



QSFP28 Passive Copper Cable Assembly

QSFP28-100G-CUXM

Features

- Compliant with SFF-8665
- Compliant with IEEE 802.3bj
- Up to 100Gb/s data rates
- Ultra low crosstalk for improved performance
- Low insertion loss
- BER better than 10^{-12}
- Tested in an end-to-end system
- Compliant with RoHS

Applications

- Low EMI radiation Switches, servers and routers
- Data Center networks
- Storage area networks
- High performance computing
- Telecommunication and wireless infrastructure
- Medical diagnostics and networking
- Test and measurement equipment

Product Description

QSFP28-100G-CUXM passive copper cables provide robust connections for leading edge 100Gb/s systems. Passive copper cables require no additional power to ensure quality connectivity.

The 100Gb/s passive copper cables are fully compliant with SFF-8436 specification and provide connectivity between devices using QSFP28 ports. QSFP28-100G-CUXM 100Gb/s passive copper cables fill the need for short, cost-effective connectivity in the data center.

JSTT's high-quality solutions provide a power-efficient replacement for active power connectivity such as fiber optic cables for short distances. Optimizing systems to operate with QSFP28-100G-CUXM 100Gb/s passive copper cables significantly reduces power consumption and EMI emission.



Recommended Operation Condition

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Topc	-40	85	degC
Storage Temperature	Tst	-40	125	degC
Relative Humidity (non-condensation)	RS	-	85	%
Supply Voltage	VCC3	3.135	3.465	V
Voltage on LVTTTL Input	Vilvttl	-0.3	VCC3 +0.2	V
Power Supply Current	ICC3	0.001	-	mA
Total Power Consumption	Pd	-	0.03	W

Notes:

Stress or conditions exceed the above range may cause permanent damage to the device.

This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not applied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Frequency Domain

Item	Test Parameter	IEEE802.3bj Specification
1	Differential Insertion Loss (SDD21)	Maximum insertion loss at 12.8906Ghz -22.48dB Minimum insertion loss at 12.8906Ghz -8dB
2	Differential Insertion Loss (SDD21)	Maximum insertion loss at 12.8906Ghz -22.48dB Minimum insertion loss at 12.8906Ghz -8dB
3	Differential Return Loss (SDD22)	-16.5+2xSQRT(f) @ 0.01 to 4.1GHz -10.66+14xLog10(f/5.5) @4.1 to 19GHz
4	Differential Return Loss (SDD11)	-16.5+2xSQRT(f) @ 0.01 to 4.1GHz -10.66+14xLog10(f/5.5) @4.1 to 19GHz
5	Common Mode Reflection (SCC22)	-2dB @ 0.01 to 19GHz
6	Common Mode Reflection (SCC11)	-2dB @ 0.01 to 19GHz
7	Common Mode Conversion (SCD22)	-22+(20/25.78)*(f) @ 0.01 to 12.89GHz -15+(6/25.78)*(f) @ 12.9 to 19GHz
8	Common Mode Conversion (SCD11)	-22+(20/25.78)*(f) @ 0.01 to 12.89GHz -15+(6/25.78)*(f) @ 12.9 to 19GHz
9	Differential to Common Mode Conversion Loss (SCD12)	-10dB @ 0.01 to 12.89GHz -27+(29/22)*(f) @ 12.9 to 15.7GHz -6.3dB @ 15.71 to 19GHz
10	Differential to Common Mode Conversion Loss (SCD21)	-10dB @ 0.01 to 12.89GHz -27+(29/22)*(f) @ 12.9 to 15.7GHz -6.3dB @ 15.71 to 19GHz



Time Domain

Item	Test Parameter	Specification (Proposal)
1	Intra-Skew* 1M 1.5M~2M 2.5M~3M 4~5M	20ps Max 25ps Max 30ps Max 35ps Max 40ps Max
2	Impedance Rise time: 14ps (20%~80%)	100 +/- 10 Ohm
3	Insertion Loss* (SDD21) for 1M	a) 0.6GHz : -2.11 dB Max b) 1.25GHz : -2.88 dB Max c) 2.50GHz : -3.78 dB Max d) 3.25GHz : -4.95 dB Max e) 5.0GHz : -5.82 dB Max
	Insertion Loss* (SDD21) for 1.5M	a) 0.6GHz : -2.13 dB Max b) 1.25GHz : -3.24 dB Max c) 2.50GHz : -4.44 dB Max d) 3.25GHz : -5.99 dB Max e) 5.0GHz : -6.90 dB Max
	Insertion Loss* (SDD21) for 2M	a) 0.6GHz : -2.32 dB Max b) 1.25GHz : -3.76 dB Max c) 2.50GHz : -5.26 dB Max d) 3.25GHz : -7.20dB Max e) 5.0GHz : -8.14 dB Max
	Insertion Loss* (SDD21) for 2.5M	a) 0.6GHz : -2.58 dB Max b) 1.25GHz : -3.74 dB Max c) 2.50GHz : -5.27 dB Max d) 3.25GHz : -6.15dB Max e) 5.0GHz : -8.38 dB Max
	Insertion Loss* (SDD21) for 3M	a) 0.6GHz : -2.86 dB Max b) 1.25GHz : -4.24 dB Max c) 2.50GHz : -6.02 dB Max d) 3.25GHz : -6.99 dB Max e) 5.0GHz : -9.5 dB Max
	Insertion Loss* (SDD21) for 4M	a) 0.6GHz : -3.49 dB Max b) 1.25GHz : -5.29 dB Max c) 2.50GHz : -7.56 dB Max d) 3.25GHz : -8.87 dB Max e) 5.0GHz : -11.81 dB Max
	Insertion Loss* (SDD21) for 5M	a) 0.6GHz : -4.15 dB Max b) 1.25GHz : -6.37 dB Max c) 2.50GHz : -9.14 dB Max d) 3.25GHz : -10.5 dB Max e) 5.0GHz : -14.5 dB Max

* Notes:

The item 1and 3, Different diameter and length requirements, Different specification

Host board Connector Pinout

Figure 1: MSA compliant Connector

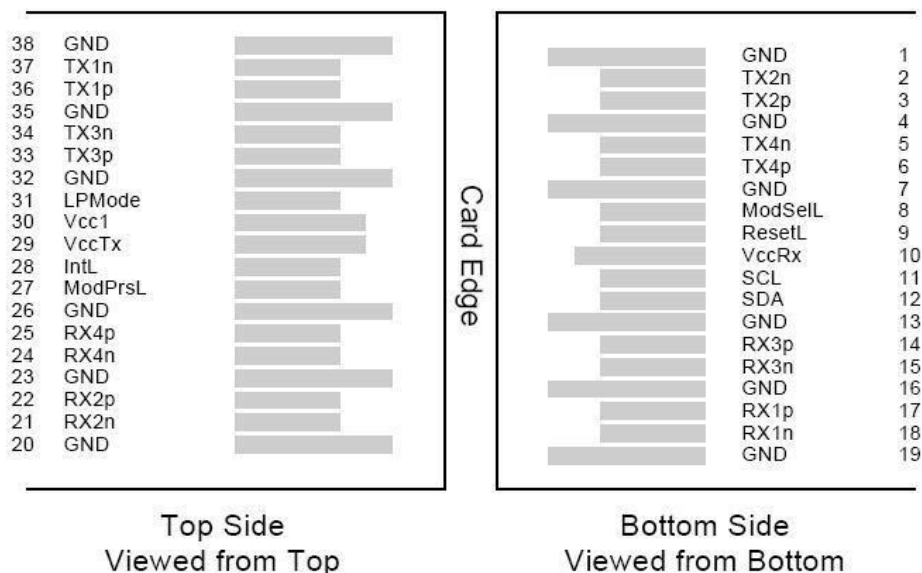


Figure 2: Pin Definitions.

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



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		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V 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 Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
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 otherwise noted. Connect these directly to the host board signal common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx 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.

2-wire Management Interface

The transceivers provide management two-wire interface and the management memory map is specified by SFF-8436.

EEPROM Map

Device 0xA0			
Address (Dec)	Value (Hex)	Name of Field (as per SFF-8436)	Description of data code
0	11	ID and status	11h= QSFP28
1-2	01 02	Status	01h 02h=Digital state of the IntL Interrupt output pin
3-21	00	Interrupt Flags	00h = not specified
22-33	00	Module Monitors	00h = not specified
34-81	00	Channel Monitors	00h = not specified
82-85	00	Reserved	00h = not specified
86-97	00	Control	00h = not specified
98-99	00	Reserved	00h = not specified
100-106	00	Module and Channel Mask	00h = not specified
107-118	00	Reserved	00h = not specified
119-122	00	Password Change Entry	00h = not specified



		Area (Optional)	
123-126	00	Password Entry Area (Optional)	00h = not specified
127	00	Page Select Byte	00h = not specified
128	11	Identifier	11h= QSFP28
129	00	Ext. Identifier	00h = Power Class 1, No CLEI, No CDR
130	21	Connector	21h = Copper pigtail
131	80	Transceiver Reserved	80h=Reserved
132	00		00h = not specified
133	00		00h = not specified
134	00		00h = not specified
135	00		00h = not specified
136	00		00h = not specified
137	00		00h = not specified
138	00		00h = not specified
139	00	Encoding	00h = not specified
140	FF	Nominal bit rate (unit: 100M bps)	FFh= 25500MBs
141	00	Reserved	00h = not specified
142	00	Length(SMF)	00h = not specified
143	00	Length (E-50µm)	00h = not specified
144	00	Length (50 µm)	00h = not specified
145	00	Length (62.5 µm)	00h = not specified
146	01	Cable Length(Copper)	Copper Length 1M
147	A0	Device Tech	A0h = Copper Unequalized
148-163	31 30 47 74 65 6B 20...	Vendor name	OEM
164	1F	Extended Transceiver Codes	1F =EDR/QDR/DDR/SDR Support
165	00	Vendor OUI[0]	OUI Code
166	00	Vendor OUI[1]	
167	00	Vendor OUI[2]	
168	43	Vendor PN	QSFP28-100G-CUXM
169	41		
170	42		
171	2D		
172	5A		
173	51		
174	50		
175	2F		
176	5A		
177	51		
178	50		
179	2D		
180	50		
181	31		
182	4D		
183	20		
184-185	30 31	Vendor Rev	30h 31h=01
186-187	00	Wavelength or Copper cable	00h = not specified
188-189	00	Attenuation	00h = not specified



190	46	Max Case Temperature	46h= 70°C
191	Check Sum	Check Code for Base ID Fields	Fill in Check Sum
192	0B	Link Codes	0Bh = 100GBASE-CR4
193 -195	00	Options	00h = not specified
196-211	51 31 37 30 31 30 30 30 31 30 30 30 31	Vendor SN	Q17010001001
212-219	31 37 30 31 30 31	Date Code	170101
220	00	Diagnostic Monitoring Type	00h = not specified
221	00	Enhanced Options	00h = not specified
222	00	BR, Nominal	00h = not specified
223	Check Sum	Check code for Extended ID fields	Fill in Check Sum
224-255	00	Vendor Specific ID Fields	00h = not specified

Mechanical Specifications

Mechanical				
Parameter	Minimum	Typical	Maximum	Unit
Cable Diameter (26AWG)		0.385		Inches
Bend Radius (26AWG)	1.925			Inches
Cable Diameter (28AWG)		0.329		Inches
Bend Radius (28AWG)	1.649			Inches
Cable Diameter (30 AWG)		0.271		Inches
Bend Radius (30 AWG)	1.355			Inches
Within Pair Skew			100	ps/10m
Cable Insertion Loss		29.77		dB/5m
Bulk Cable Time Delay			5.2	ns/m
Bulk Cable Impedance	95	100	105	Ohms
Insertion Force	/		40	N
Withdrawal Force	/		30	N
Retention Force	90		/	N
Durability	50 Cycles		/	/

Mechanical Dimensions (Type A for 30/28AWG, Type B for 26AWG)

