40G QSFP to 4xSFP+ breakout Active Optical Cable Specification

1 Description:

40G QSFP to 4xSFP+ active optical cable is a high-performance, low-power, long-distance interconnection solution that supports 40G.

40G QSFP to 4xSFP+ is a combination of 4 full-duplex channels, each of which can transmit data at a rate of up to 10GB/s, providing an aggregation rate of 40GB/s.

40G QSFP to 4xSFP+ active optical cable (AOC) can be used as an alternative to QSFP passive and active copper cables, while providing improved signal integrity, longer distances, superior electromagnetic immunity and better bit error rate performance.

2 Product Features

- Electrical interface compliant to QSFP+ connector (SFF-8436) and SFP+ connectors (SFF-8431)
- Hot Pluggable
- 850nm VCSEL transmitter, PIN photo-detector receiver
- Operating case temperature: 0 to 70℃
- 3.3V power supply voltage

3 Applications :

- 40 Gigabit Ethernet
- Fibre Channel Applications
- InfiniBand QDR, SDR, DDR
- Servers, switches, storage and host card adapters

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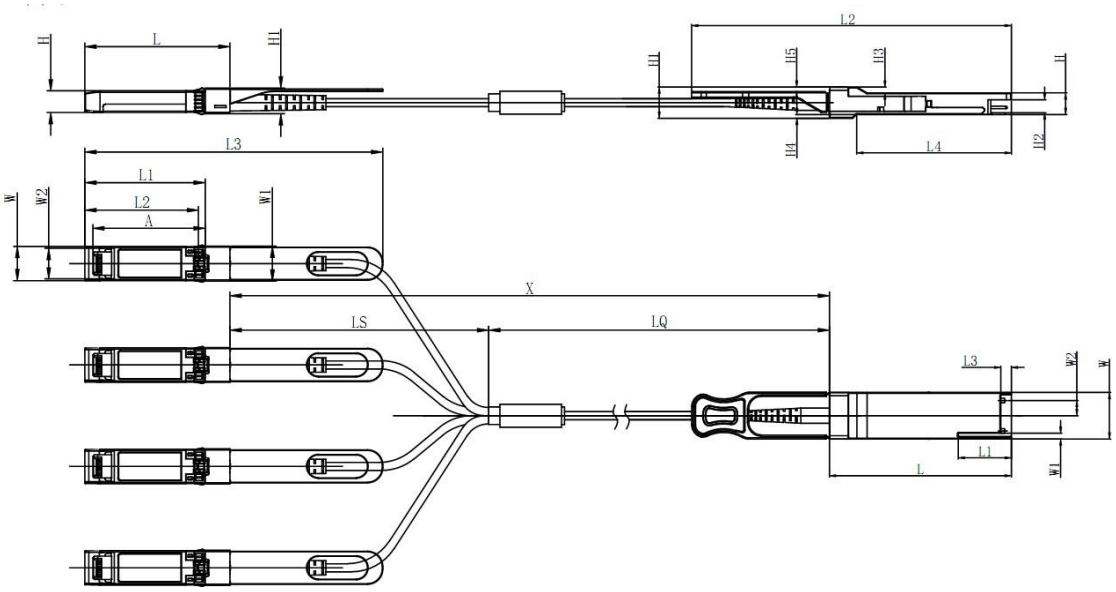
4 Outline drawing:

4.1



Unit mm

QSFP+	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	-

SFP+	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

4.2 length tolerance

Cable Length（Unit: m）	Tolerant（Unit: cm）
＜1.0	+5/-0
1.0~4.5	+15/-0
5.0~14.5	+30/-0
≥15.0	+2%/-0

4.3 Cable branch 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

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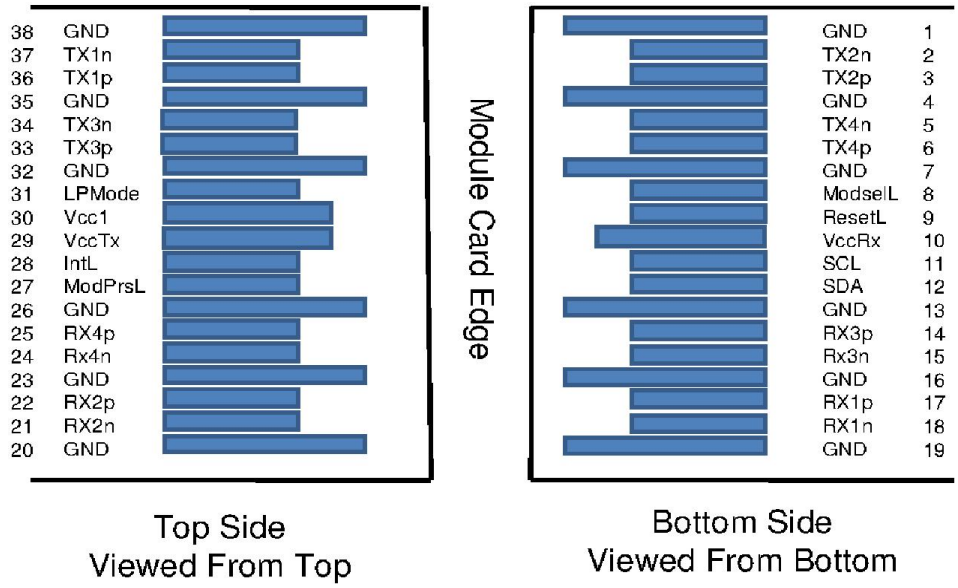
15	12	3
20	17	3
25	22	3
30	27	3
40	37	3
50	47	3

5 Wiring Diagram：

5.1 QSFP pin

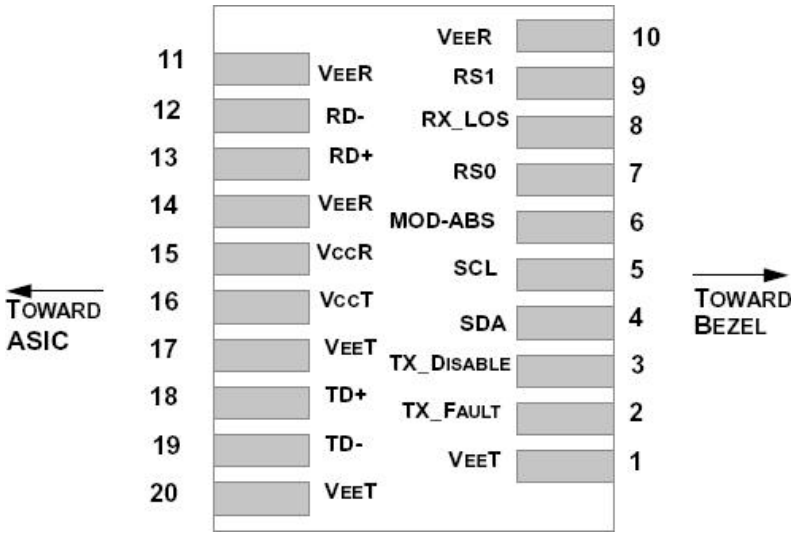


5.2 QSFP pin description

PIN	Name	Function/Description
1	GND	Module Ground
2	Tx2n	Transmitter inverted data input
3	Tx2p	Transmitter non-inverted data input
4	GND	Module Ground
5	Tx4n	Transmitter inverted data input
6	Tx4p	Transmitter non-inverted data input
7	GND	Module Ground
8	MODSEIL	Module Select
9	ResetL	Module Reset
10	VCCRx	+3.3v Receiver Power Supply
11	SCL	2-wire Serial interface clock
12	SDA	2-wire Serial interface data
13	GND	Module Ground
14	RX3p	Receiver non-inverted data output
15	RX3n	Receiver inverted data output
16	GND	Transmitter Power Supply
17	RX1p	Receiver non-inverted data output

18	RX1n	Receiver inverted data output
19	GND	Module Ground
20	GND	Module Ground
21	RX2n	Receiver inverted data output
22	RX2p	Receiver non-inverted data output
23	GND	Module Ground
24	RX4n	Receiver inverted data output
25	RX4p	Receiver non-inverted data output
26	GND	Module Ground
27	ModPrsL	Module Present, internal pulled down to GND
28	IntL	Interrupt output, should be pulled up on host board
29	VCCTx	+3.3v Transmitter Power Supply
30	VCC1	+3.3v Power Supply
31	LPMode	Low Power Mode
32	GND	Module Ground
33	Tx3p	Transmitter non-inverted data input
34	Tx3n	Transmitter inverted data input
35	GND	Module Ground
36	Tx1p	Transmitter non-inverted data input
37	Tx1n	Transmitter inverted data input
38	GND	Module Ground

5.3 SFP+ pin design



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5.4 SFP+ pin description

PIN	Name	Function/Description
1	VEET	Module Transmitter Ground
2	TX_FAULT	Module Transmitter Fault
3	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output
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
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)
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter
10	$V_{EE}R$	Module Receiver Ground
11	$V_{EE}R$	Module Receiver Ground
12	RD-	Receiver Inverted Data Output
13	RD+	Receiver Non-Inverted Data Output
14	$V_{EE}R$	Module Receiver Ground
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
18	TD+	Transmitter Non-Inverted Data Input
19	TD-	Transmitter Inverted Data Input
20	$V_{EE}T$	Module Transmitter Ground

6. 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 QSFP+	Pd	-	-	1.5	W	
Power Dissipation per SFP+	Pd	-	-	0.6	W	1
Bit Rate per Lane	BR	-	10.3125	-	Gbps	

6.1. Absolute Maximum Ratings:

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc_3	-0.5	-	+3.6	V	
Storage Temperature	T_s	-10	-	+70	°C	
Operating Humidity	RH	+5	-	+85	%	1

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7. Electrical Characteristics:

7.1 QSFP+

Parameter		Symbol	Min.	Typ.	Max.	Units	Notes
ModSelL	Module Select	V_{OL}	0	-	0.8	V	
	Module Unselect	V_{OH}	2.5	-	V_{CC}	V	
LPMode	Low Power Mode	V_{IL}	0	-	0.8	V	
	Normal Operation	V_{IH}	2.5	-	V_{CC}+0.3	V	
ResetL	Reset	V_{IL}	0	-	0.8	V	
	Normal Operation	V_{IH}	2.5	-	V_{CC}+0.3	V	
ModPrsL	Normal Operation	V_{OL}	0	-	0.4	V	
IntL	Interrupt	V_{OL}	0	-	0.4	V	
	Normal Operation	V_{oH}	2.4	-	V_{CC}	V	
Electrical Transmitter Characteristics							
Differential Date Input Swing		V_{out}	200	-	1600	mV	
Output Differential Impedance		Z_D	90	100	110	Ω	
Electrical Receiver Characteristics							
Differential Data Output Swing		$V_{in,P-P}$	350	-	800	mV_{PP}	
Bit Error Rate		BER			E-12		1
Input Differential Impedance		Z_{IN}	90	100	110	Ω	

7.2 SFP+

Parameter		Symbol	Min.	Typ.	Max.	Units	Notes
Electrical Transmitter Characteristics							
Differential Data Input Swing		$V_{in,P-P}$	200	-	1600	mV_{PP}	
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
Tx_Fault	Normal Operation	V_{OL}	0	-	0.8	V	
	Transmitter Fault	V_{OH}	2.0	-	V_{CC}	V	
Tx_Disable	Normal Operation	V_{IL}	0	-	0.8	V	
	Laser Disable	V_{IH}	2.0	-	V_{CC}+0.3	V	
Electrical Receiver Characteristics							
Differential Date Output		V_{out}	370	-	1600	mV	
Output Differential Impedance		Z_D	90	100	110	Ω	
Rx_LOS	Normal Operation	V_{OL}	0	-	0.8	V	
	Lose Signal	V_{oH}	2.0	-	V_{CC}	V	

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