40G QSFP+ to 8 X LC Connector Breakout Active Optical Cable (AOC)

Application

- 40GBASE-SR4 40G Ethernet
- 4G/ 8G/ 10G Fibre Channel
- Proprietary high speed, high density data transmission
- Creating a breakout cable with four Duplex LC/SC/ST/FC connectors for port expander applications
- High performance computing, server and data storage.

Features

- Transmission data rate up to 10.3Gbit/s per channel
- Connector 1: QSFP+
- Connector 2: LC/SC/ST/FC Connector(8)
- Full duplex 4 channel 850nm parallel active optical cable
- Available lengths (in meters): 1, 2, 3, 4, 5....
- SFF-8436 QSFP+ compliant housing and hot pluggable electrical interface
- Differential AC-coupled high speed data interface
- Management Interface and digital diagnostic monitoring（DDM) through I2C
- Commercial temperature range(COM): 0 to 70° C
- Support Rx output pre-emphasis
- Housing isolated from connector ground
- Low power consumption
- 3.3V power supply voltage
- RoHS 6 compliant

Description

FS.COM QSFP+ to 8 x LC/SC/ST/FC Connector Breakout Active Optical Cable(AOC) are a high performance, low power consumption, long reach interconnect solution supporting 40G Ethernet, fiber channel and PCIe. It is compliant with the QSFP MSA and IEEE P802.3ba 40GBASE-SR4. QSFP+ Breakout Cable is an assembly of 4 full-duplex lanes, where each lane is capable of transmitting data at rates up to 10Gb/s, providing an aggregated rate of 40Gb/s.

QSFP+ Breakout Cable are suitable for short distances and offer a highly cost-effective way to connect within racks and across adjacent racks. This product is a high data rate parallel active optical cable, to overcome the bandwidth limitation of traditional copper cable.

Products Specifications

I. Absolute Maximum Ratings

*Exceeding the limits below may damage the active optical cable permanently.

Parameter	Symbol	Min	Max	Unit
3.3V Supply Voltage	Vcc	3.135	3.465	V
Input Voltage	Vin	-0.3	Vcc+0.3	V
Operating Case Temperature	Tc	0	70	ºC
Humidity(non-condensing)	Rh	5	95	%
Data Rate Per Lane	fd	2.5	10.3	Gbps
Power Dissipation	Pm		1.5	W

II. Specifications

Parameter	Symbol	Min	Typ.	Max	Unit
Differential input impedance	Zin	90	100	110	ohm
Differential Output impedance	Zout	90	100	110	ohm
Differential input voltage amplitude a Amplitude	ΔVin	300		1100	mVp-p
Differential output voltage amplitude	ΔVout	500		800	mVp-p
Skew	Sw			300	ps
Bit Error Rate	BR			E-12	
Input Logic Level High	VIH	2		VCC	V
Input Logic Level Low	VIL	0		0.8	V
Output Logic Level High	VOH	VCC-0.5		VCC	V
Output Logic Level Low	VOL	0		0.4	V

Notes:

BER=10^-12; PRBS 2^31-1@10.3125Gbps.

Differential input voltage amplitude is measured between TxNp and TxNn.

Differential output voltage amplitude is measured between RxNp and RxNn.

III. Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min	Min	Max	Unit	Notes
Transmitter						
Center Wavelength	λt	840	850	860	nm	
RMS spettral width	Δλt	-7.5		0.65	nm	
Average launch power, each lane	Pout			2.5	dBm	
Difference in launch power between any two lanes (OMA)				4	dB	
Extinction Ratio	ER	3			dB	
Peak power, each lane				4	dBm	
Transmigrate and dispersionpenalty (TDP), each lane	TDP			3.5	dB	
Average launch power of OFF transmitter, each lane				-30	dB	
Eye Mask coordinates:X1, X2, X3, Y1, Y2, Y3	SPECIFICATION VALUES 0.23, 0.34, 0.43, 0.27, 0.35, 0.4				Hit Ratio =5x10-5	
Receiver						
Center Wavelength	λr	840	850	860	nm	
Stressed receiver sensitivity inOMA, each lane				-5.4	dBm	1
Maximum Average power atreceiver input, each lane				2.4	dBm	
Receiver Reflectance				-12	dB	
Peak power, each lane				4	dBm	
LOS Assert		-30			dBm	
LOS De-Assert – OMA				-7.5	dBm	
LOS Hysteresis		0.5			dB	

Note:

1.Measured with conformance test signal at TP3 for BER = 10e-12

IV. Pin Description

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2	CML-I	Tx2-	Transmitter Inverted Data Input	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Input	
4		GND	Module Ground	1
5	CML-I	Tx4-	Transmitter Inverted Data Input	
6	CML-I	Tx4+	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	+3.3v 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	Rx3+	Receiver Non-Inverted Data Output	
15	CML-O	Rx3-	Receiver Inverted Data Output	
16		GND	Module Ground	1
17	CML-O	Rx1+	Receiver Non-Inverted Data Output	
18	CML-O	Rx1-	Receiver Inverted Data Output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	Rx2-	Receiver Inverted Data Output	

23		GND	Module Ground	1
24	CML-O	Rx4-	Receiver Inverted Data Output	
25	CML-O	Rx4+	Receiver Non-Inverted Data Output	
26		GND	Module Present, internal pulled down to GND	
27	LVTTL-O	ModPrsL	Interrupt output, should be pulled up on host board	2
28	LVTTL-O	IntL	Interrupt	
29		Vcc Tx	+3.3 V Transmitter Power supply	
30		Vcc I	+3.3 V Power Supply	
31	LVTTL-I	LPMode	Low Power Mode	2
32		GND	Module Ground	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3-	Transmitter Inverted Data Input	
35		GND	Module Ground	1
36	CML-I	Tx1+	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1-	Transmitter Inverted Data Input	
38		GND	Module Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k -10k ohms on host board to a voltage between 3.15Vand 3.6V.

20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	2
28	LVTTL-O	IntL	Interrupt	2
29		Vcc Tx	+3.3V Power Supply Transmitter	
30		Vcc1	+3.3V Power Supply	
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Input	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Input	
38		GND	Ground	1

Notes:

1.Module ground pins GND are isolated from the module case and chassis ground within the module.

2.Shall be pulled up with 4.7K-10Kohms to a voltage between 3.14V and 3.47V on the host board.

V. Low Speed Electrical Hardware Pins

In addition to 2-wire serial interface, 40G QSFP+ AOC module has the following low speed pins for control and status:

(1) ModSelL Pin

The ModSelL is an input pin. When held low by the host, the module responds to 2-wire serial Communication commands. The ModSelL allows the use of multiple QSFP modules on a single 2-wire interface bus. When the ModSelL is "High", the module will not respond to any 2-wire interface communication from the host. ModSelL has an internal pull-up in the module.

(2) ResetL Pin

Reset. LPMode_Reset has an internal pull-up in the module. A low level on the ResetL pin for longer than theminimum pulse length (t_Reset_init) initiates a complete module reset, returning all user module settings to their default state. Module Reset Assert Time (t_init) starts on the rising edge after the low level on the ResetL pin is released. During the execution of a reset (t_init) the host shall disregard all status bits until the module indicates a completion of the reset interrupt. The module indicates this by posting an IntL signal with the Data_Not_Ready bit negated. Note that on power up (including hot insertion) the module will post this completion of reset interrupt without requiring a reset.

(3) LPMode Pin

F-tone QSFP AOC operate in the low power mode (less than 1.5 W power consumption) This pin active high will decrease power consumption to less than 1W.

(4) ModPrsL Pin

ModPrsL is pulled up to Vcc on the host board and grounded in the module. The ModPrsL is asserted "Low"when the module is inserted and deasserted "High" when the module is physically absent from the host connector.

(5) IntL Pin

IntL is an output pin. When "Low", it indicates a possible module operational fault or a status critical to the host system. The host identifies the source of the interrupt by using the 2-wire serial interface. The IntL pin is an open collector output and must be pulled up to Vcc on the host board.

VI. Power Supply Filtering

The host board should use the power supply filtering shown in Figure 1.

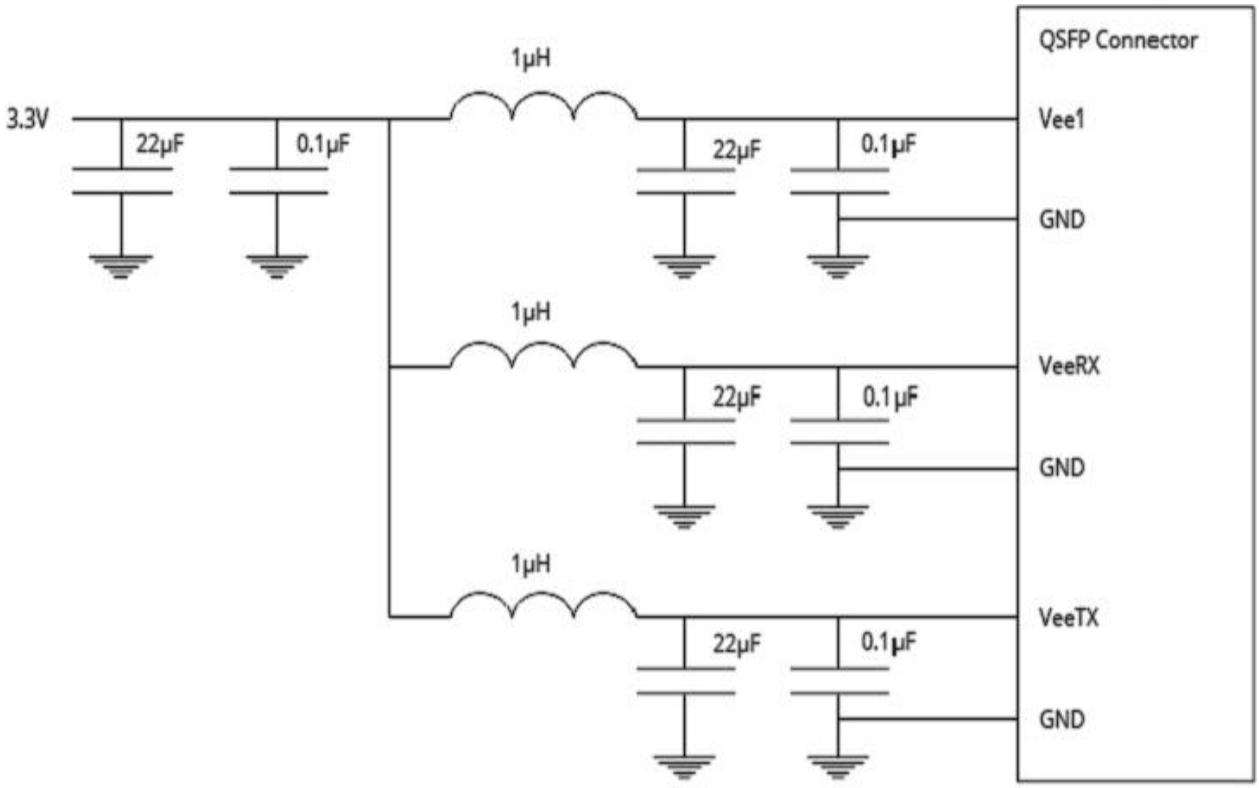
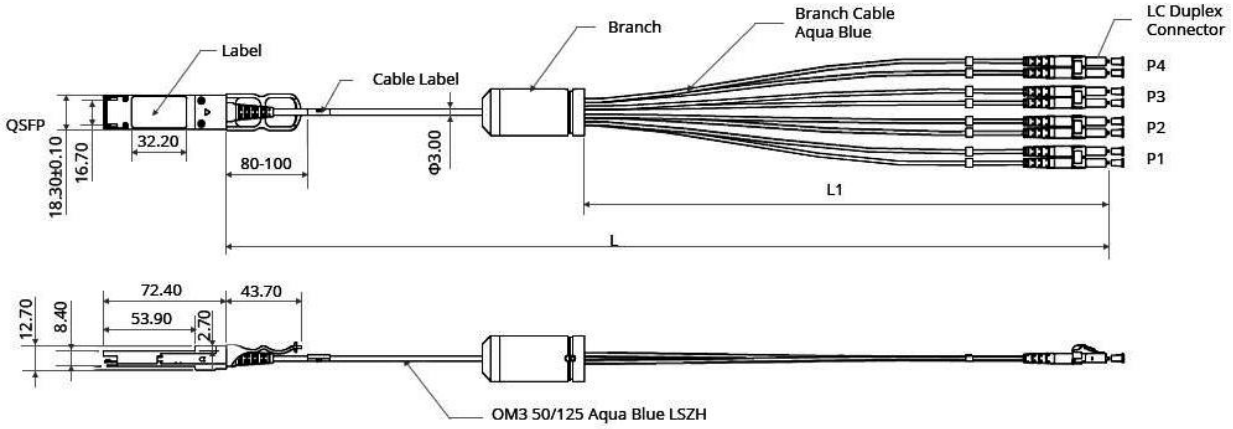


Figure 1. Host Board Power Supply Filtering

VII. Mechanical Outline Dimensions



XI. Installation

Caution:

Follow accepted ESD practices when handling 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+ cable assembly:

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

Step 2. Slide the QSFP+ 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+ Module

Figure 2. Disconnecting Latch Mechanism

Figure 3. Removing Modules

Caution :

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

B. Removing QSFP+ Modules

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

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

Step 2. Grasp the QSFP+ 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+ into an ESD protected bag.

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

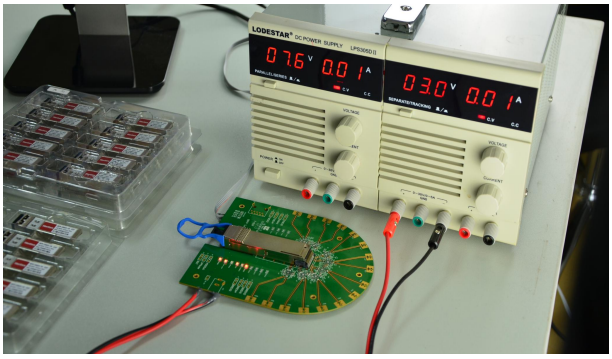
HP 5406R ZL2 V3(J9996A)

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 tracking 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	Cable Jacket
QSFP-8X-AOC-5	Up to 40G	5m	AOC Cable	QSFP+ to 8 x LC	OFNP
QSFP-8X-AOC-10	Up to 40G	10m	AOC Cable	QSFP+ to 8 x LC	OFNP
QSFP-8X-AOC-15	Up to 40G	15m	AOC Cable	QSFP+ to 8 x LC	OFNP
QSFP-8X-AOC-20	Up to 40G	20m	AOC Cable	QSFP+ to 8 x LC	OFNP
QSFP-8X-AOC-30	Up to 40G	30m	AOC Cable	QSFP+ to 8 x LC	OFNP

Notes:

1.40G QSFP+ to 8 X LC Connector Breakout Active Optical Cable 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 40GBASE QSFP+ to LC/SC/ST/FC Connector(8) Breakout AOCs are available in various lengths.

3.Customized 40GBASE QSFP+ to LC/SC/ST/FC Connector(8) Breakout AOCs are available in various cconnectors , including LC, SC, ST and FC connector.

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