Cisco 25GBASE SFP28 Modules

Contents

Product overview

The Cisco® 25GBASE SFP28 (Small Form-Factor Pluggable) portfolio offers customers a wide variety of high-density and low-power 25 Gigabit Ethernet connectivity options for data center and high-performance computing networks applications. The 25G Modules are based on SFP28 form factor.

25G Direct Attached Cables (DAC)

25G Active Optical Cables (AOC)

25G Short Reach (SR) Module

10/25G Cisco Short Reach (CSR) Module

10/25G Long Reach (LR) Module

10/25G Long Reach (LR) Industrial Temperature Module

SFP-10/25G-BXD-I

SFP-10/25G-BXU-I

SFP-25G-ER-I

SFP-25G-BX40D-I

SFP-25G-BXU-I

Features and benefits of Cisco 25G Modules

- Interoperable with other IEEE-compliant 25G interfaces where applicable.
- Certified and tested on Cisco SFP28 ports for superior performance, quality, and reliability.
- High-speed connectivity compliant to IEEE 802.3by and IEEE 802.3cc.

Table 1. Cisco 25G Portfolio

Product	Descriptions
SFP-H25G-CU1M	25GBASE-CR1 Copper Cable 1-meter
SFP-H25G-CU1.5M	25GBASE-CR1 Copper Cable 1.5-meter
SFP-H25G-CU2M	25GBASE-CR1 Copper Cable 2-meter
SFP-H25G-CU2.5M	25GBASE-CR1 Copper Cable 2.5-meter
SFP-H25G-CU3M	25GBASE-CR1 Copper Cable 3-meter
SFP-H25G-CU4M	25GBASE-CR1 Copper Cable 4-meter
SFP-H25G-CU5M	25GBASE-CR1 Copper Cable 5-meter
SFP-25G-AOC1M	25GBASE-AOC Active Optical Cable 1-meter
SFP-25G-AOC2M	25GBASE-AOC Active Optical Cable 2-meter
SFP-25G-AOC3M	25GBASE-AOC Active Optical Cable 3-meter
SFP-25G-AOC4M	25GBASE-AOC Active Optical Cable 4-meter
SFP-25G-AOC5M	25GBASE-AOC Active Optical Cable 5-meter
SFP-25G-AOC7M	25GBASE-AOC Active Optical Cable 7-meter
SFP-25G-AOC10M	25GBASE-AOC Active Optical Cable 10-meter
SFP-25G-SR-S	25GBASE-SR SFP28 Module for MMF
SFP-25G-SL	25GBASE-SL SFP28 Module for MMF
SFP-10/25G-CSR-S	10/25GBASE-CSR SFP28 Module for MMF
SFP-10/25G-LR-S	10/25GBASE-LR SFP28 Module for SMF
SFP-10/25G-LR-I	10/25GBASE-LR SFP28, Industrial Temperature Module for SMF

Product	Descriptions
SFP-10/25G-BXD-I	10GBASE-LR, 10GBASE-BR10, 25GBASE-BR10 SFP28, Bidirectional, Industrial Temp Module for SMF
SFP-10/25G-BXU-I	10GBASE-LR, 10GBASE-BR10, 25GBASE-BR10 SFP28, Bidirectional, Industrial Temp Module for SMF
SFP-25G-ER-I	25GBASE-ER, SFP28 Industrial Temperature Module for SMF
SFP-25G-BX40D-I	25GBASE-BR40, SFP28, Bidirectional, Industrial Temp Module for SMF
SFP-25G-BX40U-I	25GBASE-BR40, SFP28, Bidirectional, Industrial Temp Module for SMF

Cisco SFP-25G copper cables

Cisco SFP28 to SFP28 copper direct-attach 25GBASE-CR1 cables are suitable for very short links and offer a highly cost-effective way to establish a 25-Gigabit link between SFP28 ports of Cisco switches within racks and across adjacent racks. Cisco offers passive copper cables in lengths of x= 1, 1.5, 2, 2.5, 3, 4 and 5 meters.

1m, 1.5m, and 2m cables do not require FEC on the host ports; 2.5m and 3m cables require BASE-R FEC (also known as FC-FEC) on the host ports; 4m and 5m cables require RS-FEC on the host ports.

Cisco SFP-25G active optical cables

Cisco SFP28 to SFP28 Active Optical Cables are direct-attach fiber assemblies with SFP connectors. They are suitable for very short distances and offer a cost-effective way to connect within racks and across adjacent racks. Cisco offers Active Optical Cables in lengths of 1, 2, 3, 4, 5, 7, and 10 meters.

AOC cable require BASE-R FEC, or RS-FEC on the host ports.

Cisco SFP-25G-SR-S

The Cisco 25GBASE-SR Module supports a link length of 70/100m on OM3/4 MMF.

This module requires RS-FEC on the host ports.

Cisco SFP-25G-SL

The Cisco 25GBASE-SL Module supports a link length of 20/30m on OM3/4 MMF.

The Cisco SFP-25G-SL (Short Link) module requires RS-FEC on the host ports

Cisco SFP-10/25G-CSR-S

The Cisco 10/25GBASE-CSR Module supports a link length of up to 300/400m over OM3/4 at 10G, and up to 300/400m over OM3/4 at 25G*. It also supports link lengths of 82m over OM2 at 10G, and up to 70m over OM2 at 25G.

This module requires RS-FEC on the host port for full reach operation at 25G. Using BASE-R FEC the module can support 70/100m over OM3/4 and with-out FEC it can support 30/50m over OM3/4 at 25G*. For 10G operation FEC is not required.

*Depends upon fiber quality.

Cisco SFP-10/25G-LR-S

The Cisco 10/25GBASE-LR Module supports a link length of 10 kilometers on standard Single-Mode Fiber (SMF) G.652 at both 10G and 25G.

This module requires RS-FEC on the host ports for operation at 25G.

Cisco SFP-10/25G-LR-I

The Cisco 10/25GBASE-LR Module supports a link length of 10 kilometers on standard Single-Mode Fiber (SMF) G.652 at both 10G and 25G. The module requires RS-FEC on the host ports for full reach operation at 25G. This module has an industrial temperature range. This module also supports CPRI datarates options 7, 8, 9 and 10.

In some applications using BASE-R FEC the module can support 3.5km and without FEC it can support 1.5km, depending on fiber quality.

Cisco SFP-10/25G-BXD-I and SFP-10/25G-BXU-I (single-fiber bidirectional applications)

The Cisco 10GBASE-LR/10GBASE-BR/25GBASE-BR Module supports a link length of 10 kilometers on a single strand of standard Single-Mode Fiber (SMF) G.652 at both 10G and 25G. A SFP-10/25G-BXD-I device is always connected to a SFP-10/25G-BXU-I device with a single strand of standard SMF. The communication over a single strand of fiber is achieved by separating the transmission wavelength of the two devices. SFP-10/25G-BXD-I transmits at 1330nm channel and receives at 1270nm signal. The SFP-10/25G-BXU-I transmits at a 1270nm wavelength and receives a 1330nm signal.

The module requires RS-FEC on the host ports for full reach operation at 25G. This module has an industrial temperature range. This module also supports CPRI datarates options 7, 8, 9 and 10.

In some applications using BASE-R FEC the module can support 3.5km and without FEC it can support 1.5km, depending on fiber quality.

Cisco SFP-25G-ER-I

The Cisco 25GBASE-ER Module supports a link length of 40 kilometers on standard Single-Mode Fiber (SMF) G.652 at 25G.

The module requires RS-FEC on the host ports for full reach operation at 25G. This module has an industrial temperature range.

Cisco SFP-25G-BX40D-I and SFP-25G-BX40U-I (single-fiber bidirectional applications)

The Cisco 25GBASE-BR40 Modules support link lengths of 40km over a single strand of standard Single-Mode Fiber (SMF) G.652 at 25G. An SFP-25G-BX40D-I device is always connected to an SFP-25G-BX40U-I device with a single strand of standard SMF. The communication over a single strand is achieved by separating the transmission wavelength of the two devices. SFP-25G-BX40D-I transmits at 1314nm wavelength and receives at 1289nm wavelength. The SFP-25G-BX40U-I transmits at 1289nm and receives at 1314nm wavelengths.

These modules require RS-FEC on the host ports for full reach operation at 25G. These modules have an industrial temperature range.

Technical specifications

Platform support

Cisco 25G transceivers are supported on Cisco switches. For more details, refer to the document "Transceiver Module Group (TMG) Compatibility Matrix".

Connectors and cabling

Refer to Table 2 for cabling specifications for each 25G product.

Table 2. 25G Port cabling specifications

SFP-25G	Cable Type	Cable Distance	Max Power Consumption (W)	Pull Tab /Bail Latch Color
SFP-H25G-CU1M	Direct-attach copper cable assembly	1m	1/10	Beige
SFP-H25G-CU1.5M		1.5m		Black
SFP-H25G-CU2M		2m		Brown
SFP-H25G-CU2.5M		2.5m		Yellow
SFP-H25G-CU3M		3m		Orange
SFP-H25G-CU4M		4m		Green
SFP-H25G-CU5M		5m		Gray
SFP-25G-AOC1M	Active Optical Cable assembly	1m	1	Beige
SFP-25G-AOC2M		2m		Brown
SFP-25G-AOC3M		3m		Orange
SFP-25G-AOC4M		4m		Green
SFP-25G-AOC5M		5m		Gray
SFP-25G-AOC7M		7m		Blue
SFP-25G-AOC10M		10m		Red
SFP-25G-SR-S	MMF	70/100m (OM3/OM4)	1.2	Beige
SFP-25G-SL	MMF	20/30m (OM3/OM4)	1.2	Purple
SFP-10/25G-CSR-S	MMF	300/400m (OM3/OM4)*	1.2	Peach
SFP-10/25G-LR-S	SMF	10km	1.3	Blue
SFP-10/25G-LR-I	SMF	10km**	1.3	Blue

SFP-25G	Cable Type	Cable Distance	Max Power Consumption (W)	Pull Tab /Bail Latch Color
SFP-10/25G-BXD-I	SMF	10km***	1.5W	Violet
SFP-10/25G-BXU-I	SMF	10km***	1.5W	Blue
SFP-25G-ER-I	SMF	40km****	1.5W	Red
SFP-25G-BX40D-I	SMF	40km*****	1.9W	Red
SFP-25G-BX40U-I	SMF	40km*****	1.9W	Red

*Depending upon fiber quality.

**Links up to 15km reach are supported as engineered links as long as channel insertion loss is <9.3dB and RS-FEC is required.

***Links up to 15km reach are supported as engineered links as long as channel insertion loss is <8dB and RS-FEC is required.

****Links greater than 30km reach are considered engineered links.

*****Links up to 40km reach are supported as engineered links as long as channel insertion loss is <18dB and RS-FEC is required.

Table 3. SFP28 port cabling specifications

SFP-25G	Wavelength (nm)	Cable Type	Core Size (Microns)	Modal Bandwidth	Cable Distance
SFP-25G-SR-S	850	MMF	50.0	2000 (OM3)	70m
				4700 (OM4)	100m
				4700 (OM5)	100m
SFP-25G-SL	850	MMF	50.0	2000 (OM3)	20m
				4700 (OM4)	30m
				4700 (OM5)	30m
SFP-10/25G-CSR-S	850	MMF	50.0	500 (OM2)	70m (25G) 82m (10G)
				2000 (OM3)	300m*
				4700 (OM4)	400m*
				4700 (OM5)	400m
SFP-10/25G-LR-S	1310	SMF	G.652	-	10km
SFP-10/25G-LR-I	1310	SMF	G.652	-	10km**
SFP-10/25G-BXD-I	1330	SMF	G.652	-	10km***
SFP-10/25G-BXU-I	1270	SMF	G.652	-	10km***

SFP-25G	Wavelength (nm)	Cable Type	Core Size (Microns)	Modal Bandwidth	Cable Distance
SFP-25G-ER-I	1310	SMF	G.652	-	40km****
SFP-25G-BX40D-I	1314	SMF	G.652	-	40km****
SFP-25G-BX40U-I	1289	SMF	G.652	-	40km****

**Links up to 15km reach are supported as engineered links as long as channel insertion loss is <9.3dB and RS-FEC is required.

***Links up to 15km reach are supported as engineered links as long as channel insertion loss is <8dB and RS-FEC is required.

****Links greater than 30km reach are considered engineered links.

Table 4. Optical transmit and receive specifications

Product	Type	Transmit Power (dBm)*		Receive Power (dBm)*		Transmit and Receive Wavelength (nm)
		Maximum	Minimum	Maximum	Minimum	
SFP-25G-SR-S	25GBASE-SR 850nm MMF	+2.4	-8.4	+2.4	-10.3	840 to 860
SFP-25G-SL	25GBASE-SL 850nm MMF	+2.4	-8.4	+2.4	-10.3	840 to 860
SFP-10/25G-CSR-S**	10G	+2.4	-7.3	+2.4	-9.9	840 to 860
	25G	+2.4	-6	+2.4	-8.7	840 to 860
SFP-10/25G-LR-S	10G	+0.5	-8.2	+0.5	-14.4	1260 to 1355 (10G)
	25G	+2.0	-7.0	+2.0	-13.3	1295 to 1325 (25G)
SFP-10/25G-LR-I	10G	+0.5	-6.7	+0.5	-15.9	1260 to 1355 (10G)
	25G	+2.0	-5.5	+2.0	-14.8	1295 to 1325 (25G)
SFP-10/25G-BXD-I	10G	+0.5	-8.2	+0.5	-16.2	1320 to 1340 (Tx) 1260 to 1280 (Rx)
	25G	+2.0	-7.0	+2.0	-15.0	1320 to 1340 (Tx) 1260 to 1280 (Rx)
SFP-10/25G-BXU-I	10G	+0.5	-8.2	+0.5	-16.2	1260 to 1280 (Tx) 1320 to 1340 (Rx)
	25G	+2.0	-7.0	+2.0	-15.0	1260 to 1280 (Tx) 1320 to 1340 (Rx)

Product	Type	Transmit Power (dBm)*		Receive Power (dBm)*		Transmit and Receive Wavelength (nm)
		Maximum	Minimum	Maximum	Minimum	
SFP-25G-ER-I	25G	+6.0	-3.0	-4.0	-21.0	1295 to 1310
SFP-25G-BX40D-I	25G	+6.0	-3.0	-4.0	-21.0	1306 to 1322 (Tx) 1281 to 1297 (Rx)
SFP-25G-BX40U-I	25G	+6.0	-3.0	-4.0	-21.0	1281 to 1297 (Tx) 1306 to 1322 (Rx)

*Transmitter and receiver power is in average, unless specified.

**The launch power shall be the lesser of the class 1 safety limit or the maximum receive power. Class 1 laser requirements are defined by IEC 60825-1: 2001.

***The SFP-10/25G-CSR-S when interoperating with IEEE 10G-SR may overload the receiver, see the Cisco Optics to Optics interoperability matrix for details. https://tmgmatrix.cisco.com/iop.

Connectors: Dual LC/PC connector **(SFP-25G-SR-S, SFP-10/25G-CSR-S SFP-10/25G-LR-S, SFP-10/25G-LR-I and SFP-25G-ER-I)**.

Fiber Channel over Ethernet: The 25G DAC's (SFP-H25G-CUxxM), AOC's (SFP-25G-AOCxxM) and transceivers (SFP-25G-SR-S, SFP-10/25G-CSR-S and SFP-10/25G-LR-S) support FCoE with the appropriate host s/w support.

Note: Only connections with patch cords with PC or UPC connectors are supported. Patch cords with APC connectors are not supported. All cables and cable assemblies used must be compliant with the standards specified in the standards section.

Environmental conditions

Operating temperature range:

- Commercial temperature range: 0 to 70° C (32 to 158° F)
- Industrial temperature range: -40 to 85° C (-40 to 185° F)
- Storage temperature range: -40 to 85° C (-40 to 185° F)

Ordering information

Table 5 provides the ordering information for Cisco 25G cables and transceivers.

Table 5. Ordering information

Description	Product Number
25GBASE-CR1 SFP28 Passive Copper Cable, 1-meter	SFP-H25G-CU1M
25GBASE-CR1 SFP28 Passive Copper Cable 1.5-meter	SFP-H25G-CU1.5M
25GBASE-CR1 SFP28 Passive Copper Cable, 2-meter	SFP-H25G-CU2M
25GBASE-CR1 SFP28 Passive Copper Cable 2.5-meter	SFP-H25G-CU2.5M
25GBASE-CR1 SFP28 Passive Copper Cable, 3-meter	SFP-H25G-CU3M
25GBASE-CR1 SFP28 Passive Copper Cable 4-meter	SFP-H25G-CU4M
25GBASE-CR1 SFP28 Passive Copper Cable, 5-meter	SFP-H25G-CU5M
25GBASE-AOC SFP28 Active Optical Cable, 1-meter	SFP-25G-AOC1M
25GBASE-AOC SFP28 Active Optical Cable, 2-meter	SFP-25G-AOC2M
25GBASE-AOC SFP28 Active Optical Cable, 3-meter	SFP-25G-AOC3M
25GBASE-AOC SFP28 Active Optical Cable 4-meter	SFP-25G-AOC4M
25GBASE-AOC SFP28 Active Optical Cable, 5-meter	SFP-25G-AOC5M
25GBASE-AOC SFP28 Active Optical Cable, 7-meter	SFP-25G-AOC7M
25GBASE-AOC SFP28 Active Optical Cable, 10-meter	SFP-25G-AOC10M
25GBASE-SR SFP28 Module for MMF	SFP-25G-SR-S
25GBASE-SL SFP28 Module for MMF	SFP-25G-SL
10/25GBASE-CSR SFP28 Module for MMF	SFP-10/25G-CSR-S
10/25GBASE-LR SFP28 Module for SMF	SFP-10/25G-LR-S
10/25GBASE-LR SFP28 Module for SMF, Industrial Temp	SFP-10/25G-LR-I
10/25GBASE-BR SFP28 Bidi module for SMF, Industrial Temp, Downstream	SFP-10/25G-BXD-I
10/25GBASE-BR SFP28 Bidi module for SMF, Industrial Temp, Upstream	SFP-10/25G-BXU-I
25GBASE-ER SFP28 Module for SMF, Industrial Temp	SFP-25G-ER-I
25GBASE-BR40 SFP28 Bidi module for SMF, Industrial Temp, Downstream	SFP-25G-BX40D-I
25GBASE-BR40 SFP28 Bidi module for SMF, Industrial Temp, Upstream	SFP-25G-BX40U-I

Regulatory and standards compliance

Standards:

- SFF-8402: SFP+ 28 Gb/s 1x Pluggable Transceiver Solution (SFP28) - Rev 1.0 March 30, 2014.
- SFF-8472: Diagnostic Monitoring Interface for Optical Transceivers - Rev 12 August 29, 2014.
- IEEE 802.3™ - 2015 IEEE Standard for Ethernet.
- IEEE P802.3by™ - 2016 Amendment 2: Media Access Control Parameters, Physical Layers, and Management Parameters for 25 Gb/s Operation.
- IEEE P802.3cc™ - 2017 Amendment 11: Physical Layer and Management Parameters for Serial 25 Gb/s Ethernet Operation Over Single-Mode Fiber.
- IEEE P802.3cp - Clause 159 Physical Layer specification for a 25Gb/s bidirectional link over one singe-mode fiber with reach up to 40km.
- RoHS 6

Safety:

- Laser Class 1 21CFR-1040 LN#50 7/2001
- Laser Class 1 IEC60825-1
- Cable jacket of SFP copper modules is UL E116441 Compliant
- SFP copper cables are ELV Compliant

Warranty

- Standard warranty: 5 years
- Expedited replacement available via a Cisco SMARTnet® Service support contract

Product sustainability

Table 6. Product sustainability

	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
	Countries and Regions Supported	Regulatory Compliance
Power	Power (Including Pluggable)	Power Consumption

	Sustainability topic	Reference
Material	Product packaging weight and materials	Contact: environment@cisco.com

Cisco Capital

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Additional information

For more information about Cisco 25GBASE SFP28 optics and copper modules, contact your sales representative or visit https://www.cisco.com/c/en/us/products/interfaces-modules/25-gigabit-modules/index.html.

Document history

Table 7. Document history

New or Revised Topic	Described In	Date
Updated to include new transceivers, SFP-10/25G-BXD-I, SFP-10/25G-BXU-I, SFP-25G-ER-I	Ordering Information	July 1, 2021
Addition of SFP-25G-SL	Table 1	

Americas Headquarters
Cisco Systems, Inc.
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Singapore

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Cisco Systems International BV Amsterdam,
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Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **https://www.cisco.com/go/offices**.

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