7 Pluggable Modules for Interfaces

NOTE

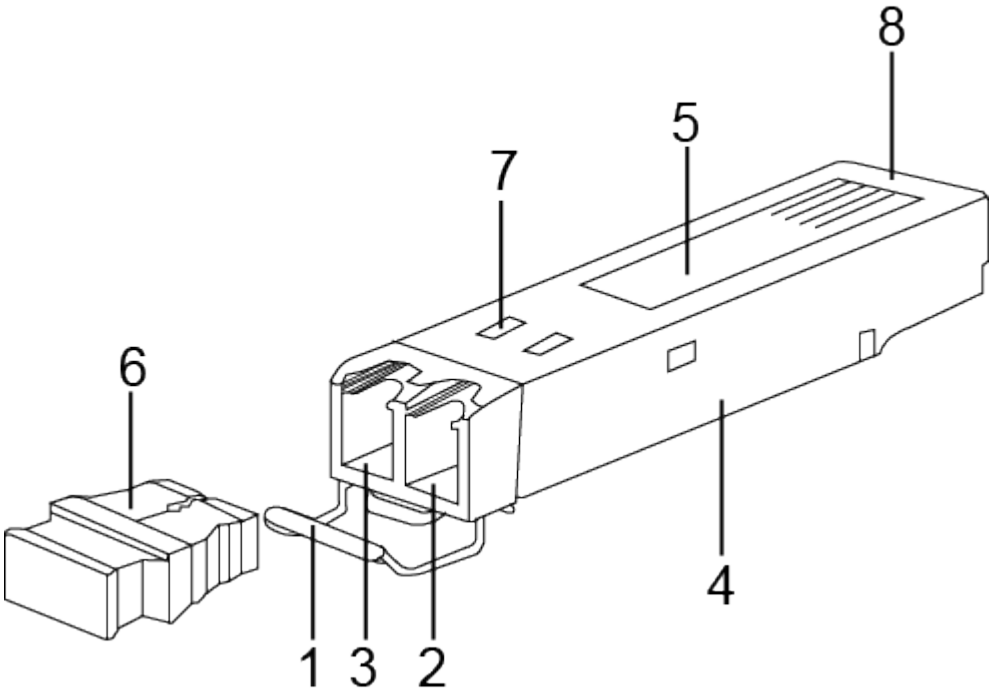
- In this document, optical modules are classified based on encapsulation types, and optical modules of each encapsulation type are classified based on interface rates.
- The actual optical modules depend on the delivered ones. The appearance of optical modules in this document is for reference only.
- Use optical modules certified for the CloudEngine 9800, 8800, 7800, 6800, and 5800 series switches. Non-certified optical modules cannot ensure transmission reliability and may affect service stability on the switch. Huawei is not responsible for any problem caused by non-certified optical modules and will not fix such problems.
- All the optical modules listed in the documentation are Huawei certified optical modules.
- The transmit power of a long-distance optical module is often larger than its overload power. Therefore, when using such optical modules, select optical fibers of an appropriate length to ensure that the actual receive power is smaller than the overload power. If the optical fibers connected to a long-distance optical module are too short, use an optical attenuator to reduce the receive power on the remote optical module. Otherwise, the remote optical module may be burnt.

7.1 Understanding Optical Modules

7.1.1 Optical Module Appearance and Structure

Figure 7-1 shows the structure of an optical module.

Figure 7-1 Optical module structure (SFP module as an example)



1. Handle	2. Receiver	3. Transmitter
4. Shell	5. Label	6. Dust cap
7. Spring	8. Module connector	-

The following figures show appearances of various transceiver modules.

Figure 7-2 SFP/SFP+ module

Figure 7-3 QSFP+ module

Figure 7-4 SFP28 optical module

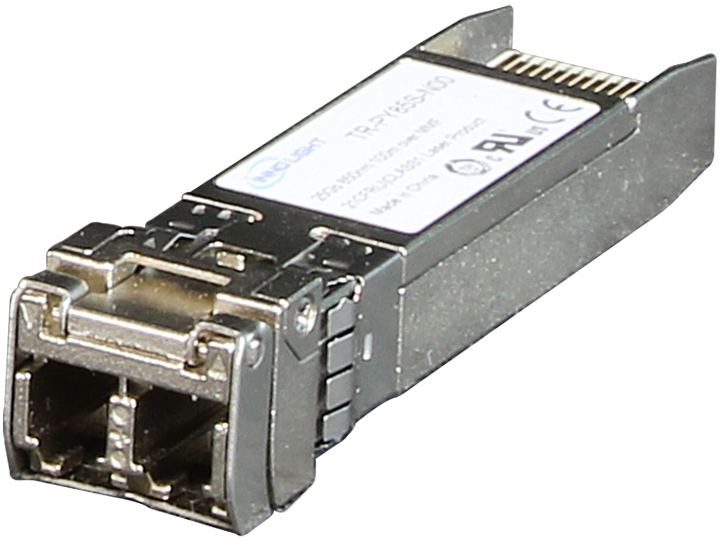
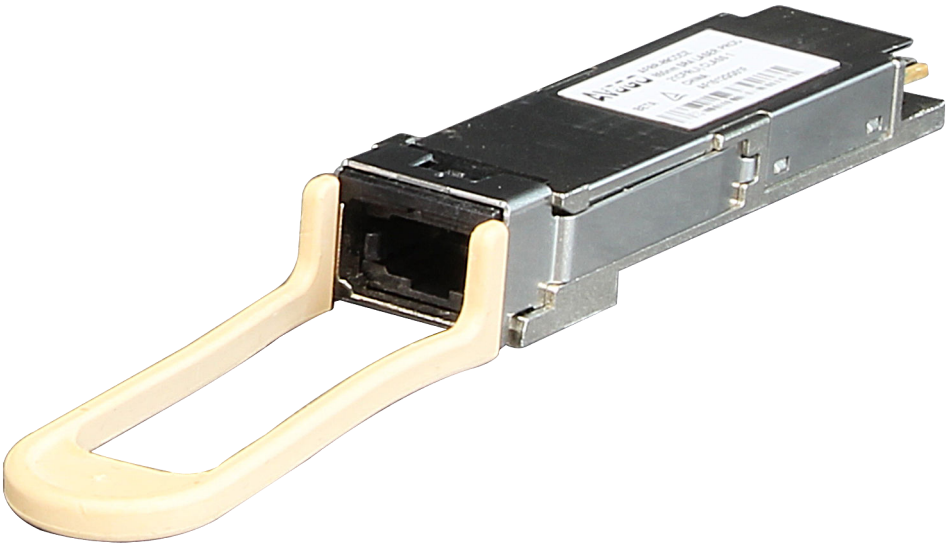


Figure 7-5 QSFP28 optical module



7.1.2 Types of Optical Modules

Optical modules are available in various types to meet diversified requirements.

- **Classified by transmission rates**

  Depending on transmission rates, optical modules are classified into 100GE, 40GE, 25GE, 10GE, FE, and GE optical modules.
- **Classified by encapsulation types**

  The higher transmission rate an optical module provides, the more complex structure it has. Optical modules are encapsulated in different modes to provide different structures. Huawei switches support optical modules of the following encapsulation types: SFP, eSFP, SFP+, XFP, SFP28, QSFP+, CXP, CFP, and QSFP28. All optical modules are hot swappable.

  - SFP: small form-factor pluggable. SFP optical modules support LC fiber connectors.
  - eSFP: enhanced small form-factor pluggable. An eSFP module is an SFP module that supports monitoring of voltage, temperature, bias current, transmit optical power, and receive optical power. Because all the SFP optical modules support these monitoring functions, eSFP is also called SFP.
  - SFP+: small form-factor pluggable plus, SFP with a higher rate. SFP+ modules are more sensitive to electromagnetic interference (EMI) because they have a higher rate. To reduce EMI, SFP+ modules have more springs than SFP modules and the cages for SFP+ modules on a card are tighter.
  - XFP: 10 Gigabit small form-factor pluggable. X is the Roman numeral 10, meaning that all XFP optical modules provide a 10 Gbit/s transmission rate. XFP optical modules support LC fiber connectors. XFP optical modules are wider and longer than SFP+ optical modules.
  - SFP28: with the same interface size as an SFP+ module. An SFP28 interface can use a 25GE SFP28 optical module or 10GE SFP+ optical module.
  - QSFP+: quad small form-factor pluggable. QSFP+ optical modules support MPO fiber connectors and are larger than SFP+ modules.
  - CXP: hot-pluggable high-density parallel optics transceiver form factor, which provides 12 channels of traffic in each of the Tx and Rx directions. It applies only to short multimode links.
  - CFP: C form-factor pluggable, a new standard for high-speed, hot-pluggable optical transceivers that support data communication and telecommunication applications. Dimensions of a CFP optical module are 144.75 mm x 82 mm x 13.6 mm (W x D x H).
  - QSFP28: with the same interface size as a QSFP+ module. A QSFP28 interface can use a 100GE QSFP28 optical module or a 40GE QSFP+ optical module.

- **Classified by physical layer standards**

  Different physical layer standards are defined to allow data transmission in different modes. Therefore, different types of optical modules are produced to comply with these standards. For details, see **Standards compliance** of the specific optical module.

- **Classified by modes**

  Optical fibers are classified into single-mode and multimode fibers. Therefore, optical modules are also classified into single-mode and multimode modules to support different optical fibers.

  - Single-mode optical modules are used with single-mode fibers. Single-mode fibers support a wide band and large transmission capacity, and are used for long-distance transmission.
  - Multimode optical modules are used with multimode fibers. Multimode fibers have lower transmission performance than single-mode fibers because of modal dispersion, but their costs are also lower. They are used for small-capacity, short-distance transmission.

Wavelength division multiplexing modules differ from other optical modules in center wavelengths. A common optical module has a center wavelength of 850

nm, 1310 nm, or 1550 nm, whereas a wavelength division multiplexing module transmits lights with different center wavelengths. Wavelength division multiplexing modules are classified into two types: coarse wavelength division multiplexing (CWDM) and dense wavelength division multiplexing (DWDM). Within the same band, DWDM modules are available in more types and use wavelength resources more efficiently than CWDM modules. DWDM and CWDM modules allow lights with different center wavelengths to be transmitted on one fiber without interfering each other. Therefore, a passive multiplexer can be used to combine the lights into one channel, which is then split into multiple channels by a demultiplexer on the remote end. This reduces the optical fibers required. DWDM and CWDM modules are used for long-distance transmission.

The transmit power of a long-distance optical module is often larger than its overload power. Therefore, when using such optical modules, select optical fibers of an appropriate length to ensure that the actual receive power is smaller than the overload power. If the optical fibers connected to a long-distance optical module are too short, use an optical attenuator to reduce the receive power on the remote optical module. Otherwise, the remote optical module may be burnt.

7.1.3 Optical Module Terms

Transmission distance	Maximum distance over which optical signals can transmit. Optical signals sent from different types of sources can transmit over different distances due to negative effects of optical fibers, such as dispersion and attenuation.
Interface rate	Maximum rate of electrical signals that an optical device can transmit without bit errors. Various interface rates are defined in Ethernet standards, such as 125 Mbit/s, 1.25 Gbit/s, 10.3125 Gbit/s, 25.78125Gbit/s, and 41.25 Gbit/s.

Encapsulation type

Appearance type of an optical module. Encapsulation types of optical modules include SFP, eSFP, SFP+, XFP, QSFP+, SFP28, and QSFP28.

- SFP: small form-factor pluggable.
- eSFP: enhanced small form-factor pluggable. An eSFP module is an SFP module that supports monitoring of voltage, temperature, bias current, transmit optical power, and receive optical power. Because all the SFP optical modules support these monitoring functions, eSFP is also called SFP.
- SFP+: small form-factor pluggable plus, SFP with a higher rate. SFP+ modules are more sensitive to electromagnetic interference (EMI) because they have a higher rate. To reduce EMI, SFP+ modules have more springs than SFP modules.
- XFP: 10GE optical module. X is the Roman numeral 10.
- QSFP+: Quad SFP+, four-channel SFP+.
- SFP28: with the same interface size as an SFP+ module. An SFP28 interface can use a 25 GE SFP28 optical module or 10GE SFP+ optical module.
- QSFP28: with the same interface size as a QSFP+ module. A QSFP28 interface can use a 100GE QSFP28 optical module or a 40GE QSFP+ optical module.

Wavelength division multiplexing modules differ from other optical modules in center wavelengths. A common optical module has a center wavelength of 850 nm, 1310 nm, or 1550 nm, whereas a wavelength division multiplexing module transmits lights with different center wavelengths. Wavelength division multiplexing modules are classified into two types: coarse wavelength division multiplexing (CWDM) and dense wavelength division multiplexing (DWDM). Within the same band, DWDM modules are available in more types and use wavelength resources more efficiently than CWDM modules. DWDM and CWDM modules allow lights with different center wavelengths to be transmitted on one fiber without interfering each other. Therefore, a passive multiplexer can be used to combine the lights into one channel, which is then split into multiple channels by a demultiplexer on the remote end. This reduces the optical fibers required. DWDM and CWDM modules are used for long-distance transmission.

The transmit power of a long-distance optical module is often larger than its overload power. Therefore, when using such optical modules, select optical fibers of an appropriate length to ensure that the actual receive power is smaller than the overload power. If the optical fibers connected to a long-distance optical module are too short, use an optical attenuator to reduce the receive power on the remote optical module. Otherwise, the remote optical module may be burnt.

Center wavelength

Wavelength measured at the midpoint of the half-amplitude line in the transmit spectrum.

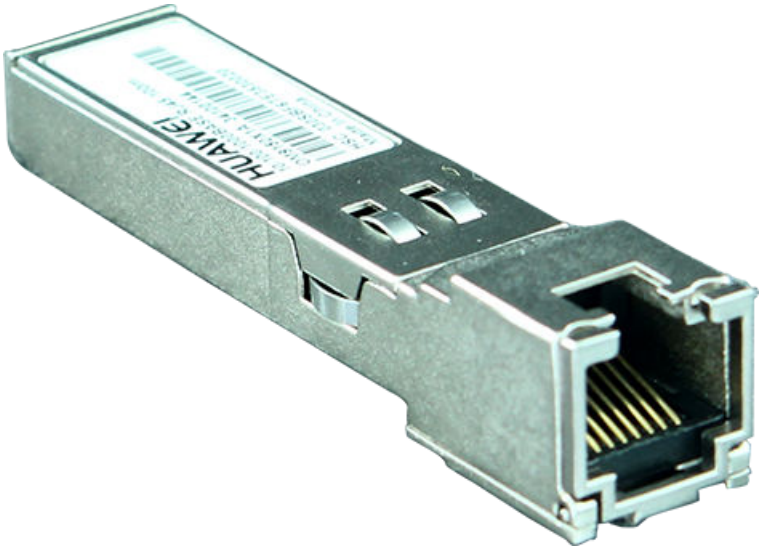
Fiber mode	Mode of fibers defining based on core diameters and features of optical fibers. Optical fibers are classified into single-mode fibers and multi-mode fibers. Generally, multi-mode fibers have large core diameters and severe dispersion, so they transmit optical signals over short distances when working with multi-mode optical modules. Single-mode fibers have small dispersion and can transmit optical signals over long distances when working with single-mode optical modules.
Modal bandwidth	Bandwidth measured at a point with transmit power several dB lower than that of the point with the peak center wavelength. Modal bandwidth reflects spectrum characteristics of an optical module.
Fiber diameter	Diameter of the core of a fiber. According to international standards for optical fibers, the diameter of a multi-mode fiber is 62.5 um or 50 um, and the diameter of a single-mode fiber is 9 um.
Fiber class	Optical signals with different wavelengths have their best working windows in different optical fibers. To help efficiently adjust wavelengths or dispersion features of optical fibers and change their refractive indexes, the following classes are defined: multi-mode fiber (G.651), common single-mode fiber (G.652), shifted dispersion fiber (G.653), and non-zero shifted dispersion fiber (G.655). Multi-mode fiber (G.651) and common single-mode fiber (G.652) are commonly used fiber classes.
Connector type	Type of the interface on an optical module to accommodate a fiber. Commonly used connector types are LC (applicable to all the SFP, SFP+, SFP28, and XFP modules) and MPO (applicable to some of QSFP+ and QSFP28 modules).
Transmit optical power	Output optical power of an optical module when it is working properly.
Maximum receiver sensitivity	Minimum average input optical power that the receiver of an optical module can receive within a range of bit error rate (BER = 10^{-12}).
Overload optical power	Maximum average input optical power that the receiver of an optical module can receive within a range of bit error rate (BER = 10^{-12}).
Extinction ratio	Minimum ratio of the average optical power with signals transmitted against the average optical power without signals transmitted in complete modulation mode. The extinction ratio indicates the capability of an optical module to identify signal 0 and signal 1.

7.2 Understanding Copper Modules

Copper modules are also called RJ45 modules. Unlike optical modules, copper modules do not perform electrical-optical conversion. When two optical interfaces have copper modules installed, the interfaces can be connected using a copper cable. Currently, Huawei offers only GE copper modules with RJ45 interfaces. GE copper modules work with Category 5 network cables, comply with 1000BASE-T (IEEE 802.3ab), and support a maximum transmission distance of 100 m.

Figure 7-6 shows a GE SFP copper module.

Figure 7-6 Appearance of a GE SFP copper module



7.3 FE SFP/eSFP Optical Modules

7.3.1 eSFP-FE-LX-SM1310

Table 7-1 Technical specifications

Item	Description
Part number	02315205
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	FE
Center wavelength (nm)	1310
Standards compliance	100BASE-LX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 15 km
Modal bandwidth	-

Item	Description
Transmit power (dBm)	-15 to -8
Maximum receiver sensitivity (dBm)	-31
Overload power (dBm)	-8
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.3.2 SFP-FE-LX-SM1310-BIDI (Single-Fiber-Bidirectional Module)

Table 7-2 Technical specifications

Item	Description
Part number	02315203
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	FE
Center wavelength (nm)	Tx1310/Rx1550
Standards compliance	100BASE-BX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 15 km
Modal bandwidth	-
Transmit power (dBm)	-15 to -8
Maximum receiver sensitivity (dBm)	-32
Overload power (dBm)	-8
Extinction ratio (dB)	≥ 8.5

Item	Description
Operating temperature	0°C to 70°C

NOTE

BIDI optical modules must be used in pairs. For example, SFP-FE-LX-SM1310-BIDI must be used with SFP-FE-LX-SM1550-BIDI.

7.3.3 SFP-FE-LX-SM1550-BIDI (Single-Fiber-Bidirectional Module)

Table 7-3 Technical specifications

Item	Description
Part number	02315202
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	FE
Center wavelength (nm)	Tx1550/Rx1310
Standards compliance	100BASE-BX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 15 km
Modal bandwidth	-
Transmit power (dBm)	-15 to -8
Maximum receiver sensitivity (dBm)	-32
Overload power (dBm)	-8
Extinction ratio (dB)	≥ 8.5
Operating temperature	0°C to 70°C

NOTE

BIDI optical modules must be used in pairs. For example, SFP-FE-LX-SM1550-BIDI must be used with SFP-FE-LX-SM1310-BIDI.

7.3.4 SFP-FE-SX-MM1310

Table 7-4 Technical specifications

Item	Description
Part number	02315233
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	SFP
Transmission speed	FE
Center wavelength (nm)	1310
Standards compliance	100BASE-FX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM1) (with diameter of 62.5 μm): 2 km • Multimode fiber (with diameter of 50 μm): 2 km • Multimode fiber (OM2) (with diameter of 50 μm): 2 km
Modal bandwidth	• Multimode fiber (OM1): 200 MHz*km • Multimode fiber: 400 MHz*km • Multimode fiber (OM2): 500 MHz*km
Transmit power (dBm)	-19 to -14
Maximum receiver sensitivity (dBm)	-30
Overload power (dBm)	-14
Extinction ratio (dB)	≥ 10
Operating temperature	0°C to 70°C

7.3.5 S-SFP-FE-LH40-SM1310

Table 7-5 Technical specifications

Item	Description
Part number	02317344
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	FE
Center wavelength (nm)	1310
Standards compliance	100BASE-EX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-5 to 0
Maximum receiver sensitivity (dBm)	-37
Overload power (dBm)	-10
Extinction ratio (dB)	≥ 10.5
Operating temperature	0°C to 70°C

7.4 GE eSFP Optical Modules

7.4.1 eSFP-GE-SX-MM850

Table 7-6 Technical specifications

Item	Description
Part number	02315204
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP

Item	Description
Transmission speed	GE
Center wavelength (nm)	850
Standards compliance	1000BASE-SX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (with diameter of 62.5 μm): 220 m • Multimode fiber (OM1) (with diameter of 62.5 μm): 275 m • Multimode fiber (with diameter of 50 μm): 500 m • Multimode fiber (OM2) (with diameter of 50 μm): 550 m
Modal bandwidth	• Multimode fiber: 160 MHz*km • Multimode fiber (OM1): 200 MHz*km • Multimode fiber: 400 MHz*km • Multimode fiber (OM2): 500 MHz*km
Transmit power (dBm)	-9.5 to -2.5
Maximum receiver sensitivity (dBm)	-17
Overload power (dBm)	0
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.4.2 eSFP-GE-ZX100-SM1550

Table 7-7 Technical specifications

Item	Description
Part number	02315206
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE

Item	Description
Center wavelength (nm)	1550
Standards compliance	-
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber: 100 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-30
Overload power (dBm)	-9
Extinction ratio (dB)	≥ 8
Operating temperature	0°C to 70°C

7.4.3 LE2MGSC40DE0 (Single-Fiber-Bidirectional Module)

Table 7-8 Technical specifications

Item	Description
Part number	02310KVV
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	Tx1310/Rx1490
Standards compliance	-
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	Single-mode fiber: 40 km
Modal bandwidth	-
Transmit power (dBm)	-2 to +3
Maximum receiver sensitivity (dBm)	-23
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

NOTE

Single-fiber bidirectional (BIDI) optical modules must be used in pairs. For example, LE2MGSC40DE0 must be used with LE2MGSC40ED0.

7.4.4 LE2MGSC40ED0 (Single-Fiber-Bidirectional Module)

Table 7-9 Technical specifications

Item	Description
Part number	02310KVU
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	Tx1490/Rx1310
Standards compliance	-
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber: 40 km
Modal bandwidth	-

Item	Description
Transmit power (dBm)	-2 to +3
Maximum receiver sensitivity (dBm)	-23
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

NOTE

Single-fiber bidirectional (BIDI) optical modules must be used in pairs. For example, LE2MGSC40ED0 must be used with LE2MGSC40DE0.

7.4.5 SFP-GE-LX-SM1310

Table 7-10 Technical specifications

Item	Description
Part number	02315200
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1310
Standards compliance	1000BASE-LX10
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM1) (with diameter of 62.5 μm): 550 m • Multimode fiber (with diameter of 50 μm): 550 m • Multimode fiber (OM2) (with diameter of 50 μm): 550 m • Single-mode fiber (G.652) (with diameter of 9 μm): 10 km

Item	Description
Modal bandwidth	• Multimode fiber (OM1): 200/500 MHz*km • Multimode fiber: 400/400 MHz*km • Multimode fiber (OM2): 500/500 MHz*km • Single-mode fiber (G.652): -
Transmit power (dBm)	-9 to -3
Maximum receiver sensitivity (dBm)	-20
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.4.6 SFP-GE-LX-SM1310-BIDI (Single-Fiber-Bidirectional Module)

Table 7-11 Technical specifications

Item	Description
Part number	02315285
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	Tx1310/Rx1490
Standards compliance	1000BASE-BX10
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-9 to -3

Item	Description
Maximum receiver sensitivity (dBm)	-19.5
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 6
Operating temperature	0°C to 70°C

NOTE

Single-fiber bidirectional (BIDI) optical modules must be used in pairs. For example, SFP-GE-LX-SM1310-BIDI must be used with SFP-GE-LX-SM1490-BIDI.

7.4.7 SFP-GE-LX-SM1490-BIDI (Single-Fiber-Bidirectional Module)

Table 7-12 Technical specifications

Item	Description
Part number	02315286
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	Tx1490/Rx1310
Standards compliance	1000BASE-BX10
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-9 to -3
Maximum receiver sensitivity (dBm)	-19.5
Overload power (dBm)	-3

Item	Description
Extinction ratio (dB)	≥ 6
Operating temperature	0°C to 70°C

NOTE

Single-fiber bidirectional (BIDI) optical modules must be used in pairs. For example, SFP-GE-LX-SM1490-BIDI must be used with SFP-GE-LX-SM1310-BIDI.

7.4.8 S-SFP-GE-LH40-SM1310

Table 7-13 Technical specifications

Item	Description
Part number	02317346
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1310
Standards compliance	1000BASE-EX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-5 to 0
Maximum receiver sensitivity (dBm)	-23
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.4.9 S-SFP-GE-LH80-SM1550

Table 7-14 Technical specifications

Item	Description
Part number	02317348
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1550
Standards compliance	1000BASE-ZX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 80 km
Modal bandwidth	-
Transmit power (dBm)	-2 to +5
Maximum receiver sensitivity (dBm)	-23
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.4.10 CWDM-SFPGE-LH40-1471 (CWDM Optical Modules)

Table 7-15 Technical specifications

Item	Description
Part number	02312FWB
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP

Item	Description
Transmission speed	GE
Center wavelength (nm)	1471
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.11 CWDM-SFPGE-LH40-1491 (CWDM Optical Modules)

Table 7-16 Technical specifications

Item	Description
Part number	02312FVX
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1491
Standards compliance	GE-CWDM
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.12 CWDM-SFPGE-LH40-1511 (CWDM Optical Modules)

Table 7-17 Technical specifications

Item	Description
Part number	02312FWC
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1511
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5

Item	Description
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.13 CWDM-SFPGE-LH40-1531 (CWDM Optical Modules)

Table 7-18 Technical specifications

Item	Description
Part number	02312FWQ
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1531
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.14 CWDM-SFPGE-LH40-1551 (CWDM Optical Modules)

Table 7-19 Technical specifications

Item	Description
Part number	02312FWR
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1551
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.15 CWDM-SFPGE-LH40-1571 (CWDM Optical Modules)

Table 7-20 Technical specifications

Item	Description
Part number	02312FWS
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP

Item	Description
Transmission speed	GE
Center wavelength (nm)	1571
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.16 CWDM-SFPGE-LH40-1591 (CWDM Optical Modules)

Table 7-21 Technical specifications

Item	Description
Part number	02312FWT
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1591
Standards compliance	GE-CWDM
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.4.17 CWDM-SFPGE-LH40-1611 (CWDM Optical Modules)

Table 7-22 Technical specifications

Item	Description
Part number	02312FWU
Version support	Supported in V200R005C10 and later versions
Transceiver form factor	eSFP
Transmission speed	GE
Center wavelength (nm)	1611
Standards compliance	GE-CWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5

Item	Description
Maximum receiver sensitivity (dBm)	-19
Overload power (dBm)	-3
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.5 GE SFP Copper Modules

7.5.1 SFP-1000BaseT

Table 7-23 Technical specifications

Item	Description
Part number	02314171
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP
Cable Type	CAT5 UTP/STP
Standards compliance	1000BASE-T (SFP-GE-T)
Connector type	RJ45
Transmission Distance	100 m

7.6 2G, 4G, 8G, and 16G SFP Optical Modules

7.6.1 SFP-FC2G-LW

Table 7-24 Technical specifications

Item	Description
Part number	02311BJG
Version support	V100R006C00 and later versions
Transceiver form factor	SFP

Item	Description
Transmission speed	2G
Center wavelength (nm)	1310
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 15 km
Modal bandwidth	-
Transmit power (dBm)	-5 to 0
Maximum receiver sensitivity (dBm)	-21
Overload power (dBm)	0
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C (32°F to 158°F)

7.6.2 SFP-FC2G-SW

Table 7-25 Technical specifications

Item	Description
Part number	02311BJH
Version support	V100R005C10 and later versions
Transceiver form factor	SFP
Transmission speed	2G
Center wavelength (nm)	850
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	• Multimode fiber (OM2) (with diameter of 50 μm): 0.3 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.5 km
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km
Transmit power (dBm)	-9.5 to -2.5
Maximum receiver sensitivity (dBm)	-17
Overload power (dBm)	0
Extinction ratio (dB)	≥ 9
Operating temperature	-20°C to 85°C (-4°F to 185°F)

7.6.3 SFP-FC4G-LW

Table 7-26 Technical specifications

Item	Description
Part number	02311BJE
Version support	V100R005C10 and later versions
Transceiver form factor	SFP
Transmission speed	2G/4G
Center wavelength (nm)	1310
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.4 to -1
Maximum receiver sensitivity (dBm)	-18

Item	Description
Overload power (dBm)	0
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C (32°F to 158°F)

7.6.4 SFP-FC4G-SW

Table 7-27 Technical specifications

Item	Description
Part number	02311BJF
Version support	V100R005C10 and later versions
Transceiver form factor	SFP
Transmission speed	2G/4G
Center wavelength (nm)	850
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Multimode fiber (OM3) (with diameter of 50 μm): 0.3 km
Modal bandwidth	Multimode fiber (OM3): 2000 MHz*km
Transmit power (dBm)	-9 to -1.5
Maximum receiver sensitivity (dBm)	-15
Overload power (dBm)	0
Extinction ratio (dB)	≥ 3
Operating temperature	-20°C to 85°C (-4°F to 185°F)

7.6.5 SFP-FC8G-LW

Table 7-28 Technical specifications

Item	Description
Part number	02311BJA
Version support	V100R005C10 and later versions
Transceiver form factor	SFP
Transmission speed	2G/4G/8G
Center wavelength (nm)	1310
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.4 to 0.5
Maximum receiver sensitivity (dBm)	-13.8
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C (32°F to 158°F)

7.6.6 SFP-FC8G-SW

Table 7-29 Technical specifications

Item	Description
Part number	02311BJL
Version support	V100R005C10 and later versions
Transceiver form factor	SFP
Transmission speed	2G/4G/8G
Center wavelength (nm)	850
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	2G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.3 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.5 km 4G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.15 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.38 km 8G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.05 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.15 km
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km
Transmit power (dBm)	-8.2 to -1.3
Maximum receiver sensitivity (dBm)	-11.2
Overload power (dBm)	0
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C (32°F to 158°F)

7.6.7 SFP-FC16G-SW

Table 7-30 Technical specifications

Item	Description
Part number	02311TPA
Version support	V200R003C00 and later versions
Transceiver form factor	SFP+
Transmission speed	4G/8G/16G

Item	Description
Center wavelength (nm)	850
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	4G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.15 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.38 km 8G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.05 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.15 km 16G: • Multimode fiber (OM2) (with diameter of 50 μm): 0.035 km • Multimode fiber (OM3) (with diameter of 50 μm): 0.1 km
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km
Transmit power (dBm)	-7.8 to 0
Maximum receiver sensitivity (dBm)	-10.5
Overload power (dBm)	0
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C (32°F to 158°F)

7.7 10GE SFP+ Optical Modules

7.7.1 LE2MXSC80FF0

Table 7-31 Technical specifications

Item	Description
Part number	02310JFE
Version support	Supported only in V100R001C00 and V100R002C00
Transceiver form factor	SFP+
Transmission speed	10G
Center wavelength (nm)	1550
Standards compliance	10GBASE-ZR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 80 km
Modal bandwidth	-
Transmit power (dBm)	0 to 4
Maximum receiver sensitivity (dBm)	-24
Overload power (dBm)	-7
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.7.2 OMXD30000

Table 7-32 Technical specifications

Item	Description
Part number	02318169
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	850

Item	Description
Standards compliance	10GBASE-SR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (with diameter of 62.5 μm): 26 m • Multimode fiber (OM1) (with diameter of 62.5 μm): 33 m • Multimode fiber (with diameter of 50 μm): 66 m • Multimode fiber (OM2) (with diameter of 50 μm): 82 m • Multimode fiber (OM3) (with diameter of 50 μm): 300 m • Multimode fiber (OM4) (with diameter of 50 μm): 400 m
Modal bandwidth	• Multimode fiber: 160 MHz*km • Multimode fiber (OM1): 200 MHz*km • Multimode fiber: 400 MHz*km • Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-7.3 to -1
Maximum receiver sensitivity (dBm)	-11.1
Overload power (dBm)	-1
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.7.3 OSX010000

Table 7-33 Technical specifications

Item	Description
Part number	02318170
Version support	Supported in V100R003C00 and later versions
Transceiver form factor	SFP+

Item	Description
Transmission speed	10GE
Center wavelength (nm)	1310
Standards compliance	10GBASE-LR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-12.6
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.7.4 OSX040N01

Table 7-34 Technical specifications

Item	Description
Part number	02310CNF
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1550
Standards compliance	10GBASE-ER
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-4.7 to +4
Maximum receiver sensitivity (dBm)	-14.1
Overload power (dBm)	-1
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.7.5 OSXD22N00

Table 7-35 Technical specifications

Item	Description
Part number	02310CRM
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1310
Standards compliance	10GBASE-LRM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	• Multimode fiber (with diameter of 62.5 μm): 220 m • Multimode fiber (OM1) (with diameter of 62.5 μm): 220 m • Multimode fiber (with diameter of 50 μm): 100 m • Multimode fiber (OM2) (with diameter of 50 μm): 220 m • Multimode fiber (OM3) (with diameter of 50 μm): 220 m
Modal bandwidth	• Multimode fiber: 160/500 MHz*km • Multimode fiber (OM1): 200/500 MHz*km • Multimode fiber: 400/400 MHz*km • Multimode fiber (OM2): 500/500 MHz*km • Multimode fiber (OM3): 1500/500 MHz*km
Transmit power (dBm)	-6.5 to +0.5
Maximum receiver sensitivity (dBm)	-6.5
Overload power (dBm)	1.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.7.6 SFP-10G-BXD1 (Single-Fiber-Bidirectional Module)

Table 7-36 Technical specifications

Item	Description
Part number	02310QDT
Version support	Supported in V100R006C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	Tx1330/Rx1270
Standards compliance	10GBASE-BX
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-14.4
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	-40°C to 85°C

7.7.7 SFP-10G-BXU1 (Single-Fiber-Bidirectional Module)

Table 7-37 Technical specifications

Item	Description
Part number	02310QBJ
Version support	Supported in V100R006C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	Tx1270/Rx1330
Standards compliance	10GBASE-BX
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5

Item	Description
Maximum receiver sensitivity (dBm)	-14.4
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	-40°C to 85°C

7.7.8 SFP-10G-ER-SM1270-BIDI (Single-Fiber-Bidirectional Module)

Table 7-38 Technical specifications

Item	Description
Part number	02311BJC
Version support	Supported in V100R005C10 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	Tx1270/Rx1330
Standards compliance	10GBASE-BDER
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-18
Overload power (dBm)	-9
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.7.9 SFP-10G-ER-SM1330-BIDI (Single-Fiber-Bidirectional Module)

Table 7-39 Technical specifications

Item	Description
Part number	02311BJB
Version support	Supported in V100R005C10 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	Tx1330/Rx1270
Standards compliance	10GBASE-BDER
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	0 to 5
Maximum receiver sensitivity (dBm)	-18
Overload power (dBm)	-9
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.7.10 SFP-10G-ER-1310

Table 7-40 Technical specifications

Item	Description
Part number	02311RLX
Version support	Supported in V200R002C50 and later versions

Item	Description
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1310
Standards compliance	10GBASE-ER
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-2.0 to +4.0
Maximum receiver sensitivity (dBm)	-20
Overload power (dBm)	-7.0
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

NOTE

When connected to a 10GBASE-ER standard optical module (1550 nm, 10 Gbit/s, 40 km), an SFP-10G-ER-1310 optical module supports only 20 km of maximum transmission distance.

7.7.11 SFP-10G-iLR

Table 7-41 Technical specifications

Item	Description
Part number	02311BJJ
Version support	Supported in V100R005C10 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1310

Item	Description
Standards compliance	10GBASE-iLR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 1.4 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-14.4
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	-40°C to 85°C

7.7.12 SFP-10G-LR

Table 7-42 Technical specifications

Item	Description
Part number	02310QDJ
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1310
Standards compliance	10GBASE-LR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km

Item	Description
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-12.6
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.7.13 SFP-10G-USR

Table 7-43 Technical specifications

Item	Description
Part number	02310MNW
Version support	Supported in V100R002C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	850
Standards compliance	10GBASE-USR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM2) (with diameter of 50 μm): 30 m • Multimode fiber (OM3) (with diameter of 50 μm): 100 m • Multimode fiber (OM4) (with diameter of 50 μm): 150 m
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-7.3 to -1

Item	Description
Maximum receiver sensitivity (dBm)	-10.7
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.7.14 SFP-10G-ZR

Table 7-44 Technical specifications

Item	Description
Part number	02310SNN
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1550
Standards compliance	10GBASE-ZR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 80 km
Modal bandwidth	-
Transmit power (dBm)	0 to 4
Maximum receiver sensitivity (dBm)	-24
Overload power (dBm)	-7
Extinction ratio (dB)	≥ 9
Operating temperature	0°C to 70°C

7.7.15 SFP-10G-ZDWT-L

Table 7-45 Technical specifications

Item	Description
Part number	02312DAN
Version support	Supported in V200R003C00 and later versions
Transceiver form factor	SFP+
Transmission speed	10GE
Center wavelength (nm)	1529.16 to 1560.61
Standards compliance	10G-DWDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 60 km
Modal bandwidth	-
Transmit power (dBm)	-1 to +3
Maximum receiver sensitivity (dBm)	-24
Overload power (dBm)	-1
Extinction ratio (dB)	≥ 8.2
Operating temperature	0°C to 70°C

7.8 25GE SFP28 Optical Modules

7.8.1 SFP-25G-SR

Table 7-46 Technical specifications

Item	Description
Part number	02311KNR

Item	Description
Version support	V100R006C00 and later versions
Transceiver form factor	SFP28
Transmission speed	25GE
Center wavelength (nm)	850
Standards compliance	25GBase-SR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	When the bit error rate (BER) is 10^-12: • Multimode fiber (OM3) (with diameter of 50 μm): 30 m • Multimode fiber (OM4) (with diameter of 50 μm): 40 m When the BER is 5*10^-5: • Multimode fiber (OM3) (with diameter of 50 μm): 70 m • Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-8.4 to +2.4
Maximum receiver sensitivity (dBm)	-10.3
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 2
Operating temperature	0°C to 70°C (32°F to 158°F)

7.8.2 SFP-25G-LR

Table 7-47 Technical specifications

Item	Description
Part number	02312LSE

Item	Description
Version support	V200R019C10 and later versions
Transceiver form factor	SFP28
Transmission speed	25GE
Center wavelength (nm)	1310
Standards compliance	25GBase-LR
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-7 to +2
Maximum receiver sensitivity (dBm)	-11.3
Overload power (dBm)	2
Extinction ratio (dB)	≥ 3.5
Operating temperature	-45°C to 85°C (-49°F to 185°F)

7.9 40GE QSFP+ Optical Modules

7.9.1 QSFP-40G-ER4

Table 7-48 Technical specifications

Item	Description
Part number	02311BKT
Version support	Supported in V100R005C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE

Item	Description
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	40GBASE-ER4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-2.7 to +4.5
Maximum receiver sensitivity (dBm)	-19.5
Overload power (dBm)	-4.5
Extinction ratio (dB)	≥ 5.5
Operating temperature	0°C to 70°C

7.9.2 QSFP-40G-eSM4

Table 7-49 Technical specifications

Item	Description
Part number	02311DTR
Version support	Supported in V100R005C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	1310
Standards compliance	40GBASE-eSM4
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-12.6
Overload power (dBm)	0.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.9.3 QSFP-40G-eSR4

Table 7-50 Technical specifications

Item	Description
Part number	02310RMB
Version support	Supported in V100R003C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850
Standards compliance	40GBASE-eSR4 10GBASE-SR (four lanes)
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector • Multimode fiber (OM2) (with diameter of 50 μm): 82 m • Multimode fiber (OM3) (with diameter of 50 μm): 300 m • Multimode fiber (OM4) (with diameter of 50 μm): 400 m

Item	Description
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-7.6 to +0.5
Maximum receiver sensitivity (dBm)	-11.1
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.9.4 QSFP-40G-iSM4

Table 7-51 Technical specifications

Item	Description
Part number	02311DRW
Version support	Supported in V100R005C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	1310
Standards compliance	40GBASE-iSM4
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector Single-mode fiber (G.652) (with diameter of 9 μm): 1.4 km
Modal bandwidth	-
Transmit power (dBm)	-8.2 to +0.5
Maximum receiver sensitivity (dBm)	-11.5
Overload power (dBm)	0.5

Item	Description
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.9.5 QSFP-40G-iSR4

Table 7-52 Technical specifications

Item	Description
Part number	02310MHR
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850
Standards compliance	40GBASE-SR4 10GBASE-USR (four lanes)
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector • Multimode fiber (OM2) (with diameter of 50 μm): 30 m • Multimode fiber (OM3) (with diameter of 50 μm): 100 m • Multimode fiber (OM4) (with diameter of 50 μm): 150 m
Modal bandwidth	• Multimode fiber (OM2): 500 MHz*km • Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-7.6 to +0.5
Maximum receiver sensitivity (dBm)	-9.5
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3

Item	Description
Operating temperature	0°C to 70°C

7.9.6 QSFP-40G-LR4

Table 7-53 Technical specifications

Item	Description
Part number	02310MHS
Version support	Supported in V100R001C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	40GBASE-LR4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-7 to +2.3
Maximum receiver sensitivity (dBm)	-11.5
Overload power (dBm)	3.3
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.9.7 QSFP-40G-LR4-Lite

Table 7-54 Technical specifications

Item	Description
Part number	02311YVB
Version support	Supported in V200R003C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	40GBASE-LR4 Lite
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 2 km
Modal bandwidth	-
Transmit power (dBm)	-9 to +2.3
Maximum receiver sensitivity (OAM) (dBm)	-10.5
Overload power (dBm)	2.3
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.9.8 QSFP-40G-LX4

Table 7-55 Technical specifications

Item	Description
Part number	02311HNP
Version support	Supported in V100R006C00 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE

Item	Description
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	40GBASE-LX4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with diameter of 50 μm): 150 m • Multimode fiber (OM4) (with diameter of 50 μm): 150 m • Single-mode fiber (G.652) (with diameter of 9 μm): 2 km
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km • Single-mode fiber (G.652): -
Transmit power (dBm)	-7 to +2.3
Maximum receiver sensitivity (dBm)	-11.5
Overload power (dBm)	2.3
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C (32°F to 158°F)

NOTE

- If optical distribution frames (ODFs) with MPO ports need to be used, route the fiber jumpers through one such ODF at most.
- If optical distribution frames (ODFs) with LC ports need to be used, route the fiber jumpers through two such ODFs at most.

7.9.9 QSFP-40G-SR-BD (Single-Fiber-Bidirectional Module)

Table 7-56 Technical specifications

Item	Description
Part number	02311FPA
Version support	Supported in V100R006C00 and later versions

Item	Description
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850, 900
Standards compliance	40GBASE-BIDI **NOTE** The optical module has two 20-Gbit/s channels to transmit and receive signals simultaneously using single-fiber bidirectional technology and needs 2 LC interface multimode fiber.
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with diameter of 50 μm): 100 m • Multimode fiber (OM4) (with diameter of 50 μm): 150 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-4 to +5
Maximum receiver sensitivity (dBm)	-4.5
Overload power (dBm)	5
Extinction ratio (dB)	≥ 4.5
Operating temperature	10°C to 70°C

7.9.10 QSFP-40G-eSDLC-PAM

Table 7-57 Technical specifications

Item	Description
Part number	02311QTR
Version support	Supported in V200R002C50 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE

Item	Description
Center wavelength (nm)	850
Standards compliance	40GBase-eSDLC-PAM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with diameter of 50 μm): 100 m • Multimode fiber (OM4) (with diameter of 50 μm): 300 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-2 to +2.4
Maximum receiver sensitivity (dBm)	-8.0
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.9.11 QSFP-40G-SDLC-PAM

Table 7-58 Technical specifications

Item	Description
Part number	02311PUU
Version support	Supported in V200R002C50 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850
Standards compliance	40GBase-SDLC-PAM4
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with diameter of 50 μm): 100 m • Multimode fiber (OM4) (with diameter of 50 μm): 150 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-2.5 to +2.4
Maximum receiver sensitivity (dBm)	-8.0
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

7.9.12 QSFP-40G-eSDLC-PAM-G2

Table 7-59 Technical specifications

Item	Description
Part number	02312ELG
Version support	Supported in V200R002C50 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850
Standards compliance	40GBase-eSDLC-PAM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with the diameter of 50 μm): 100 m • Multimode fiber (OM4) (with the diameter of 50 μm): 300 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-2 to +2.4
Maximum receiver sensitivity (dBm)	-8.0
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

NOTE

The QSFP-40G-eSDLC-PAM optical module cannot be connected to the QSFP-40G-eSDLC-PAM-G2 optical module.

7.9.13 QSFP-40G-SDLC-PAM-G2

Table 7-60 Technical specifications

Item	Description
Part number	02312ELH
Version support	Supported in V200R002C50 and later versions
Transceiver form factor	QSFP+
Transmission speed	40GE
Center wavelength (nm)	850
Standards compliance	40GBase-SDLC-PAM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with the diameter of 50 μm): 100 m • Multimode fiber (OM4) (with the diameter of 50 μm): 150 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-2.5 to +2.4
Maximum receiver sensitivity (dBm)	-8.0
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 3
Operating temperature	0°C to 70°C

NOTE

The QSFP-40G-SDLC-PAM optical module cannot be connected to the QSFP-40G-SDLC-PAM-G2 optical module.

7.10 100GE QSFP28 Optical Modules

7.10.1 QSFP28-100G-LR4

Table 7-61 Technical specifications

Item	Description
Part number	02311KNU
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1295, 1300, 1304, 1309
Standards compliance	100GBASE-LR4
Connector type	LC

Item	Description
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-4.3 to +4.5
Maximum receiver sensitivity (dBm)	-8.6
Overload power (dBm)	4.5
Extinction ratio (dB)	≥ 2
Operating temperature	0°C to 70°C

7.10.2 QSFP28-100G-PSM4

Table 7-62 Technical specifications

Item	Description
Part number	02311MNM
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1310
Standards compliance	100GBASE-PSM4
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector Single-mode fiber (G.652) (with diameter of 9 μm): 500 m
Modal bandwidth	-

Item	Description
Transmit power (dBm)	-9.4 to +2
Maximum receiver sensitivity (dBm)	-11.35
Overload power (dBm)	2.2
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.10.3 QSFP28-100G-SR4

Table 7-63 Technical specifications

Item	Description
Part number	02311GBW
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	850
Standards compliance	100GBASE-SR4
Connector type	MPO
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	8-strand or 12-strand, type B, female connector • Multimode fiber (OM3) (with diameter of 50 μm): 70 m • Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-8.4 to +2.4
Maximum receiver sensitivity (dBm)	-8.5
Overload power (dBm)	2.4

Item	Description
Extinction ratio (dB)	≥ 2
Operating temperature	0°C to 70°C

7.10.4 QSFP28-100G-SR4-MP

Table 7-64 QSFP28-100G-SR4-MP specifications

Item	Value
Basic Information	
Module name	QSFP28-100G-SR4-MP
Part Number	02313FYX
Model	QSFP28-100G-SR4-MP
Form factor	QSFP28
Application standard/Type	100GBASE-SR4
Connector type	MPO
Optical fiber type	MMF
Type of the end face of the fiber ceramic ferrule	PC or UPC
Working case temperature [°C (°F)]	0°C to 70°C (32°F to 158°F)
Transmission rate [bit/s]	100Gbit/s
Target transmission distance [km]	8-strand or 12-strand, type B, female connector Multimode fiber (OM3) (with diameter of 50 μm): 70 m Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth [MHz*km]	Multimode fiber (OM3): 2000 MHz*kmMultimode fiber (OM4): 4700 MHz*km
Transmitter Optical Characteristics	
Center wavelength [nm]	850 nm
Maximum Tx optical power (AVG) [dBm]	2.4 dBm
Minimum Tx optical power (AVG) [dBm]	-8.4 dBm

Item	Value
Minimum extinction ratio [dBm]	2 dBm
Receiver Optical Characteristics	
Rx sensitivity (OMA) [dBm]	-8.5 dBm
Overload power (AVG) [dBm]	2.4 dBm

7.10.5 QSFP28-100G-BIDI

Table 7-65 QSFP28-100G-BIDI specifications

Item	Value
Basic Information	
Module name	QSFP28-100G-BIDI
Part Number	02313EEK
Model	QSFP28-100G-BIDI
Form factor	QSFP28
Application standard/Type	100G PAM4 BiDi
Connector type	LC
Optical fiber type	MMF
Type of the end face of the fiber ceramic ferrule	PC or UPC
Working case temperature [°C (°F)]	10°C to 70°C (50°F to 158°F)
DDM options	Supported
Transmission rate [bit/s]	100Gbit/s
Target transmission distance [km]	Multimode fiber (OM3) (with diameter of 50 μm): 70 m Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth [MHz*km]	Multimode fiber (OM3): 2000 MHz*kmMultimode fiber (OM4): 4700 MHz*km
Bit error ratio (BER)	1e-12
Transmitter Optical Characteristics	
Center wavelength [nm]	850 nm/910 nm

Item	Value
Maximum Tx optical power (AVG) [dBm]	4 dBm
Minimum Tx optical power (AVG) [dBm]	-4.4 dBm
Maximum Tx optical power (OMA) [dBm]	3 dBm
Minimum Tx optical power (OMA) [dBm]	-2.4 dBm
Minimum extinction ratio [dBm]	3 dBm
Receiver Optical Characteristics	
Rx sensitivity (AVG) [dBm]	-7.9 dBm
Rx sensitivity (OMA) [dBm]	-5.9 dBm
Overload power (AVG) [dBm]	3.5 dBm

NOTE

- Version support:
  - V200R002C50, V200R005C10, V200R005C20 and V200R019C10 after the corresponding patch is installed
  - V200R020C10 and later versions
- Before installing a QSFP28-100G-BIDI optical module on a port, you need to disable the FEC function on the port. For example, if the RS-FEC function is enabled on a port that has a QSFP28-100G-BIDI optical module installed, the port status will become Down (Transceiver type mismatch).

7.10.6 QSFP28-100G-DR

Table 7-66 QSFP28-100G-DR specifications

Item	Value
Basic Information	
Module name	QSFP28-100G-DR
Part Number	02312VSP
Model	QSFP28-100G-DR
Form factor	QSFP28
Application standard/Type	100GBase-DR
Connector type	LC

Item	Value
Optical fiber type	SMF
Type of the end face of the fiber ceramic ferrule	PC or UPC
Working case temperature [°C (°F)]	0°C to 70°C (32°F to 158°F)
DDM options	Supported
Transmission rate [bit/s]	100Gbit/s
Target transmission distance [km]	Single-mode fiber (G.652) (with diameter of 9 μm): 500m
Transmitter Optical Characteristics	
Center wavelength [nm]	1311 nm
Maximum Tx optical power (AVG) [dBm]	4 dBm
Minimum Tx optical power (AVG) [dBm]	-2.9 dBm
Maximum Tx optical power (OMA) [dBm]	4.2 dBm
Minimum Tx optical power (OMA) [dBm]	-0.8 dBm
Minimum extinction ratio [dBm]	3.5 dBm
Receiver Optical Characteristics	
Rx sensitivity (AVG) [dBm]	-5.9 dBm
Rx sensitivity (OMA) [dBm]	Max(-3.9,SECQ-5.3)
Overload power (AVG) [dBm]	4 dBm

NOTE

- A port that has a QSFP28-100G-DR optical module installed cannot be used for stack connection.
- Before installing a QSFP28-100G-DR optical module on a port, you need to disable the FEC function on the port. For example, if the RS-FEC function is enabled on a port that has a QSFP28-100G-DR optical module installed, the port status will become Down (Transceiver type mismatch).

7.10.7 QSFP28-100G-4WDM-40

Table 7-67 Technical specifications

Item	Description
Part number	02312QTL
Version support	Supported in V200R019C10 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1310
Standards compliance	100GBASE-4WDM
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 40 km
Modal bandwidth	-
Transmit power (dBm)	-2.5 to +6.5
Maximum receiver sensitivity (dBm)	-18.5
Overload power (dBm)	-3.5
Extinction ratio (dB)	≥4.5
Operating temperature	0°C to 70°C

7.10.8 QSFP-100G-CLR4

Table 7-68 Technical specifications

Item	Description
Part number	02311MNP
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1271, 1291, 1311, 1331

Item	Description
Standards compliance	100GBASE-CLR4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 2 km
Modal bandwidth	-
Transmit power (dBm)	-6.5 to +2.5
Maximum receiver sensitivity (dBm)	-10.7
Overload power (dBm)	2.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.10.9 QSFP-100G-CWDM4

Table 7-69 Technical specifications

Item	Description
Part number	02311MNN
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	100GBASE-CWDM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 2 km

Item	Description
Modal bandwidth	-
Transmit power (dBm)	-6.5 to +2.5
Maximum receiver sensitivity (dBm)	-9.8
Overload power (dBm)	2.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.10.10 QSFP-100G-CWDM4-500

Table 7-70 Technical specifications

Item	Description
Part number	02312UJN
Version support	Supported in V200R019C10 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	100GBASE-CWDM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 0.5 km
Modal bandwidth	-
Transmit power (dBm)	-6.5 to +2.5
Maximum receiver sensitivity (dBm)	-9.8
Overload power (dBm)	2.5
Extinction ratio (dB)	≥ 3.5

Item	Description
Operating temperature	0°C to 70°C

7.10.11 QSFP-100G-LR4-Lite

Table 7-71 Technical specifications

Item	Description
Part number	02311UPS
Version support	Supported in V200R002C50 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1295, 1300, 1304, 1309
Standards compliance	100GBASE-LR4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 2 km
Modal bandwidth	-
Transmit power (dBm)	-4.3 to +4.5
Maximum receiver sensitivity (dBm)	-8.6
Overload power (dBm)	4.5
Extinction ratio (dB)	≥ 4
Operating temperature	0°C to 70°C

7.10.12 QSFP-100G-eCWDM4

Table 7-72 Technical specifications

Item	Description
Part number	02312DAT
Version support	Supported in V200R001C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1271, 1291, 1311, 1331
Standards compliance	100GBASE-eCWDM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 10 km
Modal bandwidth	-
Transmit power (dBm)	-6.5 to +2.5
Maximum receiver sensitivity (dBm)	-13
Overload power (dBm)	2.5
Extinction ratio (dB)	≥ 3.5
Operating temperature	0°C to 70°C

7.10.13 QSFP-100G-ER4-Lite

Table 7-73 Technical specifications

Item	Description
Part number	02311YXR
Version support	Supported in V200R003C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	1295, 1300, 1304, 1309

Item	Description
Standards compliance	100GBASE-ER4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC
Applicable cable and maximum transmission distance	Single-mode fiber (G.652) (with diameter of 9 μm): 30 km (FEC OFF)/40 km (FEC ON)
Modal bandwidth	-
Transmit power (dBm)	-2.5 to +2.9
Maximum receiver sensitivity (dBm)	-18.4
Overload power (dBm)	-3.5
Extinction ratio (dB)	≥ 8
Operating temperature	0°C to 70°C

7.10.14 QSFP-100G-SWDM4

Table 7-74 Technical specifications

Item	Description
Part number	02311QUK
Version support	V200R003C00 and later versions
Transceiver form factor	QSFP28
Transmission speed	100GE
Center wavelength (nm)	850
Standards compliance	100G-SWDM4
Connector type	LC
Type of the end face of the fiber ceramic ferrule	PC or UPC

Item	Description
Applicable cable and maximum transmission distance	• Multimode fiber (OM3) (with diameter of 50 μm): 75 m • Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth	• Multimode fiber (OM3): 2000 MHz*km • Multimode fiber (OM4): 4700 MHz*km
Transmit power (dBm)	-7.5 to +3.4
Maximum receiver sensitivity (dBm)	-10.5
Overload power (dBm)	2.4
Extinction ratio (dB)	≥ 2
Operating temperature	0°C to 70°C

7.10.15 QSFP-100G/40G-SR4

Table 7-75 QSFP-100G/40G-SR4 specifications

Item	Value
Basic Information	
Module name	QSFP-100G/40G-SR4
Part Number	02313FCH
Model	QSFP-100G/40G-SR4
Form factor	QSFP28
Application standard/Type	100Gbase-SR4
Connector type	MPO
Optical fiber type	MMF
Type of the end face of the fiber ceramic ferrule	PC or UPC
Working case temperature [°C (°F)]	0°C to 70°C (-23°F to 167°F)
DDM options	Supported
Transmission rate [bit/s]	40/100G

Item	Value
Target transmission distance [km]	Multimode fiber (OM3) (with diameter of 50 μm): 70 m Multimode fiber (OM4) (with diameter of 50 μm): 100 m
Modal bandwidth [MHz*km]	Multimode fiber (OM3): 2000 MHz*km Multimode fiber (OM4): 4700 MHz*km
Transmitter Optical Characteristics	
Center wavelength [nm]	850 nm
Maximum Tx optical power (AVG) [dBm]	2.4 dBm
Minimum Tx optical power (AVG) [dBm]	-8.4 dBm
Maximum Tx optical power (OMA) [dBm]	3 dBm
Minimum Tx optical power (OMA) [dBm]	-6.4 dBm
Minimum extinction ratio [dBm]	2 dBm
Receiver Optical Characteristics	
Rx sensitivity (OMA) [dBm]	-8.5 dBm
Overload power (AVG) [dBm]	2.4 dBm

NOTE

Only the CE8850-64CQ-EI and CE8861-4C-EI switches support this optical module.