QSFP-4SFP25-xxAOC Active Optical Cable

Features

- Supports 4x25GBASE-SR applications
- Compliant to QSFP28 MSA SFF-8636 and SFP28 MSA SFF-8431 and SF-8472
- Multi rate of up to 25.78125Gbps per lane
- +3.3V single power supply
- Low power consumption
- UL certification cables (optional)
- Operating case temp Commercial: 0°C to +70°C
- RoHS compliant

Applications

- 4x25Gbe-SR
- Other optical links

Order Information

Table 1-Order Information

Part No.	Bit Rate (Gbps)	Laser (nm)	Distance	Fiber Type	DDMI	Connector	Temp[note1]
QSFP-4SFP25-XXAOC	25.781	850	1~50m	MMF	YES	N/A	0°C ~+70°C

Note: 1 Case Temperature

Absolute Maximum Ratings

Table2- Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc_3	-0.5	-	+3.6	V	
Storage Temperature	T_s	-5	-	+75	°C	
Operating Humidity	RH	+5	-	+85	%	1

Note: 1 No condensation

Recommended Operating Conditions

Table 3- Recommended operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_C	0	-	+70	°C	
Power Supply Voltage	Vcc	3.14	3.3	3.47	V	
Power Dissipation per QSFP28	Pd	-	-	2.5	W	
Power Dissipation per SFP28	Pd	-	-	1.0	W	1
Bit Rate Bit Rate per Lane	BR	10.3125	25.78125	-	Gbps	Per lane

Note: 1 Per terminal

Electrical Characteristics

Table 4- Electrical Characteristics for QSFP28

Parameter		Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter							
Differential Data Input Swing		V_{out}	200	-	1000	mV	
Input Differential Impedance		Z_D	90	100	110	Ω	
ModSelL	Module Select	V_{OL}	V_{EE}-0.3	-	0.4	V	
	Module Unselect	V_{OH}	2.0	-	V_{CC}+0.3	V	
LPMode	Low Power Mode	V_{IL}	V_{EE}-0.3	-	0.8	V	
	Normal Operation	V_{IH}	2.0	-	V_{CC}+0.3	V	
ResetL	Reset	V_{IL}	V_{EE}-0.3	-	0.8	V	
	Normal Operation	V_{IH}	2.0	-	V_{CC}+0.3	V	
Receiver							
Differential Data Output Swing		$V_{in,P-P}$	200	-	1000	mV_{PP}	
Output Differential Impedance		Z_D	90	100	110	Ω	
ModPrsL	Normal Operation	V_{OL}	V_{EE}-0.3	-	0.4	V	
IntL	Interrupt	V_{OL}	V_{EE}-0.3	-	0.4	V	
	Normal Operation	V_{oH}	2.0	-	V_{CC}+0.3	V	
Bit Error Rate		BER			E-12		1

Table 5- Electrical Characteristics for SFP28

Parameter		Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Transmitter Characteristics							
Differential Data Input Swing		$V_{in,P-P}$	200	-	1000	mV_{PP}	
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
Tx_Fault	Normal Operation	V_{OL}	V_{EE}-0.3	-	0.4	V	
	Transmitter Fault	V_{OH}	2.0	-	V_{CC}+0.3	V	
Tx_Disable	Normal Operation	V_{IL}	V_{EE}-0.3	-	0.8	V	
	Laser Disable	V_{IH}	2.0	-	V_{CC}+0.3	V	
Electrical Receiver Characteristics							
Differential Date Output		V_{out}	200	-	1000	mV	
Output Differential Impedance		Z_D	90	100	110	Ω	
Rx_LOS	Normal Operation	V_{OL}	V_{EE}-0.3	-	0.4	V	
	Lose Signal	V_{oH}	2.0	-	V_{CC}+0.3	V	
Bit Error Rate		BER	-	-	E-12	-	

Note: 1 PRBS2^31-1@25.78125Gbps

Pinout

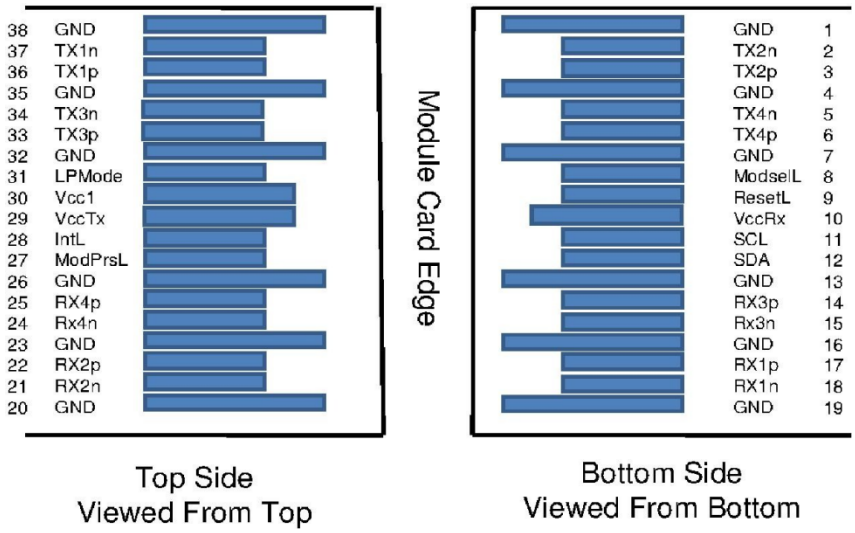


Figure 1, Pin View for QSFP28

Table 6- Pin Function Definitions for QSFP28

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	

26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note: 1. Circuit ground is internally isolated from chassis ground.

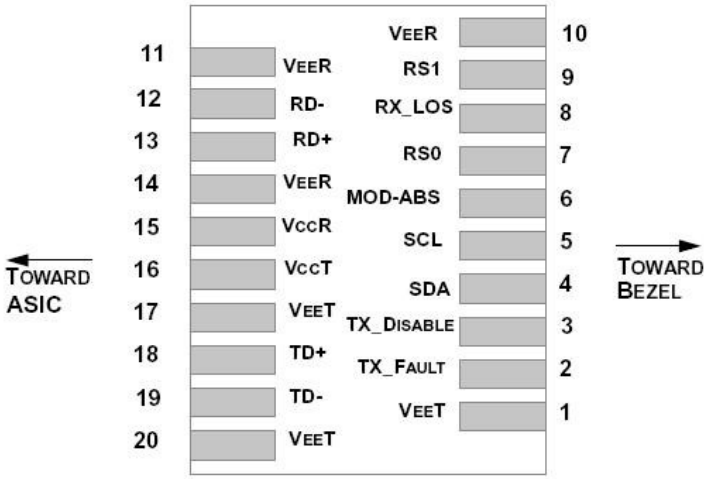


Figure 2, Pin View for SFP28

Table 7-Pin Function Definitions

Pin	Symbol	Name/Description	Notes
1	VEET	Module Transmitter Ground	1
2	TX_FAULT	Module Transmitter Fault	2
3	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output	3
4	SDA	2-Wire Serial Interface Data Line (MOD-DEF2)	
5	SCL	2-Wire Serial Interface Clock (MOD-DEF1)	
6	MOD_ABS	Module Absent, connected to $V_{EE}T$ or $V_{EE}R$ in the module	2
7	RS0	Rate Select 0, optionally controls SFP+ module receiver	
8	RX_LOS	Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as NOT Signal Detect)	2
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter	
10	$V_{EE}R$	Module Receiver Ground	1
11	$V_{EE}R$	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	

13	RD+	Receiver Non-Inverted Data Output	
14	$V_{EE}R$	Module Receiver Ground	1
15	$V_{CC}R$	Module Receiver 3.3 V Supply	
16	$V_{CC}T$	Module Transmitter 3.3 V Supply	
17	$V_{EE}T$	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	$V_{EE}T$	Module Transmitter Ground	1

Note:

1. **The module ground pins are isolated from the module case.**
2. **The pins shall be pulled up with 4.7K-10Kohms to a voltage between 3.14V and 3.46V on host board.**
3. **The pin is pulled up to VCCT with a 4.7K-10KΩ resistor in the module.**

Recommended Circuit

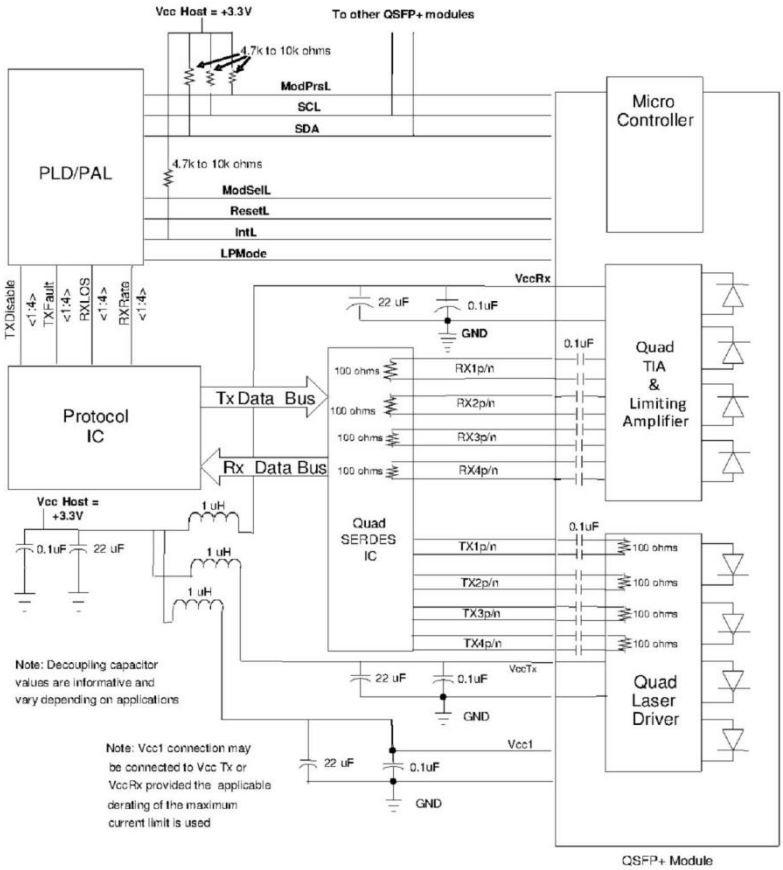


Figure 3, Recommended Interface Circuit for QSFP28

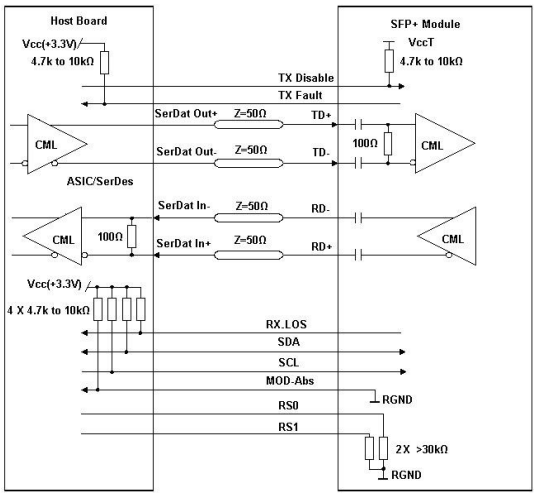


Figure 4, Recommended Interface Circuit for SFP28

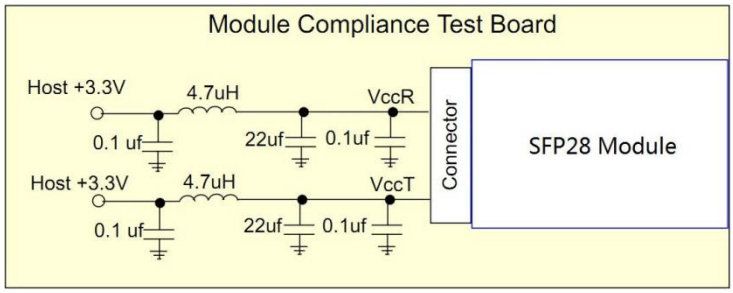


Figure 5, Recommended Host Board Power Supply Circuit for SFP28

Monitoring Specification

2-Wire Serial Address 1010000x			
Lower Page 00h			
0 Identifier			
1- 2 Status			
3- 21 Interrupt Flags			
22- 33 Free Side Device Monitors			
34- 81 Channel Monitors			
82- 85 Reserved			
86- 98 Control			
99 Reserved			
100-104 Hardware Interrupt Pin Masks			
105-106 Vendor Specific			
107 Reserved			
108-110 Free Side Device Properties			
111-112 Assigned for use by PCI Express			
113 Free Side Device Properties			
114-118 Reserved			
119-122 Password Change Entry Area (Optional)			
123-126 Password Entry Area (Optional)			
127 Page Select Byte			
Upper Page 00h	**Optional Page 01h**	**Optional Page 02h**	**Optional Page 03h**
128 Identifier	128 CC_APPS	128-255 User EEPROM Data	128-175 Free Side Device Thresholds
129-191 Base ID Fields	129 AST Table Length (TL)		
	130-131 Application Code Entry 0		
	132-133 Application Code Entry 1		
	134-253 other entries		
192-223 Extended ID			176-223 Channel Thresholds
224-255 Vendor Specific ID			224 Tx EQ & Rx Emphasis Magnitude ID
			225 RX output amplitude indicators
			226-241 Channel Controls
			242-251 Channel Monitor Masks
	254-255 Application Code Entry TL		252-255 Reserved

Figure 6, Memory Map for QSFP28

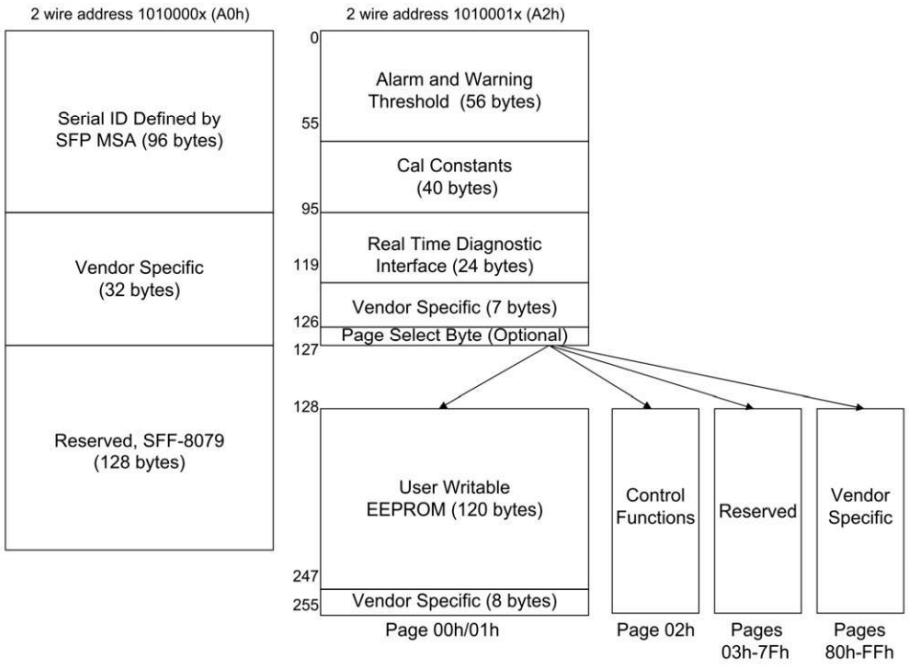
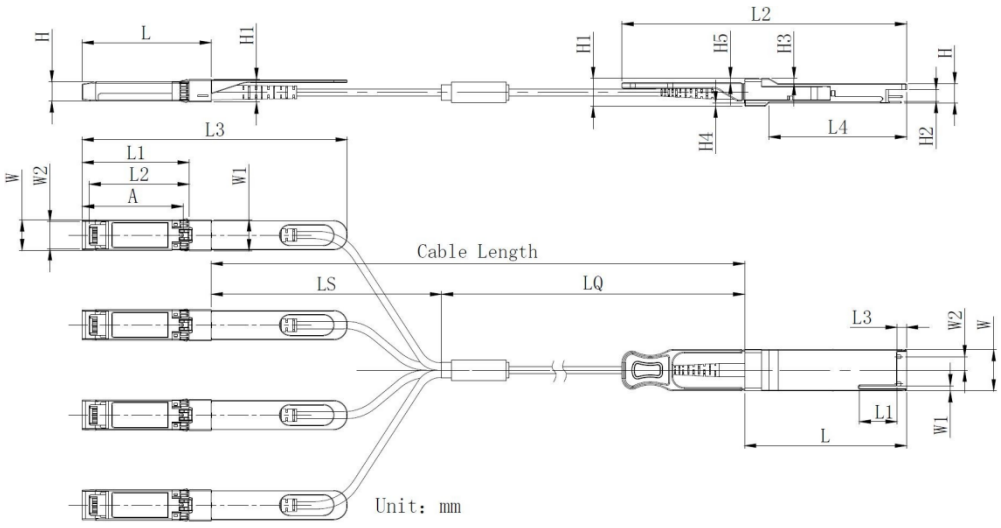


Figure 7, Memory Map for SF

Mechanical



Unit mm

QSFP28	L	L1	L2	L3	L4	W	W1	W2	H	H1	H2	H3	H4	H5	H6
Max	72.2	-	128	4.35	61.4	18.45	-	6.2	8.6	12.4	5.35	2.5	1.6	2.0	-
Type	72.0	-	-	4.20	61.2	18.35	-	-	8.5	12.2	5.2	2.3	1.5	1.8	6.55
Min	68.8	16.5	124	4.05	61.0	18.25	2.2	5.8	8.4	12.0	5.05	2.1	1.3	1.6	-

SFP28	L	L1	L2	L3	W	W1	W2	H	H1	A
Max	57.6	47.7	44.55	119.9	13.8	14.0	12.3	8.7	10.3	45.25
Type	57.4	47.5	44.35	117.9	13.55	13.8	12.1	8.5	10.1	45
Min	57.2	47.3	44.15	115.9	13.3	13.6	11.9	8.4	9.9	44.65

Figure 8, Mechanical Diagram

Table 8- Cable Length

Parameter	Value	Units
Diameter	3	mm
Minimum bend radius	30	mm
Length tolerance	Length < 1 m: +5 /-0	cm
	1 m ≤length ≤ 4.5 m: +15 / -0	cm
	5 m ≤length ≤ 14.5 m: +30 / -0	cm
	Length≥15.0 m +2% / -0	m
Cable color	Orange(OM2),Aqua(OM3),Magenta(OM4)	

Table 9- Breakout Cable Nominal Length

Total Length X (Unit: m)	Breakout Point Measured from QSFP LQ (Unit: m)	Breakout Point Measured from SFP LS(Unit: m)
1	0.3	0.7
2	0.6	1.4
3	1	2
5	2	3
7	4	3
10	7	3
15	12	3
20	17	3
25	22	3
30	27	3
40	37	3
50	47	3

Warnings

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.

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