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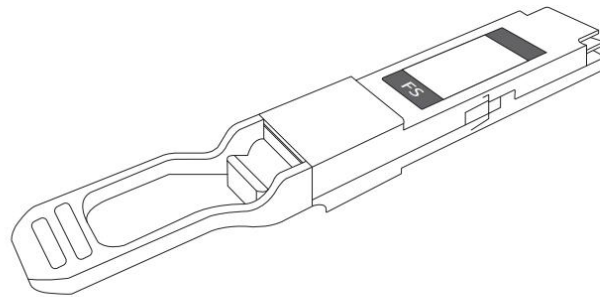
50G QSFP28/SFP56 Cable and Transceiver Modules Data Sheet

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Product overview

The FS® 50GBASE Quad Small Form-Factor Pluggable (QSFP28/SFP56) portfolio offers customers a wide variety of high-density and low-power 50 Gigabit Ethernet connectivity options for data center, high-performance computing networks, enterprise core and distribution layers, and service provider applications. The QSFP28/SFP56-50G modules are our latest generation of 50G transceiver modules solution based on a QSFP28/SFP56 form factor. (See Figure 1).



- QSFP28-ER-50G
- SFP56-SR-50G
- QSFP28-LR-50G
- QSFP28-50G-BX

Figure 1.

QSFP28/SFP56-50G Optical modules

Features and benefits

- Hot-swappable input/output device that plugs into a 50G Gigabit Ethernet QSFP28/SFP56 port
- Interoperable with other IEEE-compliant 50GBASE interfaces where applicable
- Certified and tested on Cisco, Dell, Brocade QSFP28-50G ports for superior performance, quality, and reliability. For more details, refer to the [FS Assured Program for Transceivers](#)
- High-speed electrical interface compliant to IEEE 802.3cd

Table 1 describes the QSFP28/SFP56-50G portfolio.

Table 1. QSFP28/SFP56-50G portfolio

Product	Description	Connector type
QSFP28-ER-50G	50GBASE ER QSFP28 Transceiver, LC, 40km over SMF	Duplex LC
SFP56-SR-50G	50GBASE SR SFP56 Transceiver, LC, 100m over MMF	Duplex LC
QSFP28-LR-50G	50GBASE LR QSFP28 Transceiver, LC, 10km over SMF	Duplex LC

Product	Description	Connector type
QSFP28-50G-BX	50GBASE BX QSFP28 Transceiver, Simplex LC, 10km over SMF	Simplex LC
SFP56-LR-50GM-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	Duplex LC
QSFP28-ZR2-50G	50GBASE ZR2 QSFP28 Transceiver, LC, 80km over SMF	Duplex LC
SFP56-LR-50G-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	Duplex LC
QSFP28-50G-BX40	50GBASE BX QSFP28 Transceiver, Simplex LC, 40km over SMF	Simplex LC
QSFP56-PCxx (0.5m, 1m, 2m, 3m, 4m, 5m)	56G QSFP+ Passive Direct Attach Copper Cable	-
QSFP56-AOxx (1m, 2m, 3m, 5m, 10m, 15m, 20m, 25m, 30m, 50m, 100m)	56G QSFP+ Active Optical Cable	-
SFP56-PCxx (1m, 2m, 3m)	50G SFP56 Passive Direct Attach Copper Twinax Cable	-
S56-AC0x (1m, 2m, 3m, 5m, 7m)	50G SFP56 Active Direct Attach Copper Twinax Cable	-
S56-AOxx (1m, 2m, 3m, 5m, 10m, 15m, 20m, 25m, 30m, 50m)	50G SFP56 Active Optical Cable	-

QSFP28-ER-50G

The QSFP28-ER-50G Module supports up to 40km link lengths over OS2 SMF via a LC duplex connector. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters via the I2C interface. This transceiver is compliant with QSFP28 MSA, SFF-8636 and SFF-8679 standard, and is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications.

SFP56-SR-50G

The SFP56-SR-50G Module supports up to 100m link lengths over OM4 MMF via a LC duplex connector. Digital Diagnostics functions are available via a 2-wire serial interface. The transceivers are compliant with the applicable requirements defined in SFF-8402, SFF-8472, IEEE 802.3cd, OIF-CEI-04.0, and RoHS-6 compliant. It is suitable for 25G&50GBase Ethernet applications.

QSFP28-LR-50G

The QSFP28-LR-50G Module supports up to 10km link lengths over OS2 SMF via a LC duplex connector. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters via the I2C interface. This transceiver is compliant with QSFP28 MSA, SFF-8636 and SFF-8679 standard, and is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications.

QSFP28-50G-BX

The QSFP28-50G-BX Module supports up to 10km link lengths over OS2 SMF via a LC simplex connector. This transceiver is compliant with QSFP28 MSA, IEEE P802.3 standard. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters via the I2C interface. This transceiver is compliant with QSFP28 MSA, IEEE P802.3 standard, and is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications.

SFP56-LR-50GM-I

The SFP56-LR-50GM-I Module provides multi-rate 10/25/50GBase-LR throughput up to 10km over OS2 SMF via an LC duplex connector. The SFP56-LR-50GM-I module is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications and can work in harsh industrial environments, such as telecommunications, outdoor applications and marine, oil and gas, mining.

QSFP28-ZR2-50G

The QSFP28-ZR2-50G Module supports up to 80km link lengths over OS2 SMF. Digital Diagnostics functions are available via a 2-wire serial interface. The two transmitters are cooled 1310nm LAN-WDM lasers generating two optical 25Gbps output signals. This transceiver is compliant with QSFP28 MSA, SFF-8661, SFF-8679 and SFF-8636 standards. It is suitable for 50GBase Ethernet applications.

SFP56-LR-50G-I

The SFP56-LR-50G-I Module supports up to 10km link lengths over OS2 SMF via an LC duplex connector. This transceiver is compliant with SFP56 MSA, SFF-8432 and SFF-8472 standards. The SFP56-LR-50G-I module is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications and can work in harsh industrial environments, such as telecommunications, outdoor applications and marine, oil and gas, mining.

QSFP28-50G-BX40

The QSFP28-50G-BX40 Module supports up to 40km link lengths over OS2 SMF via a LC simplex connector. This transceiver is compliant with QSFP28 MSA, IEEE P802.3 standard. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters via the I2C interface. This transceiver is compliant with QSFP28 MSA, IEEE P802.3 standard, and is suitable for 50GBASE Ethernet, 5G Network Mid/Backhaul applications.

QSFP56-PCxx

QSFP56-PCxx copper direct-attach 56G QSFP+ cables(Figure 1) are suitable for cost effective close range interconnections within equipment room of telecom operators or data centers, interconnecting LAN or SAN applications with speeds up to 56G. FS currently offers passive copper cables in lengths of x= 0.5、 1、 1.5、 2、 3、 4、 5 meters.



Figure 1.
QSFP56-PCxx cables

QSFP56-AOxx

QSFP56-AOxx copper direct-attach 56G QSFP+ cables(Figure 2) provides a cost-efficient solution as compared to using discrete optical transceivers and optical patch cables and is suitable for 56Gbps connections within racks and across adjacent racks. FS currently offers active optical cable in lengths of x= 1、 2、 3、 5、 10、 15、 20、 25、 30、 50 、 100meters.



Figure 2.
QSFP56-AOxx cables

S56-PCxx

SFP56-PCxx copper direct-attach 50G SFP56 cables(Figure 3) are suitable for cost effective close range interconnections within equipment room of telecom operators or data centers, interconnecting LAN or SAN applications with speeds up to 50G. FS currently offers passive copper cables in lengths of x= 1、 2、 3 meters.



Figure 3.
S56-PCxx cables

S56-AC0x

SFP56-AC0x copper twinax 50G SFP56 cables(Figure 4) are suitable for short-distance connectivity within a rack or between adjacent racks in data centers. FS currently offers passive copper cables in lengths of x= 1、 2、 3、 5、 7meters.



Figure 4.
S56-AC0x cables

S56-AOxx

S56-AOxx copper direct-attach 50G SFP56 cables(Figure 5) are suitable for very short distances and offer a cost-effective way to connect within racks and across adjacent racks, interconnecting LAN or SAN applications with speeds up to 50G. FS currently offers passive copper cables in lengths of x= 1、 2、 3、 5、 10、 15、 20、 25、 30、 50 meters



Figure 5.

S56-AOxx cables

Product Specifications

Table 2 shows the key electrical characteristics for the 50G QSFP28/SFP56 modules.

Table 2. Electrical specifications

Product	Description	Nominal data rate (Gbps)	High-speed electrical	Link meter
QSFP28-ER-50G	50GBASE ER QSFP28 Transceiver, LC, 40km over SMF	53.125Gbps	50G CAUI-4	40km
SFP56-SR-50G	50GBASE SR SFP56 Transceiver, LC, 100m over MMF	53.125Gbps	50G CAUI-4	100m
QSFP28-LR-50G	50GBASE LR QSFP28 Transceiver, LC, 10km over SMF	53.125Gbps	50G CAUI-4	10km
QSFP28-50G-BX	50GBASE BX QSFP28 Transceiver, Simplex LC, 10km over SMF	53.125Gbps	50G CAUI-4	10km
SFP56-LR-50GM-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	53.125Gbps	50G CAUI-4	10km
QSFP28-ZR2-50G	50GBASE ZR2 QSFP28 Transceiver, LC, 80km over SMF	53.125Gbps	50G CAUI-4	80km
SFP56-LR-50G-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	53.125Gbps	50G CAUI-4	10km
QSFP28-50G-BX40	50GBASE BX QSFP28 Transceiver, Simplex LC, 40km over SMF	53.125Gbps	50G CAUI-4	40km
QSFP56-PCxx (0.5m, 1m, 1.5m, 2m, 3m, 4m, 5m)	56G QSFP+ Passive Direct Attach Copper Cable	56Gbps	-	0.5, 1, 2, 3, 4, 5
QSFP56-AOxx (1m, 2m, 3m, 5m, 10m, 15m, 20m, 25m, 30m, 50m, 100m)	56G QSFP+ Active Optical Cable	56Gbps	-	1, 2, 3, 5, 10, 15, 20, 25, 30, 50, 100
S56-PCxx (1m, 2m, 3m)	50G SFP56 Passive Direct Attach Copper Cable	50Gbps	-	1, 2, 3
S56-AC0x (1m, 2m, 3m, 5m, 7m)	50G SFP56 Active Direct Attach Copper Twinax Cable	50Gbps	-	1, 2, 3, 5, 7

Table 3 shows the key optical characteristics for the 50G QSFP28/SFP56 modules.

Table 3. Optical specifications

Product	Description	Transmit Power (dBm) per lane		Receive Power (dBm) per lane		Transmit and Receive Wavelength (nm)
		Minimum	Maximum	Minimum	Maximum	
QSFP28-ER-50G	50GBASE ER QSFP28 Transceiver, LC, 40km over SMF	0.4	6.6	-17.6	-7	1310nm
SFP56-SR-50G	50GBASE SR SFP56 Transceiver, LC, 100m over MMF	-6.5	4	-8.4	4	850nm
QSFP28-LR-50G	50GBASE LR QSFP28 Transceiver, LC, 10km over SMF	-4.5	4.2	-10.8	4.2	1310nm
QSFP28-50G-BX	50GBASE BX QSFP28 Transceiver, Simplex LC, 10km over SMF	-4.5	4.2	-10.8	4.2	1271 (Tx) 1331 (Rx)
SFP56-LR-50GM-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	-4.5	4.2	-10.8	4.2	1311
QSFP28-ZR2-50G	50GBASE ZR2 QSFP28 Transceiver, LC, 80km over SMF	2	6.5	-10.8	4	1310
SFP56-LR-50G-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF	-4.5	4.2	-10.8	4.2	1310
QSFP28-50G-BX40	50GBASE BX QSFP28 Transceiver, Simplex LC, 40km over SMF	0.4	6.6	-17.6	-3.37	1295 (Tx) 1309 (Rx)

Table 4 shows the mechanical characteristics for the 50G QSFP28/SFP56 modules.

Table 4. Mechanical specifications

Parameter	Product	Weight
Module dimension with pull tab	(H x W x D) 8.5 x 18.35 x 123.41 mm	
Module weight (Max)	Optical modules	400 g
	QSFP56-PC005	120g
	QSFP56-PC01	112g
	QSFP56-PC015	240g
	QSFP56-PC02	224g
	QSFP56-PC03	240g
	QSFP56-PC04	320g
	QSFP56-PC05	120g
	QSFP56-AO01	120g
	QSFP56-AO02	160g
	QSFP56-AO03	160g
	QSFP56-AO05	240g
	QSFP56-AO10	480g
	QSFP56-AO15	720g
	QSFP56-AO20	960g
	QSFP56-AO25	1040g
QSFP56-AO30	1200g	
QSFP56-AO50	1360g	
QSFP56-AO100	2720g	

Parameter	Product	Weight
Module weight (Max)	S56-PC01	120g
	S56-PC02	168g
	S56-PC03	204g
	S56-AC01	78g
	S56-AC02	105g
	S56-AC03	133g
	S56-AC05	220g
	S56-AC07	340g
	S56-AO01	58g
	S56-AO02	66g
	S56-AO03	74g
	S56-AO05	90g
	S56-AO10	130g
	S56-AO15	170g
	S56-AO20	210g
	S56-AO25	250g
	S56-AO30	290g
	S56-AO50	450g

Warranty

- Standard warranty: 5 years
- For more information for FS Returns & Refunds policy, visit <https://www.fs.com/policies/warranty.html> or https://www.fs.com/policies/day_return_policy.html

Ordering information

Table 5 provides the ordering information for QSFP28/SFP56 50G modules and related cables.

Table 5. Ordering information

Part number	Description
QSFP28/SFP56 optics modules	
QSFP28-ER-50G	50GBASE ER QSFP28 Transceiver, LC, 40km over SMF
QSFP28-LR-50G	50GBASE LR QSFP28 Transceiver, LC, 10km over SMF
QSFP28-50G-BX	50GBASE BX QSFP28 Transceiver, Simplex LC, 10km over SMF
QSFP28-ZR2-50G	50GBASE ZR2 QSFP28 Transceiver, LC, 80km over SMF
QSFP28-50G-BX40	50GBASE BX QSFP28 Transceiver, Simplex LC, 40km over SMF

Part number	Description
QSFP28/SFP56 optics modules	
SFP56-SR-50G	50GBASE SR SFP56 Transceiver, LC, 100m over MMF
SFP56-LR-50GM-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF
SFP56-LR-50G-I	50GBASE LR SFP56 Transceiver, LC, 10km over SMF
QSFP28/SFP56 direct-attach copper modules	
QSFP56-PC005	56G QSFP+ Passive Direct Attach Copper Cable, 0.5-meter
QSFP56-PC01	56G QSFP+ Passive Direct Attach Copper Cable, 1-meter
QSFP56-PC015	56G QSFP+ Passive Direct Attach Copper Cable, 1.5-meter
QSFP56-PC02	56G QSFP+ Passive Direct Attach Copper Cable, 2-meter
QSFP56-PC03	56G QSFP+ Passive Direct Attach Copper Cable, 3-meter
QSFP56-PC04	56G QSFP+ Passive Direct Attach Copper Cable, 4-meter
QSFP56-PC05	56G QSFP+ Passive Direct Attach Copper Cable, 5-meter
S56-PC01	50G SFP56 Passive Direct Attach Copper Twinax Cable, 1-meter
S56-PC02	50G SFP56 Passive Direct Attach Copper Twinax Cable, 2-meter
S56-PC03	50G SFP56 Passive Direct Attach Copper Twinax Cable, 3-meter
S56-AC01	50G SFP56 Active Direct Attach Copper Twinax Cable, 1-meter
S56-AC02	50G SFP56 Active Direct Attach Copper Twinax Cable, 2-meter
S56-AC03	50G SFP56 Active Direct Attach Copper Twinax Cable, 3-meter
S56-AC05	50G SFP56 Active Direct Attach Copper Twinax Cable, 5-meter
S56-AC07	50G SFP56 Active Direct Attach Copper Twinax Cable, 7-meter
QSFP56-AO01	56G QSFP+ Active Optical Cable, 1-meter
QSFP56-AO02	56G QSFP+ Active Optical Cable, 2-meter
QSFP56-AO03	56G QSFP+ Active Optical Cable, 3-meter

QSFP56-AO05	56G QSFP+ Active Optical Cable, 5-meter
QSFP56-AO10	56G QSFP+ Active Optical Cable, 10-meter
QSFP56-AO15	56G QSFP+ Active Optical Cable, 15-meter
QSFP56-AO20	56G QSFP+ Active Optical Cable, 20-meter
QSFP56-AO25	56G QSFP+ Active Optical Cable, 25-meter
QSFP56-AO30	56G QSFP+ Active Optical Cable, 30-meter
QSFP56-AO50	56G QSFP+ Active Optical Cable, 50-meter
QSFP56-AO100	56G QSFP+ Active Optical Cable, 100-meter
S56-AO01	50G SFP56 Active Optical Cable, 1-meter
S56-AO02	50G SFP56 Active Optical Cable, 2-meter
S56-AO03	50G SFP56 Active Optical Cable, 3-meter
S56-AO05	50G SFP56 Active Optical Cable, 5-meter
S56-AO10	50G SFP56 Active Optical Cable, 10-meter
S56-AO15	50G SFP56 Active Optical Cable, 15-meter
S56-AO20	50G SFP56 Active Optical Cable, 20-meter
S56-AO25	50G SFP56 Active Optical Cable, 25-meter
S56-AO30	50G SFP56 Active Optical Cable, 30-meter
S56-AO50	50G SFP56 Active Optical Cable, 50-meter

I Regulatory and standards compliance

Standards

- SFF-8665: QSFP28/SFP56+ 28 Gb/s 4X Pluggable Transceiver Solution (QSFP28/SFP56)
- SFF-8636: Common Management Interface
- 802.3™-2012 IEEE Standard for Ethernet
- IEEE 802.3ba Amendment of IEEE Std 802.3
- IEEE 802.3bm Amendment of IEEE Std 802.3
- GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
- GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies

- GR-468-CORE: Generic Requirements for Optoelectronic Devices Used in Telecommunications Equipment
- GR-1435-CORE: Generic Requirements for Multifiber Optical Connectors
- RoHS 6

Safety

- Modules are compliant with Laser Class 1 as defined in IEC 60825-1, IEC 60825-2 and Comply with 21 CFR 1040.10 and 1040.11

Table 6. Laser class for the QSFP28/SFP56-50G optical modules

Product	Laser class
QSFP28-ER-50G	1
SFP56-SR-50G	1
QSFP28-LR-50G	1
QSFP28-50G-BX	1
SFP56-LR-50GM-I	1
QSFP28-ZR2-50G	1
SFP56-LR-50G-I	1
QSFP28-50G-BX40	1

Additional information

For more information about 50GBASE QSFP28/SFP56 optics and copper modules, contact your account manager or visit <https://www.fs.com/c/fiber-optic-transceivers-9>

Document history

New or revised topic	Described in	Date
50G QSFP28/SFP56 Cable and Transceiver Modules Data Sheet	Updated all	12/21/2022



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