

## SFP+ Passive Copper Cable Assembly

### CAB-10GSFP-PxM

#### Features

- SFF-8431 Compliant
- Broadband serial data rate operation:10 Mbps to 12 Gbps
- 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

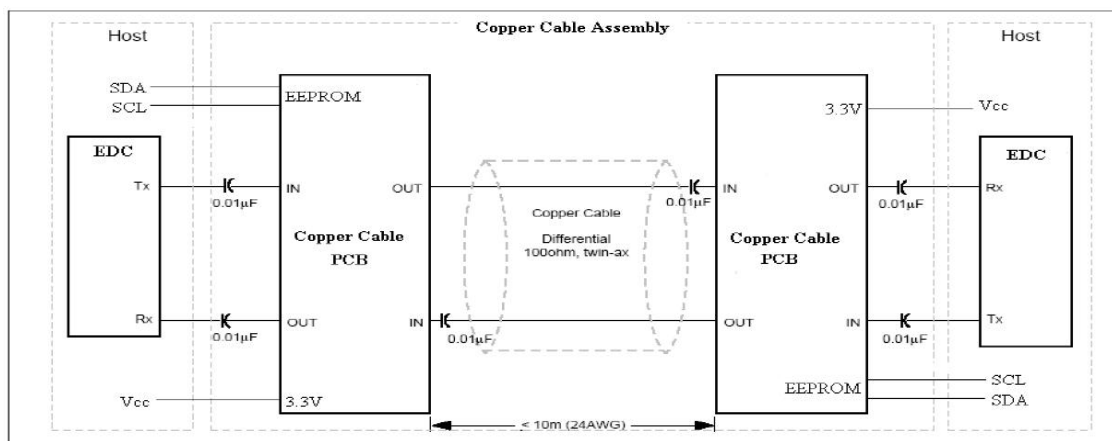


#### Applications

- 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

## Product Description

The 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.		-20		85	C
Input Voltage	VccT, VccR	1.8	3.3	5.5	Volts
Clock Frequency				400	kHz
Maximum Power				15	mW
Maximum Average Current	Icc			4	mA
Data Rate		0.010		10.3125	Gbps

## WDP Specifications

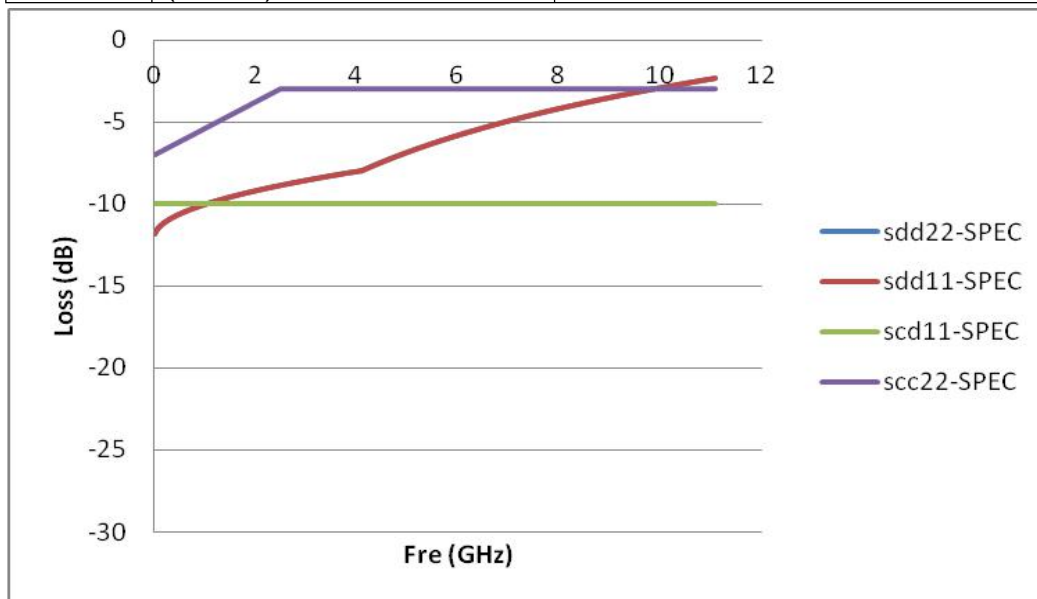
WDP				
Cable Gauge	Cable Length	WDPo (dB)	WDPi (dB)	dWDP
Spec Limit	--	--	--	6.75
30 AWG	3 meter	6.16	2.4	3.76
28 AWG	5 meter	7.49	2.4	5.09
24 AWG	7 meter	7.44	2.4	5.04

**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

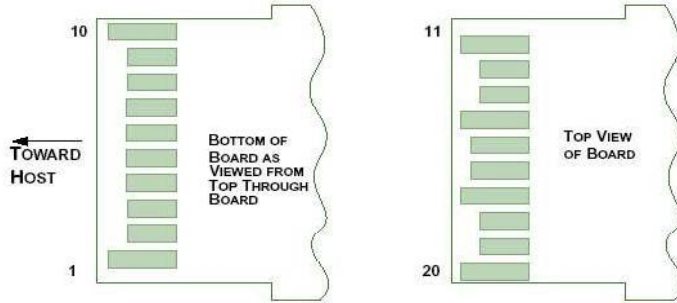


Figure 2 : Pin Definitions.

Pin	Logic	Symbol	Name	Note
Pin 1		VeeT	Module Transmitter Ground	1
Pin 2	LVTTTL-O	Tx_Fault	Transmitter Fault	2
Pin 3	LVTTTL-I	Tx_Disabl e	Transmitter Disable	3
Pin 4	LVTTTL-I/O	SDA	MOD-DEF2 2-wire serial interface data line	4
Pin 5	LVTTTL-I/O	SCL	MOD-DEF1 2-wire serial interface clock line	4
Pin 6		Mod_Abs	Module Absent	5
Pin 7	LVTTTL-I	RS0	Rate Select Zero	
Pin 8	LVTTTL- O	Rx_LOS	Module Receiver Loss of Signal	2
Pin 9	LVTTTL-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:** x\_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. Addresses 128 to 255 can be reserved for customer specific information that is in addition to the SFF 8431 specification.

SFP+ Passive Cable EEPROM Map

Device 0xA0				
Addr (dec)	Addr (hex)	Value (hex)	Name of Field	Description
0	0	3	Identifier	03h=SFP
1	1	4	Extended identifier	04h=GBIC/SFP function is defined
2	2	21	Connector type	21h=Copper pigtail
3	3	0	Transceiver application supported	
4	4	0		
5	5	0		
6	6	0		
7	7	0		
8	8	4	SFP+ Cable Technology	04h=Passive Cable
9	9	0	Transceiver application supported	
10	A	0		
11	B	0	Encoding	
12	C	67	Nominal bit rate (unit: 100M bps)	67h=10.3G/bps
13	D	0	Reserved	
14	E	0	Link length supported for 9/125um fiber in Km	
15	F	0	Link length supported for 9/125um fiber in 100m	
16	10	0	Link length supported for 50/125um fiber in 10m	
17	11	0	Link length supported for 62.5/125um fiber in 10m	
18	12	1	Link length supported for copper in meters	01h=1M
19	13	0	Length(OM3)	
20	14	31	Vendor name	10Gtek
21	15	30		
22	16	47		
23	17	74		
24	18	65		
25	19	6B		
26	1A	20		
27	1B	20		
28	1C	20		
29	1D	20		
30	1E	20		
31	1F	20		
32	20	20		
33	21	20		
34	22	20		
35	23	20		
36	24	0	Reserved	
37	25	0	Vendor OUI	
38	26	0		
39	27	0		
40	28	53	Vendor PN	SFP-10G-CU1M
41	29	46		
42	2A	50		

43	2B	2D		
44	2C	31		
45	2D	30		
46	2E	47		
47	2F	2D		
48	30	43		
49	31	55		
50	32	31		
51	33	4D		
52	34	20		
53	35	20		
54	36	20		
55	37	20		
56	38	30	Vendor rev	01
57	39	31		
58	3A	20		
59	3B	20		
60	3C	1	Wavelength	01=Passive Cable
61	3D	0		
62	3E	0	Reserved	
63	3F	0	Checksum	addresses 0 to 62
64	40	0	Implemented options	
65	41	0		
66	42	0	Maximum bit rate margin	
67	43	0	Minimum bit rate margin	
68	44	41	Vendor serial number	A1234560001
69	45	31		
70	46	32		
71	47	33		
72	48	34		
73	49	35		
74	4A	36		
75	4B	30		
76	4C	30		
77	4D	30		
78	4E	31		
79	4F	20		
80	50	20		
81	51	20		
82	52	20		
83	53	20		
84	54	31	Date code	YYMMDD(160501)
85	55	36		
86	56	30		
87	57	35		
88	58	30		
89	59	31		
90	5A	20	Lot number	
91	5B	20		
92	5C	0	DD monitoring type	
93	5D	0	Enhanced software options	
94	5E	0	SFF-8472 compliance	
95	5F	43	Checksum	addresses 64 to94
96	60	0	Vendor Specific ID Fields	0
97	61	0		

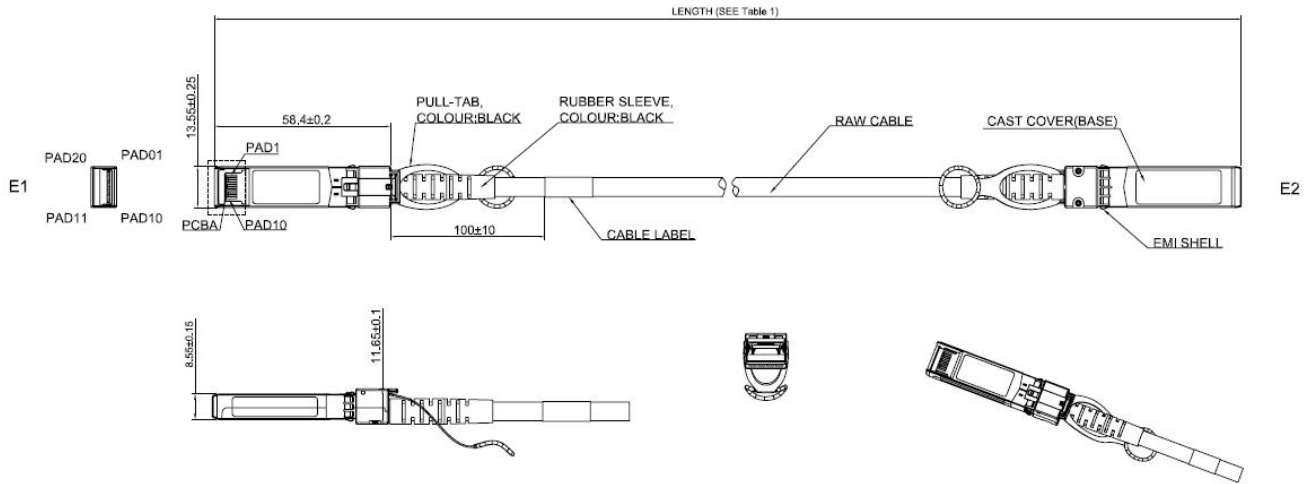
98	62	0		
99	63	0		
100	64	0		
101	65	0		
102	66	0		
103	67	0		
104	68	0		
105	69	0		
106	6A	0		
107	6B	0		
108	6C	0		
109	6D	0		
110	6E	0		
111	6F	0		
112	70	0		
113	71	0		
114	72	0		
115	73	0		
116	74	0		
117	75	0		
118	76	0		
119	77	0		
120	78	0		
121	79	0		
122	7A	0		
123	7B	0		
124	7C	0		
125	7D	0		
126	7E	0		
127	7F	0		

**Mechanical Specifications**

<b>Mechanical</b>				
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**



**Part Numbers**

**Passive SFP+ Cable Assemblies**

Length	24AWG P/N	28AWG P/N	30AWG P/N
0.5 meter	CAB-10GSFP-P50CM-00-3-2	CAB-10GSFP-P50CM-00-2-2	CAB-10GSFP-P50CM-00-1-2
1 meter	CAB-10GSFP-P1M-00-3-2	CAB-10GSFP-P1M-00-2-2	CAB-10GSFP-P1M-00-1-2
2 meter	CAB-10GSFP-P2M-00-3-2	CAB-10GSFP-P2M-00-2-2	CAB-10GSFP-P2M-00-1-2
3 meter	CAB-10GSFP-P3M-00-3-2	CAB-10GSFP-P3M-00-2-2	CAB-10GSFP-P3M-00-1-2
5 meter	CAB-10GSFP-P5M-00-3-2	CAB-10GSFP-P5M-00-2-2	
7 meter	CAB-10GSFP-P7M-00-3-2		
10 meter	CAB-10GSFP-P10M-00-3-2		

**Revision History**

Revision	Initiated	Review	Approved	Revision History	Release Date
V1.3	Vinson	Steven	Nicky	Released.	Jul,23, 2016

**Further Information**

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