

## 40G QSFP+ 2km FR4 Transceiver Specification

### HTQXP-4CA4-02BD

#### **Feature**

- ◆ QSFP+ MSA compliant
- ◆ Compliant to IEEE P802.3ba 40GBASE-IR4
- ◆ 4CH CWDM uncooled FP lasers, using ITU G.694.2 wavelength grid at 1271, 1291, 1311, and 1331 nm
- ◆ High-sensitivity PIN-TIA with optical DEMUX
- ◆ Up to 2km reach over standard single mode fiber
- ◆ Hot-pluggable electrical interface
- ◆ Power consumption < 3.5W
- ◆ Operating case temperature 0°C to +70°C
- ◆ 3.3V power supply
- ◆ RoHS-6 compliant(lead free)

#### **Applications**

- ◆ 40G Ethernet
- ◆ Data Centers

#### **Standards**

- ◆ QSFP+ MSA
- ◆ IEEE P802.3ba 40GBASE-IR4
- ◆ ROHS Compliant

#### **Description**

The Hirundo' s HTQXP-4CA4-02BD transceiver is designed to transmit and receive serial optical data over single mode fiber with 2km. They are compliant with SFF-8436, and IEEE P802.3ba 40GBASE-IR4. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP+ MSA.

## 1. Ordering Information

**Table 1.1 Ordering Information**

Part No.	Specifications							
	Package	Date rate (Gbps)	Wavelength (nm)	Optical Power (dBm)	Sensitivity OMA(dBm)	Temp (°C)	Reach (km)	Connector
HTQXP-4CA4-02BD	QSFP+	4*10.3125	1271 1291 1311 1331	-10~2.3	<-10.5	0~70	2	LC
<b>PN</b>	HTQXP-4CA4-02BD							
<b>Description</b>	40Gbps,SMF, 2km, 0-70°C							
<b>SAP No</b>	-							
<b>Customer PN</b>	-							

## 2. Revision History

**Table 2.1 Revision History**

Version	Initiated	Reviewed	Revision	Date
V1.0	Leo	Virgil	LiuSJ	2020.10.13

## 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	95
Power Supply Voltage	Vcc	V	-0.5	4.0
Signal Input Voltage		V	-0.3	Vcc+0.3
Receiver Damage Threshold		dBm	+3.4	

**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
Bit Rate(Per channel)	BR	Gbps		10.3215	
Bit Error Ratio	BER				10 <sup>-12</sup>
Max Supported Link Length	L	km			2

## 4. Optical Specification

**Table 4.1 Optical Specifications**

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Transmitter (per Lane)</b>						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	$\lambda_c$	nm	1264.5 1284.5 1304.5 1324.5	1271 1291 1311 1331	1277.5 1297.5 1317.5 1337.5	
Average Launch Power per Lane	TXP <sub>X</sub>	dBm	-10		2.3	
Side-Mode Suppression Ratio	SMSR	dB	30			
Optical Modulation Amplitude (OMA), each lane	P <sub>OMA</sub>	dBm	-6		3.5	
Optical Extinction Ratio	ER	dB	3.5			
Relative Intensity Noise	RIN	dB/Hz			-128	
Optical Return Loss Tolerance		dB			12	
Average launch power of OFF Transmitter, each lane		dBm			-30	
Transmitter Eye mask definition {X1,X2,X3, Y1,Y2,Y3}			{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			
<b>Receiver(per Lane)</b>						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	$\lambda_c$	nm	1264.5 1284.5 1304.5 1324.5	1271 1291 1311 1331	1277.5 1297.5 1317.5 1337.5	
Receiver sensitivity in OMA, each lane	R <sub>SENS</sub>	dBm			-10.5	Note1
Receiver Reflectance	R <sub>fl</sub>	dB			-26	
LOS De-Assert	LOSD	dBm			-14	
LOS Assert	LOSA	dBm	-30			
LOS Hysteresis		dB	0.5			

Note1: Measured with a PRBS 2<sup>31</sup>-1 test pattern, @10.3125Gb/s, BER<10<sup>-12</sup>.

## 5. Electrical Specification

**Table 5.1 Electrical Specifications**

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Supply Voltage	VCC	V	3.1	3.3	3.5	
Supply Current	ICC	A			1	
Power Consumption	Pc	W			3.5	
<b>Transmitter</b>						
Signaling rate per lane		Gbps		10.3125		
Input Differential Impedance	R <sub>IN</sub>	Ω	90	100	110	
Differential data input swing	V <sub>IN</sub>	mVp-p	180		1000	
<b>Receiver</b>						
Signaling rate per lane		Gbps		10.3125		
Output Differential Impedance	R <sub>OUT</sub>	Ω	90	100	110	
Differential data output swing	V <sub>OUT</sub>	mVp-p	300		850	
<b>IIC communication</b>						
IIC Clock frequency	-	KHz	100		400	

## 6. 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.

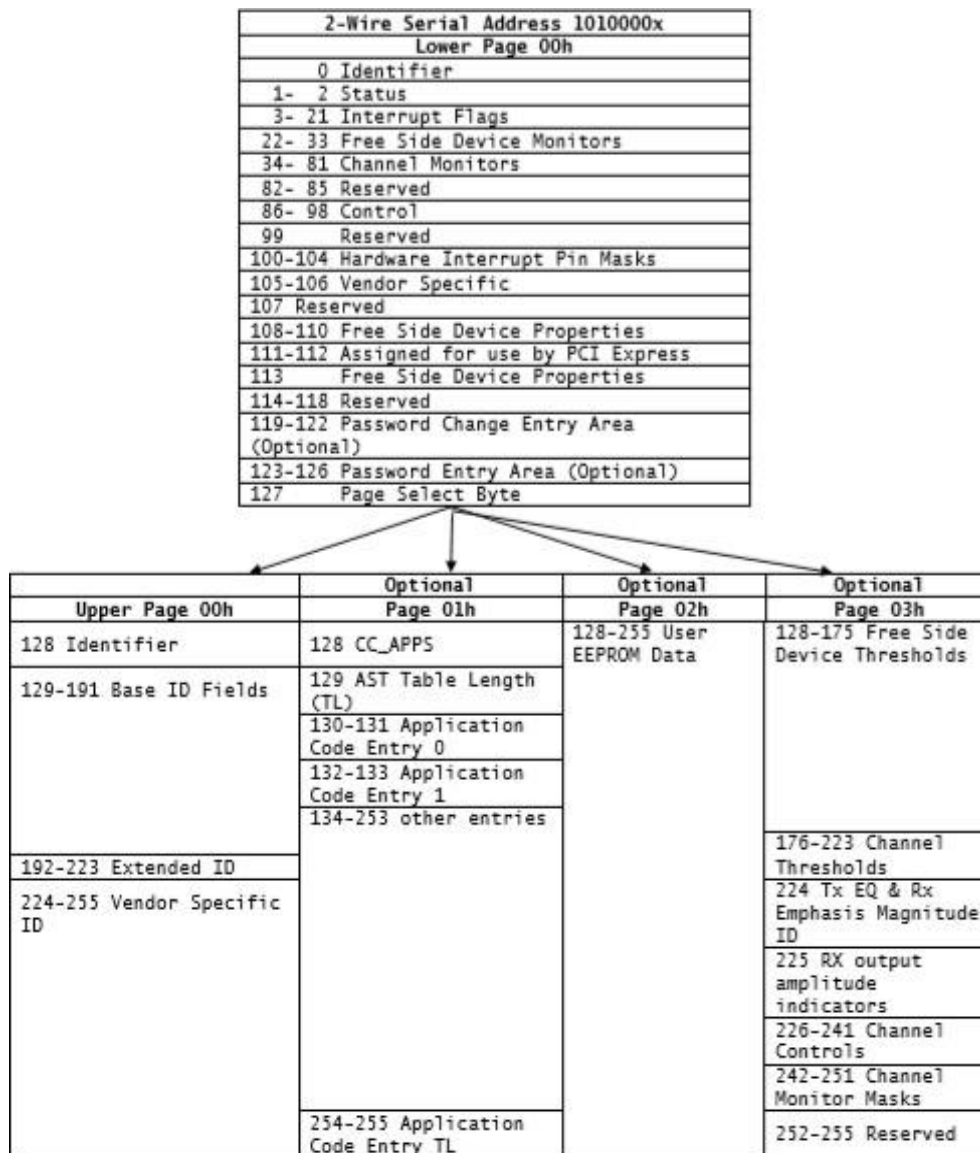


Figure 1 Digital Diagnostic Memory Map

## 7. Pin Assignment and Pin Description

### 7.1 Pin Assignment

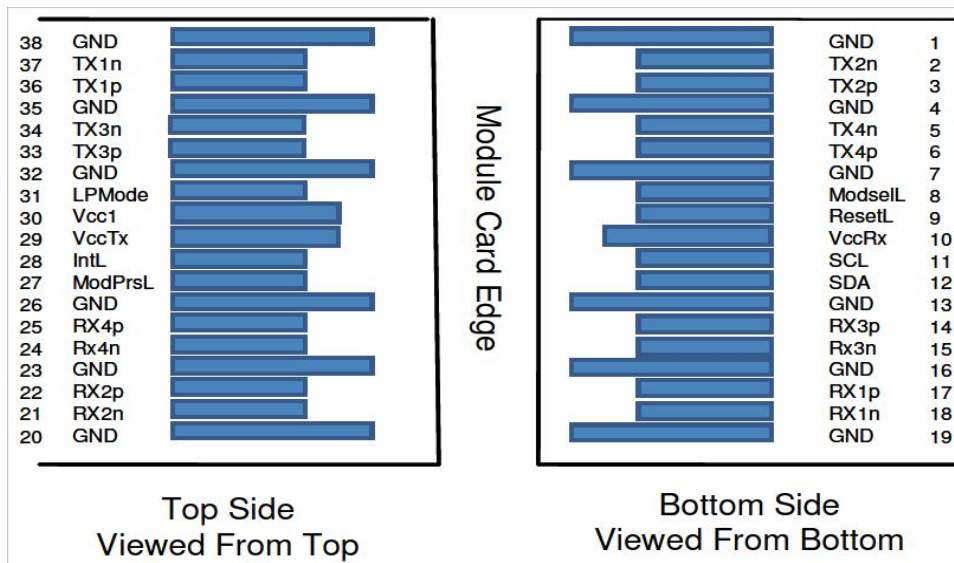


Figure 2 Electrical Pin-out Details

### 7.2 Pin Description

Table 7.1 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.

### 8. Typical Application Circuit

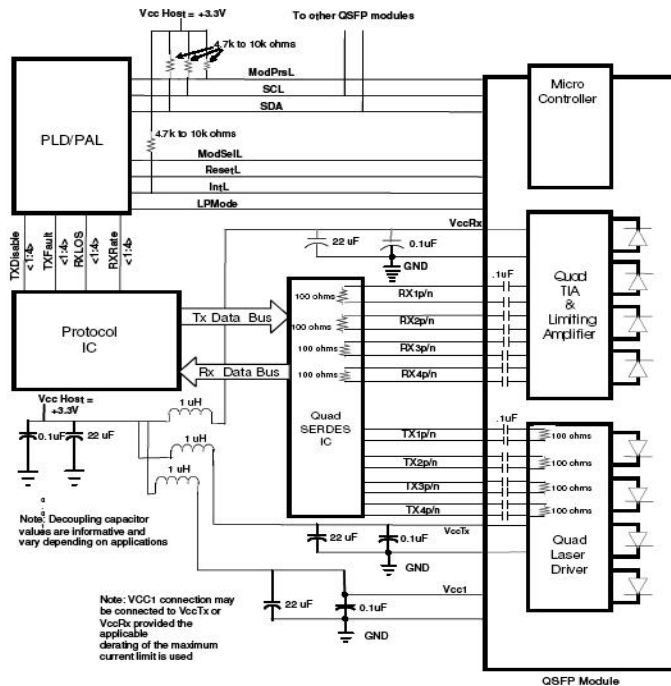


Figure 3 Typical application circuit

### 9. 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.

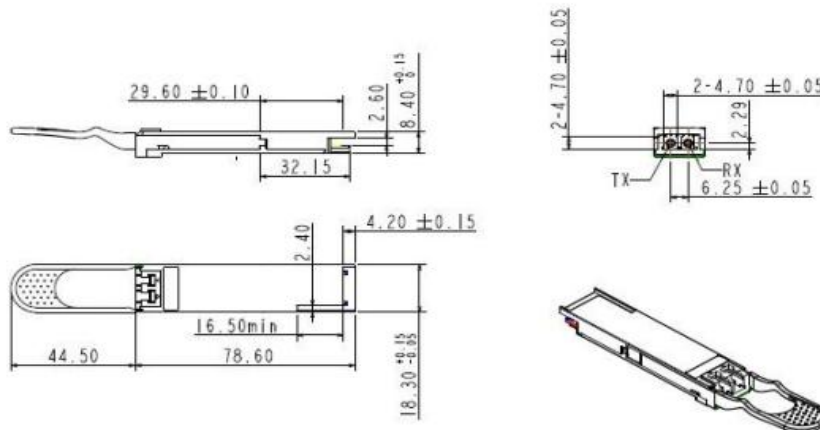


Figure 4 Package Dimensions



## 10. For More Information

Hirundo Optics Inc

2nd floor, building-6, #16 Xinfu Road South Cable industrial park Rongli Ronggui street  
Shunde district Foshan City, Guangdong province, China;

Zip Code: 528300

Tel. 0757-26619220

<http://www.hirundo-link.com/>