

## 100G QSFP28 2km CWDM4 Transceiver Specification

### HTQ28-4C04-02BD

#### **Feature**

- ◆ Supports 103.1Gbps aggregate bit rate
- ◆ 4x25Gbps electrical interface
- ◆ 4X25Gbps DFB CWDM transmitter and PIN/TIA receiver
- ◆ Maximum link length of 2km on Single Mode Fiber
- ◆ Hot pluggable QSFP28 footprint
- ◆ Duplex LC receptacles
- ◆ Single 3.3V power supply
- ◆ Maximum power dissipation<3.5W
- ◆ RoHS-6 compliant and lead-free
- ◆ I2C management interface
- ◆ 0°C to +70°C case operating temperature

#### **Applications**

- ◆ 100G Ethernet
- ◆ Data center
- ◆ Infiniband EDR

#### **Standards**

- ◆ QSFP MSA
- ◆ 100G CWDM4 MSA
- ◆ IEEE P802.3bm

#### **Description**

Hirundo ' s QSFP28 CWDM4 transceivers are designed for 100Gigabit Ethernet over 2km single mode fiber. The HTQ28-4C04-02BD is compliant with the 100G CWDM4 MSA and QSFP MSA. The module converts 4 input channels of 25Gb/s electrical data to 4 channels of CWDM4 optical signals and then multiplexes them into a single channel for 100Gb/s optical transmission. Reversely on the receiver side, the module de-multiplexes a 100Gb/s optical input into 4 channels of CWDM4 optical signals and then converts them to 4 output channels of electrical data.

## 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
HTQ28-4C04-02BD	QSFP28	4*25.78	CWDM4	-6.5~2.5	< -10	0~70	2	LC
<b>PN</b>	HTQ28-4C04-02BD							
<b>Description</b>	4X25Gbps,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	2020.12.04

## 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	%	0	95
Power Supply Voltage	Vcc	V	-0.5	+4.0
Signal Input Voltage		V	-0.3	Vcc+0.3
Receiver Damage Threshold		dBm	+3.5	

**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		25.78	
Bit Error Ratio	BER				5X10 <sup>-5</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		25.78125		
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	
Spectral Width(-20dB)	SW	nm			1	
Total Average Launch Power	Pout	dBm			8.5	
Transmit OMA per Lane	TxOMA	dBm	-4.0		2.5	
Average Launch Power per Lane	TXPx	dBm	-6.5		2.5	
Optical Extinction Ratio	ER	dB	3.5			
Transmitter and Dispersion Penalty per lane	TDP	dB			3	
Side-Mode Suppression Ratio	SMSR	dB	30			
Relative Intensity Noise	RIN	dB/Hz			-128	
Optical Return Loss Tolerance		dB			20	
Transmitter Reflectance		dB			-12	
Average launch power of OFF Transmitter, each lane		dBm			-30	
Transmitter Eye mask definition {X1,X2,X3, Y1,Y2,Y3}			{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}			Hit ratio 5x10 <sup>-5</sup>
<b>Receiver(per Lane)</b>						
Signaling rate per lane		Gbps		25.78125		
Center wavelength	$\lambda_{IN}$	nm	1264.5 1284.5 1304.5 1324.5	1271 1291 1311 1331	1277.5 1297.5 1317.5 1337.5	
Damage Threshold Per Lane	DT	dBm	3.5			
Average receive Power per Lane	RXPx	dBm	-		2.5	
RX Sensitivity (OMA) per Lane	R <sub>sens</sub>	dBm	-		-10	5x10 <sup>-5</sup> BER
Receiver reflectance	Rfl	dB			-26	
LOS De-Assert	LOSD	dBm			-11.6	
LOS Assert	LOSA	dBm	-24		-13.6	
LOS Hysteresis		dB	0.5	1.5	5	

## 5. Electrical Specification

**Table 5.1 Electrical Specifications**

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Supply Voltage	VCC	V	3.135	3.3	3.465	
Supply Current	ICC	A		1.06		
Power Consumption	Pc	W			3.5	
<b>Transmitter</b>						
Signaling rate per lane		Gbps		25.7812		
Input Differential Impedance	R <sub>IN</sub>	Ω	90	100	110	
Differential data input swing	V <sub>IN</sub>	mVp-p	180		900	
<b>Receiver</b>						
Signaling rate per lane		Gbps		25.7812		
Output Differential Impedance	R <sub>OUT</sub>	Ω	90	100	110	
Differential data output swing	V <sub>OUT</sub>	mVp-p	400		800	
<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.

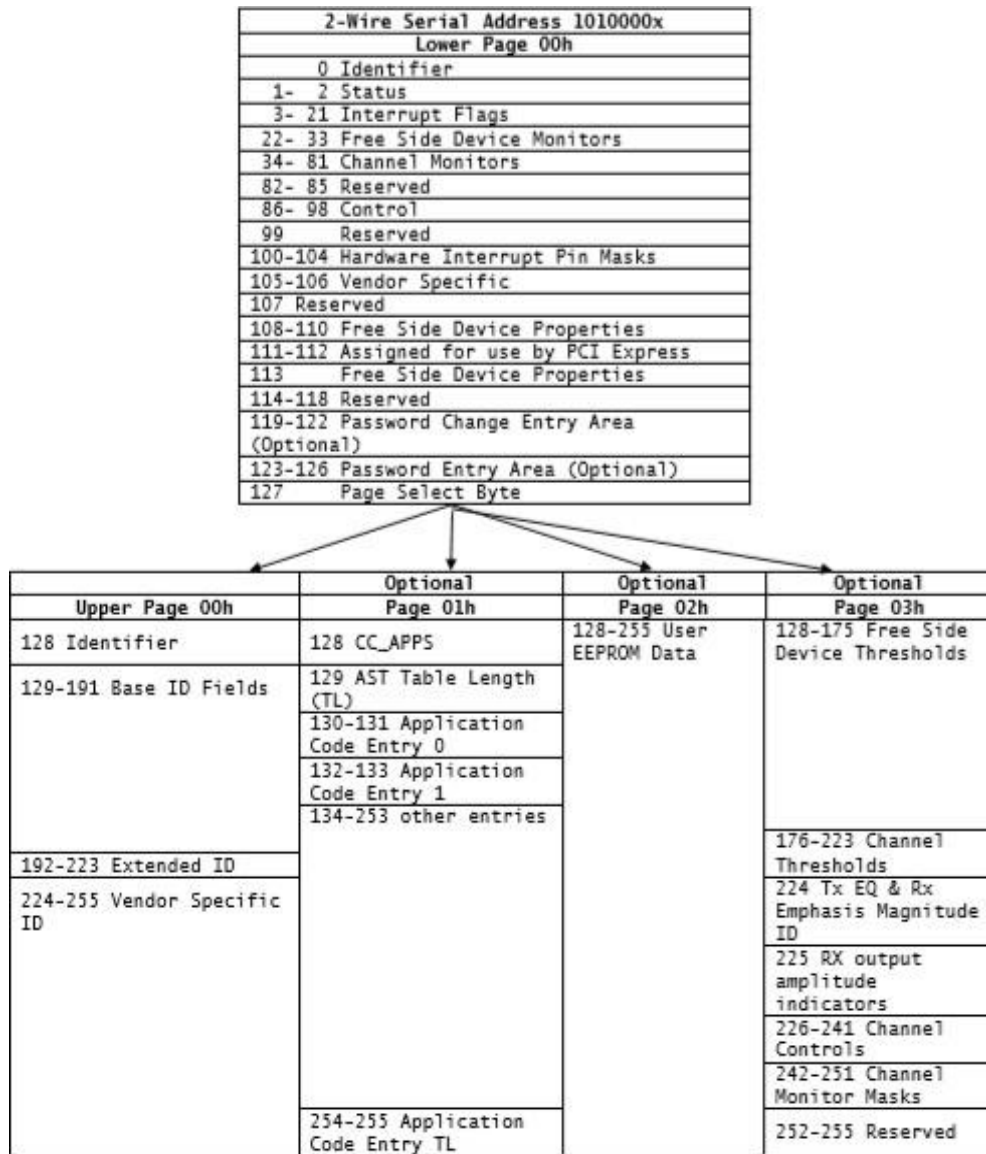


Figure 1 Digital Diagnostic Memory Map

## 7. Pin Assignment and Pin Description

### 7.1 Pin Assignment

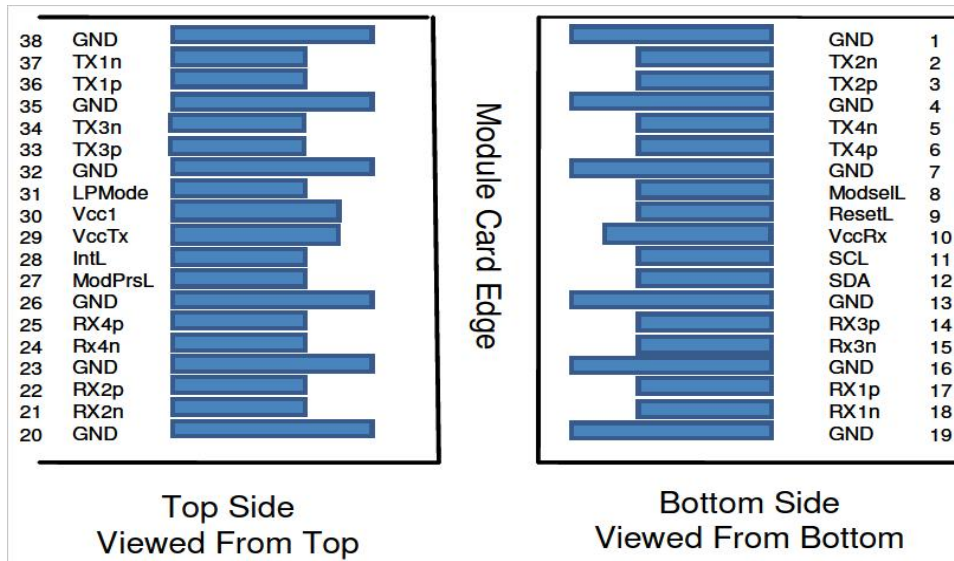


Figure 2 Electrical Pin-out Details

### 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 QSFP28 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**

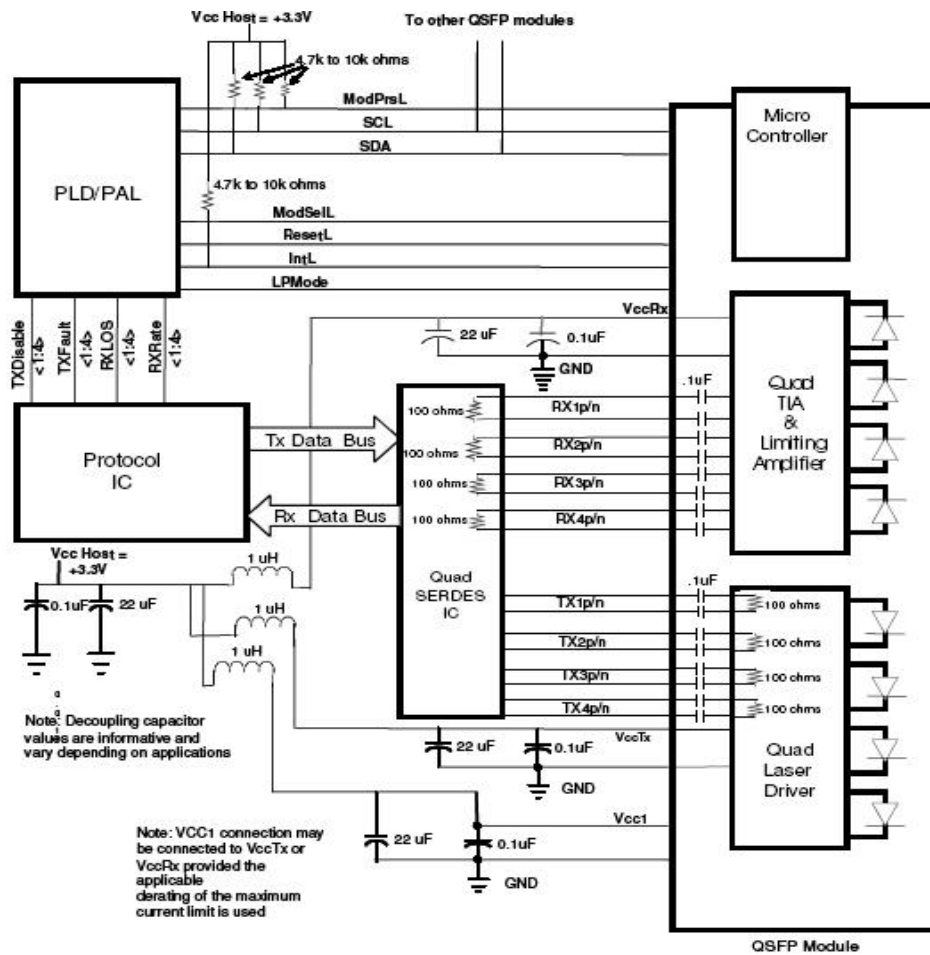


Figure 3 Typical application circuit

### 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-8665.

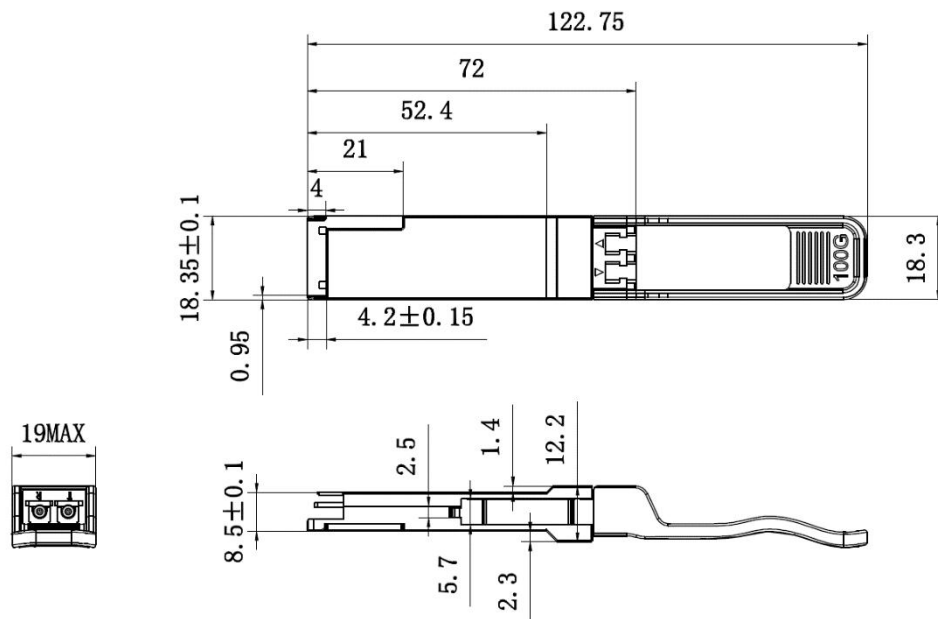


Figure 4 Package Dimensions

### 10. For More Information

Hirundo Optics Inc

2nd floor, building-6, #16 Xinfa 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/>