-SC+-10G-EP30.3= through ONS-SC+-10G-EP61.8=	10-2797-01 through 10-2836-01 10-2871-01 through 10-2911-01
	ONS-SC+-10G-ER=	10-2619-01
	ONS-SC+-10G-LR=	10-2618-01
	ONS-SC+-10G-SR=	10-2620-01
	ONS-SC+-10G-ZR=	10-2730-01
	ONS-SC+-10G-30.3= through ONS-SC+-10G-61.4=	10-2690-01 through 10-2729-01
MXP_2.5G_10E card MXP_2.5G_10E_L card MXP_2.5G_10E_C card	15454-SFP-OC48-IR=	10-1975-01
	ONS-SE-2G-S1=	10-2017-01
	ONS-SE-2G-L2=	10-2013-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
	ONS-SI-2G-L1=	10-2102-02
	ONS-SI-2G-L2=	10-1990-02
	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01
MXP_MR_2.5G card MXPP_MR_2.5G card	15454-SFP-GE+-LX=	10-1832-03
	15454-SFP-GEFC-SX=	10-1833-03
	ONS-SE-G2F-SX=	10-2272-02
	ONS-SE-G2F-LX=	10-2273-02
	ONS-SE-200-MM=	10-2248-01
	ONS-SE-GE-ZX=	10-2354-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01
TXP_MR_10E card TXP_MR_10E_L card TXP_MR_10E_C card	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-L2= (Only when placed in slots 6, 7, 12, or 13)	10-2194-02

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
TXP_MR_2.5G card TXPP_MR_2.5G card	15454-SFP3-1-IR=	10-1828-01
	15454-SFP12-4-IR=	10-1976-01
	15454-SFP-OC48-IR=	10-1975-01
	15454-SFP-200=	10-1750-01
	15454-SFP-GEFC-SX=	10-1833-02
	15454-SFP-GE+-LX=	10-1832-03
	ONS-SI-155-I1=	10-1938-02
	ONS-SI-622-I1=	10-1956-02
	ONS-SE-G2F-SX=	10-2272-02
	ONS-SE-G2F-LX=	10-2273-02
	ONS-SE-200-MM=	10-2248-01
	ONS-SE-GE-ZX=	10-2354-01
	ONS-SE-2G-S1=	10-1971-02
	ONS-SE-Z1=	10-2017-01
	ONS-SE-2G-L2=	10-2013-01
	ONS-SI-155-SR-MM=	10-2279-01
	ONS-SI-2G-S1=	10-1992-02
	ONS-SI-2G-I1=	10-1993-02
	ONS-SI-2G-L2=	10-1990-02
	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
MXP_MR_10DME_C card MXP_MR_10DME_L card	15454-SFP-GE+-LX=	10-1832-03
	15454-SFP-GEFC-SX=	10-1833-02
	ONS-SE-4G-MM=	10-2259-01
	ONS-SE-4G-SM=	10-2252-01
	ONS-SE-G2F-LX=	10-2273-02
	ONS-SE-G2F-SX=	10-2272-02
	ONS-SE-ZE-EL=	10-2351-01
	ONS-SI-GE-ZX=	10-2296-01
40G-MXP-C card 40E-MXP-C card 40ME-MXP-C card	ONS-XC-8G-SM=	10-2484-01
	ONS-XC-8G-MM=	10-2623-01
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-L2=	10-2194-02
	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-1470= through ONS-XC-10G-1610=	10-2548-01 through 10-2557-01
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ADM-10G card	ONS-SC-155-EL= ONS-SE-Z1= ONS-SE-G2F-LX= ONS-SE-G2F-SX=	10-2363-01 10-1971-02 10-2273-02 10-2272-02
	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01
	ONS-SI-GE-ZX=	10-2296-01
	ONS-SI-155-L2=	10-1937-02
	ONS-SI-2G-S1=	10-1992-02
	ONS-SI-2G-I1=	10-1993-02
	ONS-SI-622-I1=	10-1956-02
	ONS-SI-2G-L2	10-1990-02
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-96C=	10-2789-01
	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-30.3= through ONS-XC-10G-61.4=	10-2347-02 through 10-2309-02
	ONS-XC-10G-1470= through ONS-XC-10G-1610=	10-2548-01 through 10-2557-01
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
GE_XP card	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2285-01 through 10-2292-01
	ONS-SC-EOP1= (GE_XPE only)	30-1446-01
	ONS-SC-EOP3= (GE_XPE only)	30-1449-01
	ONS-SC-E1-T1-PW= (GE_XPE only)	30-1447-01
	ONS-SC-E3-T3-PW= (GE_XPE only)	30-1450-01
	ONS-SI-100-LX10= (GE_XPE only)	10-2294-01
	ONS-SI-100-FX= (GE_XPE only)	10-2350-01
	ONS-SI-GE-ZX=	10-2296-01
	ONS-SE-G2F-LX=	10-2273-02
	ONS-SE-G2F-SX=	10-2272-02
	ONS-SE-GE-BXD=	10-2482-01
	ONS-SE-GE-BXU=	10-2481-01
	ONS-SE-ZE-EL=	10-2351-01
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-96C=	10-2789-01
	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-30.3= through ONS-XC-10G-61.4=	10-2347-02 through 10-2309-02
	ONS-XC-10G-1470= through ONS-XC-10G-1610=	10-2548-01 through 10-2557-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01
10GE_XP card 10GE_XPE card	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-96C=	10-2789-01
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-L2=	10-2194-02
	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-30.3= through ONS-XC-10G-61.4=	10-2347-02 through 10-2309-02
	ONS-XC-10G-1470= through ONS-XC-10G-1610=	10-2548-01 through 10-2557-01
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01
OTU2-XP card	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-96C=	10-2789-01
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-L2=	10-2194-02
	ONS-XC-10G-SR-MM=	10-2420-01
	ONS-XC-10G-30.3= through ONS-XC-10G-61.4=	10-2347-02 through 10-2309-02
	ONS-XC-10G-1470= through ONS-XC-10G-1610=	10-2548-01 through 10-2557-01
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
AR-MXP card AR-XP card	ONS-SC-155-EL=	10-2363-01
	ONS-SI-155-SR-MM=	10-2279-01
	ONS-SI-155-I1=	10-1938-02
	ONS-SI-155-L2=	10-1937-02
	ONS-SI-622-I1=	10-1956-02
	ONS-SI-2G-S1=	10-1992-02
	ONS-SI-2G-L1=	10-2102-02
	ONS-SI-2G-L2=	10-1990-02
	ONS-SE-Z1=	10-1971-02
	ONS-SE-ZE-EL=	10-2351-01
	ONS-SI-GE-ZX=	10-2296-01
	ONS-SE-GE-BXU=	10-2481-01
	ONS-SE-GE-BXD=	10-2482-01
	ONS-SI-100-LX10=	10-2294-01
	ONS-SI-100-FX=5	10-2350-01
	ONS-SE-200-MM=	10-2248-01
	ONS-SE-4G-MM=	10-2259-01
	ONS-SE-4G-SM=	10-2252-01
	ONS-SE-155-1470= through ONS-SE-155-1610=	10-1996-01 through 10-2003-01
	ONS-SC-2G-28.7= ONS-SC-2G-30.3=through ONS-SC-2G-60.6= ONS-SC-2G-37.4= ONS-SC-2G-45.3= ONS-SC-2G-53.3=	10-2307-02 10-2155-02 through 10-2184-02 10-2668-01 10-2670-01 10-2669-01
	ONS-SC-HD3GV-TX=	10-2630-01
	ONS-SC-HD3GV-RX=	10-2629-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
	ONS-XC-10G-S1=	10-2012-02, 10-2012-03
	ONS-XC-10G-I2=	10-2193-02
	ONS-XC-10G-L2=	10-2194-02
	ONS-XC-8G-SM=	10-2484-01
	ONS-XC-8G-MM=	10-2623-01
	ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=	10-2577-01 through 10-2612-01
	ONS-XC-10G-C=	10-2480-01
	ONS-XC-10G-96C=	10-2789-01
400G-XP-LC card	ONS-QSFP28-LR4=	10-3204-01
	QSFP-100G-SM-SR=	10-3220-02
	QSFP-40G-SR4=	10-2672-03
	QSFP-100G-SR4-S=	10-3142-01
	QSFP-100G-LR4-S=	10-3146-01
	ONS-QSFP-4x10-MLR=	10-3205-01
	QSFP-4x10G-LR-S=	10-3118-01
	ONS-CFP2-WDM	10-3128-0x
	ONS-QC-16GFC-LW	10-3323-01
	ONS-QC-16GFC-SW=	10-3313-01
	QSFP-40G-SR-BD [3]	10-2945-02
	QSFP-40/100-SRBD [4]	10-3317-01
	QSFP-40G-LR4	10-2842-02
	ONS-QSFP-4X10-MER	10-3466-01
	QSFP-100G-FR-S	10-3248-01
	QSFP-100G-ERL-S	10-3536-01

Card Name	Compatible SFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
1.2T-MXP	QSFP-100G-SR4-S	10-3142-01
	QSFP-100G-LR4-S	10-3146-01
	QSFP-100G-FR-S	10-3248-01
	QSFP-100G-SM-SR	10-3220-01
	ONS-CFP2D-400G-C	10-3500-01
	ONS-QSFP28-LR4	10-3204-01
	QDD-400G-LR8-S	10-3320-01
	QSFP-100G-CWDM4-S	10-3145-01
	QDD-400G-DR4-S	10-3441-01
	QDD-400-AOC1M	
	QDD-400-AOC2M	10-3430-01
	QDD-400-AOC3M	10-3431-01
	QDD-400-AOC5M	
	QDD-400-AOC7M	
	QDD-400-AOC10M	
	QDD-400-AOC15M	
	QDD-400-FR4-S	10-3321-01

[1] In the 200G-CK-LC card, the trunk facility loopback and drop settings are not supported when the client pluggable is CPAK-100G-FR.

[2] In the 200G-CK-LC card with the client pluggable as CPAK-100G-FR, we recommend you to move the client port from in service to out of service and again to in service after every trunk FEC configuration change.

[3] Power monitoring is not supported on version 1 and version 2.

[4] Sub-network Connection (SNC) switch time for manual or automatic switching can reach up to several hundred milliseconds.

GBIC Description and Specifications

GBICs are integrated fiber-optic transceivers that provide high speed serial links from a port or slot to the network. Various latching mechanisms can be utilized on the GBICs. There is no correlation between the type of latch and the model type (such as SX or LX/LH) or technology type (such as Gigabit Ethernet). See the label on the GBIC for technology type and model. One GBIC model has two clips (one on each side of the GBIC) that secure the GBIC in the slot on the Ethernet card; the other has a locking handle. Both types are shown in Figure 1: GBICs with Clips (Left) and with a Handle (Right), on page 19.

GBIC dimensions are:

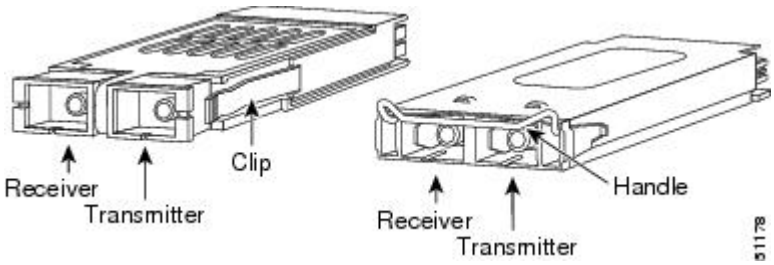
- Height 0.39 inches (1 cm)
- Width 1.18 inches (3 cm)
- Depth 2.56 inches (6.5 cm)

GBIC temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (-5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit it to 185 degrees Fahrenheit (-5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between -40 degrees Fahrenheit to 185 degrees Fahrenheit (-40 degrees Celsius to 85 degrees Celsius)

Caution Do not add labels or markings to the GBICs.

Figure 1: GBICs with Clips (Left) and with a Handle (Right)



GBIC Specifications

The following table lists specifications for available GBICs (non-DWDM/CWDM).

Note Operating temperature range for a card with CWDM/DWDM GBICs—15454-GBIC-xx.x and 15454-GBIC-xxxx—installed is limited to -5 to +40 degrees Celsius. Operation with CWDM/DWDM GBICs requires R4.1 or later version of G1K-4 hardware, with CLEI Code WM5IRWPCAA.

Table 4: GBIC Specifications

GBIC	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-GC-GE-SX= Short Reach	Gigabit Ethernet Fibre Channel, 1 Gbps	-9.5 to -4	-17 to 0

GBIC	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-GC-GE-LX=Long Reach	Gigabit Ethernet Fibre Channel, 1 Gbps	-9.5 to -3	-19 to -3
15454-GC-GE-ZX= Extended Reach	Gigabit Ethernet	0 to 5	-23 to -3
15454-GBIC-xx.x= 15454E-GBIC-xx.x= DWDM	Gigabit Ethernet	0 to +3	-28 to -7
15454-GBIC-xxxx= 15454E-GBIC-xxxx= CWDM	Gigabit Ethernet	1 to 5	-29 to -7
15454-GBIC-LX= / 15454E-GBIC-LX=	1000Base-LX, SC, SM, or MM	-9.5 to -3	-19 to -3
15454-GBIC-SX= / 15454E-GBIC-SX=	1000Base-SX, SC, or MM	-9.5 to 0	-17 to -0
15454-GBIC-LX/LH= 15454E-GBIC-LX/LH=	1000Base-LX, SC, SM, or MM	-9.5 to -3	-19 to -3
15454-GBIC-ZX= 15454E-GBIC-ZX=	1000Base-ZX, SM	-5 to 0	-23 to -3
ONS-GX-2FC-MMI= Short Reach	Fibre Channel, 1 or 2 Gbps	-9.5 to -5	-17 to 0
ONS-GX-2FC-SML= Long Reach	Fibre Channel, 1 or 2 Gbps	-9 to -3	-18 to -3

Single-Mode Fiber GBIC Port Cabling Specifications

The following table provides cabling specifications for single-mode fiber (SMF) GBICs that you install into Ethernet cards. All GBIC ports have SC-type connectors and the minimum cable distance for all GBICs listed is 6.5 feet (2 m).

Important notes for the following table:

- The 15454-GC-GE-ZX GBIC operates on SMF optic link spans of up to 49.7 miles (80 km) in length. Link spans of up to 62.1 miles (100 km) are possible using premium SMF or dispersion shifted SMF. When shorter distances of SMF are used, it might be necessary to insert an in-line optical attenuator in the link, to avoid overloading the receiver. For fiber-optic cable spans less than 15.5 miles (25 km), insert a 10 dB in-line optical attenuator between the fiber-optic cable plant and the receiving port on the 15454-GC-GE-ZX GBIC at each end of the link. For fiber-optic cable spans equal to or greater than 15.5 miles (25 km) and less than 31 miles (50 km), insert a 5 dB in-line optical attenuator between the fiber-optic cable plant and the receiving port on the 15454-GC-GE-ZX GBIC at the end of the link.
- Typical loss on a 1310 nm wavelength SMF is 0.5 dB/km.
- Typical loss on a 1550 nm wavelength SMF is 0.3 dB/km.
- The 15454-GC-GE-ZX GBIC requires dispersion-shifted SMF for 100 km (62.1 miles) cable distance.

Table 5: Single-Mode Fiber GBIC Port Cabling Specifications

GBIC	Wavelength	Fiber Type	Cable Distance
15454-GC-GE-LX= Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles)
		50 micron SMF	550 m (1804 ft)
		62.5 micron SMF	275 m (902.2 ft)
15454-GC-GE-ZX= Extended Reach	1550 nm	9 micron SMF	70 to 100 km (43.4 to 62 miles)
ONS-GX-2FC-SML= Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles)

Multimode Fiber GBIC Port Cabling Specifications

Table 9 provides cabling specifications for multimode fiber (MMF) GBICs that you install into Ethernet cards. All GBIC ports have SC-type connectors and the minimum cable distance for all GBICs listed is 6.5 feet (2 m).

Important notes for Table 9:

- The numbers given for MMF refer to the core diameter. For SMF, 8.3 micron refers to the core diameter. The 9-micron and 10-micron values refer to the mode-field diameter (MFD), which is the diameter of the light-carrying portion of the fiber. This area consists of the fiber core and a small portion of the surrounding cladding. The MFD is a function of the core diameter, the wavelength of the laser, and the refractive index difference between the core and the cladding.
- When using an LX/LH GBIC with 62.5-micron diameter MMF, you must install a mode-conditioning patchcord (CAB-GELX-625 or equivalent) between the GBIC and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patchcord is required for link distances less than 328 feet (100 m) or greater than 984 feet (300 m). The mode-conditioning patchcord prevents overdriving the receiver for short lengths of MMF and reduces differential mode delay for long lengths of MMF.

Table 6: Multimode Fiber GBIC Port Cabling Specifications

GBIC	Wavelength	Fiber Type	Cable Distance
15454-GC-GE-SX= Short Reach	850 nm	62.5 micron MMF	220 m (722 ft) 275 m (902 ft)
		50 micron MMF	500 m (1640 ft) 550 m (1804 ft)
15454-GC-GE-LX= Long Reach	1310 nm	62.5 micron MMF	550 m (1804 ft)
		50 micron MMF	550 m (1804 ft)
ONS-GX-2FC-MMI= Short Reach	850 nm	62.5 micron MMF	550 m (1804 ft)
		50 micron MMF	300 m (984.3 ft)

SFP and SFP+ Description and Specifications

The SFP modules are integrated fiber optic transceivers that provide high speed serial links from a port or slot to the network. The SFP+ transceiver is an enhancement over the SFP optics developed for 1 Gbps Ethernet and 1 Gbps, 2 Gbps, and 4 Gbps Fibre Channel. The SFP+ modules extend the data rate up to 11.10 Gbps. SFP+ modules also provide 2-wire serial, I2C interface. The I2C interface is used for serial ID, digital diagnostics, and module control functions.

Various latching mechanisms can be utilized on the SFP and SFP+ modules. There is no correlation between the type of latch and the model type (such as SX or LX/LH) or technology type (such as Gigabit Ethernet). See the label on the SFP and SFP+ modules for technology type and model. One type of latch available is a mylar tab as shown in Figure 4, a second type of latch is an actuator/button (Figure 5), and the third type of latch is a bail clasp (Figure 6 and Figure 7).

SFP and SFP+ module dimensions are:

- Height 0.33 inches (8.5 mm)
- Width 0.53 inches (13.4 mm)
- Depth 2.22 inches (56.5 mm)

SFP and SFP+ module temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit it to 185 degrees Fahrenheit (–5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between –40 degrees Fahrenheit to 185 degrees Fahrenheit (–40 degrees Celsius to 85 degrees Celsius)

Caution Do not add labels or markings to the SFP and SFP+ modules.

Figure 2: Mylar Tab SFP

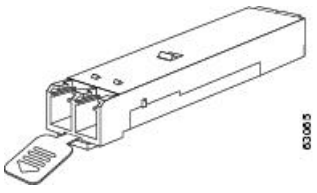


Figure 3: Actuator/Button SFP

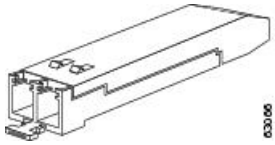


Figure 4: Bail Clasp SFP

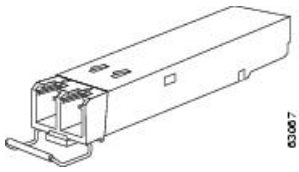
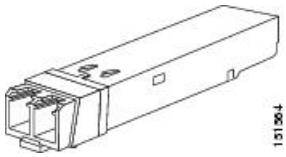


Figure 5: Wide Bail Clasp SFP



Note From Release 11.0, ONS-SI-100-LX-10= and ONS-SE-100-LX-10= pluggables are supported on NCS 2015-ECU for MSM.

SFP Specifications

The following table lists specifications for available SFPs.

- The ONS-SC-2G-28.7= through ONS-SC-2G-60.6= SFPs on the TNC and TNCE cards support only GE payload.
- The LED based SFPs (ONS-SI-100-FX) do not support the optical power transmitted (OPT) and laser bias current (LBC) optical parameters.
- For ONS-SE-4G-SM SFP, specified Optical Modulation Amplitude (OMA) at 4.25 Gbps is equal to an average power of -7.3 dBm at an ER of 9 dB (transmitter output power) and specified OMA at 4.25 Gbps is equal to an average power of -17.3 dBm at an ER of 9 dB (receiver power input).
- For ONS-SE-2G-30.3 through ONS-SE-2G-60.6 SFPs, the power limited performance at bit error rate (BER) = 10e-12 with SONET framed PRBS23, optical signal-to-noise ratio (OSNR) of 21 dB, 0.1 nm bandwidth (BW) and power limited performance at BER = 10e-12 with SONET framed PRBS23, OSNR of 16 dB, 0.1 nm BW.

Table 7: SFP Specifications

SFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SC-2G-28.7= through ONS-SC-2G-60.6=	OC-48, STM-16, GE	0 to +4	–28 to –9
ONS-SC-4G-30.3= through ONS-SC-4G-61.4=	4G FC	0 to +4	–28 to –9
ONS-SE-100-FX=	100 Mbps long reach - 1310 nm - SM - LC, EXT-TEMP	–20 to –14	–31 to –14
ONS-SE-100-LX10=	100 Mbps long reach - 1310 nm - MM - LC, EXT-TEMP	–15 to –8	–28 to –8

SFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SE-155-1470= through ONS-SE-155-1610=	OC-3, STM-1	0 to +5	–34 to –7
ONS-SE-4G-MM=	4G FC/Ficon	–9 to –2.5	–15 –18 to –3
ONS-SE-4G-SM=	4G FC/Ficon	290 microwatts OMA	29 microwatts OMA
ONS-SE-622-1470= through ONS-SE-622-1610=	OC-12, STM-4	0 to +5	–28 to –7
ONS-SE-2G-30.3= through ONS-SE-2G-60.6=	OC-48, STM-16	0 to +4	–28 to –9
ONS-SE-2G-L2=	OC-48, STM-16	–2.0 to 3.0	–22 to –9
ONS-SE-2G-S1=	OC-48, STM-16	–10 to –3	–28 to –9
ONS-SE-Z1=	OC-3, OC-12, OC48, STM-1, STM-4, STM-16	–5.0 to 0	–23 to –3 (155.52/ 622.08 Mbps) –19 to –3 (1250 Mbps) –18 to 0 (2488.32 Mbps)
ONS-SI-155-I1=	OC-3, STM-1	–15 to –8.0	–28 to –8
ONS-SI-155-L1=	OC-3, STM-1	–5.0 to 0	–34 to –10
ONS-SI-155-L2=	OC-3, STM-1	–5.0 to 0	–34 to –10
ONS-SI-2G-I1=	OC-48, STM-16	–5.0 to 0	–18 to –0
ONS-SI-2G-L1=	OC-48, STM-16	–2 to +3	–27 to –9
ONS-SI-2G-L2=	OC-48, STM-16	–2 to +3	–28 to –9
ONS-SI-2G-S1=	OC-48, STM-16	–10 to –3	–18 to –3
ONS-SI-622-I1=	OC-12, OC-3, STM-4, STM-1	–15 to –8.0	–28 to –8
ONS-SI-622-L1=	OC-12, STM-4	–3.0 to 2.0	–28 to –8
ONS-SI-622-L2=	OC-12, STM-4	–3.0 to 2.0	–28 to –8
15454-SFP-LC-SX=/ ONS-SC-GE-SX=	Gigabit Ethernet (GE)	–9.5 to –4	–17 to 0
15454-SFP-LC-LX=/ ONS-SC-GE-LX=	GE	–9.5 to –3	–19 to –3

SFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-SFP3-1-IR=	OC-3	–15 to –8	–28 to –8
15454E-SFP-L.1.1=	STM-1	–15 to –8	–34 to –10
15454-SFP12-4-IR=	OC-12, D1 Video	–15 to –8	–28 to –7
15454E-SFP-L.4.1=	STM-4, D1 Video	–15 to –8	–28 to –8
15454-SFP-OC48-IR=	OC-48, DV6000 (C-Cor)	–5 to +0	–18 to +0
15454E-SFP-L.16.1=	STM-16, DV6000 (C-Cor)	–5 to +0	–18 to +0
15454-SFP-200=/ 15454E-SFP-200=	Enterprise System Connection (ESCON)	–20.5 to -15	–29 to –14
15454-SFP-GEFC-SX=/ 15454E-SFP-GEFC-S=/ ONS-SE-G2F-SX=	Fibre Channel (1 and 2 Gbps), FICON, GE	–10 to –3.5	–17 to 0 for 1FC, GE –15 for 2FC
15454-SFP-GE+-LX=/ 15454E-SFP-GE+-LX=/ ONS-SE-G2F-LX	Fibre Channel (1 and 2 Gbps), FICON, GE, High-definition television (HDTV)	–9.5 to –3.0	–20 to –3 for 1FC, 2FC, and GE
ONS-SI-155-SR-MM=	OC-3, STM-1	–19 to –14	–14 to –5
ONS-SI-622-SR-MM=	OC-12, STM-4	–19 to –14	–14 to –5
ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	OC48/STM16/GE	0 to +5	–9 (min)
ONS-SE-2G-1470= through ONS-SE-2G-1610=	OC48/STM16/GE	–1 to +4	–28 to –9
ONS-SE-Z1=	OC-3/STM-1 OC-12/STM-4 OC-48/STM-16 Fibre Channel (1 and 2 Gbps) GE	–5 to 0	–23 to –3 (OC-3) –23 to –3 (OC-12) –18 to 0 (OC-48) 0 to –21 (Fibre Channel) 0 to –22 (GE)
ONS-SI-2G-S1	OC-48/STM-16	–10 to –3	–3 (min)
ONS-SE-155-1470 through ONS-SE-155-1610	OC-3/STM-1	0 to 5	–7 to 0
ONS-SI-GE-ZX	GE	0 to +5	–23 to –3

SFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SE-GE-ZX	GE	0 to +5	–23 to –3
ONS-SE-ZE-EL	1000 Base-T Ethernet	—	—
ONS-SE-GE-BXD=	1000Base BXD/GE	–9 to –3	–19.5 to –3
ONS-SE-GE-BXU=	1000Base BXU/GE	–9 to –3	–19.5 to –3
ONS-SC-EOP1=	Fast Ethernet over DS1/E1	—	—
ONS-SC-EOP3=	Fast Ethernet over DS3/E3	—	—
ONS-SC-E1-T1-PW=	E1/DS1 over Fast Ethernet	—	—
ONS-SC-E3-T3-PW-	E3/DS3 PDH over Fast Ethernet	—	—
ONS-SI-100-FX=	Fast Ethernet	–19.0 to –14	–31.0 to –14
ONS-SI-100-LX10=	Fast Ethernet	–15.0 to –8	–28 to –8
ONS-SC-OSC-ULH=	OC3/STM1/FE OSC	+1 to +5	43 to –7
ONS-SC-OSC-18.0=	OC3/STM1/FE OSC for RAMAN 1518.0 nm signal	+2.5 to +7	43 to –7
ONS-SE-155-1510=	OC3/FE TNC OSC	+1 to +5	43 to –7
ONS-SC-Z3-1510	GE TNC OSC	0 to +5	–29 to –9
ONS-SC-HD3GV-TX=	3G HD Video TX	–3 to 0	–20
ONS-SC-HD3GV-RX=	3G HD Video RX	–3 to 0	–20

SFP+ Specifications

The following table lists specifications for available SFP+ modules.

Table 8: SFP+ Specifications

SFP+	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SC+-10G-ER=	10GBASE-ER	–4.7 to +4.0	–15.8 to –1.0
ONS-SC+-10G-LR=	10GBASE-LR	–8.2 to +0.5	–14.1 to +0.5
ONS-SC+-10G-SR=	10GBASE-SR	–7.3 to –1.2	–9.9 to –1.0
ONS-SC+-10G-ZR=	10GBASE-ZR	–7.3 to –1.3	–11 to –1

SFP+	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SC+-10G-C=	OC-192, STM-64, 8GFC, 10GE, 10GFC, OTU2	–1.0 to +3.0	• –7 to –23 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm resolution bandwidth [RBW]) • –7 to –20 at BER=1E-12 with PRBS31 and 10 GE frame; chromatic dispersion (CD) of –500 to +1600 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-12 with PRBS31 and 10 GE frame; CD of –500 to +1600 ps/nm with 20 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 11 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1600 ps/nm with 12 dB OSNR (0.5 nm RBW) • –7 to –27 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –24 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1600 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 8 dB OSNR (0.5 nm RBW) • –7 to –18 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1600 ps/nm with 9 dB OSNR (0.5 nm RBW) • The maximum allowable Polarization Mode Dispersion (PMD) penalty at 30 ps differential group delay (DGD) is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 0 ps/nm (BTB condition). • The maximum allowable PMD penalty at 15 ps DGD is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 1600 ps/nm (System condition).

SFP+	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SC+-10G-30.3= through ONS-SC+-10G-61.4=	OC-192, STM-64, 8GFC, 10GE, 10GFC, OTU2, OTU2e	–1.0 to +3.0	• –7 to –23 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –20 at BER=1E-12 with PRBS31 and 10 GE frame; CD of –500 to +900 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-12 with PRBS31 and 10 GE frame; CD of –500 to +900 ps/nm with 20 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 11 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1100 ps/nm with 12 dB OSNR (0.5 nm RBW) • –7 to –27 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –24 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1300 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 8 dB OSNR (0.5 nm RBW) • –7 to –17 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –500 to +1100 ps/nm with 9 dB OSNR (0.5 nm RBW) • The maximum allowable PMD penalty at 30 ps DGD is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 0 ps/nm (BTB condition). • The maximum allowable PMD penalty at 15 ps DGD is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 1100 ps/nm (System condition).

SFP+	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SC+-10G-EP30.3= through ONS-SC+-10G-EP61.8=	OC-192, STM-64, 8GFC, 10GE, 10GFC, OTU2, OTU2e	–2.0 to +2.0	• –7 to –23 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –20 at BER=1E-12 with PRBS31 and 10 GE frame; CD of –400 to +800 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –16 at BER=1E-12 with PRBS31 and 10 GE frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –14 at BER=1E-12 with PRBS31 and 10 GE frame; CD of –400 to +800 ps/nm with 20 dB OSNR (0.5 nm RBW) • –7 to –16 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 13 dB OSNR (0.5 nm RBW) • –7 to –16 at BER=1E-5 (pre-FEC) with PRBS31 and OTU2 frame; CD of –400 to +800 ps/nm with 14 dB OSNR (0.5 nm RBW) • –7 to –27 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 23 dB OSNR (0.5 nm RBW) • –7 to –24 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –400 to +800 ps/nm with 23 dB OSNR (0.5 nm RBW) • –7 to –16 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; back-to-back with 8.5 dB OSNR (0.5 nm RBW) • –7 to –16 at BER=1E-3 (pre-FEC) with PRBS31 and OTU2 frame; CD of –400 to +800 ps/nm with 9.5 dB OSNR (0.5 nm RBW) • The maximum allowable PMD penalty at 30 ps DGD is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 0 ps/nm (BTB condition). • The maximum allowable PMD penalty at 15 ps DGD is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual CD is 800 ps/nm (System condition).

SFP and SFP+ Port Cabling Specifications

Table 15 provides cabling specifications for the SMF SFPs, Table 16 provides cabling specifications for MMF SFPs, Table 17 provides cabling specifications of video SFPs, Table 18 provides cabling specifications for SMF SFP+ modules, and Table 19 provides cabling specifications for MMF SFP+ modules that you install into interface cards. The ports of the listed SFP and SFP+ modules have LC-type connectors.

Single-Mode Fiber SFP Port Cabling Specifications

The following table provides cabling specifications for the SMF SFPs.

- Typical loss on a 1310 nm wavelength SMF is 0.6 dB/km.
- The ONS-SC-2G-xx.x cable distance varies depending on the DWDM system installation.

Table 9: Single-Mode Fiber SFP Port Cabling Specifications

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SC-2G-28.7=	1528.70 nm	9 micron SMF	N/A
ONS-SC-2G-30.3=	1530.33 nm	9 micron SMF	N/A
ONS-SC-2G-31.1=	1531.12 nm	9 micron SMF	N/A
ONS-SC-2G-31.9=	1531.90 nm	9 micron SMF	N/A
ONS-SC-2G-32.6=	1532.68 nm	9 micron SMF	N/A
ONS-SC-2G-33.4=	1533.47 nm	9 micron SMF	N/A
ONS-SC-2G-34.2=	1534.25 nm	9 micron SMF	N/A
ONS-SC-2G-35.0=	1535.04 nm	9 micron SMF	N/A
ONS-SC-2G-35.8=	1535.82 nm	9 micron SMF	N/A
ONS-SC-2G-36.6=	1536.61 nm	9 micron SMF	N/A
ONS-SC-2G-37.4=	1537.40 nm	9 micron SMF	N/A
ONS-SC-2G-38.1=	1538.19 nm	9 micron SMF	N/A
ONS-SC-2G-38.9=	1538.98 nm	9 micron SMF	N/A
ONS-SC-2G-39.7=	1539.77 nm	9 micron SMF	N/A
ONS-SC-2G-40.5=	1540.56 nm	9 micron SMF	N/A
ONS-SC-2G-41.3=	1541.35 nm	9 micron SMF	N/A
ONS-SC-2G-42.1=	1542.14 nm	9 micron SMF	N/A
ONS-SC-2G-42.9=	1542.94 nm	9 micron SMF	N/A
ONS-SC-2G-43.7=	1543.73 nm	9 micron SMF	N/A
ONS-SC-2G-44.5=	1544.53 nm	9 micron SMF	N/A
ONS-SC-2G-45.3=	1545.32 nm	9 micron SMF	N/A
ONS-SC-2G-46.1=	1546.12 nm	9 micron SMF	N/A
ONS-SC-2G-46.9=	1546.92 nm	9 micron SMF	N/A
ONS-SC-2G-47.7=	1547.72 nm	9 micron SMF	N/A
ONS-SC-2G-48.5=	1548.51 nm	9 micron SMF	N/A

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SC-2G-49.3=	1549.32 nm	9 micron SMF	N/A
ONS-SC-2G-50.1=	1550.12 nm	9 micron SMF	N/A
ONS-SC-2G-50.9=	1550.92 nm	9 micron SMF	N/A
ONS-SC-2G-51.7=	1551.72 nm	9 micron SMF	N/A
ONS-SC-2G-52.5=	1552.52 nm	9 micron SMF	N/A
ONS-SC-2G-53.3=	1553.33 nm	9 micron SMF	N/A
ONS-SC-2G-54.1=	1554.13 nm	9 micron SMF	N/A
ONS-SC-2G-54.9=	1554.94 nm	9 micron SMF	N/A
ONS-SC-2G-55.7=	1555.75 nm	9 micron SMF	N/A
ONS-SC-2G-56.5=	1556.55 nm	9 micron SMF	N/A
ONS-SC-2G-57.3=	1557.36 nm	9 micron SMF	N/A
ONS-SC-2G-58.1=	1558.17 nm	9 micron SMF	N/A
ONS-SC-2G-58.9=	1558.98 nm	9 micron SMF	N/A
ONS-SC-2G-59.7=	1559.79 nm	9 micron SMF	N/A
ONS-SC-2G-60.6=	1560.61 nm	9 micron SMF	N/A
ONS-SE-155-1470=	1470 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1490=	1490 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1510=	1510 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1530=	1530 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1550=	1550 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1570=	1570 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1590=	1590 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1610=	1610 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-622-1470=	1470 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1490=	1490 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1510=	1510 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1530=	1530 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1550=	1550 nm	9 micron SMF	100 km (62.14 miles)

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SE-622-1570=	1570 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1590=	1590 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1610=	1610 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-2G-L2=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-2G-S1= Short Reach	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SE-4G-SM=	1270 – 1355 nm	9 micron SMF	10 km (6.2 miles)
ONS-SE-Z1=	1310 nm	9 micron SMF	15 km (9.3 miles)
ONS-SI-155-I1= Intermediate Reach	1310 nm	9 micron SMF	21 km (13.05 miles)
ONS-SI-155-L1= Long Reach	1310 nm	9 micron SMF	50 km (31.07 miles)
ONS-SI-155-L2= Long Reach	1550 nm	9 micron SMF	100 km (62.14 miles)
ONS-SI-2G-I1=	1310 nm	9 micron SMF	15 km (9.3 miles)
ONS-SI-2G-L1=	1310 nm	9 micron SMF	40 km (25.80 miles)
ONS-SI-2G-L2=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SI-2G-S1=	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SI-622-I1= Intermediate Reach	1310 nm	9 micron SMF	21 km (13.05 miles)
ONS-SI-622-L1= Long Reach	1310 nm	9 micron SMF	42 km (26.10 miles)
ONS-SI-622-L2= Long Reach	1550 nm	9 micron SMF	85 km (52.82 miles)
15454-SFP-LC-LX=/ 15454E-SFP-LC-LX=/ ONS-SC-GE-LX Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles)
15454-SFP3-1-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15454E-SFP-L.1.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)
15454-SFP12-4-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15600-SFP-12-4-LR2=	1530 nm	9 micron SMF	80 km (49.71 miles)
15454E-SFP-L.4.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)

SFP	Transmit Wavelength	Fiber Type	Cable Distance
15454-SFP-OC48-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15454E-SFP-L.16.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)
15454-SFP-GE+-LX=/ 15454E-SFP-GE+-LX= Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles) for FC 1G, FC 2G, and GE 5 km (3.1 miles) for HDTV
ONS-SC-Z3-1470= Long Reach	1470 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1490= Long Reach	1490 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1510= Long Reach	1510 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1530= Long Reach	1530 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1550= Long Reach	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1570= Long Reach	1570 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1590= Long Reach	1590 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1610= Long Reach	1610 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-Z1= Intermediate Reach	1310 nm	9 micron SMF	30 km (18.6 miles) for OC-3/STM1, OC-12/STM-4, OC-48/STM-16, and Fibre Channel (1 and 2 Gbps) 20 km (12.4 miles) for GE
ONS-SI-2G-S1= Short Reach	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SE-155-1470= Long Reach	1470 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1490= Long Reach	1490 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1510= Long Reach	1510 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1530= Long Reach	1530 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1550= Long Reach	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1570= Long Reach	1570 nm	9 micron SMF	80 km (49.71 miles)

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SE-155-1590= Long Reach	1590 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1610= Long Reach	1610 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1470= Long Reach	1470 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1490= Long Reach	1490 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1510= Long Reach	1510 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1530= Long Reach	1530 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1550= Long Reach	1550 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1570= Long Reach	1570 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1590= Long Reach	1590 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1610= Long Reach	1610 nm	9 micron SMF	100 km (62.14 miles)
ONS-SI-GE-ZX=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-GE-ZX=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-GE-BXD=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-GE-BXU=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-EOP1=	—	9 micron SMF	2.5 km (1.56 miles)
ONS-SC-EOP3=	—	9 micron SMF	2.5 km (1.56 miles)
ONS-SC-E1-T1-PW=	—	9 micron SMF	1.83 km (1.136 miles)
ONS-SC-E3-T3-PW=	—	9 micron SMF	1.83 km (1.136 miles)
ONS-SC-E1-T1-CES=	—	9 micron SMF	1.83 km (1.136 miles)
ONS-SC-E3-T3-CES=	—	9 micron SMF	1.83 km (1.136 miles)
ONS-SI-100-LX10=	1310 nm	9 micron SMF	2 km (1.24 miles)
ONS-SC-OSC-ULH=	1500 – 1520 nm	9 micron SMF	160 km (99.41 miles)

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SC-OSC-18.0=	1518 nm	—	—

Multimode Fiber SFP Port Cabling Specifications

The following table provides cabling specifications for the MMF SFPs.

Table 10: Multimode Fiber SFP Port Cabling Specifications

SFP	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SE-4G-MM=	830 – 860 nm	62.5 micron MMF	300 m (984 ft)
		50.0 micron MMF	500 m (1640 ft)
ONS-SE-100-FX=	1270 – 1380 nm	MMF	2 km (1.24 miles)
ONS-SE-100-LX10=	1260 – 1360 nm	MMF	15 km (9.32 miles)
15454-SFP-LC-SX= Short Reach	850 nm	62.5 micron MMF	220 m (722 ft) 275 m (902 ft)
		50.0 micron MMF	500 m (1640 ft) 550 m (1804 ft)
15454-SFP-LC-LX= Long Reach	1310 nm	62.5 micron MMF	550 m (1804 ft)
		50.0 micron MMF	550 m (1804 ft)
15454-SFP-200= Long Reach	1310 nm	62.5 micron MMF	2 km (1.2 miles)
ONS-SE-200-MM=	1310 nm	62.5 micron MMF	2 km (1.2 miles)
15454-SFP-GEFC-SX= Short Reach	850 nm	62.5 micron MMF	300 m (984 ft) for FC 1 Gbps and GE 150 m (492 ft) for FC 2 Gbps
		50.0 micron MMF	550 m (1804 ft) for FC 1 Gbps and GE 300 m (984 ft) for FC 2 Gbps
ONS-SI-155-SR-MM= Intermediate Reach	1310 nm	62.5/125 micron MMF	2 km (1.2 miles)
ONS-SI-622-SR-MM= Intermediate Reach	1310 nm	62.5/125 micron MMF	2 km (1.2 miles)
ONS-SI-100-FX=	1310 nm	MMF	2 km (1.24 miles)

Video SFP Port Cabling Specifications

The following table provides cabling specifications for video SFPs.

Table 11: Video SFP Port Cabling Specifications

SFP	Operating Wavelength Range	Fiber Type	Cable Distance
ONS-SC-HD3GV-TX=	1270 – 1350 nm	—	—
ONS-SC-HD3GV-RX=	1270 – 1350 nm	—	—

Single-Mode Fiber SFP+ Port Cabling Specifications

The following table provides cabling specifications for the SMF SFP+ modules.

Table 12: Single-Mode Fiber SFP+ Port Cabling Specifications

SFP+	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SC+-10G-ER=	1550 nm	9 micron SMF	40 km (24.85 miles)
ONS-SC+-10G-LR=	1310 nm	9 micron SMF	10 km (6.214 miles)
ONS-SC+-10G-ZR=	1550 nm	9 micron SMF	80 km (49.71 miles)

Multimode Fiber SFP+ Port Cabling Specifications

The following table provides cabling specifications for the MMF SFP+ modules.

Table 13: Multimode Fiber SFP+ Port Cabling Specifications

SFP+	Transmit Wavelength	Fiber Type	Cable Distance
ONS-SC+-10G-SR=	840-860 nm	62.5 micron FDDI-Grade	26 m (85.3 ft)
		62.5 micron OM1	33 m (108.27 ft)
		50.0 micron	66 m (216.54 ft)
		50.0 micron OM2	82 m (269 ft)
		50.0 micron OM3	300 m (984 ft)
		50.0 micron OM4	400 m (1312.36 ft)

Copper Fiber SFP+ Port Cabling Specifications

The following table provides cabling specifications for the copper fiber SFP+ modules.

Table 14: Copper Fiber SFP+ Port Cabling Specifications

SFP+	Cable Distance
ONS-SC+-10G-CU1=	1 m (3.28 ft)

SFP+	Cable Distance
ONS-SC+-10G-CU3=	3 m (9.84 ft)
ONS-SC+-10G-CU5=	5 m (16.4 ft)
ONS-SC+-10G-CU7=	7 m (22.97 ft)

QSFP Specifications

Table 15: QSFP Specifications

QSFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
QSFP-100G-ERL-S	100 GE	–3.2 to +7.8 per wavelength	–8.6 to +7.6 per wavelength
QSFP-40G-SR4=	IEEE 40GBase-SR4, 10GBase-SR	–7.6 to –1.0 per wavelength	–9.5 to +2.4 per wavelength
QSFP-4x10G-LR=	10GBASE-LR	–8.2 to +0.5 per wavelength	–14.4 to +0.5 per wavelength
ONS-QSFP28-LR4	IEEE 100GBase-LR4	–2.5 to +4.5 per wavelength	–10.6
QSFP-100G-SR4-S	IEEE 100GBase-SR4	–8.4 to +2.4 per wavelength	–10.4
QSFP-100G-LR4-S	IEEE 100GBase-LR4	–4.3 to +4.5 per wavelength	–10.6
QSFP-4x10G-LR-S	10GBase-LR	–8.2 to +0.5 per wavelength	–14.4
QSFP-MLR	10GBase-LR	–8.2 to +0.5 per wavelength	–14.4 to +0.5 per wavelength
QSFP-100G-SM-SR	NON-IEEE 100GBase-SM-SR	–6.9 to +2.5 per wavelength	+2.5 to –9.5 per wavelength
ONS-QC-16GFC-SW	Cisco Proprietary (Non-IEEE)	–3 (OMA) to 0 per wavelength	–6 (OMA) to +2.4 per wavelength
ONS-QC-16GFC-LW	FC-PI-5	–5 to +2 per wavelength	–10.4 to +2 per wavelength
QSPF-40G-SR-BD	40 GE	–4 to +5 per wavelength	–6 to +5 per wavelength
QSPF-40/100-SRBD	100 GE	–6 to +4 per wavelength (100G mode) –4 to +5 per wavelength (40G mode)	–7.9 to +4 per wavelength (100G mode) -6 to +5 per wavelength (40G mode)
ONS-QSFP-4X10-MER	10GE, OTU2, OTU2E, OC192	–2.7 to +5.5 per wavelength	–16.9 to +3 per wavelength
QDD-400G-LR8-S	IEEE 400GBase-LR8	–2.8 to +5.3 per wavelength	–7.1 to +5.7 per wavelength
QSFP-100G-CWDM4-S	100GE	–6.5 to +2.5 per wavelength	–10 to +2.5 per wavelength

QSFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
QDD-400G-DR4-S	IEEE 400GBase-DR4, IEEE 100GBase-DR	–2.9 to +4.0 per wavelength	–3.9 to +4.0 per wavelength
QDD-400-AOC1M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC2M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC3M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC5M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC7M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC10M	400GE (400GAUI8 Electrical)	—	—
QDD-400-AOC15M	400GE (400GAUI8 Electrical)	—	—
QDD-400-FR4-S	IEEE 400GBase-FR4	–3.3 to +3.5 per wavelength	–4.6 to +3.5 per wavelength

QSFP Port Cabling Specifications

Table 16: QSFP Port Cabling Specifications

QSFP	Transmit Wavelength	Fiber Type	Fiber Connector	Cable Distance
QSFP-100G-ERL-S	1310 nm	G.652 micron SMF	Duplex LC	25 km
QSFP-40G-SR4=	850 nm	50 micron MMF	12-fiber MPO	100 m (OM3 fiber) 150 m (OM4 fiber)
QSFP-4x10G-LR=	1310 nm	G.652 micron SMF	12-fiber MPO	10 km (6.2 miles)
ONS-QSFP28-LR4	1310 nm	G.652 micron SMF	Duplex LC	10 km (6.2 miles)
QSFP-100G-SR4-S	850 nm	50 micron MMF	12-fiber MPO	70 m (OM3 fiber) 100 m (OM4 fiber)
QSFP-100G-LR4-S	1310 nm	G.652 micron SMF	Duplex LC	10 km (6.2 miles)
QSFP-4x10G-LR-S	1310 nm	G.652 micron SMF	12-fiber MPO	10 km (6.2 miles)
QSFP-MLR	1310 nm	G.652 micron SMF	12-fiber MPO	10 km (6.2 miles)
QSFP-100G-SM-SR	1310 nm	G.652 micron SMF	Duplex LC	500 m
ONS-QC-16GFC-SW	850 nm	50 micron MMF	12-fiber MPO	33 m (OM3 fiber) 50 m (OM4 fiber)
ONS-QC-16GFC-LW	1310 nm	G.652 micron SMF	12-fiber MPO	2 km (1.24 miles)

QSFP	Transmit Wavelength	Fiber Type	Fiber Connector	Cable Distance
QSFP-40G-LR4	1310 nm	G.652 micron SMF	Duplex LC	10 km
QSFP-40G-SR-BD	850 nm	62.5 micron MMF 50 micron MMF	Duplex LC	220m, 275 m (for OM3 and OM4 respectively) for 62.5 micron MMF 500m, 550m (for OM3 and OM4 respectively) for 50 micron MMF
QSFP-40/100-SRBD	850 nm	62.5 micron MMF 50 micron MMF	Duplex LC	220m, 275 m (for OM3 and OM4 respectively) for 62.5 micron MMF 500m, 550m (for OM3 and OM4 respectively) for 50 micron MMF
ONS-QSFP-4X10-MER	1310 nm	G.652 micron SMF	12-fiber MPO	25 km
QSFP-100G-FR-S	1310 nm	G.652 micron SMF	Duplex LC	2 km

QSFP Temperature Specifications

The following table has the temperature details for QSFP pluggables:

Table 17: QSFP Temperature Specifications

QSFP	Temperature Alarm (low/high in C)	Temperature Warning (low/high in C)
QSFP-40G-SR-BD	+5/ +75	+10/ +70
QSFP-40/100-SRBD	-5/ +75	0/ +70

QSFP Limitations

QSFP-100G-ERL-S

The following list provides the limitations of the QSFP-100G-ERL-S pluggable optics:

- When protection switching is configured on 400G-XP-LC, the QSFP-100G-ERL-S optics takes around 6.5 seconds to switch from working path to protected path and vice versa.
- After bootup, the QSFP-100G-ERL-S optics takes around 5–7 seconds to bring up laser
- After turning the laser off and on, the QSFP-100G-ERL-S optics takes 5–6 seconds to achieve the Rx data lock. This delay triggers the NCS 2000 platform to raise the SYNCLOSS alarm.

XFP Description and Specifications

The 10 Gbps 1310 nm XFP transceiver is an integrated fiber optic transceiver that provides high-speed serial link at the following signaling rates—9.95 Gbps, 10.31 Gbps, 10.51 Gbps, and 10.66/10.71/11.10 Gbps. These rates apply to 10GBASE-LR (Fibre Channel and Ethernet) .

The XFP integrates the receiver and transmit path. The transmit side recovers and retimes the 10 Gbps serial data and passes it to a laser driver. The laser driver biases and modulates a 1310 nm DFB (distributed feedback) laser, enabling data transmission over SMF through an LC connector. The receive side recovers and retimes the 10 Gbps optical data stream from a positive-intrinsic-negative (PIN) photo detector, transimpedance amplifier and passes it to an output driver.

The XFP module uses the bail clasp latching mechanism as shown unlatched in the following figures. See the label on the XFP for technology type and model.

XFP module dimensions are:

- Height 0.33 inches (8.5 mm)
- Width 0.72 inches (18.3 mm)
- Depth 3.1 inches (78 mm)

XFP temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (-5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit it to 185 degrees Fahrenheit (-5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between -40 degrees Fahrenheit to 185 degrees Fahrenheit (-40 degrees Celsius to 85 degrees Celsius)

⚠

Caution Do not add labels or markings to the XFP modules.

Figure 6: Bail Clasp XFP (Unlatched)

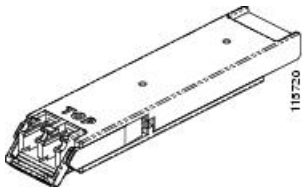
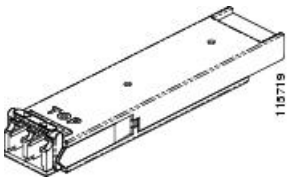


Figure 7: Bail Clasp XFP (Latched)



XFP Specifications

The following table lists specifications for available XFPs.

Important notes for the following table:

- The ONS-XC-10G-L2 XFP installed on a transponder card, must be installed in high-speed slots 5, 6, 12, or 13 for power dissipation when FTA-3 or FTA-48V is used. There is no restriction on the slots in which the ONS-XC-10G-L2-FXP is installed when CC-FTA is used.
- The IB_5G payload is supported by ONS-XC-10G-S1 XFP P/N version 03 only.

Table 18: XFP Specifications

XFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-XC-8G-MM=	OC192/STM64/8GFC	–8.2 to –1.5	0.151 mW (stressed received in OMA)
ONS-XC-8G-SM=	OC192/STM64/8GFC	–8.4 to +0.5	–13.8 (–11.8 stressed) to +0.5 (targeting up to 10 km distance)
ONS-XC-10G-C=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	0 to +3	–24 to –7
ONS-XC-10G-I2=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +2	–14 to +2
ONS-XC-10G-L2=	OC-192/STM-64/10GE/10GFC/OTU2	0 to +4	–24 to –7
ONS-XC-10G-S1=	OC-192/STM64/10GE/10GFC/IB_5G	–6 to –1 –8.2 to +0.5	–11 to –1 –14.4 to +0.5
ONS-XC-10G-SR-MM=	OC-192/STM-64/10GE/10GFC/OTU2	–7.3 to –1	–9.9 to –1
ONS-XC-10G-30.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-31.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-31.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-32.6=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-33.4=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-34.2=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-35.0=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-35.8=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-36.6=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-37.4=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-38.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7

XFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-XC-10G-38.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-39.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-40.5=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-41.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-42.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-42.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-43.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-44.5=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-45.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-46.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-46.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-47.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-48.5=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-49.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-50.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-50.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-51.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-52.5=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-53.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-54.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-54.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-55.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-56.5=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-57.3=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-58.1=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-58.9=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-59.7=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7

XFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-XC-10G-60.6=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-61.4=	OC-192/STM-64/10GE/10GFC/OTU2/IB_5G	–1 to +3	–23 to –7
ONS-XC-10G-1470=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1490=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1510=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1530=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1550=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1570=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1590=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-1610=	OC-192/STM-64/10GE/10GFC/OTU2	+3 to +7	–14 to –0
ONS-XC-10G-EP30.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP31.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP31.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP32.6=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP33.4=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP34.2=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP35.0=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP35.8=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP36.6=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP37.4=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP38.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP38.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP39.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP40.5=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP41.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP42.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP42.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8

XFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-XC-10G-EP43.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP44.5=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP45.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP46.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP46.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP47.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP48.5=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP49.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP50.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP50.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP51.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP52.5=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP53.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP54.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP54.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP55.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP56.5=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP57.3=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP58.1=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP58.9=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP59.7=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP60.6=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8
ONS-XC-10G-EP61.4=	OC-192/STM-64/10GE/10GFC/OTU2	–1 to +3	–27 to –8

Single-Mode Fiber XFP Port Cabling Specifications

The following table lists specifications for single-mode fiber XFP port cabling.

Important note for the following table:

- In CTC card view, ONS-XC-10G-1530 XFP shows the supported wavelength as 1530.33 nm. When you try to set the wavelength as 1530 nm, the PROV-MISMATCH alarm is raised.

Table 19: Single-Mode Fiber XFP Port Cabling Specifications

XFP	Wavelength	Fiber Type	Cable Distance
ONS-XC-8G-SM=	1550 nm	SMF	—
ONS-XC-10G-C=	1529.55 nm through 1561.83 nm, with ITU spacing	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-I2=	Receiver: 1260 nm to 1565 nm Transmitter: 1530 nm to 1565 nm	SMF	40 km (25.80 miles) for OC-192/STM64
ONS-XC-10G-L2=	Transmitter: 1530 nm to 1565 nm Receiver: 1260 nm to 1565 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-S1=	1310 nm	SMF	10 km (6.2 miles) for 10GE/10GFC 2 km (1.2 miles) for OC-192/STM64
ONS-XC-10G-29.9=	1529.95 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-30.3=	1530.33 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-31.1=	1531.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-31.9=	1531.90 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-32.6=	1532.68 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-33.4=	1533.47 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-34.2=	1534.25 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-35.0=	1535.04 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-35.8=	1535.82 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-36.6=	1536.61 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-37.4=	1537.40 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-38.1=	1538.19 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-38.9=	1538.98 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-39.7=	1539.77 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-40.5=	1540.56 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-41.3=	1541.35 nm	SMF	80 km (49.71 miles) for OC-192/STM64

XFP	Wavelength	Fiber Type	Cable Distance
ONS-XC-10G-42.1=	1542.14 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-42.9=	1542.94 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-43.7=	1543.73 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-44.5=	1544.53 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-45.3=	1545.32 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-46.1=	1546.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-46.9=	1546.92 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-47.7=	1547.72 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-48.5=	1548.51 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-49.3=	1549.32 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-50.1=	1550.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-50.9=	1550.92 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-51.7=	1551.72 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-52.5=	1552.52 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-53.3=	1553.33 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-54.1=	1554.13 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-54.9=	1554.94 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-55.7=	1555.75 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-56.5=	1556.55 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-57.3=	1557.36 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-58.1=	1558.17 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-58.9=	1558.98 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-59.7=	1559.79 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-60.6=	1560.61 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-61.4=	1561.43 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-1470=	1470 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64

XFP	Wavelength	Fiber Type	Cable Distance
ONS-XC-10G-1490=	1490 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1510=	1510 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1530=	1530 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1550=	1550 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1570=	1570 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1590=	1590 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-1610=	1610 nm	SMF	40 km (25.80 miles) for OTU2 and 10GE 10 km (6.2 miles) for OC192/STM64
ONS-XC-10G-EP30.3=	1530.33 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP31.1=	1531.12 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP31.9=	1531.90 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP32.6=	1532.68 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP33.4=	1533.47 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP34.2=	1534.25 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP35.0=	1535.04 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP35.8=	1535.82 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP36.6=	1536.61 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP37.4=	1537.40 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP38.1=	1538.19 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP38.9=	1538.98 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP39.7=	1539.77 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP40.5=	1540.56 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP41.3=	1541.35 nm	SMF	50 km (31.1 miles)

XFP	Wavelength	Fiber Type	Cable Distance
ONS-XC-10G-EP42.1=	1542.14 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP42.9=	1542.94 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP43.7=	1543.73 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP44.5=	1544.53 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP45.3=	1545.32 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP46.1=	1546.12 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP46.9=	1546.92 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP47.7=	1547.72 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP48.5=	1548.51 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP49.3=	1549.32 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP50.1=	1550.12 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP50.9=	1550.92 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP51.7=	1551.72 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP52.5=	1552.52 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP53.3=	1553.33 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP54.1=	1554.13 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP54.9=	1554.94 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP55.7=	1555.75 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP56.5=	1556.55 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP57.3=	1557.36 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP58.1=	1558.17 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP58.9=	1558.98 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP59.7=	1559.79 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP60.6=	1560.61 nm	SMF	50 km (31.1 miles)
ONS-XC-10G-EP61.4=	1561.43 nm	SMF	50 km (31.1 miles)

Multimode Fiber XFP Port Cabling Specifications

The following table lists specifications for multimode fiber XFP port cabling.

Table 20: Multimode Fiber XFP Port Cabling Specifications

XFP	Wavelength	Fiber Type	Cable Distance
ONS-XC-8G-MM=	840 nm to 860 nm	MMF	—
ONS-XC-10G-SR-MM=	840 nm to 860 nm	MMF	26-300 m (0.1864 miles) OC-192/STM64/10GE/10GFC/OTU2

CFP Description and Specifications

The C Form factor Pluggable (CFP) modules are hot-swappable I/O devices that plug into 40-Gigabit and 100-Gigabit Ethernet module ports. The CFP modules provide data rate up to 40 Gbps for ONS-CC-40G-LR4 or 100 Gbps for ONS-CC-100G-LR4.

CFP dimensions are:

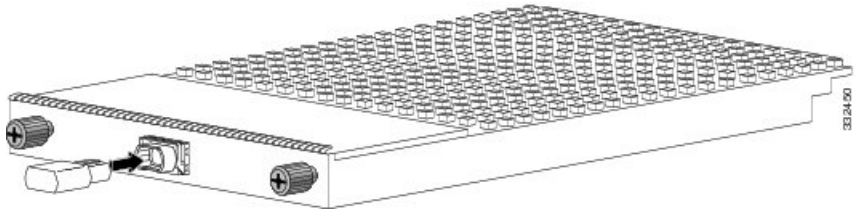
- Height 0.53 inches (1.36 cm)
- Width 3.22 inches (8.2 cm)
- Depth 5.7 inches (14.48 cm)

The CFP module operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius).

The 100 Gbps signal is carried over four wavelengths (1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1 nm). Multiplexing and demultiplexing of the four wavelengths are managed within the device. The 40 Gbps signal is carried over four wavelengths (1271 nm, 1291 nm, 1311 nm, and 1331 nm). Multiplexing and demultiplexing of the four wavelengths are managed within the device.

The following figure shows a CFP module with a 12-fiber MPO connector.

Figure 8: CFP with MPO Fiber Connector



1	Captive installation screws	3	Transmit and receive multifiber optical bore, MPO/MTP connector
2	Optical bore dust plug		

Note The MPO connectors on the optical CFP transceivers support network interface cables with either Physical Contact (PC) or Ultra-Physical Contact (UPC) flat polished face types. The MPO connectors on the optical CFP transceivers do not support network interface cables with an Angle Polished Connector (APC) polished face type.

CFP Specifications

The following table lists specifications for available CFP modules.

Table 21: CFP Specifications

CFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-CC-100G-LR4=	100GBASE-LR4	–4.3 to 4.5 per wavelength	–10.6 to 4.5 per wavelength
	4I1-9D1-F	–2.5 to 2.9 per wavelength	2.9 to –8.8 per wavelength
ONS-CC-100GE-LR4=	100GBASE-LR4	–4.3 to 4.5 per wavelength	–10.6 to 4.5 per wavelength
ONS-CC-40G-LR4=	40GBASE-LR4	–7 to 2.3 per wavelength	–13.7 to 2.3 per wavelength
	C4S1_2D1	–2.3 to 2.3 per wavelength	–9 to 2.3 per wavelength
ONS-CC-40G-FR=	40GBASE-FR	0 to 3	–6 to 3
CFP-40G-SR4=	40GBASE-SR4	–7.6 to 2.4 per wavelength	–9.5 to 2.4 per wavelength

Single-Mode Fiber CFP Port Cabling Specifications

The following table provides cabling specifications for the SMF CFPs.

Table 22: Single-Mode Fiber CFP Port Cabling Specifications

CFP	Wavelength (nm)	Fiber Type	Cable Distance
ONS-CC-100G-LR4=	1310	SMF	10 km (6.2 miles)
ONS-CC-40G-LR4=	1310	SMF	10 km (6.2 miles)
ONS-CC-40G-FR=	1530	SMF	2 km (1.24 miles)

Multimode Fiber CFP Port Cabling Specifications

The following table provides cabling specifications for the MMF CFP.

Table 23: Multimode Fiber CFP Port Cabling Specifications

CFP	Wavelength (nm)	Fiber Type	Cable Distance
CFP-40G-SR4	850	MMF	30 m (98.4 ft) for OM2 100 m (328 ft) for OM3 150 m (492.1 ft) for OM4

CFP2 Description and Specifications

The CFP2 module is a hot pluggable form factor designed for optical networking applications. The module size accommodates a wide range of power dissipations and applications. The module's electrical interface has been generically specified to support supplier-specific customization for various 4 x 25Gbit/s interfaces. It can also support 8x25Gbit/s, 10x10Gbit/s, and 8x50Gbit/s.

The CFP2 pluggable is based on the CFP2-ACO specification with a few modifications. The CFP2-ACO module contains all the required functions to perform bidirectional dual polarization coherent optical signaling over a pair of single mode optical fibers.

The key features of the CFP2 pluggable module:

- Supports different modulation schemes - BPSK, QPSK, 8-QAM, 16-QAM (200G and 250G)
- Tunable across the full C-Band, covering 96 Nyquist shaped channels on the 50-GHz grid or griddles with 100MHz tuning granularity per channel
- Optical output power adjustable
- Temperature range between –5 degree Celsius up to 75 degrees Celsius
- Control management interface based on MDIO
- CFP2 power class 5
- Dual LC connector

Table 24: CFP2 Specifications

CFP2	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-CFP2-WDM =	Duplex LC	–11.5 to –1.5 dBm	–20 to 0 dBm
ONS-CFP2D-400G-C	400ZR, 300ZR, 200ZR	–10 to –1 dBm	–23 to +1 dBm

Table 25: CFP2 Port Cabling Specifications

CFP2	Wavelength (nm)	Fiber Type	Cable Distance
ONS-CFP2-WDM=	96 channels	SMF	Depends on the selected modulation format

CXP Description and Specifications

The CXP pluggable transceiver modules has 12 dedicated transmit (Tx) channels and 12 receive (Rx) channels per transceiver with data rates up to 10.3125 Gbps and OTN rates up to 11.25 Gbps. The CXP module provides 2-wire serial (I2C) management interface and digital diagnostics, including Tx and Rx optical power monitoring per wavelength. The CXP module uses a 24-fiber MPO connector that supports bidirectional transmission across the fibers (12 Tx + 12 Rx). The following table lists the supported CXP-CFP MPO connectors:

Table 26: Supported CXP-CFP MPO Connectors

Cable	Description	Distance
ONS-CCC-100G-5=	CXP-CFP MPO connector	5 m (16.4 ft)
ONS-CCC-100G-10=	CXP-CFP MPO connector	10 m (32.8 ft)
ONS-CCC-100G-20=	CXP-CFP MPO connector	20 m (65.6 ft)

The CXP module operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius).

CXP Specifications

The following table lists specifications for available CXP.

Table 27: CXP Specifications

CXP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-CXP-100G-SR10=	100GBASE-SR10	–7.6 to –1 per wavelength	–9.5 to 2.4 per wavelength

CXP Port Cabling Specifications

The following table provides cabling specifications for the MMF CXP.

Table 28: Multimode Fiber CFP Port Cabling Specifications

CXP	Wavelength (nm)	Fiber Type	Cable Distance
ONS-CXP-100G-SR10=	840 – 860	50.0 micron OM3	100 m (328 ft)
		50.0 micron OM4	300 m (984 ft)

CPAK Description and Specifications

The Cisco CPAK 100GBASE modules CPAK 100GBASE-LR4 and CPAK 100GBASE-SR10 provides a wide variety of high-density100 Gigabit connectivity solutions.

The Cisco CPAK 100GBASE-LR4 module supports link lengths of up to 10 km over standard single-mode fiber (SMF, G.652) operating at a nominal 25 Gbps per lane. The nominal power consumption is less than 5.5W.

The Cisco CPAK 100GBASE-SR10 module supports link lengths of 100m and 150m on laser-optimized OM3 and OM4 multi-fiber cables, respectively. The module delivers high-bandwidth 100 Gigabit links over 24-fiber ribbon cables terminated with MPO, MTP or both connectors. It can also be used in 10 x 10 Gigabit mode along with ribbon-to-duplex-fiber breakout cables for connectivity to ten 10GBASE-SR optical interfaces.

The Cisco CPAK 100GBASE-SR4 is a form factor transceiver module for a multi-mode fiber. It supports short wavelengths over 4 lanes in the 850-nm wavelength window terminated with a MPO-12 connector.

The maximum outer dimensions for the CPAK modules are (H x W x D): 11.6 x 34.8 x 101.2 mm (0.46 x 1.37 x 3.98 in). The Cisco CPAK modules weigh approximately 127 grams (4.48 oz.).

The environmental conditions and power requirements are:

Specification	Value
Storage temperature range	-40 to 85°C (-40 to 185°F)
CPAK 100GBASE-LR4 operating temperature range	0 to 75°C (32 to 167°F)
CPAK 100GBASE-SR10 operating temperature range	0 to 70°C (32 to 158°F)
CPAK 100GBASE-SR4 operating temperature range	0 to 70°C (32 to 158°F)
CPAK 100GBASE FR operating temperature range	0 to 70°C (32 to 158°F)
CPAK 100GBASE-LR4 power consumption at 70°C	less than 6.75W maximum
CPAK 100GBASE-SR10 power consumption at 70°C	less than 4.5W maximum
CPAK 100GBASE-SR4 power consumption at 70°C	less than 8W maximum
CPAK 100GBASE FR power consumption at 70°C	less than 9W maximum

The following table provides cabling specifications for the Cisco CPAK modules.

Table 29: Supported CPAK

Module	Description	Distance
CPAK 100GBASE-LR4	Single-mode, Dual SC /PC connector	10 km
CPAK 100GBASE-SR10	Multi-mode MPO-24 or MTP-24 connector	100 m (OM3) 150 m (OM4)
CPAK 100GBASE-SR4	Multi-mode, MPO-12 or MTP-12 connector	0.5m to 70m (OM3 MMF) 0.5m to 100m (OM4 MMF)
CPAK 100GBASE FR	Single-mode, Dual SC /PC connector	2 km

The following table shows the primary optical characteristics for the Cisco CPAK 100GBASE modules.

Table 30: Optical Transmit and Receive Specifications

Module	Type	Transmit Power (dBm)		Receive Power (dBm)		Transmit and Receive Center Wavelength Range (nm)
		Maximum	Minimum	Maximum	Minimum	
CPAK 100GBASE-LR4	100GBASE-LR4 1310 nm SMF	4.5 per lane	-4.3 per lane	4.5 per lane	-10.6 per lane	Four lanes: • 1294.53 to 1296.59 • 1299.02 to 1301.09 • 1303.54 to 1305.63 • 1308.09 to 1310.19
CPAK 100GBASE-SR10	100GBASE-SR10 850 nm MMF	-1.0 per lane	-7.6 per lane	2.4 per lane	-9.5 per lane	Ten lanes: 840 to 860 nm
CPAK 100GBASE-SR4	100GBASE-SR4 850 nm MMF	2.4 per lane	-8.4 per lane	2.4 per lane	-10.3 per lane	840 to 860 nm
CPAK-100GBASE FR	100GBASE FR SMF	4.0 per lane	-2.4 per lane	4.5 per lane	-6.4 per lane	One lane: 1304.5 to 1317.5

NTP-G324 Install, Provision, and Delete PPMs

Warning GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules are Class I laser products. Statement 1008

Warning Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard. Statement 1056

Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Warning Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure. Statement 1057

Warning During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself. Statement 94

Warning Before you install, operate, or service the system, read the Site Preparation and Safety Guide. This guide contains important safety information you should know before working with the system.

Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 148

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, for Ethernet RJ-45 ports, use only shielded Ethernet cables that are grounded on both ends. In a NEBS installation, all Ethernet ports are limited to intra-building wiring. Statement 7012

Warning Ethernet ports are intra-building ports and are suitable only for connecting to shielded cabling grounded at both ends. Statement 1084

Caution Do not use GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules from third-party vendors. Cisco TAC does not support third-party vendor GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules. A third-party vendor GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules is any GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK module that is not sourced from Cisco directly, or via a Cisco Partner, or Cisco authorized seller. Cisco-sourced GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules can be identified by the Cisco label and logo.

Note GBICs and SFPs must be matched on either end by type: SX to SX, LX/LH to LX/LH, or ZX to ZX (GBIC).

Note The shelf should be equipped with a CC-FAN if the copper SFP is installed on a MXP_MR_10DME card.

Purpose	This task installs, provisions, and deletes PPMs (GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules) on the line cards. Because GBICs, SFP, SFP+, XFP, CXP, CFP, and CPAK modules are hot-swappable, they can be installed and removed while the card/shelf assembly is powered and running.

Tools/Equipment	• Wrist strap or other personal grounding device to prevent electro-static discharge (ESD) occurrences. • Antistatic mat or antistatic foam to set the PPM on. • Small flat-blade screwdriver for removing the CFP module socket cover. • Fiber-optic end-face cleaning tools and inspection equipment. For complete information on inspecting and cleaning fiber-optic connections, see the Inspection and Cleaning Procedures for Fiber-Optic Connections document.
Prerequisite Procedures	"NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, 100G-LC-C, 10x10G-LC, CFP-LC, ADM-10G, and OTU2_XP Cards" task in the chapter "Provision Transponder and Muxponder Cards" of *Cisco NCS 2002 and NCS 2006 Configuration Guide*.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Procedure

Step 1 Install PPMs. Complete the necessary task as applicable:

- DLP-G723 Install PPM on a Line Card, on page 56
- DLP-G724 Connecting Single-Mode and Multimode Optical Fiber, on page 63

Step 2 Provision the PPM. Complete the necessary task as applicable:

- DLP-G725 Preprovisioning PPM Slot, on page 63
- DLP-G726 Preprovisioning a Multirate PPM, on page 64

Step 3 Delete the PPM. Complete the necessary task as applicable:

- DLP-G727 Delete PPM Provisioning, on page 65
- DLP-G728 Remove PPM from the Line Card, on page 66

Stop. You have completed this procedure.

DLP-G723 Install PPM on a Line Card

Purpose	This task installs PPM on a line card. The PPMs provide a fiber interface to the card.

Tools/Equipment	• Wrist strap or other personal grounding device to prevent electro-static discharge (ESD) occurrences. • Antistatic mat or antistatic foam to set the PPM on. • Small flat-blade screwdriver for removing the CFP module socket cover. • Fiber-optic end-face cleaning tools and inspection equipment. For complete information on inspecting and cleaning fiber-optic connections, see the Inspection and Cleaning Procedures for Fiber-Optic Connections document.
Prerequisite Procedures	"NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, 100G-LC-C, 10x10G-LC, CFP-LC, ADM-10G, and OTU2_XP Cards" task in the chapter "Provision Transponder and Muxponder Cards" of *Cisco NCS 2002 and NCS 2006 Line Card Configuration Guide*.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher



Warning GBICs, SFP, SFP+, XFP, CXP, and CFP modules are Class I laser products. Statement 1008



Warning Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Statement 70



Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040



Warning Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure. Statement 1057



Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the serial high-speed WAN interface ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7003

Note

- In case of a full C-band tunable XFP, it is mandatory to use optical cables that are fully compliant with NEBS Telcordia GR-326-CORE, Issue 3 recommendation. The Cisco patchcord indicated by the Cisco Transport Planner (CTP) tool is fully compliant with NEBS Telcordia GR-326-CORE, Issue 3 recommendation.
- The CC-FTA fan tray assembly must be installed in a shelf where CWDM and DWDM SFPs or XFPs are used.
- If you have installed a fan tray lower than CC-FTA on the MSTP unit, you must have the TXP_MR_10E transponder card (only if you have installed ONS-XC-10G-L2 XFP on the TXP_MR_10E card) installed in Slot 5, 6, 12, or 13. This limitation does not exist for fan-tray versions higher than CC-FTA.

  G-Series cards manufactured before August 2003 do not support DWDM GBICs. The G1K-4 cards compatible with DWDM GBICs have a CLEI code of WM5IRWPCAA.

  All versions of G1K-4 cards support CWDM GBICs.

Procedure

Step 1 Verify that the GBICs, SFP, SFP+, XFP, CXP, and CFP module is correct for your network. Ensure that you are installing compatible GBICs, SFP, SFP+, XFP, CXP, and CFP module, for example, SX to SX or LX/LH to LX/LH.

Step 2 Remove the PPM from its protective packaging.

Step 3 Check the label to verify that the PPM is the correct type for your network.

Table 3: Compatibility by Card—Cisco NCS 2002 and Cisco NCS 2006 Platforms, on page 7 shows the available GBICs, SFP, XFP, CFP, and CXP modules.

- The GBICs are very similar in appearance. Check the GBIC label carefully before installing it.
- Before you install SFPs on the MRC-2.5G-4 or MRC-12 card, see the MRC2.5G-4 or MRC-12 card information in the *Cisco ONS 15454 Reference Manual* for bandwidth restrictions based on the port where you want to install the SFP, and the cross-connect card being used.

Step 4 Verify the type of PPM you are using:

- If you are using a GBIC with clips, go to 5.
- If you are using a GBIC with a handle, go to 6.
- If you are using SFP, SFP+, XFP, CFP, or CXP, go to 7.
- If you are using CFP module, go to 8.

Step 5 Install GBICs with clips. Perform the following:

a) Grip the sides of the GBIC with your thumb and forefinger and insert the GBIC into the slot on the card.

Note
GBICs are keyed to prevent incorrect installation.

b) Slide the GBIC through the flap that covers the opening until you hear a click. The click indicates the GBIC is locked into the slot.

In a noisy environment the click may not be audible. Verify that the GBIC is in locked position by carefully pulling it without touching the release latch. If the GBIC is locked, it does not come out.

Caution
To avoid loss of traffic due to incorrect locking of the GBIC, ensure that it is locked properly.

c) When you are ready to attach the network fiber-optic cable, remove the protective plug from the GBIC, then plug the fiber connector into the GBIC. Save the plug for future use.

Step 6 Install GBICs with a handle. Perform the following:

a) Remove the protective plug from the SC-type connector. Save the plug for future use.
b) Grip the sides of the GBIC with your thumb and forefinger and insert the GBIC into the slot on the card.
c) Lock the GBIC into place by closing the handle down. The handle is in the correct closed position when it does not obstruct access to the SC-type connector.
d) Slide the GBIC through the cover flap until you hear a click. The click indicates that the GBIC is locked into the slot.

   In a noisy environment the click may not be audible. Verify that the GBIC is in locked position by carefully pulling it without touching the release latch. If the GBIC is locked, it does not come out.

   Caution
   To avoid loss of traffic due to incorrect locking of the GBIC, ensure that it is locked properly.

e) When you are ready to attach the network fiber-optic cable, see the DLP-G724 Connecting Single-Mode and Multimode Optical Fiber, on page 63 section.

Step 7 Install the SFP, SFP+, XFP, or CXP module. Perform the following:

Note
Use deep doors when ONS-SC+-10G-C pluggables are installed on a NCS 2002 or NCS 2006 shelf.

a) Plug the LC duplex connector of the fiber into the SFP, SFP+, XFP module.
b) If you are installing ONS-SC-EOP1, ONS-SC-EOP3, ONS-SC-E1-T1-PW, ONS-SC-E3-T3-PW, ONS-SC-E1-T1-CES, or ONS-SC-E3-T3-CESSFP, set the dual in-line package (DIP) switches to the desired operation mode as specified in the following table.

   The ONS-SC-EOP1, ONS-SC-EOP3, ONS-SC-E1-T1-PW, ONS-SC-E3-T3-PW, ONS-SC-E1-T1-CES, and ONS-SC-E3-T3-CES SFPs include a 2-section DIP switch used to select one of the following working modes of the device:

   - Database initialization
   - Normal operation (default setting)
   - Software download
   - Configuration

   On the underside of the ONS-SC-EOP1, ONS-SC-EOP3, ONS-SC-E1-T1-PW, ONS-SC-E3-T3-PW, ONS-SC-E1-T1-CES, or ONS-SC-E3-T3-CES SFP, set the DIP switches as listed in the following table to enable the desired working mode.

Table 31: DIP Switch Settings for ONS-SC-EOP1, ONS-SC-EOP3, ONS-SC-E1-T1-PW, ONS-SC-E3-T3-PW, ONS-SC-E1-T1-CES, or ONS-SC-E3-T3-CES SFP

Switch Position SW1	Switch Position SW2	Function
OFF	OFF	Database initialization
OFF	ON	Normal operation (default setting)
ON	OFF	Software download
ON	ON	Configuration

c) Attach the fiber-optic cable to the SFP, SFP+, XFP, or CXP. For more information, see the DLP-G724 Connecting Single-Mode and Multimode Optical Fiber, on page 63

d) If the new SFP, SFP+, XFP, or CXP module has a latch, close the latch over the cable to secure it.

e) Plug the cabled SFP, SFP+, XFP, or CXPinto the slot until it clicks.

- For a mylar tab SFP, SFP+, XFP, or CXP—Slide the SFP, SFP+, XFP, or CXP into the slot.
- For an actuator/button SFP, SFP+, XFP, or CXP—Slide the SFP, SFP+, XFP, or CXP all the way into the slot.
- For a bail clasp SFP, SFP+, XFP, or CXP—Latch (flip upwards) the bail clasp before inserting the SFP, SFP+, XFP, or CXP into the slot and then slide it into the slot.

A click indicates that the SFP, SFP+, XFP, or CXP module is locked into the port. In a noisy environment the click may not be audible. Verify that the SFP, SFP+, XFP, or CXP is in locked position by carefully pulling it without touching the release latch. If the SFP, SFP+, XFP, or CXP is locked, it does not come out.

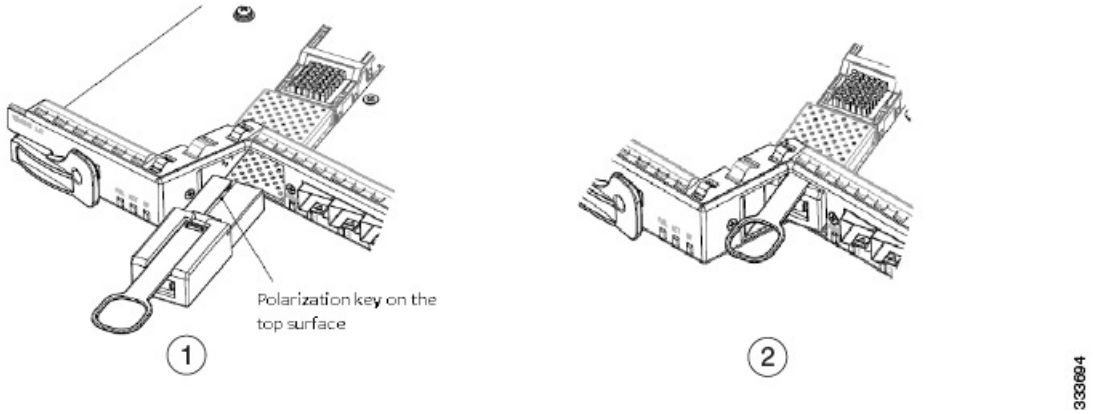
Caution

To avoid loss of traffic due to incorrect locking of the SFP, SFP+, XFP, or CXP module, ensure that it is locked properly.

Note

- SFP, SFP+, XFP, and CXP modules are keyed to prevent incorrect installation.
- During the installation of the CXP module in the 100G-LC-C or 10x10G-LC card, orient the CXP module so that the polarization notch aligns with the polarization key on the CXP module. See the following diagram.

Figure 9: CXP Module Installation



SFP, SFP+, XFP, or CXP modules must be provisioned in CTC. If you install a multirate PPM, complete the DLP-G726 Preprovisioning a Multirate PPM, on page 64 task. (Single-rate XFPs do not need to be provisioned in CTC.)

Step 8 Install CFP module. Perform the following:

Caution
The CFP module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling the CFP modules or coming into contact with the modules.

a) Remove the CFP module from its protective packaging.
b) Check the label on the CFP module body to verify that you have the correct model for your network.
c) Remove the dust plug from the CFP module module optical port and set it aside.
d) Align the CFP device into the transceiver port socket of your card, and slide it in until the CFP module EMI gasket flange makes contact with the card faceplate.
e) Press firmly on the front of the CFP module with your thumb to fully seat it in the transceiver socket.
f) Gently tighten the two captive installation screws on the transceiver to secure the CFP module in the socket.
g) Reinstall the dust plug into the CFP module's optical bore until you are ready to attach the network interface cable.
h) When you are ready to attach the network cable interface, remove the dust plugs and inspect and clean fiber connector end faces, and then immediately attach the network interface cable connectors into the CFP module optical bores.

Step 9 Install CFP2 module. Perform the following:

Caution
The CFP2 module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling the CFP modules or coming into contact with the modules.

a) Remove the CFP2 module from its protective packaging.
b) Check the label on the CFP2 module body to verify that you have the correct model for your network.
c) Align the CFP2 device into the transceiver port socket of your card, and slide it in until the CFP2 module EMI gasket flange makes contact with the card faceplate.
d) Press firmly on the front of the CFP2 module with your thumb to fully seat it in the transceiver socket. For details regarding proper insertion of the pluggable, see Installing the CFP2-DWDM Pluggable , on page 62.
e) When you are ready to attach the network cable interface, remove the dust plugs and inspect and clean fiber connector end faces, and then immediately attach the network interface cable connectors into the CFP module optical bores.

Step 10 Return to your originating procedure (NTP).

Installing the CFP2-DWDM Pluggable

To correctly insert the CFP2-DWDM pluggable, ensure the following:

- The electrical connectors should be completely mated.
- The latching mechanisms on both the sides of the pluggable should be fully engaged.
- The pluggable is properly seated on the slot, by the application of a symmetrical force of at least 60N on its front surface, along the centerline. See the following figure for reference.

Figure 10: Inserting CFP2-DWDM Pluggable (face-up)

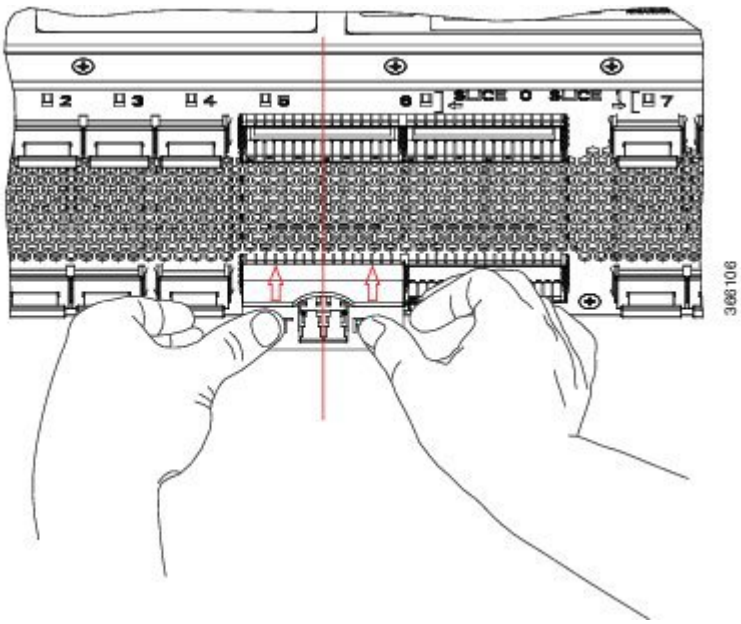
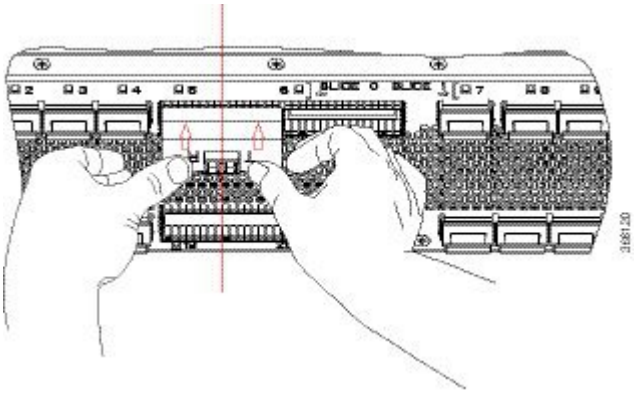


Figure 11: Inserting CFP2-DWDM Pluggable (face-down)



DLP-G724 Connecting Single-Mode and Multimode Optical Fiber

To connect the single-mode or multimode optical fiber, attach the appropriate optical fiber cable directly to the SC-type receptacle on the GBIC or the LC-type connector on the SFP, SFP+, or XFP module. You can use either simplex or duplex connectors for most devices. For simplex connectors, two cables are required, one cable for transmit (Tx) and a second cable for receive (Rx). For duplex connectors, only one cable that has both Tx and Rx connectors is required.

Purpose	This task connects the single-mode or multimode optical fiber for GBICs, SFP, SFP+, and XFP modules installed on the line cards.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Procedure

Step 1 Remove the protective plugs from the GBICs, SFP, SFP+, and XFP module and save them for future use.

Step 2 Remove the protective caps from the connectors on the fiber-optic cable and save them for future use.

Step 3 Clean fiber-optic connectors on fiber-optic cables.

Step 4 Plug the fiber-optic cable into the SC-type receptacle on the GBIC or the LC-type connector on the SFP, SFP+, or XFP module.

Step 5 Return to your originating procedure (NTP).

DLP-G725 Preprovisioning PPM Slot

Purpose	This task preprovisions PPM (GBIC, SFP, SFP+, XFP, CXP, or CFP) slot.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC" in the Connect the PC and Log into the GUI document.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher



Note GBIC, SFP, SFP+, XFP, CXP, or CFP modules are generically called PPMs in CTC. After installing multirate GBIC, SFP, SFP+, XFP, CXP, or CFP modules, multirate PPMs must be provisioned in CTC. To complete the provisioning of the multirate pluggable port, complete the DLP-G726 Preprovisioning a Multirate PPM, on page 64 task.

Procedure

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card where you want to provision PPM settings.

Step 2 Click the **Provisioning** > **Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose the slot number where the GBIC, SFP, SFP+, XFP, CXP, or CFP module is installed, from the drop-down list.
- PPM Type—Choose the number of ports supported by your GBIC, SFP, SFP+, XFP, CXP, or CFP module, from the drop-down list. The drop-down list displays the number of PPMs that are available for provisioning. If only one port is supported, PPM (1 port) is the only option.

Step 5 Click **OK**. The newly created port appears in the Pluggable Port Modules pane. The row in the Pluggable Port Modules pane turns light blue. The Actual Equipment Type column remains blank until the actual GBIC, SFP, SFP+, XFP, CXP, or CFP module is installed. After the GBIC, SFP, SFP+, XFP, CXP, or CFP module is installed, the row in the pane turns white and the Actual Equipment Type column shows the equipment name.

Note
For ONS-SC-EOP1, ONS-SC-EOP3, ONS-SC-E1-T1-PW, ONS-SC-E3-T3-PW, ONS-SC-E1-T1-CES, and ONS-SC-E3-T3-CES SFPs, set the port rate as FE.

Step 6 Verify that the PPM appears in the list in the Pluggable Port Modules pane. If it does not, repeat Step 3 through Step 5.

Step 7 Repeat Step 2 through Step 5 to provision a second PPM, if needed. If not, continue with Step 8.

Step 8 Click **OK**.

Step 9 Return to your originating procedure (NTP).

DLP-G726 Preprovisioning a Multirate PPM

Purpose	This task provisions a multirate PPM on a line card.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC" in the Connect the PC and Log into the GUI document.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If the PPM was preprovisioned using the DLP-G725 Preprovisioning PPM Slot, on page 63 task, this task is unnecessary, unless the PPM has an Out-of-Service and Autonomous Management, Unassigned (ANSI) or Unlocked-disabled, unassigned (ETSI) service state.

Procedure

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the line card where you want to provision the multirate PPM settings.

Step 2 If this is the first multirate PPM provisioned for the card, continue with Step 3. If not, complete the following steps.

a) Click the **Provisioning** > **Line** > **SONET** (ANSI) or **SDH** (ETSI) tabs.

b) Locate the Trunk port table row and verify that the Service State column value is OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI). If yes, continue with Step 3. If not, continue with the following step.

c) Click the **Admin State** table cell and choose **OOS-MA,DSBLD** (ANSI) or **Locked-enabled,disabled** (ETSI).

d) Click **Apply**, then **Yes**.

Step 3 Click the **Provisioning** > **Pluggable Port Modules** tabs.

Step 4 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 5 In the Create PPM dialog box, complete the following:

- PPM—Choose the port number where the multirate PPM is installed, from the drop-down list.
- PPM Type—Choose the number of ports supported by your multirate PPM from the drop-down list. If only one port is supported, PPM (1 port) is the only option.

Step 6 Click **OK**. The newly created port appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area turns white and the Actual Equipment Type column lists the equipment name.

Step 7 If you want to provision a PPM on another port, repeat Step 3 through Step 5.

Step 8 Return to your originating procedure (NTP).

DLP-G727 Delete PPM Provisioning

- Before deleting a PPM, delete the PPM from the provisioning pane.
- This task does not apply to the TXP_MR_10G card. To change the TXP_MR_10G data rate, see the section "DLP-G365 Provision the TXP_MR_10G Data Rate" in the chapter "Provision Transponder and Muxponder Cards" of *Cisco ONS 15454 DWDM Configuration Guide*.
- You cannot delete a PPM if the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card is part of a regenerator group. For OTU2_XP card, you cannot delete a PPM if the card configuration is in Standard Regen or Enhanced FEC mode.

Purpose	This task deletes PPM provisioning for GBICs, SFP, SFP+, XFP, CXP, and CFP modules installed on the line cards.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC" in the Connect the PC and Log into the GUI document.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Procedure

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the line card where you want to delete PPM settings.

Step 2 Verify that the PPM port Service State is OOS,DSBLD. If it is not OOS,DSBLD, follow the tasks in "NTP-G128 Manage Pluggable Port Modules" in the chapter "Provision Transponder and Muxponder Cards" of *Cisco ONS 15454 DWDM Configuration Guide* to change the Service State of the PPM port to OOS,DSBLD.

Step 3 Click the **Provisioning** > **Pluggable Port Modules** tabs.

Step 4 To delete a PPM and the associated ports, perform the following:

a) In the Pluggable Port Modules area, click the PPM that you want to delete. The highlight changes to dark blue.

b) Click **Delete**. The Delete PPM dialog box appears.

c) Click **Yes**. The PPM provisioning is removed from the Pluggable Port Modules area and the Pluggable Ports area.

Note
You cannot delete a PPM until its port is in the OOS,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) state. You cannot delete a client port if the client is in the In Service and Normal (IS-NR) (ANSI) or Unlocked-enabled (ETSI) service state, is in a protection group, has a generic communications channel (GCC) or data communications channel (DCC), is a timing source, has circuits or overhead circuits, or transports Link Management Protocol channels or links. You can delete a client port (except the last port) if the trunk port is in service and the client port is in the OOS,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) service state. You can delete the last client port only if the trunk port is in a OOS,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) service state for all cards. For more information about port states, see the Administrative and Service States document.

Step 5 Verify that the PPM provisioning is deleted:

- In the card view, CTC shows an empty port after the PPM is deleted.
- If the PPM is physically present when you delete the PPM provisioning, CTC transitions to the deleted state, the ports (if any) are deleted, and the PPM is represented as a gray graphic in CTC. The PPM can be provisioned again in CTC, or the equipment can be removed. If the equipment is removed, the graphic disappears.

Step 6 (Optional) If you need to remove the PPM hardware, complete the DLP-G728 Remove PPM from the Line Card, on page 66.

Step 7 Return to your originating procedure (NTP).

DLP-G728 Remove PPM from the Line Card

Purpose	This task removes PPMs from the line cards.
Tools/Equipment	• Wrist strap or other personal grounding device to prevent electro-static discharge (ESD) occurrences. • Antistatic mat or antistatic foam to set the PPM on. • Small flat-blade screwdriver for removing the CFP module socket cover. • Fiber-optic end-face cleaning tools and inspection equipment. For complete information on inspecting and cleaning fiber-optic connections, see the Inspection and Cleaning Procedures for Fiber-Optic Connections document.

Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning GBICs, SFP, SFP+, XFP, CXP, and CFP modules are Class I laser products. Statement 1008

Warning Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Statement 70

Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Note

- This task removes the GBICs, SFP, SFP+, XFP, CXP, and CFP hardware. To delete the provisioning for GBICs, SFP, SFP+, XFP, CXP, and CFP, see the DLP-G727 Delete PPM Provisioning, on page 65 task.
- Removing a PPM from the client ports of a Y-cable protection group card causes an IMPROPRMVL (PPM) alarm. The working port raises the CR,IMPROPRMVL,SA alarm and the protected port raises the MN,IMPROPRMVL,NSA alarm. The severity on the client ports is changed according to the protection switch state.

Procedure

Step 1 Disconnect the network fiber cable from the PPM connector. If the GBICs, SFP, SFP+, XFP, CXP, and CFP connector has a latch securing the fiber cable, pull it upward to release the cable.

Step 2 Remove PPM. Perform the following as necessary:

- To remove GBIC with clips, go to Step 3.
- To remove GBIC with a handle, go to Step 4.
- To remove SFP, SFP+, or XFP module, go to Step 5.
- To remove CFP module, go to Step 6.

Step 3 Remove GBIC with clips. Perform the following:

a) Release the GBIC from the slot by squeezing the two plastic tabs on each side of the GBIC.
b) Slide the GBIC out of the slot. A flap closes over the slot to protect the connector on the Gigabit Ethernet card.

Step 4 Remove GBIC with a handle. Perform the following:

a) Release the GBIC by opening the handle.

b) Pull the handle of the GBIC.
c) Slide the GBIC out of the slot. A flap closes over the slot to protect the connector on the Gigabit Ethernet card.

Step 5 Remove SFP, SFP+, or XFP module. Perform the following:

a) If the SFP, SFP+, or XFP connector has a latch securing the fiber cable, pull it upward to release the cable.
b) Pull the fiber cable straight out of the connector.
c) Release the SFP, SFP+, or XFP module from the slot by performing one of the following actions (depending on which latch is on the SFP, SFP+, or XFP):

- For a mylar tab SFP, SFP+, or XFP—Pull out the mylar tab.
- For an actuator/button SFP, SFP+, or XFP—Press the actuator/button.
- For a bail clasp —Unlatch the bail clasp and swing it downward.

d) Slide the module out of the slot.

Step 6 Remove CFP module. Perform the following:

Caution
The CFP module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling the CFP modules or coming into contact with the modules.

a) Disconnect the network fiber-optic cable from the CFP transceiver connectors. Immediately reinstall the dust plugs in the CFP transceiver optical bores.
b) Loosen the two captive installation screws that secure the CFP to the networking module.
c) Slide the CFP transceiver out of the module socket. Immediately place the CFP transceiver in antistatic protective packaging.

Step 7 Return to your originating procedure (NTP).

Related Documentation

Use this document in conjunction with the following referenced publications as needed:

- *Cisco NCS 2002 and NCS 2006 Shelf Setup Guide*
- *Cisco NCS 2002 and NCS 2006 Network Operations Guide*
- *Cisco NCS 2002 and NCS 2006 Line Card Configuration Guide*
- *Cisco NCS 2002 and NCS 2006 Hardware Installation Guide*
- *Electrostatic Discharge and Grounding Guide for Cisco NCS Platforms*
- *Regulatory Compliance and Safety Information for Cisco NCS Platforms*

Additional References

Related Documents

Use this document in conjunction with the other release-specific documentation listed in this table:

Link	Description
Cisco ONS Documentation Roadmap	Provides quick access to publications of Cisco ONS releases.
Cisco ONS 15454 DWDM Control Card and Node Configuration Guide	Provides background and reference material and procedures for installation and configuration of control cards and node configuration on Cisco ONS 15454 dense wavelength division multiplexing (DWDM) systems.
Cisco ONS 15454 DWDM Line Card Configuration Guide	Provides background and reference material and procedures for installation and configuration of line cards on Cisco ONS 15454 dense wavelength division multiplexing (DWDM) systems.
Cisco ONS 15454 DWDM Network Configuration Guide	Provides background and reference material, procedures for turn up, provisioning, and maintenance of Cisco ONS 15454 dense wavelength division multiplexing (DWDM) systems.
Cisco ONS 15454 DWDM Troubleshooting Guide	Provides general troubleshooting instructions, alarm troubleshooting instructions, and a list of error messages that apply to the Cisco ONS 15454 dense wavelength division multiplexing (DWDM) systems.
Release Notes for Cisco ONS 15454	Provides information about new features and enhancements for the Cisco ONS 15454 DWDM platforms.
Cisco ONS 15454 Hardware Installation Guide	Provides installation information of the Cisco ONS 15454 hardware.
Cisco ONS 15454 DWDM Licensing Guide	Provides information about installing and managing Cisco ONS 15454 DWDM licenses.
Cisco ONS SDH TL1 Command Guide *Cisco ONS SONET TL1 Command Guide*	Provides a comprehensive list of TL1 commands.
Installing the GBIC, SFP, SFP+, XFP, CXP, CFP, and CPAK Optical Modules in Cisco ONS Platforms	Provides information about the Pluggable Port Modules support.

Link	Description
Cisco NCS 2000 Series Documentation Roadmap	Provides quick access to publications of Cisco NCS 2000 Series releases.
Cisco NCS 2000 Series Control Card and Node Configuration Guide	Provides background and reference material and procedures for installation and configuration of control cards and node configuration on Cisco NCS 2000 Series systems.
Cisco NCS 2000 Series Line Card Configuration Guide	Provides background and reference material and procedures for installation and configuration of line cards on Cisco NCS 2000 Series systems.

Link	Description
Cisco NCS 2000 Series Network Configuration Guide	Provides background and reference material, procedures for turn up, provisioning, and maintenance of Cisco NCS 2000 Series systems.
Cisco NCS 2000 Series Troubleshooting Guide	Provides general troubleshooting instructions, alarm troubleshooting instructions, and a list of error messages that apply to the Cisco NCS 2000 Series systems.
Release Notes for Cisco NCS 2000 Series	Provides information about new features and enhancements for the Cisco NCS 2000 Series systems.
Cisco NCS 2000 Series Hardware Installation Guide	Provides installation information of the Cisco NCS 2000 Series hardware.
Cisco NCS 2000 Series Licensing Configuration Guide	Provides information about installing and managing NCS licenses.
Cisco NCS 2000 Series TL1 Command Guide	Provides a comprehensive list of TL1 commands.
Installing the GBIC, SFP, SFP+, XFP, CXP, CFP, and CPAK Optical Modules in Cisco NCS Platforms	Provides information about the Pluggable Port Modules support.

Technical Assistance

Link	Description
http://www.cisco.com/support	The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.

Short Description

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- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

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