

40GBASE QSFP+ to 4 SFP+ Passive Copper Breakout Direct Attach Cable (PCC)



Application

- InfiniBand4x SDR, DDR, QDR
- 10G/40Gigabit Ethernet
- Switches, Routers, and HBAs
- SAS & Fiber Channel
- Rack-to-Rack, Shelf-to-Shelf Interconnect
- Enterprise & Data Center Networking & Storage
- ATM/SDH/SONET

Features

- Connector 1: QSFP+ 40GBASE Rated Connector (SFF-8436 Compliant)
- Connector 2: 4 x SFP+ 10GBASE Rated Connector (SFF-8431 Compliant)
- Up to 10.3125GBASE transfer rate per SFP+ channel (40GBASE aggregate)
- Cable Type: Passive Copper Cable
- Wire AWG: AWG30/AWG26/AWG24
- Available lengths (in meters): 0.5, 1, 2, 3.....
- Hot plug swappable
- Commercial temperature range (COM): 0~ 70 ° C
- Low power consumption: 0.02W (typ.)
- Power supply :+3.3V
- Low cross-talk and pair-to-pair skew maintains signal integrity
- Fully compliant to the latest SFP+ & QSFP MSA
- RoHS compatible

Description

FS.COM QSFP+ to 4 x SFP+ passive copper cables are 40Gb/s to 10Gb/s cable assemblies. The cables are compliant with SFF-8431 and SFF-8436 specifications and provide connectivity between devices using QSFP+ port on one end and multiple SFP+ ports on the other end. Each QSFP+ to SFP+ cable features a single QSFP+ connector (SFF-8436) rated for 40-Gb/s on one end and 4 SFP+ connectors (SFF-8431), each rated for 10-Gb/s, on the other. The cables use state-of-the-art signal processing technology to fill the expanding need for cost effective data center intercon-nects.

FS.COM’s unique quality passive copper cable solutions provide power-efficient replacement for active power connectivity such as fiber optic cables. The QSFP+ to 4 x SFP+ cables provide 40GbE systems the ability to connect to 10GbE switches or adapter cards. Optimizing systems to operate with FS.COM’s QSFP+ to 4 x SFP+ passive copper cables significantly reduce power consumption and enlarge the connectivity opportunities of the system. Rigorous cable production testing ensures best out-of-the-box installation experience, performance and durability.

Products Specifications



I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Operating Case Temperature	Tc	0		70	°C
Relative Humidity	RS	-		85	%
Supply Voltage	Vcc3	3.135	3.3	3.465	v
Power Dissipation	PD			1.5	W

Note:

1.Damage may occur if the transceiver is subjected to conditions beyond the limits.

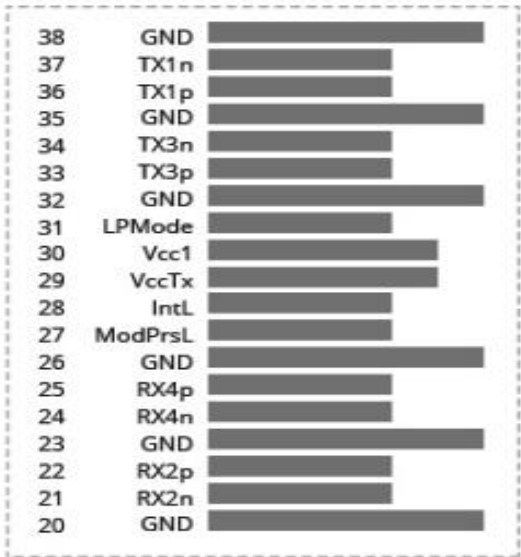
II. Performance Specification

Electrical	
Min. Dielectric Withstand Voltage	300 VDC
Insulation Resistance	1000 Mohms
Current Rating	0.5 Amp Min/Signal Contact
General	
Operating Temperature	0 to 70°C
Flammability Rating (Plastics)	UL 94
Green Features	RoHS, Lead-Free
Shield	Braid/Foil
Marking	Mfg Name, Part#, Date Code
Plug	
Backshell Material	Nickel-Plated Zinc Diecast
Contact Material	PCB with Gold-Plated Pads
Latch	Positive Latching w/Pull Tab
Insertion Force	QSFP+: 40N Max. SFP+ 30N Max
Withdrawal Force	QSFP+: 30N Max. SFP+ 20N Max
Retention Force	90N Min
Durability	QSFP+: 250 Cycles Min. SFP+ 50 cycles Min.
Cable	
Conductor	Solid
Wire Gauge	AWG30/AWG26/AWG24
Impedence	100 ± 5 ohms
Construction	Twin-axial
Cable OD	AWG 30 : 4.2mm
	AWG 26 : 5.2mm
	AWG 24 : 6.0mm
Jacket Type	PVC
Bend Radius	5X Cable OD -Single, 10X Cable OD - Repeated

III. Electrical Characteristics

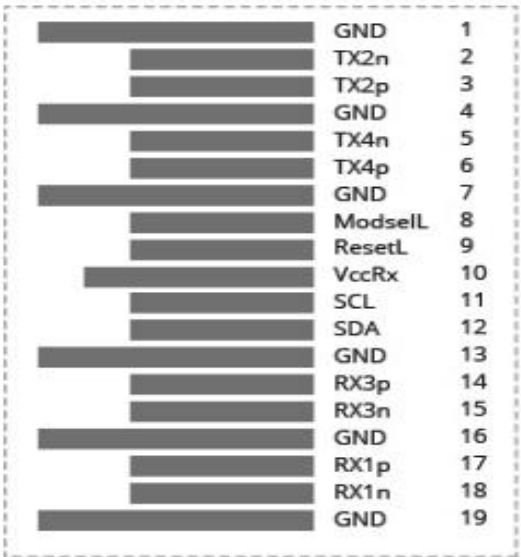
Test Type	Test Item	24AWG	26AWG	28AWG	30AWG
Electrical Characteristics	Differential impedance	100 ± 5Ω @ TDR	100 ± 5Ω	100 ± 5Ω	100 ± 5Ω @ TDR
	Mutual capacitance	14pF/ft nominal	14pF/ft nominal	14pF/ft nominal	14pF/ft nominal
	Time delay	1.31ns/ft nominal, (4.3ns/m) nominal	1.35ns/ft nominal	1.35ns/ft nominal	1.35ns/ft nominal, (4.3ns/m) nominal
	Time delay skew (within pairs)	80ps/10m maximum	120ps/8.5m maximum	120ps/7m maximum	50ps/5.5m maximum
	Time delay skew (between pairs)	350ps/10m maximum	500ps/8.5m maximum	500ps/7m maximum	350ps/5.5m maximum
	Attenuation	10dB/10m maximum @ 1.25Ghz	10dB/8.5m maximum @ 1.25Ghz	10dB/7m maximum @ 1.25Ghz	8.4dB/5.5m maximum @ 1.25Ghz
	Conductor DC Resistance	0.026Ω/ft maximum @20° C	0.04Ω/ft maximum @20° C	0.06Ω/ft maximum @20° C	0.01Ω/ft maximum @20° C
	Conductors(two pair)	24AWG Solid, Silver plated copper	26AWG Solid, Silver plated copper	28AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper
	Insulation	Foam polyolefin	Foam polyolefin	Foam polyolefin	Foam polyolefin
	Pair drain wire	26AWG Solid, Silver plated copper	28AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper
Physical Characteristics	Overall cable shield	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage
	Outer diameter	6.0mm	5.2mm	4.7mm	4.2mm

IV. Pin Designation



Top Side
Viewed From Top

Module
Card Edge



Bottom Side
Viewed From Bottom

Pin	Logic	Symbol	Name/Description	Notes
1		GND	Module Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Module Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Module Ground	1

8	LVTTL-I	ModSelL	Module Select	2
9	LVTTL-I	ResetL	Module Reset	2
10		Vcc Rx	+3.3 V Receiver Power Supply	
11	LVCMOS-I	SCL	2-wire Serial Interface Clock	2
12	LVCMOS-I/O	SDA	2-wire Serial Interface Data	2
13		GND	Module Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Module Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Module Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Module Ground	1
27	LVTTL-O	ModPrsL	Module Present, internal pulled down to GND	

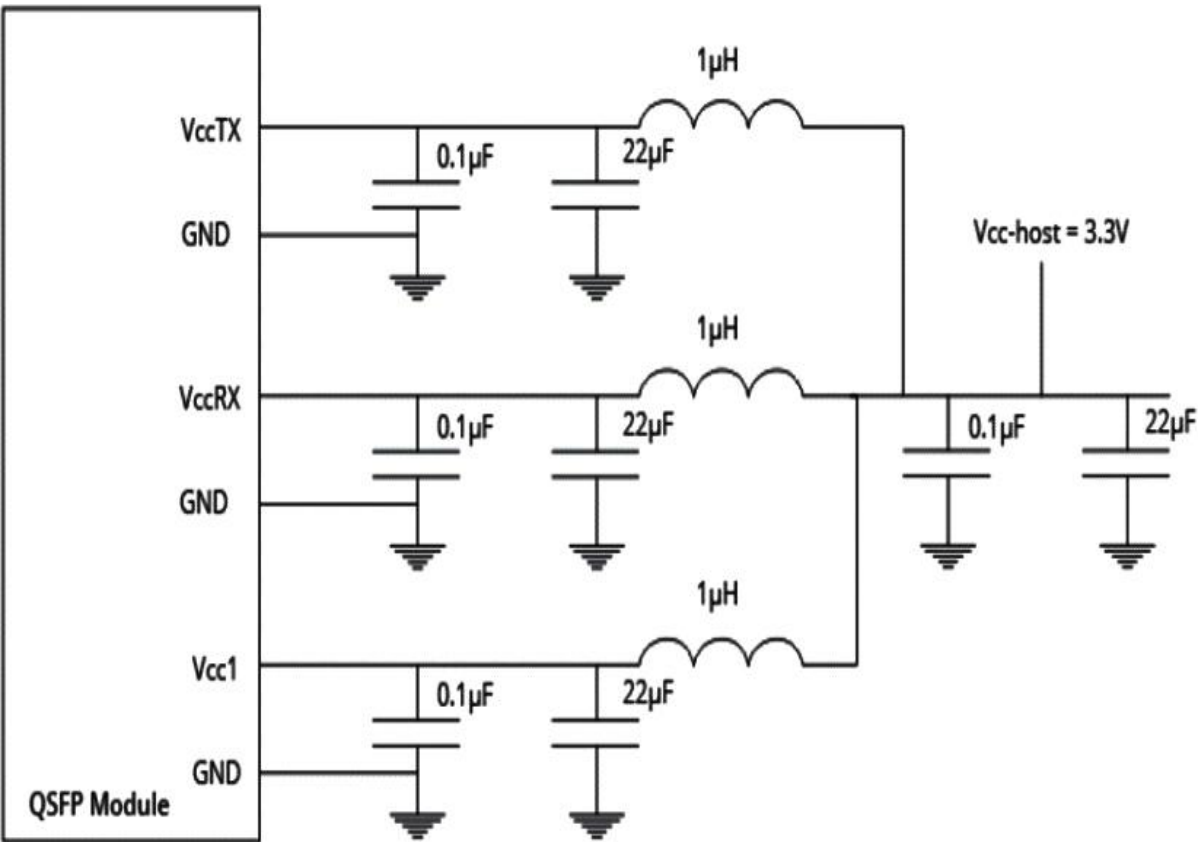
28	LVTTTL-O	IntL	Interrupt output, should be pulled up on host board	2
29		Vcc Tx	+3.3 V Transmitter Power supply	
30		Vcc 1	+3.3 V Power Supply	
31	LVTTTL-I	LPMode	Low Power Mode	2
32		GND	Module Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Input	
35		GND	Module Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Input	
38		GND	Module Ground	1

Notes:

- 1.GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
- 2.Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ Module module in any combination. The connector pins are each rated for a maximum current of 500 mA.

V. Recommended power supply filtering Example of QSFP Host board schematics

A typical host board mechanical layout for attaching the QSFP+ transceiver is presented below. The recommended host electrical connector should be a 38-pin IPASS right angle connector assembly and the cage assembly should be QSFP+ single cage.



VI. SFP+ Pin Descriptions

Pin	Logic	Symbol	Name/Description	Notes
1		VeeT	Transmitter Ground	
2	LV-TTL-O	TX-Fault	N/A	1
3	LV-TTL-I	TX-DIS	Transmitter Disable	2
4	LV-TTL-O	SDA	Tow Wire Serial Data	
5	LV-TTL-I	SCL	Tow Wire Serial Clock	
6		MOD-DEF0	Module present, connect to VeeT	
7	LV-TTL-I	RS0	N/A	1
8	LV-TTL-O	ROS	LOS of Signal	2
9	LV-TTL-I	RS1	N/A	1
10		VeeR	Receiver Ground	
11		VeeR	Receiver Ground	
12	CML-O	RD-	Receiver Data Inverted	
13	CML-O	RD+	Receiver Data Non-Inverted	
14		VeeR	Receiver Ground	
15		VccR	Receiver Supply 3.3 V	
16		VccT	Transmitter Supply 3.3 V	
17		VeeT	Transmitter Ground	
18	CML-I	TD+	Transmitter Data Non-Inverted	
19	CML-I	TD-	Transmitter Data Inverted	
20		VeeT	Transmitter Ground	

Notes:

- 1.Signals not supported in SFP+ Copper pulled-down to VeeT with 30K ohms resistor
- 2.Passive cable assemblies do not support LOS and TX_DIS

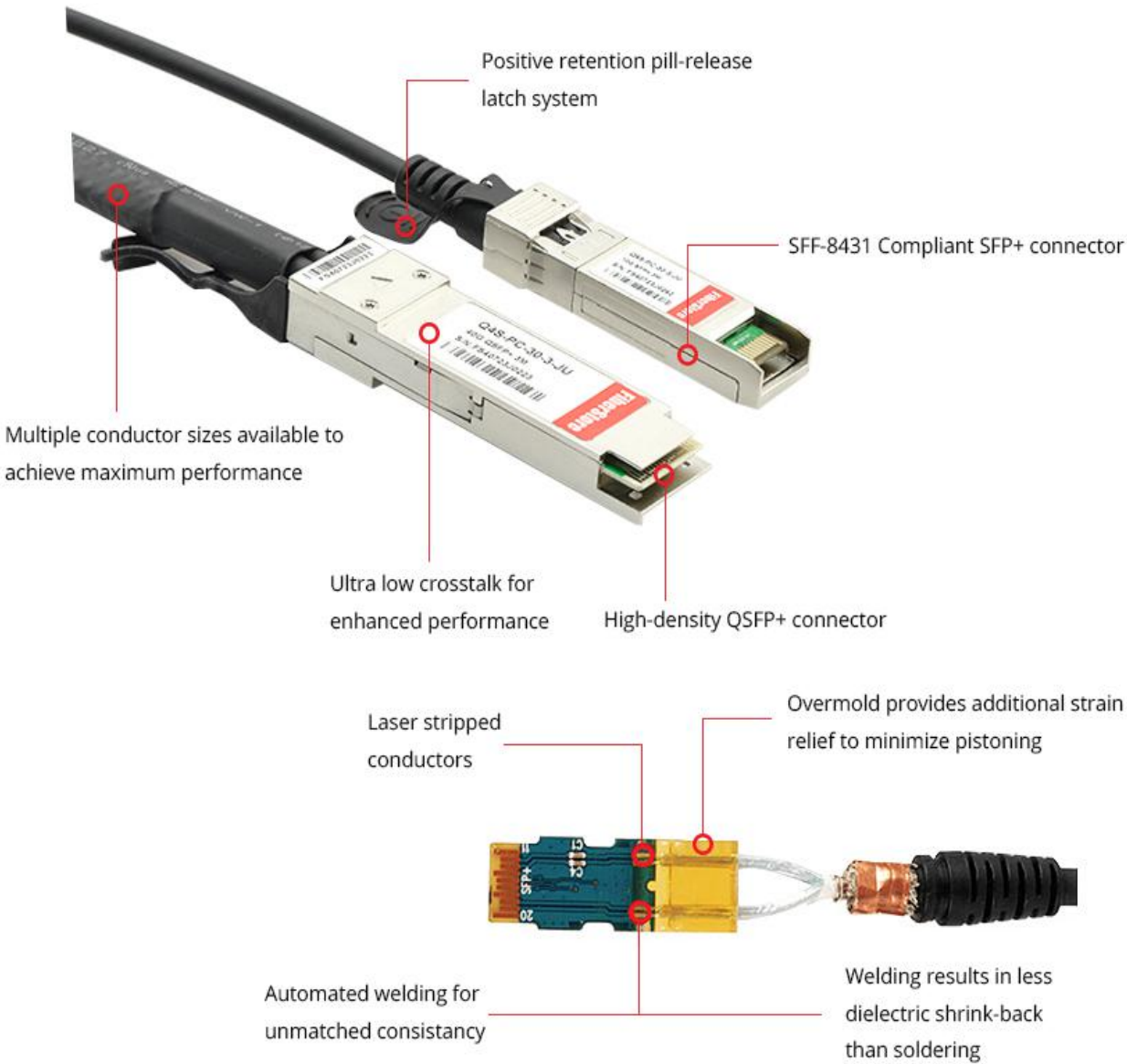
VII. Recommended Wiring Diagram

High Speed signal					
P0(4x-Pluggable-QSFP)			P1/P2/P3/P4		
Pad	Signal		Pad	Signal	
36	TX1p	— —	12	RD-	P1
37	TX1n	— —	13	RD+	
17	RX1p	— —	18	TD+	
18	RX1n	— —	19	TD-	
02	TX2n	— —	12	RD-	P2
03	TX2p	— —	13	RD+	
21	RX2n	— —	18	TD+	
22	RX2p	— —	19	TD-	
33	TX3p	— —	12	RD-	P3
34	TX3n	— —	13	RD+	
14	RX3p	— —	18	TD+	
15	RX3n	— —	19	TD-	
05	TX4n	— —	12	RD-	P4
06	TX4p	— —	13	RD+	
24	RX4n	— —	18	TD+	
25	RX4p	— —	19	TD-	
GND Group	GND		GND Group	GND	
GND Group 01、04、07、13、16、19、 20、23、26、32、35、38			GND Group(P1/P2/P3/P4) 01、09、10、11、14、17、20		
Connector Shell			Connector Shell		

Low Speed Signal & Power		
P1(4x-Pluggable-QSFP)		
Pad	Signal	
08	ModScl	 Vcc
09	ResetI	 Vcc
10	VccRx	N.C.
1	SCL	 Vcc GND
12	SDA	
27	ModPrsl	 GND
28	IntI	 Vcc
29	VccTx	 Vcc
30	Vccl	 Vcc
31	LpMode	
		N.C.

Low Speed Signal & Power		
P1/P2/P3/P4		
Pad	Signal	
02	TX-FAULT	 TX-FAULT
03	TX-DISABLE	 TX-DISABLE
04	MOD-DEF2	
05	MOD-DEF1	
06	MOD-DEF0	 GND
07	RATESELE	 GND
08	LOS	 LOS
15	VCCR	 Vcc
16	VCCT	

VIII. High Speed Interconnect



IX. Installation

Caution:

Follow accepted ESD practices when handling QSFP+/SFP+ connectors to prevent damage to the internal components within the connector. ESD (electrostatic discharge) is the sudden flow of electricity between two objects at different voltage potentials caused by contact. The basis of any ESD protection strategy is to ground or bring all elements in the ESD protected area to the same potential. An ESD wrist strap should be used for everything in the ESD protected area including personnel, tools, cabinets and components.

A. Installing QSFP+/SFP+ Modules

Follow these steps to install a FS.COM QSFP+/SFP+ cable assembly:

Step 1. Remove the protective ESD cap from the connector.

Step 2. Slide the QSFP+/SFP+ cable end into the slot until it locks into position (see figure 1).

There is an audible click when the connector is properly seated.



Figure 1. Installing an QSFP+/SFP+ Module



Figure 2. Disconnecting Latch Mechanism



Figure 3. Removing Modules

Caution :

The latching mechanism locks the QSFP+/SFP+ connector into place when cables are connected. Do not pull on the cable in an attempt to remove the QSFP+/SFP+ connector.

B. Removing QSFP+/SFP+ Modules

Follow these steps to remove a FS.COM SFP+ cable assembly:

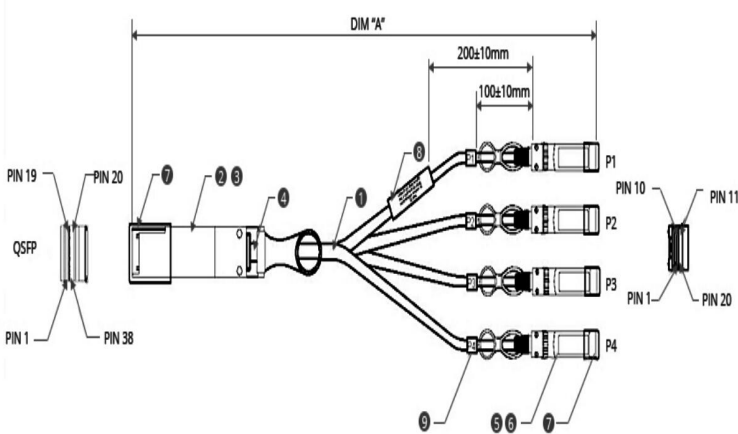
Step 1. Pull on the QSFP+/SFP+ latch pull lanyard. See figure 2.

Step 2. Grasp the QSFP+/SFP+ connector on both sides and remove it from the system. See figure 3.

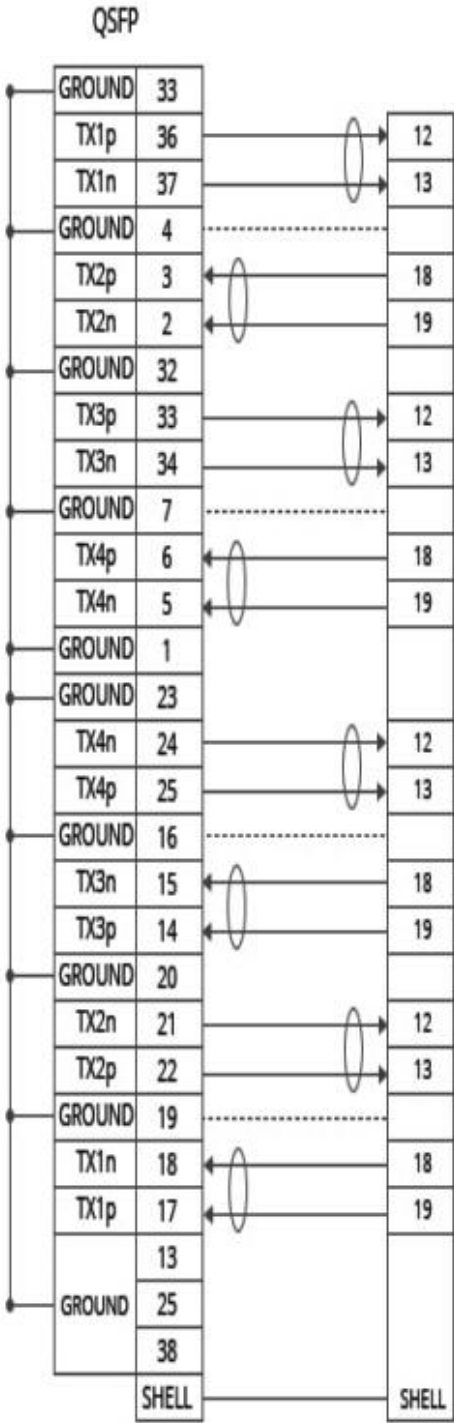
Step 3. If possible, replace the ESD protective cap or put the QSFP+/SFP+ into an ESD protected bag.

X. Mechanical Dimensions

WIRING DIAGRAM:



9	4	LABEL	CABLE LABEL : P1, P2, P3, P4
8	1	LABEL	FOR CONTENT, SEE LABEL DETAIL
7	A/R	DUST COVER	49.0006SZ
6	4	PCB	PASSIVE SFP + PCBA
5	4	CONNECTOR	SFP+ CONNECTOR (NO LOGO, BLACK, PULL TAB)
4	A/R	STRAIN RELIEF MOLD	PVC 75A
3	1	PCB	QSFP PRINT CIRCUIT BOARD
2	1	CONNECTOR	QSFP CONNECTOR
1.2	A/R	CABLE OPTION	2P X 28AWG. 100 OHM, COLOR : BLACK
1.1	A/R	CABLE OPTION	2P X 30AWG. 100OHM, COLOR : BLACK
ITEM	QTY	NAME	DESCRIPTION



Test Center

FS.COM transceivers are tested to ensure connectivity and compatibility in our test center before shipped out. FS.COM test center is supported by a variety of mainstream original brand switches and groups of professional staff, helping our customers make the most efficient use of our products in their systems, network designs and deployments.

The original switches could be found nowhere but at FS.COM test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX & Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, Avaya VSP 7000 MDA 2, etc.



Cisco ASR 9000 Series(A9K-MPA-1X40GE)



ARISTA 7050S-64(DCS-7050S-64)



Juniper MX960



Brocade ICX 7750-26Q



Extreme Networks X670V VIM-40G4X



Mellanox M3601Q



Dell N4032F



HP 5406R ZL2 V3(J9996A)



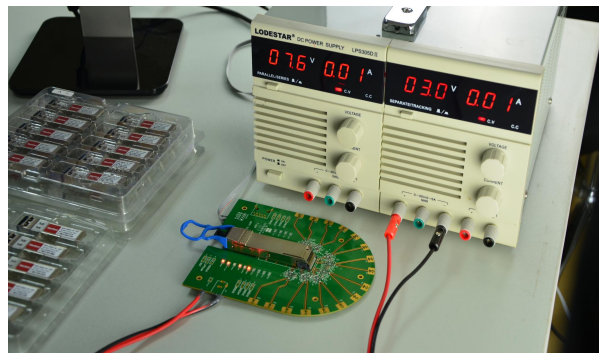
AVAYA 7024XLS(7002QQ-MDA)

Test Assured Program

FS.COM truly understands the value of compatibility and interoperability to each optics. Every module FS.COM provides must run through programming and an extensive series of platform diagnostic tests to prove its performance and compatibility. In our test center, we care of every detail from staff to facilities—professionally trained staff, advanced test facilities and comprehensive original-brand switches, to ensure our customers to receive the optics with superior quality.



Our smart data system allows effective product management and quality control according to the unique serial number, properly tracing the order, shipment and every part.



Our in-house coding facility programs all of our parts to standard OEM specs for compatibility on all major vendors and systems such as Cisco, Juniper, Brocade, HP, Dell, Arista and so on.



With a comprehensive line of original-brand switches, we can recreate an environment and test each optics in practical application to ensure quality and distance.



The last test assured step to ensure our products to be shipped with perfect package.

Order Information

Part Number	Data Rate	Length	Wire Gauge	Connector Type	Temp. Range	Cable Jacket
QSFP-4SFP10G-DAC-0.5	Up to 40G	0.5m	AWG30	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-1	Up to 40G	1m	AWG30	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-2	Up to 40G	2m	AWG30	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-3	Up to 40G	3m	AWG30	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-4	Up to 40G	4m	AWG26	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-5	Up to 40G	5m	AWG26	QSFP+ to 4SFP+	0-70 ° C	PVC
QSFP-4SFP10G-DAC-7	Up to 40G	7m	AWG26	QSFP+ to 4SFP+	0-70 ° C	PVC

Notes:

1. 40G QSFP to 4 SFP+ PCC is individually tested on corresponding equipment such as Cisco, Arista, Juniper, Dell, Brocade and other brands, and passes the monitoring of FS.COM intelligent quality control system.
2. Customized 40G QSFP to 4 SFP+ PCCs are available in various lengths.
3. The wire gauge can be customized if it is required, like AWG24, AWG26, AWG28 and AWG30.