100G QSFP28 to 4*SFP28 Passive Direct Copper Cables

1. Applications

- 100/25 Gigabit Ethernet
- Switches, Routers, and HBAs
- Data Center Network



2. Features

- Supporting 100 Gbps to 4 x 25 Gbps
- Support data rates: 25.78Gb/s (per channel)
- IEEE 802.3bj 100GEBASE-CR4 and P802.3by compliant
- Compatible to SFP28 MSA and QSFP28 MSA
- Compatible to SFF-8402, SFF-8432 and SFF8665
- Maximum aggregate data rate: 100 Gb/s (4 x25Gb/s)
- High-Density QSFP28 38-PIN and 4x SFP28 20-PIN Connector
- Temperature Range: 0~ 70 °C
- Copper link length up to 2m
- 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
- Belden brand cable: AWG30#, AWG26#

3. Description

100G QSFP28 Passive Copper Cables assemblies are high performance， cost effective for SFP28 and QSFP28 equipment interconnects . The Hybrid cables are compliant with SFF-8402 and SFF-8665 specifications. It is offer a low power consumption， short reach interconnect applications. The cable each lane is capable of transmitting data at rates up to 25Gb/s, providing an aggregated rate of 100Gb/s.

4. Standard

- IEEE 802.3bj
- InfiniBand EDR
- QSFP28 MSA
- ROHS Compliant

5. Performance Specifications

5.1. Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Table.1 Absolute maximum ratings

Parameter	Symbol	Min	Max	Unit
Maximum Supply Voltage	Vcc	0	3.6	V
Storage Temperature	Ts	-40	85	°C
Relative Humidity	RH	5	95	%

5.2. Recommended Operating Conditions

Table.2 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard Tc	0	25	70	°C
Storage Temperature	Ts	-40		85	°C
Relative Humidity	RH	5		95	%
Data Rate				25.78	Gbps
Power Dissipation	PD			0.02	W

5.3. Product Characteristics

Table.3 Product Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
Differential Impedance	Rin,p-p	90	100	110	Ω	
Insertion loss	SDD21	8		22.48	dB	At 12.8906 GHz
Differential Return Loss	SDD11 SDD22	12.45		See1	dB	At 0.05 to 4.1 GHz
		3.12		See2	dB	At 4.1 to 19 GHz
Common-mode to common-mode output return loss	SDD11 SDD22	2			dB	At 0.2 to 19 GHz
Differential to common-mode return loss	SDD11 SDD22	12		See3	dB	At 0.01 to 12.89 GHz
		10.58		See4		At 12.89 to 19 GHz
Differential to common-mode Conversion Loss	SCD21-IL	10			dB	At 0.01 to 12.89 GHz
				See5		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(dB) < 16.5-2*SQRT(f),with f in GHz

2.Reflection Coefficient given by equation SDD11(dB) < 10.66-14*log10(f/5.5),with f in GHz

3.Reflection Coefficient given by equation SDD11(dB) < 22-(20/25.78)*f, with f in GHz

4.Reflection Coefficient given by equation SDD11(dB) < 15-(6/25.78)*f, with f in GHz

5.Reflection Coefficient given by equation SDD21(dB) < 27-(29/22)*f, with f in GHz

5.4. Pin Definitions

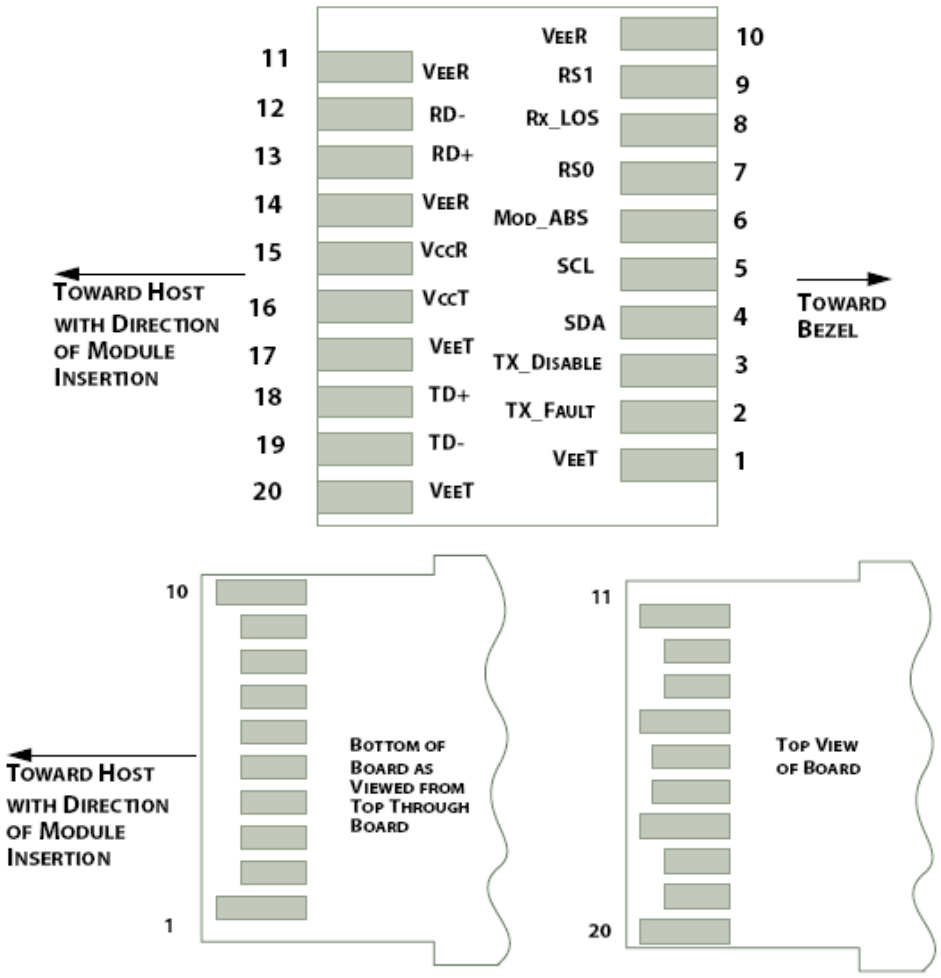
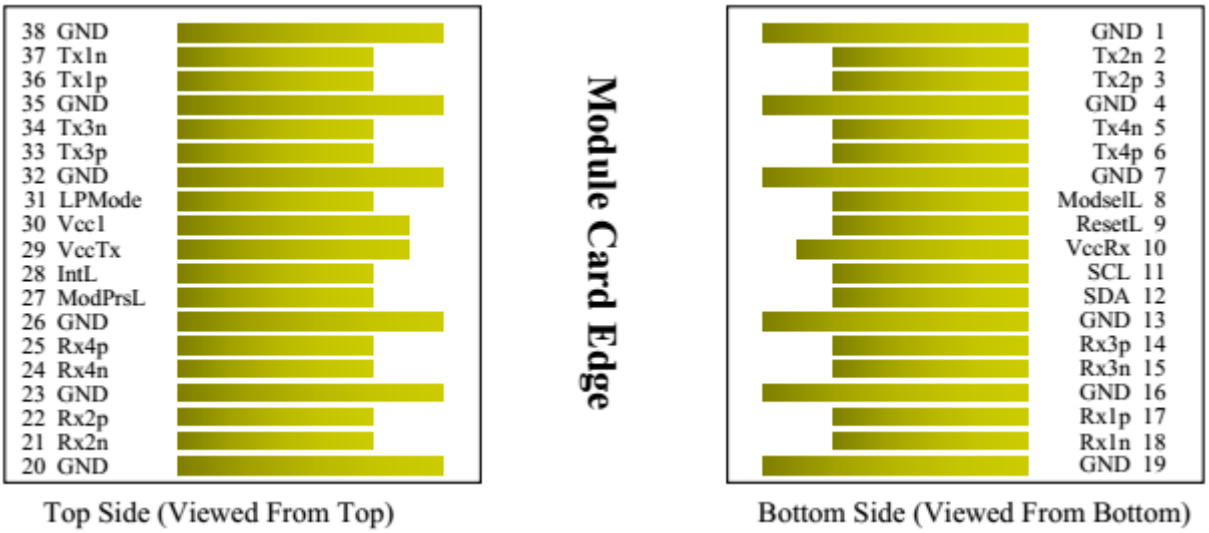


Table.4 SFP28 Pin Definitions

PIN	Symbol	Description	Remarks
1	$V_{EE}T$	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
2	Tx_Fault	Transmitter Fault. Not supported	
3	Tx_Disable	Transmitter Disable. Laser output disable on high or open	Disabled: TDIS>2V or open Enabled: TDIS<0.8V
4	SDA	2-wire Serial Interface Data Line	Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and
5	SCL	2-wire Serial Interface Clock Line	

6	M_{OD}_ABS	Module Absent. Grounded within the module.	3.6V
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	LOS is open collector output
9	RS1	No connection required	
10	V_{EE}R	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
11	V_{EE}R	Receiver ground (common with transmitter ground)	
12	RD–	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V_{EE}R	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
15	V_{CC}R	Receiver power supply	
16	V_{CC}T	Transmitter power supply	
17	V_{EE}T	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD–	Transmitter Inverted DATA in. AC coupled	
20	V_{EE}T	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground



Top Side (Viewed From Top)

Bottom Side (Viewed From Bottom)

Table.5 QSFP28 Pin Definitions

Pin number	Logic	Symbol	Signal	Description
1		GND	Signal Ground	Ground
2	CML-I	Tx2n	Tx2n	Transmitter Inverted Date Input.AC coupled
3	CML-I	Tx2p	Tx2p	Transmitter Non_Inverted Date Input.AC coupled
4		GND	Signal Ground	Ground
5	CML-I	Tx4n	Tx4n	Transmitter Inverted Date Input.AC coupled
6	CML-I	Tx4p	Tx4p	Transmitter Non_Inverted Date Input.AC coupled
7		GND	Signal Ground	Ground
8	LVTTL-I	ModSelL	ModSelL	Module Select pin.Selected when held low by the host.
9	LVTTL-I	ResetL	LPMode_Reset	Module Reset.A"low" pulse induces a reset on the module.
10		Vcc Rx	Vcc Rx	+3.3V Power Supply Receiver
11	LVCMOS-I/O	SCL	SCL	2-wire serial interface
12	LVCMOS-I/O	SDA	SDA	
13		GND	Signal Ground	Ground
14	CML-O	Rx3p	Rx3p	Receiver Non_Inverted Date Input.AC coupled
15	CML-O	Rx3n	Rx3n	Receiver Inverted Date Input.AC coupled
16		GND	Signal Ground	Ground
17	CML-O	Rx1p	Rx1p	Receiver Non_Inverted Date Input.AC coupled
18	CML-O	Rx1n	Rx1n	Receiver Inverted Date Input.AC coupled
19		GND	Signal Ground	Ground
20		GND	Signal Ground	Ground
21	CML-O	Rx2n	Rx2n	Receiver Inverted Date Input.AC coupled
22	CML-O	Rx2p	Rx2p	Receiver Non_Inverted Date Input.AC coupled
23		GND	Signal Ground	Ground
24	CML-O	Rx4n	Rx4n	Receiver Inverted Date Input.AC coupled
25	CML-O	Rx4p	Rx4p	Receiver Non_Inverted Date Input.AC coupled
26		GND	Signal Ground	Ground
27	LVTTL-O	ModPrsL	ModPrsL	Module Present pin.Internally grounded inside the module.
28	LVTTL-O	IntL	IntL	Interrupt by the QSFP module."Low" indicates an Alarm/Warning.
29		Vcc Tx	Vcc Tx	+3.3V Power Supply Transmitter
30		Vccl	Vccl	+3.3V Power Supply
31	LVTTL-I	LPMode	LPMode	Low Power Mode
32		GND	Signal Ground	Ground
33	CML-I	Tx3p	Tx3p	Transmitter Non_Inverted Date Input.AC coupled
34	CML-I	Tx3n	Tx3n	Transmitter Inverted Date Input.AC coupled
35		GND	Signal Ground	Ground
36	CML-I	Tx1p	Tx1p	Transmitter Non_Inverted Date Input.AC coupled
37	CML-I	Tx1n	Tx1n	Transmitter Inverted Date Input.AC coupled
38		GND	Signal Ground	Ground
Housing			Chassis Ground	

5.5. Mechanical Dimensions

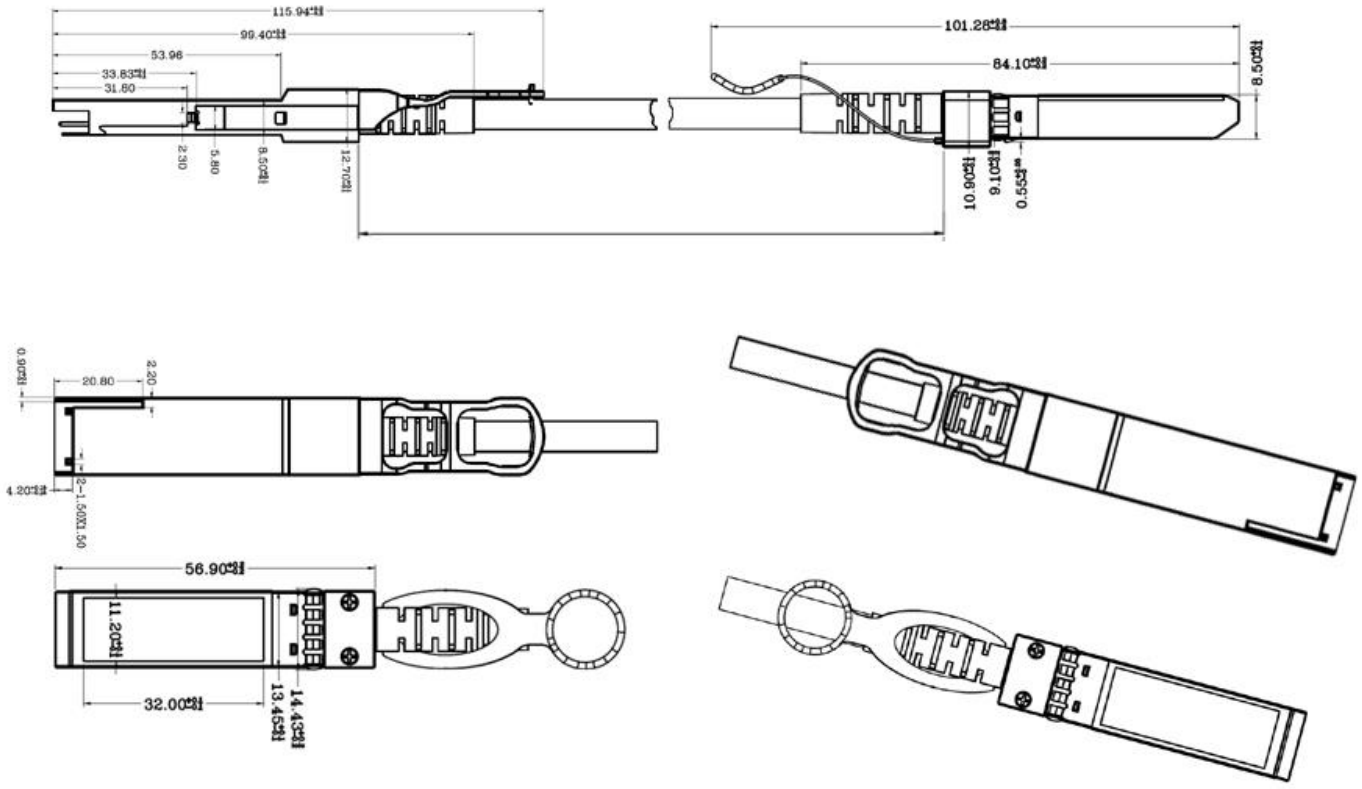


Diagram of Mechanical Dimensions

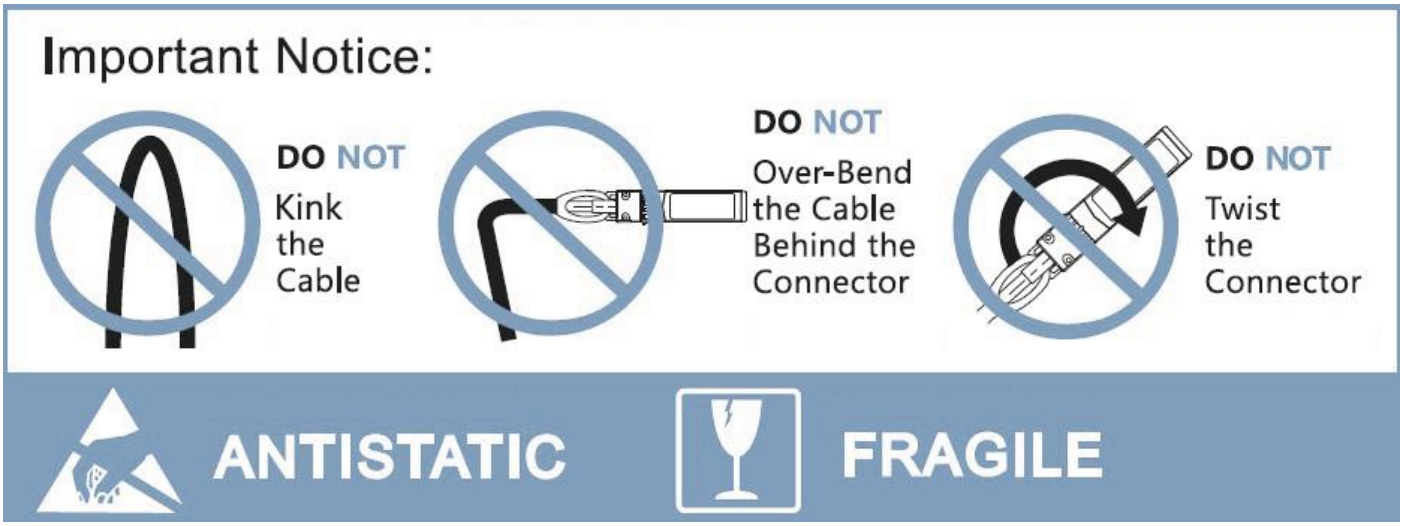
6. Application Cautions

6.1. ESD

This transceiver is specified as ESD threshold 1kV for high speed pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the

handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

6.2. Important Notice



Note:

1) Copper type maximum length recommended at 2 meters;
2) Various cable lengths available for all types;
3) Latch /tab available on “top” or “bottom” position.