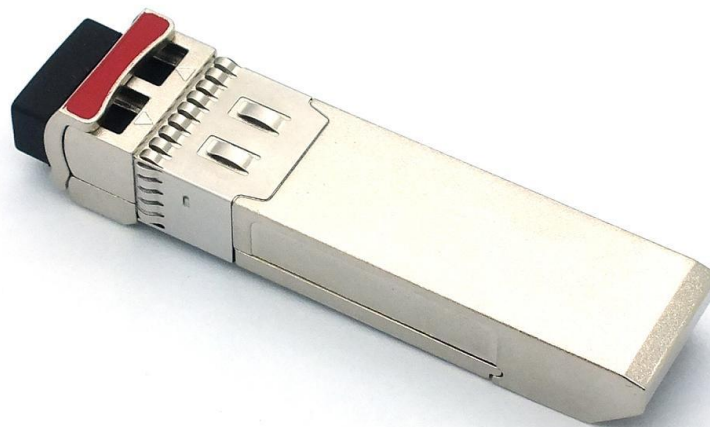




Shenzhen Haili Link Technology Co., Ltd

Product Specification Sheet

RoHS Compliant 10Gb/s SFP+ DWDM 40km Optical Transceiver



SHENZHEN HAILI LINK CO., LTD

www.hilinktech.com



Product Features

- Supports 9.95 to 11.3 Gb/s bit rates
- Duplex LC connector
- Hot pluggable SFP+ footprint
- Cooled EML transmitter and PIN-TIA receiver
- Applicable for 40km SMF connection
- Low power consumption, < 1.2W
- 100 GHz channel spacing
- Digital Diagnostic Monitor Interface
- Optical interface compliant to ITU-T 694.1 & G.698.1
- Electrical interface compliant to SFF-8431 & SFF-8432
- Operating case temperature:
 - Commerical: 0 to 70 °C
 - Industrial: -5 to 80 °C

Applications

- 10G Ethernet
- 2x, 4x, 8x Fiber Channel
- ITU-T G.698.1
- Other optical links

Product Descriptions

Hilink's HLSDXX1XL-C(I)D40 Enhanced Small Form Factor Pluggable SFP+ transceivers are designed for use in 10-Gigabit Ethernet links up to 40km over SingleMode fiber. They are compliant with SFF- 8431, SFF-8432 and ITU-T G.698.1. The transceiver designs are optimized for high performance and cost effective to supply customers the best solutions for telecommunication.

This transceiver consists of two sections: The transmitter section incorporates a cooled EML laser. And the receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage.



Product Channel Selection

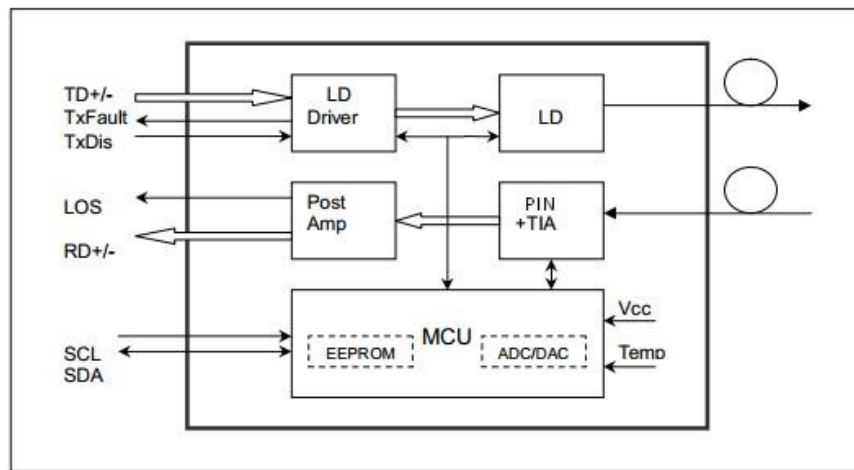
Product Code	Frequency (THz)	Cent Wavelength (nm)
CH61	196.1	1528.77
CH60	196.0	1529.55
CH59	195.9	1530.33
CH58	195.8	1531.12
CH57	195.7	1531.90
CH56	195.6	1532.68
CH55	195.5	1533.47
CH54	195.4	1534.25
CH53	195.3	1535.04
CH52	195.2	1535.82
CH51	195.1	1536.61
CH50	195.0	1537.40
CH49	194.9	1538.19
CH48	194.8	1538.98
CH47	194.7	1539.77
CH46	194.6	1540.56
CH45	194.5	1541.35
CH44	194.4	1542.14
CH43	194.3	1542.94
CH42	194.2	1543.73
CH41	194.1	1544.53
CH40	194.0	1545.32
CH39	193.9	1546.12
CH38	193.8	1546.92
CH37	193.7	1547.72
CH36	193.6	1548.51
CH35	193.5	1549.32
CH34	193.4	1550.12
CH33	193.3	1550.92
CH32	193.2	1551.72
CH31	193.1	1552.52
CH30	193.0	1553.33
CH29	192.9	1554.13
CH28	192.8	1554.94



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CH27	192.7	1555.75
CH26	192.6	1556.55
CH25	192.5	1557.36
CH24	192.4	1558.17
CH23	192.3	1558.98
CH22	192.2	1559.79
CH21	192.1	1560.61
CH20	192.0	1561.42
CH19	191.9	1562.23
CH18	191.8	1563.05
CH17	191.7	1563.86

Functional Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	Ts	-40	85	°C	
Relative Humidity	RH	0	85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

General Operating Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Iccs			360	mA	
Operating Case Temp.	Tc	0		70	°C	
	Tl	-5		80		



Electrical Characteristics ($T_{OP(C)} = 0 \text{ to } 70 \text{ }^{\circ}\text{C}$, $T_{OP(I)} = -5 \text{ to } 80 \text{ }^{\circ}\text{C}$, $V_{CC} = 3.13 \text{ to } 3.47 \text{ V}$)

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Differential data input swing	$V_{IN,PP}$	120		850	mV _{pp}	
Transmit Disable Voltage	V_D	$V_{CC}-0.8$		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	V _{ee}		$V_{ee}+0.8$	V	
Input differential impedance	R_{in}		100		Ω	
Receiver						
Differential data output swing	$V_{out,pp}$	340		800	mV _{pp}	
Output rise time and fall time	T_r, T_f	28			Ps	1
LOS asserted	V_{LOS_F}	$V_{CC}-0.8$		V_{CC}	V	2
LOS de-asserted	V_{LOS_N}	V _{ee}		$V_{ee}+0.8$	V	2

Notes:

1. 20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative.
2. LOS is an open collector output. Should be pulled up with 4.7k Ω – 10k Ω on the host board. Normal operation is logic 0; loss of signal is logic 1.

Optical Characteristics ($T_{OP(C)} = 0 \text{ to } 70 \text{ }^{\circ}\text{C}$, $T_{OP(I)} = -5 \text{ to } 80 \text{ }^{\circ}\text{C}$, $V_{CC} = 3.13 \text{ to } 3.47 \text{ V}$)

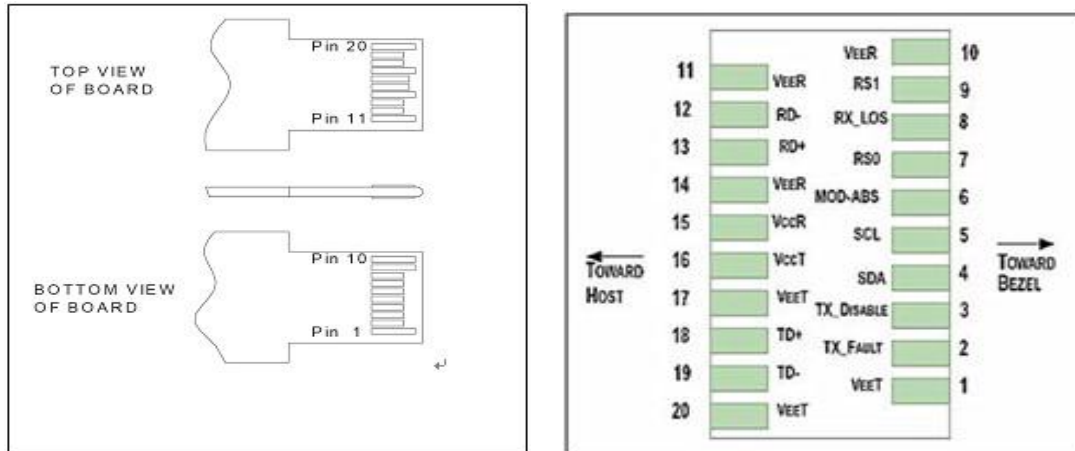
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Center Wavelength	λ_c	1528.77		1563.86	nm	
Center Wavelength (End of Life)	λ_{c_EOL}		$\lambda_c \pm 100\text{pm}$			
Ave. output power (Enabled)	P_{AVE}	-1		2	dBm	1
Side-Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	8.2			dB	
RMS spectral width	$\Delta\lambda$			1	nm	
Rise/Fall time (20%~80%)	T_r/T_f			50	ps	
Relative Intensity Noise	R_{IN}			-128	dB/Hz	
Receiver						
Operating Wavelength	λ	1260		1600	nm	
Receiver Sensitivity	P_{SEN}			-16	dBm	2
Overload	P_{AVE}	+0.5			dBm	
LOS Assert	P_a	-30			dBm	
LOS De-assert	P_d			-18	dBm	
LOS Hysteresis	P_d-P_a	0.5			dB	

Notes:

1. Measured $2^{31}-1$ PRBS@10.3125G
2. Measured with worst ER=8.2dB; $2^{31}-1$ PRBS@10.3125G



Pin Defintion And Functions



Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:

- 1.Module circuit ground is isolated from module chassis ground within the module.
- 2.should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15Vand 3.6V.
- 3.Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.



4.Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ.Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

Serial Interface for ID and DDM

The HLSDxx1XL-C(I)D40 transceiver support the 2-wire serial communication protocol as defined in the SFP+ MSA. The standard SFP+ serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer, and other information. Additionally, This SFP+ transceivers provide an enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X(A0h), so the originally monitoring interface makes use of the 8 bit address(A2h), so the originally defined serial ID memory map remains unchanged. The structure of the memory map is shown in Table1.

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
Address	Information	Address	Information
0~95	Serial ID Defined by SFP MSA (96 bytes)	0~55	Alarm and Warning Thresholds (56 bytes)
96~127	Vendor Specific (32 bytes)	56~95	Calibration Constants (40 bytes)
128~255	Reserved,SFF8079 (128 bytes)	96~119	Real Time Diagnostic Interface (24 bytes)
		120~127	Vender Specific (8 bytes)
		128~247	User Writable EEPROM (120 bytes)
		248~255	Vender Specific (8 bytes)

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

Digital Diagnostic Specifications

The HLSDxx1XL-C(I)D40 transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

Parameter	Symbol	Units	Min.	Max.	Accuracy	Note
Transceiver temperature	DTemp-E	°C	-10	+90	±5°C	1,2
Transceiver supply voltage	DVoltage	V	2.8	4.0	±3%	
Transmitter bias current	DBias	mA	0	127	±10%	3
Transmitter output power	DTx-Power	dBm	-3	+4	±2dB	
Receiver average input power	DRx-Power	dBm	-20	+2	±2dB	

Notes:

1. When Operating temp.=0~70 °C,the range will be min=-5,Max=+75
2. Internally measured
3. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser



Package Dimensions

