

GHPC-XX3G-L4CD

3Gbps Video SFP Optical Transceiver, 40km Reach

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
- ◆ **16** CWDM 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 I2C 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

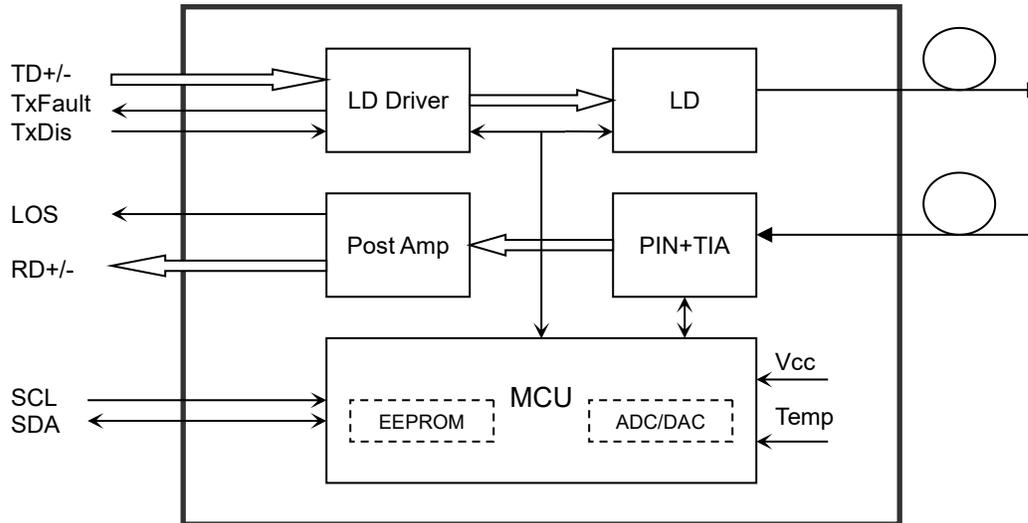
The video series transceivers are high performance, cost effective modules for duplex video transmission application over single mode fiber.

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	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
Transmitter						
Centre Wavelength	λ_c	$\lambda_c-6.5$	λ_c	$\lambda_c+6.5$	nm	
Spectral Width (-20dB)	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	P _{out}	-2	0	+3	dBm	1
Extinction Ratio	ER	5			dB	
Rise/Fall Time (20%~80%)	SD-SDI			270		2
	HD-SDI	tr/	tf	270	ps	
	3G-SDI			270		
Total Output Jitter	PRBS and colour bar	SD-SDI	70	200		ps
		HD-SDI	50	135		
	3G-SDI	70	100			
	pathologic al	SD-SDI	200	300		
		HD-SDI	115			
		3G-SDI	120			
Data Input Swing Differential	V _{IN}	400		1800	mV	3
Input Differential Impedance	Z _{IN}	90	100	110	Ω	
TX Disable	Disable	2.0		V _{cc}	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		V _{cc}	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ_c	1260		1570	nm	
Receiver Sensitivity	SD-SDI			-20	dBm	

(PRBS)	HD-SDI				-20		dBm	
	3G-SDI				-20		dBm	
Receiver Sensitivity (Pathological)	SD-SDI				-16		dBm	
	HD-SDI				-15		dBm	
	3G-SDI				-14		dBm	
Receiver Overload		0				dBm	4	
LOS De-Assert	LOS _D				-22		dBm	
LOS Assert	LOS _A	-30					dBm	
LOS Hysteresis		1		4			dB	
Data Output Swing Differential	Vout	650	800	1000			mV	3
LOS	High	2.0		Vcc			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.

Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t _{on}			1	ms
Tx Disable Assert Time	t _{off}			10	μs
Time To Initialize, including Reset of Tx Fault	t _{init}			300	ms
Tx Fault Assert Time	t _{fault}			100	μs
Tx Disable To Reset	t _{reset}	10			μs
LOS Assert Time	t _{loss_on}			100	μs
LOS De-assert Time	t _{loss_off}			100	μs
Serial ID Clock Rate	f _{serial_clock}			400	KHz

MOD_DEF (0:2)-High	V _H	2		Vcc	V
MOD_DEF (0:2)-Low	V _L			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.

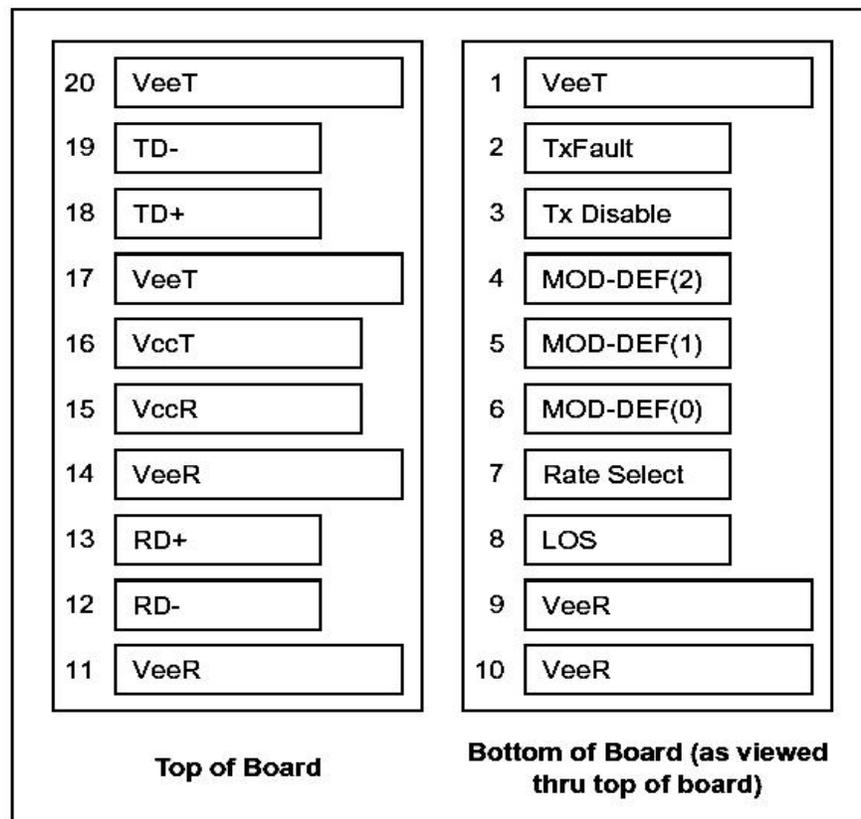
Low: 0 – 0.8 V

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

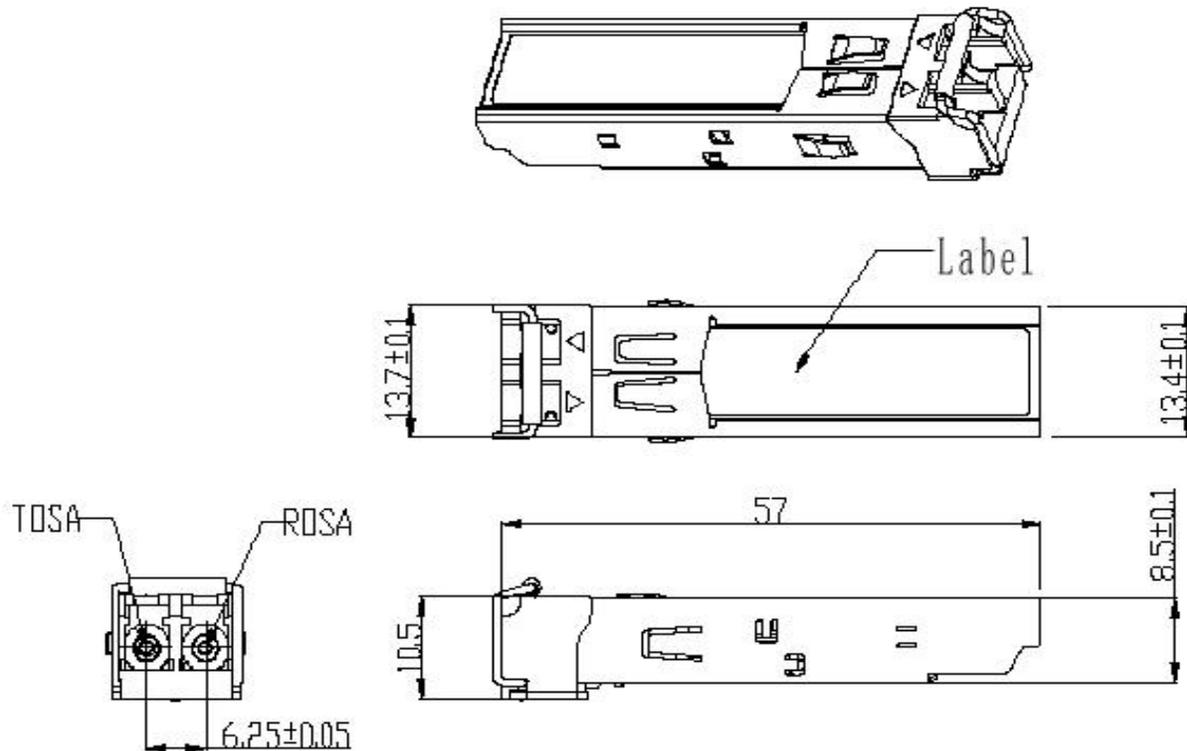
Low (0 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter Disabled
Open:	Transmitter Disabled
- 3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR}.
 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_{cc}+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.

CWDM Wavelength (0~70℃)

Band	Suffix	Wavelength (nm)
O-band Original	A	1270
	B	1290
	C	1310
	D	1330
	E	1350
E-band Extended	F	1370
	G	1390
	H	1410
	I	1430
	J	1450
S-band Short Wavelength	K	1470
	L	1490
	M	1510
	N	1530
C-band Conventional	O	1550
L-band Long Wavelength	P	1570

Mechanical Dimensions



Ordering information

Part Number	Product Description
GHPC-XX3G-L4CD	CWDM, 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 Max PRBS receiver sensitivity SD-SDI -25dBm, HD-SDI 23dBm, 3G-SDI 18dBm to -20dBm; Change Max pathological Rx sensitivity SD-SDI -25dBm to -16dBm, HD-SDI -23dBm to -15dBm, 3G-SDI -18dBm to -14dBm