Datasheet

10G SFP+ Passive Copper Cable (PCC)

ZeeVee Part #: Z4KSFP-DAC-0.5M
Z4KSFP-DAC-1.0M
Z4KSFP-DAC-2.0M
Z4KSFP-DAC-3.0M
Z4KSFP-DAC-6.0M

Features:

- Support for multi-gigabit data rates up to 10.5Gbps
- 850nm VCSEL transmitter, PIN photo-detector receiver
- Wire AWG: AWG30, AWG24
- Cable type: Passive Copper Twinax Cable
- Available length (in meters): 0.5, 1, 2, 3, 6
- 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

Description

The SFP+ 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 cast 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.

Product Specifications

I. Absolute Maximum Ratings

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

II. Performance Specification

Electrical	
Min. Dielectric Withstand Voltage	300 VDC
Insulation Resistance	1000 Mohms
Current Rating	0.5 Amp Min/Signal Contact

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

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, AWG24
Impedance	100 +/- 5 ohms
Cable OD	AWG30: 4.2mm
	AWG24: 6.0mm
Jacket Type	PVC
Bend Radius	5X Cable OD

III. Electrical Characteristics

Test Type	Test Item	24AWG	30AWG
Electrical Characteristics	Differential Impedance	100±5Ω @ TDR	100±5Ω @ TDR
	Mutual Capacitance	14pF/ft nominal	14pF/ft nominal
	Time Delay	1.31ns/ft nominal, (4.3ns/m) nominal	1.35ns/ft nominal (4.3ns/m) nominal
	Time Delay Skew (within pairs)	80ps/10m maximum	50ps/5.5m maximum
	Time Delay Skew (between pairs)	350ps/10m maximum	350ps/5.5m maximum
	Attenuation	10dB/10m maximum @ 1.25Ghz	8.4dB/5.5m maximum @ 1.25Ghz
	Conductor DC Resistance	0.026Ω /ft maximum @ 20°C	0.01Ω/ft maximum @ 20°C
Physical Characteristics	Conductors (two pair)	24AWG Solid, Silver plated copper	30AWG Solid, Silver plated copper
	Insulation	Foam polyolefin	Foam polyolefin
	Overall cable shield	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage
	Outer diameter	6.0mm	4.2mm

IV. Pin Designation

Pin	Logic	Symbol	Name/Description
1		VeeT	Transmitter Ground
2	LV-TTL-O	TX_Fault	N/A
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
8	LV-TTL-O	LOS	LOS of Signal
9	LV-TTL-I	RS1	N/A
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

V. 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 4.7k-10k ohms 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 > 30kΩ 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-10k ohms 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_DEF0.

(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.

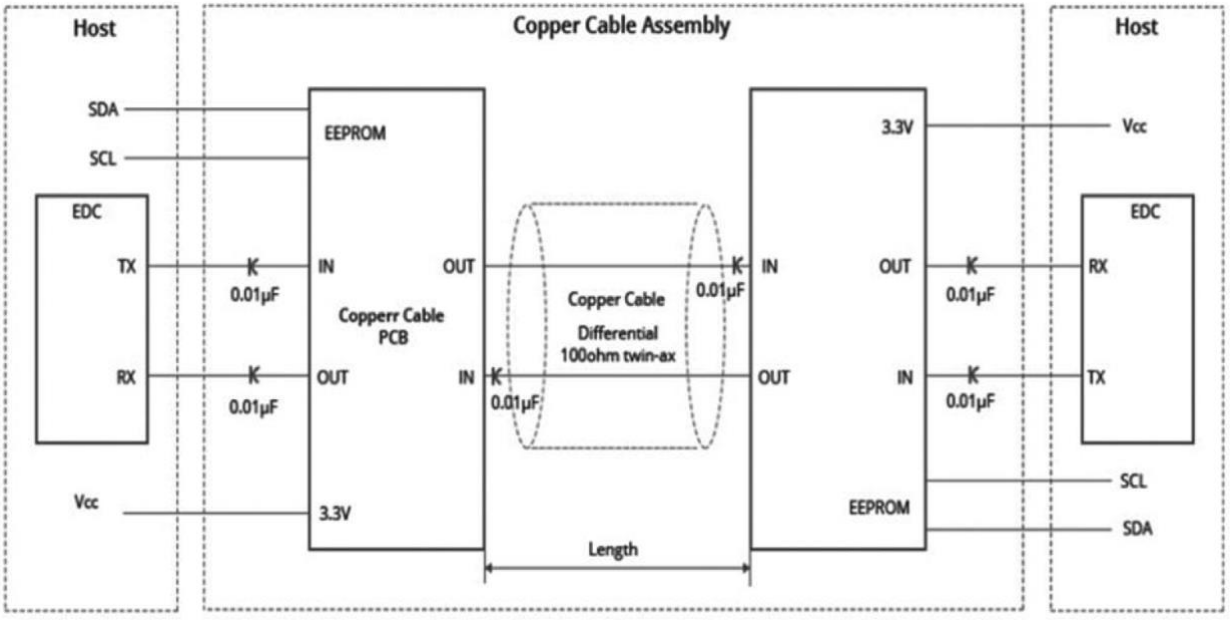
(6) RX_LOS

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-10k ohms on the host board. RX_LOS assert min and de-assert max are defined in the relevant standard.

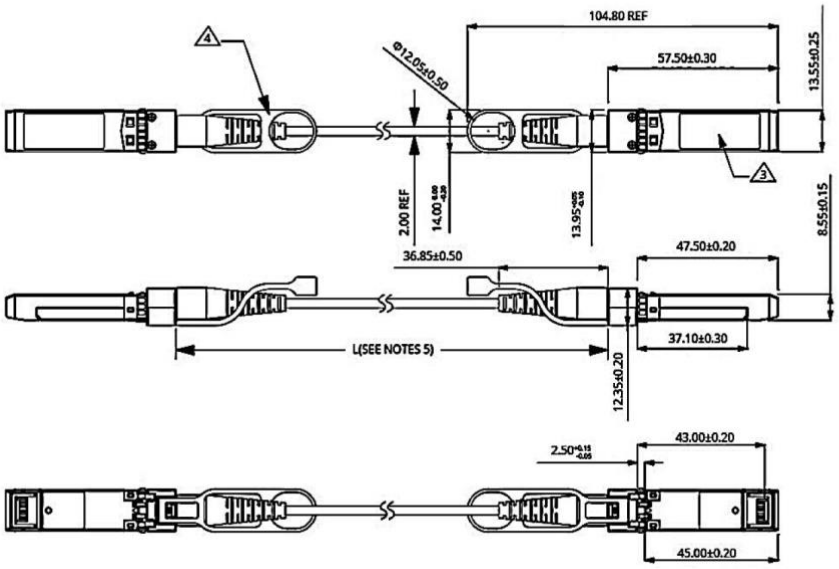
VI: Electrical Design

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.



VII: Mechanical Dimensions



Notes:

- Unit: mm
- Tolerance: φ0.1mm if not shown
- Label specification
- Latch color: black
- Tolerance of cable length

L	TOLERANCE
L ≤ 5M	±5CM
L > 5M	±1%

VIII: Installation Instructions

Caution:
Follow accepted ESD practices when handling SFP+ connectors to prevent damage to the internal components within the connector. ESD (electrostatic discharge) is the sudden flow of electricity between two objects at different voltage potentials caused by contact. The basis of any ESD protection strategy is to ground or bring all elements in the ESD protected area to the same potential. An ESD wrist strap should be used for everything in the ESD protected area including personnel, tools, cabinets and components.

Installing SFP+ Modules

Step 1: Remove the protective ESD cap from the connector

Step 2: Slide the SFP+ cable end into the slot until it locks into position
There is an audible click when the connector is properly seated

Caution:
The latching mechanism locks the SFP+ connector into place when cables are connected. Do not pull on the cable in an attempt to remove the SFP+ connector.

Removing SFP+ Modules

Step 1: Pull on the SFP+ latch
Step 2: Grasp the SFP+ connector on both sides and remove it from the system

Order Information

Part Number	Description	Length
Z4KSFP-DAC-0.5M	Passive Copper AWG30 10GBase SFP+ DAC, 0.5M	0.5m
Z4KSFP-DAC-1.0M	Passive Copper AWG30 10GBase SFP+ DAC, 1.0M	1.0m
Z4KSFP-DAC-2.0M	Passive Copper AWG24 10GBase SFP+ DAC, 2.0M	2.0m
Z4KSFP-DAC-3.0M	Passive Copper AWG24 10GBase SFP+ DAC, 3.0M	3.0m
Z4KSFP-DAC-6.0M	Passive Copper AWG24 10GBase SFP+ DAC, 6.0M	6.0m