Cisco Optical Transceiver Handling Guide

Contents

## Handling Guidelines for QSFP-DD, QSFP, SFP Transceiver

This guide describes the general handling measures and precautions when handling optical transceivers to ensure they can be handled with reduced risk for damage.

Overview

The QSFP-DD, QSFP, and SFP transceiver modules are hot-swappable and connect the electrical circuitry of the system with an optical external network.
The following figure shows the QSFP-DD transceiver, but the procedures outlined in this document apply to all pluggable transceivers. The QSFP-DD transceiver is used primarily in switches, routers, and data center equipment where it provides higher bandwidth density than SFP and QSFP modules.

Figure 1. QSFP-DD Transceiver Module (Optical)
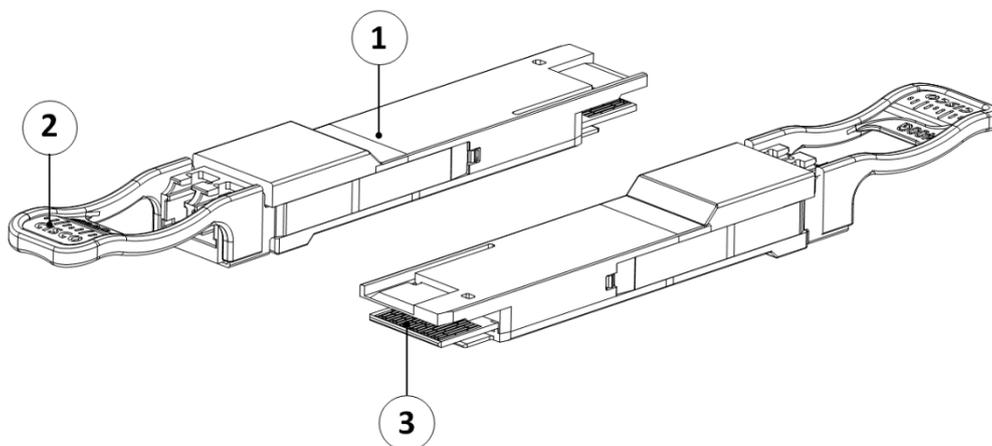
| 1 | QSFP-DD transceiver body | 3 | Electrical connection to the module circuitry |

2	Pull tab latch	

Required Tools and Equipment

You need these tools to install transceiver modules:

- Wrist strap or other personal grounding device to prevent ESD occurrences.
- Antistatic mat or antistatic foam to set the transceiver on.
- Optical connector cleaning tool suitable for the connector

Operating Temperature of Optical Transceivers

Several parameters impact the operating case temperature of optical transceiver and its surface temperature.

The ambient temperature of the environment that the platform is operating in, air flow, cage and heat sink design, impact the case temperature of the module.

If the module needs to be physically extracted from the port, then this should be done when the module is in the comfortable range to be handled.

Telcordia NEBS™ Requirements: Physical Protection GR-63 CORE outlines the temperature range for a touchable surface in normal use (short periods) as 55°C for a metal surface and 70°C for non-metals such as the pull handle of the module. Parts that are held in normal use (prolonged use) are expected to be held for anywhere between 10 seconds to 10 minutes and the temperature is 48°C for all surface types.

The case operating temperature of the module is around typically 10 to 15 degrees hotter than the ambient temperature. A transceiver operated at an ambient temperature of 45°C can easily reach 60°C or more, making the metal transceiver body hotter than the standards recommend. The module has been designed to effectively dissipate heat via thermal conduction through the host platform cage and riding heat sink, provided there is sufficient air flow.

If a module that is operational needs to be extracted from a port then the following guidelines should be followed for removal.

ESD Precaution

Transceivers are susceptible to ESD (electrostatic discharge) which can damage the sensitive integrated circuits. An ESD protective wrist strap should be worn by personnel extracting the module, and the wrist strap should be connected to ground potential. Work surfaces and benches should be ESD protected and connected to a common ground point.

⚠️ **Caution** The QSFP-DD, QSFP, SFP transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling transceiver modules or coming into contact with modules.

Module Handling Temperature

Before extracting a transceiver from the host platform, the host should verify that the port is no longer carrying active traffic and it is ready for extraction.

Next recommendation is to remotely monitor the temperature of the module that needs to be extracted, to ensure it is comfortable to handle [Appendix 1.]

The module updates to the current temperature each time the host software polls this reading over the low speed communication interface. The module internal temperature is calibrated to be close to the module case temperature and this reading is provided to the host software.

A module that has temperature reading less than 55°C should be comfortable for handling.

For transceivers that need to be swapped, which report a temperature higher than 55°C, the recommendation is to remotely configure the port into administrative (admin) down state by issuing the corresponding host command. This should only be done after the host has confirmed there is no longer active traffic on the port, as admin down will set the link down.

> ⚠️ **Caution**   Be careful when removing QSFP-DD, QSFP, SFP modules from host platform. The transceiver module body temperature might go over 160°F (70°C) and be too hot to touch with bare hands.

Admin down state disables the transceiver's transmitter circuit. The module enters into standby mode, and it should take approximately 2 -3 minutes to cool down to comfortable handling temperature.

The admin down command can be set on a single port, or group of ports. In this state, transceivers are still able to update their temperature reading, as the low speed interface is active.

The host can poll the module to confirm the temperature is ready for handling before extracting the module.

QSFP-DD, QSFP, SFP Removal Guideline

The form factor pluggable optics QSFP-DD, QSFP, 25G SFP28 and 10G SFP AOC and DAC are designed with a pull tab release mechanism. Some SFP modules use bail release mechanism.

To remove a transceiver module, using pull tabs follow these steps:
1. Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.
2. For optical transceiver modules, disconnect the fiber connector from the transceiver. The fiber connectors should be kept clean.
3. Transceivers equipped with a pull tab latch (see QSFP-DD example in Figure 2 below):
   a. Immediately install the dust plug into the transceiver's optical bore.
   b. Grasp the tab with fingers and gently pull to release the transceiver from the socket.
   c. Slide the transceiver out of the socket holding the pull tab only without touching the pluggable metal surfaces.
4. Place the transceiver module onto the ESD bench or work area and allow it to cool prior to inserting into an antistatic bag.
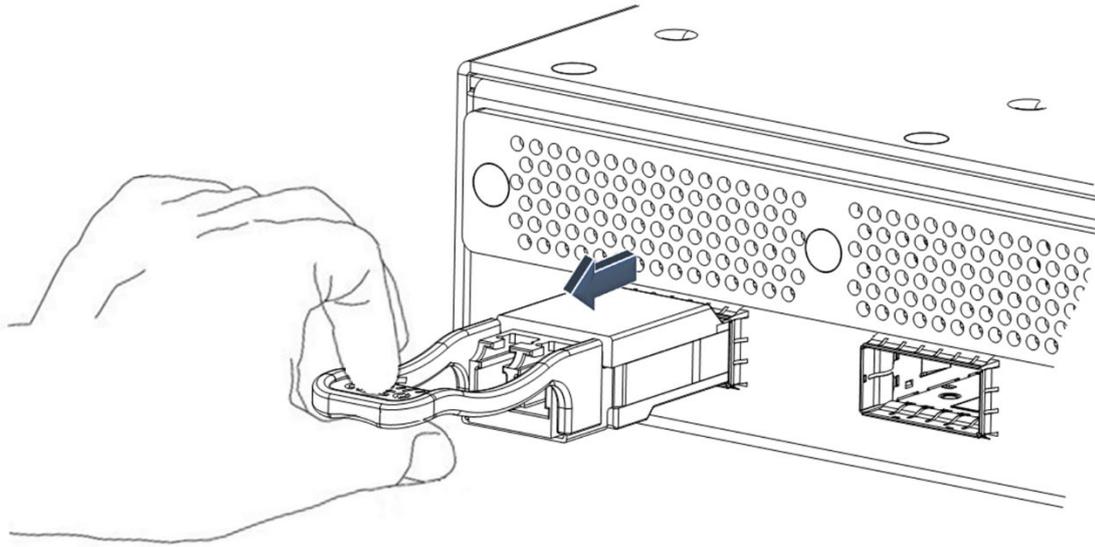
Figure 2. Removing the QSFP-DD Transceiver Module

## Installing the QSFP-DD, QSFP, SFP Transceiver Module

> ⚠️ **Caution**
>
> The transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP-DD transceiver modules or coming into contact with system modules.

To install transceiver modules, follow these steps:

1. Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.
2. Remove the transceiver module from its protective packaging.
3. Check the label on the QSFP-DD, QSFP, SFP transceiver module body to verify that you have the correct model for your network.
4. Hold the transceiver module so that the identifier label is on the bottom. Align the transceiver in front of the platform port and carefully slide the transceiver into the socket until the transceiver makes contact with the socket electrical connector. In some platforms the QSFP-DD cages are installed up-side-down, in this case the identifier label must be on the top.

Figure 3. Installing the QSFP-DD Transceiver Module (Optical Transceiver Equipped with Pull Tab Shown)
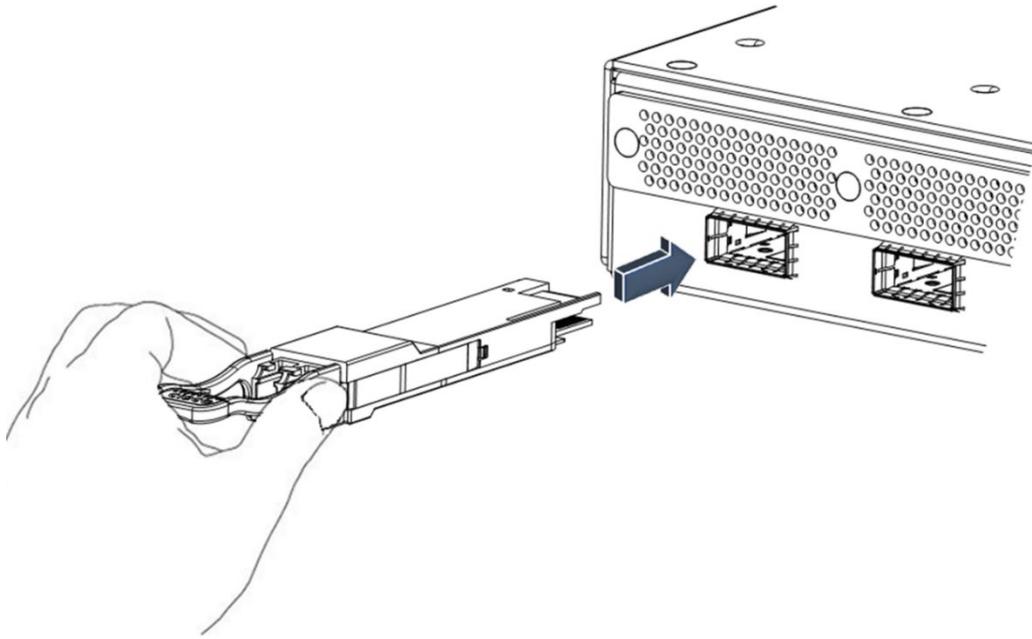
5. Press firmly on the front of the transceiver module with your thumb to fully seat the transceiver in the module's transceiver socket (see the below figure).

> ⚠️ **Caution**   If the latch is not fully engaged, you might accidentally disconnect the QSFP-DD transceiver module.

Figure 4. Seating the QSFP-DD Transceiver Module (Optical Transceiver Equipped with a Pull Tab Latch Shown)
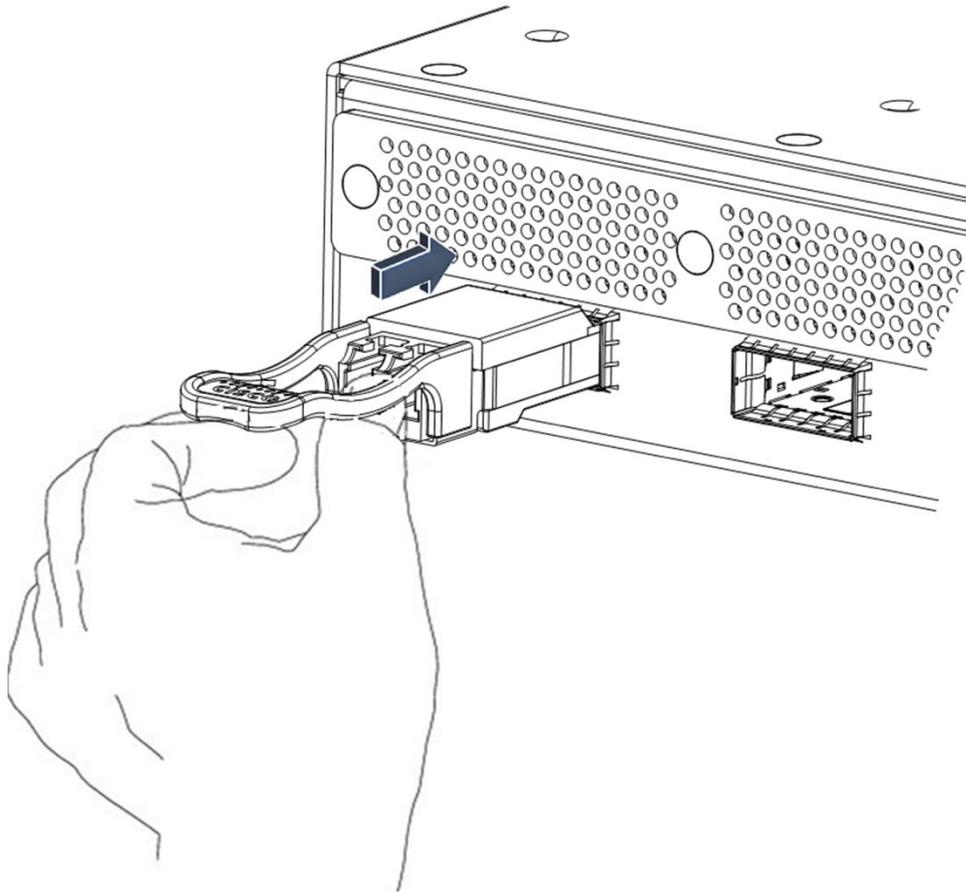
6. Do not remove the dust plug until you are ready to attach the fiber cable. Dust plug is not shown in the figures of this document.

7. Always clean the optical connector surface using a fiber connector cleaner, this should be done for every fiber insertion into the module optical receptacle

Appendix

1. Telcordia NEBSTM Requirements: Physical Protection GR-63-CORE Issue 5, December 2017

2. Specification – QSFP-DD (qsfp-dd.com)
QDD Power Class

Table 6- Power Classes

Power Class	Max Power (W)
1	1.5
2	3.5
3	7.0
4	8.0
5	10
6	12
7	14
8	>14

3. Specification - QSFP28 SFF-8679
QSFP Power Class

TABLE 5-3 QSFP+ MODULE POWER CLASSES

Power Class	Maximum power consumption per module (W)
1	1.5
2	2.0
3	2.5
4	3.5
5	4.0
6	4.5
7	5.0
8	10.0 (Note)

Note: For power class 8, maximum power consumption is declared by the module in SFF-8636, Page 00h, Byte 107

4. Specification - SFP+ SFF-8431
SFP Power Class

Table 4- Power Classification

Power Class	Max Power (W)
1	1.0
2	1.5
3	2.0
4	3.5
5	5.0
6	reserved
7	reserved
8	See management register for maximum power consumption