

## **GHP-313G-L4x(D)** 3G-SDI SFP 1310nm 40km

### **Features**

- ◆ HD-SDI SFP Transceiver available
- ◆ SD-SDI SFP Transceiver available
- ◆ 3G-SDI SFP Transceiver available
- ◆ SMPTE 297-2006 Compatible.
- ◆ Metal enclosure for Lower EMI
- ◆ 1310nm DFB laser and PIN photodetector
- ◆ Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- ◆ Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- ◆ Digital Diagnostic functions available through the I<sup>2</sup>C interface
- ◆ Compatible with RoHS
- ◆ +3.3V single power supply
- ◆ Operating case temperature:  
Standard : 0 to +70°C



### **Applications**

- ◆ SMPTE 297-2006 Compatible Electrical-to-Optical Interfaces.
- ◆ HDTV/SDTV Service Interfaces.

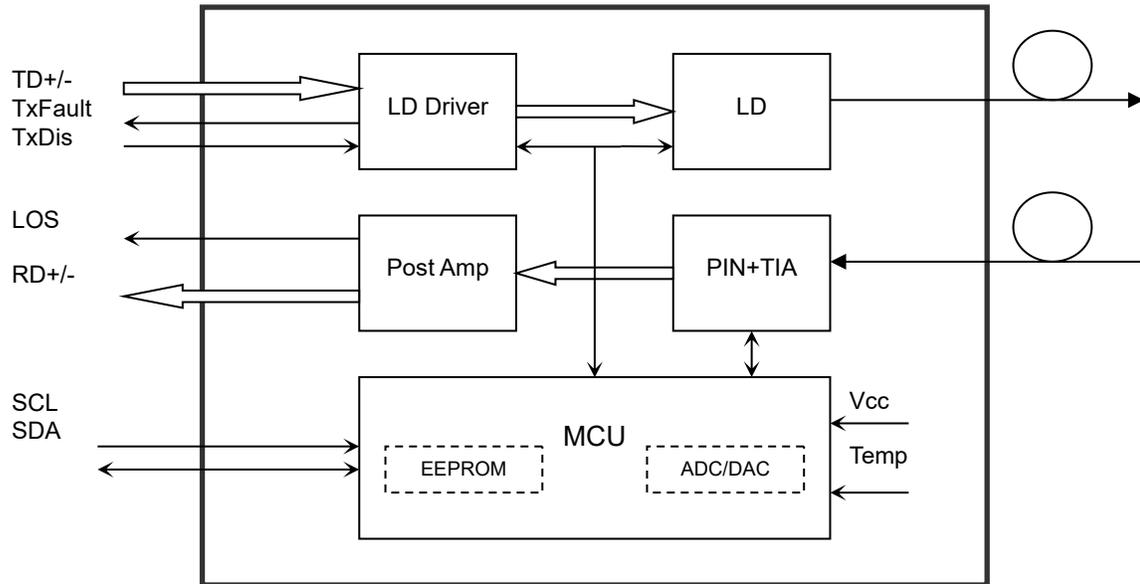
### **Description**

The video series transceivers are high performance, cost effective modules for duplex video transmission application over single mode fiber.

The transceiver is designed to transmit/receive data rates from 50Mbps to 2.97Gbps and is specifically designed for robust performance in the presence of SDI pathological patterns for SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M serial rates. The module is fully compliant with SMPTE 297M-2006.

The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.



### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	
Operating Case Temperature	Standard	Tc	0		+70	°C
						°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			400	mA	
Data Rate			3		Gbps	

## Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes	
<b>Transmitter</b>							
Centre Wavelength	$\lambda_c$	1260	1310	1360	nm		
Spectral Width (-20dB)	$\sigma$			1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Average Output Power	Pout	-2	0	+3	dBm	1	
Extinction Ratio	ER	5			dB		
Rise/Fall Time (20%~80%)	SD-SDI	tr/tf			270	ps	2
	HD-SDI				270		
	3G-SDI				270		
Total Output Jitter	PRBS and colour bar	SD-SDI		70	200	ps	
		HD-SDI		50	135		
		3G-SDI		70	100		
	pathological	SD-SDI		200	300		
		HD-SDI		115			
		3G-SDI		120			
Data Input Swing Differential	V <sub>IN</sub>	400		1800	mV	3	
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$		
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	

	Normal		0		0.8	V	
<b>Receiver</b>							
Centre Wavelength	$\lambda_c$	1260			1580	nm	
Receiver Sensitivity	SD-SDI				-16	dBm	5
	HD-SDI				-15	dBm	
	3G-SDI				-14	dBm	
Receiver Overload		0				dBm	4
LOS De-Assert	LOS <sub>D</sub>				-22	dBm	
LOS Assert	LOS <sub>A</sub>	-30				dBm	
LOS Hysteresis		1			4	dB	
Data Output Swing Differential	V <sub>out</sub>	650	800		1000	mV	3
LOS	High	2.0			V <sub>cc</sub>	V	
	Low				0.8	V	

**Notes:**

1. The optical power is launched into SMF.
2. Rise and fall times, 20% to 80%, are measured following a fourth-order Bessel-Thompson filter with a bandwidth of 0.75 x clock frequency corresponding to the serial data rate
3. PECL input, internally AC-coupled and terminated.
4. Internally AC-coupled.
5. The sensitivity and overload specification refers to the input power levels for BER = 1E-12 against both PRBS and pathological patterns at SMPTE 259M, SMPTE 292M and SMPTE 424M rates.

**Timing and Electrical**

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t <sub>on</sub>			1	ms
Tx Disable Assert Time	t <sub>off</sub>			10	μs
Time To Initialize, including Reset of Tx Fault	t <sub>init</sub>			300	ms
Tx Fault Assert Time	t <sub>fault</sub>			100	μs
Tx Disable To Reset	t <sub>reset</sub>	10			μs
LOS Assert Time	t <sub>loss_on</sub>			100	μs
LOS De-assert Time	t <sub>loss_off</sub>			100	μs

Serial ID Clock Rate	f_serial_clock		100		KHz
MOD_DEF (0:2)-High	V <sub>H</sub>	2		V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V

## Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-2 to +3	dBm	±3dB	Internal / External
RX Power	-20 to -6	dBm	±3dB	Internal / External

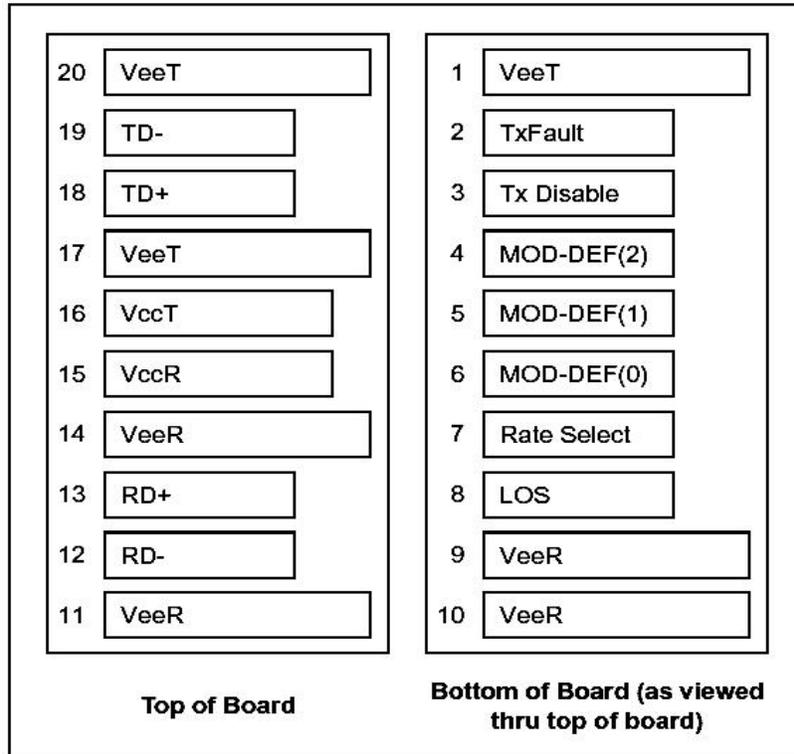
## I2C Bus Interface

The I2C bus interface uses the 2-wire serial CMOS E2PROM protocol. The serial interface meets the following specifications:

- 1.Support a maximum clock rate of 280Khz.
2. Input/Output levels comply with LVCMOS/LVTTL or compatible logics.  
Low: 0 – 0.8 V  
High: 2.0 – 3.3 V  
Undefined: 0.8 – 2.0 V

## Pin Definitions

### Pin Diagram



## Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	

10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

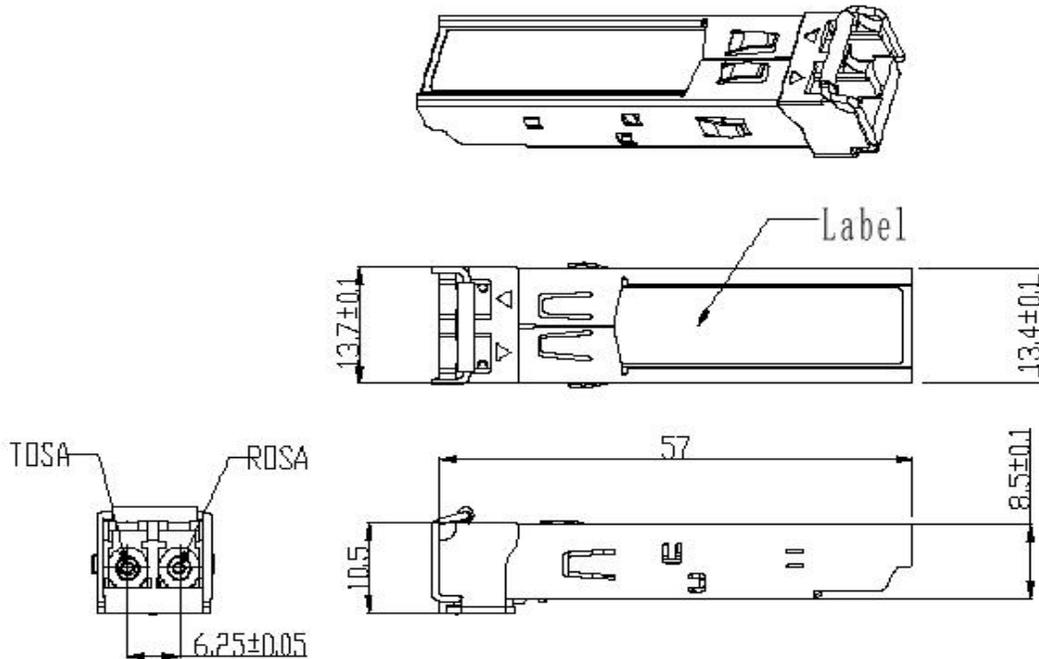
**Notes:**

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
 

Low (0 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter Disabled
Open:	Transmitter Disabled
- 3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V<sub>ccT</sub> or V<sub>ccR</sub>.  
 Mod-Def 0 is grounded by the module to indicate that the module is present  
 Mod-Def 1 is the clock line of two wire serial interface for serial ID  
 Mod-Def 2 is the data line of two wire serial interface for serial ID
- 4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- 5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 6) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

## Mechanical Dimensions



## Ordering information

Part Number	Product Description
GHP-313G-L4CD	1310nm, 3Gbps, 40km, 0°C ~ +70°C, With Digital Diagnostic Monitoring

## Important Notice

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## Revision History

Version	Date	Description
V0	Mar. 10th, 2012	New release
V1	Oct. 20th, 2021	Change receiver sensitivity SD-SDI -21dBm to -16dBm, HD-SDI -20dBm to -15dBm, 3G-SDI -19dBm to -14dBm