



### Features:

- ✧ QSFP28 conforms to the Small Form Factor SFF8665
- ✧ 4-Channel Full-Duplex Passive Copper Cable Transceiver
- ✧ Support data rates : 25.78Gb/s (per channel)
- ✧ Maximum aggregate data rate: 100Gb/s (4 x 25.78Gb/s)
- ✧ IEEE 802.3bj 100GEBASE-CR4
- ✧ Copper link x (x=1m,3m,5m)

- ✧ Power Supply :+3.3V
- ✧ Low crosstalk
- ✧ I2C based two-wire serial interface for EEPROM signature which can be customized
- ✧ Operating Temperature: 0~ 70 °C
- ✧ ROHS Compliant

### Applications:

- ✧ 100 Gigabit Ethernet
- ✧ Fiber Channel over Ethernet
- ✧ Data storage and communication industry Switch / router / HBA
- ✧ Enterprise network SAN
- ✧ Data Center Network

### Standards Compliance

- ✧ IEEE 802.3bj
- ✧ InfiniBand EDR
- ✧ QSFP28 MSA
- ✧ RoHS Compliant

### ● Ordering information

PartNumber	ProductDescription	Wiregauge (AWG)
OPQET1	1 meter QSFP28 PassiveCable	30
OPQET3	3 meter QSFP28 PassiveCable	26
OPQET5	5 meter QSFP28 PassiveCable	26

### ● Description:

The 100GE QSFP28 cable assemblies are high performance, cost effective I/O solutions for LAN, HPC and SAN. The high speed cable assemblies meet and exceed 100 Gigabit Ethernet, InfiniBand EDR and temperature requirements for performance and reliability. The cables are compliant with SFF-8436 specifications and provide connectivity between devices using QSFP ports.

## ● Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature		-40		+85	°C
Operating Case Temperature	T <sub>c</sub>	0		+70	°C
Power Supply Voltage	V <sub>CC3</sub>	3.14	3.3	3.47	V
Data Rate Per Lane		1		25.78	Gb/s

## ● High Speed Characteristics

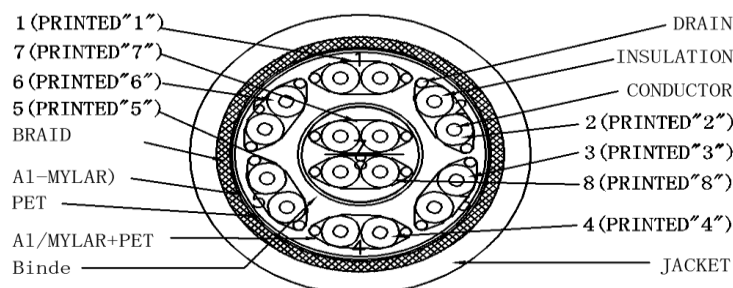
Parameter	Symbol	Min	Typic	Max	Unit	Note
Differential	RIN,P-	9	100	110	Ω	
Insertion loss	SDD21	8		22.48	dB	At 12.8906 GHz
Differential Return Loss	SDD11	12.45		See 1	dB	At 0.05 to 4.1 GHz
	SDD22	3.12		See 2	dB	At 4.1 to 19 GHz
Common-mode to common-mode output return loss	SCC11 SCC22	2			dB	At 0.2 to 19 GHz
Differential to common-mode return	SCD11	12		See 3	dB	At 0.01 to 12.89 GHz
	SCD22	10.58		See 4		At 12.89 to 19 GHz
Differential to common Mode Conversion Loss	SCD21-IL	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	COM	3			dB	

### Notes:

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

## ● Bulk Cable Characteristics

The structure of the cable is shown as the figure , the characteristics of the bulk cable are listed below.



- ✧ Voltage rating: 30V
- ✧ Temperature rating: 80°C;
- ✧ Impedance: Differential mode: 100 +10/-5 ohm @TDR;
- ✧ Insulation Resistance: 200M Ohms/KM min. AT 20°C;
- ✧ Dielectric Strength: AC 500V/1MINUTE;
- ✧ Delay Skew(INTRA-SKEW): 50ps/5m max;
- ✧ Signal Twin-ax pair cable: Solid Ag plated copper conductor;
- ✧ Braid shielding coverage 85% min.

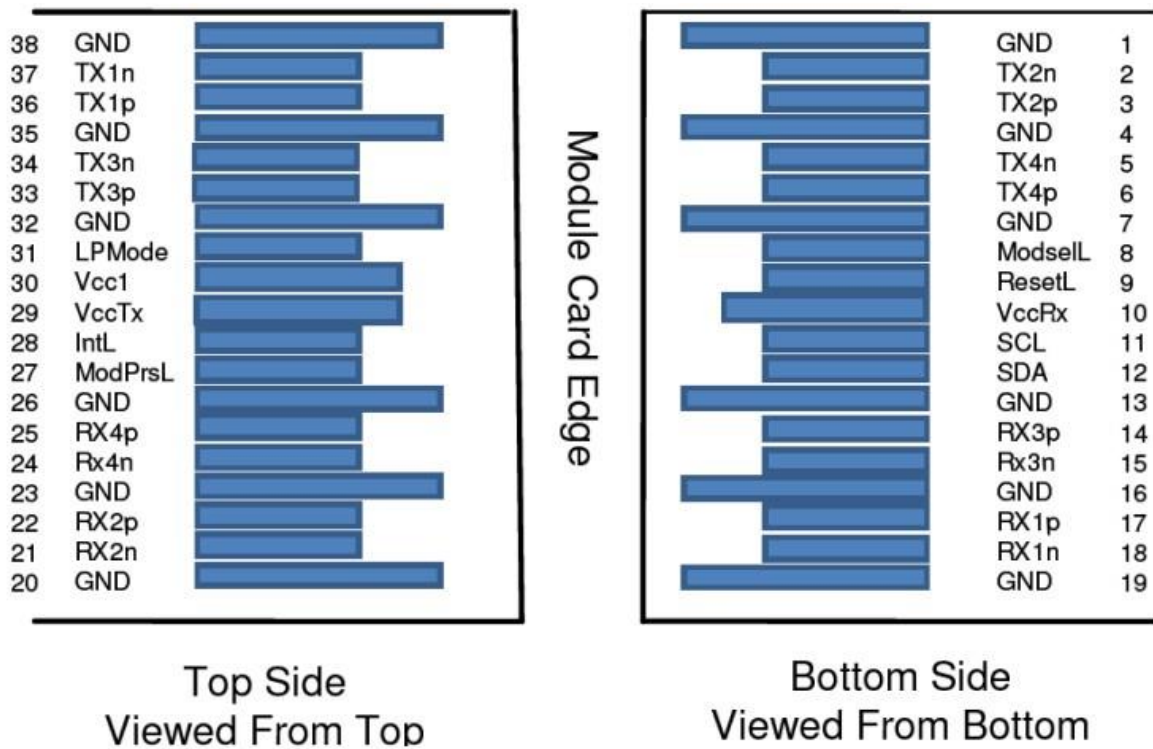
## ● Pin Descriptions

Pin	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data	
3	CML-I	Tx2p	Transmitter Non-Inverted	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data	
6	CML-I	Tx4p	Transmitter Non-Inverted	
7		GND	Ground	1
8	LVTTL-I	ModSel	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		Vcc Rx	+3.3V Power Supply	2
11	LVC MOS	SCL	2-wire serial interface	
12	LVC MOS	SDA	2-wire serial interface	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted	
15	CML-O	Rx3n	Receiver Inverted Data	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted	
18	CML-O	Rx1n	Receiver Inverted Data	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data	
22	CML-O	Rx2p	Receiver Non-Inverted	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data	
25	CML-O	Rx4p	Receiver Non-Inverted	
26		GND	Ground	1
27	LVTTL-O	ModPrs	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		Vcc Tx	+3.3V Power supply	2
30		Vcc1	+3.3V Power supply	2

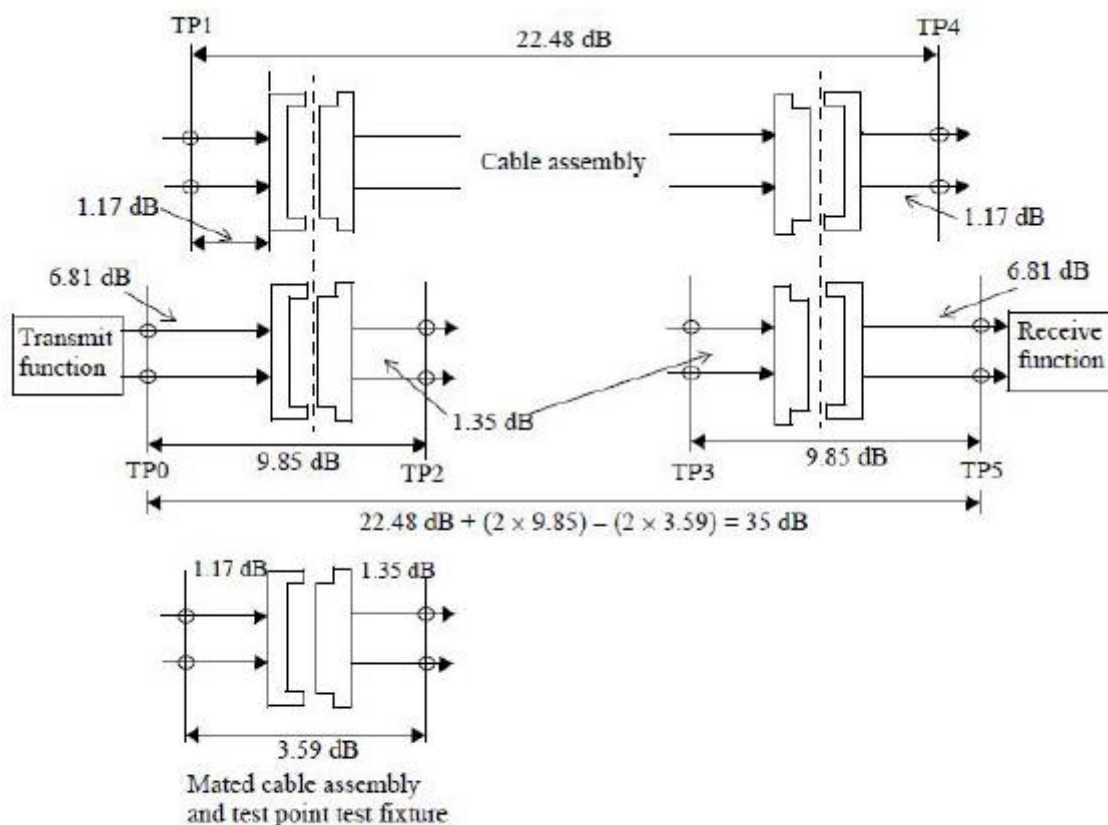
31	LVTTL-I	LPMMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted	
34	CML-I	Tx3n	Transmitter Inverted Data	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted	
37	CML-I	Tx1n	Transmitter Inverted Data	
38		GND	Ground	1

**Note 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 hostboard signal-common ground plane.

**Note 2:** Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table 6. Recommended host board power supply filtering is shown in Figure 4. 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.



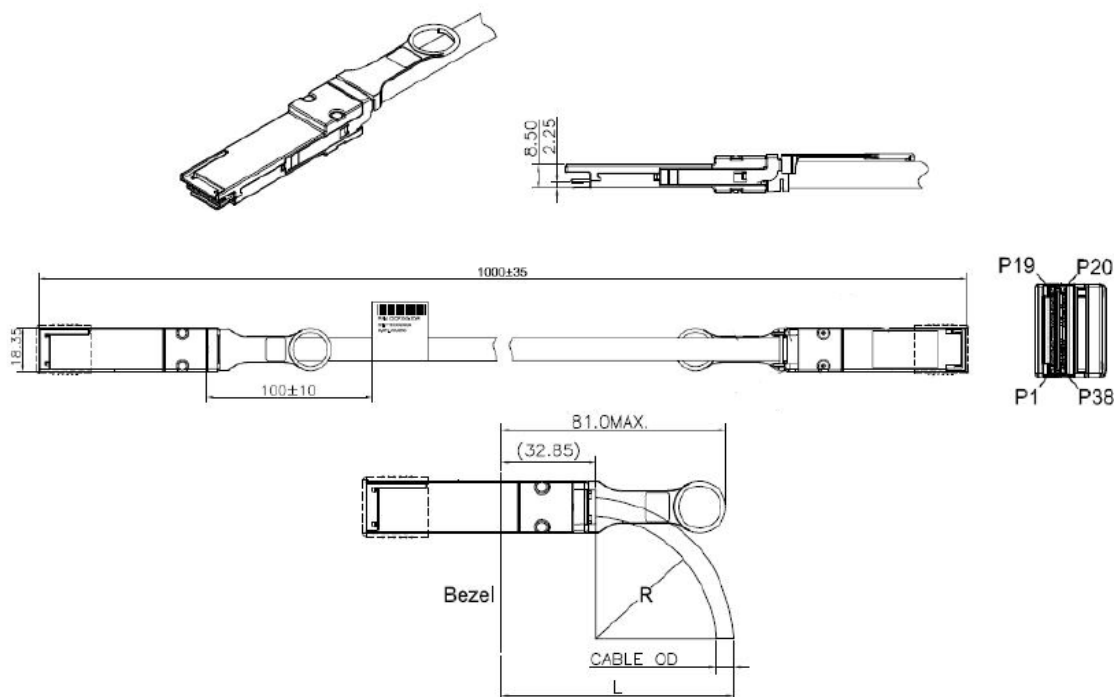
● Channel insertion loss budget



NOTE—The connector insertion loss is 1.07 dB for the mated test fixture. The host connector is allocated 0.62 dB of additional margin.

35dB Channel insertion loss budget at 12.8906 GHz

● Mechanical Dimensions:



Cable Gauge	Cable“OD”	Min, bend Radius“R”	Min, bend Space“L”
30 AWG	6.6mm	33mm	72.45MM
28 AWG	7.4mm	37mm	77.25MM
26/25 AWG	8.4mm	42mm	83.25MM
24 AWG	9.8mm	49mm	91.65MM

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