# Pluggable Optical Modules: Transceivers for the Cisco ONS Family

# Contents

## What You Will Learn

This document provides technical descriptions, applications, and compatibility information for the following categories of optics modules in the Cisco® ONS product family:

- Gigabit Interface Converter (GBIC)
- Small Form-Factor Pluggable (SFP)
- 10-Gigabit Small Form-Factor Pluggable (XFP)
- 10-Gigabit Enhanced Small Form-Factor Pluggable (SFP+)
- CXP
- C Form-Factor Pluggable (CFP)
- Quad Small Form-Factor Pluggable (QSFP+)
- Cisco CPAK™
- C Form-Factor Pluggable 2 (CFP2)
- C Form-Factor high density pluggable (CXP2)

## Introduction

Cisco offers a comprehensive range of pluggable optical modules for the Cisco ONS family of multiservice platforms. The wide variety of modules gives you flexible and cost-effective options for all types of interfaces. Cisco offers a range of GBIC, SFP, XFP, SFP+, CXP, CFP, Cisco CPAK, and QSFP+ pluggable modules. These small, modular optical interface transceivers offer a convenient and cost-effective solution for an array of applications in the data center, campus, metropolitan-area access and ring network, storage area network, and long-haul network.

## Technical overview

**SFP module**

An SFP transceiver module (Figure 1) is a bidirectional device with a transmitter and receiver in the same physical package. The module interfaces to the network through a connector interface on the electrical ports and through an LC termination connector on the optical ports. Electrical interfaces and dimensions are defined in the SFF-8472 industry-standard Multisource Agreement (MSA).

**Figure 1.**
SFP Transceiver modules for the Cisco ONS Family

### XFP module

The XFP transceiver module (Figure 2) is a bidirectional device with a transmitter and receiver in the same physical package. The XFP module contains a 30-pin surface mount connector on the electrical interface and a duplex LC connector on the optical interface.

**Figure 2.**
XFP Transceiver module for the Cisco ONS Family

### SFP+ module

An SFP+ transceiver module (Figure 3) is a bidirectional device with a transmitter and receiver in the same physical package. The module interfaces to the network through a connector interface on the electrical ports and through an LC termination connector on the optical ports. It is identical in size to SFP modules, but capable of 10-Gbps transmission.

**Figure 3.**
An SFP+ Transceiver module for the Cisco ONS Family

### CXP module

An CXP transceiver module (Figure 4) is a bidirectional device with a transmitter and receiver in the same physical package. The module interfaces to the network through a connector interface on the electrical ports and through a Multifiber Push On (MPO) termination connector on the optical ports. It is dedicated usually for 100-Gbps transmission, and it is only capable of 100GBASE-SR10 connectivity.

**Figure 4.**
A CXP Transceiver module for the Cisco ONS Family

### CFP module

A CFP transceiver module (Figure 5) is a bidirectional device with a transmitter and receiver in the same physical package. The module interfaces to the network through a connector interface on the electrical ports and through an MPO or LC connector on the optical ports. The electrical connection of a CFP uses 10x10-Gbps lanes in each direction (receive and transmit), while the optical connection can support both 10x10-Gbps and 4x25-Gbps variants of 100-Gbps interconnects (typically referred to as 100GBASE-SR10 and 100GBASE-LR4 in 10 km reach).

**Figure 5.**
A CFP Transceiver module for the Cisco ONS Family

### QSFP+ module

The Cisco 40GBASE QSFP portfolio offers customers a wide variety of high-density and low-power 40 Gigabit Ethernet connectivity options for data center, high-performance computing networks, enterprise core and distribution layers, and service provider applications.

**Figure 6.**
A QSFP+ Transceiver Module for the Cisco ONS Family

### Cisco CPAK module

Cisco CPAK 100GBASE fiber modules offer a selection of high-density 100-Gbps connectivity solutions. By using CMOS photonics technology, Cisco CPAK is smaller and consumes significantly less power than alternative form factors (Figure 7). They are fully interoperable with other IEEE-compliant interfaces.

**Figure 7.**
Cisco CPAK module

### Cisco 400G CFP2-DCO digital optics

The CFP2 Digital Optical pluggable solution is the combination of the transceiver module and the DSP photonics integrated on a CFP2 form factor. The presence of the DSP module on board distinguishes this CFP2 “Digital” pluggable from the erstwhile CFP2 “Analog” pluggable that is popular in the market today and is also sold by Cisco since a while now.

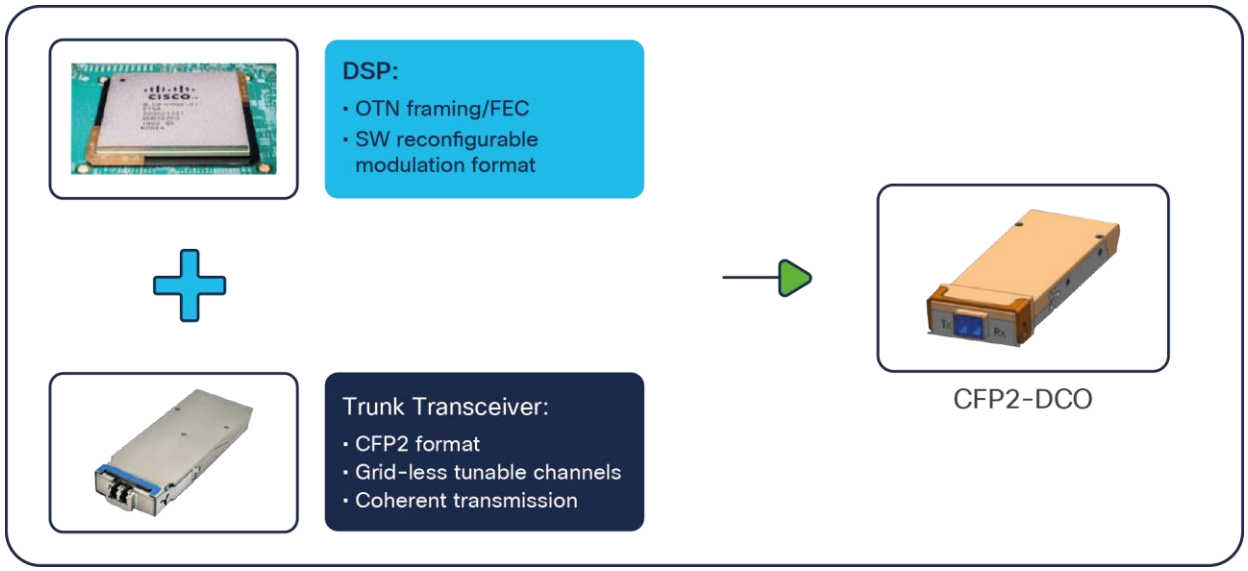


**Figure 8.**
Digital Optics

Cisco offers a 400G CFP2-DCO pluggable optics module that addresses a wide range of network optical interconnect applications including service provider access aggregation, wireless 5G backhaul, metro and long haul networks, as well as data center interconnects. With support for Ethernet/OTN clients, and line-side transmission of 100Gbps QPSK modulation up to 400Gbps 16QAM, the module offers enhanced flexibility in a pluggable coherent solution. The CFP2-DCO product family features an expansive list of interoperability modes as documented by OpenROADM MSA, and the Optical Internetworking Forum (OIF).

Pluggable solutions such as 400G CFP2-DCO are designed to enable network operators to address increasing bandwidth demand through a pay-as-you-grow model that has the potential of reducing both capital and operational expenditures. The 400G CFP2-DCO module incorporates a 7nm CMOS technology, and a silicon photonic integrated circuit (PIC) for an optimized co-packaged design.

**Figure 9.**
The 400G CFP2-DCO pluggable

The Optical Internetworking Forum (OIF) first created the “400ZR” standard. This 400ZR standard is targeted towards edge and relatively short reach, up to 120km DCI applications. Around the same time, the OpenROADM Multi-Source Agreement (MSA) also defined a specification for a 400G DWDM pluggable, that focused on what service provider networks would need, such as long optical reach (>120km), advanced forward error correction (known as oFEC) and selectable data rates (100G, 200G, 300G, or 400G). Though the additional capabilities were achievable, it would require more power than that specified for the original 400ZR. Therefore, the updated OpenROADM’s specification came to be known as 400ZR+.

Ultimately, between the two organizations and the various optics manufacturers, it was agreed to take the best of the OIF and OpenROADM standards, combine them and call it “OpenZR+”. By combing the features of each in the same form factor, it leaves us with one highly versatile coherent digital DWDM optics. The 400G-CFP2-DCO pluggable offered by Cisco supports all three line protocol modes / standards, the 400ZR, Open ROADM ZR and Open ZR+.

As illustrated in the figure below, OpenZR+ is a combination of two industry standardization efforts created to maintain the simple Ethernet-only host interface of 400ZR while adding support for features such as: (1) higher coding gain using oFEC from the OpenROADM standard, which extends the reach capability; (2) multirate Ethernet, which enables the multiplexing of 100GbE and 200GbE clients over the line-side link, providing optimization options for the switch/router equipment to channelize the traffic over the transport link; (3) adjustable 100G, 200G, 300G, or 400G line-side transport links (using QPSK, 8QAM, or 16QAM modulation), which enables reach/capacity optimization over various fiber links; and (4) higher dispersion tolerance.

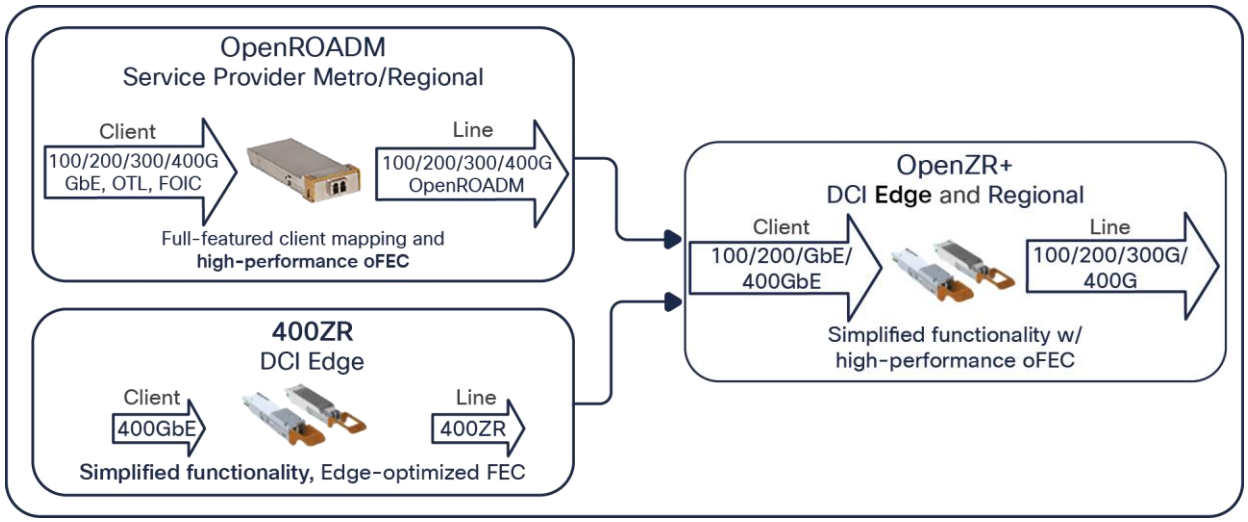


**Figure 10.**
Standards: 400ZR, Open ZR and Open ZR+

oFEC is a critical element of openZR+ MSA compliant Digital Coherent Optics. The oFEC engine is a block-based encoder and iterative Soft-Decision (SD) decoder. With 3 SD iterations the Net Coding Gain is 11.1 dB @ BER 10-15 (DP-QPSK) and 11.6 dB @ BER 10-15 (DP-16QAM), with pre-FEC BER threshold of 2.0 × 10-2. The combined latency of the encoder and decoder is less than 3 µs. The higher gain FEC allows OpenZR+ modules to achieve greater reaches and overcome link impairments, such as narrow filtering or dispersion effects, while low latency is beneficial in a variety of access and data center applications. The Cisco 400G-CFP2-DCO leverages this critical aspect by supporting oFEC for Open ZR and Open ZR+ modes and the standard C-FEC in the 400ZR mode.

## Pluggable modules: List and description

Cisco ONS Family modules have well-defined product IDs, making it easy for you to order the appropriate module.

The product ID is structured as follows: ONS-AB-CCC-DD. The variables in the ID include:

- **For the A variable:** S stands for SFP, G for GBIC, X for XFP, and SB+ for SFP+.
- **For the B variable:** C stands for commercial temperature (0 to 70° C), E for extended temperature (-10 to 85° C), and I for industrial temperature (-40 to 85° C).
- **The CCC variable** indicates the supported bit-rate or signal type, such as 155 Mbps for OC-12/STM-1 signal or 2 GF for a tri-rate Gigabit Ethernet, Fibre Channel, and 2G Fibre Channel signal support.
- **The DD variable** indicates the supported reach, such as S1 for short-reach or intraoffice 1310 nm interface or SX for Ethernet.
- CXPs are denoted by the tag CXP directly.
- CFPs are denoted by the tag CC.
- QSFPs are denoted by the tag QSFP.
- Cisco CPAKs are denoted by the tag CPAK.

## Chapter 1: List of Pluggables by Product ID and Cisco part number

### SONET/SDH SFP modules

Cisco offers a wide range of SFP modules that are fully compliant with SONET and SDH standards. Table 1 provides the details.

**Table 1.** SONET/SDH SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-2G-S1=** | SFP - OC48/STM16 - 1310 nm, SR - SM LC | 10-2017-01 | GR253 OC48 SR G.957 I-16 | -10 to +85 |
| **ONS-SE-2G-L2=** | OC48/STM16, LR2, 1550 nm, SFP, EXT | 10-2013-01 | GR253 OC48 LR2 G.957 L-16.2 | -10 to +85 |
| **ONS-SI-155-SR-MM=** | SFP - OC3, SR, 1310 nm, MULTI MODE, I-TEMP | 10-2279-01 | GR253 | -40 to +85 |
| **ONS-SI-155-I1=** | SFP - OC3/STM1 IR1/S-1.1 1310 nm, ITEMP | 10-1938-02 | GR253 OC3 IR1 G.957 S-1.1 | -40 to +85 |
| **ONS-SI-155-L1=** | SFP - OC3/STM1 LR, L-1.1, 1310 nm, ITEMP | 10-1957-02 | GR253 OC3 LR1 G.957 L-1.1 | -40 to +85 |
| **ONS-SI-155-L2=** | SFP - OC3/STM1 LR-2, L-1.2, 1550 nm, ITEMP | 10-1937-02 | GR253 OC3 LR2 G.957 L-1.2 | -40 to +85 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **ONS-SI-622-SR-MM=** | SFP - OC12, SR, 1310 NM, MULTI MODE, I-TEMP | 10-2280-01 | GR253 | -40 to +85 |
| **ONS-SI-622-I1=** | SFP - OC12/STM4 and OC3/STM1 IR, S-4.1, S-1.1, 1310 nm, ITEMP | 10-1956-02 | GR253 OC3/OC12 IR1 G.957 S-4.1/S-1.1 | -40 to +85 |
| **ONS-SI-622-L1=** | SFP - OC12/STM4 LR, L-4.1, 1310 nm, ITEMP | 10-1958-02 | GR253 OC12 LR1 G.957 L-4.1 | -40 to +85 |
| **ONS-SI-622-L2=** | SFP - OC12/STM4 LR, L-4.2, 1550 nm, ITEMP | 10-1936-02 | GR253 OC12 LR2 G.957 L-4.2 | -40 to +85 |
| **ONS-SI-2G-S1** | SFP - OC48/STM16, SR, 1310 nm, ITEMP, LC | 10-1992-02 | GR253 OC48 SR G.957 I-16 | -40 to +85 |
| **ONS-SI-2G-I1=** | SFP - OC48/STM16, IR, 1310 nm, ITEMP, LC | 10-1993-02 | GR253 OC48 IR1 G.957 S-16.1 | -40 to +85 |
| **ONS-SI-2G-L1=** | SFP - OC48/STM16, LR1, 1310 nm, ITEMP, LC | 10-2102-02 | GR253 OC48 LR1 G.957 L-16.1 | -40 to +85 |
| **ONS-SI-2G-L2=** | SFP - OC48/STM16, LR2, 1550 nm, ITEMP, LC | 10-1990-02 | GR253 OC48 LR2 G.957 L-16.2 | -40 to +85 |

### Data SFP modules

Cisco offers a wide range of data SFP modules capable of transmitting Gigabit Ethernet, Fibre Channel, IBM Fiber Connection (FICON), and Enterprise Systems Connection (ESCON) signal format. Table 2 provides the details.

**Table 2.** Data SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **ONS-SE-100-LX10=** | SFP - 100 Mbps Long Reach - 1310 nm - SM - LC, EXT-TEMP | 10-2213-01 | 100BASE LX IEEE-802.3 | -10 to +85 |
| **ONS-SI-100-LX10=** | SFP - 100 Mbps Long Reach - 1310 nm - SM - LC, I-TEMP | 10-2294-01 | 100BASE LX IEEE-802.3 | -40 to +85 |
| **ONS-SE-100-FX=** | SFP - 100 Mbps Short Reach - 1310 nm - MM - LC, EXT-TEMP | 10-2212-01 | 100BASE FX IEEE-802.3 | -10 to +85 |
| **ONS-SI-100-FX=** | SFP - 100 Mbps Short Reach - 1310 nm - MM - LC, I-TEMP | 10-2350-01 | 100BASE FX IEEE-802.3 | -40 to +85 |
| **ONS-SE-100-BX10U=** | SFP - 10/100 BX-U, EXT | 10-2353-01 | 100BASE BX-U IEEE-802.3 | -10 to +85 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-100-BX10D=** | SFP - 10/100 BX-D, EXT | 10-2352-01 | 1000BASE BX-D<br>IEEE-802.3 | -10 to +85 |
| **ONS-SE-GE-BXU=** | SFP - 1000BASE-BX U - GE Bidirectional Upstream - Ext Temp | 10-2481-01 | 100BASE BX-U<br>IEEE-802.3 | -10 to +85 |
| **ONS-SE-GE-BXD=** | SFP - 1000BASE BX D - GE Bidirectional Downstream Ext Temp | 10-2482-01 | 1000BASE BX-D<br>IEEE-802.3 | -10 to +85 |
| **15327-SFP-LC-SX=EOS** | 1000BASE-SX LC, SFP | 30-1301-01 | 1000BASE SX<br>IEEE-802.3 | 0 to +70 |
| **15327-SFP-LC-LX=EOS** | 1000BASE-LX LC, SFP | 30-1299-01 | 1000BASE SX<br>IEEE-802.3 | 0 to +70 |
| **15454-SFP-LC-SX=** | 1000BASE-ASESX LC, SFP | 30-1301-01 | 1000BASE SX<br>IEEE-802.3 | 0 to +70 |
| **15454-SFP-LC-LX=** | 1000BASE LX LC, SFP | 30-1299-01 | 1000BASE LX<br>IEEE-802.3 | 0 to +70 |
| **ONS-SC-GE-SX=**[1] | 1000BASE SX SFP - 850 nm - LC - C Temp | 10-2301-01 | 1000BASE SX<br>IEEE-802.3 | 0 to +70 |
| **ONS-SI-GE-SX=** | SFP - 1000BASE-SX Gigabit Ethernet, 850 nm, MM, I-TEMP | 10-2295-01 | 1000BASE SX<br>IEEE-802.3 | -40 to +85 |
| **ONS-SC-GE-LX=**[2] | 1000BASE LX SFP - 1310 nm - LC - C Temp | 10-2298-01 | 1000BASE LX<br>IEEE-802.3 | 0 to +70 |
| **ONS-SI-GE-LX=** | SFP - 1000BASE-LX Gigabit Ethernet, 1310 nm, SM, I-TEMP | 10-2300-01 | 1000BASE SX<br>IEEE-802.3 | -40 to +85 |
| **ONS-SI-GE-EX=** | SFP - 1000Base EX - I-Temp | 10-2734-01 | 1000BASE EX<br>IEEE-802.3z, FC-PI v2.0 | -40 to +85 |
| **15454-SFP-GE+-LX=EOS** | SFP - GE/1G-FC/2G-FC - 1310 nm - MM - LC | 10-1832-03 | 1000BASE LX<br>IEEE-802.3,<br>100-M5-SN-I<br>200-M5-SN-I | -10 to +85 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **15454-SFP-GEFC-SX=EOS** | SFP - GE/1G-FC/2G-FC - 850 nm - MM - LC | 10-1833-02 | 1000BASE SX IEEE-802.3, 100-M5-SN-I 100-M6-SN-I 200-M5-SN-I 200-M6-SN-I | -10 to +85 |
| **ONS-SE-G2F-SX=** | SFP - GE/1G-FC/2G-FC - 850 nm - MM - LC - EXT TEMP | 10-2272-02 | 1000BASE SX IEEE-802.3, 100-M5-SN-I 100-M6-SN-I 200-M5-SN-I 200-M6-SN-I | -10 to +85 |
| **ONS-SE-G2F-LX=** | SFP - GE/1G-FC/2G-FC/HDTV - 1310 nm - SM - LC - EXT TEMP | 10-2273-02 | 1000BASE LX IEEE-802.3, 100-SM-LC-L 200-SM-LC-L | -10 to +85 |
| **ONS-SI-GE-ZX=** | SFP - 1000BASE-ZX Gigabit Ethernet, 1550 nm, SM, I-Temp | 10-2296-01 | 1000BASE ZX IEEE-802.3 | -40 to +85 |
| **ONS-SE-GE-ZX=** | SFP - 1000BASE-ZX Gigabit Ethernet, 1550, SM, Ext-Temp | 10-2354-01 | 1000BASE ZX IEEE-802.3 | -10 to +85 |
| **15454-SFP-200=** | SFP-ESCON - 1310 nm - MM - LC | 10-1750-01 | ESCON | 0 to +70 |
| **ONS-SE-200-MM=** | SFP-ESCON - 1310 nm - MM - LC - EXT TEMP | 10-2248-01 | ESCON | -10 to +85 |
| **ONS-SE-4G-MM=** | 4G FC SFP, 850 nm, LC, MM - EXT TEMP | 10-2259-01 | 400-M5-SN-I and 400-M6-SN-I | -10 to +85 |
| **ONS-SE-4G-SM=** | 4G FC SFP, 1310 nm, LC, SM - EXT TEMP | 10-2252-01 | 400-SM-LC-L | -10 to +85 |

[1] This SFP module will replace the 15327-SFP-LC-SX= and 15454-SFP-LC-SX=, which have begun the end-of-life process.

[2] This SFP module will replace the 15327-SFP-LC-LX= and 15454-SFP-LC-LX=, which have begun the end-of-life process.

### Electrical SFP modules

Cisco offers electrical SFP modules for the Cisco ONS platform. Details are shown in Table 3.

**Table 3.** Electrical SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-ZE-EL=** | SFP - 10/100/1000 Ethernet BASE-T Multirate Copper RJ-45 | 10-2351-01 | IEEE-802.3 | -10 to +85 |
| **ONS-SC-155-EL=** | SFP - STM1 Electrical | 10-2363-01 | ITU-T G.703 (ES1) | 0 to +70 |
| **ONS-SC-E3-T3-PW=** | SFP - E3/DS3 PDH over FE Pseudowire - Commercial Temp | 30-1450-01 | ITU-T G.703 | 0 to +70 |
| **ONS-SC-E1-T1-PW=** | SFP - E1/DS1 PDH over FE Pseudowire - Commercial Temp | 30-1447-01 | ITU-T G.703 | 0 to +70 |
| **ONS-SC-EoP1=** | SFP - FE over DS1/E1 - Commercial Temp | 30-1446-01 | ITU-T G.703 | 0 to +70 |
| **ONS-SC-EOP3=** | SFP - FE over DS3/E3 - Commercial Temp | 30-1449-01 | ITU-T G.703 | 0 to +70 |

### Multirate SFP module

Cisco offers a multirate SFP module for the Cisco ONS 15600 Series and 15454 platforms. Table 4 provides details.

**Table 4.** Multirate SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-Z1=** | SFP-OC-48IR1,12/3SR1, GE LX STM S-16.1, I-4, I-1, 1310nm EXT-TEMP | 10-1971-02 | 1000BASE-LX IEEE-802.3, GR253 OC-48 IR1 OC-12 SR, OC-3 SR G.957 S-16.1, I-4.1, I-1.1 | -10 to +85 |

### Optical Service Channel SFP module

Cisco offers an optical service channel SFP module for the Cisco ONS 15454 MSTP. Table 5 provides details.

**Table 5.** Multirate SFP module

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-OSC-ULH=** | SFP-OC-3/STM-1/FE Optical Service Channel SFPs ULH-Commercial Temp | 10-2469-01 | FE IEEE-802.3, GR253 OC3 G.957 STM-1 | 0 to +70 |
| **ONS-SC-OSC-18.0=** | SFP FE/OC3/STM1 OSC for RAMAN application 1518.0nm | 10-2737-01 | FE IEEE-802.3, GR253 OC3 G.957 STM-1 | 0 to +70 |

### DWDM SFP modules

Cisco offers a wide range of Dense Wavelength-Division Multiplexing (DWDM) ITU-T-compliant SFP modules. Table 6 lists details.

**Table 6.** DWDM SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-2G-28.7=** | OC-48/STM-16, SFP, 1528.77, 100 GHz, LC | 10-2307-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-30.3=** | OC-48/STM-16, SFP, 1530.33, 100 GHz, LC | 10-2155-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-31.1=** | OC-48/STM-16, SFP, 1531.12, 100 GHz, LC | 10-2156-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-31.9=** | OC-48/STM-16, SFP, 1531.90, 100 GHz, LC | 10-2157-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-32.6=** | OC-48/STM-16, SFP, 1532.68, 100 GHz, LC | 10-2158-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-33.4=** | OC-48/STM-16, SFP, 1533.47, 100 GHz, LC | 10-2306-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-34.2=** | OC-48/STM-16, SFP, 1534.25, 100 GHz, LC | 10-2159-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-35.0=** | OC-48/STM-16, SFP, 1535.04, 100 GHz, LC | 10-2160-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-35.8=** | OC-48/STM-16, SFP, 1535.82, 100 GHz, LC | 10-2161-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-36.6=** | OC-48/STM-16, SFP, 1536.61, 100 GHz, LC | 10-2162-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-37.4=** | SFP - OC-48/STM16, 1537.40nm, 100 GHz, SM, LC | 10-2668-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-2G-38.1=** | OC-48/STM-16, SFP, 1538.19, 100 GHz, LC | 10-2163-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-38.9=** | OC-48/STM-16, SFP, 1538.98, 100 GHz, LC | 10-2164-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-39.7=** | OC-48/STM-16, SFP, 1539.77, 100 GHz, LC | 10-2165-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-40.5=** | OC-48/STM-16, SFP, 1540.56, 100 GHz, LC | 10-2185-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-41.3=** | OC-48/STM-16, SFP, 1541.35, 100 GHz, LC | 10-2305-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-42.1=** | OC-48/STM-16, SFP, 1542.14, 100 GHz, LC | 10-2166-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-42.9=** | OC-48/STM-16, SFP, 1542.94, 100 GHz, LC | 10-2167-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-43.7=** | OC-48/STM-16, SFP, 1543.73, 100 GHz, LC | 10-2168-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-44.5=** | OC-48/STM-16, SFP, 1544.53, 100 GHz, LC | 10-2169-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-45.3=** | SFP - OC-48/STM16, 1545.32nm, 100 GHz, SM, LC | 10-2670-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-46.1=** | OC-48/STM-16, SFP, 1546.12, 100 GHz, LC | 10-2170-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-46.9=** | OC-48/STM-16, SFP, 1546.92, 100 GHz, LC | 10-2171-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-47.7=** | OC-48/STM-16, SFP, 1547.72, 100 GHz, LC | 10-2172-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-48.5=** | OC-48/STM-16, SFP, 1548.51, 100 GHz, LC | 10-2173-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-49.3=** | OC-48/STM-16, SFP, 1549.32, 100 GHz, LC | 10-2304-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-50.1=** | OC-48/STM-16, SFP, 1550.12, 100 GHz, LC | 10-2186-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-50.9=** | OC-48/STM-16, SFP, 1550.92, 100 GHz, LC | 10-2174-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-51.7=** | OC-48/STM-16, SFP, 1551.72, 100 GHz, LC | 10-2175-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-52.5=** | OC-48/STM-16, SFP, 1552.52, 100 GHz, LC | 10-2176-02 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-2G-53.3=** | SFP - OC-48/STM16, 1553.33nm, 100 GHz, SM, LC | 10-2669-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-54.1=** | OC-48/STM-16, SFP, 1554.13, 100 GHz, LC | 10-2177-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-54.9=** | OC-48/STM-16, SFP, 1554.94, 100 GHz, LC | 10-2178-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-55.7=** | OC-48/STM-16, SFP, 1555.75, 100 GHz, LC | 10-2179-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-56.5=** | OC-48/STM-16, SFP, 1556.55, 100 GHz, LC | 10-2180-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-57.3=** | OC-48/STM-16, SFP, 1557.36, 100 GHz, LC | 10-2308-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-58.1=** | OC-48/STM-16, SFP, 1558.17, 100 GHz, LC | 10-2181-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-58.9=** | OC-48/STM-16, SFP, 1558.98, 100 GHz, LC | 10-2182-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-59.7=** | OC-48/STM-16, SFP, 1559.79, 100 GHz, LC | 10-2183-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-2G-60.6=** | OC-48/STM-16, SFP, 1560.61, 100 GHz, LC | 10-2184-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-30.3=** | SFP - 4G FC 1530.33, 100 GHz, LC - Commercial Temp | 10-2487-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-31.1=** | SFP - 4G FC 1531.12, 100 GHz, LC - Commercial Temp | 10-2488-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-31.9=** | SFP - 4G FC 1531.90, 100 GHz, LC - Commercial Temp | 10-2489-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-32.6=** | SFP - 4G FC 1532.68, 100 GHz, LC - Commercial Temp | 10-2490-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-33.4=** | SFP - 4G FC 1533.47, 100 GHz, LC - Commercial Temp | 10-2491-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-34.2=** | SFP - 4G FC 1534.25, 100 GHz, LC - Commercial Temp | 10-2523-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-35.0=** | SFP - 4G FC 1535.04, 100 GHz, LC - Commercial Temp | 10-2492-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-35.8=** | SFP - 4G FC 1535.82, 100 GHz, LC - Commercial Temp | 10-2493-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-36.6=** | SFP - 4G FC 1536.61, 100 GHz, LC - Commercial Temp | 10-2494-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-4G-37.4=** | SFP - 4G FC 1537.40, 100 GHz, LC - Commercial Temp | 10-2495-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-38.1=** | SFP - 4G FC 1538.19, 100 GHz, LC - Commercial Temp | 10-2496-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-38.9=** | SFP - 4G FC 1538.98, 100 GHz, LC - Commercial Temp | 10-2497-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-39.7=** | SFP - 4G FC 1539.77, 100 GHz, LC - Commercial Temp | 10-2502-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-40.5=** | SFP - 4G FC 1540.56, 100 GHz, LC - Commercial Temp | 10-2503-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-41.3=** | SFP - 4G FC 1541.35, 100 GHz, LC - Commercial Temp | 10-2498-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-42.1=** | SFP - 4G FC 1542.14, 100 GHz, LC - Commercial Temp | 10-2499-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-42.9=** | SFP - 4G FC 1542.94, 100 GHz, LC - Commercial Temp | 10-2500-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-43.7=** | SFP - 4G FC 1543.73, 100 GHz, LC - Commercial Temp | 10-2501-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-44.5=** | SFP - 4G FC 1544.53, 100 GHz, LC - Commercial Temp | 10-2521-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-45.3=** | SFP - 4G FC 1545.32, 100 GHz, LC - Commercial Temp | 10-2527-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-46.1=** | SFP - 4G FC 1546.12, 100 GHz, LC - Commercial Temp | 10-2520-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-46.9=** | SFP - 4G FC 1546.92, 100 GHz, LC - Commercial Temp | 10-2519-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-47.7=** | SFP - 4G FC 1547.72, 100 GHz, LC - Commercial Temp | 10-2518-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-48.5=** | SFP - 4G FC 1548.51, 100 GHz, LC - Commercial Temp | 10-2517-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-49.3=** | SFP - 4G FC 1549.32, 100 GHz, LC - Commercial Temp | 10-2516-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-4G-50.1=** | SFP - 4G FC 1550.12, 100 GHz, LC - Commercial Temp | 10-2515-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-50.9=** | SFP - 4G FC 1550.92, 100 GHz, LC - Commercial Temp | 10-2514-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-51.7=** | SFP - 4G FC 1551.72, 100 GHz, LC - Commercial Temp | 10-2526-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-52.5=** | SFP - 4G FC 1552.52, 100 GHz, LC - Commercial Temp | 10-2513-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-53.3=** | SFP - 4G FC 1553.33, 100 GHz, LC - Commercial Temp | 10-2512-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-54.1=** | SFP - 4G FC 1554.13, 100 GHz, LC - Commercial Temp | 10-2525-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-54.9=** | SFP - 4G FC 1554.94, 100 GHz, LC - Commercial Temp | 10-2511-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-55.7=** | SFP - 4G FC 1555.75, 100 GHz, LC - Commercial Temp | 10-2510-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-56.5=** | SFP - 4G FC 1556.55, 100 GHz, LC - Commercial Temp | 10-2509-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-57.3=** | SFP - 4G FC 1557.36, 100 GHz, LC - Commercial Temp | 10-2524-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-58.1=** | SFP - 4G FC 1558.17, 100 GHz, LC - Commercial Temp | 10-2508-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-58.9=** | SFP - 4G FC 1558.98, 100 GHz, LC - Commercial Temp | 10-2507-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-59.7=** | SFP - 4G FC 1559.79, 100 GHz, LC - Commercial Temp | 10-2506-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-60.6=** | SFP - 4G FC 1560.61, 100 GHz, LC - Commercial Temp | 10-2505-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-SC-4G-61.4=** | SFP - 4G FC 1561.43, 100 GHz, LC - Commercial Temp | 10-2504-01 | ITU G694, GR2918 | 0 to +70 |

### CWDM SFP modules

Cisco offers a wide range of Coarse Wavelength-Division Multiplexing (CWDM) ITU-T-compliant SFP modules. Table 7 lists the details.

**Table 7.** CWDM SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-155-1470=** | SFP - OC-3/STM-1, CWDM, 1470 nm, EXT | 10-1996-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1490=** | SFP - OC-3/STM-1, CWDM, 1490 nm, EXT | 10-1998-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1510=** | SFP - OC-3/STM-1, CWDM, 1510 nm, EXT | 10-1999-01 | ITU-T G.694.2 IEEE 802.3 FE | -10 to +85 |
| **ONS-SE-155-1530=** | SFP - OC-3/STM-1, CWDM, 1530 nm, EXT | 10-2000-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1550=** | SFP - OC-3/STM-1, CWDM, 1550 nm, EXT | 10-2001-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1570=** | SFP - OC-3/STM-1, CWDM, 1570 nm, EXT | 10-2002-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1590=** | SFP - OC-3/STM-1, CWDM, 1590 nm, EXT | 10-2003-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-155-1610=** | SFP - OC-3/STM-1, CWDM, 1610 nm, EXT | 10-1997-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1470=** | SFP - OC-12/STM-4, CWDM, 1470 nm, EXT | 10-2004-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1490=** | SFP - OC-12/STM-4, CWDM, 1490 nm, EXT | 10-2005-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1510=** | SFP - OC-12/STM-4, CWDM, 1510 nm, EXT | 10-2006-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1530=** | SFP - OC-12/STM-4, CWDM, 1530 nm, EXT | 10-2007-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1550=** | SFP - OC-12/STM-4, CWDM, 1550 nm, EXT | 10-2008-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1570=** | SFP - OC-12/STM-4, CWDM, 1570 nm, EXT | 10-2009-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SE-622-1590=** | SFP - OC-12/STM-4, CWDM, 1590 nm, EXT | 10-2010-01 | ITU-T G.694.2 | -10 to +85 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SE-622-1610=** | SFP - OC-12/STM-4, CWDM, 1610 nm, EXT | 10-2011-01 | ITU-T G.694.2 | -10 to +85 |
| **ONS-SC-Z3-1470=** | SFP - OC-48/STM-16/GE, CWDM, 1470 nm | 10-2285-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1490=** | SFP - OC-48/STM-16/GE, CWDM, 1490 nm | 10-2286-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1510=** | SFP - OC-48/STM-16/GE, CWDM, 1510 nm | 10-2287-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1530=** | SFP - OC-48/STM-16/GE, CWDM, 1530 nm | 10-2288-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1550=** | SFP - OC-48/STM-16/GE, CWDM, 1550 nm | 10-2289-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1570=** | SFP - OC-48/STM-16/GE, CWDM, 1570 nm | 10-2290-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1590=** | SFP - OC-48/STM-16/GE, CWDM, 1590 nm | 10-2291-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SC-Z3-1610=** | SFP - OC-48/STM-16/GE, CWDM, 1610 nm | 10-2292-01 | ITU-T G.694.2 | 0 to +70 |
| **ONS-SE-2G-1470=** | SFP - OC-48/STM-16/GE, CWDM, 1470 nm Ext Temp | 10-2461-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1490=** | SFP - OC-48/STM-16/GE, CWDM, 1490 nm Ext Temp | 10-2462-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1510=** | SFP - OC-48/STM-16/GE, CWDM, 1510 nm Ext Temp | 10-2463-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1530=** | SFP - OC-48/STM-16/GE, CWDM, 1530 nm Ext Temp | 10-2464-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1550=** | SFP - OC-48/STM-16/GE, CWDM, 1550 nm Ext Temp | 10-2465-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1570=** | SFP - OC-48/STM-16/GE, CWDM, 1570 nm Ext Temp | 10-2466-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1590=** | SFP - OC-48/STM-16/GE, CWDM, 1590 nm Ext Temp | 10-2467-01 | ITU-T G.694.2 | 0 to +85 |
| **ONS-SE-2G-1610=** | SFP - OC-48/STM-16/GE, CWDM, 1610 nm Ext Temp | 10-2468-01 | ITU-T G.694.2 | 0 to +85 |

### Grey GBICs

Cisco offers a range of Grey GBICs. Table 8 provides the details.

**Table 8.** Grey GBICs

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **ONS-GC-GE-LX=** | 1000BASE-LX, SC, SM, or MM | 10-2191-01 | 1000BASE-SX IEEE-802.3 | 0 to +70 |
| **ONS-GC-GE-SX=** | 1000BASE-SX, SC, MM | 10-2192-01 | 1000BASE-LX IEEE-802.3 | 0 to +70 |
| **ONS-GC-GE-ZX=** | 1000BASE-ZX, SM | 10-2190-01 | 1000BASE-ZX IEEE-802.3 | 0 to +70 |
| **ONS-GX-2FC-MMI=** | 1 Gbps or 2 Gbps, 850 nm, SC, MM | 10-2015-01 | 100-M5-SN-I, 100-M6-SN-I, 200-M5-SN-I, 200-M6-SN-I | -10 to +85 |
| **ONS-GX-2FC-SML=** | 1 Gbps or 2 Gbps, 1310 nm, SC, SM | 10-2016-01 | 100-SM-LC-L 200-SM-LC-L | -10 to +85 |

### CWDM GBICs

Cisco offers a range of CWDM GBICs. Table 9 lists details.

**Table 9.** CWDM GBICs

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **15454-GBIC-1470= EOS** | 1000BASE-CWDM 1470 nm GBIC (single mode only) | 10-1453-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1490= EOS** | 1000BASE-CWDM 1490 nm GBIC (single mode only) | 10-1454-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1510= EOS** | 1000BASE-CWDM 1510 nm GBIC (single mode only) | 10-1455-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1530= EOS** | 1000BASE-CWDM 1530 nm GBIC (single mode only) | 10-1456-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1550= EOS** | 1000BASE-CWDM 1550 nm GBIC (single mode only) | 10-1457-01 | ITU-T G.694.2 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **15454-GBIC-1570= EOS** | 1000BASE-CWDM 1570 nm GBIC (single mode only) | 10-1458-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1590= EOS** | 1000BASE-CWDM 1590 nm GBIC (single mode only) | 10-1459-01 | ITU-T G.694.2 | 0 to +70 |
| **15454-GBIC-1610= EOS** | 1000BASE-CWDM 1610 nm GBIC (single mode only) | 10-1460-01 | ITU-T G.694.2 | 0 to +70 |

### DWDM GBICs

Cisco offers a wide range of DWDM GBICs. Table 10 lists the details.

**Table 10.** DWDM GBICs

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **15454-GBIC-30.3= EOS** | 1000BASE-DWDM 1530.33 nm GBIC | 10-1845-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-31.1= EOS** | 1000BASE-DWDM 1531.12 nm GBIC | 10-1846-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-31.9= EOS** | 1000BASE-DWDM 1531.90 nm GBIC | 10-1847-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-32.6= EOS** | 1000BASE-DWDM 1532.68 nm GBIC | 10-1848-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-34.2= EOS** | 1000BASE-DWDM 1534.25 nm GBIC | 10-1849-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-35.0= EOS** | 1000BASE-DWDM 1535.04 nm GBIC | 10-1850-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-35.8= EOS** | 1000BASE-DWDM 1535.82 nm GBIC | 10-1851-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-36.6= EOS** | 1000BASE-DWDM 1536.61 nm GBIC | 10-1852-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-38.1= EOS** | 1000BASE-DWDM 1538.19 nm GBIC | 10-1853-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-38.9= EOS** | 1000BASE-DWDM 1538.98 nm GBIC | 10-1854-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **15454-GBIC-39.7= EOS** | 1000BASE-DWDM 1539.77 nm GBIC | 10-1855-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-40.5= EOS** | 1000BASE-DWDM 1540.56 nm GBIC | 10-1856-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-42.1= EOS** | 1000BASE-DWDM 1542.14 nm GBIC | 10-1857-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-42.9= EOS** | 1000BASE-DWDM 1542.94 nm GBIC | 10-1858-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-43.7= EOS** | 1000BASE-DWDM 1543.73 nm GBIC | 10-1859-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-44.5= EOS** | 1000BASE-DWDM 1544.53 nm GBIC | 10-1860-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-46.1= EOS** | 1000BASE-DWDM 1546.12 nm GBIC | 10-1861-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-46.9= EOS** | 1000BASE-DWDM 1546.92 nm GBIC | 10-1862-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-47.7= EOS** | 1000BASE-DWDM 1547.72 nm GBIC | 10-1863-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-48.5= EOS** | 1000BASE-DWDM 1548.51 nm GBIC | 10-1864-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-50.1= EOS** | 1000BASE-DWDM 1550.12 nm GBIC | 10-1865-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-50.9= EOS** | 1000BASE-DWDM 1550.92 nm GBIC | 10-1866-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-51.7= EOS** | 1000BASE-DWDM 1551.72 nm GBIC | 10-1867-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-52.5= EOS** | 1000BASE-DWDM 1552.52 nm GBIC | 10-1868-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **15454-GBIC-54.1= EOS** | 1000BASE-DWDM 1554.13 nm GBIC | 10-1869-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-54.9= EOS** | 1000BASE-DWDM 1554.94 nm GBIC | 10-1870-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-55.7= EOS** | 1000BASE-DWDM 1555.75 nm GBIC | 10-1871-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-56.5= EOS** | 1000BASE-DWDM 1556.55 nm GBIC | 10-1872-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-58.1= EOS** | 1000BASE-DWDM 1558.17 nm GBIC | 10-1873-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-58.9= EOS** | 1000BASE-DWDM 1558.98 nm GBIC | 10-1874-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-59.7= EOS** | 1000BASE-DWDM 1559.79 nm GBIC | 10-1875-01 | ITU G694, GR2918 | 0 to +70 |
| **15454-GBIC-60.6= EOS** | 1000BASE-DWDM 1560.61 nm GBIC | 10-1876-01 | ITU G694, GR2918 | 0 to +70 |

### XFP Modules

Cisco offers a range of XFP modules, listed in tables 11, 12, and 13.

**Table 11.** Grey (Non-DWDM) XFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-S1=** | XFP - OC-192/STM-64/10GE - 1310 SR - SM LC | 10-2012-03 | ITU G694 I-64.1<br>GR253 SR-1<br>10GE BASE LR<br>1200-SM-LL-L<br>IB-1x-DDR-LX | 0 to +70 |
| **ONS-XC-10G-I2=** | XFP - OC-192/STM-64/10GE - 1550 IR2 - SM LC | 10-2193-02 | ITU G694 S-64.2b<br>GR253 IR-2<br>10GE BASE-ER | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-L2=** | XFP - OC-192/STM-64 - 1550 LR2 - SM LC | 10-2194-02 | ITU G959.1 P1L1-2D2<br>GR253 LR-2<br>10GE BASE-ZR | 0 to +70 |
| **ONS-XC-10G-SR-MM=** | XFP - Ultra Short Reach MM -10GE BASE SR | 10-2420-01 | 1200-MX-SN-I/<br>10GE BASE-SR | 0 to +70 |
| **ONS-XC-8G-FC-SM=** | 8G FC XFP SM | 10-2484-01 | FC-PI-4 800-SN-LC-L | 0 to +70 |
| **ONS-XC-8G-FC-MM=** | 8G FC XFP MM | 10-2623-01 | 800-M5-SN-I<br>800-M6-SN-I | 0 to +70 |

**Table 12.** DWDM XFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-C=** | 10G Multirate Full C Band Tunable DWDM XFP, 50 GHz, LC | 10-2480-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-96C=** | XFP - 10G 96 ch Full C Band Tunable DWDM XFP, 50 GHz, LC | 10-2789-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-30.3=** | OC-192/STM-64/10GE, XFP, 1530.33, 100 GHz, LC | 10-2347-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-31.1=** | OC-192/STM-64/10GE, XFP, 1531.12, 100 GHz, LC | 10-2346-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-31.9=** | OC-192/STM-64/10GE, XFP, 1531.90, 100 GHz, LC | 10-2344-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-32.6=** | OC-192/STM-64/10GE, XFP, 1532.68, 100 GHz, LC | 10-2345-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-33.4=** | OC-192/STM-64/10GE, XFP, 1533.47, 100 GHz, LC | 10-2343-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-34.2=** | OC-192/STM-64/10GE, XFP, 1534.25, 100 GHz, LC | 10-2342-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-35.0=** | OC-192/STM-64/10GE, XFP, 1535.04, 100 GHz, LC | 10-2341-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-35.8=** | OC-192/STM-64/10GE, XFP, 1535.82, 100 GHz, LC | 10-2340-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-36.6=** | OC-192/STM-64/10GE, XFP, 1536.61, 100 GHz, LC | 10-2339-02 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-37.4=** | OC-192/STM-64/10GE, XFP, 1537.40, 100 GHz, LC | 10-2338-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-38.1=** | OC-192/STM-64/10GE, XFP, 1531.90, 100 GHz, LC | 10-2337-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-38.9=** | OC-192/STM-64/10GE, XFP, 1538.19, 100 GHz, LC | 10-2336-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-39.7=** | OC-192/STM-64/10GE, XFP, 1539.77, 100 GHz, LC | 10-2335-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-40.5=** | OC-192/STM-64/10GE, XFP, 1540.56, 100 GHz, LC | 10-2348-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-41.3=** | OC-192/STM-64/10GE, XFP, 1541.35, 100 GHz, LC | 10-2334-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-42.1=** | OC-192/STM-64/10GE, XFP, 1542.14, 100 GHz, LC | 10-2333-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-42.9=** | OC-192/STM-64/10GE, XFP, 1542.94, 100 GHz, LC | 10-2332-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-43.7=** | OC-192/STM-64/10GE, XFP, 1543.73, 100 GHz, LC | 10-2331-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-44.5=** | OC-192/STM-64/10GE, XFP, 1544.53, 100 GHz, LC | 10-2330-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-45.3=** | OC-192/STM-64/10GE, XFP, 1545.32, 100 GHz, LC | 10-2329-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-46.1=** | OC-192/STM-64/10GE, XFP, 1546.12, 100 GHz, LC | 10-2328-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-46.9=** | OC-192/STM-64/10GE, XFP, 1546.92, 100 GHz, LC | 10-2327-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-47.7=** | OC-192/STM-64/10GE, XFP, 1547.72, 100 GHz, LC | 10-2326-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-48.5=** | OC-192/STM-64/10GE, XFP, 1548.51, 100 GHz, LC | 10-2325-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-49.3=** | OC-192/STM-64/10GE, XFP, 1549.32, 100 GHz, LC | 10-2324-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-50.1=** | OC-192/STM-64/10GE, XFP, 1550.12, 100 GHz, LC | 10-2323-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-50.9=** | OC-192/STM-64/10GE, XFP, 1550.92, 100 GHz, LC | 10-2322-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-51.7=** | OC-192/STM-64/10GE, XFP, 1551.72, 100 GHz, LC | 10-2321-02 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-52.5=** | OC-192/STM-64/10GE, XFP, 1552.52, 100 GHz, LC | 10-2320-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-53.3=** | OC-192/STM-64/10GE, XFP, 1553.33, 100 GHz, LC | 10-2319-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-54.1=** | OC-192/STM-64/10GE, XFP, 1554.13, 100 GHz, LC | 10-2318-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-54.9=** | OC-192/STM-64/10GE, XFP, 1554.94, 100 GHz, LC | 10-2317-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-55.7=** | OC-192/STM-64/10GE, XFP, 1555.75, 100 GHz, LC | 10-2316-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-56.5=** | OC-192/STM-64/10GE, XFP, 1556.55, 100 GHz, LC | 10-2315-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-57.3=** | OC-192/STM-64/10GE, XFP, 1557.36, 100 GHz, LC | 10-2314-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-58.1=** | OC-192/STM-64/10GE, XFP, 1558.17, 100 GHz, LC | 10-2313-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-58.9=** | OC-192/STM-64/10GE, XFP, 1558.98, 100 GHz, LC | 10-2312-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-59.7=** | OC-192/STM-64/10GE, XFP, 1559.79, 100 GHz, LC | 10-2311-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-60.6=** | OC-192/STM-64/10GE, XFP, 1560.61, 100 GHz, LC | 10-2310-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-61.4=** | OC-192/STM-64/10GE, XFP, 1561.43, 100 GHz, LC | 10-2309-02 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP30.3=** | 10G MR, XFP, Edge Performance 1530.33, 100 GHz, LC | 10-2577-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP31.1=** | 10G MR, XFP, Edge Performance 1531.12, 100 GHz, LC | 10-2579-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP31.9=** | 10G MR, XFP, Edge Performance 1531.90, 100 GHz, LC | 10-2580-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP32.6=** | 10G MR, XFP, Edge Performance 1532.68, 100 GHz, LC | 10-2581-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP33.4=** | 10G MR, XFP, Edge Performance 1533.47, 100 GHz, LC | 10-2582-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-EP34.2=** | 10G MR, XFP, Edge Performance 1534.25, 100 GHz, LC | 10-2578-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP35.0=** | 10G MR, XFP, Edge Performance 1535.04, 100 GHz, LC | 10-2611-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP35.8=** | 10G MR, XFP, Edge Performance 1535.82, 100 GHz, LC | 10-2604-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP36.6=** | 10G MR, XFP, Edge Performance 1536.61, 100 GHz, LC | 10-2615-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP37.4=** | 10G MR, XFP, Edge Performance 1537.40, 100 GHz, LC | 10-2608-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP38.1=** | 10G MR, XFP, Edge Performance 1538.19, 100 GHz, LC | 10-2610-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP38.9=** | 10G MR, XFP, Edge Performance 1538.98, 100 GHz, LC | 10-2612-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP39.7=** | 10G MR, XFP, Edge Performance 1539.77, 100 GHz, LC | 10-2609-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP40.5=** | 10G MR, XFP, Edge Performance 1540.56, 100 GHz, LC | 10-2607-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP41.3=** | 10G MR, XFP, Edge Performance 1541.35, 100 GHz, LC | 10-2606-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP42.1=** | 10G MR, XFP, Edge Performance 1542.14, 100 GHz, LC | 10-2605-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP42.9=** | 10G MR, XFP, Edge Performance 1542.94, 100 GHz, LC | 10-2603-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP43.7=** | 10G MR, XFP, Edge Performance 1543.73, 100 GHz, LC | 10-2590-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP44.5=** | 10G MR, XFP, Edge Performance 1544.53, 100 GHz, LC | 10-2602-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-EP45.3=** | 10G MR, XFP, Edge Performance 1545.32, 100 GHz, LC | 10-2601-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP46.1=** | 10G MR, XFP, Edge Performance 1546.12, 100 GHz, LC | 10-2589-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP46.9=** | 10G MR, XFP, Edge Performance 1546.92, 100 GHz, LC | 10-2588-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP47.7=** | 10G MR, XFP, Edge Performance 1547.72, 100 GHz, LC | 10-2600-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP48.5=** | 10G MR, XFP, Edge Performance 1548.51, 100 GHz, LC | 10-2599-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP49.3=** | 10G MR, XFP, Edge Performance 1549.32, 100 GHz, LC | 10-2587-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP50.1=** | 10G MR, XFP, Edge Performance 1550.12, 100 GHz, LC | 10-2598-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP50.9=** | 10G MR, XFP, Edge Performance 1550.92, 100 GHz, LC | 10-2597-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP51.7=** | 10G MR, XFP, Edge Performance 1551.72, 100 GHz, LC | 10-2596-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP52.5=** | 10G MR, XFP, Edge Performance 1552.52, 100 GHz, LC | 10-2614-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP53.3=** | 10G MR, XFP, Edge Performance 1553.33, 100 GHz, LC | 10-2595-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP54.1=** | 10G MR, XFP, Edge Performance 1554.13, 100 GHz, LC | 10-2586-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP54.9=** | 10G MR, XFP, Edge Performance 1554.94, 100 GHz, LC | 10-2585-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP55.7=** | 10G MR, XFP, Edge Performance 1555.75, 100 GHz, LC | 10-2594-01 | ITU G694, GR2918 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **ONS-XC-10G-EP56.5=** | 10G MR, XFP, Edge Performance 1556.55, 100 GHz, LC | 10-2613-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP57.3=** | 10G MR, XFP, Edge Performance 1557.36, 100 GHz, LC | 10-2584-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP58.1=** | 10G MR, XFP, Edge Performance 1558.17, 100 GHz, LC | 10-2583-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP58.9=** | 10G MR, XFP, Edge Performance 1558.98, 100 GHz, LC | 10-2593-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP59.7=** | 10G MR, XFP, Edge Performance 1559.79, 100 GHz, LC | 10-2576-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP60.6=** | 10G MR, XFP, Edge Performance 1560.61, 100 GHz, LC | 10-2592-01 | ITU G694, GR2918 | 0 to +70 |
| **ONS-XC-10G-EP61.4=** | 10G MR, XFP, Edge Performance 1561.43, 100 GHz, LC | 10-2591-01 | ITU G694, GR2918 | 0 to +70 |

**Table 13.** CWDM XFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (°C) |
|---|---|---|---|---|
| **ONS-XC-10G-1470=** | OC192/10GE/OTU2, CWDM, 1470mn, XFP C-Temp, 40km range | 10-2548-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1490=** | OC192/10GE/OTU2, CWDM, 1490mn, XFP C-Temp, 40km range | 10-2551-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1510=** | OC192/10GE/OTU2, CWDM, 1510mn, XFP C-Temp, 40km range | 10-2552-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1530=** | OC192/10GE/OTU2, CWDM, 1530nm, XFP C-Temp, 40km range | 10-2553-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1550=** | OC192/10GE/OTU2, CWDM, 1550nm, XFP C-Temp, 40km range | 10-2554-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1570=** | OC192/10GE/OTU2, CWDM, 1570nm, XFP C-Temp, 40km range | 10-2555-01 | ITU G694.2 | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-XC-10G-1590=** | OC192/10GE/OTU2, CWDM, 1590nm, XFP C-Temp, 40km range | 10-2556-01 | ITU G694.2 | 0 to +70 |
| **ONS-XC-10G-1610=** | OC192/10GE/OTU2, CWDM, 1610nm, XFP C-Temp, 40km range | 10-2557-01 | ITU G694.2 | 0 to +70 |

### Video SFP modules

Cisco offers two types of video SFP modules, one for transmission and the other for reception of video. The video protocols supported by this pluggable is High Definition (HD) 3G, Standard Definition (SD) Serial Digital Interface (SDI). Table 14 lists the details.

**Table 14.** Video SFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC-HD3GV-TX=** | SFP - 3G HD Video Tx | 10-2630-01 | SMPTE 259M SD-SDI<br>SMPTE 292M HD-SDI<br>SMPTE 424M 3G-SDI | 0 to +70 |
| **ONS-SC-HD3GV-RX=** | SFP - 3G HD Video RX | 10-2629-01 | SMPTE 259M SD-SDI<br>SMPTE 292M HD-SDI<br>SMPTE 424M 3G-SDI | 0 to +70 |

### SFP+ modules

Cisco offers a wide range of SFP+ modules listed in tables 15, 16, and 17.

**Table 15.** Grey SFP+ modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC+-10G-SR=** | SFP+ SR - Commercial Temp | 10-2620-01 | IEEE 802.3 10GE BASE SR, OIF VSR4-1, FC-PI-4, ITU-T G.709 | 0 to +70 |
| **ONS-SC+-10G-ER=** | SFP+ ER - Commercial Temp | 10-2619-01 | IEEE 802.3 10GE BASE-ER, Telcordia GR-253 OC192 IR2, FC-PI-4, ITU-T G.709 | 0 to +70 |
| **ONS-SC+-10G-LR=** | SFP+ LR - Commercial Temp | 10-2618-01 | IEEE 802.3 10GE BASE-LR, Telcordia GR-253 OC192 SR1, FC-PI-4, ITU-T G.709, 8G FC | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC+-10G-ZR=** | SFP+ ZR - Commercial Temp | 10-2730-01 | IEEE 802.3 10GE BASE-ZR, Telcordia GR-253 OC192 LR2, FC-PI-4, ITU-T G.709 | 0 to +70 |
| **ONS-SI+-10G-SR=** | SFP+ SR - Industrial Temp | 10-3425-01 | IEEE 802.3 ae, 10GE BASE SR, FC-PI-4, 10G FC Rev 4.0, SFF-8431, SFF-8472 | -40 to +85 |
| **ONS-SI+-10G-LR=** | SFP+ LR - Industrial Temp | 10-3426-01 | IEEE 802.3 ae, 10GE BASE LR, FC-PI-4, 10G FC Rev 4.0, SFF-8431, SFF-8472 | -40 to +85 |
| **ONS-SI+-10G-ER=** | SFP+ ER - Industrial Temp | 10-3427-01 | IEEE 802.3 ae, 10GE BASE ER, FC-PI-4, 10G FC Rev 4.0, 8.5 Gb/s Fiber Channel, SFF-8431, 8432, SFF-8472 | -40 to +85 |
| **ONS-SI+-10G-ZR=** | SFP+-ZR- Industrial Temp | 10-3428-01 | IEEE 802.3 10GE BASE-ZR, Telcordia GR-253 OC192 LR2, FC-PI-4, ITU-T G.709 | -28 to +85 |

**Note:** Pluggables in Table 15 are multi-rate pluggables that support OC-192, STM-64, 10 Gigabit Ethernet, OTU2e, and 8G Fibre Channel rates.

**Table 16.** DWDM SFP+ modules

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10G-C=** | SFP+ -10G MR, Full C Band Tunable DWDM SFP+, 50 GHz, LC | 10-2841-01 | 0 to +70 |
| **ONS-SC+-10G-30.3=** | 10G MR, SFP+ 1530.33, 100 GHz, LC | 10-2690-01 | 0 to +70 |
| **ONS-SC+-10G-31.1=** | 10G MR, SFP+ 1531.12, 100 GHz, LC | 10-2693-01 | 0 to +70 |
| **ONS-SC+-10G-31.9=** | 10G MR, SFP+ 1531.90, 100 GHz, LC | 10-2691-01 | 0 to +70 |
| **ONS-SC+-10G-32.6=** | 10G MR, SFP+ 1532.68, 100 GHz, LC | 10-2692-01 | 0 to +70 |
| **ONS-SC+-10G-33.4=** | 10G MR, SFP+ 1533.47, 100 GHz, LC | 10-2694-01 | 0 to +70 |
| **ONS-SC+-10G-34.2=** | 10G MR, SFP+ 1534.25, 100 GHz, LC | 10-2698-01 | 0 to +70 |
| **ONS-SC+-10G-35.0=** | 10G MR, SFP+ 1535.04, 100 GHz, LC | 10-2699-01 | 0 to +70 |
| **ONS-SC+-10G-35.8=** | 10G MR, SFP+ 1535.82, 100 GHz, LC | 10-2700-01 | 0 to +70 |
| **ONS-SC+-10G-36.6=** | 10G MR, SFP+ 1536.61, 100 GHz, LC | 10-2695-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10G-37.4=** | 10G MR, SFP+ 1537.40, 100 GHz, LC | 10-2696-01 | 0 to +70 |
| **ONS-SC+-10G-38.1=** | 10G MR, SFP+ 1538.19, 100 GHz, LC | 10-2701-01 | 0 to +70 |
| **ONS-SC+-10G-38.9=** | 10G MR, SFP+ 1538.98, 100 GHz, LC | 10-2702-01 | 0 to +70 |
| **ONS-SC+-10G-39.7=** | 10G MR, SFP+ 1539.77, 100 GHz, LC | 10-2703-01 | 0 to +70 |
| **ONS-SC+-10G-40.5=** | 10G MR, SFP+ 1540.56, 100 GHz, LC | 10-2704-01 | 0 to +70 |
| **ONS-SC+-10G-41.3=** | 10G MR, SFP+ 1541.35, 100 GHz, LC | 10-2705-01 | 0 to +70 |
| **ONS-SC+-10G-42.1=** | 10G MR, SFP+ 1542.14, 100 GHz, LC | 10-2706-01 | 0 to +70 |
| **ONS-SC+-10G-42.9=** | 10G MR, SFP+ 1542.94, 100 GHz, LC | 10-2707-01 | 0 to +70 |
| **ONS-SC+-10G-43.7=** | 10G MR, SFP+ 1543.73, 100 GHz, LC | 10-2708-01 | 0 to +70 |
| **ONS-SC+-10G-44.5=** | 10G MR, SFP+ 1544.53, 100 GHz, LC | 10-2709-01 | 0 to +70 |
| **ONS-SC+-10G-45.3=** | 10G MR, SFP+ 1545.32, 100 GHz, LC | 10-2710-01 | 0 to +70 |
| **ONS-SC+-10G-46.1=** | 10G MR, SFP+ 1546.12, 100 GHz, LC | 10-2711-01 | 0 to +70 |
| **ONS-SC+-10G-46.9=** | 10G MR, SFP+ 1546.92, 100 GHz, LC | 10-2697-01 | 0 to +70 |
| **ONS-SC+-10G-47.7=** | 10G MR, SFP+ 1547.72, 100 GHz, LC | 10-2712-01 | 0 to +70 |
| **ONS-SC+-10G-48.5=** | 10G MR, SFP+ 1548.51, 100 GHz, LC | 10-2722-01 | 0 to +70 |
| **ONS-SC+-10G-49.3=** | 10G MR, SFP+ 1549.32, 100 GHz, LC | 10-2723-01 | 0 to +70 |
| **ONS-SC+-10G-50.1=** | 10G MR, SFP+ 1550.12, 100 GHz, LC | 10-2713-01 | 0 to +70 |
| **ONS-SC+-10G-50.9=** | 10G MR, SFP+ 1550.92, 100 GHz, LC | 10-2724-01 | 0 to +70 |
| **ONS-SC+-10G-51.7=** | 10G MR, SFP+ 1551.72, 100 GHz, LC | 10-2725-01 | 0 to +70 |
| **ONS-SC+-10G-52.5=** | 10G MR, SFP+ 1552.52, 100 GHz, LC | 10-2717-01 | 0 to +70 |
| **ONS-SC+-10G-53.3=** | 10G MR, SFP+ 1553.33, 100 GHz, LC | 10-2714-01 | 0 to +70 |
| **ONS-SC+-10G-54.1=** | 10G MR, SFP+ 1554.13, 100 GHz, LC | 10-2718-01 | 0 to +70 |
| **ONS-SC+-10G-54.9=** | 10G MR, SFP+ 1554.94, 100 GHz, LC | 10-2715-01 | 0 to +70 |
| **ONS-SC+-10G-55.7=** | 10G MR, SFP+ 1555.75, 100 GHz, LC | 10-2716-01 | 0 to +70 |
| **ONS-SC+-10G-56.5=** | 10G MR, SFP+ 1556.55, 100 GHz, LC | 10-2726-01 | 0 to +70 |
| **ONS-SC+-10G-57.3=** | 10G MR, SFP+ 1557.36, 100 GHz, LC | 10-2729-01 | 0 to +70 |
| **ONS-SC+-10G-58.1=** | 10G MR, SFP+ 1558.17, 100 GHz, LC | 10-2719-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10G-58.9=** | 10G MR, SFP+ 1558.98, 100 GHz, LC | 10-2727-01 | 0 to +70 |
| **ONS-SC+-10G-59.7=** | 10G MR, SFP+ 1559.79, 100 GHz, LC | 10-2720-01 | 0 to +70 |
| **ONS-SC+-10G-60.6=** | 10G MR, SFP+ 1560.61, 100 GHz, LC | 10-2728-01 | 0 to +70 |
| **ONS-SC+-10G-61.4=** | 10G MR, SFP+ 1561.43, 100 GHz, LC | 10-2721-01 | 0 to +70 |
| **ONS-SC+-10GEP30.3=** | 10G MR, Edge Performance SFP+ 1530.33, 100 GHz, LC | 10-2873-01 | 0 to +70 |
| **ONS-SC+-10GEP30.7=** | 10G MR, Edge Performance SFP+ 1530.72, 100 GHz, LC | 10-2835-01 | 0 to +70 |
| **ONS-SC+-10GEP31.1=** | 10G MR, Edge Performance SFP+ 1531.12, 100 GHz, LC | 10-2881-01 | 0 to +70 |
| **ONS-SC+-10GEP31.5=** | 10G MR, Edge Performance SFP+ 1531.51, 100 GHz, LC | 10-2829-01 | 0 to +70 |
| **ONS-SC+-10GEP31.9=** | 10G MR, Edge Performance SFP+ 1531.90, 100 GHz, LC | 10-2871-01 | 0 to +70 |
| **ONS-SC+-10GEP32.2=** | 10G MR, Edge Performance SFP+ 1532.29, 100 GHz, LC | 10-2828-01 | 0 to +70 |
| **ONS-SC+-10GEP32.6=** | 10G MR, Edge Performance SFP+ 1532.68, 100 GHz, LC | 10-2882-01 | 0 to +70 |
| **ONS-SC+-10GEP33.0=** | 10G MR, Edge Performance SFP+ 1533.07, 100 GHz, LC | 10-2836-01 | 0 to +70 |
| **ONS-SC+-10GEP33.4=** | 10G MR, Edge Performance SFP+ 1533.47, 100 GHz, LC | 10-2874-01 | 0 to +70 |
| **ONS-SC+-10GEP33.8=** | 10G MR, Edge Performance SFP+ 1533.86, 100 GHz, LC | 10-2834-01 | 0 to +70 |
| **ONS-SC+-10GEP34.2=** | 10G MR, Edge Performance SFP+ 1534.25, 100 GHz, LC | 10-2891-01 | 0 to +70 |
| **ONS-SC+-10GEP34.6=** | 10G MR, Edge Performance SFP+ 1534.64, 100 GHz, LC | 10-2833-01 | 0 to +70 |
| **ONS-SC+-10GEP35.0=** | 10G MR, Edge Performance SFP+ 1535.04, 100 GHz, LC | 10-2883-01 | 0 to +70 |
| **ONS-SC+-10GEP35.4=** | 10G MR, Edge Performance SFP+ 1535.43, 100 GHz, LC | 10-2832-01 | 0 to +70 |
| **ONS-SC+-10GEP35.8=** | 10G MR, Edge Performance SFP+ 1535.82, 100 GHz, LC | 10-2884-01 | 0 to +70 |
| **ONS-SC+-10GEP36.2=** | 10G MR, Edge Performance SFP+ 1536.22, 100 GHz, LC | 10-2830-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10GEP36.6=** | 10G MR, Edge Performance SFP+ 1536.61, 100 GHz, LC | 10-2885-01 | 0 to +70 |
| **ONS-SC+-10GEP37.0=** | 10G MR, Edge Performance SFP+ 1537.00, 100 GHz, LC | 10-2827-01 | 0 to +70 |
| **ONS-SC+-10GEP37.4=** | 10G MR, Edge Performance SFP+ 1537.40, 100 GHz, LC | 10-2875-01 | 0 to +70 |
| **ONS-SC+-10GEP37.7=** | 10G MR, Edge Performance SFP+ 1537.79, 100 GHz, LC | 10-2831-01 | 0 to +70 |
| **ONS-SC+-10GEP38.1=** | 10G MR, Edge Performance SFP+ 1538.19, 100 GHz, LC | 10-2876-01 | 0 to +70 |
| **ONS-SC+-10GEP38.5=** | 10G MR, Edge Performance SFP+ 1538.58, 100 GHz, LC | 10-2826-01 | 0 to +70 |
| **ONS-SC+-10GEP38.9=** | 10G MR, Edge Performance SFP+ 1538.98, 100 GHz, LC | 10-2886-01 | 0 to +70 |
| **ONS-SC+-10GEP39.3=** | 10G MR, Edge Performance SFP+ 1539.37, 100 GHz, LC | 10-2825-01 | 0 to +70 |
| **ONS-SC+-10GEP39.7=** | 10G MR, Edge Performance SFP+ 1539.77, 100 GHz, LC | 10-2887-01 | 0 to +70 |
| **ONS-SC+-10GEP40.1=** | 10G MR, Edge Performance SFP+ 1540.16, 100 GHz, LC | 10-2824-01 | 0 to +70 |
| **ONS-SC+-10GEP40.5=** | 10G MR, Edge Performance SFP+ 1540.56, 100 GHz, LC | 10-2888-01 | 0 to +70 |
| **ONS-SC+-10GEP40.9=** | 10G MR, Edge Performance SFP+ 1540.95, 100 GHz, LC | 10-2823-01 | 0 to +70 |
| **ONS-SC+-10GEP41.3=** | 10G MR, Edge Performance SFP+ 1541.35, 100 GHz, LC | 10-2872-01 | 0 to +70 |
| **ONS-SC+-10GEP41.7=** | 10G MR, Edge Performance SFP+ 1541.75, 100 GHz, LC | 10-2819-01 | 0 to +70 |
| **ONS-SC+-10GEP42.1=** | 10G MR, Edge Performance SFP+ 1542.14, 100 GHz, LC | 10-2889-01 | 0 to +70 |
| **ONS-SC+-10GEP42.5=** | 10G MR, Edge Performance SFP+ 1542.54, 100 GHz, LC | 10-2822-01 | 0 to +70 |
| **ONS-SC+-10GEP42.9=** | 10G MR, Edge Performance SFP+ 1542.94, 100 GHz, LC | 10-2877-01 | 0 to +70 |
| **ONS-SC+-10GEP43.3=** | 10G MR, Edge Performance SFP+ 1543.33, 100 GHz, LC | 10-2821-01 | 0 to +70 |
| **ONS-SC+-10GEP43.7=** | 10G MR, Edge Performance SFP+ 1543.73, 100 GHz, LC | 10-2878-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10GEP44.1=** | 10G MR, Edge Performance SFP+ 1544.13, 100 GHz, LC | 10-2820-01 | 0 to +70 |
| **ONS-SC+-10GEP44.5=** | 10G MR, Edge Performance SFP+ 1544.53, 100 GHz, LC | 10-2879-01 | 0 to +70 |
| **ONS-SC+-10GEP44.9=** | 10G MR, Edge Performance SFP+ 1544.92, 100 GHz, LC | 10-2818-01 | 0 to +70 |
| **ONS-SC+-10GEP45.3=** | 10G MR, Edge Performance SFP+ 1545.32, 100 GHz, LC | 10-2880-01 | 0 to +70 |
| **ONS-SC+-10GEP45.7=** | 10G MR, Edge Performance SFP+ 1545.72, 100 GHz, LC | 10-2816-01 | 0 to +70 |
| **ONS-SC+-10GEP46.1=** | 10G MR, Edge Performance SFP+ 1546.12, 100 GHz, LC | 10-2890-01 | 0 to +70 |
| **ONS-SC+-10GEP46.5=** | 10G MR, Edge Performance SFP+ 1546.52, 100 GHz, LC | 10-2804-01 | 0 to +70 |
| **ONS-SC+-10GEP46.9=** | 10G MR, Edge Performance SFP+ 1546.92, 100 GHz, LC | 10-2892-01 | 0 to +70 |
| **ONS-SC+-10GEP47.3=** | 10G MR, Edge Performance SFP+ 1547.32, 100 GHz, LC | 10-2815-01 | 0 to +70 |
| **ONS-SC+-10GEP47.7=** | 10G MR, Edge Performance SFP+ 1547.72, 100 GHz, LC | 10-2895-01 | 0 to +70 |
| **ONS-SC+-10GEP48.1=** | 10G MR, Edge Performance SFP+ 1548.11, 100 GHz, LC | 10-2814-01 | 0 to +70 |
| **ONS-SC+-10GEP48.5=** | 10G MR, Edge Performance SFP+ 1548.51, 100 GHz, LC | 10-2893-01 | 0 to +70 |
| **ONS-SC+-10GEP48.9=** | 10G MR, Edge Performance SFP+ 1548.91, 100 GHz, LC | 10-2803-01 | 0 to +70 |
| **ONS-SC+-10GEP49.3=** | 10G MR, Edge Performance SFP+ 1549.32, 100 GHz, LC | 10-2894-01 | 0 to +70 |
| **ONS-SC+-10GEP49.7=** | 10G MR, Edge Performance SFP+ 1549.72, 100 GHz, LC | 10-2817-01 | 0 to +70 |
| **ONS-SC+-10GEP50.1=** | 10G MR, Edge Performance SFP+ 1550.12, 100 GHz, LC | 10-2897-01 | 0 to +70 |
| **ONS-SC+-10GEP50.5=** | 10G MR, Edge Performance SFP+ 1550.52, 100 GHz, LC | 10-2802-01 | 0 to +70 |
| **ONS-SC+-10GEP50.9=** | 10G MR, Edge Performance SFP+ 1550.92, 100 GHz, LC | 10-2896-01 | 0 to +70 |
| **ONS-SC+-10GEP51.3=** | 10G MR, Edge Performance SFP+ 1551.32, 100 GHz, LC | 10-2813-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10GEP51.7=** | 10G MR, Edge Performance SFP+ 1551.72, 100 GHz, LC | 10-2899-01 | 0 to +70 |
| **ONS-SC+-10GEP52.1=** | 10G MR, Edge Performance SFP+ 1552.12, 100 GHz, LC | 10-2801-01 | 0 to +70 |
| **ONS-SC+-10GEP52.5=** | 10G MR, Edge Performance SFP+ 1552.52, 100 GHz, LC | 10-2900-01 | 0 to +70 |
| **ONS-SC+-10GEP52.9=** | 10G MR, Edge Performance SFP+ 1552.93, 100 GHz, LC | 10-2811-01 | 0 to +70 |
| **ONS-SC+-10GEP53.3=** | 10G MR, Edge Performance SFP+ 1553.33, 100 GHz, LC | 10-2902-01 | 0 to +70 |
| **ONS-SC+-10GEP53.7=** | 10G MR, Edge Performance SFP+ 1553.73, 100 GHz, LC | 10-2812-01 | 0 to +70 |
| **ONS-SC+-10GEP54.1=** | 10G MR, Edge Performance SFP+ 1554.13, 100 GHz, LC | 10-2901-01 | 0 to +70 |
| **ONS-SC+-10GEP54.5=** | 10G MR, Edge Performance SFP+ 1554.54, 100 GHz, LC | 10-2809-01 | 0 to +70 |
| **ONS-SC+-10GEP54.9=** | 10G MR, Edge Performance SFP+ 1554.94, 100 GHz, LC | 10-2903-01 | 0 to +70 |
| **ONS-SC+-10GEP55.3=** | 10G MR, Edge Performance SFP+ 1555.34, 100 GHz, LC | 10-2808-01 | 0 to +70 |
| **ONS-SC+-10GEP55.7=** | 10G MR, Edge Performance SFP+ 1555.75, 100 GHz, LC | 10-2904-01 | 0 to +70 |
| **ONS-SC+-10GEP56.1=** | 10G MR, Edge Performance SFP+ 1556.15, 100 GHz, LC | 10-2810-01 | 0 to +70 |
| **ONS-SC+-10GEP56.5=** | 10G MR, Edge Performance SFP+ 1556.55, 100 GHz, LC | 10-2905-01 | 0 to +70 |
| **ONS-SC+-10GEP56.9=** | 10G MR, Edge Performance SFP+ 1556.96, 100 GHz, LC | 10-2807-01 | 0 to +70 |
| **ONS-SC+-10GEP57.3=** | 10G MR, Edge Performance SFP+ 1557.36, 100 GHz, LC | 10-2906-01 | 0 to +70 |
| **ONS-SC+-10GEP57.7=** | 10G MR, Edge Performance SFP+ 1557.77, 100 GHz, LC | 10-2806-01 | 0 to +70 |
| **ONS-SC+-10GEP58.1=** | 10G MR, Edge Performance SFP+ 1558.17, 100 GHz, LC | 10-2908-01 | 0 to +70 |
| **ONS-SC+-10GEP58.5=** | 10G MR, Edge Performance SFP+ 1558.58, 100 GHz, LC | 10-2805-01 | 0 to +70 |
| **ONS-SC+-10GEP58.9=** | 10G MR, Edge Performance SFP+ 1558.98, 100 GHz, LC | 10-2907-01 | 0 to +70 |

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SC+-10GEP59.3=** | 10G MR, Edge Performance SFP+ 1559.39, 100 GHz, LC | 10-2800-01 | 0 to +70 |
| **ONS-SC+-10GEP59.7=** | 10G MR, Edge Performance SFP+ 1559.79, 100 GHz, LC | 10-2909-01 | 0 to +70 |
| **ONS-SC+-10GEP60.2=** | 10G MR, Edge Performance SFP+ 1560.20, 100 GHz, LC | 10-2799-01 | 0 to +70 |
| **ONS-SC+-10GEP60.6=** | 10G MR, Edge Performance SFP+ 1560.61, 100 GHz, LC | 10-2910-01 | 0 to +70 |
| **ONS-SC+-10GEP61.0=** | 10G MR, Edge Performance SFP+ 1561.01, 100 GHz, LC | 10-2798-01 | 0 to +70 |
| **ONS-SC+-10GEP61.4=** | 10G MR, Edge Performance SFP+ 1561.42, 100 GHz, LC | 10-2911-01 | 0 to +70 |
| **ONS-SC+-10GEP61.8=** | 10G MR, Edge Performance SFP+ 1561.83, 100 GHz, LC | 10-2797-01 | to +70 |

**Note:** MR refers to multi-rate. 10G MR pluggables will support OC-192, STM-64, 10 Gigabit Ethernet, OTU2e, and 8G Fibre Channel rates. The applicable standards to the above DWDM SFP+ in Table 16 are: IEEE 802.3: 10-Gigabit Ethernet, ITU-T G.709, ITU-T G.975: GFEC, ITU-T G.975.1: EFECs, ITU-T694.1: DWDM

### SFP+ Smart cables

Cisco offers a range of copper-based smart SFP+ cable modules. Table 17 lists the details.

**Table 17.** Active cable

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-SC+-10G-CU1=** | 10GBASE-CU SFP+ Cable 1 Meter | 37-1188-01 | 10GE | 0 to +70 |
| **ONS-SC+-10G-CU3=** | 10GBASE-CU SFP+ Cable 3 Meter | 37-1197-01 | 10GE | 0 to +70 |
| **ONS-SC+-10G-CU5=** | 10GBASE-CU SFP+ Cable 5 Meter | 37-1198-01 | 10GE | 0 to +70 |
| **ONS-SC+-10G-CU7=** | 10GBASE-CU SFP+ Cable 7 Meter | 37-1196-01 | 10GE | 0 to +70 |

### CXP and CFP modules

Tables 18 and 19 list the details of the CXP and CFP modules currently offered for the Cisco ONS family

**Table 18.** CXP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-CXP-100G-SR10=** | CXP - 100GBASE-SR - Commercial temp | 10-2790-01 | InfiniBand CXP 12x QDR standard | 0 to +70 |

**Table 19.** CFP modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-CC-100G-LR4=** | 100G Multirate CFP - LR4 - Commercial temp | 10-2736-01 | CFP MSA; IEEE 802.3ba 100GBASE-LR4 | 0 to +70 |
| **ONS-CC-40G-LR4=** | 40G Multirate CFP - LR4 - Commercial Temp | 10-2744-01 | CFP MSA; IEEE 802.3ba 40GBASE-LR4 | 0 to +70 |
| **ONS-CC-40G-FR=** | 40G Multirate CFP- FR - Commercial Temp | 10-2839-01 | IEEE 802.3bg 40GBASE-FR | 0 to +70 |
| **ONS-CC-100GE-LR4=** | 100GE Single rate CFP - LR4 - Commercial temp | 10-2795-01 | CFP MSA; IEEE 802.3ba 100GBASE-LR4 | 0 to +70 |

Cisco offers a range of cables to interconnect CXP and CFPs. Table 20 lists the details.

**Table 20.** Active cable

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-CCC-100G-5=** | CXP-CFP MPO cable, 5m long | 39-0296-01 | 0 to +70 |
| **ONS-CCC-100G-10=** | CXP-CFP MPO cable, 10m long | 39-0294-01 | 0 to +70 |
| **ONS-CCC-100G-20=** | CXP-CFP MPO cable, 20m long | 39-0295-01 | 0 to +70 |

### Cisco CPAK modules

Cisco offers a range of Cisco CPAK modules listed in Table 21.

**Table 21.** Cisco CPAK modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **CPAK-100G-LR4=** | CPAK-100G-LR4 Transceiver module, 10km SMF | 800-39910-07 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, IEEE 802.3ba | 0 to +70 |
| **CPAK-100G-SR10=** | CPAK-100G-SR10 Transceiver module, 100m OM3 MMF | 800-41495-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, IEEE 802.3ba | 0 to +70 |
| **CPAK-100G-SR4=** | 100GBASE-SR4 Cisco CPAK Module for MMF | 800-103176-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, IEEE 802.3ba | 0 to +70 |

### QSFP+ modules

Cisco offers a range of QSFP+ modules listed in Table 22.

**Table 22.** QSFP+ modules

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **QSFP-40G-SR4=** | 40GBASE-SR4 QSFP Transceiver Module with MPO Connector | 10-2672-03 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, IEEE 802.3ba | 0 to +70 |
| **QSFP-100G-LR4-S=** | 100GBASE LR4 QSFP Transceiver, LC, 10km over SMF | 10-3146-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, GR-468-CORE, IEEE 802.3ba, IEEE 802.3bm | 0 to +70 |
| **QSFP-100G-SR4-S=** | 100GBASE SR4 QSFP Transceiver, MPO, 100m over OM4 MMF | 10-3142-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, GR-468-CORE, IEEE 802.3ba, IEEE 802.3bm | 0 to +70 |
| **QSFP-4X10G-LR-S=** | QSFP 4x10G Transceiver Module, SM MPO, 10KM, Enterprise-Class | 10-3118-02 | GR-20-CORE, GR-326-CORE, GR-1435-CORE | 0 to +70 |
| **QSFP-40G-LR4=** | Cisco 40GBASE-LR4 QSFP Module for SMF | 10-2842-02 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, IEEE 802.3ba | 0 to +70 |

| Product ID | Product Description | Part Number | Applicable Standard | Temperature Range (° C) |
|---|---|---|---|---|
| **ONS-QSFP-4X10-MLR=** | 4x10Gbps Multi-rate QSFP+, LR | 10-3205-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE | 0 to +70 |
| **ONS-QSFP28-LR4=** | 100Gbps Multi-rate QSFP28, LR | 10-3204-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, GR-468-CORE, IEEE 802.3ba, IEEE 802.3bm | 0 to +70 |
| **ONS-QC-16GFC-SW=** | 4 X 16G Channel QSFP+, MM, C Temp | 10-3313-01 | Derived from FC-PI-5. | 0 to +70 |
| **QSFP-100G-SM-SR** | 100GBASE CWDM4 Lite QSFP Transceiver, 2km over SMF, 10-60C | 10-3220-02 | 100G BASE CWDM4 | +10 to +60 |
| **ONS-QC-16GFC-LW=** | 4 X 16G Fiber Channel QSFP+, SM, C Temp | 10-3323-01 | Derived from FC-PI-5. | 0 to +70 |
| **ONS-QSFP-4X10-MER=** | 4x10Gbps Multi-rate QSFP+, ER | 10-3466-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE | 0 to +70 |
| **QSFP-40/100-SRBD** | 100G and 40GBASE SR-BiDi QSFP Transceiver, LC, 100m OM4 MMF | 10-3317-01 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, GR-468-CORE, IEEE 802.3bm, ROHS 6. | • 100G: +10C to +60C<br>• 40G: +10C to +70C |
| **QSFP-40G-SR-BD** | 40GBASE-SR-BiDi, duplex MMF | 10-2945-02 | GR-20-CORE, GR-326-CORE, GR-1435-CORE, GR-468-CORE, IEEE 802.3ba, IEEE 802.3ba, RoHS 6. | +10C to +70C |

### CFP2 modules

Cisco offers Analog CFP2 WDM pluggables capable of operation at 100G, 200G and 250G line rates. The pluggables available currently are listed in Table 23 alongside the new CXP2 pluggables used for multichassis interconnections on the NCS4000 and NCS6000 platforms.

Important Note: The CXP2 shipping today supports only 23Gbps per lane as the maximum linerate.

**Table 23.** CFP2 and CXP2 modules

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-CFP2-WDM=** | 100G QPSK/200G 16-QAM - WDM CFP2 Pluggable | 10-3128-02 | -5 to +75 |
| **ONS-CFP2-WDM-1KE=** | 100G QPSK / 200G 16-QAM - WDM CFP2 Pluggable, Enhanced | 10-3231-01 | 0 to +70 |
| **ONS-CFP2-WDM-1KL=** | 100G QPSK / 200G 16-QAM - WDM CFP2 Pluggable, C temp | 10-3230-01 | 0 to +70 |
| **ONS-CXP2-SR25** | CXP2 Transceiver module - 12x25G - Fabric Interconnect | 10-3250-01 | 0 to +70 |
| **ONS-CFP2-WDM2=** | 100G QPSK/200G 16-QAM - WDM CFP2 Pluggable | 10-3541-01 | -5 to +75 |

### Digital Optical modules

Cisco offers a brand new Digital CFP2 WDM pluggable capable of operation at 400G, 300G, 200G, 100G line rates. The pluggables are listed below and are supported on linecards in the NCS1000 and NCS2000 platforms.

**Table 24.** Digital CFP2 pluggables

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-CFP2D-400G-C=** | 400G CFP2 DCO Multi-rate WDM C Band Tuneable | 10-3500-01 | -5 to +75 |
| **DP04CFP2-M25-K9=** | 400G CFP2 DCO Multi-rate WDM C Band Tuneable with Encryption | 10-3555-01 | -5 to +75 |

### TPoP SFP modules

The TPoP SFP is a new SFP meant for transparent PDH transport over a packet network (TDM over packet to simplify). The pluggable mentioned below is not a “framed” solution though.

**Table 25.** TDM over packet pluggables

| Product ID | Product Description | Part Number | Temperature Range (° C) |
|---|---|---|---|
| **ONS-SI-DS1-TPOP=** | T1/DS1 TPoP SFP, Industrial Temp | 30-1617-01 | -40 to +85 |

# Chapter 2: Pluggable transceiver technical specifications

### SONET/SDH SFP modules

Cisco SFP modules are compatible with SONET/SDH standards, and they support the digital diagnostic functions specified in the SFF-8742 Multi-Source Agreement (MSA). Table below lists the optical parameters for the Cisco ONS SONET/SDH SFP modules.

**Table 26.** SONET/SDH SFP modules: Optical specifications

| Product ID | Operating Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Maximum Dispersion (ps/nm) |
|---|---|---|---|---|
| **15454-SFP3-1-IR=**<br>**ONS-SI-155-I1=** | 1261-1360 | -15 to -8 | -28 to -8 | 96 (at 155.52 Mbps) |
| **ONS-SI-155-L1=** | 1263-1360 | -5 to 0 | -34 to -10 | - |
| **ONS-SI-155-L2=** | 1480-1580 | -5 to 0 | -34 to -10 | - |
| **ONS-SI-155-SR-MM=** | 1270-1380 | -20 to -14 | -30 to -14 | - |
| **ONS-SI-622-SR-MM=** | 1270-1380 | -20 to -14 (50 μm)<br>-24 to -14 (62.5 μm) | -26 to -14 | - |
| **15454-SFP12-4-IR=**<br>**ONS-SI-622-I1=** | 1293-1334 | -15 to -8 | -28 to -8 | 46 (at 622.08 Mbps) |
| **ONS-SI-622-L1=** | 1280-1335 | -3 to +2 | -28 to -8 | - |
| **ONS-SI-622-L2=** | 1480-1580 | -3 to +2 | -28 to -8 | - |
| **ONS-SE-2G-S1=**<br>**ONS-SI-2G-S1=** | 1266-1360 | -10 to -3 | -18 to -3 | 12 |
| **ONS-SI-2G-I1=**<br>**15454-SFP-OC48-IR=** | 1260-1360 | -5 to 0 | -18 to 0 | - |
| **ONS-SI-2G-L1=** | 1280-1335 | -2 to +3 | -27 to -9 | - |
| **ONS-SE-2G-L2=**<br>**ONS-SI-2G-L2=** | 1500-1580 | -2 to +3 | -28 to -9 | 1200-1600[1] |

[1] The indicated dispersion range corresponds to the approximate worst-case dispersion for 80 km G.652/G.654 fiber over the wavelength range 1500-1580 nm.

### GBIC and Data SFP modules

The GBIC and data SFP modules for the Cisco ONS family are compatible with the IEEE 802.3, Single-Byte Command Code Sets Connection architecture (SBCON) Rev. 2.3 [ESCON], as well as ANSI INCITS 352-2002 Information technology - Fibre Channel - Physical Interfaces (FC-PI) Rev. 13 [1xFC and 2xFC]. They also support the digital diagnostic functions specified in the SFF-8742 MSA.

Tables below list the optical parameters for the GBIC and data SFP modules for the Cisco ONS Family.

**Table 27.** Ethernet pluggable modules: Optical specifications

| Product ID | Operating Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Maximum Dispersion (ps/nm) | Maximum Target Distance |
|---|---|---|---|---|---|
| **ONS-SE-100-LX10=** | 1260-1360 | -15 to -8 | -28 to -8 | - | 10 km |
| **ONS-SE-100-FX=** | 1270-1380 | -20 to -14[1] | -31 to -14 | - | |
| **ONS-SE-100-BX10U=** | 1260-1360 (TX)<br>1480-1580 (RX) | -14 to -8 | -28.2 to -7 | - | 10 km |
| **ONS-SE-100-BX10D=** | 1480-1580 (TX)<br>1260-1360 (RX) | -14 to -8 | -28.2 to -7 | - | 10 km |
| **ONS-SE-GE-BXU=** | 1260-1360 (TX)<br>1480-1500 (RX) | -9 to -3 | -19.5 to -3 | - | 10 km |
| **ONS-SE-GE-BXD=** | 1480-1500 (TX)<br>1260-1360 (RX) | -9 to -3 | -19.5 to -3 | - | 10 km |
| **15327-SFP-LC-SX=**<br>**15454-SFP-LC-SX=**<br>**ONS-SC-GE-SX=**<br>**ONS-SI-GE-SX=**<br>**15454-SFP-GEFC-SX=**<br>**ONS-SE-G2F-SX=**<br>**ONS-GC-GE-SX=** | 770-860 | -9.5 to 0 | -17 to 0[2] | - | 0.5 to 500 m<br>(50/125 μm fiber)<br>0.5 to 300 m (62.5/125 μm fiber) |

| Product ID | Operating Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Maximum Dispersion (ps/nm) | Maximum Target Distance |
|---|---|---|---|---|---|
| **15327-SFP-LC-LX=**<br>**15454-SFP-LC-LX/LH=**<br>**15454-SFP-GE+-LX=**<br>**ONS-SC-GE-LX=**<br>**ONS-SI-GE-LX=**<br>**ONS-SE-G2F-LX=**<br>**ONS-GC-GE-LX=** | 1270-1355 | -9.5 to -3 | -19 to -3[3] | - | 10 km |
| **ONS-SI-GE-EX=** | 1290-1355 (TX)<br>1260-1600 (RX) | -1 to +3 | -22 to +1 | - | 40 km |
| **ONS-GC-GE-ZX=**<br>**ONS-SI-GE-ZX=**<br>**ONS-SE-GE-ZX=** | 1500-1580 | 0 to +5 | -23 to -3 | 1200-1600[4] | 80 km |

[1] 62.5/125 µm, NA = 0.275 fiber.

[2] Minimum Stressed Sensitivity (10-12): -12.5(62.5um) and -13.5(50um) dBm.

[3] Minimum Stressed Sensitivity (10-12): -14.4 dBm.

[4] The indicated dispersion range corresponds to the approximate worst-case dispersion for 80 km G.652/G.654 fiber over the wavelength range 1500-1580 nm.

**Table 28.** ESCON SFP module: Optical specifications

| Product ID | Operating Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Maximum Dispersion (ps/nm) | Maximum Target Distance |
|---|---|---|---|---|---|
| **15454-SFP-200=**<br>**ONS-SE-200-MM=** | 1280-1380 | -20.5 to -15 | -14 to -29[1] | - | 2 km |

[1] Based on any valid 8B/10B code pattern measured at, or extrapolated to, 10E-15 BER measured at center of eye.

**Table 29.** Fibre Channel/FICON Pluggable modules: Optical specifications

| Product ID | Operating Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Sensitivity (dBm) | Operating Distance (m) |
|---|---|---|---|---|
| **1G FC/FICON (1062.5 Kbps)** | | | | |
| **15454-SFP-GEFC-SX=**<br>**ONS-SE-G2F-SX=** | 770-860 | -10 to -3.5 | -22 | 0.5 to 500 m (50/125 μm fiber)<br>0.5 to 300 m (62.5/125 μm fiber) |
| **ONS-GX-2FC-MMI=** | 770-860 | -10 to -2.5 | -22 | 0.5 to 500 m (50/125 μm fiber)<br>0.5 to 300 m (62.5/125 μm fiber) |
| **15454-SFP-GE+-LX=**<br>**ONS-SE-G2F-LX=** | 1270-1360 | -10 to -3.5 | -22 | 2 to 10,000 |
| **ONS-GX-2FC-SML=** | 1270-1355 | -9 to -3 | -23.5 | 2 to 10,000 |
| **2G FC/FICON (2125 Kbps)** | | | | |
| **15454-SFP-GEFC-SX=**<br>**ONS-SE-G2F-SX=** | 830-860 | -10 to -3.5 | -20 | 0.5 to 300 |
| **ONS-GX-2FC-MMI=** | 820-860 | -9.5 to -5 | -15 | 0.5 to 300 |
| **15454-SFP-GE+-LX=**<br>**ONS-SE-G2F-LX=** | 1270-1360 | -10 to -3.5 | -21 | 2 to 10,000 |
| **ONS-GX-2FC-SML=** | 1270-1355 | -9 to -3 | -23.5 | 2 to 10,000 |
| **4G FC/FICON (4250 Kbps)** | | | | |
| **ONS-SE-4G-MM=** | 830-860 | -9 to -3.5 | -15 | 0 to 150 (50/125 μm fiber)<br>0 to 70 (62.5/125 μm fiber) |
| **ONS-SE-4G-SM=** | 1270-1355 | -8.4 to -3 | 29 μW OMA[1] | 2 to 10,000 |

[1] Specified OMA at 4.25 Gbps is equivalent to an average power of -17.3 dBm at an ER of 9 dB.

### Multirate SFP module and video SFP modules

Table 28 shows the optical parameters of the multirate SFP module. Table below shows the parameters of video SFP modules.

**Table 30.** Multirate SFP module: Optical parameters

| Product ID | Operating Wavelength Range (nm) | Optical Transmit Power (dBm) | Receive Sensitivity (dBm) |
|---|---|---|---|
| **ONS-SE-Z1=** | 1270-1360 (Tx)<br>1270-1600 (Rx) | -5 to 0 | -18 (OC-48/STM-16<br>-22 (GE)<br>-23 (OC-12/STM-4)<br>-23 (OC-3/STM-1) |

**Table 31.** Video SFP modules: Optical parameters

| Product ID | Operating Wavelength Range (nm) | Optical Transmit Power (dBm) | Receive Sensitivity (dBm) |
|---|---|---|---|
| **ONS-SC-HD3GV-TX=** | 1270 - 1350 (min - max), 1310 (typical) | -3 to 0 | -20 |
| **ONS-SC-HD3GV-RX=** | 1270 - 1350 (min - max), 1310 (typical) | -3 to 0 | -20 |

### Optical Service Channel SFP module

Table below shows the optical parameters of the multirate Optical Service Channel SFP module.

**Table 32.** Multirate Optical Service Channel SFP module: Optical parameters

| Product ID | Operating Wavelength Range (nm) | Optical Transmit Power (dBm) | Maximum Dispersion (ps/nm) | Receive Sensitivity (dBm) |
|---|---|---|---|---|
| **ONS-SC-OSC-ULH=** | 1500-1520 | 1 to 5 | 4000 | -43 |
| **ONS-SC-OSC-18.0=** | 1518 | 2.5 to 7 | 4000 | -43 |

### CWDM and DWDM GBICs

Cisco ONS 15454 GBICs support both CWDM and DWDM. The specifications are shown in the tables below.

**Table 33.** CWDM GBIC: Optical specifications

| Product ID | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | Receiver Power Range (dBm) | Dispersion Penalty (dB) |
|---|---|---|---|---|
| **15454-GBIC-xxxx=**[1] | +1 to +5 | 1450-1620 | -29 to -7 | 2 (at 60 km)<br>3 (at 100 km) |

[1] Product ID xxxx ranges from 1470 to 1610.

**Table 34.** DWDM GBIC: Optical specifications

| Product ID | Receiver Wavelength Range (nm) | Transmitter Stability (pm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Dispersion Penalty (dB) |
|---|---|---|---|---|---|
| **15454-GBIC-xx.x=**[1] | 1450-1620 | -100 to +100 (100GHz spacing) | -2 to +3 | -28 to -7 (BER 10-12) | 2 (at 60 km)<br>3 (at 100 km) |

[1] Product ID xx.x ranges from 30.3 to 60.6.

### CWDM and DWDM SFP modules

Cisco offers a set of CWDM SFP modules for 155 Mbps and 622 Mbps, as well as DWDM SFPs for 2.5-Gbps applications.

**Table 35.** CWDM SFP modules: Optical specifications

| Product ID | Receiver Wavelength Range (nm) | Spectral Width (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) |
|---|---|---|---|---|
| **ONS-SE-155-xxxx=**[1] | 1460-1620 | 1 | 0 to +5 | -34 to -3 (BER 10-10) |
| **ONS-SE-622-xxxx=** | 1460-1620 | 1 | 0 to +5 | -28 to -3 (BER 10-10) |
| **ONS-SC-Z3-xxxx=** | 1460-1620 | 1 | 0 to +4 | -28 to -9 (BER 10-10) |
| **ONS-SE-2G-xxxx=** | 1460-1620 | 1 | -1 to +4 | -28 to -9 (BER 10-12) |

[1] Product ID xxxx ranges from 1470 to 1610.

**Table 36.** DWDM SFP modules: Optical specifications

| Product ID | Receiver Wavelength Range (nm) | Transmitter Stability (pm) | Spectral Width (pm) | Transmit Power Range (dBm) |
|---|---|---|---|---|
| **ONS-SC-2G-xx.x=**[1] | 1260-1620[2] | -100 to +100<br>(100 GHz spacing) | 200 | 0 to +4 |
| **ONS-SC-4G-xx.x=** | 1260-1620 | -100 to +100<br>(100 GHz spacing) | 200 | +3 to +7 |

[1] Product ID xx.x ranges from 30.3 to 60.6.

[2] Receiver sensitivity specified over 1528-1561 nm only, with 2 dB degradation permitted outside of this range.

**Table 37.** DWDM SFP modules: Optical performance

| Optical Performance | | | | | |
|---|---|---|---|---|---|
| **Power-Limited Performances** | | | | | |
| | | **2G DWDM SFP** | | **4G DWDM SFP** | |
| **Input power range** | dBm | -9 to -28 | At BER=10e-12 with SONET framed PRBS23 at OSNR of 21dB, 0.1nm BW | -9 to -22 | At BER=10e-12 with SONET framed PRBS23 at OSNR of 26dB, 0.1nm RBW |
| **Dispersion tolerance** | ps/nm | -800 to +2400 | Power Penalty=3dB, OSNR=21dB at 0.1nmBW (Noise Penalty=0dB) | -800 to +1600 | -9 to -20 dBm with OSNR=26dB at 0.1nm RBW (Noise Penalty=0dB) |
| **Noise-Limited Performances** | | | | | |
| **Input power range** | dBm | -9 to -22 | At BER=10e-12 with SONET framed PRBS23 at OSNR of 16dB at 0.1nm bandwidth | -9 to -18 | At BER=10e-12 with SONET framed PRBS23 at OSNR of 22dB at 0.1nm bandwidth |
| **Dispersion tolerance** | ps/nm | -800 to +2400 | Noise Penalty=3dB, OSNR=19dB at 0.1nmBW (Power Penalty=0dB) | -800 to +1600 | -9 to -18 dBm with OSNR=25dB at 0.1nmBW (Power Penalty=0dB) |

### Grey XFP modules

Cisco offers a set of Grey XFP modules for 10-Gbps applications. Table below lists the optical parameters.

**Table 38.** XFP modules: Optical specifications

| Product ID | Transmitter Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | CD Robustness (ps/nm) | Receiver Power Range (dBm) |
|---|---|---|---|---|---|
| **ONS-XC-10G-S1=** | 1260-1335 | -6 to -1[1]<br>-8.2 to +0.5[2] | 1260-1565 | 6.6 | -11 to -1[1]<br>-14.4 to +0.5[2, 3] |
| **ONS-XC-10G-I2=** | 1530-1565 | -1 to +2 | 1260-1565 | 800 | -14 to +2 |
| **ONS-XC-10G-L2=** | 1530-1565 | 0 to +4 | 1260-1565 | 1600 | -24 to -7 |
| **ONS-XC-10G-SR-MM=** | 840-860 | -7.3 to -1 | 840-860 | - | -9.9 to -1 |
| **ONS-XC-8G-SM=** | 1260-1360 | -8.4 to +0.5 | 1260-1360 | - | -13.8 (-11.8 stressed) to +0.5 (targeting up to 10km distance) |
| **ONS-XC-8G-MM=** | 840-860 | -8.2 to -1.5 | 840-860 | - | 0.151 mW (stressed received in OMA) |

[1] SONET/SDH application.

[2] 10 Gigabit Ethernet/10G Fibre Channel application.

[3] Stressed receiver sensitivity (maximum) in OMA is -10.3 dBm.

### DWDM XFP modules

Cisco offers a set of DWDM XFP modules for 10-Gbps applications. Tables 37-39 list the optical specifications of all the variants.

**Table 39.** DWDM XFP modules: Optical specifications

| Product ID | Receiver Wavelength Range (nm) | Transmitter Stability (pm) | Spectral Width (pm) | Transmit Power Range (dBm) |
|---|---|---|---|---|
| **ONS-XC-10G-xx.x=**[1] | 1260-1607 | -100 to +100 (100 GHz spacing) | 200 | -1 to +3 |
| **ONS-XC-10G-C=** | 1260-1607 | -25 to +25 (50 GHz spacing) | 200 | 0 to +3 |
| **ONS-XC-10G-96C=** | 1260-1607 | -25 to +25 (50 GHz spacing) | 200 | 0 to +3 |

[1] Product ID xx.x ranges from 30.3 to 61.4.

**Table 40.** Fixed Wavelength DWDM XFP modules: Optical performance

| Optical Performance | | | |
|---|---|---|---|
| **Short Wavelength Performances** | | | |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (at 1310 nm ± 20 nm) applicable at 9.9G, 10.3G only |
| **Long Wavelength Performances C Band NO-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -23 | At BER=10e-12 applicable at 9.9G, 10.3G only 23 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (-500 to +1600 ps/nm) applicable at 9.9G, 10.3G only - 23 dB OSNR (0.5nm RBW) |
| **Long Wavelength Performances C Band NO-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER=10e-12 applicable at 9.9G, 10.3G only 17dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER=10e-12 (-500 to +1600 ps/nm) applicable at 9.9G, 10.3G only - 20 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 applicable at 10.7G, 11.1G only - 11 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 (-500 to +1100 ps/nm) applicable at 10.7G, 11.1G only - 12dB OSNR (0.5 nm RBW) |

| Optical Performance | | | |
|---|---|---|---|
| **Long Wavelength Performances C Band E-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -27 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 23dB OSNR |
| **Input power range** | dBm | -7 to -24 | At BER PREFEC <7*10e-4 (-500 to +1300 ps/nm) applicable at 10.7G, 11.1G only - 23 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band E-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 8 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <7*10e-4 (-500 to +1100 ps/nm) applicable at 10.7G, 11.1G only - 9 dB OSNR (0.5 nm RBW) |

**Table 41.** Edge Performance Fixed Wavelength DWDM XFP modules: Optical performance

| Optical Performance | | | |
|---|---|---|---|
| **Short Wavelength Performances** | | | |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (at 1310 nm ± 20 nm) applicable at 9.9G, 10.3G only |
| **Long Wavelength Performances C Band NO-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -23 | At BER=10e-12 applicable at 9.9G, 10.3G only 23 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (-500 to +1100 ps/nm) applicable at 9.9G, 10.3G only - 23 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band NO-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER=10e-12 applicable at 9.9G, 10.3G only 17 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER=10e-12 (-500 to +1100 ps/nm) applicable at 9.9G, 10.3G only - 20 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 applicable at 10.7G, 11.1G only - 11 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 (-500 to +1100 ps/nm) applicable at 10.7G, 11.1G only - 12 dB OSNR (0.5 nm RBW) |

| Optical Performance | | | |
|---|---|---|---|
| **Long Wavelength Performances C Band E-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -27 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 23 dB OSNR |
| **Input power range** | dBm | -7 to -24 | At BER PREFEC <7*10e-4 (-500 to +1100 ps/nm) applicable at 10.7G, 11.1G only - 23 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band E-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 8 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <7*10e-4 (-500 to +1100 ps/nm) applicable at 10.7G, 11.1G only - 9 dB OSNR (0.5 nm RBW) |

**Table 42.** Full C Band Tunable Wavelength DWDM XFP Modules: Optical performance

[ONS-XC-10G-C= and ONS-XC-10G-96C=]

| Optical Performance | | | |
|---|---|---|---|
| **Short Wavelength Performances** | | | |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (at 1310 nm ± 20nm) applicable at 9.9G, 10.3G only |
| **Long Wavelength Performances C Band NO-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -24 | At BER=10e-12 applicable at 9.9G, 10.3G only 23dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -22 | At BER=10e-12 (-500 to +1600 ps/nm) applicable at 9.9G, 10.3G only - 23 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band NO-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -22 | At BER=10e-12 applicable at 9.9G, 10.3G and 10.5 only 19dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER=10e-12 (-500 to +1600 ps/nm) applicable at 9.9G, 10.3G and 10.5G only - 19 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 applicable at 10.7G, 11.1G only - 8.5 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER PREFEC <10e-5 (-400 to +1000 ps/nm) applicable at 10.7G, 11.1G only - 10 dB OSNR (0.5 nm RBW) |

| Optical Performance | | | |
|---|---|---|---|
| **Long Wavelength Performances C Band E-FEC Applications Power-Limited** | | | |
| **Input power range** | dBm | -7 to -27 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 19 dB OSNR |
| **Input power range** | dBm | -7 to -26 | At BER PREFEC <7*10e-4 (-400 to +1300 ps/nm) applicable at 10.7G, 11.1G and 11.3G only - 19 dB OSNR (0.5 nm RBW) |
| **Long Wavelength Performances C Band E-FEC Applications Noise-Limited** | | | |
| **Input power range** | dBm | -7 to -20 | At BER PREFEC <7*10e-4 applicable at 10.7G, 11.1G only - 5 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER PREFEC <7*10e-4 (-400 ps/nm) applicable at 10.7G, 11.1G and 11.3G only - 7.5 dB OSNR (0.5 nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER PREFEC <7*10e-4 +1300 ps/nm) applicable at 10.7G, 11.1G and 11.3G only - 7 dB OSNR (0.5 nm RBW) |

### CWDM XFP module

Cisco offers a CWDM XFP module for 10-Gbps applications. Table below lists the optical parameters.

**Table 43.** CWDM XFP modules: Optical specifications

| Product ID | Wavelength Range Rx (nm) | Sensitivity Rx (dBm) | Stability Tx (nm) | Dispersion Tolerance (ps/nm) | Tx Power Range (dBm) | Supported Bit Rate | Target Distance |
|---|---|---|---|---|---|---|---|
| **ONS-XC-10G-xxxx=**[1] | 1450-1620 | -14 | +/- 6.5 | 0 to +800 | +3 to +7 | 10GE<br>OTU2<br>OTU2e (up to 11.1Gbps)<br>10G FC | 40 km<br>(OTU2 and 10GE) |

[1] Product ID xxxx ranges from 1470 to 1610.

### Electrical SFP modules

Cisco offers multiple options for copper SFP modules. Table below lists the main characteristics.

**Table 44.** Electrical SFP Module specifications

| Product ID | Bit Rate | Connector | Typical Distance |
|---|---|---|---|
| **ONS-SE-ZE-EL=** | 10/100/1000 Mbps | RJ-45 | 100 m |
| **ONS-SC-155-EL=** | 155 Mbps | Standard Coaxial Connector 75Ω | 100m |
| **ONS-SC-E3-T3-PW=** | 34.368 Mbps and 44.736 Mbps | RJ-48 | See note |
| **ONS-SC-E1-T1-PW=** | 1.544 and 2.048 Mbps | RJ-48 (100Ω for T1 and 120Ω for E1) | See note |
| **ONS-SC-EoP1=** | 1.544 and 2.048 Mbps | RJ-48 (100Ω for T1 and 120Ω for E1) | See note |

| Product ID | Bit Rate | Connector | Typical Distance |
|---|---|---|---|
| **ONS-SC-EOP3=** | 34.368 and 44.736 Mbps | RJ-48 | See note |

Table below lists the specifications for SFP's with electrical interfaces supporting PDH protocols over Ethernet. The table beyond describes the pinout for the electrical connector.

**Table 45.** PDHoEthernet SFPs

| Product ID | Line Impedance | Cable Type | Cable Length | Short Haul | Long Haul | Connector |
|---|---|---|---|---|---|---|
| **ONS-SC-E1-T1-PW= for E1** | 120Ω, balanced | UTP CAT-5 | max, 22 AWG wire | 770m (2530 ft) | 2664m (8740 ft) | RJ-48 |
| **ONS-SC-E1-T1-PW= for T1** | 100Ω, balanced | UTP CAT-5 | max, 22 AWG | 1192m (3910 ft) | 2874m (9430 ft) | RJ-48 |
| **ONS-SC-EoP1= for E1** | 100Ω, balanced | | max, up to 1829m (6000 ft) for AWG 22 cable | | | |
| **ONS-SC-EoP1= for T1** | 120Ω, balanced | | max, up to 2500m (8202 ft) for AWG 22 cable | | | |
| **ONS-SC-E3-T3-PW= and ONS-SC-EoP3= for E3** | 75Ω, unbalanced | | max, up to 275m (900 ft) | | | hDIN 1.0/2.3 connector |
| **ONS-SC-E3-T3-PW= and ONS-SC-EoP3= for T3** | 75Ω, unbalanced | | max, up to 275m (900 ft) | | | DIN 1.0/2.3 connector |

**Table 46.** E1/T1 Connector Pin Out

| Pin | Function |
|---|---|
| **1** | Tx Ring |
| **2** | Tx Tip |
| **3, 6, 7, 8** | - |
| **4** | Rx Ring |
| **5** | Rx Tip |
| **S = Conn. Body** | FGND/GND |

### SFP+ modules

Cisco offers multiple options for SFP+ modules. Technical specifications of various SFP+ units are provided in tables 45 through 51.

**Table 47.** SFP+ modules

| Product ID | Transmitter Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | Optical Reach | Receiver Power Range (dBm) |
|---|---|---|---|---|---|
| **ONS-SC+-10G-SR=** | 840-860 | -7.3 to -1.3 | 840-860 | 26 m (FDDI-Grade/62.5 micron)<br>33 m (OM1/62.5 micron)<br>66 m (50.0 micron)<br>82 m (OM2/50.0 micron)<br>300 m (OM3/50.0 micron) | -11.1 (in OMA) to -1 |
| **ONS-SC+-10G-LR=** | 1260-1355 (1310 typical) | -8.2 to +0.5 | 1260-1355 | 10km SMF | -12.6 (in OMA) to 0.5 |
| **ONS-SC+-10G-ER=** | 1530-1565 | -4.7 to +4 | 1260-1600 | 40km SMF | -14.1 (in OMA) to -1 |
| **ONS-SC+-10G-ZR=** | 1530-1565 | 0 to +4 | 1260-1565 | 80km SMF | -24 to -7 (no FEC);<br>-27 to -7 (w/ FEC) |
| **ONS-SI+-10G-SR=** | 840-860 | -7.3 to -1.3 | 840-860 | 300 m (OM3/50.0 micron MMF) | -11.1 (in OMA) to -1 |
| **ONS-SI+-10G-LR=** | 1260-1355 (1310 typical) | -8.2 to +0.5 | 1260-1355 | 10Km SMF | -12.6 (in OMA) to 0.5 |
| **ONS-SI+-10G-ER=** | 1530-1565 | -1 to +2 | 1260-1600 | 40Km SMF | 10.7Gbps: -16 (average) to -1<br>11.3Gbps: -15 (average) to -1<br>10.3Gbps: -11.3 (in OMA) to -1 |
| **ONS-SI+-10G-ZR=** | 1530-1565 | 0 to +4 | 1260-1565 | 70Km SMF | -24 to -7 (no FEC);<br>-27 to -7 (w/ FEC) |

**Table 48.** DWDM SFP+ modules: Optical specifications

| Product ID | Receiver Wavelength Range (nm) | Transmitter Stability (pm) | Max Spectral Width (pm) | Transmit Power Range (dBm) | Number of Channels Tunable to |
|---|---|---|---|---|---|
| **ONS-SC+-10G-xx.x=** | 1530.3-1560.01 | -100 to +100<br>(100 GHz spacing) | 200 | -1 to +3 | 1 |
| **ONS-SC+-10GEPxx.x=** | 1528.77-1566.72 | -100 to +100<br>(100 GHz spacing) | 200 | -2 to +2 | 1 |
| **ONS-SC+-10G-C=** | 1528.77-1566.72 | 50 GHz spacing | 200 | -1 to +3 | 96 |

**Table 49.** Fixed Wavelength DWDM SFP+ Modules: Optical performance

| **Optical Performance: ONS-SC+-10G-xx.x=** | | | |
|---|---|---|---|
| **NO FEC Application (10GE LAN and 10GE WAN) - Power Limited** | | | |
| **Input power range** | dBm | -7 to -23 | At BER=1E-12 with PRBS31 and 10GE frame; Back-to-Back w/ 23 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER=1E-12 with PRBS31 and 10GE frame; CD of -500 to 900 ps/nm, w/ 23 dB OSNR (0.5nm RBW) |
| **NO FEC Application (10GE LAN and 10GE WAN) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -17 | At BER=1E-12 with PRBS31 and 10GE frame; Back-to-Back w/ 17 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -17 | At BER=1E-12 with PRBS31 and 10GE frame; CD of -500 to 900 ps/nm, w/ 20 dB OSNR (0.5nm RBW) |
| **GFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -17 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame.; Back-to-Back w/ 11 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -17 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame.; CD of -500 to 1100 ps/nm, w/ 12 dB OSNR (0.5nm RBW) |
| **EFEC Application (OTU2 and OTU2e) - Power Limited** | | | |
| **Input power range** | dBm | -7 to -27 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; Back-to-Back w/ 23 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -24 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; CD of -500 to 1300 ps/nm, w/ 23 dB OSNR (0.5nm RBW) |

| Optical Performance: ONS-SC+-10G-xx.x= | | | |
|---|---|---|---|
| **EFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -17 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; Back-to-Back w/ 8 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -17 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; CD of -500 to 1100 ps/nm, w/ 9 dB OSNR (0.5nm RBW) |

[1] PMD penalty @30ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 0ps/nm (BTB condition).

[2] PMD penalty @15ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 1100ps/nm (System condition).

**Table 50.** Fixed Wavelength Edge performance DWDM SFP+ Modules: Optical performance

| Optical Performance: ONS-SC+-10GEPxx.x= | | | |
|---|---|---|---|
| **NO FEC Application (10GE LAN and 10GE WAN) - Power Limited** | | | |
| **Input power range** | dBm | -7 to -16 | At BER=1E-12 with PRBS31 and 10GE frame; With 23 dB OSNR (0.5nm RBW); CD ranging from -400 to 800 ps/nm |
| **Input power range** | dBm | -7 to -14 | At BER=1E-12 with PRBS31 and 10GE frame; With 23 dB OSNR (0.5nm RBW); CD ranging from -400 to 800 ps/nm |
| **GFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -16 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame; Back-to-Back w/ 13 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -16 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame; With 14 dB OSNR (0.5nm RBW); CD ranging from -400 to 800 ps/nm |
| **EFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -16 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; Back-to-Back w/ 8.5 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -16 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; CD of -400 to 800 ps/nm, w/ 9.5 dB OSNR (0.5nm RBW) |

[1] PMD penalty @30ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 0ps/nm (BTB condition).

[2] PMD penalty @15ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 800ps/nm (System condition).

**Table 51.** Fully Tunable 96 ch DWDM SFP+ Modules: Optical performance

| Optical Performance: ONS-SC+-10G-C= | | | |
|---|---|---|---|
| **NO FEC Application (10GE LAN and 10GE WAN) - Power Limited** | | | |
| **Input power range** | dBm | -7 to -23 | At BER=1E-12 with PRBS31 and 10GE frame; Back-to-Back w/ 23 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -20 | At BER=1E-12 with PRBS31 and 10GE frame; CD of -500 to 1600 ps/nm, w/ 23 dB OSNR (0.5nm RBW) |
| **NO FEC Application (10GE LAN and 10GE WAN) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At BER=1E-12 with PRBS31 and 10GE frame; Back-to-Back w/ 23 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -18 | At BER=1E-12 with PRBS31 and 10GE frame; CD of -500 to 1100 ps/nm, w/ 20 dB OSNR (0.5nm RBW) |
| **GFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame.; Back-to-Back w/ 11 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -18 | At Pre-FEC BER=1E-5 with PRBS31 and OTU2 frame.; CD of -500 to 1100 ps/nm, w/ 12 dB OSNR (0.5nm RBW) |
| **EFEC Application (OTU2 and OTU2e) - Power Limited** | | | |
| **Input power range** | dBm | -7 to -27 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; Back-to-Back w/ 23 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -24 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; CD of -500 to 1600 ps/nm, w/ 23 dB OSNR (0.5nm RBW) |
| **EFEC Application (OTU2 and OTU2e) - Noise Limited** | | | |
| **Input power range** | dBm | -7 to -18 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; Back-to-Back w/ 8 dB OSNR (0.5nm RBW) |
| **Input power range** | dBm | -7 to -18 | At Pre-FEC BER=1E-3 with PRBS31 and OTU2 frame.; CD of -500 to 1100 ps/nm, w/ 9 dB OSNR (0.5nm RBW) |

[1] PMD penalty @30ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 0ps/nm (BTB condition).

[2] PMD penalty @15ps DGD: The maximum allowable PMD penalty is 1dB of optical power in Power Limited condition or 1 dB of OSNR in Noise Limited condition, when the residual Chromatic Dispersion is 1600ps/nm (System condition).

**Table 52.** Active cables

| Product ID | Interface Standard Compliance | Cable Length | Connector |
|---|---|---|---|
| **ONS-SC+-10G-CU1=** | SFF-8431, Appendix E, SFF-8432 and SFF-8472 | 1m | SFP+ MSA |
| **ONS-SC+-10G-CU3=** | SFF-8431, Appendix E, SFF-8432 and SFF-8472 | 3m | SFP+ MSA |
| **ONS-SC+-10G-CU5=** | SFF-8431, Appendix E, SFF-8432 and SFF-8472 | 5m | SFP+ MSA |
| **ONS-SC+-10G-CU7=** | SFF-8431, Appendix E, SFF-8432 and SFF-8472 | 7m | SFP+ MSA |

### CXP and CFP modules

Cisco offers multiple options for CXP and CFP modules. Technical specifications of the units are provided in the tables below.

**Table 53.** CXP modules

| Product ID | Transmitter Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | Optical Reach | Receiver Power Range (dBm) |
|---|---|---|---|---|---|
| **ONS-CXP-100G-SR10=** | 840-860 (central wavelength range) | Average launch power, each lane (max): 1<br>Average launch power, each lane (min): -7.6 | Same as Tx range | Up to 100m (OM3 MMF)<br>Up to 150m (OM4 MMF) | Average receive power, each lane (max): 2.4<br>Average receive power, each lane (min): -9.5 |

**Table 54.** CFP modules

| Product ID | Transmitter Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | Optical Reach | Receiver Power Range (dBm) |
|---|---|---|---|---|---|
| **ONS-CC-100G-LR4=**<br>**and**<br>**ONS-CC-100GE-LR4=** | 1295.56 ±1.03 (lane 1)<br>1300.055 ±1.035 (lane 2)<br>1304.585 ±1.045 (lane 3)<br>1309.14 ±1.05 (lane 4) | Total average launch power (max): 10.5<br>Average launch power, each lane (max): 4.5<br>Average launch power, each lane (min): -4.3 | Same as Tx range | 2km to 10km | Total average receive power (max): 10.5<br>Average receive power, each lane (max): 4.5<br>Average receive power, each lane (min): -10.6 |
| **ONS-CC-40G-LR4=** | 1271 ±6.5 (lane 1)<br>1291 ±6.5 (lane 2)<br>1311 ±6.5 (lane 3)<br>1331 ±6.5 (lane 4) | Total average launch power (max): 8.3<br>Average launch power, each lane (max): 2.3<br>Average launch power, each lane (min): -7 | Same as Tx range | 2km to 10km | Total average receive power (max): 8.3<br>Average receive power, each lane (max): 2.3<br>Average receive power, each lane (min): -13 |

| Product ID | Transmitter Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Wavelength Range (nm) | Optical Reach | Receiver Power Range (dBm) |
|---|---|---|---|---|---|
| **ONS-CC-40G-FR=** | 1547.5 ±17.5 (lane 1) | Average launch power (max): 3<br>Average launch power (min): 0 | Same as Tx range | 2km | Average receive power (max): 3<br>Average receive power (min): -6 |

### Cisco CPAK modules

Technical specifications of the various Cisco CPAK modules offered by Cisco are provided in the table below.

**Table 55.** Cisco CPAK modules technical specifications

| Product ID | Tx and Rx Wavelength Range (nm) | Tx Range (dBm) | Rx Range (dBm) | Optical Reach | Type |
|---|---|---|---|---|---|
| **CPAK-100G-LR4=** | Four lanes:<br>1294.53 to 1296.59<br>1299.02 to 1301.09<br>1303.54 to 1305.63<br>1308.09 to 1310.19 | -4.3 to 4.5 (per lane) | -10.6 to 4.5 (per lane) | 2km to 10km | 100GBASE-LR4<br>1310 nm SMF |
| **CPAK-100G-SR10=** | Ten lanes: 850 to 860 nm | -7.6 to -1 (per lane) | -9.5 to 2.4 (per lane) | 100m - 150m | 100GBASE-SR10<br>850 nm MMF |
| **CPAK-100G-SR4=** | Four lanes: 840 to 860 nm | -8.4 to +2.4 (per lane) | -5.2 to +2.4 (per lane) | 70m – 100m | 100G BASE SR4 850nm MMF |

### QSFP+ modules

Technical specifications of the various QSFP+ modules offered by Cisco are provided in the table below.

**Table 56.** QSFP+ modules technical specifications

| Product ID | Tx and Rx Wavelength Range (nm) | Tx Range (dBm) | Rx Range (dBm) | Optical Reach | Type |
|---|---|---|---|---|---|
| **QSFP-40G-SR4=** | 840 - 860 | -7.6 to -1 (per lane) | -9.5 to +2.4 (per lane) | 30m (OM2), 100m (OM3), 150m (OM4) | 40GBASE-SR4, 4 lanes, 850 nm MMF<br>(4x10GE) and 40GE |
| **QSFP-100G-LR4-S=** | Four lanes:1295, 1300, 1304, 1309 | -4.3 to +4.5 (per lane) | -8.6 to +4.5 (per lane) | 10km | 100G BASE LR4 |

| Product ID | Tx and Rx Wavelength Range (nm) | Tx Range (dBm) | Rx Range (dBm) | Optical Reach | Type |
|---|---|---|---|---|---|
| **QSFP-100G-SR4-S=** | 840-860 | -8.4 to +2.4 (per lane) | -5.2 to +2.4 (per lane) | 70m (OM3), 100m (OM4) | 100G BASE SR4 |
| **QSFP-4X10G-LR-S=** | 1260 to 1355 | -8.2 to +0.5 (per lane) | -14.4 to +0.5 (per lane) | 10km | 4X10G BASE LR |
| **QSFP-40G-LR4=** | Four lanes: 1271, 1291, 1311, 1331 | -7 to +2.3 (per lane) | -13.7 to +2.3 (per lane) | 10km | 40GE BASE LR4 |
| **ONS-QSFP-4X10-MLR=** | 1260 to 1355 | -8.2 to +0.5 (per lane) | -14.4 to +0.5 (per lane) | 10km | 4X10G BASE LR |
| **ONS-QSFP28-LR4=** | Four lanes: 1295.56, 1300.05, 1304.58, 1309.14 | -4.3 to +4.5 (per lane) – 100GE<br>-0.6 to +4.0 (per lane) – OTU4 | -10 to +4.6 (per lane) – 100GE<br>-8.8 to +2.9 (per lane) – OTU4 | 10km | 100G BASE LR4, OTU4 |
| **ONS-QC-16GFC-SW=** | 840 to 860 | 0 to -7.6 (per lane) | -8.2 to +2.4 (per lane | 66m (OM3), 100m (OM4) | 4X16G FC |
| **QSFP-100G-SM-SR** | 1271, 1291, SMF 1311, 1331 | -6.9 to +2.5 (per lane) | -11.1 to +2.5 (per lane) | 2km | 100G BASE CWDM4 |
| **ONS-QC-16GFC-LW=** | 1325 to 1295 (centered at 1310) | -5 to +2 (per lane) | -11.4 to +2 (per lane) | 2km (SMF) | 4X16G FC |
| **ONS-QSFP-4X10-MER=**[1] | 1260 to 1355 (Tx)<br>1260 to 1565 (Rx) | -0.5 to +3 (per lane) | -14.4 to +0.5 (per lane) | 25km (SMF) – Note: This is an ER-lite version and cannot do 40km. | 4X10G BASE ER |
| **QSFP-40/100-SRBD** | 855, 908 | 40G: -4 to +5 (per lane)<br>100G: -6 to +4 (per lane) | 40G: -6 to +5 (per lane)<br>100G: -7.9 to +4 (per lane) | 40G: 100m (OM3 MMF); 150m (OM4 MMF)<br>100G: 70m (OM3 MMF); 100m (OM4 MMF) | 40G BASE SR, 100G BASE SR |
| **QSFP-40G-SR-BD** | 832-918 | -4 to +5 (per lane) | -6 to +5 (per lane) | 30m (OM2 MMF), 100m (OM3 MMF), 150m (OM4 MMF) | 40G BASE SR |

[1] The pluggable is multi-rate and supports 10GE, OC192, OTU2, OTU2e line rates but the jitter specifications on the OTU2e are not met and is known to have an issue (CSCvo29516). OTU2e jitter performance cannot be guaranteed thus.

### CFP2 modules

Technical specifications of the CFP2-WDM pluggables are detailed in the table below.

The Rx power can go down to -20dB given OSNR penalty is paid per:

0.3 dB for QPSK SD-FEC

0.5 for QPSK HG-FEC (4e-3)

0.8 for QPSK GFEC (1e-5)

1.5 for 200G 16QAM SD-FEC

4.0 for 250G 16QAM 7% SD-FEC

2.5 for 250G 16QAM 20% SD-FEC

Without any OSNR penalty, the Rx power can go to -14dBm for QPSK / BPSK and -12dBm for 16QAM.

**Table 57.** Technical specifications of **ONS-CFP2-WDM= and ONS-CFP2-WDM2=**

**Important note:** The ONS-CFP2-WDM2= does not support 250G linerate, has a minimum frequency tunability of 6.25Hz and doesn't support a Firmware (FW) download function. Otherwise, the technical specifications of the ONS-CFP2-WDM= and that of the ONS-CFP2-WDM2= are identical.

| **Modulation Format** | **QPSK** | | | | | **16QAM** | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Line Rate** | **100G** | | | | | **200G** | | **250G** | |
| **FEC Type** | | **7% GFEC** | **7% EFEC** | **7% SD-FEC** | **20% SD-FEC** | **7% SD-FEC** | **20% SD-FEC** | **7% SD-FEC** | **20% SD-FEC** |
| **Tx Power Tolerance (-5 to -1.5dBm)** | **Max** | +2.5 dB | | | | +2.5 dB | | | |
| | **Min** | 0 dB | | | | 0 dB | | | |
| **Tx Power Tolerance (-10 to -5dBm)** | **Max** | +3.3 dB | | | | +3.3 dB | | | |
| | **Min** | 0 dB | | | | 0 dB | | | |
| **Tx Power Range** | **Max** | -1.5 dBm | | | | -1.5 dBm | | | |
| | **Min** | -10 dBm | | | | -10 dBm | | | |
| **Rx Power Range** | **Max** | 0 dBm | | | | 0 dBm | | | |
| | **Min** | -20 dBm | | | | -20 dBm | | | |

**Table 58.** Technical specifications of **ONS-CFP2-WDM-1KE=**

| Modulation Format | QPSK | | | | | 16QAM | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line Rate | 100G | | | | | 200G | | 250G | |
| FEC Type | | 7% GFEC | 7% EFEC | 7% SD-FEC | 20% SD-FEC | 7% SD-FEC | 20% SD-FEC | 7% SD-FEC | 20% SD-FEC |
| Tx Power Tolerance (-3 to +2dBm) | Max | +2.5 dB | | | | +2.5 dB | | | |
| | Min | 0 dB | | | | 0 dB | | | |
| Tx Power Tolerance (-8 to -3dBm) | Max | +3.3 dB | | | | +3.3 dB | | | |
| | Min | 0 dB | | | | 0 dB | | | |
| Tx Power Range | Max | +2 dBm | | | | +2 dBm | | | |
| | Min | -8 dBm | | | | -8 dBm | | | |
| Rx Power Range | Max | 0 dBm | | | | 0 dBm | | | |
| | Min | -20 dBm | | | | -20 dBm | | | |

**Table 59.** Technical specifications of **ONS-CFP2-WDM-1KE=**

| Modulation Format | QPSK | | | | | 16QAM | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line Rate | 100G | | | | | 200G | | 250G | |
| FEC Type | | 7% GFEC | 7% EFEC | 7% SD-FEC | 20% SD-FEC | 7% SD-FEC | 20% SD-FEC | 7% SD-FEC | 20% SD-FEC |
| Tx Power Tolerance (-3 to +2dBm) | Max | +2.5 dB | | | | +2.5 dB | | | |
| | Min | 0 dB | | | | 0 dB | | | |
| Tx Power Tolerance (-8 to -3dBm) | Max | +3.3 dB | | | | +3.3 dB | | | |
| | Min | 0 dB | | | | 0 dB | | | |
| Tx Power Range | Max | +2 dBm | | | | +2 dBm | | | |
| | Min | -8 dBm | | | | -8 dBm | | | |
| Rx Power Range | Max | 0 dBm | | | | 0 dBm | | | |
| | Min | -20 dBm | | | | -20 dBm | | | |

**Table 60.** Line interface specifications of **ONS-CFP2D-400G-C= and the DP04CFP2-M25-K9= ****, the digital 400G-CFP2-DCO modules

| Line protocol / Standard | Uncoded Line rate (Gb/s) | Modulation Format | Bits / Symbol (single polarization) | FEC |
|---|---|---|---|---|
| **400ZR** | 400 | DP-16QAM | 4 | C-FEC |
| **Open ROADM** | 200 | DP-QPSK | 2 | oFEC |
| | 300 | DP-8QAM | 3 | oFEC |
| | 400 | DP-16QAM | 4 | oFEC |
| **Open ZR+** | 100 | DP-QPSK | 2 | oFEC |
| | 200 | DP-QPSK | 2 | oFEC |
| | 200 | DP-8QAM | 3 | oFEC |
| | 200 | DP-16QAM | 4 | oFEC |
| | 300 | DP-8QAM | 3 | oFEC |
| | 400 | DP-16QAM | 4 | oFEC |

**Table 61.** Transmitter specifications of **ONS-CFP2D-400G-C= and the DP04CFP2-M25-K9= ****, the digital 400G-CFP2-DCO modules

| Product ID | Operating Frequency range (THz) | Frequency tuning range (GHz) | Transmitter Output power (dBm) | Transmit OSNR |
|---|---|---|---|---|
| **ONS-CFP2D-400G-C=** | 191.2625 to 196.1375 | 4850 (coarse)<br>Note: 777 discrete frequencies on the 6.25 GHz grid from 191.275 THz to 196.125 GHz | -10 to +1<br>Accuracy: -1 to +1 (over temperature, voltage, aging) | Out-of-Band:<br>- Narrow Band: 39<br>- Wide Band: 38<br>In-Band: 38<br>Total Tx OSNR: 34 |

**Table 62.** Receiver sensitivity specifications of **ONS-CFP2D-400G-C= and the DP04CFP2-M25-K9= ****, the digital 400G-CFP2-DCO modules

| Line Protocol / Standard | Modulation scheme | Receiver Power sensitivity (dBm) | | | | Receiver OSNR sensitivity back-to-back (dB / 0.1nm) |
|---|---|---|---|---|---|---|
| | | Standard | Extended 1 (0.5dB OSNR penalty) | Extended 2 (1dB OSNR penalty) | Extended 3 (single channel - high OSNR >36dB) | |
| **400ZR** | 400G-16QAM | -12 to +1 | -14 to +1 | -15 to +1 | -20 to +1 | 26 |
| **Open ROADM** | 200G-QPSK | -18 to +1 | -20 to +1 | -22 to +1 | -28 to +1 | 15.7 |
| | 300G-8QAM | -16 to +1 | -18 to +1 | -20 to +1 | -23 to +1 | 20.5 |
| | 400G-16QAM | -14 to +1 | -15 to +1 | -16 to +1 | -18 to +1 (and 2.5 dB OSNR penalty) | 24 |
| **Open ZR+** | 100G-QPSK | -20 to +1 | -23 to +1 | -25 to +1 | -32 to +1 | 11.5 |
| | 200G-8QAM | -16 to +1 | -18 to +1 | -20 to +1 | -28 to +1 | 17.2 |
| | 200G-16QAM | -15 to +1 | -18 to +1 | -20 to +1 | -24 to +1 | 19.3 |
| | 200G-QPSK | -18 to +1 | -20 to +1 | -22 to +1 | -29 to +1 | 14.8 |
| | 300G-8QAM | -15 to +1 | -17 to +1 | -19 to +1 | -23 to +1<br>-22 to +1 | 19.5 (PS – NM = 1 – E)[1]<br>20.8 (PS – NM = 0 – S) |
| | 400G-16QAM | -12 to +1 | -14 to +1 | -16 to +1 | -21 to +1<br>-20 to +1 | 23.1 (PS – NM = 1 – E)<br>23.7 (PS – NM = 0 – S) |

[1] For some Line Protocols detailed above it is possible to configure the Line interface with 2 additional options:

PS: TX_Pulse_Shape: defines the roll-off of the TX spectrum; setting can be:

0 => TX shaping disabled

1 => TX shaping enabled

NM: Network_Mode: defines the modem setting for the 16QAM and 8QAM modulation formats. setting can be:

S => Standard mode

E => Enhanced mode

**Table 63.** Receiver dispersion specifications of **ONS-CFP2D-400G-C= and the DP04CFP2-M25-K9= ****, the digital 400G-CFP2-DCO modules

| Line Protocol / Standard | Modulation scheme | CD tolerance (ps/nm) – With 0.5dB OSNR penalty | DGD (ps) – With SoPMD = 0 ps^2 |
|---|---|---|---|
| **400ZR** | 400G-16QAM | -2400 to +2400 | 33 |
| **Open ROADM** | 200G-QPSK | -48000 to +48000 | 60 |
| | 300G-8QAM | -48000 to +48000 | 60 |
| | 400G-16QAM | -24000 to +24000 | 60 |
| **Open ZR+** | 100G-QPSK | -77000 to +77000 | 80 |
| | 200G-8QAM | -50000 to +50000 | 60 |
| | 200G-16QAM | -30000 to +30000 | 60 |
| | 200G-QPSK | -50000 to +50000 | 60 |
| | 300G-8QAM | -50000 to +50000 | 60 |
| | 400G-16QAM | -26000 to +26000 | 60 |

**The DP04CFP2-M25-K9= has the same optical performance characteristics as that of the ONS-CFPD-400G-C=. Both are digital CFP2-DCO modules capable of operating up to 400G. The primary difference between the two is that the DP04CFP2-M25-K9= supports ASE encryption and secure boot functionality while the ONS-CFP2D-400G-C= doesn't. The Secure Boot feature enhances the boot process by adding 2 layers of image authentication, using keyed encryption/decryption. DP04CFP2-M25-K9= supports Layer-1 (L1) functionality to support authentication and encryption/decryption of the OPU[Cn,4] Payload. The security IP provides wire-speed Galois-Counter-Mode (GCM) AES 256-bit security in either authentication only (GMAC), encryption/decryption only (CTR), or both (GCM) modes. Inter-host key exchange is supported via communication over GCC channel. Naturally, the power disspitation of the modules are also different and detailed in a subsequent table below.

## CXP2 pluggable

Technical specifications of the CXP2 are detailed in the table below.

**Table 64.** Technical specifications of **ONS-CXP2-SR25**

| Product ID | Transmitter and Receiver Wavelength Range (nm) | Transmit Power Range (dBm) | Receiver Power Range (dBm) | Reach / Sensitivity (dBm) | LOS (dBm) |
|---|---|---|---|---|---|
| **ONS-CXP2-SR25** | 840-865 (central wavelength range) | Average launch power, each lane at 23Gbps (max): +4<br>Average launch power, each lane at 23Gbps (min): -6.5 | Average receive power, each lane (max): +4<br>Average receive power, each lane (min): -8.4<br>Peak Power (per lane) / damage threshold: +7 | Receiver Sensitivity (OMA) at 23Gbps: -8.3 | LOS Assert threshold: -14.4 to -30<br>LOS De-Assert threshold: -12.4 |

## TPoP pluggable

Technical specifications of the TPoP pluggable are detailed in the table below. Please note that it is an electrical unit.

**Table 65.** Technical specifications of **ONS-SI-DS1-TPOP=**

| Product ID | Bit rate | Operating voltage | Insulation | Reach / Transmission distance | Power supply current |
|---|---|---|---|---|---|
| **ONS-SI-DS1-TPOP=**[1] | 1.25 Gbps maximum | 3.135 to 3.47 V | 1000 V (AC RMS) | 100 m | 318 to 345 mA |

[1]The pluggable supports both ACR abd DCR clocking modes. For the ACR mode alone there is a limitation: Wander compliant to ITU-T G.823/G.824 for traffic interfaces, and MEF18. The wander performance is only validated and measured according to ITU-T G.8261 testcase TC1, but performance for other testcases and PDV impairments is not tested or guaranteed.

# Chapter 3: Compatibility matrix

Tables below indicate which SFP modules are supported on different Cisco optical platforms and line cards.

**Table 66.** Cisco ONS 15454 MSPP

| Product ID | Cisco ONS 15454 MSPP Line Cards | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E1000-2-G | FC-MR-4 | G1K-4 | CE1000-4 | ML1000-2 | ML100-X-8 | 10G-SR1 | 10G-XR | MRC-12 | MRC-4 | MRC-12-2.5G | ML-MR-10 | CE-MR-10 |
| **ONS-GC-GE-LX=** | 4.x | | 4.x | 7.0 | | | | | | | | | |
| **ONS-GC-GE-SX=** | 4.x | | 4.x | 7.0 | | | | | | | | | |
| **ONS-GC-GE-ZX=** | | | 4.x | 7.0 | | | | | | | | | |
| **15454-GBIC-xx.x=**[1] | | | 4.x | | | | | | | | | | |
| **15454-GBIC-xxxx=**[2] | | | 4.x | | | | | | | | | | |
| **ONS-GX-2FC-MMI=** | | 5.0 | | | | | | | | | | | |
| **ONS-GX-2FC-SML=** | | 5.0 | | | | | | | | | | | |
| **ONS-SE-100-LX10=** | | | | | | 6.0 | | | | | | | |
| **ONS-SI-100-LX10=** | | | | | | 9.0 | | | | | | 8.5 | 8.5 |
| **ONS-SE-100-FX=** | | | | | | 6.0 | | | | | | | |
| **ONS-SI-100-FX=** | | | | | | 9.0 | | | | | | 8.5 | 8.5 |
| **ONS-SE-100-BX10D=** | | | | | | 9.0 | | | | | | 8.5 | 8.5 |
| **ONS-SE-100-BX10U=** | | | | | | 9.0 | | | | | | 8.5 | 8.5 |
| **15454-SFP-LC-SX=** | | | | | 4.x | | | | | | | | |
| **15454-SFP-LC-LX/LH=** | | | | | 4.x | | | | | | | | |
| **ONS-SC-GE-SX=** | | | | | 4.x | | | | | | | | |
| **ONS-SI-GE-SX=** | | | | | 9.0 | | | | | | | 8.5 | 8.5 |
| **ONS-SC-GE-LX=** | | | | | 4.x | | | | | | | | |
| **ONS-SI-GE-LX=** | | | | | 9.0 | | | | | | | 8.5 | 8.5 |
| **ONS-SI-GE-ZX=** | | | | | 9.0 | | | | | | | 8.5 | 8.5 |
| **ONS-SE-ZE-EL=** | | | | | | | | | | | | 8.5 | 8.5 |
| **ONS-SI-155-SR-MM=** | | | | | | | | | 8.0 | 8.0 | 8.0 | | |

| Product ID | Cisco ONS 15454 MSPP Line Cards | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E1000-2-G | FC-MR-4 | G1K-4 | CE1000-4 | ML1000-2 | ML100-X-8 | 10G-SR1 | 10G-XR | MRC-12 | MRC-4 | MRC-12-2.5G | ML-MR-10 | CE-MR-10 |
| ONS-SI-155-I1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-155-L1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-155-L2= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SE-ZE-EL= | | | | | | | | | | | | 8.5 | 8.5 |
| ONS-SC-155-EL=[3] | | | | | | | | | 8.5 | | 8.5 | | |
| ONS-SI-622-SR-MM= | | | | | | | | | 8.0 | 8.0 | 8.0 | | |
| ONS-SI-622-I1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-622-L1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-622-L2= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-2G-S1 | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-2G-I1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-2G-L1= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SI-2G-L2= | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SE-Z1= | | | | | | | | | 8.0 | 8.0 | 8.0 | | |
| ONS-SE-155-xxxx[4] | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SE-622-xxxx[5] | | | | | | | | | 6.0 | 8.0 | 8.0 | | |
| ONS-SC-2G-xx.x=[6] | | | | | | | | | 6.0 | 8.0 | 8.0 | 9.0[9] | 9.0[9] |
| ONS-SC-Z3-xxxx=[7] | | | | | | | | | 8.0 | 8.0 | 8.0 | 9.0[9] | 9.0[9] |
| ONS-XC-10G-S1= | | | | | | | 6.0 | 6.0 | | | | | |
| ONS-XC-10G-I2= | | | | | | | | 6.0 | | | | | |
| ONS-XC-10G-L2= | | | | | | | | 6.0 | | | | | |

| Product ID | Cisco ONS 15454 MSPP Line Cards | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E1000-2-G | FC-MR-4 | G1K-4 | CE1000-4 | ML1000-2 | ML100-X-8 | 10G-SR1 | 10G-XR | MRC-12 | MRC-4 | MRC-12-2.5G | ML-MR-10 | CE-MR-10 |
| **ONS-XC-10G-xx.x=[8]** | | | | | | | | 8.5 | | | | | |
| **ONS-XC-10G-EPxx.x=[8]** | | | | | | | | 9.2.1 | | | | | |
| **ONS-XC-10G-C=** | | | | | | | | 9.1 | | | | | |

[1] For DWDM GBIC, xx.x ranges from 30.3 to 60.6.

[2] For CWDM GBIC, xxxx ranges from 1470 to 1610.

[3] Valid only for the ETSI/SDH platform.

[4] For CWDM 155-Mbps SFP modules, xxxx ranges from 1470 to 1610.

[5] For CWDM 622-Mbps SFP modules, xxxx ranges from 1470 to 1610.

[6] For DWDM SFP modules, xx.x ranges from 30.3 to 60.6; wavelength 28.7, 33.4, 41.3, 49.3, 57.3 requires Release 8.5.

[7] For CWDM SFP modules, xxxx ranges from 1470 to 1610.

[8] For DWDM XFP modules, xx.x ranges from 30.3 to 61.4.

[9] A maximum of four DWDM or CWDM SFPs can be placed in the ML-MR and CE-MR cards. No other SFPs can be placed in the board. The maximum ambient temperature suitable for this configuration is +45° C.

**Table 67.** Cisco ONS 15454 MSTP

| Product ID | Cisco ONS 15454 MSTP Line Cards | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100M-2.5G MR-TXP | 2.5G MR DataMux | 4x2,5G FEC MXP | 4x2.5G EFEC MXP and MLSE MXP | 10G EFEC TXP 10G MLSE TXP | 10G MR DME and MLSE DME | ADM-10G | GE-XP | GE-XPE | 10GE-XP(E) | OTU2-XP | 40G-MXP/40E-MXP,40ME-MXP | TNC | AR-MXP and AR-XP | AR-XPE | WSE (Encryption) |
| **15454-SFP3-1-IR=** | 4.5 | | | | | | | | | | | | | | | |
| **ONS-SC-155-EL=** | | | | | | | 9.0 | | | | | | | 9.4 | 9.6 | |
| **ONS-SI-155-SR-MM=** | 8.0 | | | | | | | | | | | | | 9.4 | 9.6 | |
| **ONS-SI-155-I1=** | 9.0 | | | | | | | | | | | | | 9.4 | 9.6 | |
| **ONS-SI-155-L2=** | | | | | | | 8.0 | | | | | | | 9.4 | 9.6 | |
| **15454-SFP12-4-IR=** | 4.5 | | | | | | | | | | | | | | | |

| Product ID | Cisco ONS 15454 MSTP Line Cards | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100M-2.5G MR-TXP | 2.5G MR DataMux | 4x2,5G FEC MXP | 4x2.5G EFEC MXP and MLSE MXP | 10G EFEC TXP<br>10G MLSE TXP | 10G MR DME and MLSE DME | ADM-10G | GE-XP | GE-XPE | 10GE-XP(E) | OTU2-XP | 40G-MXP/40E-MXP,40ME-MXP | TNC | AR-MXP and AR-XP | AR-XPE | WSE (Encryption) |
| ONS-SI-622-I1= | 9.0 | | | | | | 8.0 | | | | | | | 9.4 | 9.6 | |
| 15454-SFP-OC48-IR= | 4.5 | | 4.6 | 4.7 | | | | | | | | | | | | |
| ONS-SE-2G-S1= | 5.0 | | 5.0 | 5.0 | | | | | | | | | | | | |
| ONS-SE-2G-L2= | 5.0 | | | 5.0 | | | | | | | | | | | | |
| ONS-SI-2G-S1 | 9.0 | | | 9.0 | | | 8.0 | | | | | | | 9.4 | 9.6 | |
| ONS-SI-2G-I1= | 9.0 | | | 9.0 | | | 8.0 | | | | | | | | | |
| ONS-SI-2G-L1= | | | | 9.2 | | | | | | | | | | 9.4 | 9.6 | |
| ONS-SI-2G-L2= | 9.0 | | | 9.0 | | | 8.0 | | | | | | | 9.4 | 9.6 | |
| ONS-SE-Z1= | 9.1 | | | | | | 8.0 | | | | | | | 9.4 | 9.6 | |
| ONS-SE-ZE-EL= | | | | | | 8.0 | | 8.0 | 9.0 | | | | | 9.4 | 9.6 | |
| 15454-SFP-GE+-LX= | 4.5 | 5.0 | | | | 7.0 | | | | | | | | | | |
| 15454-SFP-GEFC-SX= | 4.5 | 5.0 | | | | 7.0 | | | | | | | | | | |
| ONS-SE-G2F-SX= | 5.0 | 5.0 | | | | 7.0 | 8.0 | 8.0 | 9.0 | | | | | | | |
| ONS-SE-G2F-LX= | 5.0 | 5.0 | | | | 7.0 | 8.0 | 8.0 | 9.0 | | | | | | | |
| ONS-SE-GE-ZX= | 7.0 | 7.0 | | | | | | | | | | | | | | |
| ONS-SI-GE-ZX= | | | | | | 8.5[1] | 8.0 | 8.0 | 9.0 | | | | | 9.4 | 9.6 | |
| ONS-SI-GE-EX= | | | | | | 9.8 | 9.8 | | 9.8 | | | | | 9.8 | 9.8 | |

| Product ID | Cisco ONS 15454 MSTP Line Cards | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100M-2.5G MR-TXP | 2.5G MR DataMux | 4x2,5G FEC MXP | 4x2.5G EFEC MXP and MLSE MXP | 10G EFEC TXP<br>10G MLSE TXP | 10G MR DME and MLSE DME | ADM-10G | GE-XP | GE-XPE | 10GE-XP(E) | OTU2-XP | 40G-MXP/40E-MXP,40ME-MXP | TNC | AR-MXP and AR-XP | AR-XPE | WSE (Encryption) |
| ONS-SE-GE-BXU= | | | | | | | | 9.1 | 9.1 | | | | | 9.4 | 9.6 | |
| ONS-SE-GE-BXD= | | | | | | | | 9.1 | 9.1 | | | | | 9.4 | 9.6 | |
| ONS-SI-100-LX10= | | | | | | | | | 9.1 | | | | | 9.4 | 9.6 | |
| ONS-SI-100-FX= | | | | | | | | | 9.1 | | | | | 9.4 | 9.6 | |
| ONS-SC-E3-T3-PW= | | | | | | | | | 9.2[13] | | | | | | | |
| ONS-SC-E1-T1-PW= | | | | | | | | | 9.2[13] | | | | | | | |
| ONS-SC-EoP1= | | | | | | | | | 9.2[13] | | | | | | | |
| ONS-SC-EOP3= | | | | | | | | | 9.2[13] | | | | | | | |
| 15454-SFP-200= | 4.5 | | | | | | | | | | | | | | | |
| ONS-SE-200-MM= | 7.0 | 7.0 | | | | | | | | | | | | 9.4 | 9.6 | |
| ONS-SE-4G-MM= | | | | | | 7.0 | | | | | | | | 9.4 | 9.6 | |
| ONS-SE-4G-SM= | | | | | | 7.0 | | | | | | | | 9.4 | 9.6 | |
| ONS-SC-OSC-ULH= | | | | | | | | | | | | | 9.2 | | | |
| ONS-SC-OSC-18.0= | | | | | | | | | | | | | 9.4 | | | |
| ONS-SE-155-xxxx= | | | | | | | | | | | | | 9.2 | 9.4 | 9.6 | |
| ONS-SC-2G-xx.x=[3] | 8.5 | | | 8.5 | | | 8.5 | 8.5 | 9.0 | | | | 9.4 | 9.4 | 9.6 | |
| ONS-SC-Z3-xxxx=[4] | 8.5 | 8.5 | | 8.5 | | | 8.5 | 8.5 | 9.0 | | | | 9.2[12] | | | |

| Product ID | Cisco ONS 15454 MSTP Line Cards | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100M-2.5G MR-TXP | 2.5G MR DataMux | 4x2,5G FEC MXP | 4x2.5G EFEC MXP and MLSE MXP | 10G EFEC TXP<br>10G MLSE TXP | 10G MR DME and MLSE DME | ADM-10G | GE-XP | GE-XPE | 10GE-XP(E) | OTU2-XP | 40G-MXP/40E-MXP,40ME-MXP | TNC | AR-MXP and AR-XP | AR-XPE | WSE (Encryption) |
| ONS-SC-HD3GV-TX= | | | | | | | | | | | | | | 9.4 | 9.6 | |
| ONS-SC-HD3GV-RX= | | | | | | | | | | | | | | 9.4 | 9.6 | |
| ONS-XC-10G-S1=[9] | | | | | 5.0[5] | | 8.0 | 8.0 | 9.0 | 8.0 | 9.0 | 9.2 | | 9.4 | 9.6 | |
| ONS-XC-10G-I2=[6] | | | | | 8.5 | | 9.1[11] | 8.5 | 9.0 | 8.5 | 9.0 | 9.2 | | 9.4 | 9.6 | |
| ONS-XC-10G-L2=[2] | | | | | 7.0[8] | | | | 9.1 | 9.1 | 9.0 | 9.2 | | 9.4 | 9.6 | |
| ONS-XC-10G-xx.x=[7] | | | | | | | 8.0 | 8.0 | 9.0 | 8.0 | 9.0[10] | | | | | |
| ONS-XC-10G-SR-MM= | | | | | 9.0 | | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.2 | | | | |
| ONS-XC-8G-SM= | | | | | | | | | | | | 9.2 | | 9.4 | | |
| ONS-XC-8G-MM= | | | | | | | | | | | | 9.3 | | 9.4 | | |
| ONS-XC-10G-xxxx= | | | | | | | 9.2 | 9.2 | 9.2 | 9.2 | | 9.2 | | 9.4 | | |
| ONS-XC-10G-EPxx.x=[7] | | | | | | | 9.2.1 | 9.2.1 | 9.2.1 | 9.2.1 | 9.2.1 | 9.2.1 | | 9.4 | | |
| ONS-XC-10G-C= | | | | | | | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.2 | | 9.4 | | |
| ONS-SC+-10G-SR= | | | | | | | | | | | | | | | | 9.8 |
| ONS-SC+-10G-LR= | | | | | | | | | | | | | | | | 9.8 |
| ONS-SC+-10G-ER= | | | | | | | | | | | | | | | | 9.8 |
| ONS-SC+-10G-ZR= | | | | | | | | | | | | | | | | 9.8 |
| ONS-SC+-10G-xx.x= | | | | | | | | | | | | | | | | 9.8 |

| Product ID | Cisco ONS 15454 MSTP Line Cards | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100M-2.5G MR-TXP | 2.5G MR DataMux | 4x2,5G FEC MXP | 4x2.5G EFEC MXP and MLSE MXP | 10G EFEC TXP<br>10G MLSE TXP | 10G MR DME and MLSE DME | ADM-10G | GE-XP | GE-XPE | 10GE-XP(E) | OTU2-XP | 40G-MXP/40E-MXP,40ME-MXP | TNC | AR-MXP and AR-XP | AR-XPE | WSE (Encryption) |
| ONS-SC+-10GEPxx.x= | | | | | | | | | | | | | | | | 9.8 |
| ONS-SC+-10G-C= | | | | | | | | | | | | | | | | 9.8 |

[1] Supported in software Release 7.0 but not in 8.0. Supported in Release 8.5.

[2] ONS-XC-10G-L2. 10G TXP, when equipped with LR2 XFP, needs to be placed on high-speed slot for power dissipation constraint if using FTA-3 or FTA-48V. If CC-FTA is used, there is no restriction.

[3] For DWDM SFP modules, xx.x ranges from 30.3 to 60.6. For DWDM SFP modules, xx.x ranges from 30.3 to 60.6, wavelength 28.7, 33.4, 41.3, 49.3, 57.3 requires Release 8.5. Supports Gigabit Ethernet, 1G Fibre Channel, 2G Fibre Channel, and OC-48, pending board rate support. Only P/N version 02 is qualified on the Cisco ONS 15454 MSTP. DWDM SFP modules will require mandatory CC-FTA use.

[4] For CWDM SFP modules, xxxx ranges from 1470 to 1610. Supports Gigabit Ethernet, 1G Fibre Channel, 2G Fibre Channel, and OC-48, pending board rate support. CWDM SFP modules will require mandatory CC-FTA use.

[5] 5G IB are supported by ONS-XC-10G-S1= P/N version 03 only on 10E TXP MLSE version.

[6] Only P/N version 02 is qualified on the Cisco ONS 15454 MSTP.

[7] For DWDM XFP modules, xx.x ranges from 30.3 to 61.4.

[8] 10GEBASE-ZR rate is supported starting by Release 8.5.2.

[9] P/N 10-2012-02 supports: 10G-1200-SM-LL-L/10GE BASE-LR/10GE BASE-LW/OC192 SR1/STM-64 I-64.1/OTU-2 at 10.7G. P/N 10-2012-03 supports: 10G-1200-SM-LL-L/10GE BASE-LR/10GE BASE-WR/OC192 SR1/STM-64 I.64/OTU-2 at 10.7G, 11.05G and 11.09G.

[10] P/N version 02 is required to support 10G Fibre Channel with OTN wrapping at 11.3 Gbps.

[11] Supported with limited temperature range up to 45° C ambient temperature.

[12] Supported only with 1510 nm wavelength.

[13] Maximum of 10 per XPE line card.

**Table 68.** 100G Line Cards for ONS 15454 MSTP and Cisco Network Convergence System 2000 Series

| Product ID | ONS 15454 MSTP Line Cards | | | NCS 2000 Series Line Cards | | | | |
|---|---|---|---|---|---|---|---|---|
| | 100G LC w/CXP (15454-M-100G-LC-C, 15454-M-100G-ME-C) | 2 x CFP LC (15454-M-100G-CFP-LC) | 10 x 10G LC (15454-M-10x10G-LC) | 100G LC w/CPAK (NCS2K-100G-CK-C) | 100G LC w/SD-FEC (NCS2K-100GS-CK-C) | 200G Multirate LC (NCS2K-200G-CK-C) | 100G Multirate Muxponder (NCS2K-MR-MXP-LIC) | 400G OTN XP (NCS2K-400G-XP=) |
| **ONS-SC+-10G-SR=** | - | - | 9.6 | - | - | - | 10.3 | - |
| **ONS-SC+-10G-LR=** | - | - | 9.6 | - | - | - | 10.3 | - |
| **ONS-SC+-10G-ER=** | - | - | 9.6 | - | - | - | - | - |
| **ONS-SC+-10G-ZR=** | - | - | 9.6 | - | - | - | - | - |
| **ONS-SC+-10G-xx.x=** | - | - | 9.6 | - | - | - | - | - |
| **ONS-CXP-100G-SR10=** | 9.6 | - | - | - | - | - | - | - |
| **ONS-CC-100G-LR4=** | - | 9.6 | - | - | - | - | - | - |
| **ONS-CC-100GE-LR4=** | - | 9.6.03 | - | - | - | - | - | - |
| **ONS-CC-40G-LR4=** | - | 9.6 | - | - | - | - | - | - |
| **ONS-CC-40G-FR=** | - | 9.6.03 | - | - | - | - | - | - |
| **ONS-SC+-10GEPxx.x=** | - | - | 9.6.03 | - | - | - | 10.3 | - |
| **ONS-SC+-10G-C=** | - | - | 9.6.03 | - | - | - | 10.3 | - |
| **ONS-SC+-10G-CUx=** | - | - | 9.6.03 | - | - | - | - | - |
| **CPAK-100G-LR4=** | - | - | - | 10.0 | 10.1 | 10.3 | - | - |
| **CPAK-100G-SR10=** | - | - | - | 10.0 | 10.1 | 10.3 | - | - |
| **QSFP-40G-SR4=** | - | - | - | - | - | - | 10.3 (4x10G) | 11.0 |
| **ONS-CFP2-WDM=, ONS-CFP2-WDM2=** | - | - | - | - | - | - | - | 10.6.1 |
| **ONS-QSFP28-LR4=** | - | - | - | - | - | - | - | 10.6.1 |
| **ONS-QSFP-4X10-MLR=** | - | - | - | - | - | - | - | 10.6.2 |
| **QSFP-100G-LR4-S=** | - | - | - | - | - | - | - | 10.6.1 |
| **QSFP-100G-SR4-S=** | - | - | - | - | - | - | - | 10.6.1 |
| **QSFP-4X10G-LR=** | - | - | - | - | - | - | 10.3 | - |

| Product ID | ONS 15454 MSTP Line Cards | | | NCS 2000 Series Line Cards | | | | |
|---|---|---|---|---|---|---|---|---|
| | 100G LC w/CXP (15454-M-100G-LC-C, 15454-M-100G-ME-C) | 2 x CFP LC (15454-M-100G-CFP-LC) | 10 x 10G LC (15454-M-10x10G-LC) | 100G LC w/CPAK (NCS2K-100G-CK-C) | 100G LC w/SD-FEC (NCS2K-100GS-CK-C) | 200G Multirate LC (NCS2K-200G-CK-C) | 100G Multirate Muxponder (NCS2K-MR-MXP-LIC) | 400G OTN XP (NCS2K-400G-XP=) |
| **QSFP-4X10G-LR-S=** | - | - | - | - | - | - | - | 10.6.1 |
| **QSFP-40G-LR4=** | - | - | - | - | - | - | 10.6.1 | 11.0 |
| **CPAK-100G-SR4=** | - | - | - | 10.6.1 | - | 10.6.1 | 10.6.1 | - |
| **ONS-QC-16GFC-SW=** | - | - | - | - | - | - | - | 10.6.2 |
| **QSFP-100G-SM-SR** | - | - | - | - | - | - | - | 10.7 |
| **ONS-QC-16GFC-LW=** | - | - | - | - | - | - | - | 10.8 |
| **QSFP-40/100-SRBD** | - | - | - | - | - | - | - | 11.0 |
| **QSFP-40-SR-BD** | - | - | - | - | - | - | 11.0 | 11.0 |
| **ONS-QSFP-4X10-MER=** | - | - | - | - | - | - | - | 11.1 |
| **QSFP-100G-FR-S** | - | - | - | - | - | - | - | 11.1.2 |
| **CPAK-100G-FR** | - | - | - | - | - | 11.1.2 | - | - |

**Table 69.** Pluggables on 1.2T DWDM MXP of NCS2000

| Product ID | 1.2T MXP in NCS 2000 SW Release |
|---|---|
| **ONS-CFP2D-400G-C=** | 12.2 |
| **ONS-QSFP28-LR4=** | 12.2 |
| **QSFP-100G-FR-S** | 12.2 |
| **QSFP-100G-SR4-S=** | 12.2 |
| **QSFP-100G-SM-SR=** | 12.2 |
| **QDD-400G-DR4-S (Breakout with MPO-LC)** | 12.2 |

| Product ID | 1.2T MXP in NCS 2000 SW Release |
|---|---|
| QDD-400G-FR4-S | 12.2 |
| QDD-400G-LR8-S | 12.2 |
| QDD-400G-AOCxM x=1,2,3,5,7,15 | 12.2 |

**Table 70.** Cisco ONS 15600 Multiservice Switching Platform (MSSP)

| Product ID | Cisco ONS 15600 MSSP Line Cards | |
|---|---|---|
| | ASAP 4PIO CARD | ASAP 1PIO CARD |
| ONS-SI-155-L2= | 6.0 | |
| ONS-SI-622-L2= | 6.0 | |
| ONS-SE-Z1= | 6.0 | |
| ONS-SI-2G-S1= | 6.0 | |
| ONS-SI-2G-I1= | 9.0 | |
| ONS-SE-2G-L2= | 6.0 | |
| ONS-SI-2G-L2= | 9.0 | |
| ONS-SC-2G-xx.x=[1] | 6.0 | |
| ONS-XC-10G-S1= | | 6.0 |
| ONS-XC-10G-I2= | | 9.0 |
| ONS-XC-10G-L2= | | 6.0 |
| ONS-XC-10G-xx.x= | | 9.0 |

[1] For DWDM SFP modules, xx.x ranges from 30.3 to 60.6.

**Table 71.** Cisco ONS 15300 Series platforms

| Product ID | Cisco ONS 15300 Series Line Cards | | | | |
|---|---|---|---|---|---|
| | 15305 | 15310-CE-MR-6 | 15310-CL | 15310-MA | 15327 |
| 15327-SFP-LC-SX= | | | | | X |
| 15327-SFP-LC-LX= | | | | | X |
| ONS-SC-GE-SX= | X | | | | X |
| ONS-SC-GE-LX= | X | | | | X |
| 15454-SFP-LC-SX= | X | | | | |

| Product ID | Cisco ONS 15300 Series Line Cards | | | | |
|---|---|---|---|---|---|
| | 15305 | 15310-CE-MR-6 | 15310-CL | 15310-MA | 15327 |
| 15454-SFP-LC-LX= | X | | | | |
| ONS-SI-100-LX10= | | 8.5.1 | | | |
| ONS-SI-100-FX= | | 8.5.1 | | | |
| ONS-SE-100-BX10U= | | 8.5.1 | | | |
| ONS-SE-100-BX10D= | | 8.5.1 | | | |
| ONS-SI-GE-SX= | | 8.5.1 | | | |
| ONS-SI-GE-LX= | | 8.5.1 | | | |
| ONS-SI-GE-ZX= | | 8.5.1 | | | |
| ONS-SE-ZE-EL= | | 8.5.1 | | | |
| ONS-SC-155-EL= | | | | 9.04 | |
| ONS-SI-155-SR-MM= | | | | 9.14 | |
| ONS-SI-155-I1= | | | 7.0 | 7.0 | |
| ONS-SI-155-L1= | | | 7.0 | 7.0 | |
| ONS-SI-155-L2= | | | 7.0 | 7.0 | |
| ONS-SI-622-I1= | | | 7.0 | 7.0 | |
| ONS-SI-622-L1= | | | 7.0 | 7.0 | |
| ONS-SI-622-L2= | | | 7.0 | 7.0 | |
| ONS-SI-2G-S1= | | | | 7.0 | |
| ONS-SI-2G-I1= | | | | 7.0 | |
| ONS-SI-2G-L1= | | | | 7.0 | |
| ONS-SI-2G-L2= | | | | 7.0 | |
| ONS-SE-Z1= | | | | 8.5 | |
| ONS-SE-155-xxxx[1] | | | 9.0 | 7.0 | |

| Product ID | Cisco ONS 15300 Series Line Cards | | | | |
|---|---|---|---|---|---|
| | 15305 | 15310-CE-MR-6 | 15310-CL | 15310-MA | 15327 |
| ONS-SE-622-xxxx[2] | | | 9.0 | 7.0 | |
| ONS-SE-2G-xxxx[2] | | | | 9.0[4] | |
| ONS-SC-2G-xx.x=[3] | | | | 7.0 | |

[1] For CWDM 155 Mbps SFP modules, xxxx ranges from 1470 to 1610.

[2] For CWDM SFP modules, xxxx ranges from 1470 to 1610.

[3] For DWDM SFP modules, xx.x ranges from 30.3 to 60.6. For DWDM SFP modules, xx.x ranges from 30.3 to 60.6, wavelength 28.7, 33.4, 41.3, 49.3, 57.3 requires Release 8.5.

[4] 9.0 for 15310-SDH version, 9.0 for 15310-SDH version, 9.1 for SONET version.

**Table 72.** Cisco ONS 4G Fibre Channel DWDM SFP and MDS line card

| Cisco MDS Line Cards | Product ID ONW-SC-4G-xx.x= |
|---|---|
| DS-X9112 | X |
| DS-X9124 | X |
| DS-X9148 | X |
| DS-X9224-96K9 | X |
| DS-X9248-96K9 | X |
| DS-X9248-48K9 | X |
| DS-X9304-18K8 | X |
| DS-C9222I-K9 | X |
| DS-C9124-K9 | X |

**Table 73.** Pluggables on NCS1000

| Product ID | NCS 1002 in XR SW Release |
|---|---|
| QSFP-40G-LR4-S= | 6.1.2 |
| QSFP-40G-CSR4= | 6.1.2 |
| QSFP-4X10G-LR-S= | 6.1.2 |
| QSFP-100G-CWDM4-S= | 6.1.2 |
| QSFP-100G-SR4-S= | 6.1.2 |
| QSFP-100G-LR4-S | 6.1.2 |

| Product ID | NCS 1002 in XR SW Release |
|---|---|
| ONS-CFP2-WDM= | 6.1.2 |
| QSFP-100G-SM-SR= | 6.3.1 |
| QSFP-100G-PSM4-S= | 6.3.1 |
| QSFP-100G-AOCX= (X: 1M to 30M) | 6.3.1 |

**Table 74.** Pluggables on NCS1004

| Product ID | NCS 1004 in XR SW Release |
|---|---|
| QSFP-100G-FR-S | 7.2.1 |
| QSFP-40/100-SRBD | 7.3.1 |
| QSFP-100G-ER4 | 7.3.1 |
| QSFP-100G-DR-S | 7.3.2 |
| QSFP-100G-AOC | 7.0.1 |
| QSFP-100G-SM-SR | 7.0.1 |
| QSFP-100G-CWDM4-S= | 7.0.1 |
| QSFP-100G-LR4-S= | 7.0.1 |
| QSFP-100G-SR4-S | 7.0.1 |
| ONS-QSFP28-LR4= | 7.1.1 |

**Table 75.** Pluggables on NCS4000

| Product ID | NCS 4000 DWDM/OTN/Packet LC in XR SW Release | NCS 4000 OTN LC in XR SW Release |
|---|---|---|
| ONS-QSP28-LR4= | 6.1.22 | NA |
| ONS-QSFP-4X10-MLR= | 6.1.22 | NA |
| QSFP-40GE-LR4= | 6.1.22 | NA |
| ONS-SC+-10G-SR= | NA | 5.2.4 |
| ONS-SC+-10G-LR= | NA | 5.2.4 |
| ONS-SC+-10G-ER= | NA | 5.2.4 |
| ONS-SC+-10G-ZR= | NA | 5.2.4 |
| ONS-SC+-10G-C= | NA | 5.2.4 |

| Product ID | NCS 4000 DWDM/OTN/Packet LC in XR SW Release | NCS 4000 OTN LC in XR SW Release |
|---|---|---|
| **CPAK-100G-SR10=** | NA | 5.2.4 |
| **CPAK-100G-LR4-** | NA | 5.2.4 |
| **ONS-CFP2-WDM=, ONS-CFP2-WDM2= [2]** | 6.1.22 | NA |
| **ONS-QSFP-4X10-MER=** | 6.5.25 | NA |

**Table 76.** Pluggables on NCS6000

| Product ID | NCS 6000 in XR SW Release |
|---|---|
| **ONS-CXP2-SR25** | 6.3.2 |

**Table 77.** Pluggables on NCS42xx

| Product ID | NCS 42xx SW Release |
|---|---|
| **ONS-SI+-10G-SR=** | 16.10.2 and 17.1.1 |
| **ONS-SI+-10G-LR=** | 16.10.2 and 17.1.1 |
| **ONS-SI+-10G-ER=** | 16.10.2 and 17.1.1 |
| **ONS-SI-DS1-TPOP=[1]** | XE 16.12.1 |

[1] Among the platforms that support this pluggable: ASR-920-4SZ-A/D has a total of 4 ports to host smart SFPs and all of those 4 ports can be used to fit this smart DS1-TPOP SFP. ASR920-12SZ-IM and NCS4202-SA have a total of 8 ports to host smart SFPs and all of those 8 ports can be used to fit this DS1-TPOP SFP. Lastly, the ASR-920-24SZ-M and NCS4201-SA (non-IM) have a total of 24 optical ports. But due to existing platform level limitations on NCS42xx / ASR920, only 12 of those 24 ports can be used for hosting any smart SFPs. Further, due to limitations on the EMC specification of this DS1-TPOP SFP, the maximum number of these DS1-TPOP SFP that can be supported on ASR-920-24SZ-M and NCS4201-SA (non-IM) is 8 only. Nevertheless, the remaining ports (4 remaining of the 12), can continue to support other smart SFPs if needed but not the DS1-TPOP SFP.

[2] The ONS-CFP2-WDM= is supported on NCS1000, ASR9000, NCS5500, NCS2000 and NCS4000 platforms, while the ONS -CFP2-WDM2= is supported only on the NCS2000 and NCS4000. Both pluggables are backward compatible to each other, interchangeable, posses identical EEPROM reading and are identical across relevant SW releases. The technical specifications bear a slight difference and the same is explained in Table 55.

**Table 78.** Digital CFP2 pluggables

| Product ID | NCS 1000 in IOS XR SW Release | NCS 2000 SW Release |
|---|---|---|
| **ONS-CFP2D-400G-C=** | 7.2.1 | 12.2 |
| **QDD-400G-ZRP-S=, QDD-400G-ZR-S=** | 7.3.2 on NCS1004-OTN-XP (NCS1K4-OTN-XP=)<br>7.7.1 on NCS1004 High Density QDD TXP (NCS1K4-QXP-K9=) | NA |
| **DP04QSDD-HE0=** | 7.10.1 (NCS1K4-QXP-K9=) | NA |
| **DP04CFP2-M25-K9=** | 7.5.2 | NA |

# Chapter 4: Physical details

Tables below list reliability data, power consumption, and cable type to be used for each pluggable module.

**Table 79.** SONET/SDH SFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SE-2G-S1=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-2G-L2=** | 5,346,554 | 1W | 900ps | LC-LC |
| **ONS-SI-155-SR-MM=** | 7,936,508 | 1W | 900ps | LC-LC |
| **ONS-SI-155-I1=** | 3,039,499 | 1W | 900ps | LC-LC |
| **ONS-SI-155-L1=** | 5,346,554 | 1W | 900ps | LC-LC |
| **ONS-SI-155-L2=** | 5,346,554 | 1W | 900ps | LC-LC |
| **ONS-SI-622-SR-MM=** | 2,294, 776 | 1W | 900ps | LC-LC |
| **ONS-SI-622-I1=** | 3,039,499 | 1W | 900ps | LC-LC |
| **ONS-SI-622-L1=** | 3,039,499 | 1W | 900ps | LC-LC |
| **ONS-SI-622-L2=** | 5,346,554 | 1W | 900ps | LC-LC |
| **ONS-SI-2G-S1** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-2G-I1=** | 3,039,499 | 1W | 900ps | LC-LC |
| **ONS-SI-2G-L1=** | 5,346,554 | 1W | 900ps | LC-LC |
| **ONS-SI-2G-L2=** | 5,346,554 | 1W | 900ps | LC-LC |

**Table 80.** OSC SFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SC-OSC-ULH=** | 1,287,720 | 1W | 900ps | LC-LC |
| **ONS-SC-OSC-18.0=** | 1,287,720 | 1W | 900ps | LC-LC |

**Table 81.** Data SFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SI-100-BXD=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-100-BXU=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-100-LX10=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-100-LX10=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-100-FX=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-100-FX=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-GE-BXU=** | 6,250,000 | 1W | 900ps | LC-LC |
| **ONS-SE-GE-BXD=** | 6,250,000 | 1W | 900ps | LC-LC |
| **ONS-SC-GE-SX=** | 7,919,921 | 1W | 900ps | LC-LC |
| **ONS-SI-GE-SX=** | 7,919,921 | 1W | 900ps | LC-LC |
| **ONS-SC-GE-LX=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-GE-LX=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SI-GE-EX=** | 2,385,000 | 1W | 900ps | LC-LC |
| **ONS-SI-GE-ZX=** | 10,00,000 | 1W | 900ps | LC-LC |
| **ONS-SE-G2F-SX=** | 7,919,921 | 1W | 900ps | LC-LC |
| **ONS-SE-G2F-LX=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-200-MM=** | 9,970,080 | 1W | 900ps | LC-LC |
| **ONS-SE-4G-MM=** | 7,919,921 | 1W | 900ps | LC-LC |
| **ONS-SE-4G-SM=** | 3,039,499 | 1W | 900ps | LC-LC |

**Table 82.** Electrical SFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SE-ZE-EL=** | 4,068,349 | 1 | 450ns | RJ-45 STP CAT5e and CAT6 |
| **ONS-SC-155-EL=** | 5,714,286 | 1 | 450ns | 75Ω DIN 1.0/2.3 |
| **ONS-SC-E3-T3-PW=** | 2,496,307 | 1.25 | | RJ 45 |
| **ONS-SC-E1-T1-PW=** | 2,496,307 | 1.1 | | RJ 45 |
| **ONS-SC-EoP1=** | 5,269,564 | 1.25 | | RJ 45 |
| **ONS-SC-EOP3=** | 6,098,205 | 1.25 | | RJ 45 |

**Table 83.** Multirate SFP module

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SE-Z1=** | 3,039,499 | 1 | 900ps | |

**Table 84.** Video SFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-SC-HD3GV-TX=** | 3,460,200 | 0.6W | 900ps | LC-LC |
| **ONS-SC-HD3GV-RX=** | 6,096,960 | 0.6W | 900ps | LC-LC |

**Table 85.** Grey GBICs

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Supported Cable Connection |
|---|---|---|---|
| **ONS-GC-GE-LX=** | 7,919,921 | 1.8 | SC-PC SM |
| **ONS-GC-GE-SX=** | 9,970,080 | 1.8 | SC-PC MM |
| **ONS-GC-GE-ZX=** | 5,346,554 | 1.8 | SC-PC SM |
| **ONS-GX-2FC-MMI=** | 7,919,921 | 1.8 | SC-PC MM |
| **ONS-GX-2FC-SML=** | 3,039,499 | 1.8 | SC-PC SM |

**Table 86.** Grey XFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Average Latency | Supported Cable Connection |
|---|---|---|---|---|
| **ONS-XC-10G-S1=** | 3,039,506 | 2.5 | 5ns | LC-LC |
| **ONS-XC-10G-I2=** | 3,279,693 | 3 | 5ns | LC-LC |
| **ONS-XC-10G-L2=** | 2,711,429 | 3 | 5ns | LC-LC |
| **ONS-XC-10G-SR-MM=** | 1,974,000 | 1.5 | 5ns | LC-LC |
| **ONS-XC-8G-SM=** | 3,039,506 | 2.5 | 5ns | LC-LC |
| **ONS-XC-8G-MM=** | | 1.5 | 5ns | LC-LC |

**Table 87.** xWDM SFP modules

| Product ID | MTBF | Maximum Power Consumption (W) | Supported Cable Connection |
|---|---|---|---|
| **ONS-SC-2G-xx.x=** | 5,346,554 | 1 | LC-LC |
| **ONS-SC-4G-xx.x=** | 1,856,000 | 1.25 | LC-LC |
| **ONS-SC-Z3-xxxx=** | 2,070,393 | 1.1 | LC-LC |
| **ONS-SE-155-xxxx=** | 5,346,554 | 1 | LC-LC |
| **ONS-SE-622-xxxx=** | 5,346,554 | 1 | LC-LC |
| **ONS-XC-10G-xx.x=** | 2,711,000 | 3.5 | LC-LC |
| **ONS-XC-10G-EPxx.x=** | 2,711,000 | 3.5 | LC-LC |
| **ONS-XC-10G-C=** | 1,000,000 | 3.5 | LC-LC |
| **ONS-XC-10G-xxxx=** | 2,711,000 | 3.5 | LC-LC |

**Table 88.** SFP+ modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Supported Cable Connection |
|---|---|---|---|
| **ONS-SC+-10G-SR=** | 1,282,000 | 1 | LC-LC |
| **ONS-SC+-10G-LR=** | 632,000 | 1 | LC-LC |
| **ONS-SC+-10G-ER=** | 2,520,000 | 1 | LC-LC |
| **ONS-SC+-10G-ZR=** | 1,934,000 | 1 | LC-LC |
| **ONS-SC+-10G-xx.x=** | 1,934,000 | 1.5 | LC-LC |
| **ONS-SC+-10GEPxx.x=** | 1,934,000 | 1.5 | LC-LC |
| **ONS-SC+-10G-C=** | 1,934,000 | 1.5 | LC-LC |

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Supported Cable Connection |
|---|---|---|---|
| **ONS-SC+-10G-CUx=** | 1,934,000 | 1.5 | LC-LC |
| **ONS-SI+-10G-SR=** | 7,560,000 | 1 | LC-LC |
| **ONS-SI+-10G-LR=** | 4,490,000 | 1 | LC-LC |
| **ONS-SI+-10G-ER=** | 9,280,000 | 1.2 | LC-LC |
| **ONS-SI+-10G-ZR=** | 9,280,000 | 2 | LC-LC |

**Table 89.** CXP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Supported Cable Connection | Cables Available in Cisco Supported on These Units |
|---|---|---|---|---|
| **ONS-CXP-100G-SR10=** | 7,100,000 | 6 | 24-fiber MPO/MTP Connector (-SR10) | ONS-CCC-100G-5=<br>ONS-CCC-100G-10=<br>ONS-CCC-100G-20= |

**Table 90.** CFP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type | Cable Type |
|---|---|---|---|---|
| **ONS-CC-100G-LR4=**<br>**And ONS-CC-100GE-LR4=** | 553,000 | 19 | Dual SC/PC | SMF Duplex |
| **ONS-CC-40G-LR4=** | 1,173,000 | 19 | Dual SC/PC | SMF Duplex |
| **ONS-CC-40G-FR=** | 1,173,000 | 8 | Dual SC/PC | SMF Duplex |

**Table 91.** Cisco CPAK modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type | Cable Type |
|---|---|---|---|---|
| **CPAK-100G-LR4=** | 1,000,000 | 6.75 | Dual SC/PC | SMF Duplex |
| **CPAK-100G-SR10=** | 1,000,000 | 4.5 | 24 Fiber MPO/MTP | MMF (24 fibers) |
| **CPAK-100G-SR4=** | 1,000,000 | 6 | MPO-12 (MTP) | MMF |

**Table 92.** QSFP+ modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type | Cable Type |
|---|---|---|---|---|
| **QSFP-40G-SR4=** | 5,070,000 | 1.5 | MPO12 | MMF (OM2, OM3, OM4) |
| **QSFP-100G-LR4-S=** | 4,385,965 | 3.5 | LC | SMF |
| **QSFP-100G-SR4-S=** | 8,904,720 | 3.5 | MPO12 | MMF OM4 |
| **QSFP-4X10G-LR-S=** | 1,620,746 | 3.5 | MPO12 | SMF |
| **QSFP-40G-LR4=** | 5,070,000 | 3.5 | LC | SMF |
| **ONS-QSFP-4X10-MLR=** | 500,000 | 3.5 | MPO12 | SMF |
| **ONS-QSFP28-LR4=** | 500,000 | 4 | LC | SMF |
| **ONS-QC-16GFC-SW=** | 1,620,746 | 4 | MPO12 | MMF (OM3, OM4) |
| **QSFP-100G-SM-SR** | 500,000 | 3.5 | LC | SMF |
| **ONS-QC-16GFC-LW=** | 1,620,746 | 4 | LC | SMF |
| **ONS-QSFP-4X10-MER=** | 950,000 | 3.5 | MPO12 | SMF |
| **QSFP-40/100-SRBD** | 6800000 | 3.5 | LC | MMF |
| **QSFP-40G-SR-BD** | 2850221 | 3.5 | LC | MMF |

**Table 93.** CFP2 modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type | Cable Type |
|---|---|---|---|---|
| **ONS-CFP2-WDM=, ONS-CFP2-WDM2=** | 500,000 | 12 | LC-LC | LC |
| **ONS-CFP2-WDM-1KL=** | 500,000 | 12 | LC-LC | LC |
| **ONS-CFP2-WDM-1KE=** | 500,000 | 12 | LC-LC | LC |

**Table 94.** CXP2 module

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type |
|---|---|---|---|
| **ONS-CXP2-SR25** | 500,000 | 6 (only Tx CDRs on)<br>7.2 (both Tx and Rx CDRs on) | 24-fiber MPO/MTP Connector |

**Table 95.** TPoP modules

| Product ID | MTBF in Hours | Maximum Power Consumption (W) | Connector Type |
|---|---|---|---|
| **ONS-SI-DS1-TPOP=** | 9,600,000 | 1.05 to 1.3 | 8 pin RJ45 connector, wired in accordance with G.703 |

**Table 96.** CFP2-DCO module: ONS-CFP2D-400G-C=

| Line mode / Standard | Modulation Format | MTBF in Hours | Power Consumption (W) | | Connector Type | Cable Type |
|---|---|---|---|---|---|---|
| | | | Typical | Maximum | | |
| **Standard Operation** | | 387,597 | | 24.5 | LC-LC | LC |
| **400ZR** | 400G-16QAM | | 19.2 | 21.2 | | |
| **Open ROADM** | 200G-QPSK | | 20.2 | 22.2 | | |
| | 300G-8QAM | | 21.5 | 23.5 | | |
| | 400G-16QAM | | 22.5 | 24.5 | | |
| **Open ZR+** | 100G-QPSK | | 16.8 | 18.8 | | |
| | 200G-8QAM | | 17.8 | 19.8 | | |
| | 200G-16QAM | | 18.3 | 20.3 | | |
| | 200G-QPSK | | 19.7 | 21.7 | | |
| | 300G-8QAM | | 21.0 | 23.0 | | |
| | 400G-16QAM | | 21.9 | 23.9 | | |

**Table 97.** CFP2-DCO module: DP04CFP2-M25-K9= **

| Line mode / Standard | Modulation Format | MTBF in Hours | Power Consumption (W) | | Connector Type | Cable Type |
|---|---|---|---|---|---|---|
| | | | Typical | Maximum | | |
| **Standard Operation** | | 387,597 | | 27.5 | LC-LC | LC |
| **400ZR** | 400G-16QAM | | 24.6 | 24.6 | | |
| **Open ROADM** | 200G-QPSK | | 23.2 | 23.7 | | |
| | 300G-8QAM | | 24.7 | 25.2 | | |
| | 400G-16QAM | | 25.9 | 26.4 | | |

| Line mode / Standard | Modulation Format | MTBF in Hours | Power Consumption (W) | | Connector Type | Cable Type |
|---|---|---|---|---|---|---|
| | | | Typical | Maximum | | |
| **Open ZR+** | 100G-QPSK | | 20.1 | 20.6 | | |
| | 200G-8QAM | | 22.2 | 22.7 | | |
| | 200G-16QAM | | 21.3 | 21.8 | | |
| | 200G-QPSK | | 23.7 | 24.2 | | |
| | 300G-8QAM | | 25.6 | 26.1 | | |
| | 400G-16QAM | | 27.0 | 27.5 | | |

**The DP04CFP2-M25-K9= has the same optical performance characteristics as that of the ONS-CFPD-400G-C=. Both are digital CFP2-DCO modules capable of operating up to 400G. The primary difference between the two is that the DP04CFP2-M25-K9= supports ASE encryption and secure boot functionality while the ONS-CFP2D-400G-C= doesn't. The Secure Boot feature enhances the boot process by adding 2 layers of image authentication, using keyed encryption/decryption. DP04CFP2-M25-K9= supports Layer-1 (L1) functionality to support authentication and encryption/decryption of the OPU[Cn,4] Payload. The security IP provides wire-speed Galois-Counter-Mode (GCM) AES 256-bit security in either authentication only (GMAC), encryption/decryption only (CTR), or both (GCM) modes. Inter-host key exchange is supported via communication over GCC channel. Naturally, the power disspitation of the modules are also different and detailed in the table above.

The Open Roadm specification considers OTN framing and cyrpto capability. Open ZR+ is the Ethernet version.

### Third-party equipment

The use of third-party equipment instead of Cisco ONS SFP products is allowed, but not recommended, for the following reasons.

- Cisco can guarantee Service-Level Agreements (SLAs) only on parts that have undergone the Cisco test plan and validation process. Without comprehensive testing and validation, SFP products may display anomalous behavior that can affect host-board performance.
- Cisco SFP modules reserve specific EEPROM fields to store inventory data such as Product ID, Part Number, Serial Number, and CLEI CODE that are specific to Cisco SFP modules and are required for SLAs.

### End-of-sale and End-of-life products

The table below lists the Cisco Pluggable modules in the Cisco ONS family that have reached end-of-sale or end-of-life status, followed by their replacement products.

**Table 98.** End-of-sale and End-of-life SFP modules

| End-of-Life or End-of-Sale Product ID | Replacement Product ID |
|---|---|
| **15454-SFP-GE+-LX=** | ONS-SE-G2F-SX= |
| **15327-SFP-LC-SX=** | ONS-SC-GE-SX= |
| **15327-SFP-LC-LX=** | ONS-SC-GE-LX= |

| End-of-Life or End-of-Sale Product ID | Replacement Product ID |
|---|---|
| **15454-SFP-LC-SX=** | ONS-SC-GE-SX= |
| **15454-SFP-LC-LX=** | ONS-SC-GE-LX= |

## Product sustainability

Information about Cisco's environmental, social, and governance (ESG) initiatives and performance is provided in Cisco's CSR and sustainability reporting.

**Table 99.** Cisco environmental sustainability information

| Sustainability topic | | Reference |
|---|---|---|
| **General** | Information on product-material-content laws and regulations | Materials |
| | Information on electronic waste laws and regulations, including our products, batteries, and packaging | WEEE Compliance |
| | Information on product takeback and reuse program | Cisco Takeback and Reuse Program |
| | Sustainability inquiries | Contact: csr_inquiries@cisco.com |
| | MTBF | Chapter 4: Physical details |
| | Temperature Range | Chapter 1: List of Pluggables by Product ID and Cisco part number |
| **Power** | Max Power Consumption (W) | Chapter 4: Physical details |
| **Material** | Product packaging weight and materials | Contact: environment@cisco.com |

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## Document history

| New or Revised Topic | Described In | Date |
|---|---|---|
| **Added a new product: the 400G Digital CFP2 pluggable** | Across the datasheet | June 22, 2021 |


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