

## 25G SFP28 10km CWDM Transceiver Specification

### HTS28C-xxX1-10BD (1471~1571)

#### **Feature**

- ◆ Hot-pluggable SFP28 form factor
- ◆ Optical interface compliant to IEEE802.3cc 25GBASE-LR
- ◆ Electrical interface compliant to SFF-8431
- ◆ Duplex LC connector
- ◆ Supports 25.78Gbps data rate
- ◆ CWDM EML laser transmitter and PIN receiver
- ◆ Up to 10km on 9/125m SMF
- ◆ 2-wire interface for management specifications
- ◆ Compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers
- ◆ Power Supply :+3.3V
- ◆ Low power consumption <2 W
- ◆ Operating case temperature Range: 0~70°C
- ◆ RoHS compliant

#### **Applications**

- ◆ 25G-LR Ethernet
- ◆ eCPRI&CPRI

#### **Standards**

- ◆ IEEE802.3cc 25GBASE-LR
- ◆ SFF-8431 SFF-8432 SFF-8472

#### **Description**

The Hirundo ' s HTS28C-xxX1-10BD ( 1471~1571 ) transceiver is designed to transmit and receive serial optical data over Single-mode fiber with 10 km link length. They are compliant with SFF-8431, SFF-8432, SFF-8472 and IEEE802.3cc 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
HTS28C-xxX1-10BD (1471~1571) [1]	SFP28	25.78	1471~1571	-4~2	<-12	0~70	10	LC
<b>PN</b>	HTS28C-xxX1-10BD (1471~1571) [1]							
<b>Description</b>	25Gbps,SMF,10km,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	2020-11-15

## 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
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		25.78	
Bit Error Ratio	BER				5*10 <sup>-5</sup>

Max Supported Link Length	L	km			10
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## 4. Optical Specification

**Table 4.1 Optical Specifications**

Parameter	Symbol	Unit	Min	Typ	Max	Notes
<b>Transmitter</b>						
Signaling rate per lane		Gbps		25.78125		
Center wavelength	$\lambda_c$	nm	As per ITU-T G.694.2			
Spectral Width (-20dB)	$\sigma$	nm			1	
Side Mode Suppression Ratio	SMSR	dB	30			
Optical Output Power	P <sub>out</sub>	dBm	-4		2	
Extinction Ratio	ER	dB	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 802.3cc			
<b>Receiver</b>						
Signaling rate per lane		Gbps		25.78125		
Center wavelength	$\lambda_{IN}$	nm	1260		1610	
Receiver Sensitivity	R <sub>SENSE</sub>	dBm			-12	Note1
Overload		dBm	2			
LOS De-Assert	LOSD	dBm			-16	
LOS Assert	LOSA	dBm	-30			
LOS Hysteresis		dB	0.5			

Note1: Measured with conformance test signal at TP3 for BER=5\*10<sup>-5</sup>.

## 5. Electrical Specification

Table 5.1 Electrical Specifications

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Supply Voltage	VCC	V	3.15	3.3	3.46	
Supply Current	ICC	A			0.6	
Power Consumption	Pc	W			2	
<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	200		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	300		900	
<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.

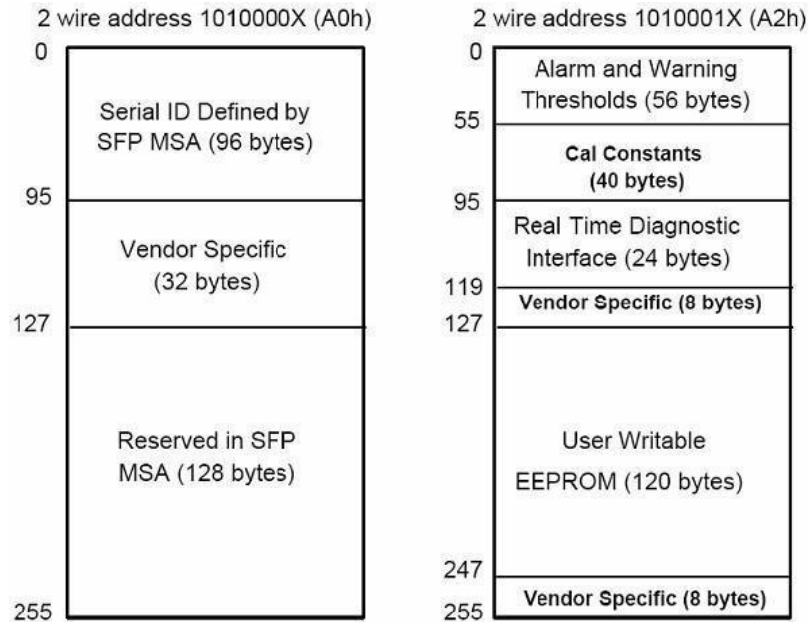


Figure 1 Digital Diagnostic Memory Map

## 7. Pin Assignment and Pin Description

### 7.1 Pin Assignment

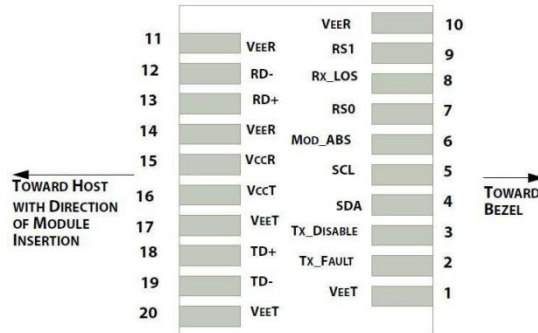


Figure 2 Electrical Pin-out Details

### 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

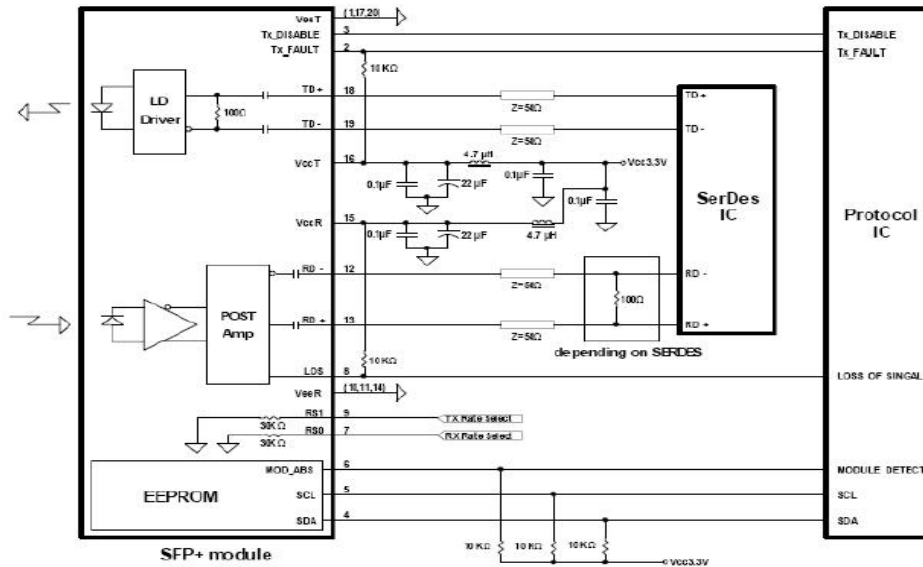


Figure 3 Typical application circuit

### 9. Package Dimensions

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

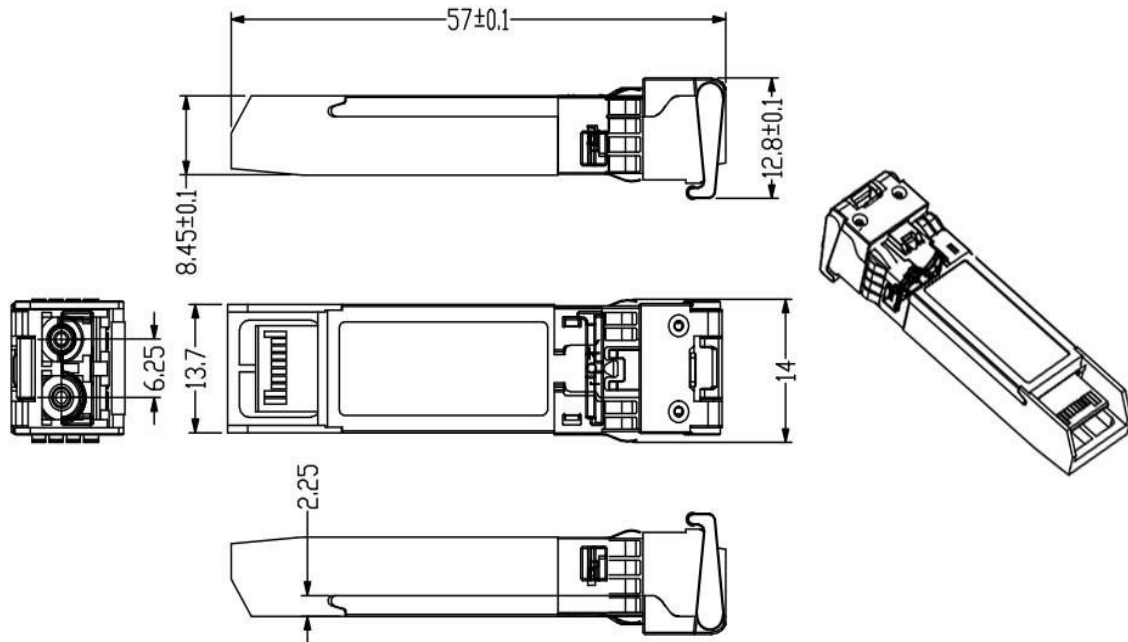


Figure 4 Package Dimensions

## 10. Ordering Information

Table 10.1 Ordering Information

Part Number	Description
HTS28C-47X1-10BD	25Gbps,SMF,10km,0-70°C,1471nm
HTS28C-49X1-10BD	25Gbps,SMF,10km,0-70°C,1491nm
HTS28C-51X1-10BD	25Gbps,SMF,10km,0-70°C,1511nm
HTS28C-53X1-10BD	25Gbps,SMF,10km,0-70°C,1531nm
HTS28C-55X1-10BD	25Gbps,SMF,10km,0-70°C,1551nm
HTS28C-57X1-10BD	25Gbps,SMF,10km,0-70°C,1571nm

## 11. For More Information

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