

10G SFP+ Passive Copper Twinax Cable (PCC)



- 1/2/4/8G Fibre Channel
- 1x InfiniBand QDR, DDR, SDR
- 10G Gigabit Ethernet & 10 GbE high performance computer clusters
- Switched fabric I/O such as ultra-high bandwidth switches and routers
- High-density connections between networking equipment
- End of row/Middle of row switching architectures
- Data center cabling infrastructure
- Storage Area Networks (SAN) & Storage Servers

The SFP+ SFPP-AT-DAC-2M passive cable assemblies are high performance, cost effective I/O solutions for 10G 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.

These assemblies are called "passive" copper cables because there isn't any signal conditioning circuitry (e.g. crosstalk or echo cancellation) contained within the SFP+ connector. Sometimes these assemblies are referred to as "DAC" or "Direct Attached Copper" cables. Inside the SFP+ MSA footprint optical cables can be used that require optical transceivers or Active Optical Cables (AOC) that contain the transceiver as part of the cable.

Key Features

- Support for multi-gigabit data rates up
- to 10.5 Gbps
- 850nm VCSEL transmitter, PIN photo- detector receiver, up to 300m on OM3 MMF
- Wire AWG: AWG30, AWG28, AWG26, AWG24
- Cable type: Passive Copper Twinax Cable
- Available length (in meters): 0.5, 1, 1.5, 2.....
- Improved Pluggable Form Factor (IPF) compliant for enhanced EMI/EMC performance
- Commercial temperature range (COM): 0 ~ 70 °C
- Low power consumption < 0.5W
- Power supply: +3.3V
- Small diameter cable design
- Compatible to SFP+ MSA
- Electrical interface compliant to SFF- 8431

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0	25	70	°C
Relative Humidity	RH	5		95	%
Supply Voltage		3.15	3.3	3.45	V
Data Rate Per Lane		1	10.5		Gbp/s

Performance Specifications

Electrical

Min. Dielectric Withstand Voltage	300 V DC
Insulation Resistance	1000 MΩ
Current Rating	0.5 Amp Min/Signal Contact

General

Operating Temperature	0 to 70 °C
Flammability Rating	UL 94 V-0
Green Features	RoHS, Lead-Free
Shield	Braid/Foil

Marking	Mfg Name, Part#, Date Code
Plug	
Backshell Material	Nickel-Plated Zinc Diecast
Contact Material	PCB with Gold-Plated Pads
Latch	Positive Latching w/Pull
Insertion Force	30N Max
Withdrawal Force	20N Max
Retention Force	90N Max
Durability	50 Cycles Min
Cable	
Conductor	Solid
Wire Gauge	AWG30, AWG28, AWG26, AWG24
Impedance	100 ± 5 Ω
Cable OD	AWG 30: 4.2 mm AWG 28: 4.7 mm AWG 26: 5.2 mm AWG 24: 6.0 mm
Jacket Type	PVC
Bend Radius	5X Cable OD

Electrical Characteristics

Test Item	24AWG	26AWG	28AWG	30AWG
Electrical Characteristics				
Differential Impedance	100±5Ω @ TDR	100±5Ω	100±5Ω	100±5Ω @ TDR
Mutual Capacitance	14pF/ft nominal	14pF/ft nominal	14pF/ft nominal	14pF/ft nominal
Time Delay	1.31ns/ft nominal, (4.3ns/m) nominal	1.35ns/ft nominal	1.35ns/ft nominal	1.35ns/ft nominal, (4.3ns/m) nominal
Time Delay Skew (Within Pairs)	80ps/10m maximum	120ps/8.5m maximum	120ps/7m maximum	50ps/5.5m maximum
Time Delay Skew (Between Pairs)	350ps/10m maximum	500ps/8.5m maximum	500ps/7m maximum	350ps/5.5m maximum
Attenuation	10dB/10m maximum @ 1.25Ghz	10dB/8.5m maximum @ 1.25Ghz	10dB/7m maximum @ 1.25Ghz	8.4dB/5.5m maximum @ 1.25Ghz
Conductor DC Resistance	0.026Ω /ft maximum @ 20°C	0.04Ω /ft maximum @ 20°C	0.06Ω/ft maximum @20°C	0.01Ω/ft maximum @20°C
Physical Characteristics				
Conductors (Two Pairs)	24AWG Solid, Silver plated copper	26AWG Solid, Silver plated copper	28AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper
Insulation	Foam polyolefin	Foam polyolefin	Foam polyolefin	Foam polyolefin
Pair Drain Wire	26AWG Solid, Silver plated copper	28AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper
Overall Cable Shield	Aluminum/polyester tape, 125% coverage,	Aluminum/polyester tape, 125% coverage,	Aluminum/polyester tape, 125% coverage,	Aluminum/polyester tape, 125% coverage,

	tin plated copper braid, 38AWG, 85% coverage	tin plated copper braid, 38AWG, 85% coverage	tin plated copper braid, 38AWG, 85% coverage	tin plated copper braid, 38AWG, 85% coverage
Outer Diameter	6.0mm	5.2mm	4.7mm	4.2mm

Pin Designation

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	
4	LV-TTL-I/O	SDA	Tow Wire Serial Data 5 LV	
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	
9	LV-TTL-I	RS1	N/A	1
10		VeeR	Receiver Ground	
11		VeeR	Receiver Ground	
12	CML-O	RD-	Receiver Data Inverted	
13	CML-O	RD+	Receiver Data Non-Inverted	
14		VeeR	Receiver Ground	
15		VccR	Receiver 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	

Low Speed Electrical Hardware Pins

In addition to the 2-wire serial interface, the SFP+ module has the following low speed pins for control and status:

1) TX_Fault

TX_Fault is a module output pin that when High, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output pin is an open drain/collector and must be pulled up to the Host_Vcc with 4.7kΩ-10kΩ on the host board.

2) TX_Disable

TX_Disable is a module input pin. When TX_Disable is asserted High or Left open, the SFP+ module transmitter output must be turned off. The TX_DIS pin must be pulled up to VccT in the SFP+ module.

3) RS0/RS1

RS0 and RS1 are module input rate select pins and are pulled low to VeeT with a $> 30k\Omega$ resistor in the module. RS0 is an input hardware pin which optionally selects the optical receive data path rate coverage for an SFP+ module. RS1 is an input hardware pin which optionally selects the optical transmit path data rate coverage for an SFP+ module.

4) MOD_ABS

Mod_ABS is pulled up to Host_Vcc with $4.7k\Omega$ - $10k\Omega$ on the host board and connected to VeeT or VeeR in the SFP+ module. MOD_ABS is then asserted "High" when the SFP+ module is physically absent from a host slot. In the SFP MSA (INF8074i) this pin had the same function but is called MOD_DEFO.

5) SCL/SDA

SCL is the 2-wire interface clock and SDA is the 2-wire interface data line. SCL and SDA are pulled up to a voltage in the range of 3.14V to 3.46V on the host.

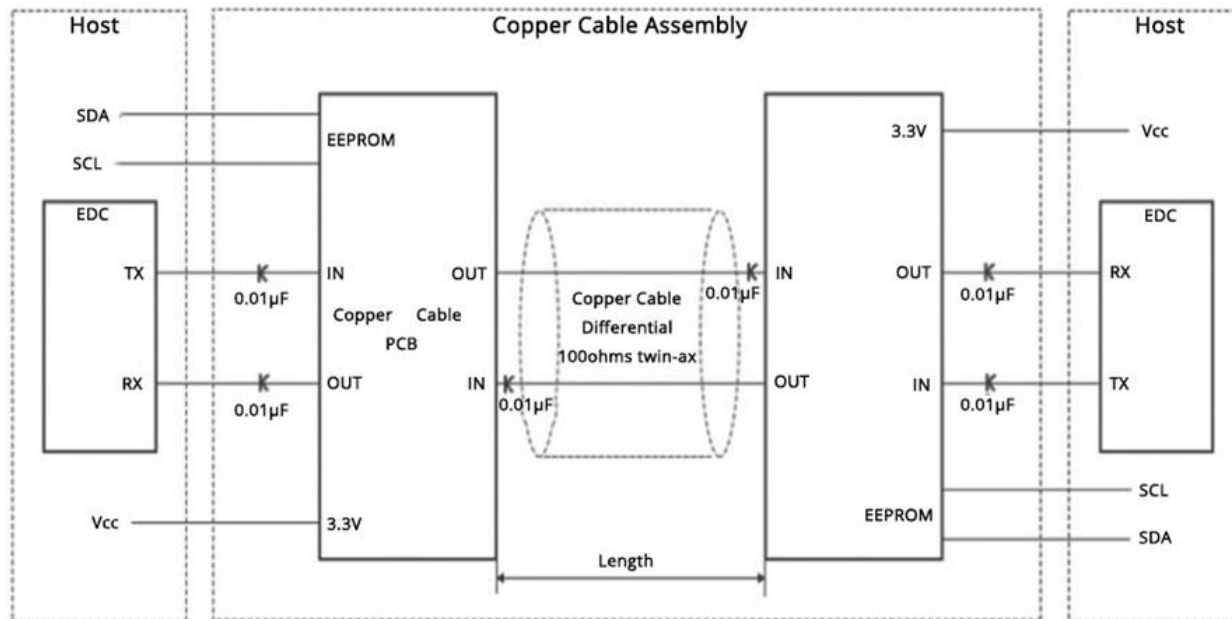
6) RX_LOS

RX_LOS when High indicated an optical signal level below that specified in the relevant standard. The RX_LOS pin is an open drain/collector output and must be pulled up to host Vcc with a $4.7k\Omega$ - $10k\Omega$ on the host board. RX_LOS assert min and de-assert max are defined in the relevant standard.

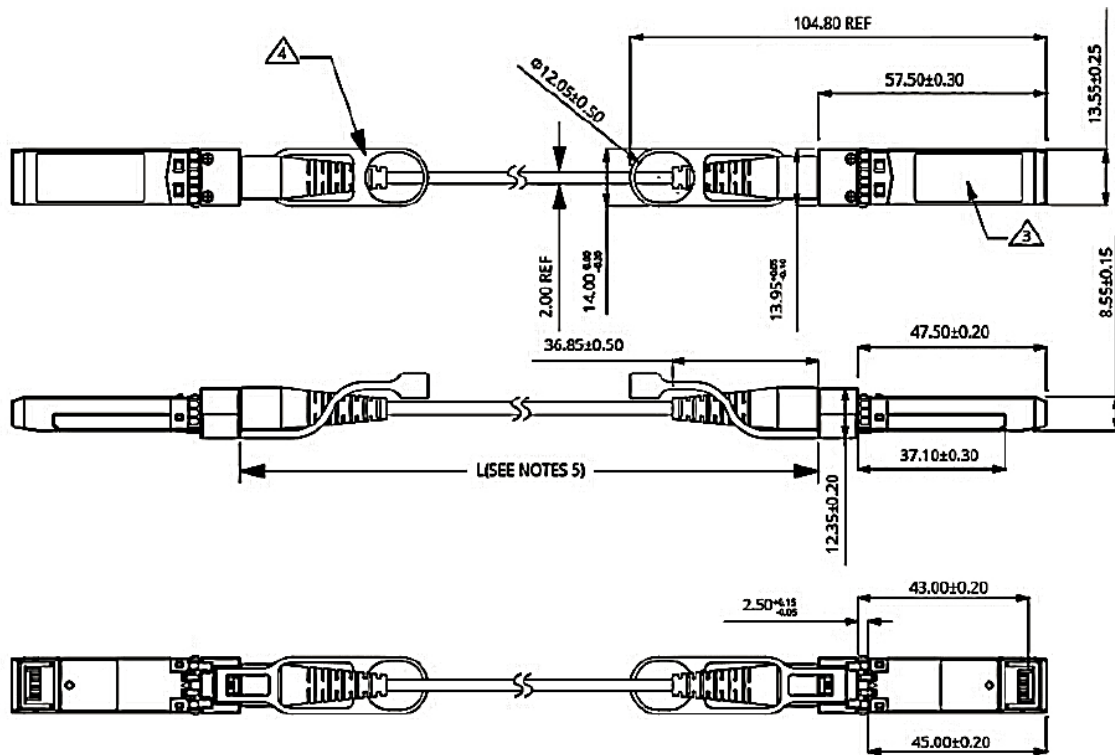
Electrical Design

The electrical design of the passive SFP+ direct attach copper cable assembly is fully compliant to the SFF-8431 SFP+ MSA. The electrical design incorporates a PCB and wire management design to minimize crosstalk, insertion loss, and return loss.

Reducing these frequency domain characteristics result in improved WDP measurements. Because of the common use of EDC(Electronic Dispersion Compensation) with passive SFP+ cable assemblies WDP measurements are a requirement instead of time domain measurements such as eye patterns.



Mechanical Dimensions



L	TOLERANCE
L ≤ 5M	±5CM
L > 5M	±1%

Notes:

1. Unit: mm
2. Tolerance: $\phi 0.1\text{mm}$ if not shown
3. Label specification
4. Latch color: black
5. Tolerance of cable length

Ordering Information

Model	Description
SFPP-AT-DAC-2M	SFP+ Plug-in, 10Gbps, Passive Direct Attach Copper Twinax Cable, 2m

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