

ESDPX-330CNxx

10G SFP+ to 10G SFP+ Direct Attach Passive Copper Cables

Features

- Support for multi-gigabit data rates up to 10Gb/s
- Data rates backward compatible to 1Gb/s
- Hot-pluggable SFP 20PIN footprint
- Improved Pluggable Form Factor (IPF) compliant for enhanced EMI/EMC performance
- Low Power Consumption < 0.2W
- Power Supply : +3.3V
- Compatible to SFP+ MSA
- Compatible to SFF-8431, SFF8432
- Temperature Range: 0~ 70 °C
- RoHS Compatible

Applications

- High Passive I/O in Storage Area Networks, Network Attached Storage, and Storage Servers
- Switched fabric I/O such as ultra high bandwidth switches and routers
- Data center cabling infrastructure
- High density connections between networking equipment

Description

The SFP+ Passive cable assemblies are high performance, cost effective I/O solutions for 10Gb Ethernet and 10G Fiber Channel applications. SFP+ copper modules allow hardware manufactures to achieve high port density, configurability and utilization at a very low cost and reduced power budget. The high speed cable assemblies meet and exceed Gigabit Ethernet and Fiber Channel industry standard requirements for performance and reliability.

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
Power Dissipation	PD			0.2	W

Systems

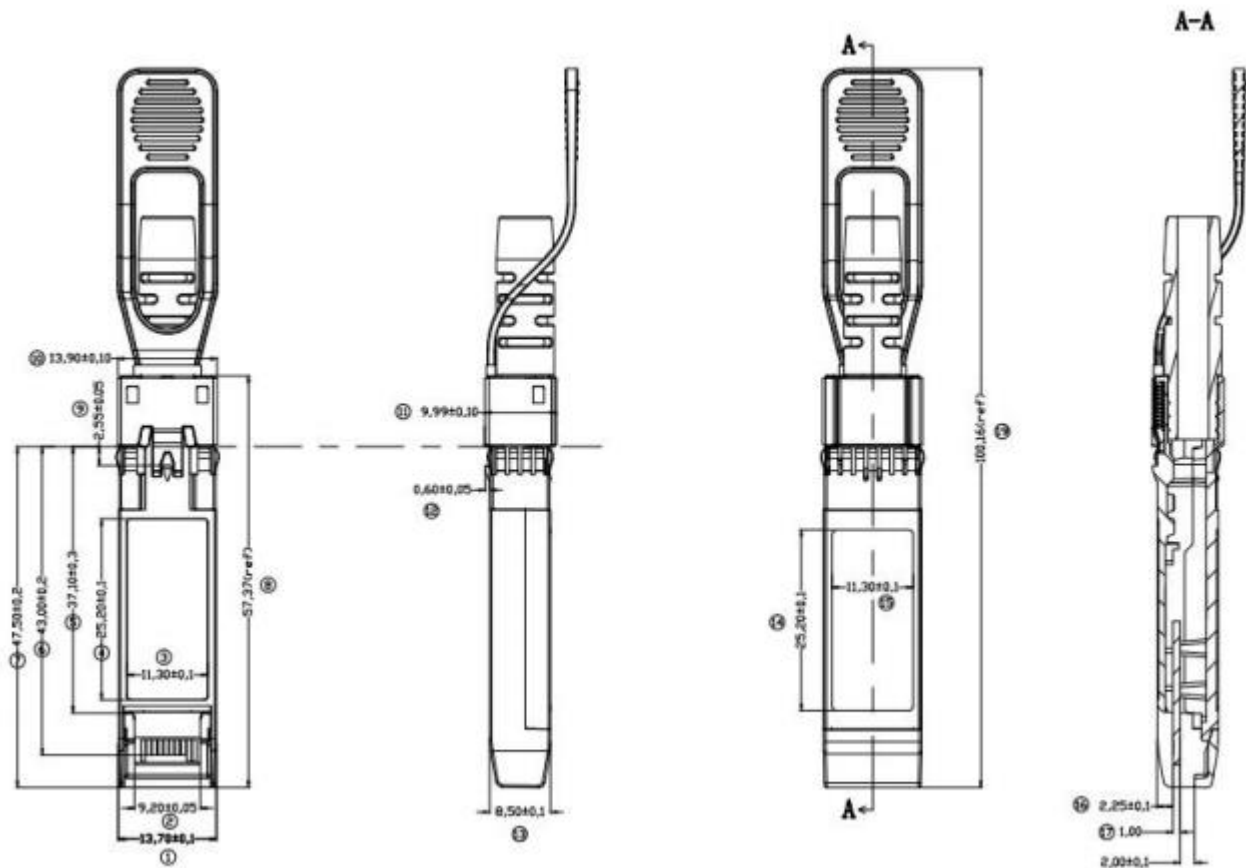
Performance	Media	Operating parameters
10.5Gbps line speed, full duplex Bit error rate: better than 10E-12	Hot-pluggable, industry-standard Small Form-Factor Pluggable (SFP+) copper cable, available as 1m,3m or 5m.	Supply voltage: 3.3V Power consumption(per end): max 0.2W

Pin Descriptions

Pin	Logic	Symbol	Name/Description	Notes
1		VeeT	Transmitter Ground	
2	LV-TTL-O	TX_Fault	N/A	1
3	LV-TTL-I	TX_DIS	Transmitter Disable	2
4	LV-TTL-I/O	SDA	Tow Wire Serial Data	
5	LV-TTL-I	SCL	Tow Wire Serial Clock	
6		MOD_DEF0	Module present, connect to VeeT	
7	LV-TTL-I	RS0	N/A	1
8	LV-TTL-O	LOS	LOS of Signal	2
9	LV-TTL-I	RS1	N/A	1
10		VeeR	Reciever Ground	
11		VeeR	Reciever Ground	
12	CML-O	RD-	Reciever Data Inverted	
13	CML-O	RD+	Reciever Data Non-Inverted	
14		VeeR	Reciever Ground	
15		VccR	Reciever Supply 3.3V	
16		VccT	Transmitter Supply 3.3V	
17		VeeT	Transmitter Ground	
18	CML-I	TD+	Transmitter Data Non-Inverted	
19	CML_I	TD-	Transmitter Data Inverted	
20		VeeT	Transmitter Ground	

- 1) Signals not supported in SFP+ Copper pulled-down to VeeT with 30K ohms resistor
- 2) Passive cable assemblies do not support LOS and TX_DIS

Mechanical Dimensions



Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by company before they become applicable to any particular order or contract. In accordance with company policy of continuous improvement specifications may change without notice. The publication of information in this data sheet does not imply freedom from patent or other protective rights of company or others. Further details are available from any company sales representative.

Ordering information

Part Number	ESDPX-330CNxx														
Length (meter)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wire gauge (AWG)	30	30	30	24	24	24	24	24	24	24	24	24	24	24	24

Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

25G SFP28 Direct Attach Cable (DAC)



General Description

SFP28 Direct Attach Cables are compliant with SFF-8432 and SFF-8402 specifications. Various choices of wire gauge are available from 30 to 26 AWG with various choices of cable length (up to 5m).

Features

- □ Up to 25.78125 Gbps data rate
- □ Up to 5 meter transmission
- □ Hot-pluggable SFP 20PIN footprint
- □ Improved Pluggable Form Factor(IPF)
compliant for enhanced EMI/EMC
performance
- □ Compatible to SFP28 MSA
- □ Compatible to SFF-8402 and SFF-8432
- □ Temperature Range: 0~ 70 °C
- □ RoHS Compatible

Benefits

- Cost-effective copper solution
- Lowest total system power solution
- Lowest total system EMI solution
- Optimized design for Signal Integrity

Applications

- 25G Ethernet

Product Description

- The SFP28 passive cable assemblies are high performance, cost effective I/O solutions for 25G Ethernet. SFP28 copper cables allow hardware manufactures to achieve high port density, configurability and utilization at a very low cost and reduced power budget

High Speed Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
Differential Impedance	TDR	90	100	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 SCC22			-2	dB	At 0.2 to 19 GHz
Differential to common-mode return loss	SCD11 SCD22			See 3	dB	At 0.01 to 12.89 GHz
				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

Notes:

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

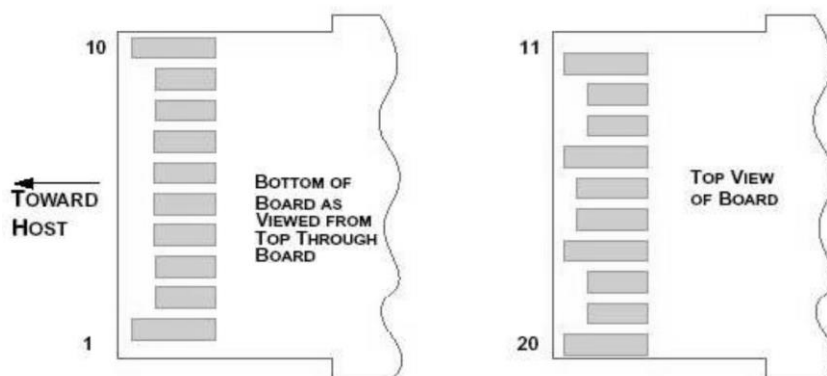
Pin Descriptions

SFP28 Pin Function Definition

Pin	Logic	Symbol	Name/Description	Notes
1		VeeT	Transmitter Ground	
2	LV-TTL-O	TX_Fault	N/A	1
3	LV-TTL-I	TX_DIS	Transmitter Disable	2
4	LV-TTL-I/O	SDA	Tow Wire Serial Data	
5	LV-TTL-I	SCL	Tow Wire Serial Clock	
6		MOD_DEF0	Module present, connect to VeeT	
7	LV-TTL-I	RS0	N/A	1
8	LV-TTL-O	LOS	LOS of Signal	2
9	LV-TTL-I	RS1	N/A	1
10		VeeR	Reciever Ground	
11		VeeR	Reciever Ground	
12	CML-O	RD-	Reciever Data Inverted	
13	CML-O	RD+	Reciever Data Non-Inverted	
14		VeeR	Reciever Ground	
15		VccR	Reciever Supply 3.3V	
16		VccT	Transmitter Supply 3.3V	
17		VeeT	Transmitter Ground	
18	CML-I	TD+	Transmitter Data Non-Inverted	
19	CML_I	TD-	Transmitter Data Inverted	
20		VeeT	Transmitter Ground	

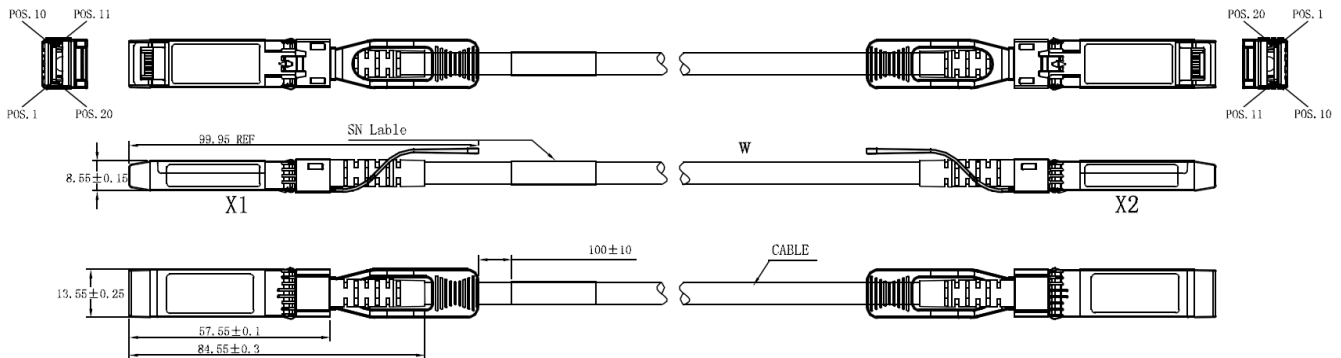
1. Signals not supported in SFP+ Copper pulled-downto VeeT with 30K ohms resistor

2. Passive cable assemblies do not support LOS and TX_DIS



Mechanical Specifications

The connector is compatible with the SFF-8432 specification.



Length (m)	Cable AWG
1	30
2	30
3	30/26
4	26
5	26

Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.7	Class 1(>2000 Volts)
Electromagnetic Interference(EMI)	FCC Class B	Compliant with Standards
	CENELEC EN55022 Class B	
	CISPR22 ITE Class B	
RF Immunity(RFI)	IEC61000-4-3	Typically Show no Measurable Effect from a 10V/m Field Swept from 80 to 1000MHz
RoHS Compliance	RoHS Directive 2011/65/EU and it's Amendment Directives (EU) 2015/863	RoHS (EU) 2015/863 compliant
REACH Compliance	REACH Regulation (EC) No 1907/2006	REACH (EC) No 1907/2006 compliant

40G QSFP+ Direct Attach Passive Copper Cables

1、Description

40G QSFP+ direct attach passive cable uses shielded high-speed differential cable, whichIt conforms to 40g Ethernet ieee802.3ba standard and sff-8436 qsfp+ standard, supports 40g transmission rate, and is also downward compatible with low rate applications. Qsfp+ passive cable is the preferred solution for 40g rate short distance application, which is widely used in data transmission between data center and cabinet or between adjacent cabinets. Its biggest characteristics are low cost, ultra-low power consumption (less than 0.1W) and high reliability.

2、Features

- Maximum aggregate data rate: 40 Gb/s (4 x 10Gb/s)
- Support for multi-gigabit data rates :1 Gb/s - 10 Gb/s (per channel)
- QSFP+ conforms to the Small Form Factor SFF-8436
- 4-Channel Full-Duplex Passive Copper Cable
- Copper link length up to 5m (passive limiting)
- High-Density QSFP 38-PIN Connector
- Compatible to IEEE 802.3ba and SFF-8436
- Compatible to QSFP+ MSA
- Power Supply :+3.3V
- Low power consumption: 0.02 W (typ.)
- I2C based two-wire serial interface for EEPROM
- signature which can be customized
- Temperature Range: 0~ 70 °C
- Comply with RoHS 6.0

3、Applications

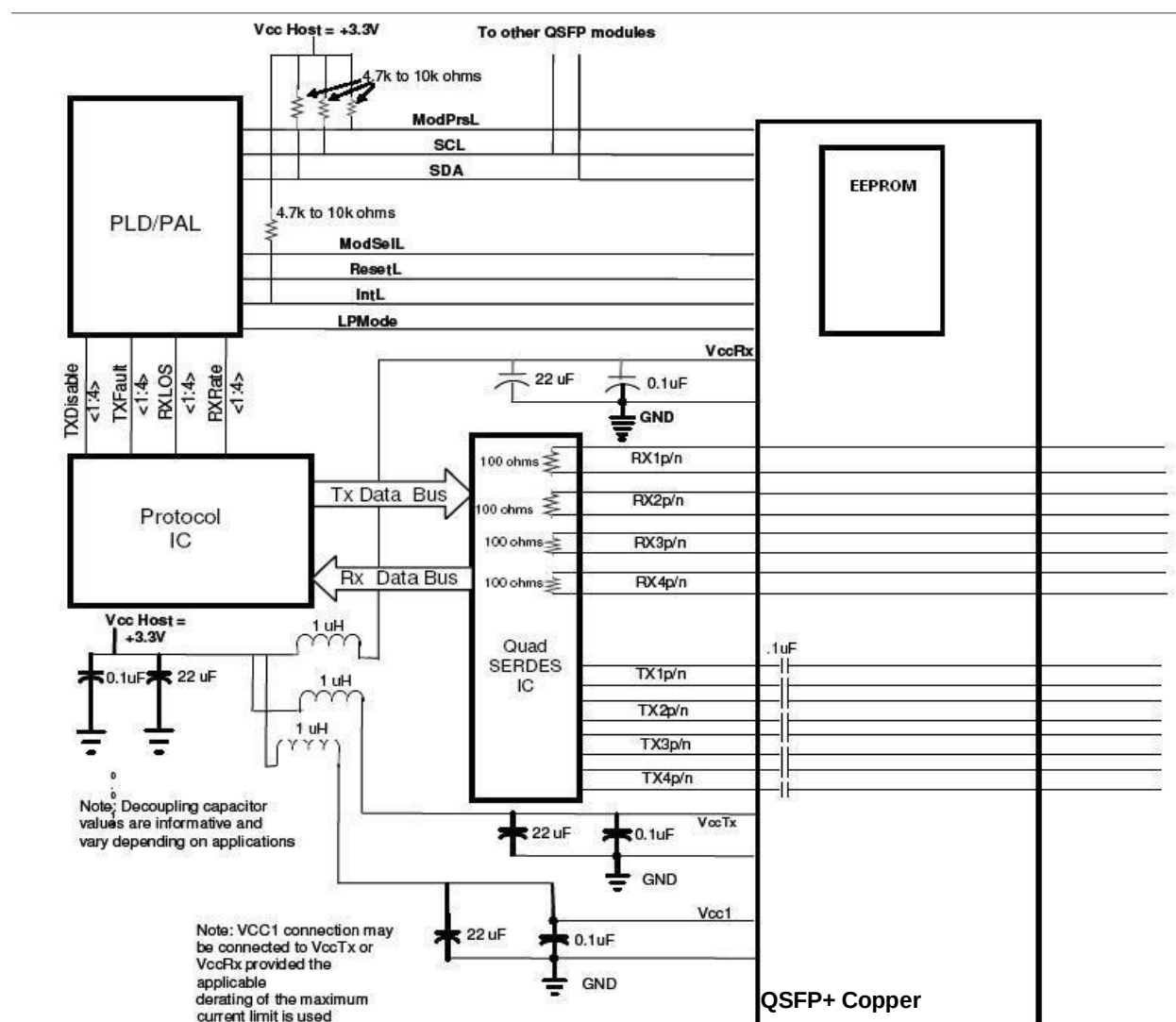
- 10G/40G Ethernet
- InfiniBand 4x SDR/DDR/QDR
- 2/4/8/10G Fibre Channel
- Fibre Channel over Ethernet
- SAS, Servers, Hubs, Switches, and Routers

4、Recommended Operating Conditions

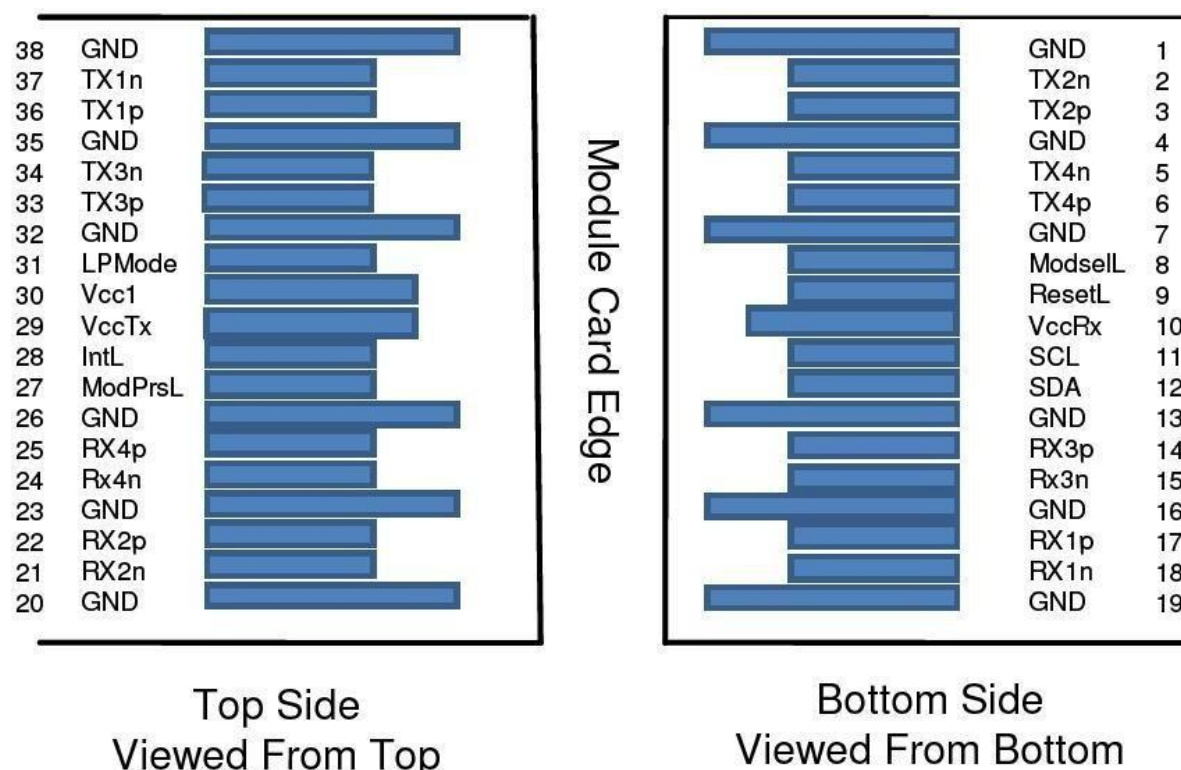
Parameter	Symbol	Min	Typical	Max	Unit
Storage Ambient Temperature		-40		+85	°C

Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	VCC3	3.14	3.3	3.47	V
Power consumption	PD			0.2	W
Data Rate Per Lane		1		41.2	Gb/s

5、QSFP+ Host Board Schematic for passive copper cables



6、Pin Descriptions



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URL : www.pdrworld.com E-mail : info@pdrworld.com, CIN No. U32108MH1974PTC017589

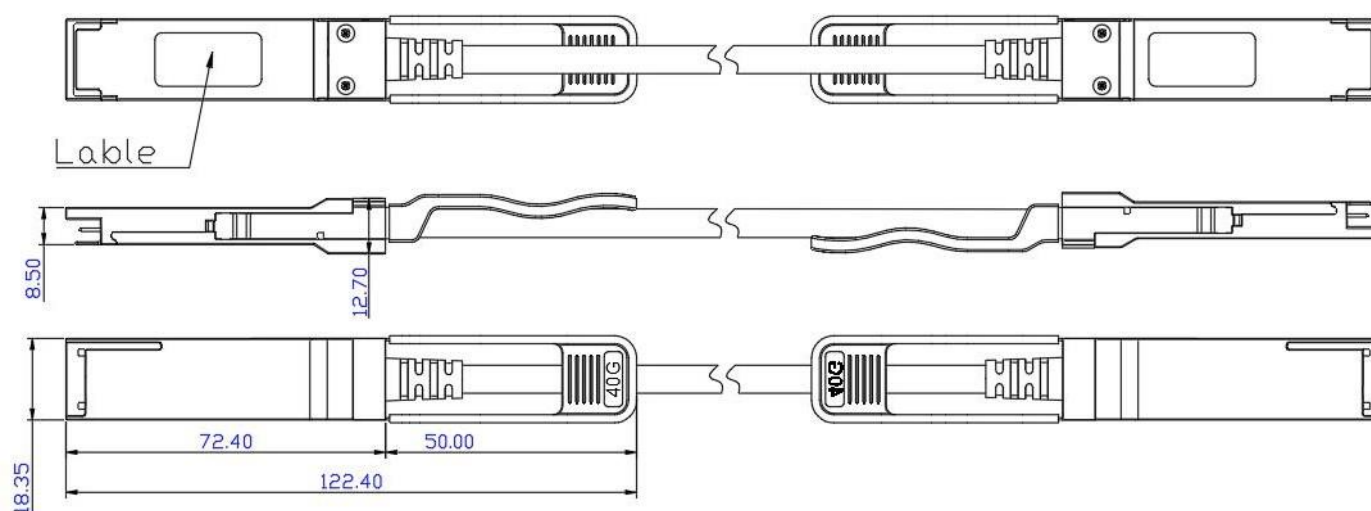
Pin	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module 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	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Input	
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 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 module in any combination. The connector pins are each rated for a maximum current of 500mA.

7、Mechanical Dimensions



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 URL : www.pdrworld.com E-mail : info@pdrworld.com, CIN No. U32108MH1974PTC017589

8、Ordering information

Part Number	Product Description
1M	40G QSFP+ Direct Attach Passive Cable (10GSFP+Cu), 1m, AWG:30 , 0°C ~ +70°C
2M	40G QSFP+ Direct Attach Passive Cable (10GSFP+Cu), 2m, AWG:30 , 0°C ~ +70°C
3M	40G QSFP+ Direct Attach Passive Cable (10GSFP+Cu), 3m, AWG:24 , 0°C ~ +70°C
5M	40G QSFP+ Direct Attach Passive Cable (10GSFP+Cu), 5m, AWG:24, 0°C ~ +70°C
7M	40G QSFP+ Direct Attach Passive Cable (10GSFP+Cu), 7m, AWG:24, 0°C ~ +70°C

Note: You can be customized diameter and distance.

100G QSFP28 Direct Attach Cable - MCU(DAC)

General Description

QSFP28 passive copper cable assembly feature eight differential copper pairs, providing four data transmission channels at speeds up to 28Gbps per channel, and meets 100G Ethernet, 25G Ethernet and InfiniBand Enhanced Data Rate (EDR) requirements. Available in a broad range of wire gauges—from 26AWG through 30AWG—this 100G copper cable assembly features low insertion loss and low cross talk.

Designed for applications in the data center, networking and telecommunications markets that require a high speed, reliable cable assembly, this next generation product shares the same mating interface with QSFP+ form factor, making it backward compatible with existing QSFP ports. QSFP28 can be used with current 10G and 14G applications with substantial signal integrity margin.

Features and Benefits

- ☐ Compatible with IEEE 802.3bj and InfiniBand EDR
- In accordance with the paging function in the protocol SFF-8636, paging can be selected 00H or 02H in 127 bytes
- Supports aggregate data rates of 100Gbps
- ☐ Optimized construction to minimize insertion loss and cross talk
- ☐ Backward compatible with existing QSFP+ connectors and cages
- ☐ Pull-to-release slide latch design
- ☐ 26AWG through 30AWG cable
- ☐ Straight and break out assembly configurations available
- Customized cable braid termination limits EMI radiation
- Customizable EEPROM mapping for cable signature
- RoHS compliant

Product Applications

- 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

Industry Standards

- 100G Ethernet(IEEE 802.3bj)
- InfiniBand EDR
- SFF-8665 QSFP+ 28G 4X Pluggable Transceiver Solution(QSFP28)

Technical Documents

- 108-32081 QSFP28 Copper Module Direct Attach Cable Assembly

High Speed Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
Differential Impedance	TDR	90	100	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 SCC22			-2	dB	At 0.2 to 19 GHz
Differential to common-mode return loss	SCD11 SCD22			See 3	dB	At 0.01 to 12.89 GHz
				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

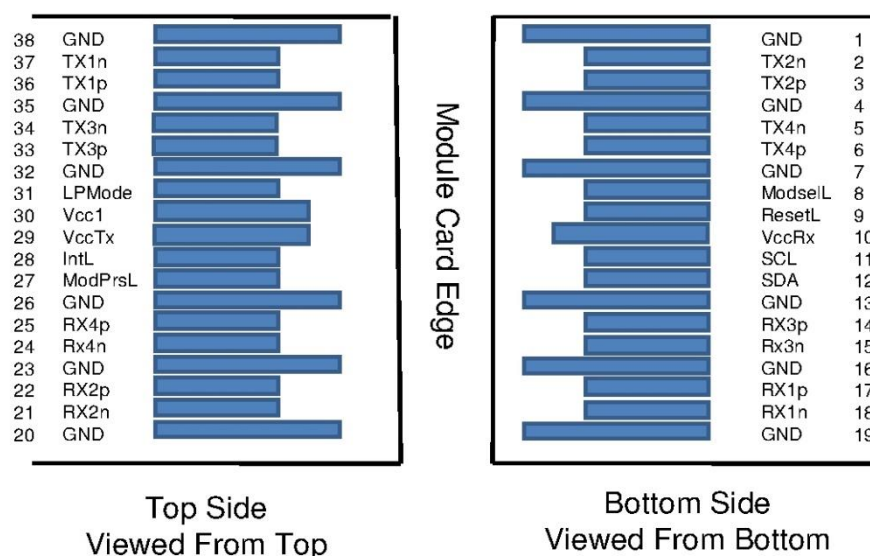
Notes:

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

Pin Descriptions

QSFP28 Pin Function Definition

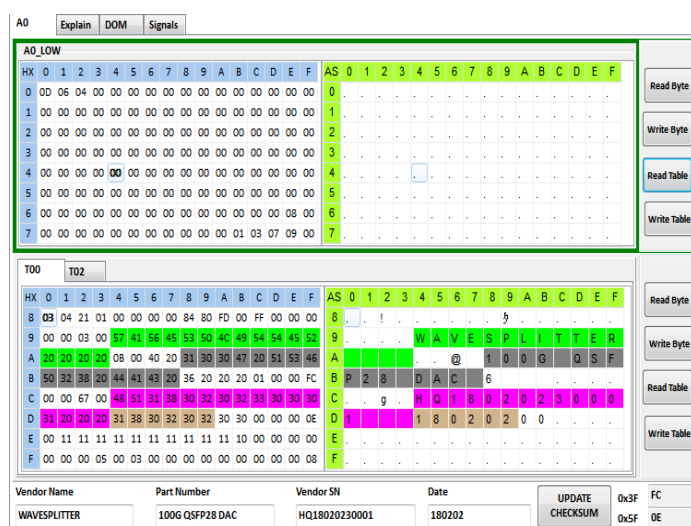
Pin	Logic	Symbol	Description
1		GND	Ground
2	CML-I	Tx2n	Transmitter Inverted Data Input
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input
4		GND	Ground
5	CML-I	Tx4n	Transmitter Inverted Data Input
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input
7		GND	Ground
8	LVTTL-I	ModSelL	Module Select
9	LVTTL-I	ResetL	Module Reset
10		Vcc Rx	+3.3V Power Supply Receiver
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
17	CML-O	Rx1p	Receiver Non-Inverted Data Output
18	CML-O	Rx1n	Receiver Inverted Data Output



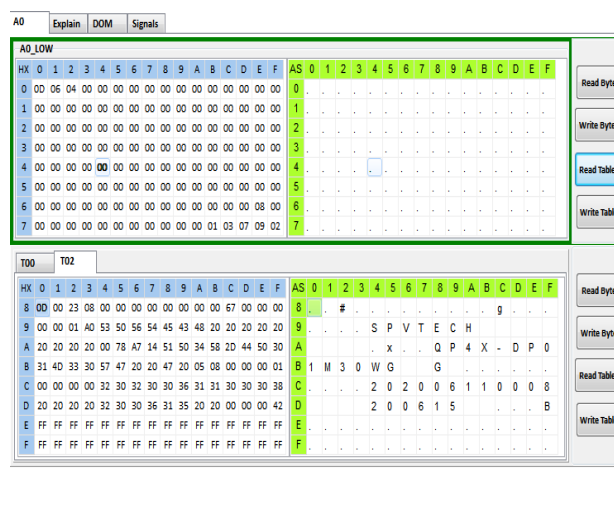
19		GND	Ground
20		GND	Ground
21	CML-O	Rx2n	Receiver Inverted Data Output
22	CML-O	Rx2p	Receiver Non-Inverted Data Output
23		GND	Ground
24	CML-O	Rx4n	Receiver Inverted Data Output
25	CML-O	Rx4p	Receiver Non-Inverted Data Output
26		GND	Ground
27	LVTTL-O	ModPrsL	Module Present
28	LVTTL-O	IntL	Interrupt
29		Vcc Tx	+3.3V Power supply transmitter
30		Vcc1	+3.3V Power supply
31	LVTTL-I	LPMode	Low Power Mode
32		GND	Ground
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input
34	CML-I	Tx3n	Transmitter Inverted Data Input
35		GND	Ground
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input
37	CML-I	Tx1n	Transmitter Inverted Data Input
38		GND	Ground

Functions realized by MCU

The paging storage function is realized through the MCU. According to the specification of the SFF-8636 protocol, the paging selection function is 127 bytes, and the selectable pages are 00H and 02H. As shown below:



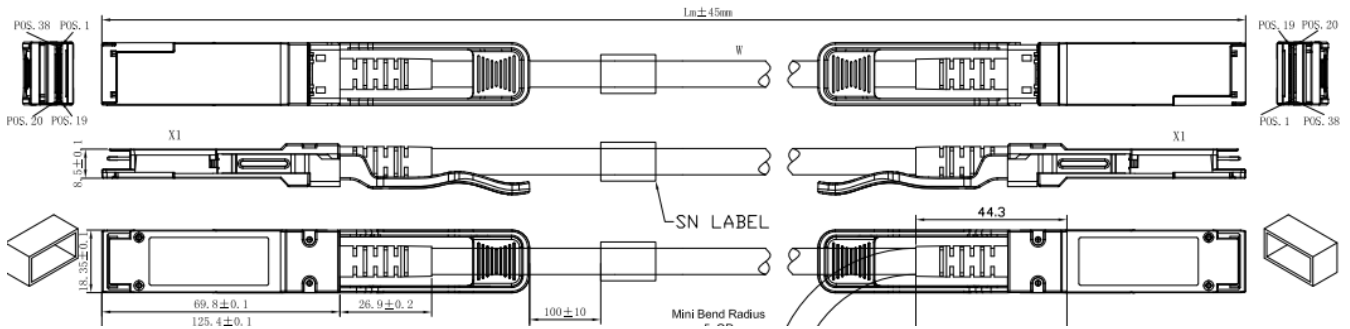
00H



02H

Mechanical Specifications

The connector is compatible with the SFF-8436 specification.



Length (m)	Cable AWG
1	30
2	30
3	26/30
4	26
5	26

Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.7	Class 1(>2000 Volts)
Electromagnetic Interference(EMI)	FCC Class B	Compliant with Standards
	CENELEC EN55022 Class B	
	CISPR22 ITE Class B	
RF Immunity(RFI)	IEC61000-4-3	Typically Show no Measurable Effect from a 10V/m Field Swept from 80 to 1000MHz
RoHS Compliance	RoHS Directive 2011/65/EU and it's Amendment Directives (EU) 2015/863	RoHS (EU) 2015/863 compliant
REACH Compliance	REACH Regulation (EC) No 1907/2006	REACH (EC) No 1907/2006 compliant