

## 40G QSFP+ to 40G QSFP+ Active Optical Cables HTOC-QQA4-xx01MB

### **Feature**

- ◆ SFF-8436 QSFP+ compliant
- ◆ Transmission data rate up to 10.3Gbps per channel
- ◆ Hot-pluggable electrical interface
- ◆ 4 channels 850nm VCSEL array
- ◆ 4 channels PIN photo-detector array
- ◆ Up to 150m on OM4 MMF
- ◆ Low power consumption < 1.5W
- ◆ Operating case temperature range 0°C to +70°C
- ◆ RoHS compliant (lead free)

### **Applications**

- ◆ IEEE 802.3ba 40GBASE-SR4
- ◆ InfiniBand SDR/DDR/QDR

### **Standards**

- ◆ IEEE 802.3ba 40GBASE-SR4
- ◆ SFF-8436
- ◆ ROHS

### **Description**

The Hirundo's HTOC-QQA4-xx01MB QSFP+ Active Optic Cables (AOCs) are direct-attach fiber assemblies with QSFP+ connectors, compliant with the QSFP MSA, 40G Ethernet IEEE 802.3ba 40GBASE-SR4 standards. They are suitable for short distances and offer a cost-effective solution to connect within racks and across adjacent racks. The 40G QSFP+ AOC is an assembly of 4 full-duplex lanes and each lane is capable of transmitting data at rates up to 10.3Gb/s, providing an aggregated rate of 41.25Gb/s. The length is up to 150 meters using OM4 MMF.

## 1. Ordering Information

**Table 1.1 Ordering Information**

Part No.	Specifications							
	Package	Date rate (Gbps)	Wavelength (nm)	Optical Power (dBm)	Bit Error Rate	Temp (°C)	Reach (m)	Other
HTOC-QQA4-xx01MB <sup>[1]</sup>	QSFP+	41.25	850	-7.6~2.4	E <sup>-12</sup>	0~70	150	DDM
<b>PN</b>	HTOC-QQA4-xx01MB <sup>[1]</sup>							
<b>Description</b>	40G QSFP+ to QSFP+ Active Optical Cables, up to 150m, 0-70°C							
<b>SAP No</b>	-							
<b>Customer PN</b>	-							

**Notes:**

1. Refer to Chapter 10 Ordering Information.

## 2. Revision History

**Table 2.1 Revision History**

Version	Initiated	Reviewed	Revision	Date
V1.0	Leo	Virgil	LiuSJ	2020.12.30

## 3. Absolute Maximum Ratings and Recommended Operating Conditions

**Table 3.1 Absolute Maximum Ratings**

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Relative Humidity	RH	%	5	85
Power Supply Voltage	Vcc	V	-0.5	4.0
Signal Input Voltage		V	-0.3	Vcc+0.3
Receiver Damage Threshold		dBm	+2.4	

**Table 3.2 Recommended Operating Conditions**

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature	Tc	°C	0		70
Power Supply Voltage	Vcc	V	3.135	3.3	3.465
Power Dissipation	Pm	W			1.5
Bit Rate(Per channel)	BR	Gbps		10.3215	
Bit Error Ratio	BER				10 <sup>-12</sup>
Max Supported Link Length(OM4)	L	m			150

## 4. Specification

Table 4.1 Specification

Parameter	Symbol	Min	Typical	Max	Unit
<b>Transmitter (per Lane)</b>					
Centre Wavelength	$\lambda_c$	840	850	860	nm
RMS spectral width	$\sigma$			0.65	nm
Average launch power, each lane	PAVG	-7.6	-1	+2.5	dBm
Input differential swing	V <sub>in</sub> PP	300		1100	mV
Input differential impedance	Z <sub>in</sub>	90	100	110	$\Omega$
Extinction Ratio	ER	3.0			dB
<b>Receiver(per Lane)</b>					
Center Wavelength	$\lambda_c$	840	850	860	nm
Bit Error Rate	BER			E-12	
Receiver Overload	PinMAX	2.5			dBm
Output Differential swing	V <sub>out</sub> PP	500		800	mV
Output Differential Impedance	Z <sub>out</sub>	90	100	110	$\Omega$
<b>IIC communication</b>					
IIC Clock frequency	-	100		400	KHz

### 5. Module Memory Map

The common memory map for managed external cable interfaces is utilized for serial ID, digital monitoring and control functions. The map is arranged into a single lower page address space of 128 bytes and multiple upper address pages.

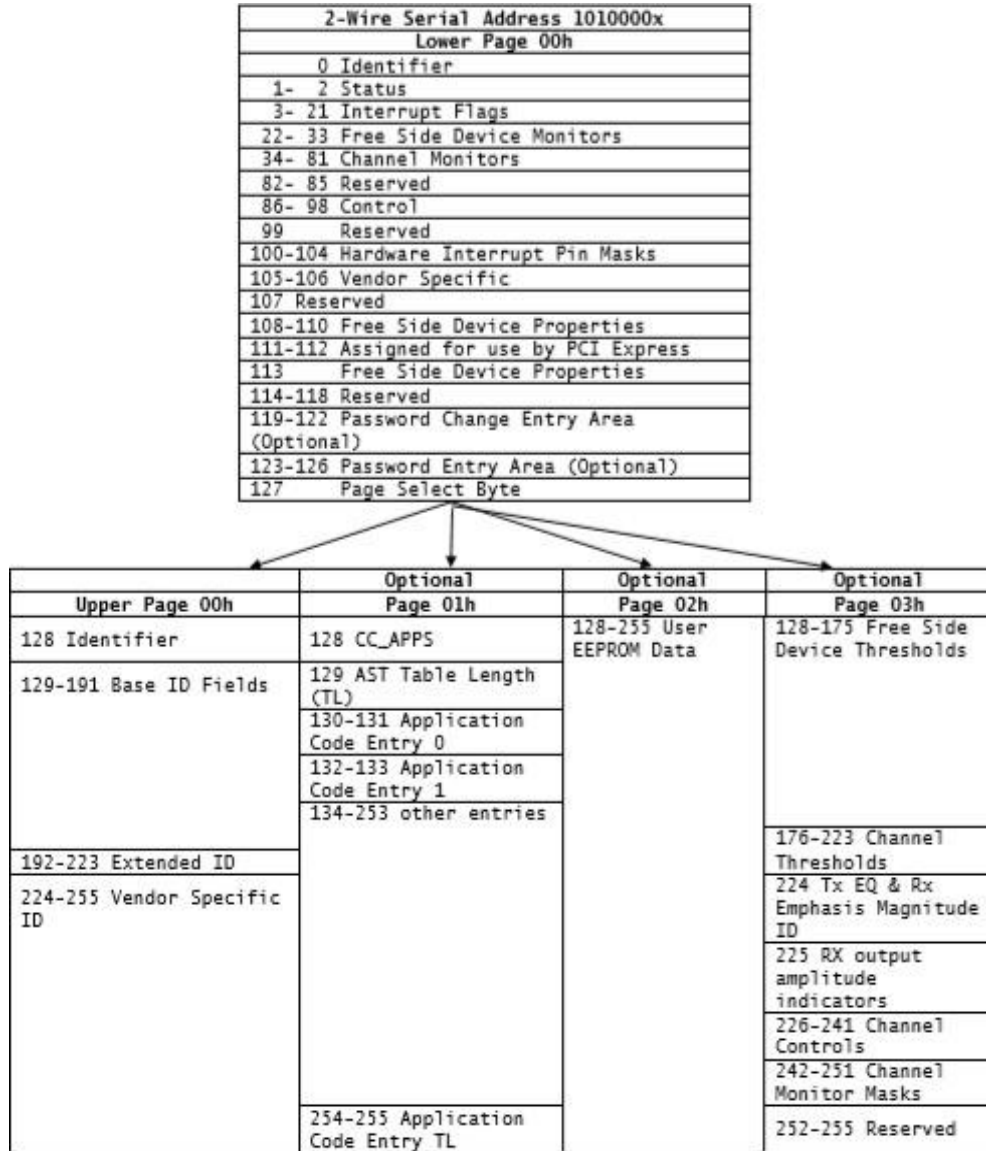


Figure 1 Digital Diagnostic Memory Map

## 6. Pin Assignment and Pin Description

### 6.1 Pin Assignment

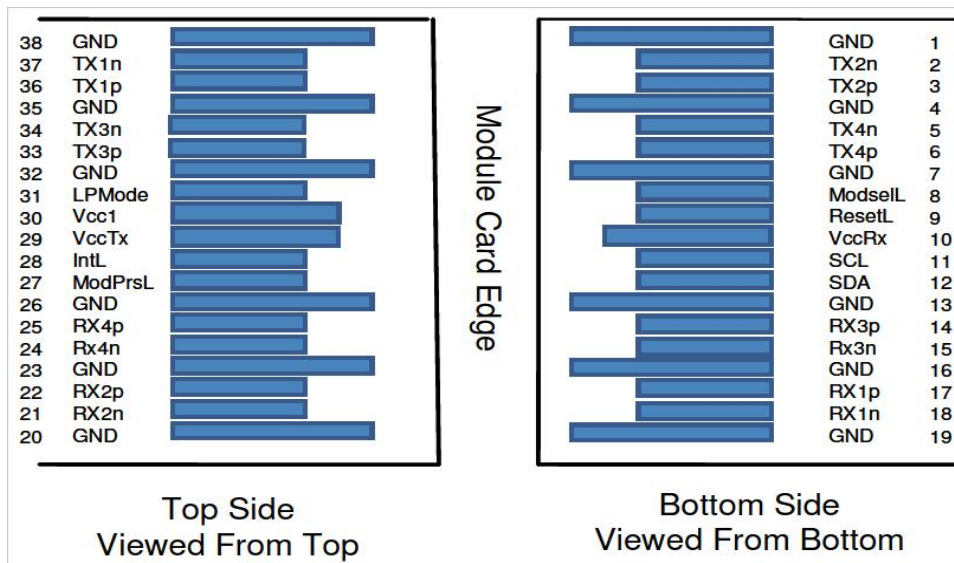


Figure 2 Electrical Pin-out Details

### 6.2 Pin Description

Table 6.1 Pin Description

Pin	Symbol	Name/Description	Note
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	ModSe1L	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	VccTx	+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

**Notes:**

1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane. Circuit ground is internally isolated from chassis ground.

### 7. Typical Application Circuit

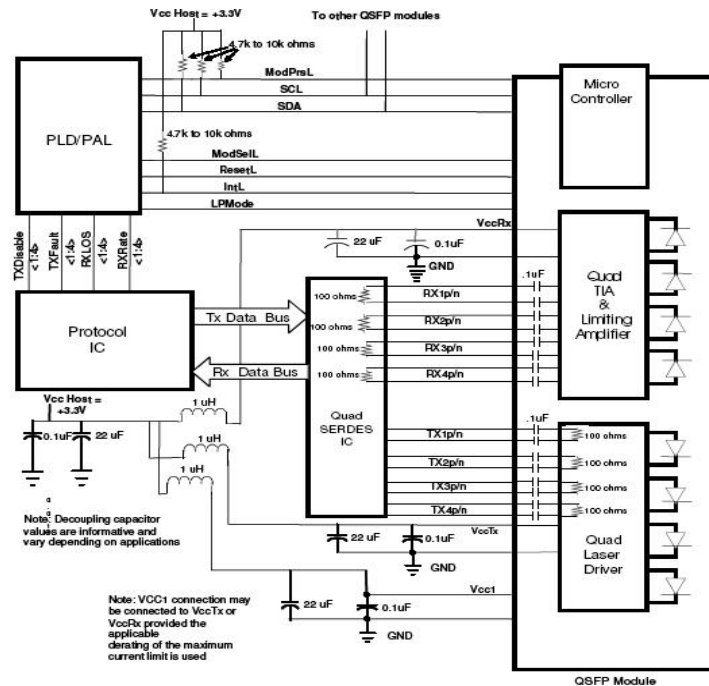


Figure 3 Typical application circuit

### 8. Package Dimensions

Figure 4 shows the package dimensions of the module. The module is designed to be compliant with QSFP+ MSA specification. Package dimensions are specified in SFF-8436.

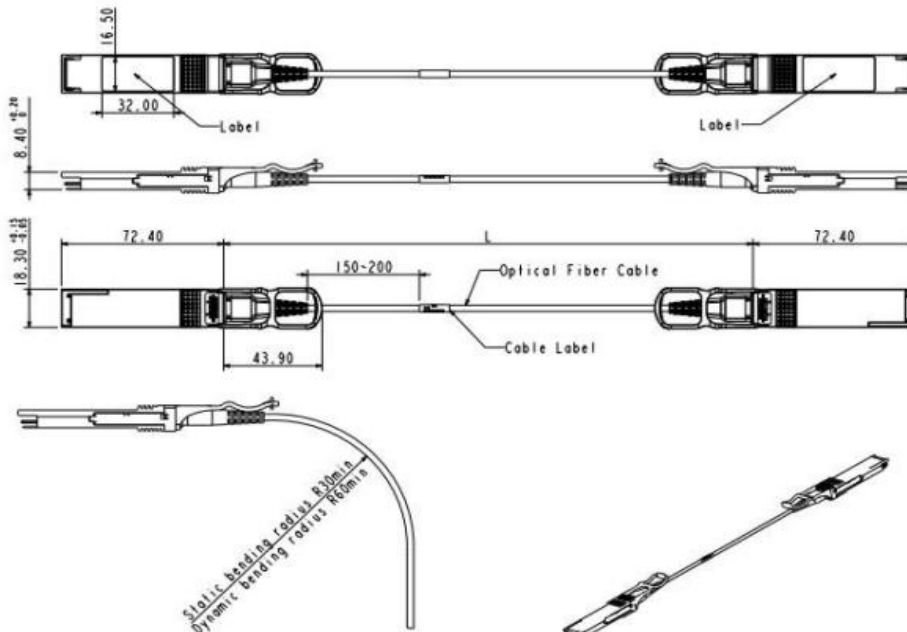


Figure 4 Package Dimensions

## 9. Ordering Information:

Table 9.1 Ordering Information

Part Number	Description
HTOC-QQA4-xx01MB	40G QSFP+ to QSFP+ Active Optical Cables, up to 150m, 0-70°C
<u>xx</u> :Represents: wire type, type has: O2/O3/O4/O5=OM2/OM3/OM4/OM5 01~150,1~150 Length in meters. (OM4 fiber is available)	

## 10. For More Information

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