Product Specification

10G SFP+ to 10G SFP+ Active Optical Cable

PN: S10-S10-C

Features

- Hot Pluggable SFP+ form factor
- Wire AWG:30AWG,24AWG
- Available length range 0.5M~7M
- Passive Copper Twinax Cable
- Operating data rate 10.3125Gbps
- Power supply：+3.3V
- Max power dissipation <0.1W
- Small diameter cable design
- Commercial temperature range 0°C to 70°C

Compliance

- SFP+ MSA
- Compliant with SFP+ Electrical MSA SFF-8431
- Compliant with SFP+ Mechanical MSA SFF-8432
- SFF-8472
- RoHS

Applications

- 1/2/4/8G Fibre Channel
- 10G Gigabit Ethernet
- 10 GbE high performance computer clusters
- High bandwidth switches and routers
- Storage Area Networks (SAN) & Storage Servers

Description

The 10G SFP+ Passive Direct Attach Copper Cable (DAC) is a high-performance, cost-effective I/O solution designed for 10G Ethernet and 10G Fiber Channel applications.These cables enable hardware manufacturers to achieve high port density, configurability, and utilization while maintaining a low cost and reduced power budget. The SFP+ passive copper assemblies meet and exceed industry standards for Gigabit Ethernet and Fiber Channel, ensuring exceptional performance and reliability.

Unlike active cables, the SFP+ passive copper cables do not contain any signal conditioning circuitry, such as crosstalk or echo cancellation, within the SFP+ connector. This makes them a simple yet efficient solution for short-distance data transmission. Often referred to as DAC cables, they provide a reliable alternative to optical solutions. The SFP+ passive copper cables are ideal for high-speed data center environments, offering a plug-and-play solution for seamless connectivity and optimal performance.

Product performance Specifications

1、Product Basic Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	T_S	-40		85	°C
Supply Voltage	V_{CC}	3.15	3.3	3.45	V
Relative Humidity	RH	5		95	%
Operating Case Temperature	T_C	0	25	70	°C
Data Rate Per Lane		1	10.3125		Gbp/s

2、High Speed Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Differential Impedance	RIN,P	90	100	110	Ω	
Single Ended Input and Output Voltage Tolerance		-0.3		4	V	
Output AC Common Mode Voltage	Vcm			13.5	mV(RMS)	See1
VMA Loss	L			4.4	dBe	See2,3
VMA Loss to Crosstalk Ratio	VCR	32.5			dB	See1
Differential Output Return Loss	SDDxx			See4	dB	0.01 to 4.1GHz
Differential Input Return Loss	SDDxx			See5	dB	4.1 to 11.1GHz
Common Mode Output Return Loss	SCCxx			See6	dB	0.01 to 2.5GHz
Common Mode Input Return Loss	SCCxx			-3	dB	2.5 to 11.1GHz

Note1: When input common mode voltage is 12.0 mV RMS and when input rise and fall times are 34ps and the amplitude is the max amplitude allowed by SFPPlus MSA Table 12.

Note2:VMA loss is the ratio of VMA measured at input and output, respectively.

Note3: With input test condition given by parameters B" given in this table.

Note4: Reflection Coefficient given by equation SDDxx(dB)= -12 + 2*SQRT(f), with fin GHz.

Note5: Reflection Coefficient given by equation SDDxx(dB)= -6.3 + 13*log10(f/5.5), with fin GHz.

Note6: Reflection coefficient given by equation SCCxx(dB) < -7 + 1.6*f, with fin GHz.

3、Product Electrical Characteristics

Test Type	Test Item	24AWG	26AWG	28AWG	30AWG
Electrical Characteristics	Differential impedance	100±5Ω at TDR	100±5Ω	100±5Ω	100±5Ω at 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 at 1.25Ghz	10dB/8.5m maximum at 1.25Ghz	10dB/7m maximum at 1.25Ghz	8.4dB/5.5m maximum at 1.25Ghz
	Conductor DC Resistance	0.026Ω /ft maximum at 20°C	0.04Ω /ft maximum at 20°C	0.06Ω/ft maximum at 20°C	0.01Ω/ft maximum at 20°C
Physical Characteristics	Conductors (two pair)	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, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage	Aluminum/polyest er 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	5.2mm	4.7mm	4.2mm

Recommended Host Board Power Supply Circuit

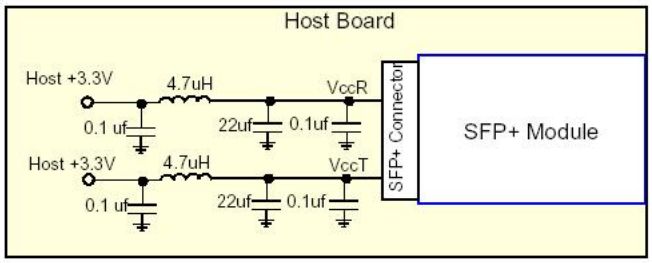


Figure 1: Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

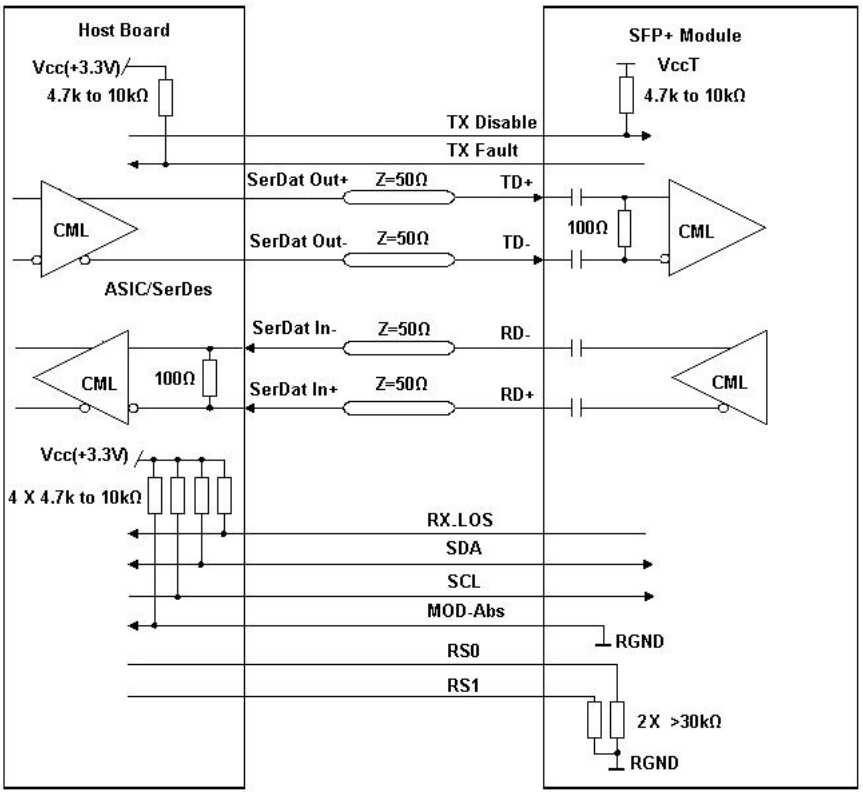


Figure2: Recommended Interface Circuit

Pin-out Definition

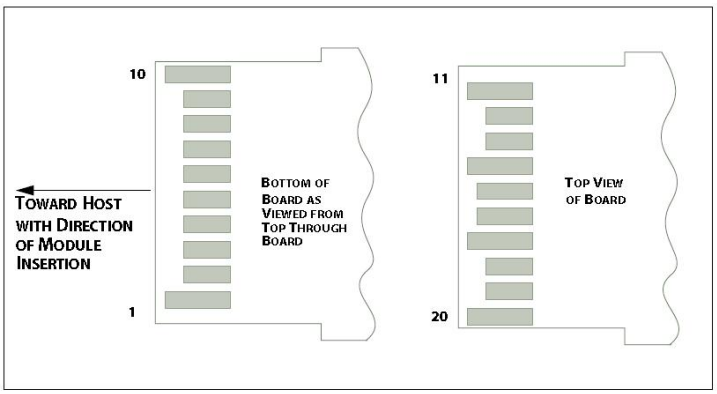


Figure3: Pin view

Pin Function Definitions

Pin	Logic	Symbol	Description
1		$VeeT_1$	Module Transmitter Ground
2	LVTTL-O	TX_Fault_2	Module Transmitter Fault
3	LVTTL-I	$TX\_Disable_3$	Transmitter Disable; Turns off transmitter laser output
4	LVTTL-I/O	SDA_4	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)
5	LVTTL-I/O	SCL_4	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)
6		MOD_ABS_5	Module Absent, connected to VeeT or VeeR in the module
7	LVTTL-I	$RS0_6$	Adaptive multi-rate operation
8	LVTTL-O	RX_LOS_2	Receiver Loss of Signal Indication (In FC designated as RX_LOS, in SONET designated as LOS, and in Ethernet designated at Signal Detect)
9	LVTTL-I	$RS1_6$	Adaptive multi-rate operation
10		$VeeR_1$	Module Receiver Ground
11		$VeeR_1$	Module Receiver Ground
12	CML-O	RD-	Receiver Inverted Data Output
13	CML-O	RD+	Receiver Non-Inverted Data Output
14		$VeeR_1$	Module Receiver Ground
15		VccR	Module Receiver 3.3 V Supply
16		VccT	Module Transmitter 3.3 V Supply
17		$VeeT_1$	Module Transmitter Ground

18	CML-I	TD+	Transmitter Non-Inverted Data Input
19	CML-I	TD-	Transmitter Inverted Data Input
20		$VeeT_1$	Module Transmitter Ground

Note1: The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.

Note2: This pin is an open collector/drain output pin and shall be pulled up with 4.7kΩ-10kΩ to Host_Vcc 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 + 0.5V.

Note3: This pin is an open collector/drain input pin and shall be pulled up with 4.7kΩ-10kΩ to VccT in the module.

Note4: See SFF-8431 4.2 2-wire Electrical Specifications.

Note5: This pin shall be pulled up with 4.7kΩ-10kΩ to Host_Vcc on the host board.

Note6: Connect with 30kΩ load pulled down to GND in the module.

Monitoring Specification

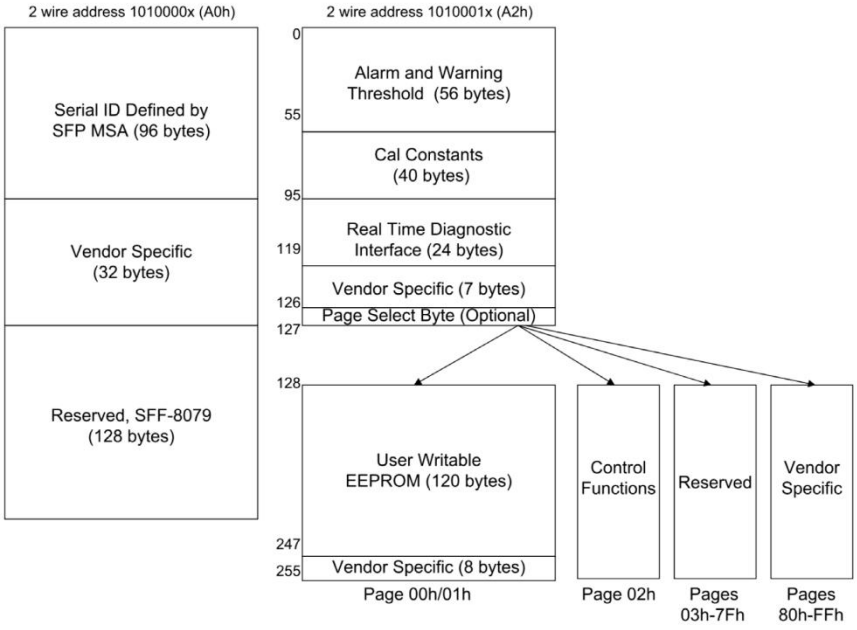


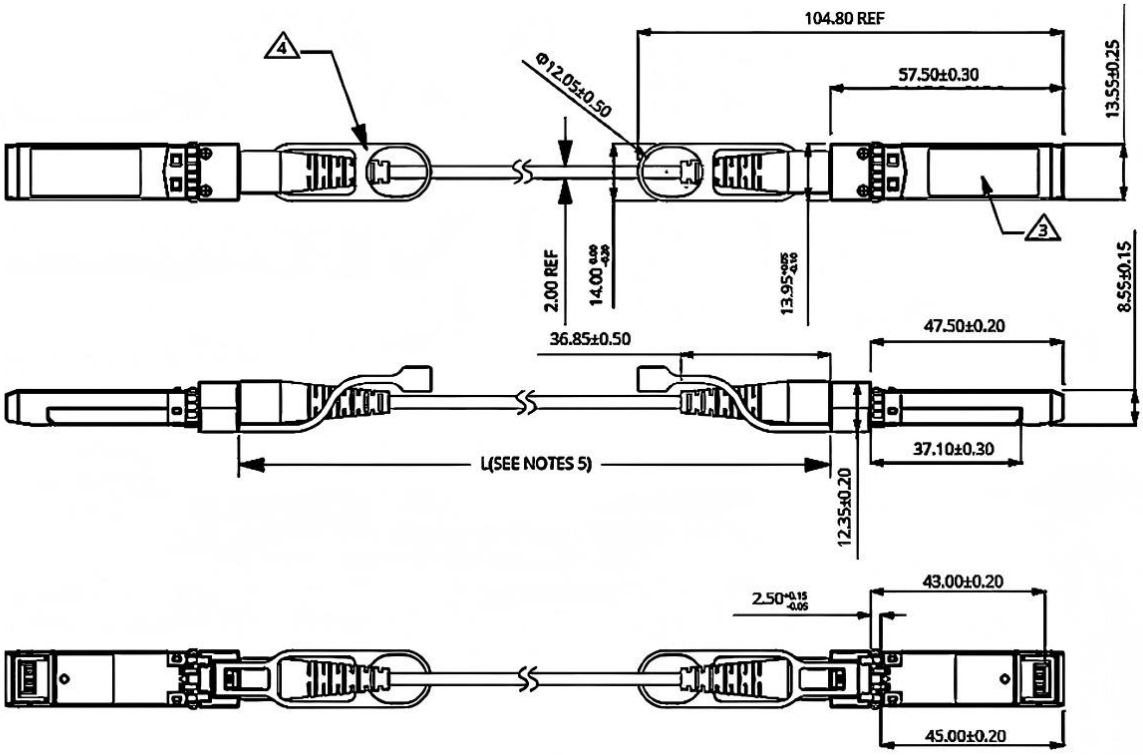
Figure4: Memory map

Memory map table

Byte	Unit	Name	Description
A0h ID Fields			
0	1	Identifier	Type of transceiver
1	1	Ext. Identifier	Extended identifier of type of transceiver
2	1	Connector	Code for connector type

3-10	8	Transceiver	Code for electronic or optical compatibility
11	1	Encoding	Code for high speed serial encoding algorithm
12	1	Signaling Rate, Nominal	Nominal signaling rate, units of 100 MBd.
13	1	Rate Identifier	Type of rate select functionality
14	1	Length (SMF,km) or Copper Cable Attenuation	Link length supported for single-mode fiber, units of km, or copper cable attenuation in dB at 12.9 GHz
15	1	Length (SMF) or Copper Cable Attenuation	Link length supported for single-mode fiber, units of 100 m, or copper cable attenuation in dB at 25.78 GHz
16	1	Length (50 um, OM2)	Link length supported for 50 um OM2 fiber, units of 10 m
17	1	Length (62.5 um, OM1)	Link length supported for 62.5 um OM1 fiber, units of 10 m
18	1	Length (OM4 or copper cable)	Link length supported for 50um OM4 fiber, units of 10 m. Alternatively, copper or direct attach cable, units of m
19	1	Length (OM3) or Cable length, additional	Link length supported for 50 um OM3 fiber, units of 10 m. Alternatively, copper or direct attach cable multiplier and base value
20-35	16	Vendor name	SFP vendor name (ASCII)
36	1	Transceiver	Code for electronic or optical compatibility
37-39	3	Vendor OUI	SFP vendor IEEE company ID
40-55	16	Vendor PN	Part number provided by SFP vendor (ASCII)
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)
60-61	2	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)
62	1	Fibre Channel Speed 2	Transceiver's Fibre Channel speed capabilities
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)
64-65	2	Options	Indicates which optional transceiver signals are implemented
66	1	Signaling Rate, max	Upper signaling rate margin, units of %
67	1	Signaling Rate, min	Lower signaling rate margin, units of %
68-83	16	Vendor SN	Serial number provided by vendor (ASCII)
84-91	8	Date code	Vendor's manufacturing date code
92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any) in the transceiver
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with.
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)
96-127	32	Vendor Specific	Vendor Specific EEPROM
128-255	128	Reserved	Reserved (was assigned to SFF-8079)

Mechanical Dimension



Note:

- Unit: mm
- Tolerance: φ0.1mm if not shown
- Latch color: black
- When L≤5m, the tolerance is ±5cm, when L>5m, the tolerance is ±1%

Waring:

- The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles.It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.
- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.