

## 40G QSFP+ Active Optical Cable

### Product Features

- Compliant to QSFP+ Electrical MSA SFF-8436
- Multi rate of up to 10.3125Gbps
- Single +3.3V power supply
- Low power dissipation: < 1.5W
- Operation case temperature: 0 to 70°C
- 850nm VCSEL transmitter, PIN photo-detector receiver
- Maximum link length: 150m on OM3 MMF
- RoHS-6 compliant



### Applications

- 40GBASE-SR4 at 10.3125Gbps per lane
- InfiniBand QDR
- Switches, Routers, and HBAs

### Absolute Maximum Ratings

Parameter	Unit	Min.	Typical	Max.	Notes
Storage Temperature	°C	-40		85	
Operating Relative Humidity	%	5		85	
Power Supply not Damaged Voltage	V	-0.5		3.6	

### Recommended Operating Conditions

Parameter	Unit	Min.	Typical	Max.	Notes
Storage Temperature	°C	-40		85	
Operating Case Temp for C-temp	°C	0		70	
Power Supply Voltage	V	3.135	3.3	3.465	
Power Consumption per terminal	W			1.5	
Bit Rate per Lane	Gbps		10.3125		
Bit Error Rate				10 <sup>-12</sup>	

**Electrical Characteristics**

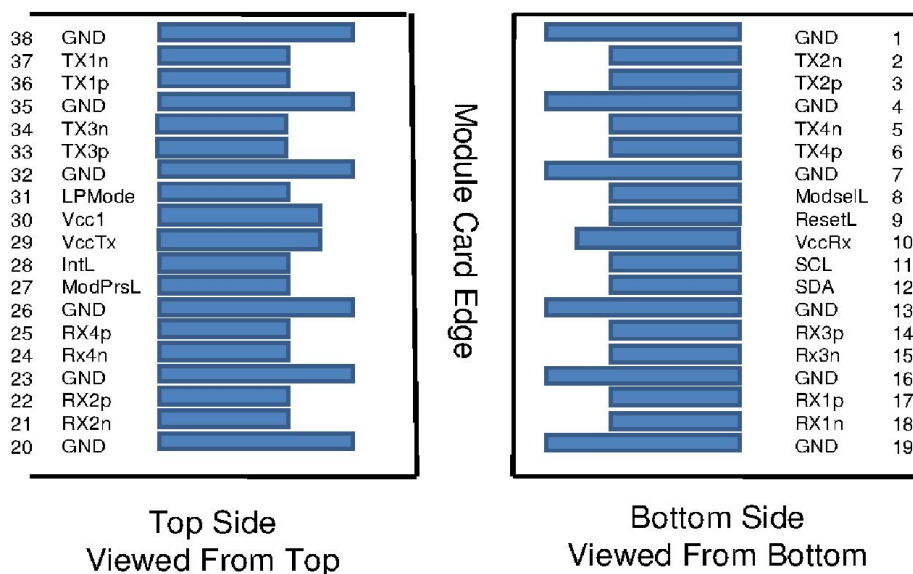
Parameter		Unit	Min.	Typical	Max.	Notes
<b>Transmitter</b>						
Data Input Swing Differential		mVp-p	200	-	1000	
Data Differential Impedance		Ω	90	100	110	
ModSelL	Module Select	V	$V_{EE}-0.3$		0.4	
	Module Unselect	V	2		$V_{CC}+0.3$	
LPMode	Low Power Mode	V	$V_{EE}-0.3$		0.8	
	Normal Operation	V	2		$V_{CC}+0.3$	
ResetL	Reset	V	2		$V_{CC}+0.3$	
	Normal Operation	V	2		$V_{CC}+0.3$	
<b>Receiver</b>						
Data Output Swing Differential		mVp-p	200	-	1000	
Data Differential Impedance		Ω	90	100	110	
ModPrsL	Normal Operation	V	$V_{EE}-0.3$		0.4	
IntL	Interrupt	V	$V_{EE}-0.3$		0.4	
	Normal Operation	V	2		$V_{CC}+0.3$	
Bit Error Rate					$10^{-12}$	1

Note1: PRBS2<sup>31</sup>-1@10.3125Gbps

**PIN Definition**

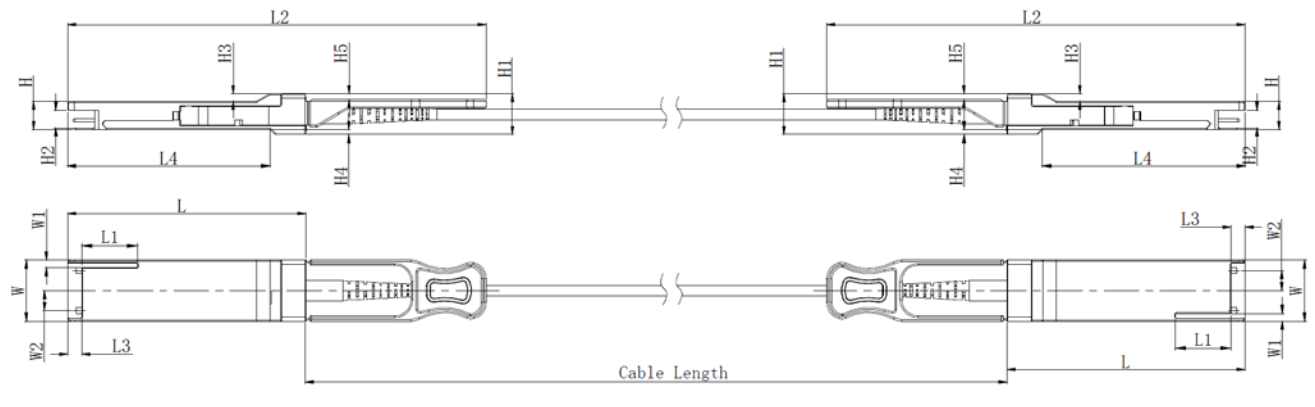
Pin No.	Symbol	Level / Logic	Description
1	GND		Module Ground
2	Tx2n	CML-I	Transmitter Inverted Data Input
3	Tx2p	CML-I	Transmitter Non-Inverted Data Input
4	GND		Module Ground
5	Tx4n	CML-I	Transmitter Inverted Data Input
6	Tx4p	CML-I	Transmitter Non-Inverted Data Input
7	GND		Module Ground
8	ModSelL	LVTTTL-I	Module Select
9	ResetL	LVTTTL-I	Module Reset
10	VccRx		+3.3V Power Supply for Receiver
11	SCL	LVTTTL-I	2-Wire Serial Interface Clock
12	SDA	LVTTTL-I/O	2-Wire Serial Interface Data Line
13	GND		Module Ground
14	Rx3p	CML-O	Receiver Non-Inverted Data Output
15	Rx3n	CML-O	Receiver Inverted Data Output

16	GND		Module Ground
17	Rx1p	CML-O	Receiver Non-Inverted Data Output
18	Rx1n	CML-O	Receiver Inverted Data Output
19	GND		Module Ground
20	GND		Module Ground
21	Rx2n	CML-O	Receiver Inverted Data Output
22	Rx2p	CML-O	Receiver Non-Inverted Data Output
23	GND		Module Ground
24	Rx4n	CML-O	Receiver Inverted Data Output
25	Rx4p	CML-O	Receiver Non-Inverted Data Output
26	GND		Module Ground
27	ModPrsL	LVTTL-O	Module Present
28	IntL	LVTTL-O	Interrupt
29	VccTx		+3.3V Power Supply for Transmitter
30	Vcc1		+3.3V Power Supply
31	LPMODE	LVTTL-I	Low Power Mode
32	GND		Module Ground
33	Tx3p	CML-I	Transmitter Non-Inverted Data Input
34	Tx3n	CML-I	Transmitter Inverted Data Input
35	GND		Module Ground
36	Tx1p	CML-I	Transmitter Non-Inverted Data Input
37	Tx1n	CML-I	Transmitter Inverted Data Input
38	GND		Module Ground

**Electrical Pad Layout**


**Cable Mechanical Specifications**

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

**Mechanical Specifications**

**Unit mm**

	L	L1	L2	L3	L4	W	W1	W2	H	H1	H2	H3	H4	H5
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
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

**ESD**

This product 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 product is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

**Laser Safety**

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

**Ordering Information**

Ordering P/Ns	Description
DH88kk-QCCA-xxx	up to 150m, 850nm, 40G QSFP+ to 40G QSFP+ AOC

XXX	Cable (MMF) Length
001	001=1m
⋮	⋮
075	075=75m
⋮	⋮
150	150=150m

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