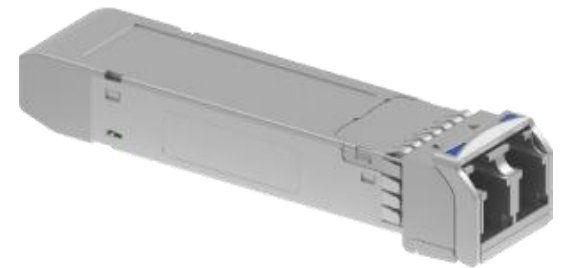


12G-SDI SFP+ BiDi Optical Transceiver FCB-V122733K20CM

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°C



Applications

- ST 259, ST 292-1, ST 424, ST-2081 and ST-2082 Electrical-to-Optical Interfaces
- UHDTV/HDTV/SDTV Service Interfaces

Description

FIBERSTAMP'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). FIBERSTAMP's Video transceiver supports SDI pathological patterns signals.

The transceiver includes these 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) .

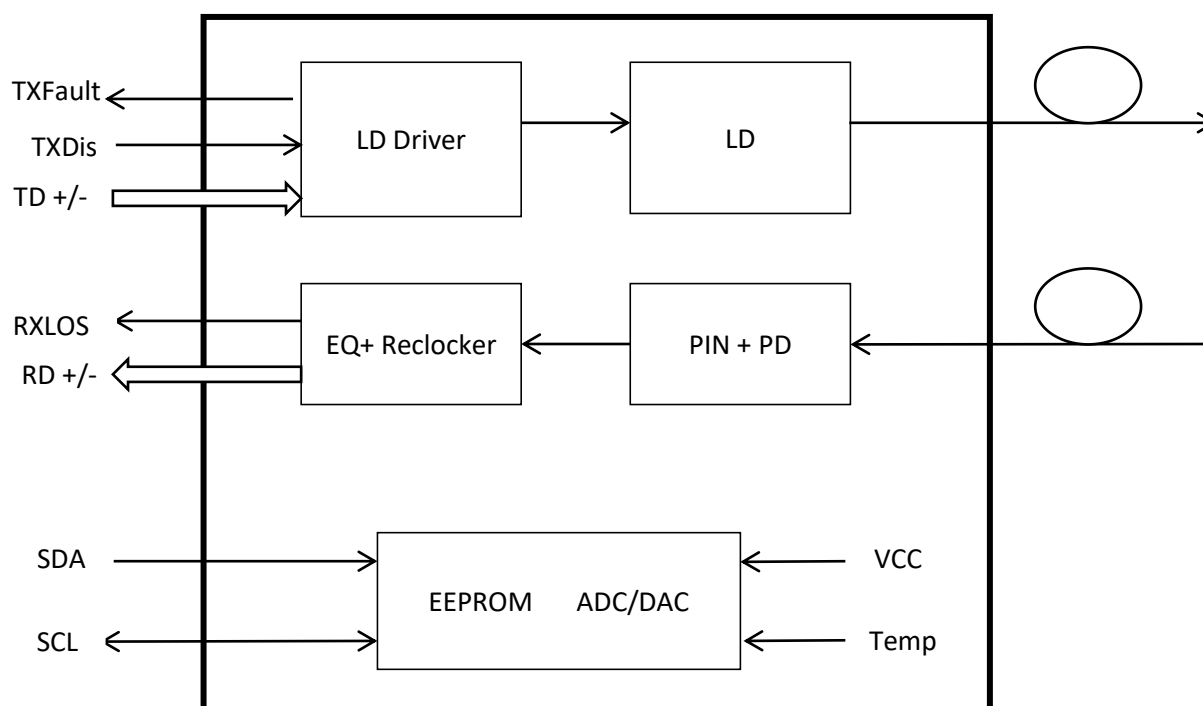


Figure 1. Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{cc}	-0.5	4	V
Storage Temperature	T _s	0	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T _c	0		+70	°C
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V
Power Supply Current	I _{cc}		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	λ_c	1260	1270	1280	nm		
Spectral Width (-20dB)	σ			1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Average Output Power	P _{out}	-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			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		



Parameter		Symbol	Min	Typical	Max	Unit	Notes
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		LOSD			-18	dBm	
LOS Assert		LOSA	-28			dBm	
LOS Hysteresis		LOSH	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		λ_c	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		VIN	400		1000	mV	2
Input Differential Impedance		ZIN	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		



Parameter	Symbol	Min	Typical	Max	Unit	Notes
Alignment Jitter	12G-SDI			8		
	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	LOSD			-18	dBm	
LOS Assert	LOSA	-28			dBm	
LOS Hysteresis	LOSH	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	VH	2		Vcc	V
MOD_DEF (0:2)-Low	VL			0.8	V

Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Tx Disable Negate Time	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	-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	



Pin	Signal Name	Description	Plug Seq.	Notes
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.

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



Pin Definition

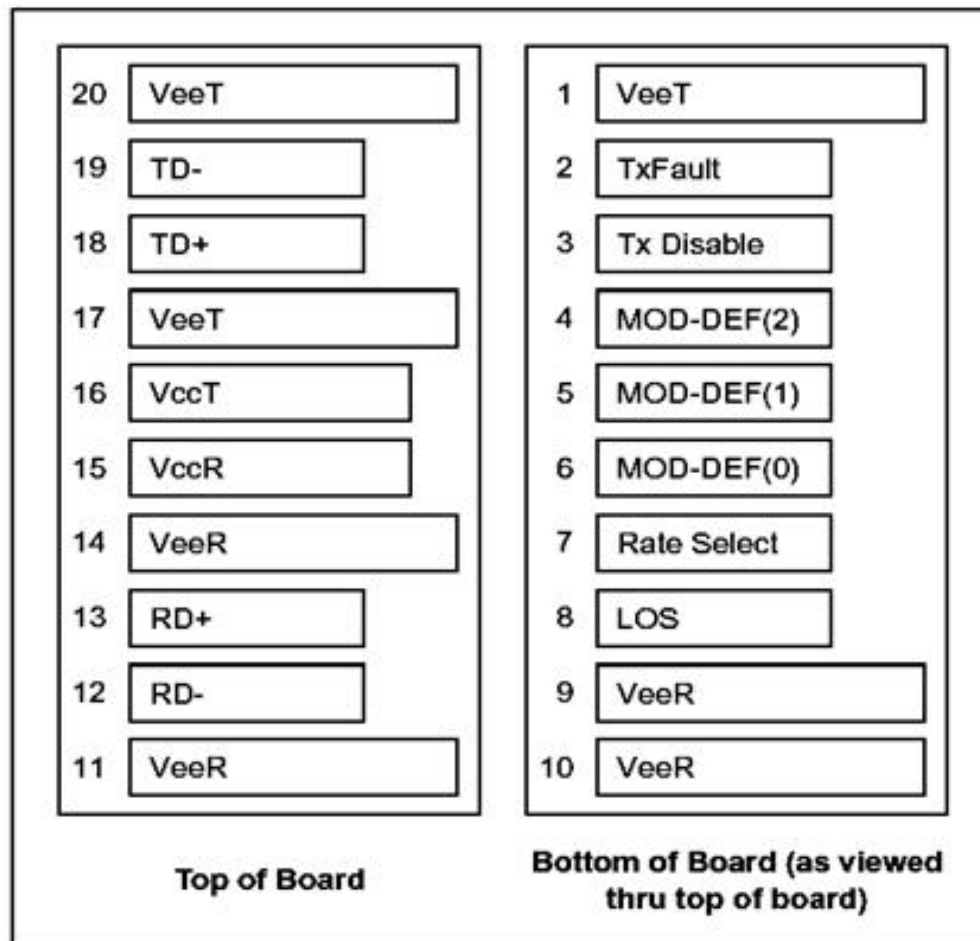


Figure 2. Electrical Pin-out Details

Mechanical Dimensions

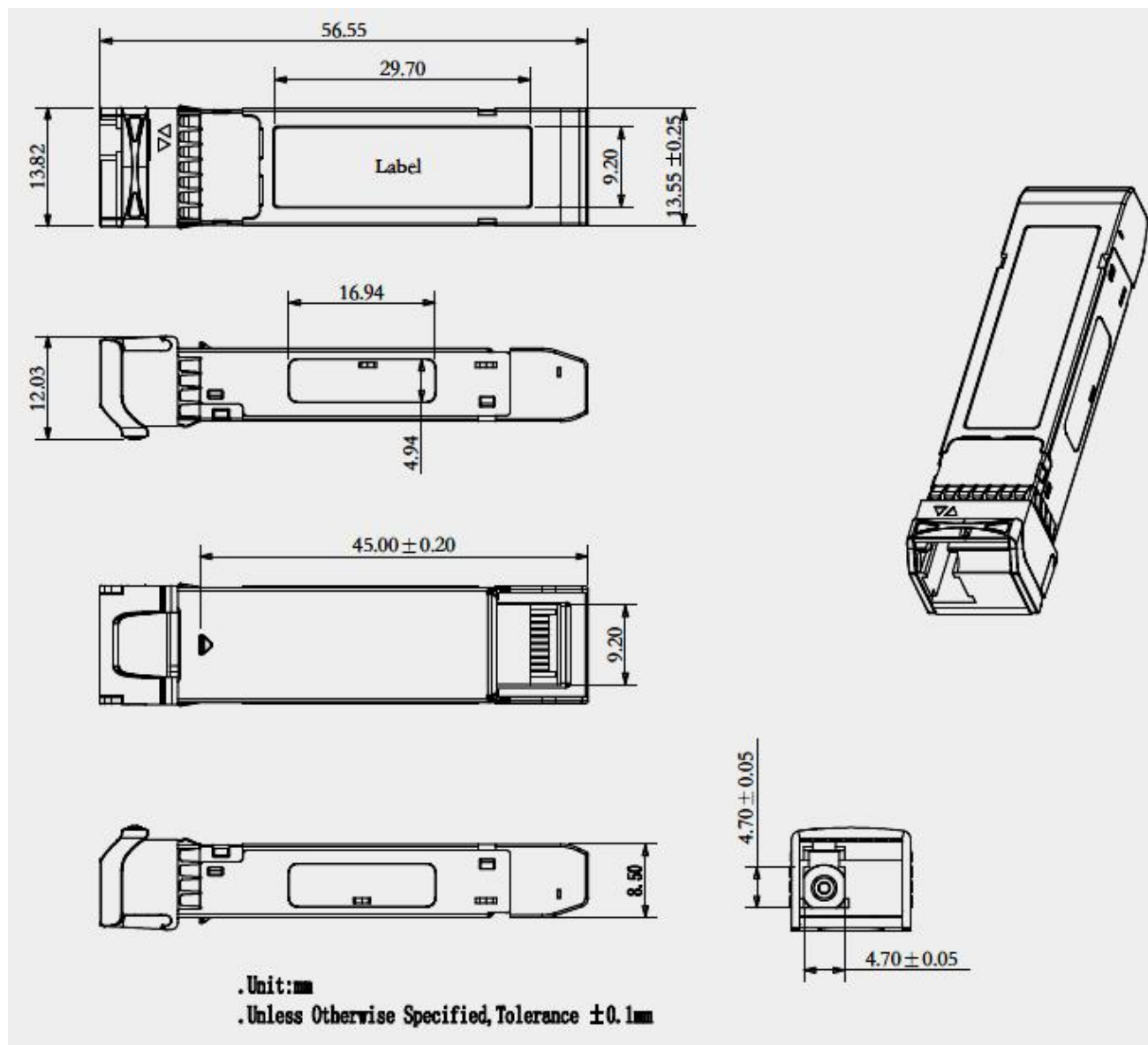


Figure 3. Mechanical Specifications



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
FCB-V122733K20CM	TX:1270nm,RX:1330nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, MSA, Simplex LC
FCB-V123327K20CM	TX:1330nm,RX:1270nm,12Gbps,10/20km,SD/HD/3G/6G/12G SDI Transceiver, MSA, Simplex LC

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