

## 10G SFP+ 10km CWDM Transceiver Specification

### HTPPC-xx96-10BD

#### **Feature**

- ◆ Optical interface compliant to IEEE 802.3ae 10GBASE-LR
- ◆ Digital Monitoring SFF-8472
- ◆ Compliant to SFP+ MSA
- ◆ Fully RoHS Compliant
- ◆ All metal housing for superior EMI performance
- ◆ Operating data rate up to 10.3125Gbps
- ◆ CWDM DFB transmitter from 1271nm to 1611nm
- ◆ PIN photo-detect
- ◆ LC duplex connector
- ◆ Hot pluggable 20pin connector
- ◆ Low power consumption <1.5 W
- ◆ 0°C to 70°C operating wide temperature range
- ◆ Single +3.3V±5% power supply

#### **Applications**

- ◆ 10G Ethernet

#### **Standards**

- ◆ IEEE802.3ae 10GBASE-LR
- ◆ SFF-8472 SFF-8431

#### **Description**

The Hirundo ' s HTPPC-xx96-10BD transceiver is designed to transmit and receive serial optical data over single mode optical fiber with 10km.They are compliant with SFF-8431,SFF-8432 and the IEEE 802.3ae standard. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## 1. Ordering Information

**Table 1.1 Ordering Information**

Part No.	Specifications							
	Package	Date rate (Gbps)	Wavelength (nm)	Optical Power (dBm)	Sensitivity (dBm)	Temp (°C)	Reach (km)	Connector
HTPPC-xx96-10BD	SFP+	10.3125	1271~1611	-2~3	<-14.5	0~70	10	LC
<b>PN</b>	HTPPC-xx96-10BD							
<b>Description</b>	10Gbps,SMF,10km, 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	2020-10-12

## 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
Signal Input Voltage		V	-0.3	Vcc+0.3

**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	BR	Gbps		10.3125	
Bit Error Ratio	BER				10 <sup>-12</sup>
Max Supported Link Length	L	Km			10

## 4. Optical Specification

**Table 4.1 Optical Specifications**

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Transmitter</b>						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	$\lambda_c$	nm	As per ITU-T G.694.2			
Side-Mode Suppression Ratio	SMSR	dB	30			
Optical Output Power	P <sub>out</sub>	dBm	-2		3	
Extinction Ratio	ER	dB	3.5			
Optical Power OMA	P <sub>OMA</sub>	dBm	-2.5			
Average Launch Power of OFF transmitter	P <sub>OFF</sub>	dBm			-30	
Relative Intensity Noise	R <sub>IN</sub>	dB/Hz			-128	
Transmitter Eye mask definition {X1,X2,X3, Y1,Y2,Y3}			Compliant with IEEE 802.3ae			
<b>Receiver</b>						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	$\lambda_{IN}$	nm	1260		1610	
Receiver Sensitivity	R <sub>SENSE</sub>	dBm			-14.5	Note1
Receiver Overload	P <sub>in</sub>	dBm			0.5	
Receiver Reflectance	R <sub>fl</sub>	dB			-12	
Receiver sensitivity in OMA		dBm			-12.6	Note1

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	3.135	3.3	3.465	
Supply Current	ICC	A			0.36	
Power Consumption	Pc	W		1.2	1.5	
<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		700	
<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 SFP modules implement the 2-wire serial communication protocol as defined in the SFP - 8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Figure 1.

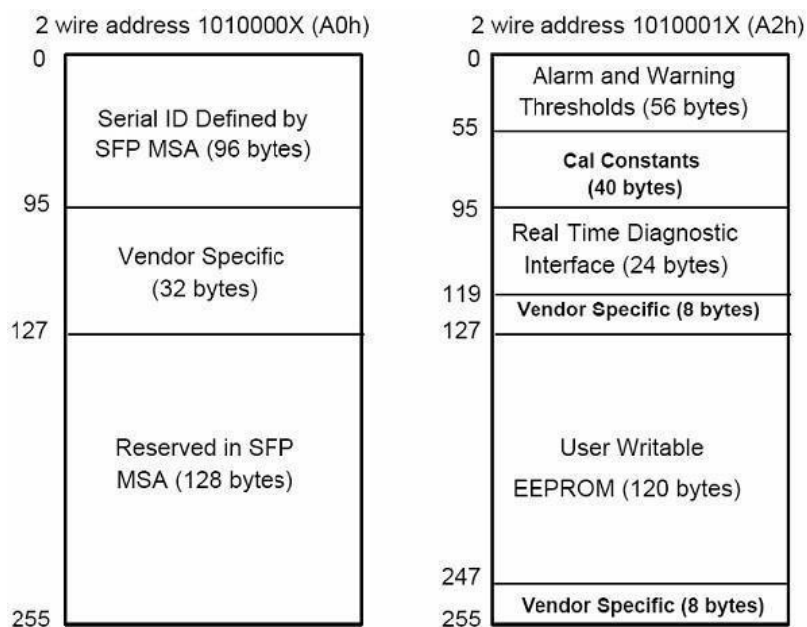


Figure 1 Digital Diagnostic Memory Map

## 7. Pin Assignment and Pin Description

### 7.1 Pin Assignment

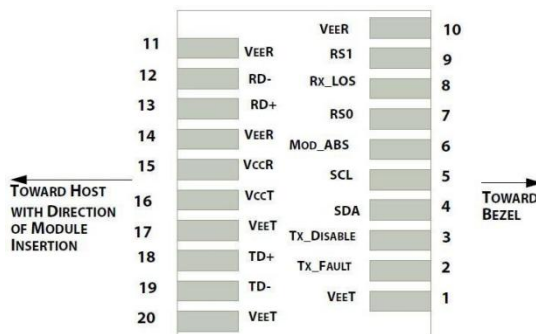


Figure 2 Electrical Pin-out Details

### 7.2 Pin Description

Table 7.1 Pin Description

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	4
5	SCL	2 wire serial interface clock input (SCL)	4
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0: module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module	
8	LOS	Receiver Loss of Signal Indication	
9	RS1	Rate select1: module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter non-inverted data out put	
19	TD-	Transmitter inverted data out put	
20	VeeT	Module transmitter ground	1

**Notes:**

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

### 8. Typical Application Circuit

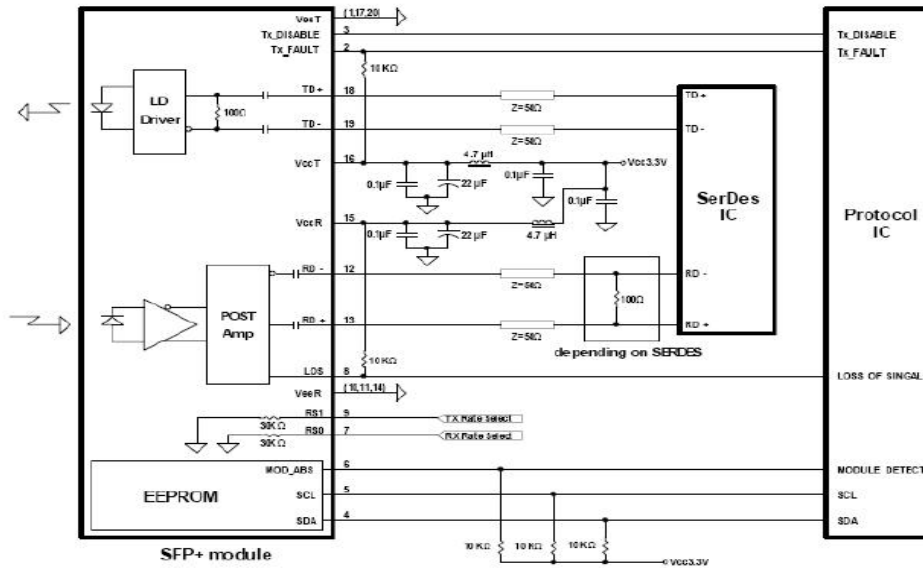


Figure 3 Typical application circuit

### 9. Package Dimensions

Figure 4 shows the package dimensions of the module. The module is designed to be compliant with SFP MSA specification.

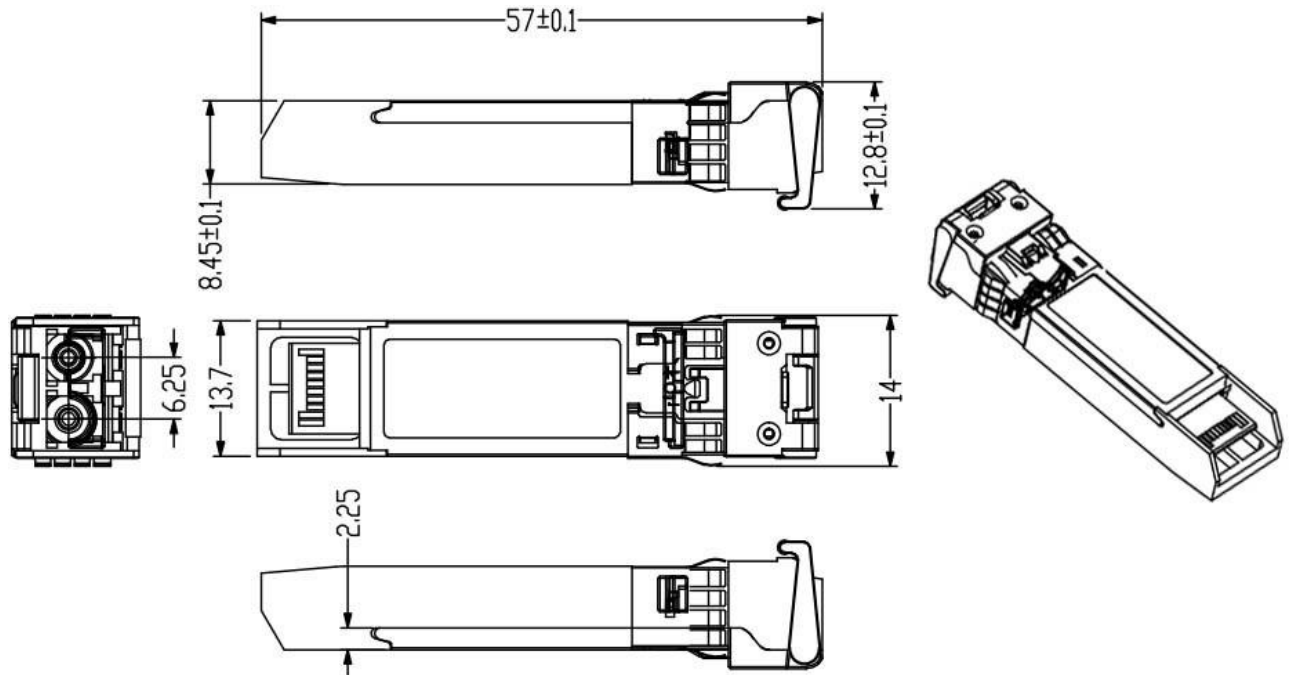


Figure 4 Package Dimensions

## 10. For More Information

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