12Gbps Video SFP Optical Transceiver, 20km Reach
GHB-XX12GL-L2CD

Features

- ✓ SD/HD/3G/6G/12G-SDI SFP Transceiver
- ✓ ST 259, ST 292-1,ST 424, ST-2081 and ST-2082 compatible
- ✓ Metal enclosure for Lower EMI
- ✓ A:1270nm DFB Laser transmitter,1330nm receiver
  B:1330nm DFB Laser transmitter,1270nm receiver
- ✓ Support pathological patterns for SD-SDI, HD-SDI, 3G-SDI,6G-SDI and 12G SDI
- ✓ Compliant with SFF-8472 with simplex LC connector
- ✓ The module's receiver contains reclocker
- ✓ ROHS compliant(lead free)
- ✓ single 3.3V power supply
- ✓ Hot-pluggable SFP footprint
- ✓ Operating case temperature range：0 to +70℃

Applications

- ✓ Serial Digital Fiber Transmission System for SMPTE ST 259, SMPTE ST 344, SMPTE ST 292-1/2, SMPTE ST 424, SMPTE ST 2081-1 and SMPTE ST 2082-1 Signals
- ✓ UHDTV/HDTV/SDTV Service Interfaces

Description

Gigalight's Video transceiver is designed to transmit/receive data rates from 50Mbps to 11.88Gbps，compliant with SMPTE ST 2082-1 (12G UHD-SDI), ST 2081-1 (6G UHD-SDI), ST424 (3G SDI), ST 292-1 (HD-SDI), and ST 259 (SD-SDI). Gigalight's Video transceiver supports SDI pathological patterns signals.

The transceiver includes threse sections: a DFB laser, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) ,Reclocker ,and a MCU controller. The transceiver is compatible with SFP Multi-Source Agreement (MSA).

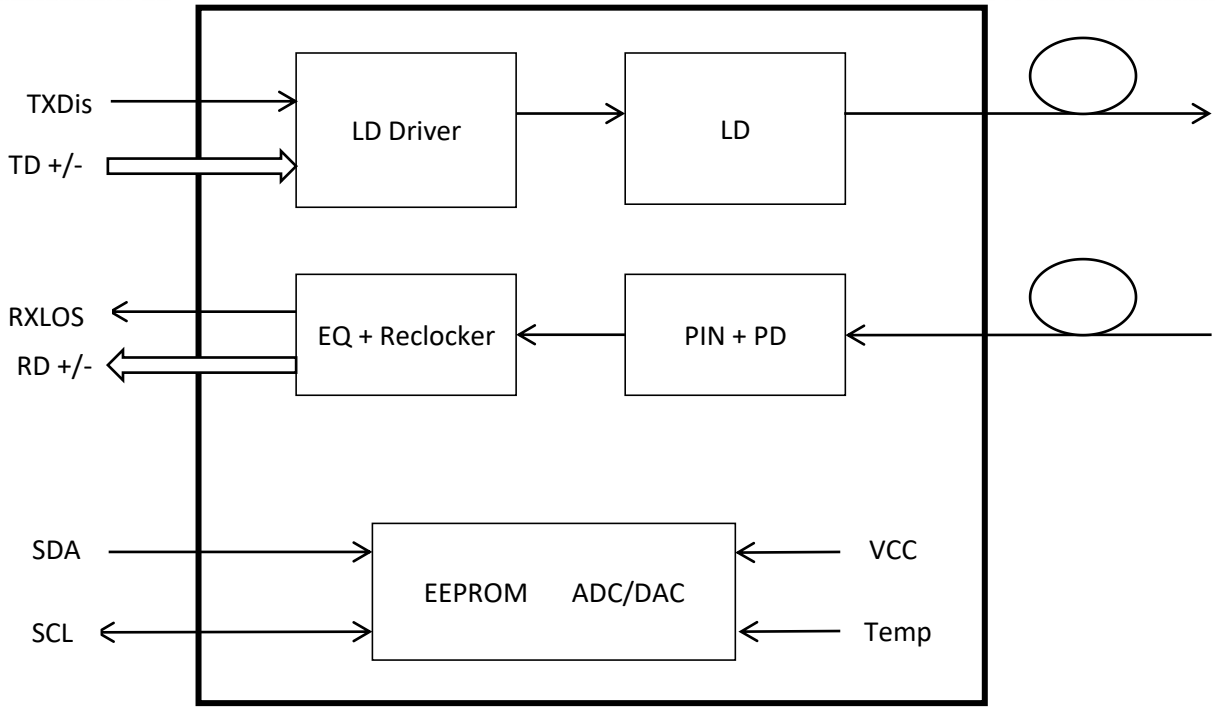

Figure 1. Module Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{cc}	-0.5	4	V
Storage Temperature	T_s	0	+85	ºC
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T_c	0		+70	ºC
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc		280	400	mA
Data Rate			12		Gbps

A:（GHB-2612GL-L2CD）Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λc	1260	1270	1280	nm	
Spectral Width (-20dB)	σ			1	nm	

Side Mode Suppression Ratio			SMSR	30			dB	
Average Output Power			Pout	-3		1	dBm	1
Extinction Ratio			ER	3.5			dB	
Data Input Swing Differential			V_{IN}	400		1000	mV	2
Input Differential Impedance			Z_{IN}	90	100	110	Ω	
Rise/Fall Time (20%~80%)		SD-SDI	tr/tf			1500	ps	3
		HD-SDI				270		
		3G-SDI				135		
		6G-SDI				80		
		12G-SDI				45		
Output Jitter	Timing Jitter	SD-SDI				0.2	UI	4
		HD-SDI				1		
		3G-SDI				2		
		6G-SDI				4		
		12G-SDI				8		
	Alignment Jitter	SD-SDI				0.2		
		HD-SDI				0.2		
		3G-SDI				0.3		
		6G-SDI				0.3		
		12G-SDI				0.3		
TX Disable		Disable		2.0		Vcc	V	
		Enable		0		0.8	V	
TX Fault		Fault		2.0		Vcc	V	
		Normal		0		0.8	V	
Receiver								
Center Wavelength			λ_c	1320	1330	1340	nm	
Receiver Sensitivity@ 11.88Gbps						-11	dBm	5
Receiver Sensitivity@ 5.94Gbps						-13	dBm	
Receiver Sensitivity@ 2.97Gbps						-15	dBm	
Receiver Overload				1			dBm	6
LOS De-Assert			LOS_D			-18	dBm	
LOS Assert			LOS_A	-28			dBm	
LOS Hysteresis			LOS_H	1		4	dB	

Data Output Swing Differential	Vout	400	800	800	mV	3
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

B：（GHB-6212GL-L2CD） Optical and Electrical Characteristics

Parameter			Symbol	Min	Typical	Max	Unit	Notes
Transmitter								
Center Wavelength			λc	1320	1330	1340	nm	
Spectral Width (-20dB)			σ			1	nm	
Side Mode Suppression Ratio			SMSR	30			dB	
Average Output Power			Pout	-3		1	dBm	1
Extinction Ratio			ER	3.5			dB	
Data Input Swing Differential			V_{IN}	400		1000	mV	2
Input Differential Impedance			Z_{IN}	90	100	110	Ω	
Rise/Fall Time (20%~80%)		SD-SDI	tr/tf			1500	ps	3
		HD-SDI				270		
		3G-SDI				135		
		6G-SDI				80		
		12G-SDI				45		
Output Jitter	Timing Jitter	SD-SDI				0.2	UI	4
		HD-SDI				1		
		3G-SDI				2		
		6G-SDI				4		
		12G-SDI				8		
	Alignment Jitter	SD-SDI				0.2		
		HD-SDI				0.2		
		3G-SDI				0.3		
		6G-SDI				0.3		
		12G-SDI				0.3		
TX Disable		Disable		2.0		Vcc	V	
		Enable		0		0.8	V	
TX Fault		Fault		2.0		Vcc	V	
		Normal		0		0.8	V	

Receiver						
Center Wavelength	λ_c	1260	1270	1280	nm	
Receiver Sensitivity@ 11.88Gbps				-11	dBm	5
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Receiver Sensitivity@ 2.97Gbps				-13	dBm	
Receiver Overload		1			dBm	6
LOS De-Assert	LOS_D			-18	dBm	
LOS Assert	LOS_A	-28			dBm	
LOS Hysteresis	LOS_H	1		4	dB	
Data Output Swing Differential	Vout	400	800	800	mV	3
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

Note:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. 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.
4. UI means one period.
5. MeasuredWith Pathological Patterns 11.88Gpbs(4096*2160 P60,100% Bars);5.94Gpbs (4096*2160 P29.97,100% Bars);2.97Gpbs (2048*1080 P50,100% Bars).
6. Internally AC-coupled, minimum input overload power for SMPTE ST 2081-1, SMPTE ST 2082-1.

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
Serial ID Clock Rate	f_serial_clock		100		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
Tx Disable Negate Time	0 to +70	℃	±3℃	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-3to +1	dBm	±3dB	Internal / External
RX Power	-24to +1	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 Description

Pin	Signal Name	Description	Plug Seq.	Notes
1	VEET	Transmitter Ground	1	
2	VEET	Transmitter Ground	3	
3	NC	Not Connected	3	
4	VEET	Transmitter Ground	3	
5	SCL	SCL Serial Clock Signal	3	Note 1
6	SDA	SDA Serial Data Signal	3	Note 1
7	VEER	Receiver ground	3	
8	LOS	Loss of Signal	3	Note 2
9	NC	Not Connected	1	
10	NC	Not Connected	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 3
13	RD+	Received Data Out	3	Note 3
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	

16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 4
19	TD-	Inv. Transmit Data In	3	Note 4
20	TX_DIS	Transmitter Disable	1	Note 5

Note:

Plug Seq.: Pin engagement sequence during hot plugging.

1. SCL,SDA. They should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 3.15V and 3.6V.
2. LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 3.15V and 3.6V. 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.
3. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) on the host board.
4. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.
5. TX_DIS is an input pin 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 ~0.8V): Transmitter on

   (0.8V ~ 2.0V): Undefined

   High (2.0 ~3.465V): Transmitter Disabled

   Open: Transmitter Disabled

Pin Definition

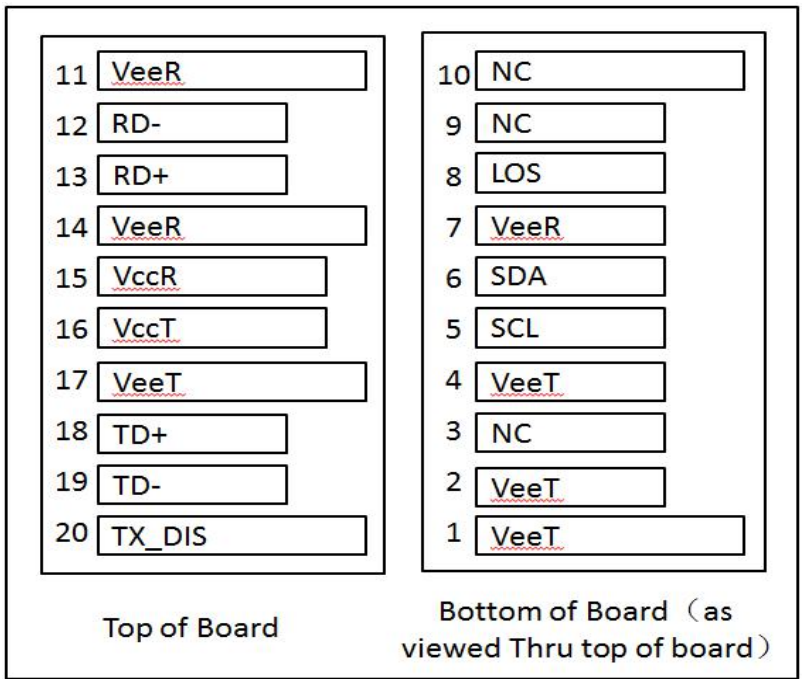

Figure 2. Electrical Pin-out Details

Mechanical Dimensions

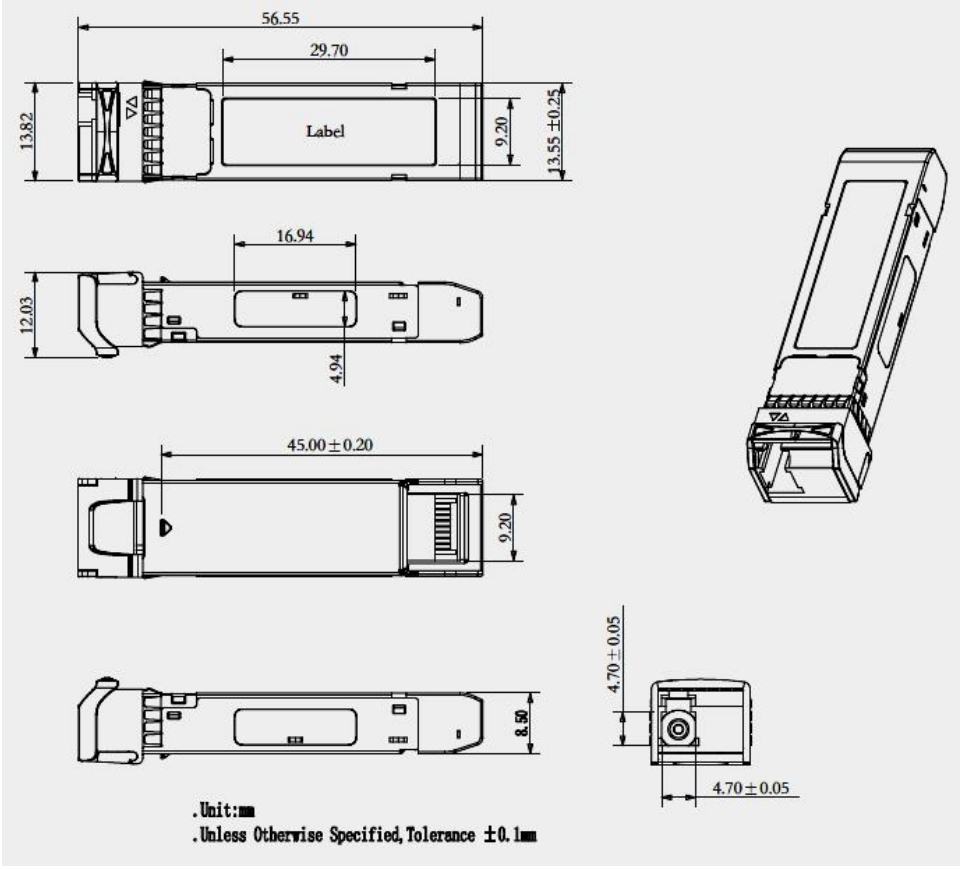

Figure 3. Mechanical Specifications

Regulatory Compliance

Feature	Standard
Laser Safety	IEC 60825-1:2014 (Third Edition) EN 60825-2：2004+A1+A2
Electrical Safety	EN 62368-1：2014 IEC 62368-1：2014 UL 62368-1：2014
Environmental protection	2011/65/EU 2015/863/EU
CE EMC	EN55032：2015 EN55035：2017 EN61000-3-2：2014 EN61000-3-3：2013
FCC	FCC Part 15, Subpart B; ANSI C63.4-2014

⚠CAUTION:

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Ordering Information

Part Number	Product Description
GHB-2612GL-L2CD	TX:1270nm,RX:1330nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, Simplex LC
GHB-6212GL-L2CD	TX:1330nm,RX:1270nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, Simplex LC

Important Notice

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Revision History

Revision	Date	Description
V0	Mar-1- 2021	Advance Release.