100Gb QSFP28 to 4x25G SFP28 Breakout Active Optical Cable

Features

- Support 4x25GBASE-SR application
- Compliant to QSFP28 MSA SFF-8636 and SFP28 MSA SFF-8431 and SFF-8472
- Multi rate of up to 25.78125Gbps per lane
- +3.3V single power supply
- Low power consumption
- UL certification cables (optional)
- Low power dissipation: <2.5W on QSFP28 end, <1W on SFP28 end
- 0 to 70°C case temperature operating range
- RoHS-6 compliant (lead-free)

Applications

- 100G Ethernet
- Datacom/Telecom Switch & Router connections
- High speed multi-channel parallel data connections
- High performance computing, server and data storage

Compliance

- Compatible to SFP28 MSA and QSFP28 MSA
- Compliant with IEEE 802.3ae

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc_3	-0.5	-	+3.6	V	
Storage Temperature	T_S	- 5	-	+70	°C	
Operating Humidity	RH	+5	-	+85	%	1

Note:

[1] No condensation

Recommended Operating Conditions

Table2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Case Temperature	TC	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

Characteristics

Table3-Electrical Characteristics for QSFP28

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Differential Data Input Swing	Vout	200		1000	mV	
Input Differential Impedance	ZD	90	100	110	Ω	
Module Select	VOL	VEE-0.3		0.4	V	
Module Unselect	VOH	2.0		VCC+0.3	V	
Low Power Mode	VIL	VEE-0.3		0.8	V	
Normal Operation	VIH	2.0		VCC+0.3	V	
Reset	VIL	VEE-0.3		0.8	V	
Normal Operation	VIH	2.0		VCC+0.3	V	
Receiver						
Differential Data Output Swing	Vin,P-P	200	-	1000	mVPP	
Output Differential Impedance	ZD	90		110	Ω	
Normal Operation	VOL	VEE-0.3	100	0.4	V	
Interrupt	VOL	VEE-0.3		0.4	V	
Normal Operation	VoH	2.0		VCC+0.3	V	

Bit Error Rate	BER			E-12	V	

Table4-Electrical Characteristics for SFP28

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
			Transmitter			
Differential Data Input Swing	Vin,P-P	200		1000	mVPP	
Input Differential Impedance	ZIN	90	100	110	Ω	
Normal Operation	VOL	VEE-0.3		0.4	V	
Transmitter Fault	VOH	2.0		VCC+0.3	V	
Normal Operation	VIL	VEE-0.3		0.8	V	
Laser Disable	VIH	2.0		VCC+0.3	V	
			Receiver			
Differential Data Output Swing	Vout	200	-	1000	mVPP	
Output Differential Impedance	ZD	90		110	Ω	
Normal Operation	VOL	VEE-0.3	100	0.4	V	
Lose Signal	VoH	2.0		VCC+0.3	V	
Bit Error Rate	BER			E-12		

Note:PRBS2^31-1@25.78125Gbps

Recommended Interface

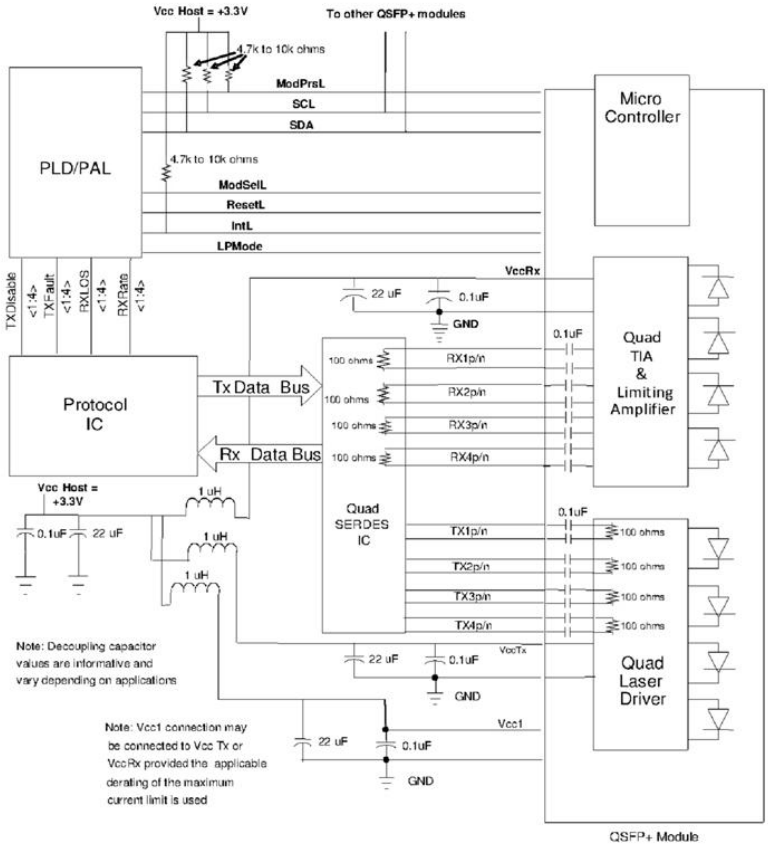

Figure 1 Recommended Interface Circuit for QSFP28

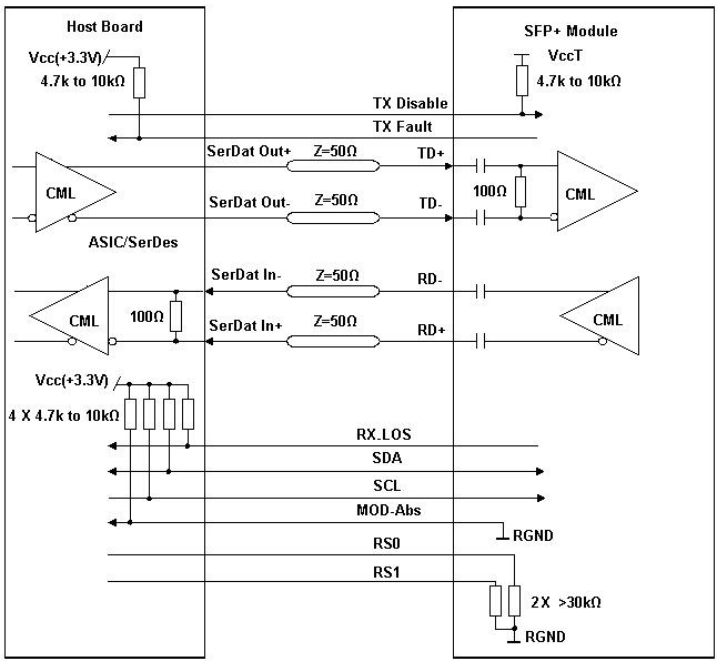

Figure 2 Recommended Interface Circuit for SFP28

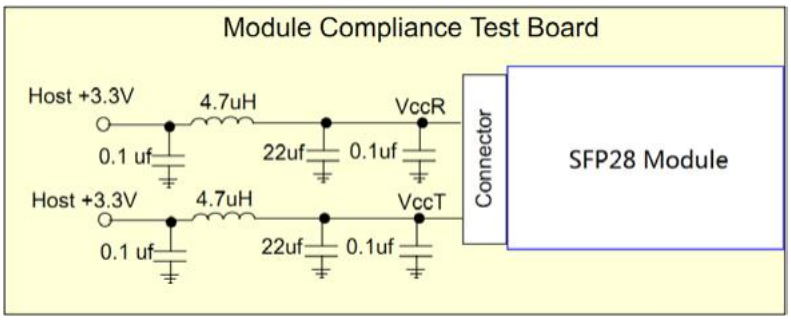

Figure 3 Recommended Host Board Power Supply Circuit for SFP28

Monitoring Specification

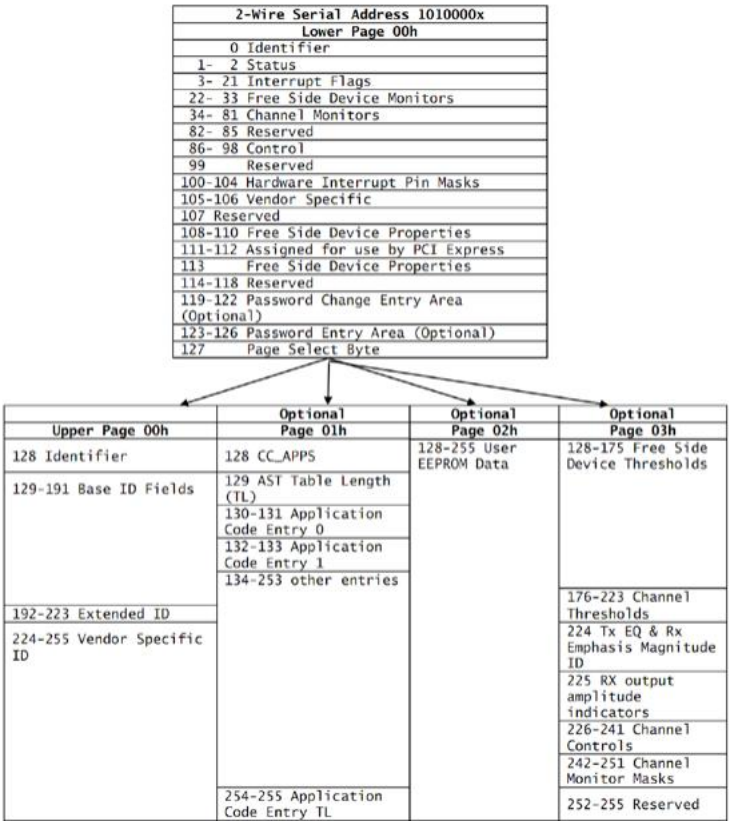

Figure 4 Memory Map for QSFP28

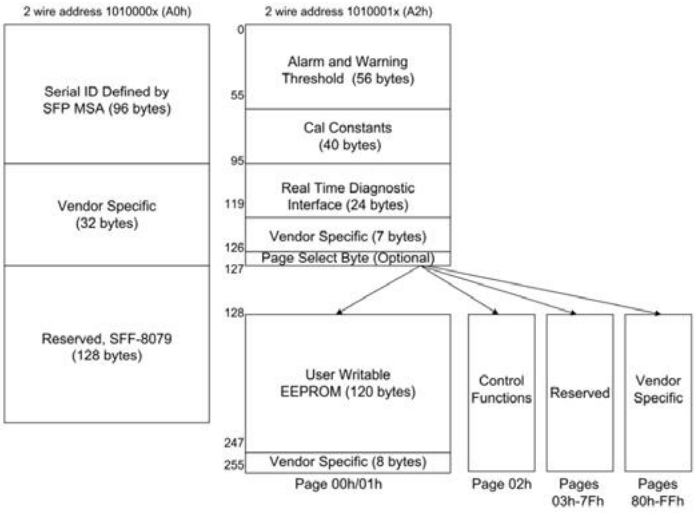

Figure 5 Memory Map for SFP28

Pin arrangement

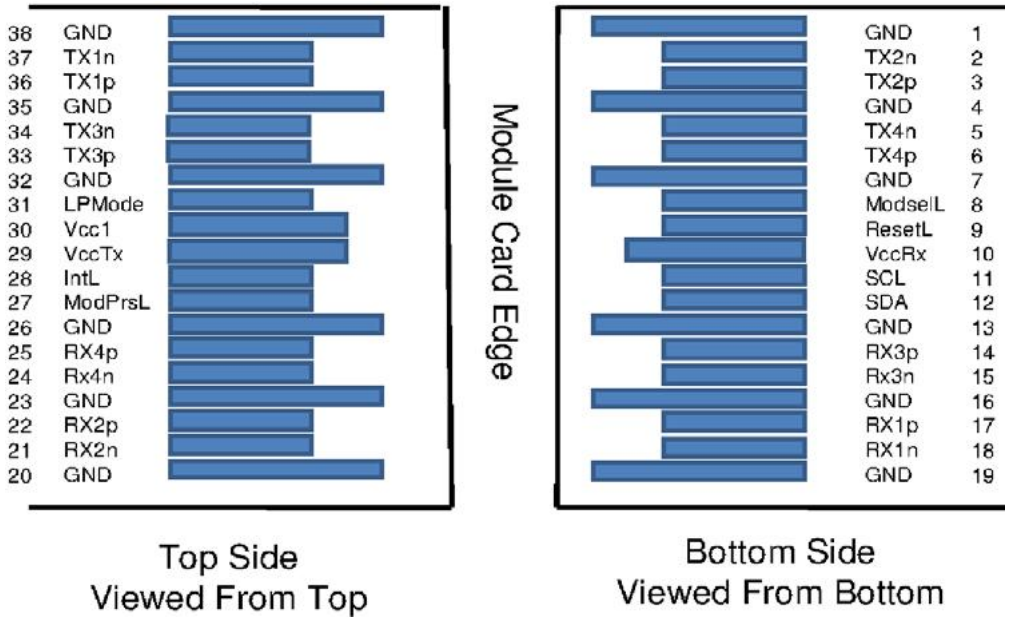

Figure 6 Pin View for QSFP28

Pin Descriptions

Table5-QSFP28 Pin Function Definition

Pin	Symbol	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:Circuit ground is internally isolated from chassis ground

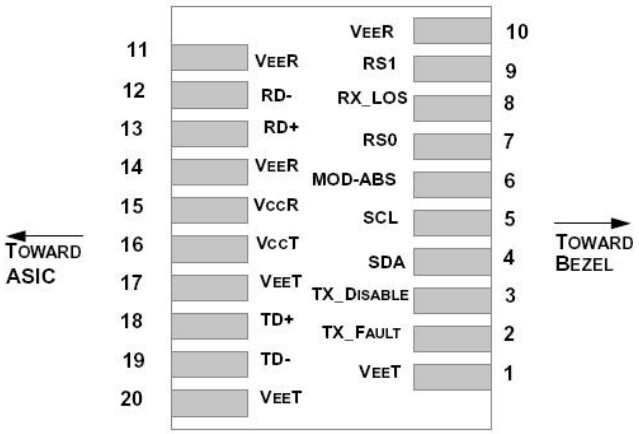

Figure 7 Pin View for SFP28

Table6-SFP28 Pin Function Definition

Pin	Symbol	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)	1
5	SCL	2-Wire Serial Interface Clock (MOD-DEF1)	
6	MOD_ABS	Module Absent, connected to VEET or VEER 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	VEER	Module Receiver Ground	1
11	VEER	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Non-Inverted Data Output	
14	VEER	Module Receiver Ground	1
15	VCCR	Module Receiver 3.3 V Supply	
16	VCCT	Module Transmitter 3.3 V Supply	1
17	VEET	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VEET	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.

Mechanical

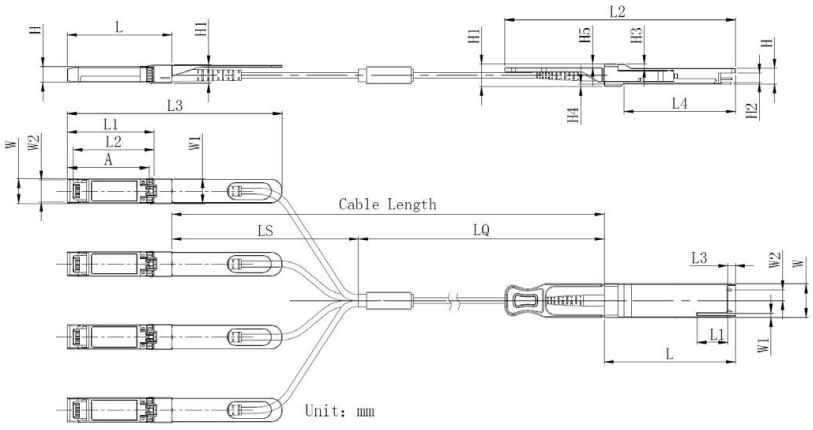

Figure 8 Mechanical Diagram

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

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)		

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