

25Gb/s SFP28 Active Optical Cable (AOC)
PSP28-AOx185xxM

Features

- SFF-8432 Mechanical MSA
- 25G 850nm VCSEL transmitter
- 25G PIN photo-detector
- 2-wire interface for management
- specifications compliant with SFF 8472
- digital diagnostic monitoring interface for optical transceivers
- Pre-terminated fiber cable
- Up to 70m/100m by active optical cable with OM3/OM4 fiber
- Operating environment temperature: 0 to 70°C
- SFP28 housing with enhanced EMI shielding
- 25G electrical interface (OIF CEI-28G-VSR)
- Maximum power consumption 1.0W each terminal
- Single 3.3V power supply
- RoHS compliant

Applications

- 25G Ethernet
- High capacity IO with SFP28 interface
- Data center and in-rack connection

Part Number Ordering Information

PSP28-AOx185xxM	SFP28 AOC optical cable with full real-time digital diagnostic monitoring
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Note:

A1	AOC 1m		AB	AOC 50m
A5	AOC 5m		AE	AOC 15m
AA	AOC 10m		AG	AOC 30m

1. General Description

This product is a high data rate active optical cable (AOC), to overcome the bandwidth limitation of traditional copper cable, supporting 25.78Gbps at both electrical ends.

The SFP-25G AOC assembly is a high performance integrated duplex serial data link for bi-directional communications. Physically, it is constructed out of a pair of SFP-25G terminations connected by a cable. The terminations contain the electrical connectors, the signal conditioning devices and the Physical Medium Dependent devices that are needed to ensure proper transmission across the chosen cable.

2. Functional Description

The SFP-25G AOC converts 25Gbps serial PECL/CML electrical compliant with CEI-28G-VSR. An open collector compatible Transmit Disable (TX_Dis) is provided. Logic “1” or no connection on this pin will disable the laser from transmitting. Logic “0” on this pin provides normal operation. An open collector compatible Transmit Fault (TX_Fault) is provided. TX_Fault is module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 k Ω . TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 k Ω to 10 k Ω resistor

The receiver converts serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. The RX_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 k Ω , or with an active termination. The RX_LOS signal is intended as a preliminary indication to the host system in which the SFP+ is installed that the received signal strength is below certain range. Such an indication typically points to broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

3. Block Diagram

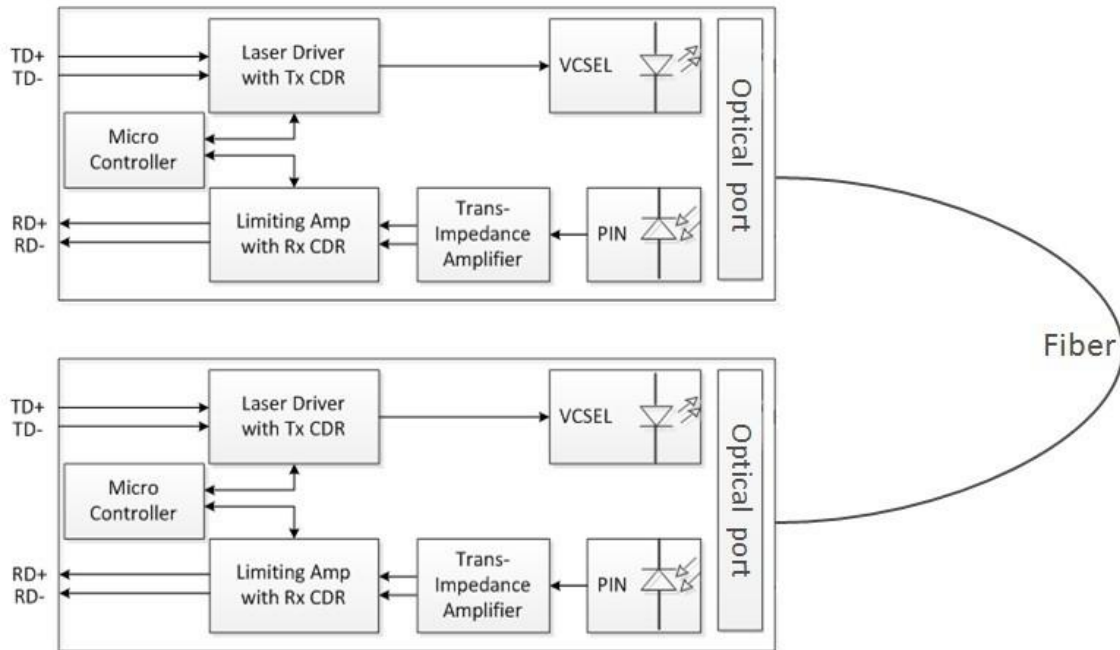


Figure 1. Function Block Diagram

4. Proposed Application Schematics

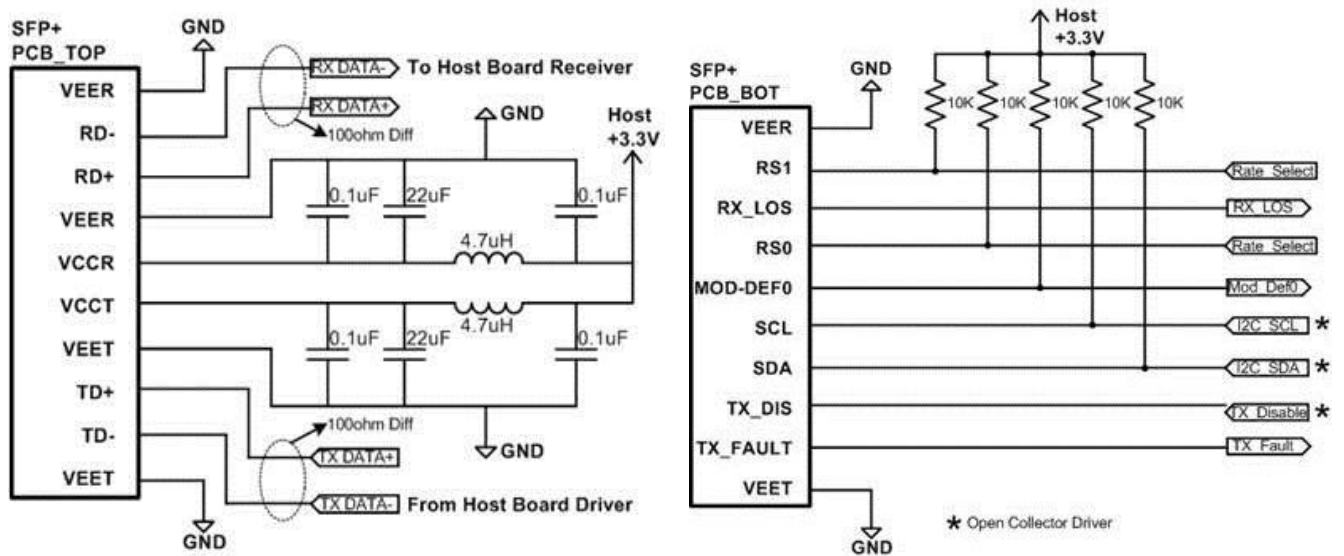


Figure 2. Application Schematics

5. Pin Definition

The SFP-25G-AOCs are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP-25G-AOC host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 3 and contact definitions are given in the PIN description table. SFP28 module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 4 and the contact sequence order listed in the PIN description table.

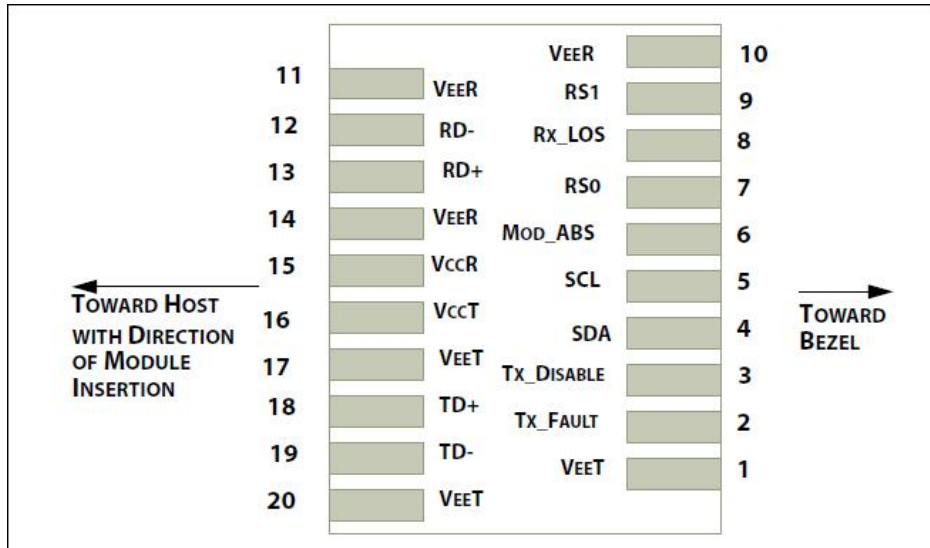


Figure 3. Interface to Host

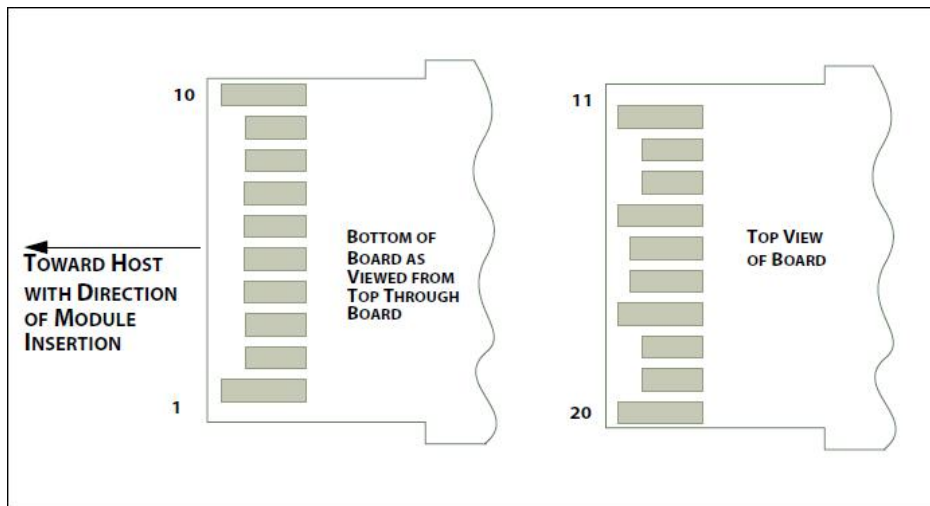


Figure 4. Contact Assignment

PIN description

PIN	Logic	Symbol	Name / Description	Notes
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	No connection required	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication. Logic 0 indicates normal operation.	
9	LVTTL-I	RS1	No connection required	
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 Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V 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. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

6. Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter	Symbol	Min	Max	Units
Storage Temperature	Ts	-40	85	°C
Operating Case Temperature	Tc	0	70	°C
Power Supply Voltage	Vcc	0	3.6	V
Relative Humidity	RH	5	85	%

7. Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	T _{OP}	0		70	degC	
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Data Rate			25.78125		Gb/s	
Data Rate Accuracy		-100		100	ppm	
Pre-FEC Bit Error Ratio				5x10 ⁻⁵		
Post-FEC Bit Error Ratio				1x10 ⁻¹²		1
Control Input Voltage High		2		V _{CC}	V	
Control Input Voltage Low		0		0.8	V	

Notes:

1. FEC provided by host system.

8. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Test Point	Min	Typical	Max	Units	Notes
Power Consumption				1.0	W	1
Supply Current	I _{CC}			300	mA	1
Transmitter						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (V _{cm})	TP1	-350		2850	mV	2
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion	TP1			See CEI-28G-VSR Equation	dB	

(SDC11, SCD11)				13-20		
Stressed Input Test	TP1 a	See CEI- 28G- VSR Section				
Receiver						
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	2
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI- 28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	TP4			See CEI- 28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	3
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10 ⁻¹⁵ probability (EW15)	TP4	0.57			UI	
Eye Height at 10 ⁻¹⁵ probability (EH15)	TP4	228			mV	

Notes:

1. Per terminal.
2. Vcm is generated by the host. Specification includes effects of ground offset voltage.
3. From 250MHz to 30GHz.

9. Mechanical Dimensions

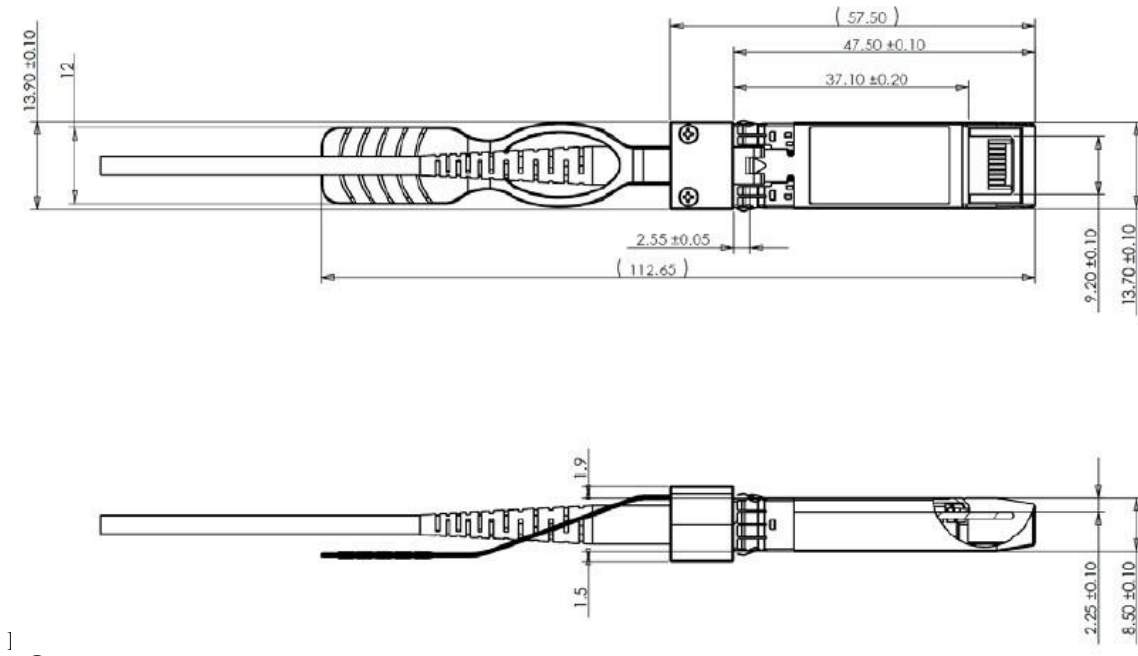


Figure 5. Mechanical Outline

10. ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

11. Laser Safety

This is a Class 1 Laser Product according to EN 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.Contact Information

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