

### 25Gb/s SFP+ Passive Cable

#### 25G-S-DACx

##### ■ Product Features

- ✓ Up to 25Gb/s data rate SFF-8402 Compliant
- ✓ Operating case temperature of 0-70°C
- ✓ Single 3.3V supply voltage
- ✓ BER better than 10<sup>-15</sup>
- ✓ Hot pluggable
- ✓ Compliant with SFF-8432
- ✓ Compliant with IEEE 802.3by
- ✓ Compliant with RoHS



##### ■ Applications

- ✓ 25G Ethernet

##### ■ Product Selection

Part Number	Lengths	Conductor Size
25G-S-DAC1	1m	26 / 30 AWG
25G-S-DAC2	2m	26 / 30 AWG
25G-S-DAC3	3m	26 AWG
25G-S-DAC5	5m	26 AWG

##### ■ Product Description

The Fiberend 25G-S-DACx passive copper cable is a high speed, cost-effective 25Gbps Ethernet connectivity solution designed to meet the growing needs for higher bandwidth in data centers.

The 25H-S-DACx passive copper cable contains a single high-speed copper pair, operating at data rates of up to 25 Gb/s. The cables are compliant with IEEE 802.3by Ethernet standard and SFF-8402 SFP28 standard. Each SFP28 connector comprises an EEPROM providing product information which can be read by the host system.

Fiberend's unique quality passive copper cable solutions provide efficient connectivity for short distance interconnects. It enables higher port bandwidth, density and configurability at a low cost and reduced power requirement in the data centers. Rigorous production testing

ensures the best out-of-the-box installation experience, performance, and durability.

### ■ Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Topc	0	70	degC
Storage Temperature	Tst	-40	125	degC
Relative Humidity (non-condensation)	RS	-	85	%
Supply Voltage	Vcc3	3.135	3.465	V
Voltage on LVTTTL Input	V <sub>LVTTTL</sub>	-0.3	Vcc3+0.2	V
Power Supply Current	Icc3	0.001	-	mA
Total Power Consumption	Pd	-	0.003	W

**Notes:** Stress or conditions exceed the above range may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not applied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ■ Frequency Domain

Item	Test Parameter	IEEE802.3by Specification
1	Differential Insertion Loss (SDD21)	Maximum insertion loss at 12.8906Ghz -22.48dB Minimum insertion loss at 12.8906Ghz -8dB
2	Differential Insertion Loss (SDD21)	Maximum insertion loss at 12.8906Ghz -22.48dB Minimum insertion loss at 12.8906Ghz -8dB
3	Differential Return Loss (SDD22)	-16.5+2xSQRT(f) @ 0.01 to 4.1GHz -10.66+14xLog10(f/5.5) @4.1 to 19GHz
4	Differential Return Loss (SDD11)	-16.5+2xSQRT(f) @ 0.01 to 4.1GHz -10.66+14xLog10(f/5.5) @4.1 to 19GHz
5	Common Mode Reflection (SCC22)	-2dB @ 0.01 to 19GH
6	Common Mode Reflection (SCC11)	-2dB @ 0.01 to 19GHz
7	Common Mode Conversion (SCD22)	-22+(20/25.78)*(f) @ 0.01 to 12.89GHz -15+(6/25.78)*(f) @ 12.9 to 19GHz

8	Common Mode Conversion (SCD11)	-22+(20/25.78)*(f) @ 0.01 to 12.89GHz -15+(6/25.78)*(f) @ 12.9 to 19GHz
9	Differential to Common Mode Conversion Loss (SCD12)	-10dB @ 0.01 to 12.89GHz -27+(29/22)*(f) @ 12.9 to 15.7GHz -6.3dB @ 15.71 to 19GHz
10	Differential to Common Mode Conversion Loss (SCD21)	-10dB @ 0.01 to 12.89GHz -27+(29/22)*(f) @ 12.9 to 15.7GHz -6.3dB @ 15.71 to 19GHz

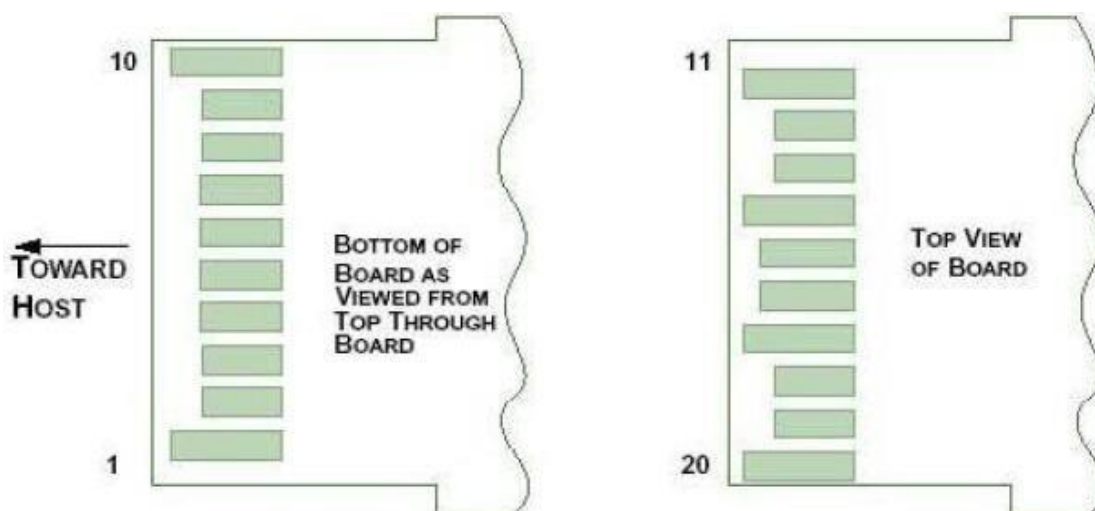
### ■ Time Domain

Item	Test Parameter	Specification (Proposal )
1	Intra-Skew*	20ps Max
	1M	25ps Max
	1.5M~2M	30ps Max
	2.5M~3M	
2	Differential Impedance Rise time : 14ps (20%~80%)	100 +/- 10 Ohm
3	Insertion Loss* (SDD21) for 1M	a) 0.6GHz : -2.11 dB Max b) 1.25GHz : -2.88 dB Max c) 2.50GHz : -3.78 dB Max d) 3.25GHz : -4.95 dB Max e) 5.0GHz : -5.82 dB Max
	Insertion Loss* (SDD21) for 1.5M	a) 0.6GHz : -2.13 dB Max b) 1.25GHz : -3.24 dB Max c) 2.50GHz : -4.44 dB Max d) 3.25GHz : -5.99 dB Max e) 5.0GHz : -6.90 dB Max
	Insertion Loss* (SDD21) for 2M	a) 0.6GHz : -2.32 dB Max b) 1.25GHz : -3.76 dB Max c) 2.50GHz : -5.26 dB Max d) 3.25GHz : -7.20dB Max e) 5.0GHz : -8.14 dB Max
	Insertion Loss* (SDD21) for 2.5M	a) 0.6GHz : -2.58 dB Max b) 1.25GHz : -3.74 dB Max c) 2.50GHz : -5.27 dB Max d) 3.25GHz : -6.15dB Max

		e) 5.0GHz : -8.38 dB Max
	Insertion Loss* (SDD21) for 3M	a) 0.6GHz : -2.86 dB Max b) 1.25GHz : -4.24 dB Max c) 2.50GHz : -6.02 dB Max d) 3.25GHz : -6.99 dB Max e) 5.0GHz : -9.5 dB Max
	Insertion Loss* (SDD21) for 4M	a) 0.6GHz : -3.85 dB Max b) 1.25GHz : -5.45 dB Max c) 2.50GHz : -8 dB Max d) 3.25GHz : -9.45 dB Max e) 5.0GHz : -12.7 dB Max
	Insertion Loss* (SDD21) for 5M	a) 0.6GHz : -3.85 dB Max b) 1.25GHz : -5.45 dB Max c) 2.50GHz : -8 dB Max d) 3.25GHz : -9.45 dB Max e) 5.0GHz : -12.7 dB Max

**Notes:** The item 1 and 3, Different diameter and length requirements, Different specification

### ■ Host board Connector Pin out for SFP28



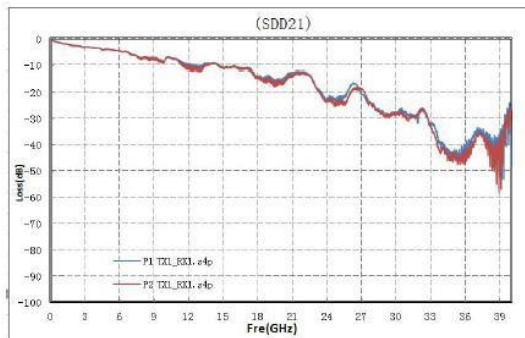
Pin	Logic	Symbol	Name/Description	Note
1	-	VeeT	Module Transmitter Ground	1
2	LVTTL-O	Tx_Fault	Transmitter Fault	2
3	LVTTL-I	Tx_Disable	Transmitter Disable	3

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

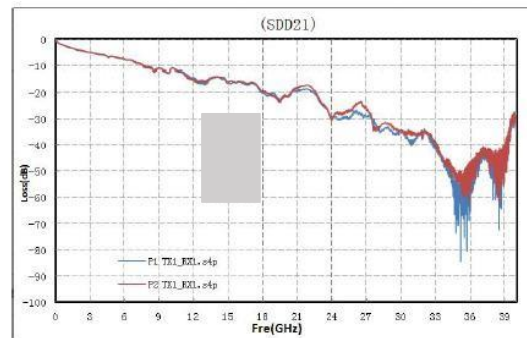
### **Notes:**

1. The module signal grounds, VeeR and VeeT, shall be isolated from the module case.
2. This is an open collector/drain output 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 has voltage exceeding module VccT/R + 0.5 V.
3. This is an open collector/drain input and shall be pulled up with 4.7-10k to VccT in the module.
4. See 2-wire electrical specification.
5. This shall be pulled up with 4.7-10k to Vcc\_Host on the host board

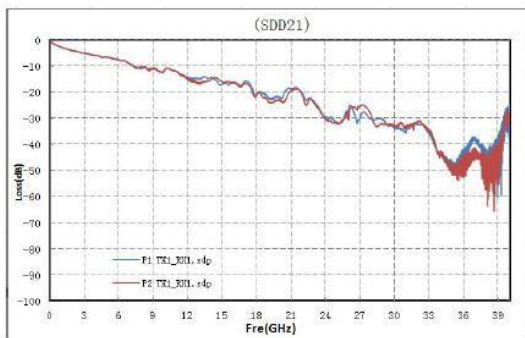
### ■ Typical Operation Characteristics



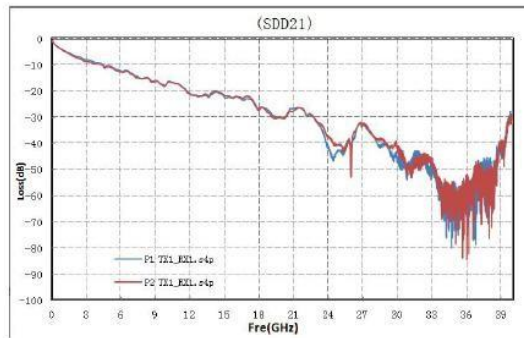
**SFP28 30AWG 1M**



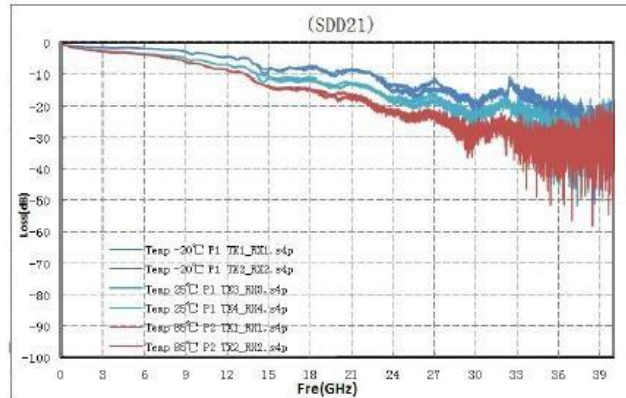
**SFP28 30AWG 2M**



**SFP28 26AWG 3M**



**SFP28 26AWG 5M**



**Temperature test data (26AWG 3M)**

### ■ Wire Interface EEPROM

The EEPROM on the SFP28 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.

EEPROM Map			
Device 0xA0			
Address(Dec)	Value(Hex)	Name of Field (as per SFF-8431)	Description of data code
0	3	Identifier	03h = SFP/SFP+/SFP28
1	4	Extended identifier	04h = Serial ID defined
2	21	Code for Connector type	21h = Copper pigtail
3	0	Transceiver application supported	00h = Not specified
4	0	Escon compliance code	00h = Not specified
5	0	Sonnet compliance code	00h = Not specified
6	0	Ethernet compliance code	00h = Not specified
7	0	Fiber channel link length	00h = Not specified
8	4	Fiber channel Technology	04h = SFP+ Passive copper cable
9	0	Fiber channel Transmission media	00h = Not specified
10	0	Fiber channel speed	00h = Not specified
11	0	Code for high speed serial Encoding	00h = Not specified
12	FF	Nominal bit rate (unit: 100Mbps)	FF = 255*100Mb or 25Gb
13	0	Reserved	00h = Not specified
14-17	0	Link length supported for various type of fiber	00h = Not specified
18	1	Link length supported for copper or direct attach cable units of m	Note 1: use 01h for length < 1m Note 2: Fractional length are rounded up to the nearest integer
19	0	Link length supported for 50um OM3 fiber units of 10m	00h = Not specified
20-35	45 54 55 96 4C 49 4E 4B 20 20 20 20...	SFP28 Vendor name	Fill in "Fiberend" Extra Bytes are filled with space (20h)
36	0	Code for electronic or optical compatibility	00h = Reserved
37	0	SFP28 Vendor IEEE company 38 0 ID	
38	0		Fiberend 's OUI
39	0		
40	43		

		Manufacture's P/N	
41	41		
42	42		
43	5A		Fill in Part Number"
44	53		25G-S-DAC1"
45	50		Extra Bytes are filled with space
46	2F		(20h)
47	5A		
48	53		
49	50		
50	2D	Manufacture's P/N	
51	50		
52	31	Manufacture's P/N	Fill in Part Number"
53	4D		25G-S-DAC1"
54	20		Extra Bytes are filled with space
55	20		(20h)
56	30		1
57	31	Revision lever for part number	
58	20	provided by Vendor (ASCII)	
59	20		
60	1	Laser Wavelength	01h = Passive Cable
61	0	(Passive /Active Cable Specification compliance)	00h = Not specified
62	0	Reserved	-
63	1E	Checksum	addresses 0 to 62
64	0	Indicates which options Transceiver signals are Implemented	00h = Copper passive (not used)
65	0		00h = Copper passive (not used)
66	0	Maximum bit rate margin	00h = Not specified
67	0	Minimum bit rate margin	00h = Not specified



68	41		Fill in Manufacture's serial number "A1234560001" Extra Bytes are filled with space (20h)
		Serial number Provided by Vendor (ASCII)	
69	31		
70	32		
71	33		
72	34		
73	35		
74	36		
75	30		
76	30		
77	30		
78	31		
79	20		
80	20		
81	20		
82	20		
83	20		
84	31	Vendor's manufacturing data code Vendor's manufacturing data code	
85	35		ASCII code, Two low order digits of year.(00 = 2000) ASCII code, digits of month.(01= Jan through 12 = Dec) ASCII code, day of month.(01~31)
86	31		
87	31		
88	32		
89	32		
90	20		ASCII code, vendor 91 20

		Lot number	specific lot code
91	20		
92	0	DD monitoring type	00h = Not specified
93	00	Enhanced software options	00h = Not specified
94	0	SFF-8472 compliance	00h = Digital diagnostic functionality not included or undefined
95	13	Check sum	addresses 64 to94
96-127	0	Vendor Specific ID Fields	0
128-255	FF	Reserved for SFF-8079 (address 128 to 255)	Not used

### ■ Mechanical Dimensions

Mechanical				
Parameter	Minimum	Typical	Maximum	Unit
Cable Diameter (26 AWG)	-	0.220	-	Inches
Bend Radius (26 AWG)	1.102	-	-	Inches
Cable Diameter (30 AWG)	-	0.181	-	Inches
Bend Radius (30 AWG)	0.905	-	-	Inches
Within Pair Skew	-	-	60	ps/5m
Cable Insertion Loss	-	24.06	28.90	dB/5m
Bulk Cable Time Delay	-	-	5.2	ns/m
Bulk Cable Impedance	95	100	105	Ohms
Insertion Force	-	-	20	N
Withdrawal Force	-	-	12.5	N
Retention Force	90	-	-	N
Durability	50 cycles	-	-	-

