Product Specification

10Gb/s SFP+ Passive Copper Cable Transceiver

PRODUCT FEATURES

- SFF-8431 Compliant
- Broadband serial data rate operation:10 Mbps to 12Gbps
- Power Level I: 15 mW per cable end
- 100 Ohm differential impedance
- Retractable pin latch
- EEPROM signature
- Pull to Release latch design
- 360° cable braid crimp
- Enhanced EMI skirt design
- Color options for strain relief and pull tab
- Linear design for use with EDCs
- AC-coupled inputs and outputs
- 30AWG to 24AWG cable available

APPLICATIONS

- 10 Gigabit Ethernet and Gigabit
- Ethernet (IEEE 802.3ae)
- Fiber Channel: 1, 2, 4, 8, and 10GFC
- Infiniband SDR, DDR, and QDR
- Fiber Channel over Ethernet (FCoE)
- Serial data transmission

STANDARD

- Compliant to IEEE 802.3ba

- RoHS Compliant.

General Description

The FIBERLAND passive SFP+ Direct attach copper cable assembly is a low cost alternative for short reach applications. The design allows for a serial data transmission up to 12Gbps in each direction. The passive design has no signal amplification in the cable assembly. Electronic Dispersion Compensation (EDC) is typically used on host board designs when passive copper cable assemblies are utilized. EDC allows for an extended length of passive cable assemblies. EEPROM signature enables the host to differentiate between a passive copper cable assembly and a fiber optic module. The mechanical design of the braid crimp and EMI skirt ensure that EMI radiation is sufficiently suppressed. Additionally, the copper cable acts as a natural heat sink. The low power consumption assists in making the passive copper cable assembly an economic solution for within rack or rack to rack applications.
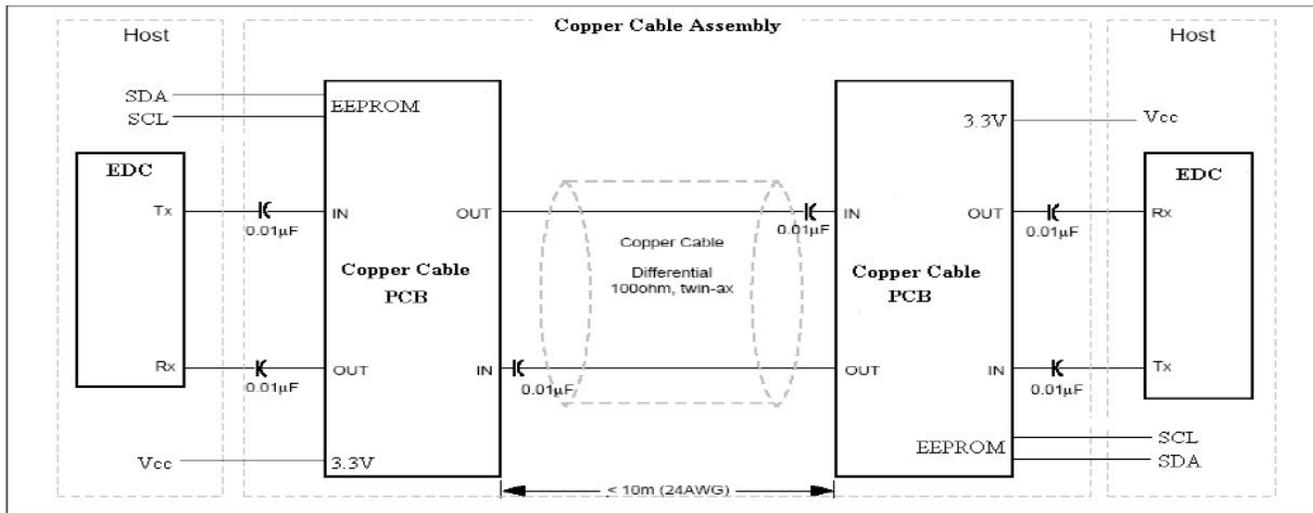
Recommended Operation Condition

Electrical					
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temp.		0		70	C
Input Voltage	VccT, VccR	1.8	3.3	5.5	Volts
Clock Frequency	fSCL			400	kHz
Maximum Power				15	mW
Maximum Average Current	Icc			4	mA
Data Rate		0.010		10.3125	Gbps

WDP Specifications

WDP				
Cable Gauge	Cable Length	WDPo (dB)	WDPi (dB)	dWDP
Spec Limit	-	--	--	6.75
30 AWG	3 meter	6.16	2.4	3.76
28 AWG	5 meter	7.49	2.4	5.09
24 AWG	7 meter	7.44	2.4	5.04

VMA and VCR Specifications

VMA & VCR			
Cable Gauge	Cable Length	VMA (dB)	VCR (dB)
Spec Limit	--	4.5	33
30 AWG	3 meter	3.03875	40.6572
28 AWG	5 meter	3.93609	38.53281
24 AWG	7 meter	3.86154	37.79826

Frequency Domain

Item	Test Parameter	Specification (Proposal)
1	Receive Return Loss (SDD22)	-12+2*SQRT(f) @ 0.01 to 4.1GHz < -6.3 + 13 * log10(f/5.5), with f in GHz；@4.1 to 11.1GHz
2	Transmit Return Loss (SDD11)	-12+2*SQRT(f) @ 0.01 to 4.1GHz < -6.3 + 13 * log10(f/5.5), with f in GHz；@4.1 to 11.1GHz
3	Common Mode Reflection (SCC22)	< -7 + 1.6 × f, with f in GHz；@ 0.01 to 2.5GHz -3dB @ 2.5 to 11.1GHz
4	Common Mode Conversion (SCD11)	-10dB @ 0.01 to 11.1GHz
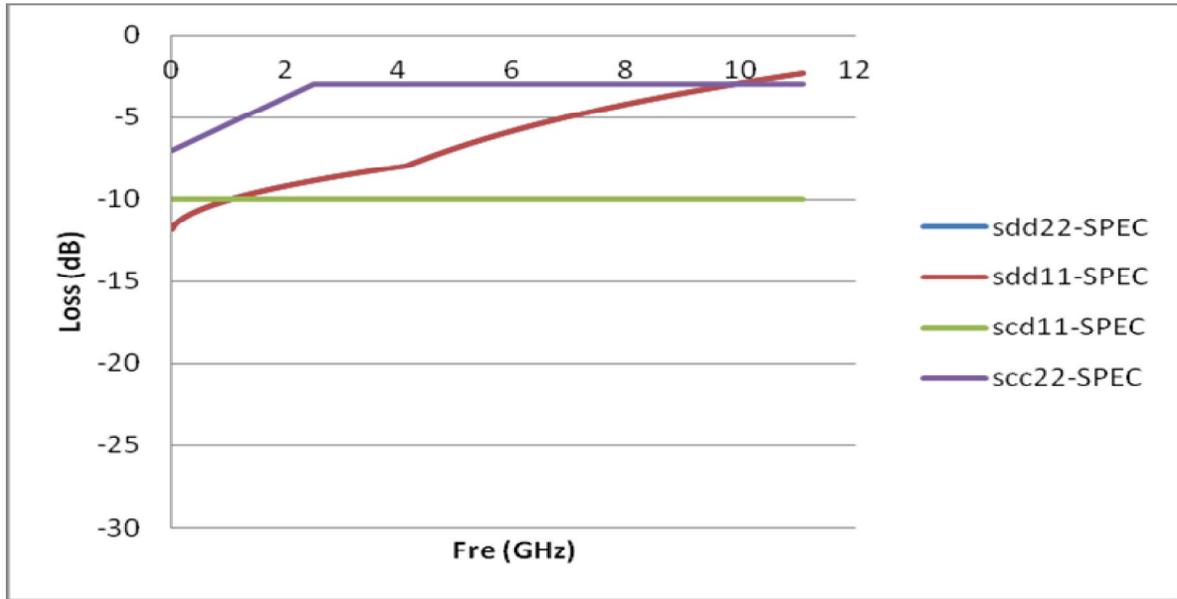
Time Domain

Item	Test Parameter	Specification (Proposal)		
1	Intra-Skew*	30 ps Max		
2	Impedance	100 +/- 10 Ohm		
3	Insertion Loss* (SDD21)	a. 0.6GHz : -1.5 dB Max b. 1.25GHz : -2.15 dB Max c. 2.50GHz : -3.22 dB Max d. 3.25GHz : -3.95dB Max e. 5.0GHz : -5.52 dB Max		

*The item 1and 3, for different length requirements, different specification

Host board Connector Pinout

Figure 1 ： MSA compliant Connector
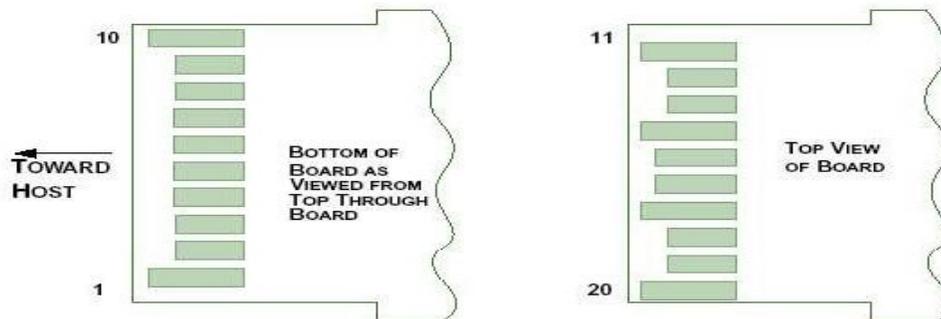
Figure 2： Pin Definitions.

Pin	Logic	Symbol	Name	Note
Pin 1		VeeT	Module Transmitter Ground	1
Pin 2	LVTTL-O	Tx_Fault	Transmitter Fault	2
Pin 3	LVTTL-I	Tx_Disable	Transmitter Disable	3
Pin 4	LVTTL-I/O	SDA	MOD-DEF2 2-wire serial interface data line	4
Pin 5	LVTTL-I/O	SCL	MOD-DEF1 2-wire serial interface clock line	4
Pin 6		Mod_Abs	Module Absent	5
Pin 7	LVTTL-I	RS0	Rate Select Zero	
Pin 8	LVTTL- O	Rx_LOS	Module Receiver Loss of Signal	2
Pin 9	LVTTL-I	RS1	Rate Select One	
Pin 10		VeeR	Module Receiver Ground	1
Pin 11		VeeR	Module Receiver Ground	1
Pin 12	CML-O	RD-	Receiver Inverted Data Output	
Pin 13	CML-O	RD+	Receiver Non-Inverted Data Output	
Pin 14		VeeR	Module Receiver Ground	1
Pin 15		VccR	Module Receiver 3.3V Supply	
Pin 16		VccT	Module Transmitter 3.3V Supply	
Pin 17		VeeT	Module Transmitter Ground	1
Pin 18	CML-I	TD+	Transmitter Non-Inverted Data Input	
Pin 19	CML-I	TD-	Transmitter Inverted Data Input	
Pin 20		VeeT	Module Transmitter Ground	1

Note 1. The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.
Note 2. This pin is an open collector/drain output pin and shall be pulled up with 4.7-10k to Vcc_Host on the host board. Pull ups can be connected to multiple power supplies, however the host board design shall ensure that no module pin has voltage exceeding module VccT/R + 0.5 V.
Note 3. This pin is an open collector/drain input pin and shall be pulled up with 4.7-10k to VccT in the module.
Note 4. See 2-wire Electrical Specifications .
Note 5. This pin shall be pulled up with 4.7-10k to Vcc_Host on the host board

Pin Description

Tx_Fault: Tx_Fault is an output pin to indicate a fault condition of a laser.This pin is connected to ground in the module.

Tx_Disable: Tx_Disable is an input pin to disable the transmitter output. This pin is pulled high in the module with a 5.11kOhm resistor.

SDA/SCL: SDA and SCL are the data and clock pins for the I2C interaction with the EEPROM.   These pins are connected to the SDA and SCL pins of the EEPROM in the module.

MOD_ABS: Mod_Abs is an output pin to indicate that a module is present in the port. This pin is connected to ground in the module.

RS0/RS1:   RS0 and RS1 are module rate select pins to determine the transmit data rate for lasers.

Rx_LOS: Rx_LOS is an output pin to indicate if the signal amplitude is below the receiver threshold. This pin is connected to ground in the module.

Ground: VeeT and VeeR are connected within the module and are used as a digital ground for signal integrity.   This digital ground does not connect to the module case or the copper cable braid.

Power: VccT and VccR are connected within the module and are used to power the EEPROM.   Typical voltage is 3.3 Volts and each pin has a maximum current capacity of 500 mA.

Signal: The two high speed signal pairs, TD+/TD- and RD+/RD-, are 100 Ohm differential impedance transmission lines with AC coupling on each RD trace.

2 Wire Interface EEPROM

The EEPROM on the SFP+ passive cable assembly is designed for 256 addresses.   The information for addresses 0 to 127 is listed below.   This information can be tailored to any customer request.   Any address can be altered to display customer specific information and more memory can be added if more addresses are needed.   Addresses128 to 255 can be reserved for customer specific information that is in addition to the SFF 8431 specification.

Mechanical Specifications

Mechanical				
Parameter	Minimum	Typical	Maximum	Unit
Cable Diameter (24 AWG)		0.255		Inches
Bend Radius (24 AWG)	1.25			Inches
Cable Diameter (28 AWG)		0.185		Inches
Bend Radius (28AWG)	0.8			Inches
Cable Diameter (30 AWG)		0.175		Inches
Bend Radius (30 AWG)	0.7			Inches
Within Pair Skew			120	ps/10m
Cable Insertion Loss		10		dB/10m
Bulk Cable Crosstalk			1	%
Bulk Cable Time Delay			4.3	ns/m
Cable Capacitance (intra-pair)			43	pF/m
Bulk Cable Impedance	95	100	105	Ohms

Mechanical Dimensions
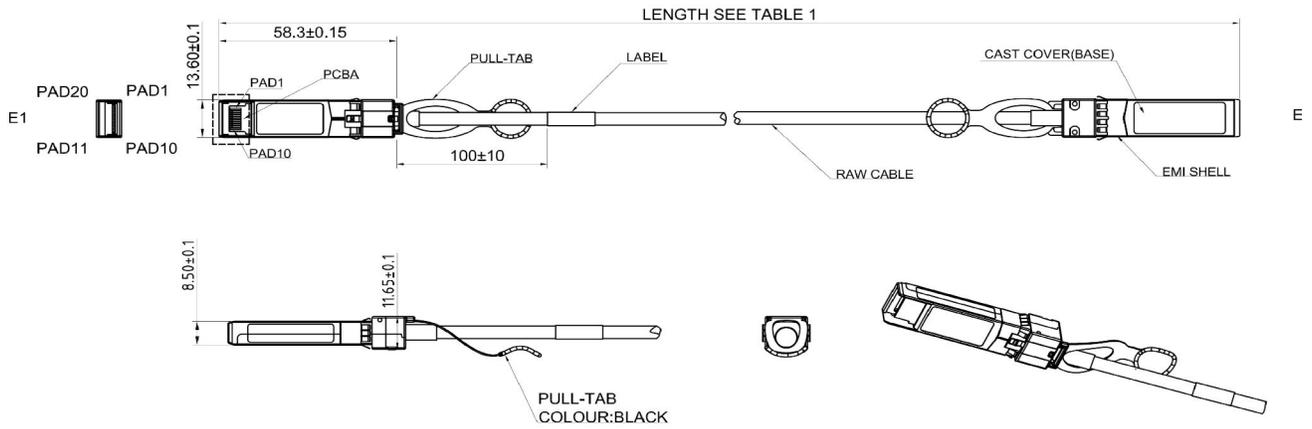
Contact :

Address	6th floor ,building 8,Zhongxing industrial zone,Nanshan district,Shenzhen,P.R.China
Zip	518000
Website	www.fiberlandtec.com
Email	sales@fiberlandtec.com

Fiberland Technology Co.,Ltd