Product Specification Sheet

TISB35(53)01L-CD20

RoHS Compliant 155M 1310/1550nm(1550/1310nm) 20KM Transceiver

PRODUCT FEATURES

●Up to 155Mbps data-rate

●1550nm FP laser and PIN photo detector for 20km transmission

●1310nm FP laser and PIN photo detector for 20km transmission

●BIDI LC/UPC type pluggable optical interface

●Compliant with SFP MSA and SFF-8472 with simplex LC receptacle

●RoHS compliant and lead-free

●Single +3.3V power supply

●Support Digital Diagnostic Monitoring interface

●Case operating temperature

Commercial: 0°C to +70°C

Extended: -10°C to +80°C

Industrial: -40°C to +85°C

APPLICATIONS

●SDH STM-1, S-1.1,L-1.1, L-1.2

●SONET OC-3 IR1,LR1,LR2

●Other Optical Links

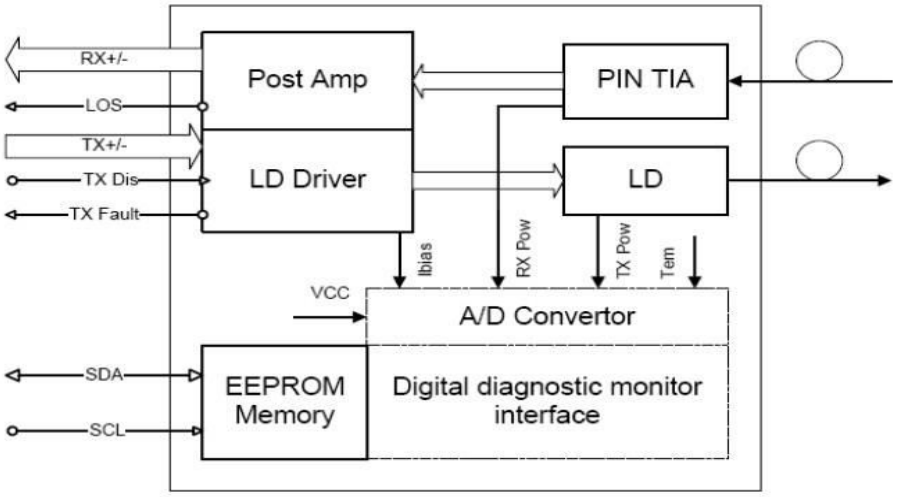
PRODUCT DESCRIPTIONS

The SFP BIDI transceivers are high performance, cost effective modules supporting 155Mbps data-rate and 20km transmission distance with SMF.

The transceiver consists of three sections: a FP 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.

FUNCTIONAL DIAGRAM



Ordering information

Product part Number	Data Rate (Mbps)	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range（Tcase）（℃）	
TISB35（53）01L-CD20	155	Single mode fiber	1310/1550(1550/1310)	20	0~70	commercial
TISB35（53）01L-ED20	155	Single mode fiber	1310/1550(1550/1310)	20	-10~80	extended
TISB35（53）01L-ID20	155	Single mode fiber	1310/1550(1550/1310)	20	-45~85	industrial

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature		-40	85	°C	
Relative Humidity		5	85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

GERERAL OPERATING CHARACTERISTICS

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate			155		Mb/s	
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc_5			220	mA	
Operating Case Temp.	Tc	0		70	°C	
		-10		80	°C	
		-40		85	°C	

ELECTRICAL INPUT/OUTPUT CHARACTERISTICS

- **Transmitter**

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Diff. input voltage swing			120		820	mVpp	1
Tx Disable input	H	VIH	2.0		Vcc+0.3	V	
	L	VIL	0		0.8		
Tx Fault output	H	VOH	2.0		Vcc+0.3	V	2
	L	VOL	0		0.8		
Input Diff. Impedance		Zin		100		Ω	

- **Receiver**

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Diff. output voltage swing			340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0		Vcc+0.3	V	2
	L	VOL	0		0.8		

Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.
Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES

.OPTICAL CHARACTERISTICS

- **Transmitter**

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength	λC	1270 1500	1310 1550	1360 1570	nm	
Ave. output power (Enabled)	Po	-14		-7	dBm	1
Extinction Ratio	ER	10			dB	1
RMS spectral width	Δλ			4	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ps	2
Output Eye Mask	**Telcordia GR-253-CORE and ITU-T G.957 compatible**					

Note (1): Measure at 2^23-1 NRZ PRBS pattern
Note (2): Transmitter eye mask definition

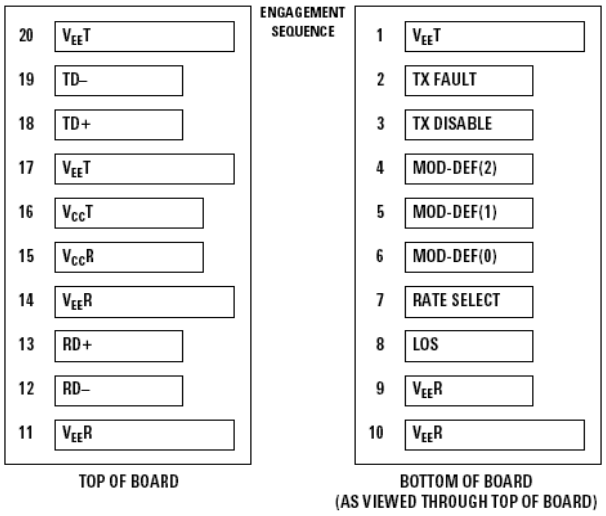
- **Receiver**

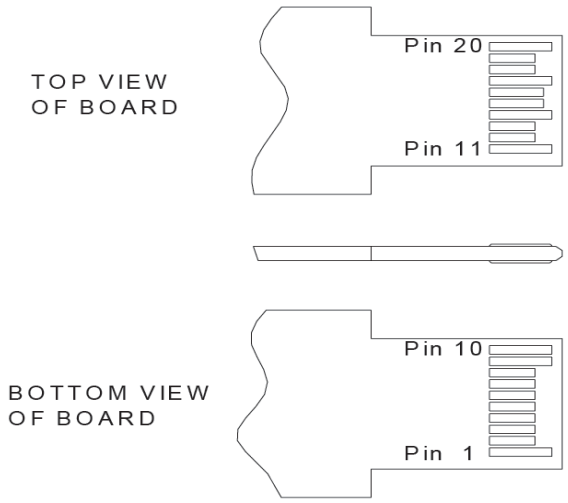
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1530 1270	1550 1310	1570 1360	nm	
Sensitivity	Psen			-30	dBm	1
Min. overload	Pimax	-3			dBm	
LOS Assert	Pa	-45			dBm	
LOS De-assert	Pd			-31	dBm	2
LOS Hysteresis	Pd-Pa	0.5		6	dB	

Note (1): Measured with Light source 1550nm(1310nm), ER=10dB; BER =<10^-12 @PRBS=2^23-1 NRZ.

Note (2): When LOS de-asserted, the RX data+/- output is signal output.

Pin Definitions and Functions





PIN#	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active “H”	1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on “H”	2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	3
6	MOD-DEF0	Model present indication	3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active “H”	4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	VeeT	Tx ground	

Note 1) When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.

Note 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 4.7 – 10KΩ resistor. Its states are:
Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined
High (2.0V~Vcc+0.3V): Transmitter Disabled Open: Transmitter Disabled

Note 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 VccT or VccR.

Mod-Def 0 has been 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

Note 4) When high, this output indicates loss of signal (LOS). Low indicates normal operation.

Note 5) RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

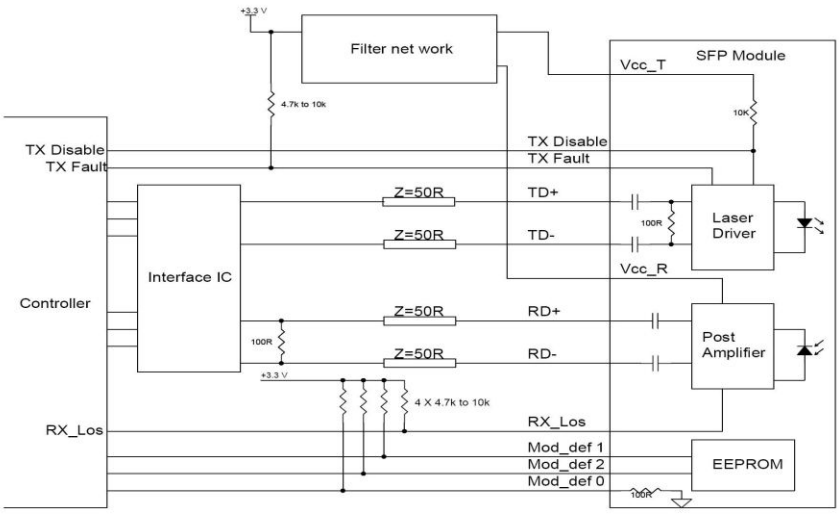
Note 6) TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Diagnostics

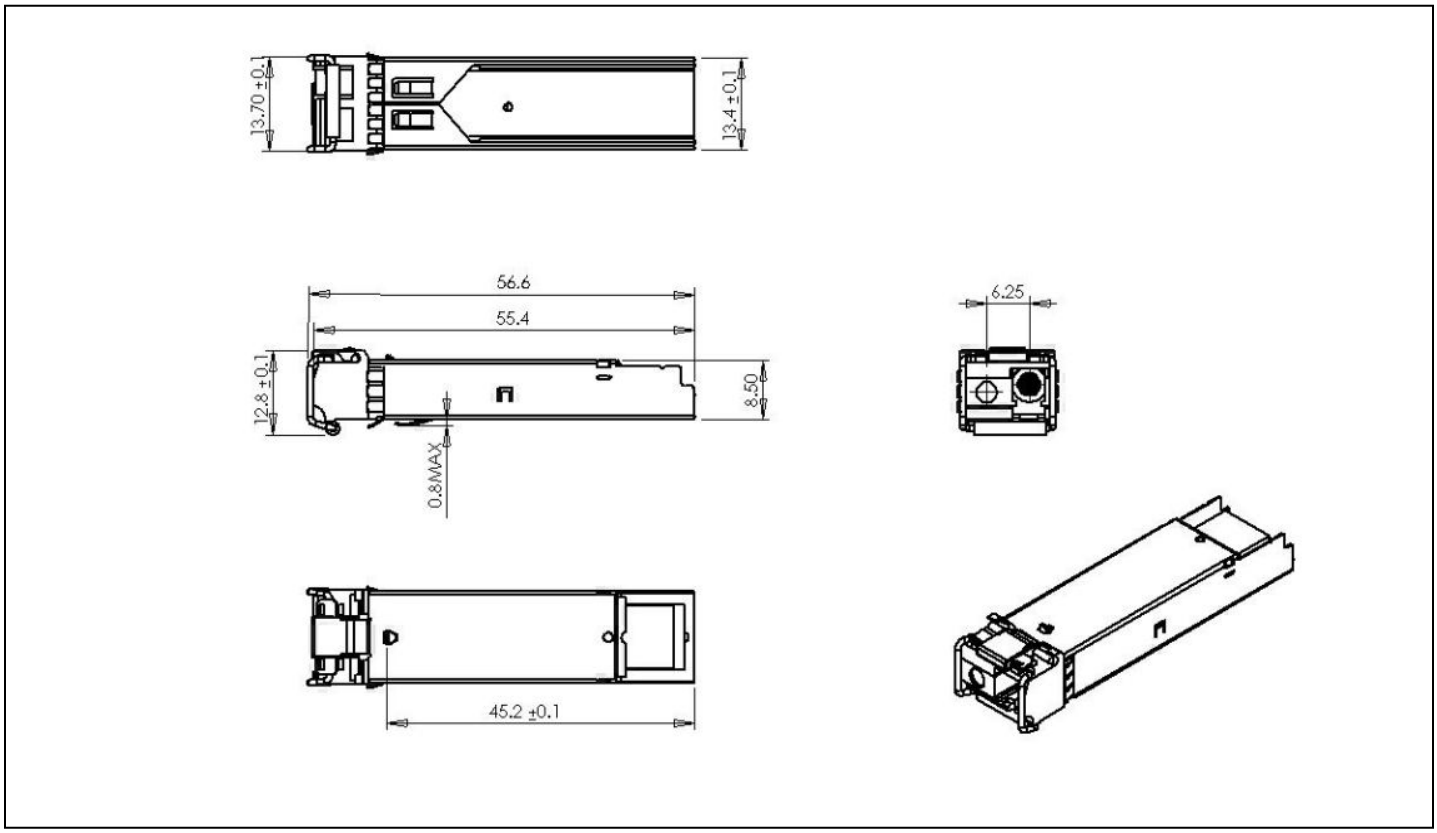
Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70 -40 to +85	°C	±3°C	Internal/ External
Voltage	3.0 to 3.6	V	±3%	Internal/ External
Bias Current	2 to 80	mA	±10%	Internal/ External
TX Power	-16 to -7	dBm	±3dB	Internal/ External
RX Power	-33 to 0	dBm	±3dB	Internal/ External

TYPICAL INTERFACE CIRCUIT



PACKAGE DIMENSIONS



Ordering Information & Related Products

TISB3501L-CD20	SFP BIDI,LC,Tx1310/Rx1550nm 155Mbps, 20km, with DDM
TISB5301L-CD20	SFP BIDI,LC,Tx1550/Rx1310nm 155Mbps, 20km, with DDM
TISB3501L-CN20	SFP BIDI,LC,Tx1310/Rx1550nm 155Mbps, 20km, without DDM
TISB5301L-CN20	SFP BIDI,LC,Tx1550/Rx1310nm 155Mbps, 20km, without DDM