12Gbps Video SFP Optical Transceiver, 20km Reach
GHB-XX12GL-L2CDM

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
- ✓ Supports SDI pathological patterns for SD-SDI,
  HD-SDI, 3G-SDI,6G-SDI and 12G SDI
- ✓ Compliant with SFP MSA
- ✓ 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

- ✓ ST 259, ST 292-1, ST 424, ST-2081 and ST-2082 Electrical-to-Optical Interfaces
- ✓ 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 compliant with SFP Multi-Source Agreement (MSA) .

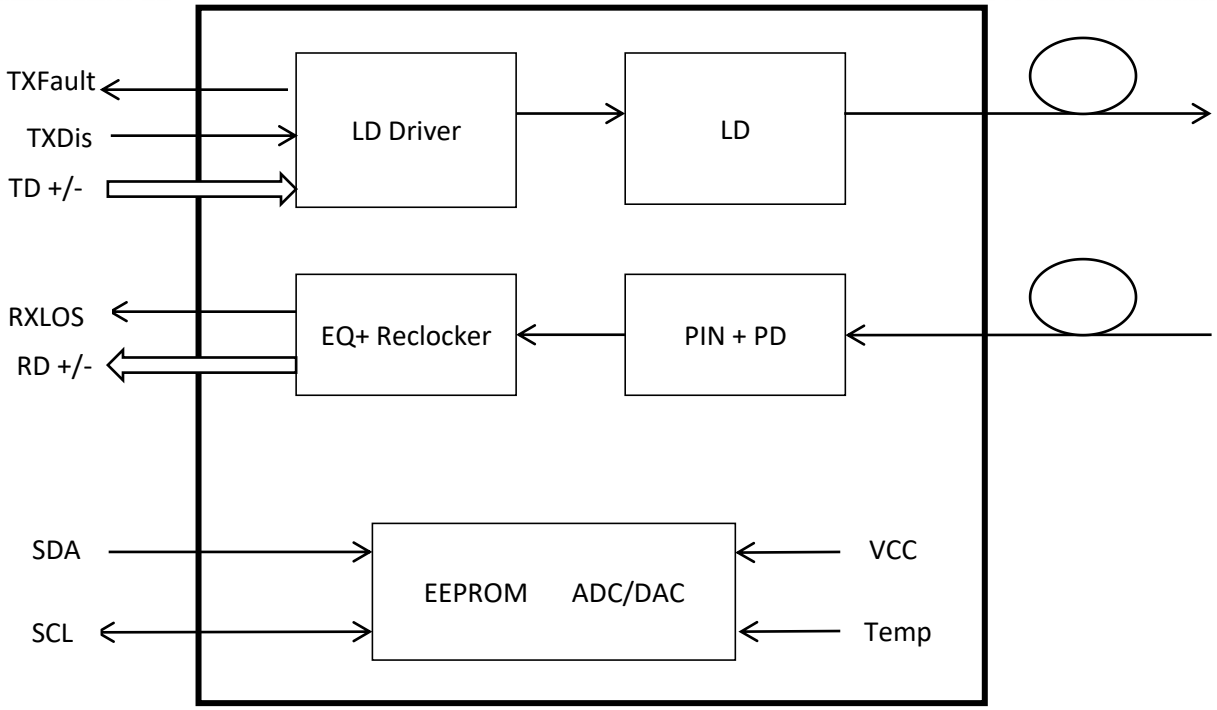

Figure 1. Module Block Diagram

Absolute Maximum Ratings

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

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T_c	0		+70	℃
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-L2CDM） 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						-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	

B：（GHB-6212GL-L2CDM） 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
Receiver Sensitivity@ 5.94Gbps				-13	dBm	
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. Measured with 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	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TXDISABLE	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	VEER	Receiver ground	1	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
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 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VEET	Transmitter Ground	1	

Note:

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 Vcc+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 ~0.8V): Transmitter on
(0.8V ~ 2.0V): Undefined
High (2.0 ~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 to VCCT or VCCR.

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 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.
5. 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 .
6. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Pin Definition

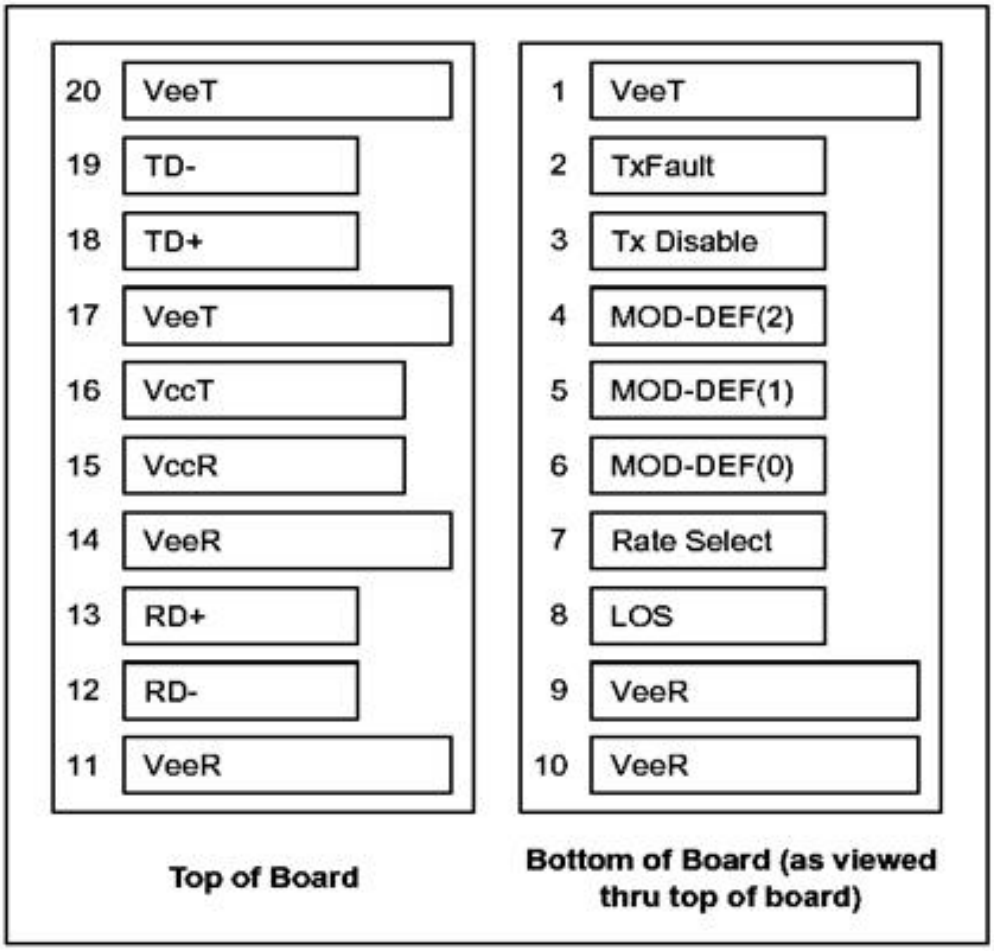

Figure 2. Electrical Pin-out Details

Mechanical Dimensions

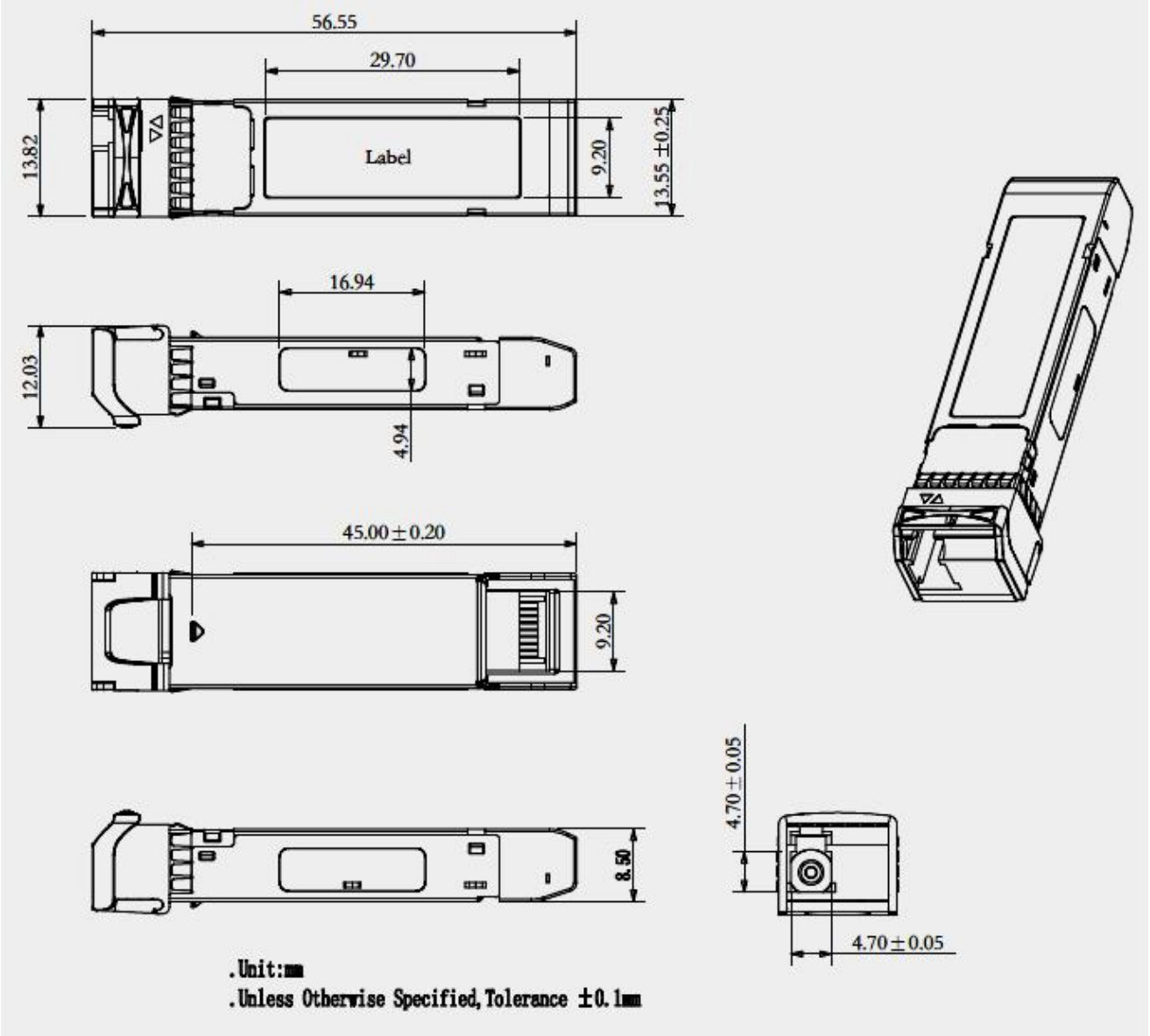

Figure 3. Mechanical Specifications

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-L2CDM	TX:1270nm,RX:1330nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, MSA, Simplex LC
GHB-6212GL-L2CDM	TX:1330nm,RX:1270nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, MSA, Simplex LC

Important Notice

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Revision History

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