



Features

- Compliant with SFF-8665/SFF-8679
- Compliant with IEEE 802.3bj
- 4 independent full-duplex channels
- Up to 25.78125 Gbps data rate per channel
- Up to 5m transmission
- Single 3.3V power supply
- Low insertion loss
- BER better than 10^{-15}
- Operating temperature: -5~+70°C
- RoHS compliant

Applications

- 40G/100G Ethernet
- Infiniband, QDR/EDR

General Product Characteristics

QSFP28 Copper Specifications

Number of Lanes	4 Tx & 4 Rx
Channel Data Rate	25.78125 Gbps/channel
Operating Case Temperature	-5 to +70°C
Storage Temperature	-40 to +85°C
Supply Voltage	3.3V nominal
Electrical Interface	38-pin edge connector
Management Interface	Serial, I ² C

High Speed Characteristics

<i>Parameter</i>	<i>Symbol</i>	<i>Min.</i>	<i>Max.</i>	<i>Units</i>	<i>Note</i>
Differential Impedance	$R_{IN,P-P}$	90	110	Ω	
Insertion loss	$SDD21$		22.48	dB	At 12.8906 GHz
Differential Return Loss	$SDD11$		See 1	dB	At 0.05 to 4.1 GHz
	$SDD22$		See 2	dB	At 4.1 to 19 GHz
Common-mode to common-mode output return loss	$SCC11$	2		dB	At 0.2 to 19 GHz
	$SCC22$				
Differential to common-mode return loss	$SCD11$		See 3	dB	At 0.01 to 12.89 GHz
	$SCD22$		See 4		At 12.89 to 19 GHz
Differential to common Mode Conversion Loss	$SCD21$		10	dB	At 0.01 to 12.89 GHz
			See 5		At 12.89 to 15.7 GHz
			6.3		At 15.7 to 19 GHz
Channel Operating Margin	COM	3		dB	

Notes:

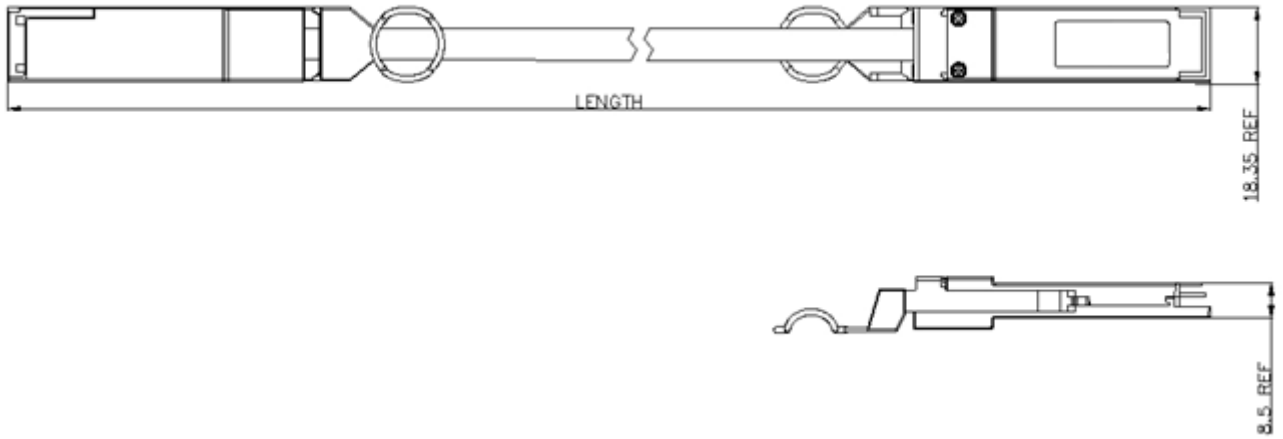
1. Reflection Coefficient given by equation $SDD11(\text{dB}) < 16.5 - 2 \times \text{SQRT}(f)$, with f in GHz
2. Reflection Coefficient given by equation $SDD11(\text{dB}) < 10.66 - 14 \times \log_{10}(f/5.5)$, with f in GHz
3. Reflection Coefficient given by equation $SCD11(\text{dB}) < 22 - (20/25.78) \times f$, with f in GHz
4. Reflection Coefficient given by equation $SCD11(\text{dB}) < 15 - (6/25.78) \times f$, with f in GHz
5. Reflection Coefficient given by equation $SCD21(\text{dB}) < 27 - (29/22) \times f$, with f in GHz

Pin Descriptions

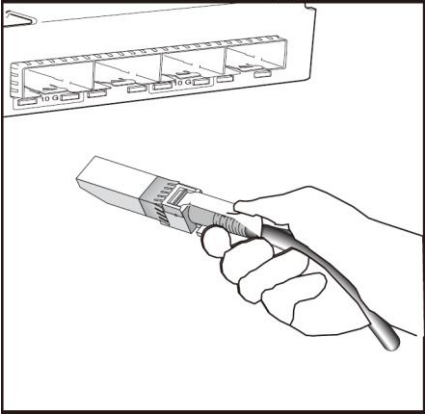
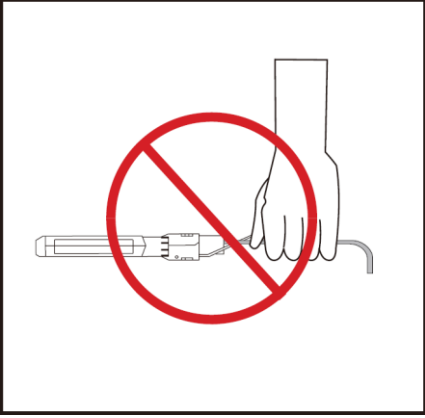
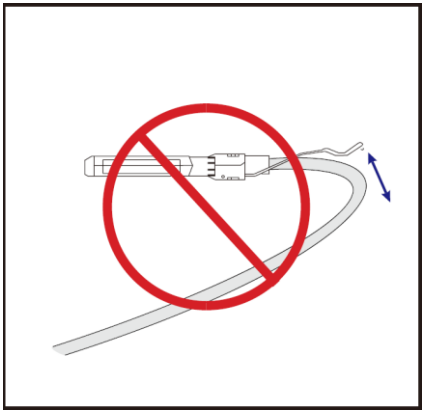
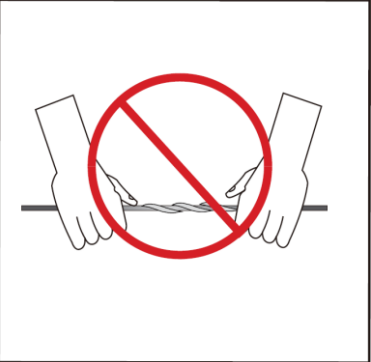

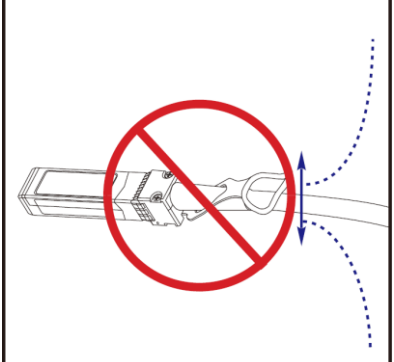
<i>Pin</i>	<i>Logic</i>	<i>Symbol</i>	<i>Name/Description</i>	<i>Plug Sequence</i>	<i>Notes</i>
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	
11	LVCMOSI/O	SCL	2-wire serial interface clock	3	2
12	LVCMOSI/O	SDA	2-wire serial interface data	3	2
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16			Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	2
28	LVTTL-O	IntL	Interrupt	3	2
29		Vcc Tx	+3.3V Power Supply transmitter	2	
30		Vcc1	+3.3V Power Supply	2	
31	LVTTL-I	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

1. GND is the symbol for signal and supply (power) common for the module. All are common within the 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 shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in SFF-8679 Table5-6. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the module in any combination. The connector pins are each rated for a maximum current of 1000 mA.

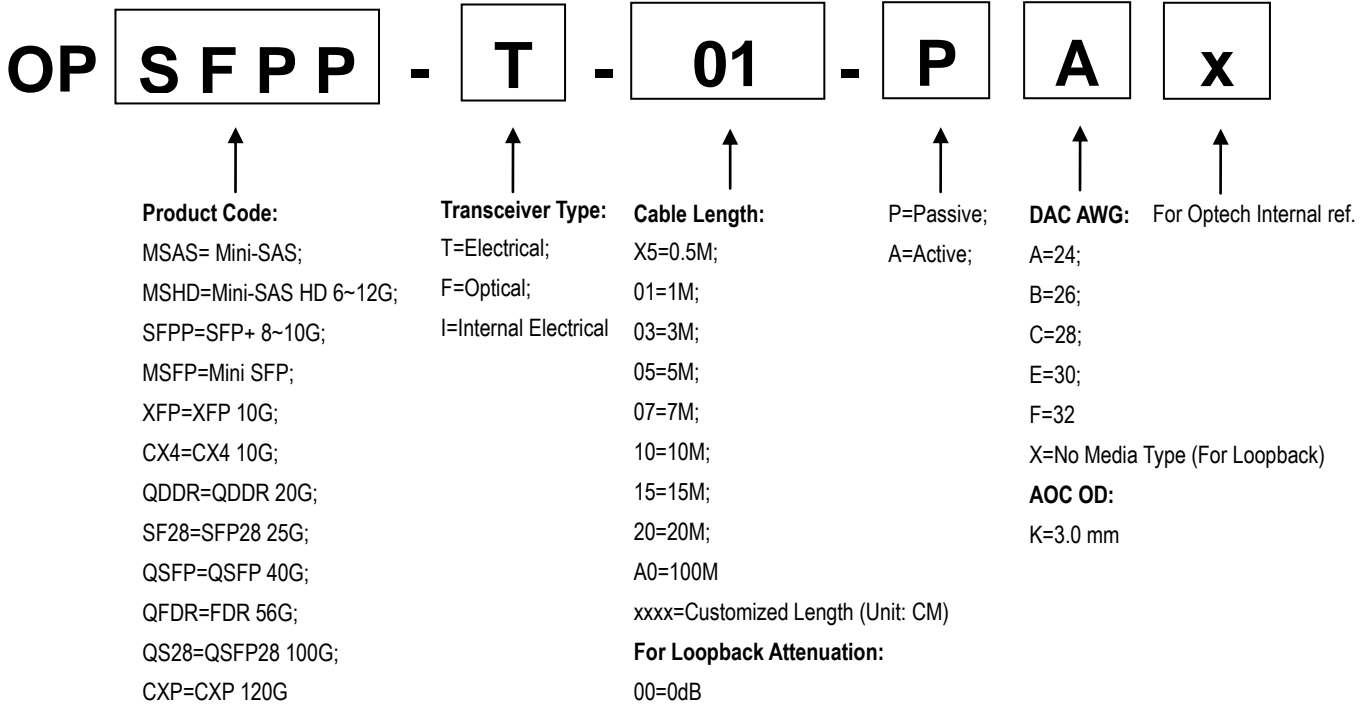
Dimensions



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	Length (M)	AWG	Voltage	Temperature
OPQS28-T-X5-PE	0.5	30	3.3V	0°C to 70 °C
OPQS28-T-01-PE	1	30	3.3V	0°C to 70 °C
OPQS28-T-02-PE	2	30	3.3V	0°C to 70 °C
OPQS28-T-03-PB	3	26	3.3V	0°C to 70 °C
OPQS28-T-05-PA	5	24	3.3V	0°C to 70 °C

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