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TK-B3524-3LCD20

1.25Gbps SFP Bi-Directional Transceiver, 20KM Reach Tx1310nm/Rx1550nm

Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1310nm FP laser and PIN photodetector for 20KM transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring:
  Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature range:
  0 °C to +70 °C (Commercial)
  -40 °C to +85 °C (Industrial)



Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

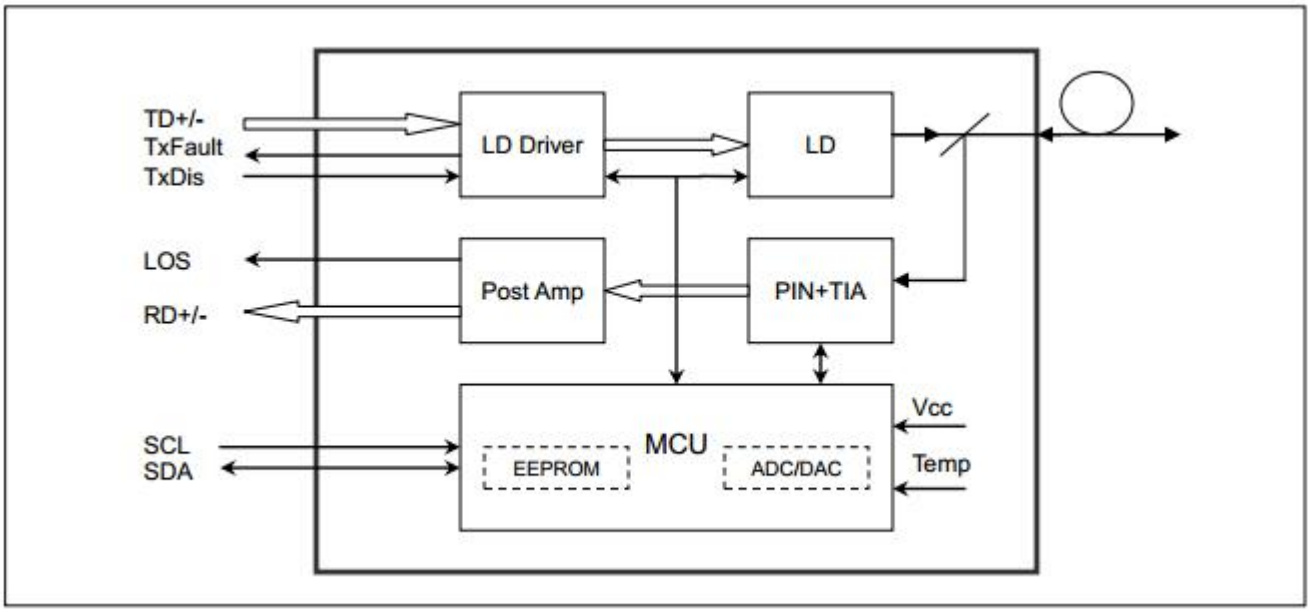
The SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 20KM transmission distance with SMF.

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.

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Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.7	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	TOP	0		70	°C	

Electrical Characteristics (TOP = 0 to 70℃, VCC = 3.15 to 3.60Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.15	3.3	3.6	V	
Supply Current	Icc		185	280	mA	
Transmitter						
Input differential impedance	Rin		100		Ω	1
Single ended data input swing	Vin,pp	250		1200	mV	
Transmit Disable Voltage	VD	Vcc–1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	us	
Receiver						
Single ended data output swing	Vout,pp	250		800	mV	3
Data output rise time	tr		100	175	ps	4
Data output fall time	tf		100	175	ps	4
LOS Fault	VLOS fault	Vcc–0.5		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 ohms differential termination.

4. 20 – 80 %
5. Loss Of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

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		

Notes:

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
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.
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	1260	1310	1360	nm	
Ave. output power (Enabled)	Po	-9		-3	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					

Notes:

1. Measure at 2^23-1 NRZ PRBS pattern
2. Transmitter eye mask definition

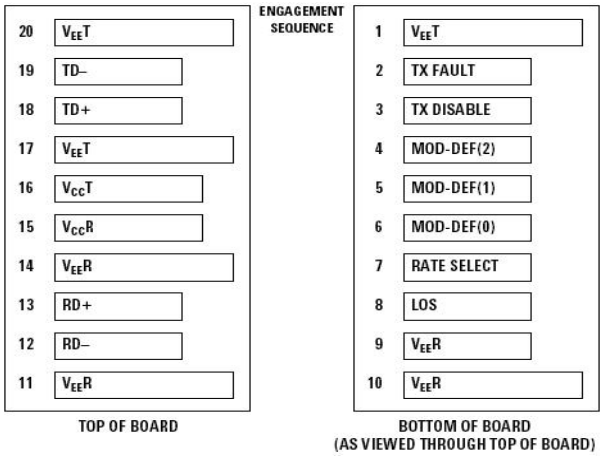
Receiver

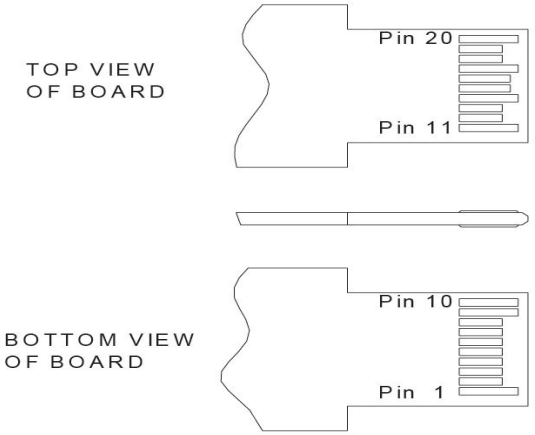
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1530		1570	nm	
Sensitivity	Psen			-22	dBm	1
Min. overload	Pimax	-3			dBm	
LOS Assert	Pa	-36			dBm	
LOS De-assert	Pd			-24	dBm	2
LOS Hysteresis	Pd-Pa	0.5		6	dB	

Notes:

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

Notes:

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

Digital Diagnostic Functions

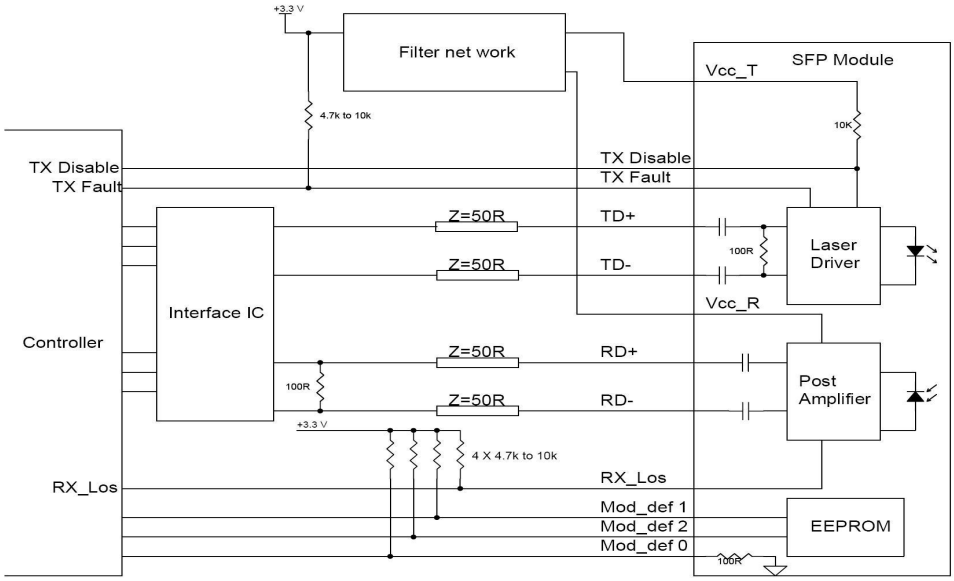
TAKFLY TK-B3524-3LCD20 transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications.
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, TAKFLY SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

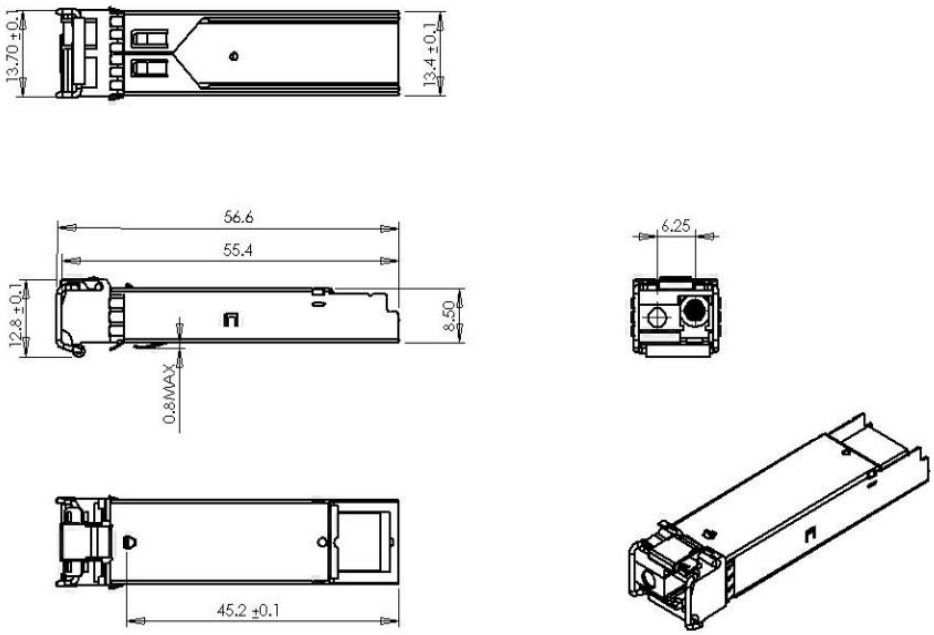
The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.Digital diagnostics for the TK-B3524-3LCD20 are Internally calibrated by default.

Typical Interface Circuit



Package Dimensions



Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge（ESD）	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards