

10G SFP+ 40km DWDM Transceiver Specification

HTPPD-xx96-40BD

Feature

- ◆ Up to 11.3Gbps Data Links
- ◆ Up to 40km transmission on SMF
- ◆ DWDM EML transmitter and PIN receiver
- ◆ Metal enclosure for lower EMI
- ◆ Low power consumption <1.4W
- ◆ 2-wire interface with integrated Digital Diagnostic monitoring
- ◆ Hot-pluggable SFP+ footprint
- ◆ Specifications compliant with SFF 8472
- ◆ Compliant with SFP+ MSA with LC connector
- ◆ Single 3.3V power supply
- ◆ Commercial/Industrial case operating temperature range: 0°C to 70°C
- ◆ with CDR supported 9.95 to 11.3Gb/s reference-free

Applications

- ◆ 10G SONET/SDH, OTU2/2e

Standards

- ◆ IEEE802.3ae 10GBASE-ER/EW
- ◆ SFF-8472 SFF-8431

Description

The Hirundo ' s HTPPD-xx96-40BD transceiver is designed to transmit and receive serial optical data over single mode optical fiber with 40km.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
HTPPD-xx96-40BD ^[1]	SFP+	10.3125	1528.38~1569.59	-1~3	<-16	0~70	40	LC
PN	HTPPD-xx96-40BD ^[1]							
Description	10Gbps,SMF,40km, 0~70°C							
SAP No	-							
Customer PN	-							

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	2020.10.18

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 ⁻¹²
Max Supported Link Length	L	Km			40

4. Optical Specification

Table 4.1 Optical Specifications

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	λ_c	nm	$\lambda_c-0.1$		$\lambda_c+0.1$	Note1
Center Wavelength Spacing		GHz		100		
Side-Mode Suppression Ratio	SMSR	dB	30			
Spectrum Band Width (-20dB)	σ	nm			1.0	
Optical Output Power	P _{out}	dBm	-1		3	
Extinction Ratio	ER	dB	8.2			
Average Launch Power of OFF transmitter	P _{OFF}	dBm			-30	
Relative Intensity Noise	R _{IN}	dB/Hz			-128	
Transmitter Eye mask definition {X1,X2,X3, Y1,Y2,Y3}			Compliant with IEEE 802.3ae			
Receiver						
Signaling rate per lane		Gbps		10.3125		
Center wavelength	λ_{IN}	nm	1270		1610	
Receiver Sensitivity	R _{SENSE}	dBm			-16	Note2
Receiver Overload	P _{in}	dBm			0	
LOS Assert	LOSA	dB	-30			
LOS De-assert	LOSD	dBm			-17	
LOS Detect Hysteresis	P _{hys}	dB	0.5			

Note1: λ_c refer to wavelength selection, and corresponds to approximately 0.8 nm

Note2: Measured with a PRBS 2³¹-1 test pattern, @10.3125Gb/s, BER<10⁻¹².

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			0.42	
Power Consumption	Pc	W			1.4	
Transmitter						
Signaling rate per lane		Gbps		10.3125		
Input Differential Impedance	R _{IN}	Ω	90	100	110	
Differential data input swing	V _{IN}	mVp-p	180		700	
Receiver						
Signaling rate per lane		Gbps		10.3125		
Output Differential Impedance	R _{OUT}	Ω	90	100	110	
Differential data output swing	V _{OUT}	mVp-p	400		800	
IIC communication						
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.

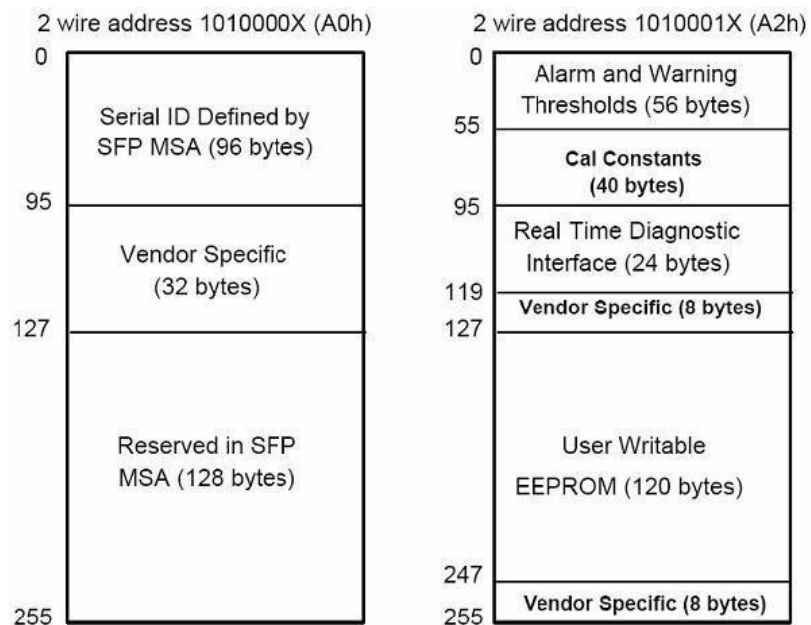


Figure 1 Digital Diagnostic Memory Map

7. Pin Assignment and Pin Description

7.1 Pin Assignment

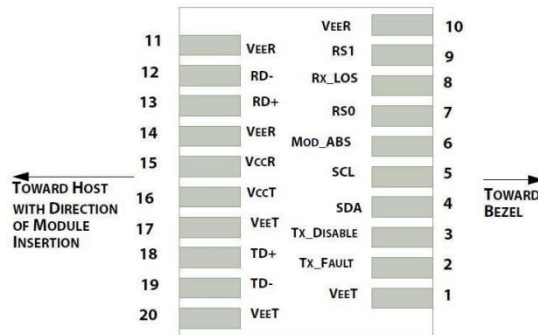


Figure 2 Electrical Pin-out Details

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

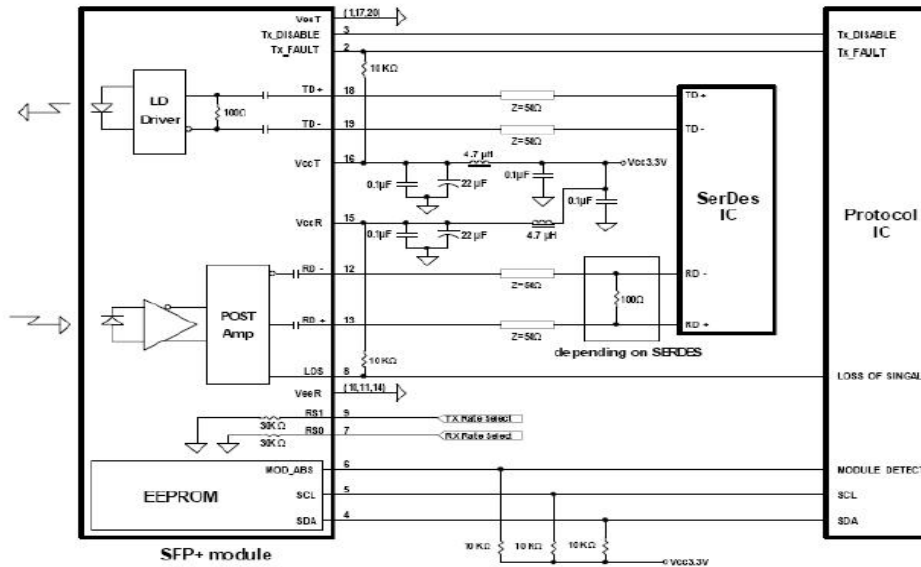


Figure 3 Typical application circuit

9. Package Dimensions

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

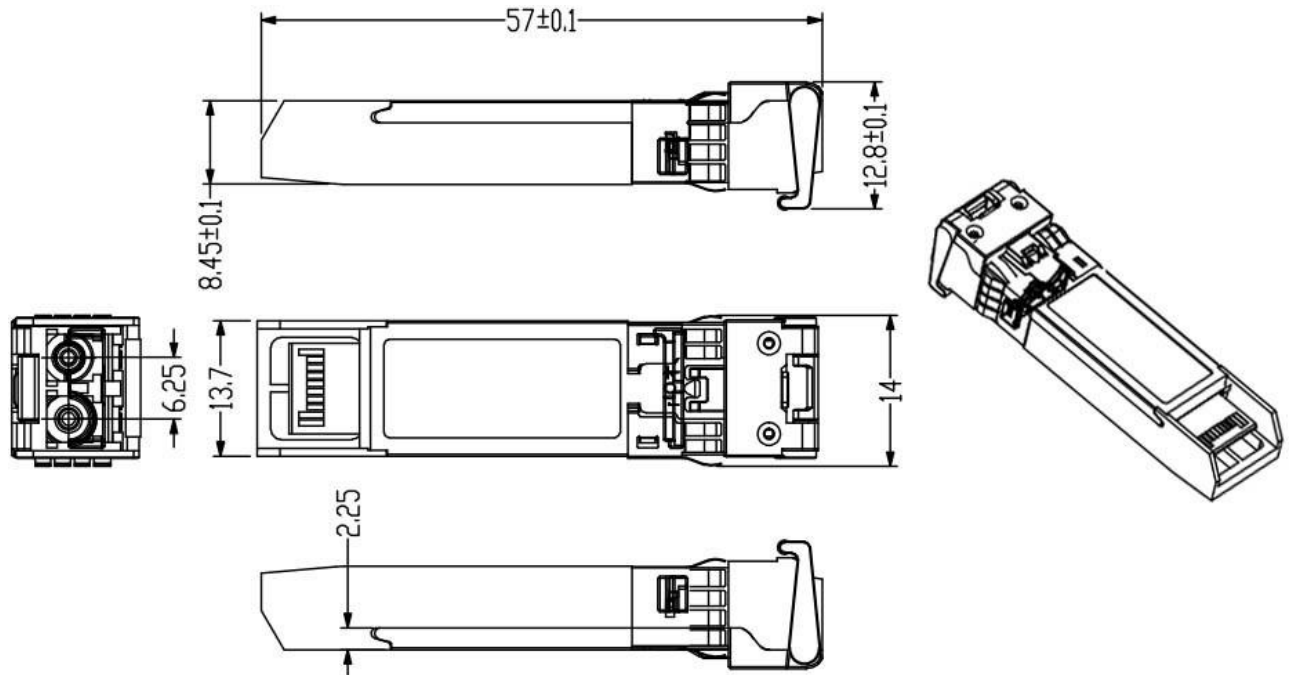


Figure 4 Package Dimensions

10. Ordering Information

Table 10.1 Ordering Information

Part Number	Description
SFP-DC10P1-LC	10Gbps,SMF,40km,0-70°C,191.00GHZ
SFP-DH10P1-LC	10Gbps,SMF,40km,0-70°C,191.05GHZ
SFP-DC11P1-LC	10Gbps,SMF,40km,0-70°C,191.10GHZ
SFP-DH11P1-LC	10Gbps,SMF,40km,0-70°C,191.15GHZ
SFP-DC12P1-LC	10Gbps,SMF,40km,0-70°C,192.20GHZ
SFP-DH12P1-LC	10Gbps,SMF,40km,0-70°C,191.25GHZ
SFP-DC13P1-LC	10Gbps,SMF,40km,0-70°C,192.30GHZ
SFP-DH13P1-LC	10Gbps,SMF,40km,0-70°C,192.35GHZ
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SFP-DC61P1-LC	10Gbps,SMF,40km,0-70°C,196.10GHZ
SFP-DH61P1-LC	10Gbps,SMF,40km,0-70°C,196.15GHZ
SFP-DCXXP1-LC	10Gbps,SMF,40km,0-70°C,XX=ITU Grid 10~61
SFP-DHXXP1-LC	10Gbps,SMF,40km,0-70°C,XX=ITU Grid 10~61

11. For More Information

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