



Features

- Electrical interface compliant to QSFP+ connector (SFPP-8436) and SFP+ connectors (SFF-8431)
- 850nm VSCSEL transmitter, PIN photo-detector receiver
- Hot Pluggable
- Up to 100m on OM3 MMF
- Operating case temperature : 0~70°C
- All-metal housing for superior EMI performance
- RoHS Compliant

Applications

- Infiniband SDR, DDR and QDR
- 40G Ethernet (40GbE)
- Fiber Channel Applications
- Switch and router high speed backplane interconnect
- High performance computing clusters.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_s	0	85	°C	
Storage Ambient Humidity	H_A	0	85	%	
Power Supply	V_{CC3}	0	3.6	V	+3.3V

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_C	0	70	°C	
Ambient Humidity	H_A	5	85	%	Non-Condensing
Supply Voltage	V_{CC3}	3.135	3.465	V	
Supply Current	I_{CC3}	---	400	mA	
Total Power Dissipation	P_D	---	0.85	W	QSFP+
	P_D	---	0.5	W	SFP+

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Optical Characteristics– Transmitter (QSFP+)

Parameter	Symbol	Min	Type	Max	Units	Notes
Center Wavelength	λ_t	840	850	860	nm	
RMS spectral width	$\Delta \lambda$	-	-	0.65	nm	
Average Optical Power	Pout	-7.5	-	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	
Transmitter Dispersion Penalty	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 Ration=5x10-5	

High Speed Characteristics – Receiver (QSFP+)

Parameter	Symbol	Min	Type	Max	Units	Notes
Center Wavelength	λ_r	840	850	860	nm	
Stressed Sensitivity in OMA(each lane)		-	-	-5.4	dBm	Note 1
Maximum Average power at receiver input				2.4	dBm	
Peak power, each lane				4	dBm	
LOS Assert		-30	-		dBm	
LOS De-Assert-OMA				-7.5	dBm	
LOS Hysteresis		0.5	-		dB	
Receiver Reflectance		-	-	-12	dB	

Notes:

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

Optical Characteristics-Transmitter (SFP+)

Parameter	Symbol	Min	Type	Max	Units	Notes
Center Wavelength	λ_t	840	850	860	nm	
RMS spectral width	Pm	-	-	Note 1	nm	
Average Optical Power	Pavg	-6.5	-	-1	dBm	Note 2
Extinction Ratio	ER	3.5	-	-	dB	Note 3
Transmitter Dispersion Penalty	TDP	-	-	3.9	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/ Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	

Note:

1. Trade-offs are available between spectral width, center wavelength and minimum OMA, as shown in table 6
2. The Optical power is launched into MMF
3. Measured with a PRBS $2^{31}-1$ test pattern @10.3125Gbps

Optical Characteristics – Receiver (SFP+)

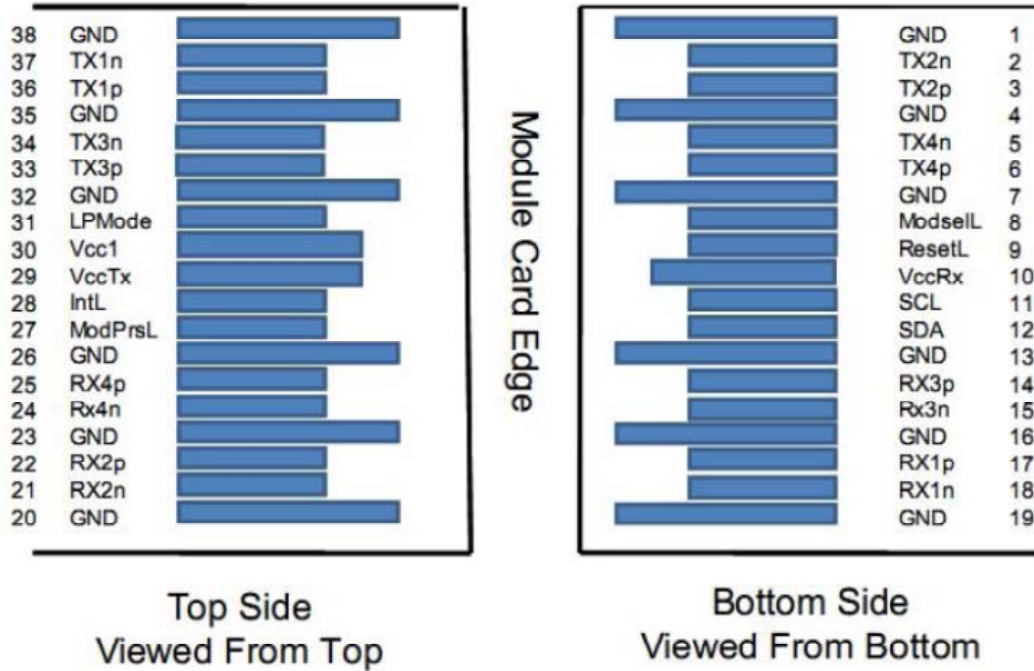
Parameter	Symbol	Min	Type	Max	Units	Notes
Center Wavelength	λ_r	840	850	860	nm	
Receiver Sensitivity	Psens	-	-	-11.1	dBm	Note 1
Stressed Sensitivity in OMA		-	-	-7.5	dBm	Note 1
Los function	Los	-30	-	-12	dBm	
Overload	Pin	-	-	-1.0	dBm	Note 1
Receiver Reflectance		-	-	-12	dB	

Notes:

1. Measured with a PRBS $2^{31}-1$ test pattern @10.3125Gbps, BER $\leq 10^{-12}$

Pin Assignment (QSFP+)

QSFP Module Pad Layout (Top View)



Pin Description

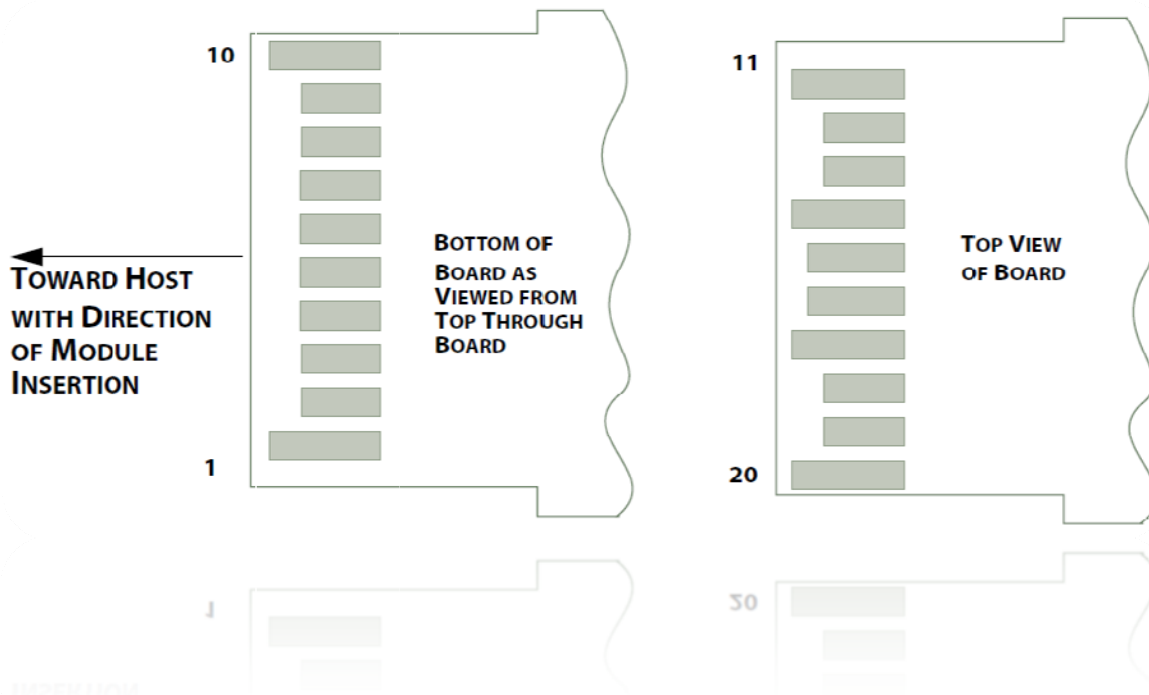
Pin	Logic	Symbol	Description	Note
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	2
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	2
13		GND	Ground	1

Pin	Logic	Symbol	Description	Note
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
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		VccTx	+3.3V Power Supply Transmitter	
30		Vcc1	+3.3V Power Supply	
31	LVTTL-1	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. GND is the symbol for signal and supply (power) common for QSFP modules. 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. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers 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 transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

Pin Assignment (SFP+)



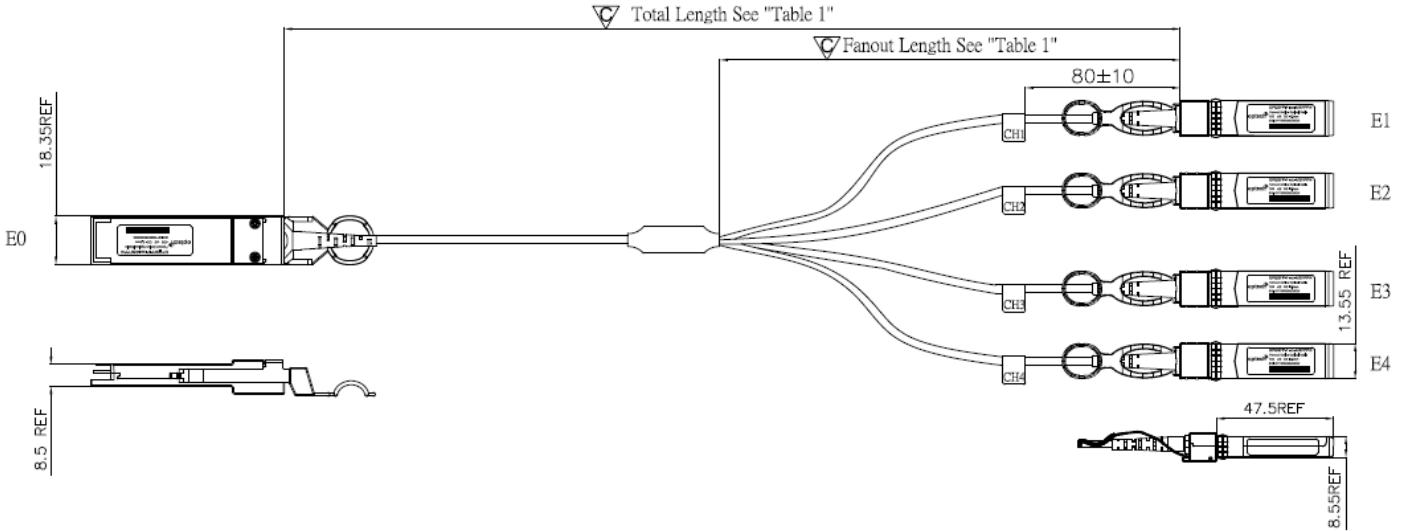
<i>Contacts</i>	<i>Logic 1</i>	<i>Symbol</i>	<i>Power Sequence Order</i>	<i>Name/Description</i>	<i>Note</i>
1		VeeT	1st	Module transmitter ground	3
2	LVTTL-O	Tx_Fault	3rd	Module transmitter fault	4
3	LVTTL-I	Tx_Disable	3rd	Transmitter disable; Turns off transmitter laser output	5
4	LVTTL-I/O	SDA	3rd	2-wire serial interface data line (same as MOD-DEF2 in INF-8074i)	6
5	LVTTL-I/O	SCL	3rd	2-wire serial interface clock (same as MOD-DEF1 in INF-8074i)	6
6		Mod_ABS	3rd	Module absent, connected to VeeT or VeeR in the module	7
7	LVTTL-I	RS0	3rd	Rate Select 0, optionally controls SFP+ module receiver	8
8	LVTTL-O	Rx_LOS	3rd	Receiver loss of signal indication (In fc designated as Rx_LOS and in Ethernet designated as signal detect)	4

9	LVTTTL-I	RS1	3rd	Rate Select 1, optionally controls SFP+ module transmitter	8
10		VeeR	1st	Module receiver ground	3
11		VeeR	1st	Module receiver ground	3
12	CML-O	RD-	3rd	Receiver inverted data output	
13	CML-O	RD+	3rd	Receiver non-inverted data output	
14		VeeR	1st	Module receiver ground	3
15		VccR	2nd	Module receiver 3.3 V supply	
16		VccT	2nd	Module transmitter 3.3 V supply	
17		VeeT	1st	Module transmitter ground	3
18	CML-I	TD+	3rd	Transmitter non-inverted data input	
19	CML-I	TD-	3rd	Transmitter inverted data input	
20		VeeT	1st	Module transmitter ground	3

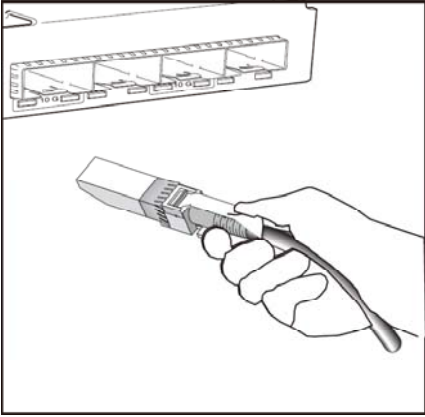
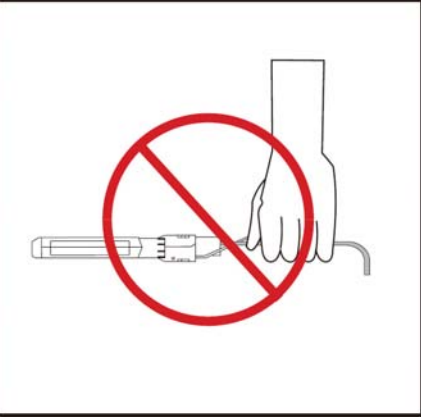
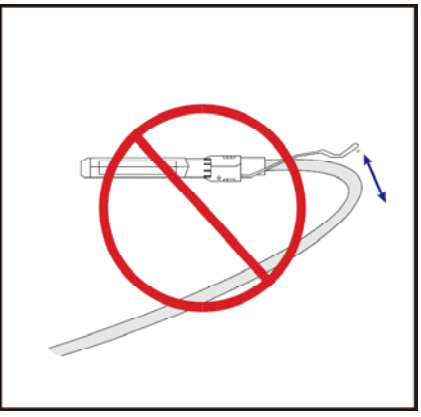


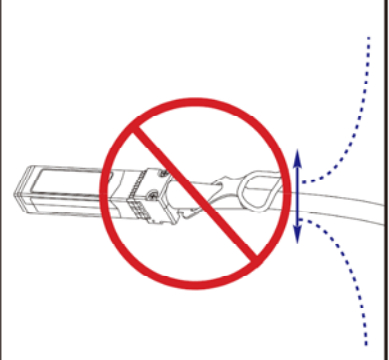
Notes

1. Labeling as inputs (I) and outputs (O) are from the perspective of the module
2. The case makes electrical contact to the cage before any of the board edge contacts are made.
3. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
4. This contact is an open collector/drain output contact and shall be pulled up on the host see SFF-8431 2.4.1 and SFF-8431 2.4.6. Pull ups can be connected to one of several power supplies, however the host board design shall ensure that no module contact has voltage exceeding module VccT/R + 0.5 V.
5. Tx_Disable is an input contact with a 4.7 k Ω to 10 k Ω pullup to VccT inside the module.
6. See SFF-8431 4.2.
7. See SFF-8431 2.4.4.
8. For SFF-8431 rate select definition see section SFF-8431 2.4.3 and SFF-8431 2.5. (If implementing SFF-8079 contact 7 and 9 in SFF-8431 are used for AS0 and AS1 respectively). Mechanical specifications:

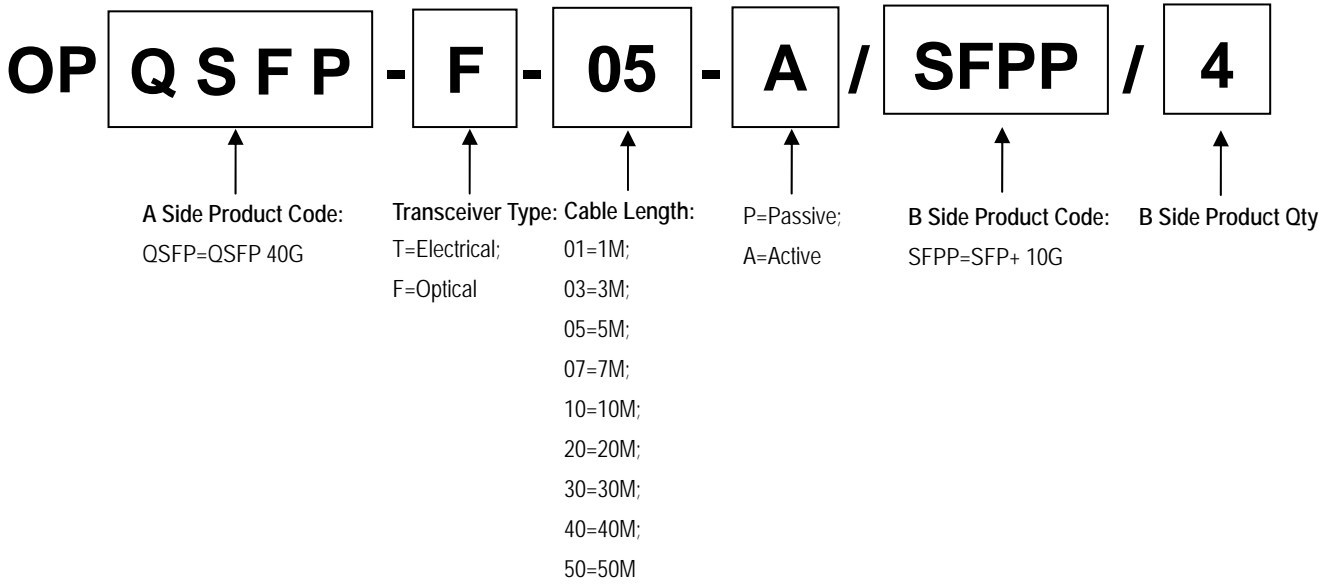
Dimensions



Important Notice

		
<p>Holding the SFP+ connector by its sides, insert the connector into the port on the switch</p>	<p>Do not handle by cable</p>	<p>DO NOT Over-bend the cable behind the connector</p>
		
<p>DO NOT twist the cable</p>	<p>DO NOT kink the cable</p>	<p>DO NOT bend up and down the cable</p>

Ordering Information



Part Number	Model Number	Length (M)	Voltage	Temperature
OPQSFP-F-01-A/SFPP/4	Active Optical Cable	1	3.3V	0°C ~ 70°C
OPQSFP-F-03-A/SFPP/4	Active Optical Cable	3	3.3V	0°C ~ 70°C
OPQSFP-F-05-A/SFPP/4	Active Optical Cable	5	3.3V	0°C ~ 70°C
OPQSFP-F-07-A/SFPP/4	Active Optical Cable	7	3.3V	0°C ~ 70°C
OPQSFP-F-10-A/SFPP/4	Active Optical Cable	10	3.3V	0°C ~ 70°C
OPQSFP-F-20-A/SFPP/4	Active Optical Cable	20	3.3V	0°C ~ 70°C
OPQSFP-F-30-A/SFPP/4	Active Optical Cable	30	3.3V	0°C ~ 70°C
OPQSFP-F-40-A/SFPP/4	Active Optical Cable	40	3.3V	0°C ~ 70°C
OPQSFP-F-50-A/SFPP/4	Active Optical Cable	50	3.3V	0°C ~ 70°C

Note: All information contained in this document is subject to change without notice.