100G QSFP28 to 4xSFP28 breakout Active Optical Cable Specification

1 Description：

100G QSFP28 to 4xSFP28 active optical cable is a high-performance, low-power, long-distance interconnection solution that supports100G.

100G QSFP to 4xSFP28 is a combination of 4 full-duplex channels, each of which can transmit data at a rate of up to 25.78125GB/s, providing an aggregation rate of 100GB/s.

100G QSFP to 4xSFP28 active optical cable (AOC) can be used as an alternative to QSFP28 passive and active copper cables.

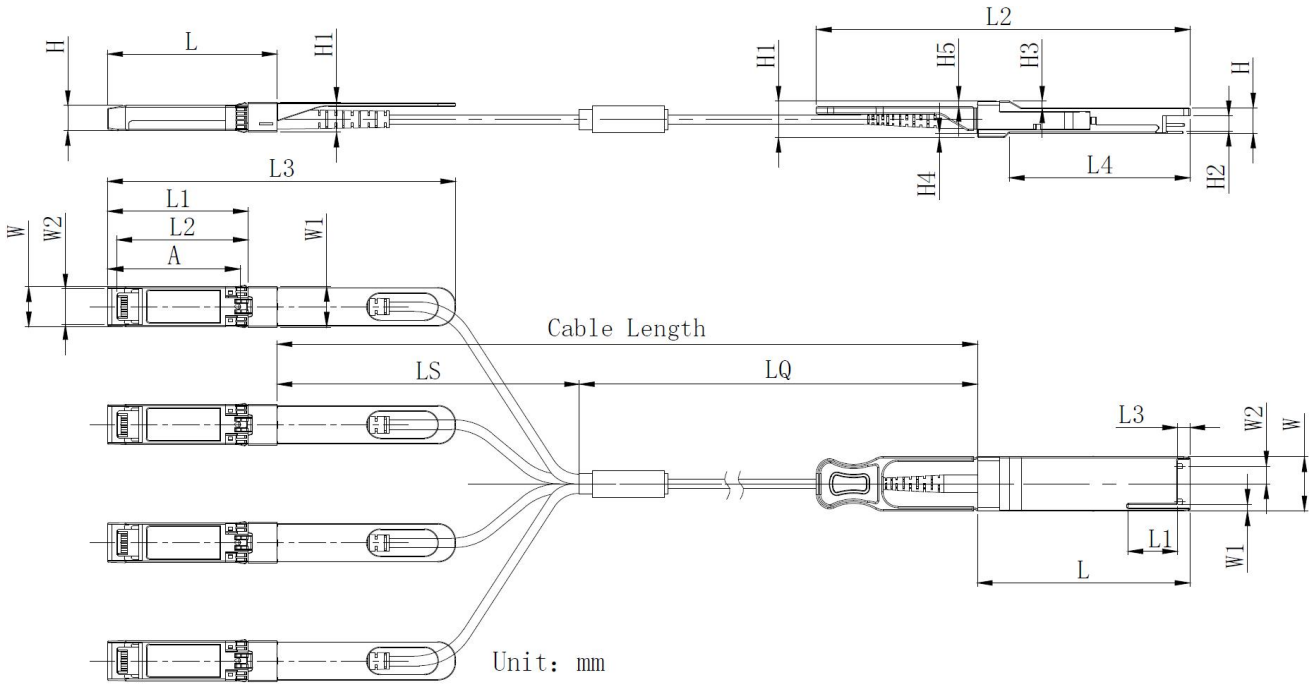
2.Features

- Support 4x25GBASE-SR application
- 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

3.Applications

- 4x25Gbe-SR
- Servers, switches, storage and host card adapters

4 Outline drawing:



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 1 Mechanical Diagram

4.1- 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),Megenta(OM4)	

4.2 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

5 Wiring Diagram：

5.1 QSFP pin

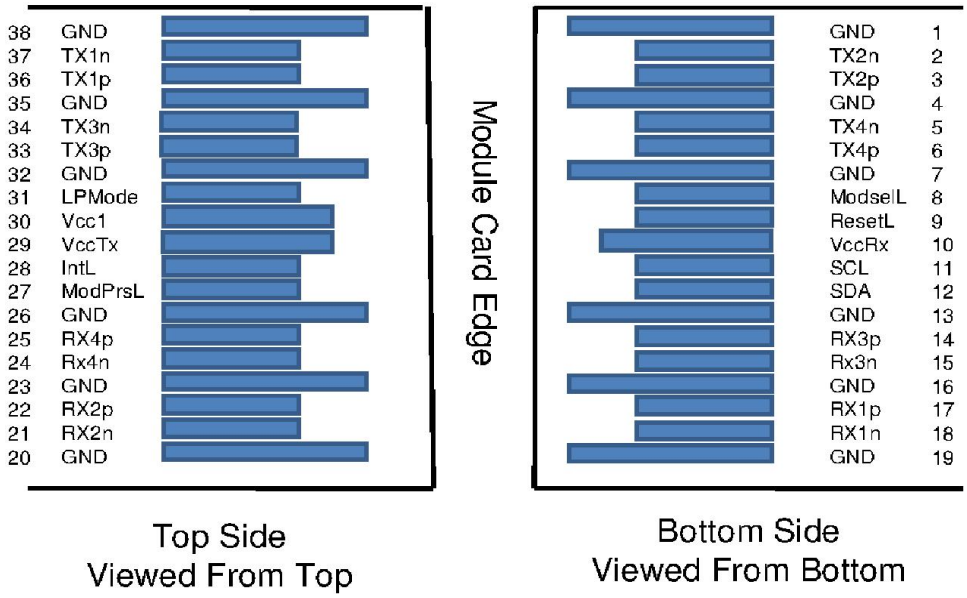


Figure 2 Pin View for QSFP28

5.2 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.

5.3 SFP+ pin design

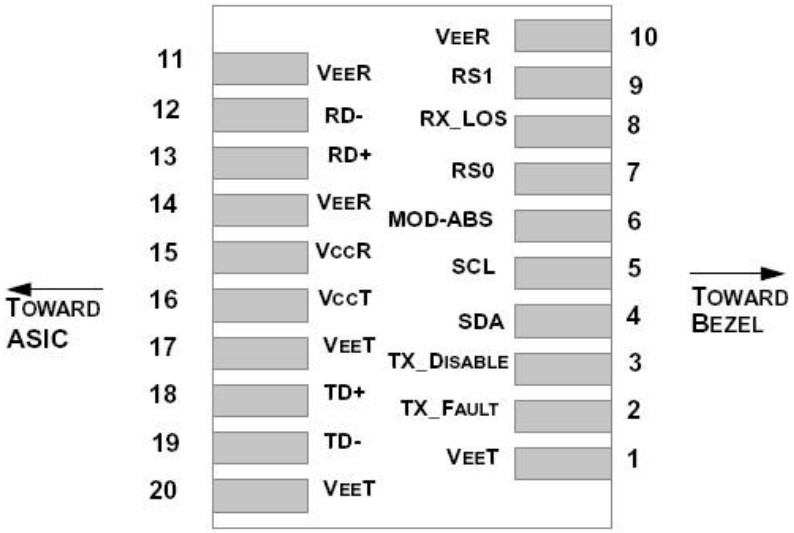


Figure 3 Pin View for SFP28

5.4- SFP+ pin description

Pin	Symbol	Name/Description	Notes
1	$V_{EE}T$	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.**

6 Recommended Operating Conditions

6.1Recommended 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

6.2 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

7 Electrical Characteristics

7.1 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

7.2Electrical 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