

# 100Gbps QSFP28 Passive Copper Cable

## QSFP28-DAC

### Features

- 4-channel full-duplex passive copper cable
- Data rate up to 100Gbps (4x 25Gbps)
- SFF-8665 compliant QSFP28 connectors
- SFF-8636 compliant I2C management interface
- IEEE 802.3bj 100GBASE-CR4 compliant
- Copper link length up to 5m (passive limiting)
- Hot Pluggable
- Low power consumption
- Excellent signal integrity, low insertion loss and low crosstalk
- Operating case temperature range: 0°C to +70°C
- Single 3.3V supply voltage
- RoHS compliant

### Applications

- 100G Ethernet 100GBASE-CR4
- InfiniBand 4x EDR
- SAS, servers, hubs, switches and routers
- Data Center

### Description

The 100G QSFP28 passive cable assembly products, based on 4 x25G or 4 x28G structure, the product can well satisfy the next generation 100G switches, servers, routers and other products of application requirements. QSFP28 cable adopts optimized design to reduce crosstalk and insertion loss, excellent signal integrity, fully conforms to the next generation 100G Ethernet and Infiniband EDR standards.



CE FC RoHS

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Storage Ambient Temperature		-40		+85	°C
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	VCC3	3.14	3.3	3.47	V
Data Rate Per Lane		1		25.78	Gb/s

## High Speed Characteristics

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

## Channel insertion loss budget

## Pin Descriptions

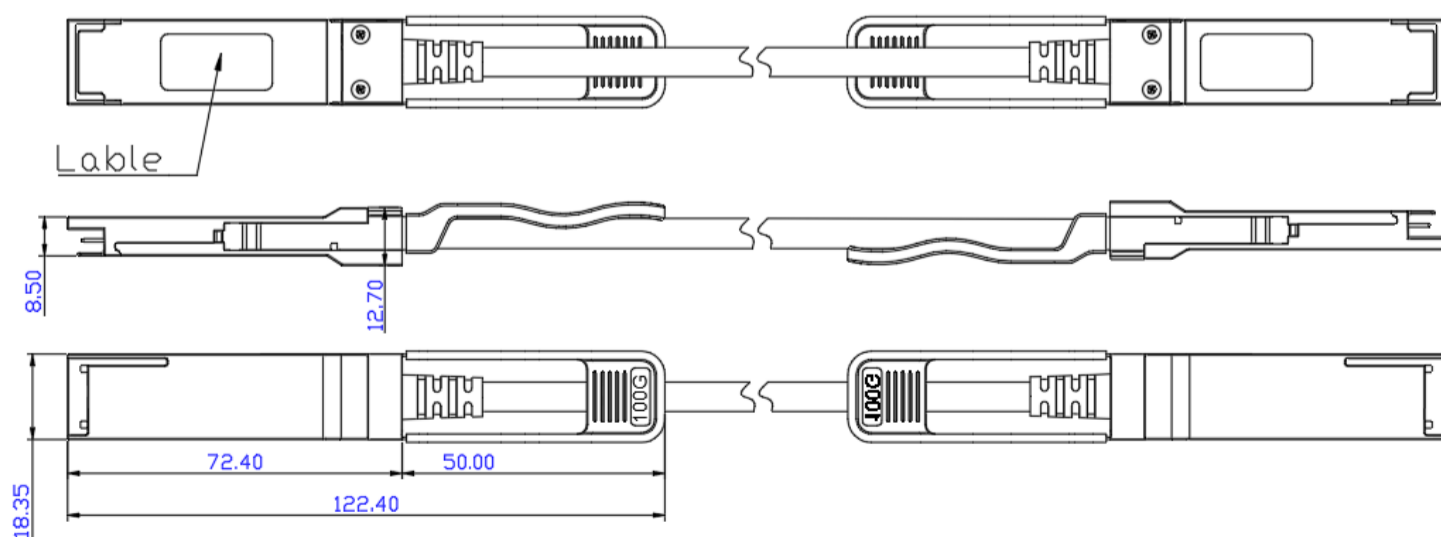
Pin	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVC MOSI/O	SCL	2-wire serial interface clock	
12	LVC MOSI/O	SDA	2-wire serial interface data	
13		GND	Ground	1
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	
28	LVTTL-O	IntL	Interrupt	
29		Vcc Tx	+3.3V Power supply transmitter	2
30		Vcc1	+3.3V Power supply	2
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	

**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 host board 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 in any combination. The connector pins are each rated for a maximum current of 500mA.

## Mechanical Dimensions



## Ordering information

Part Number	Product Description
OPT-QSFP28-DAC-30-P1	QSFP28 Direct Attach Passive Cable (100G QSFP28 - Cu), 1m, AWG:30, 0°C ~ +70°C
OPT-QSFP28-DAC-30-P2	QSFP28 Direct Attach Passive Cable (100G QSFP28 - Cu), 2m, AWG:30, 0°C ~ +70°C
OPT-QSFP28-DAC-30-P3	QSFP28 Direct Attach Passive Cable (100G QSFP28 - Cu), 3m, AWG:30, 0°C ~ +70°C
OPT-QSFP28-DAC-24-P5	QSFP28 Direct Attach Passive Cable (100G QSFP28 - Cu), 5m, AWG:24, 0°C ~ +70°C

Note: You can be customized diameter and distance.

## Important Notice

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