

1.25Gbps 1550nm/1310nm Bi-directional SFP Transceiver

PD-LD Inc. offers laser based fiber optic transceiver modules in convenient industry standard Small-Form-factor-Pluggable (SFP) packages. The PSFP-B35 series modules are designed for bi-directional 1.25G Gbps data rate applications over one 9/125um single mode optical fiber.



The optical section consists of either a 1550nm DFB laser or 1310nm FP/DFB laser, and a PIN-TIA PD in an eye safe, bi-directional optical subassembly (BOSA) which mates to the fiber cable. A LD driver IC that converts differential input LVPECL logic signals into an analog laser driving current drives the laser of OSA. The receiver is connected to a circuit providing post-amplification quantization, and optical signal detection.

Features

- 1.25Gbps data rate operation
- 1550nm/1310nm over Single Fiber
- Meets Bellcore Reliability Practices
- Compliant with SFF-8472 diagnostic monitoring
- Simplex LC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1
- RoHS compliant

Ordering Information

Part Number	Tx/Rx Wavelength	I/O Data	Laser Type	Temperature
PSFP-B53-RS01	1550 nm/1310 nm	AC/AC	1550 nm DFB	0 to 70 °C
PSFP-B53-RS02				-40 to 85 °C
PSFP-B53-RL01				0 to 70 °C
PSFP-B53-RL02				-40 to 85 °C
PSFP-B35-RS01	1310 nm/1550 nm	AC/AC	1310 nm FP	0 to 70 °C
PSFP-B35-RS02				-40 to 85 °C
PSFP-B35-RL01				0 to 70 °C
PSFP-B35-RL02				-40 to 85 °C

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_s	-40	85	°C	
Supply Voltage	V_{cc}	-0.5	4.0	V	
Input Voltage	V_{IN}	-0.5	V_{cc}	V	
Output Current	I_o	---	50	mA	
Operating Current	I_{op}	---	400	mA	

Specifications Subject to Change

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Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Case Operating Temperature	T_C	0		70	°C	-01
		-40		85	°C	-02
Supply Voltage	V_{CC}	3.1		3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---		300	mA	
Data Rate			1.25		Gbps	

Transmitter Electro-optical Characteristics ($V_{CC} = 3.1\text{ V to }3.5\text{ V}$, $T_C = 0^\circ\text{C to }70^\circ\text{C}$)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Center Wavelength	λ_c	1530	1550	1570	nm	PSFP-B53
		1260	1310	1360	nm	PSFP-B35-RS
		1290	1310	1330	nm	PSFP-B35-RL
Spectral Width (-20dB)	$\Delta\lambda$	---	---	2.5	nm	FP Laser
		---	---	1	nm	DFB Laser
Output Optical Power (Average) 9/125 μm fiber	P_{out}	-8		-3		-RS
		-2	---	+3	dBm	PSFP-B53-RL
		0		+5		PSFP-B35-RL
Extinction Ratio	ER	9	---	---	dB	
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB	
Rise/Fall Time, (20–80%)	T_{Rf}	---	---	260	ps	
Output Eye	Compliant with ITU-T G.957/ IEEE802.3z					
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	---	---	-45	dBm	
Differential Input Voltage	V_{DIFF}	0.4	---	2.0	V	
TX_Disable Input	$TX_Disable_H$	2.0	---	$V_{CC} + 0.3$	V	
	$TX_Disable_L$	0	---	0.8	V	
TX_Fault Output	TX_Fault_H	2.0	---	$V_{CC} + 0.3$	V	
	TX_Fault_L	0	---	0.8	V	
Initialization Time	T_{init}	---	---	300	ms	
TX_Fault Assertion Time	T_{fault}	---	---	100	μs	
TX_Disable Delay Time	$T_{disable}$	10	---	---	μs	

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Receiver Electro-optical Characteristics ($V_{CC} = 3.1\text{ V to }3.5\text{ V}$, $T_C = 0\text{ }^\circ\text{C to }70\text{ }^\circ\text{C}$)

Parameter	Symbol	Min.	Typ.	Max.	Units.	Note
Operating Center Wavelength	λ_C	1270	1310	1360	nm	PSFP-B53
		1500	1550	1580		PSFP-B35
Optical Input Power-Maximum	P_{IN}	-2	---	---	dBm	BER < 10^{-12}
Sensitivity (BER < 10^{-12})	P_{IN}	---	---	-23	dBm	-RS
		---	---	-24	dBm	-RL
Optical Return Loss	ORL	14	---	---	dB	1260~1360nm
Optical Isolation	ISO	---	---	-45	dB	1260~1360nm
Signal Detect-Asserted	P_A	---	---	-23	dBm	-RS
		---	---	-24	dBm	-RL
Signal Detect-Deasserted	P_D	-35	---	---	dBm	
Differential Output Voltage	V_{DIFF}	0.5	---	1.2	V	
Data Output Rise, Fall Time (20~80%)	$T_{r,f}$	---	---	0.35	ns	
Receiver Loss of Signal	RX_LOS_L	0	---	0.8	V	
	RX_LOS_H	2.0	---	$V_{CC}+0.3$		

Diagnostics

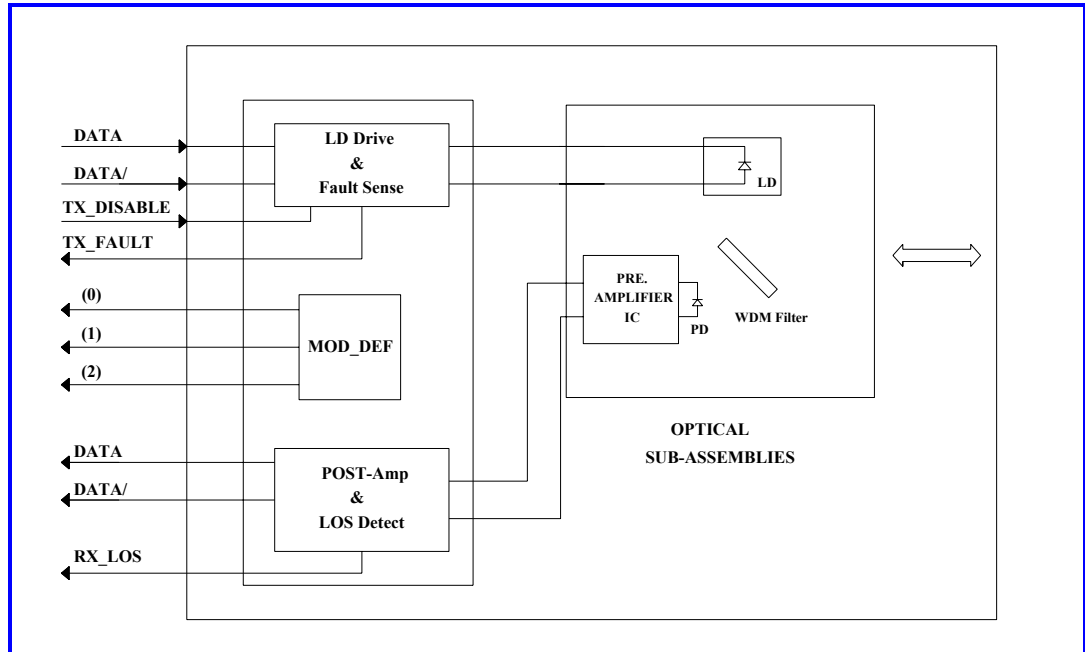
Parameter	Range	Accuracy	Units	Calibration
Temperature	-20 to 95	± 3	$^\circ\text{C}$	
Voltage	0 to V_{CC}	± 0.1	V	
Bias Current	0 to 120	± 5	MA	External
Tx Power	-5 to 6	$\pm 3\text{dB}$	dBm	
Rx Power	-23 to -3	$\pm 3\text{dB}$	dBm	

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Recommended Connection



TX_Fault

When improper power level in the laser driver is detected, the TX_Fault signal is set to high state and the Laser is turned off. TX_Fault can be reset with the TX_Disable line. This signal is a TTL-level signal.

TX_Disable

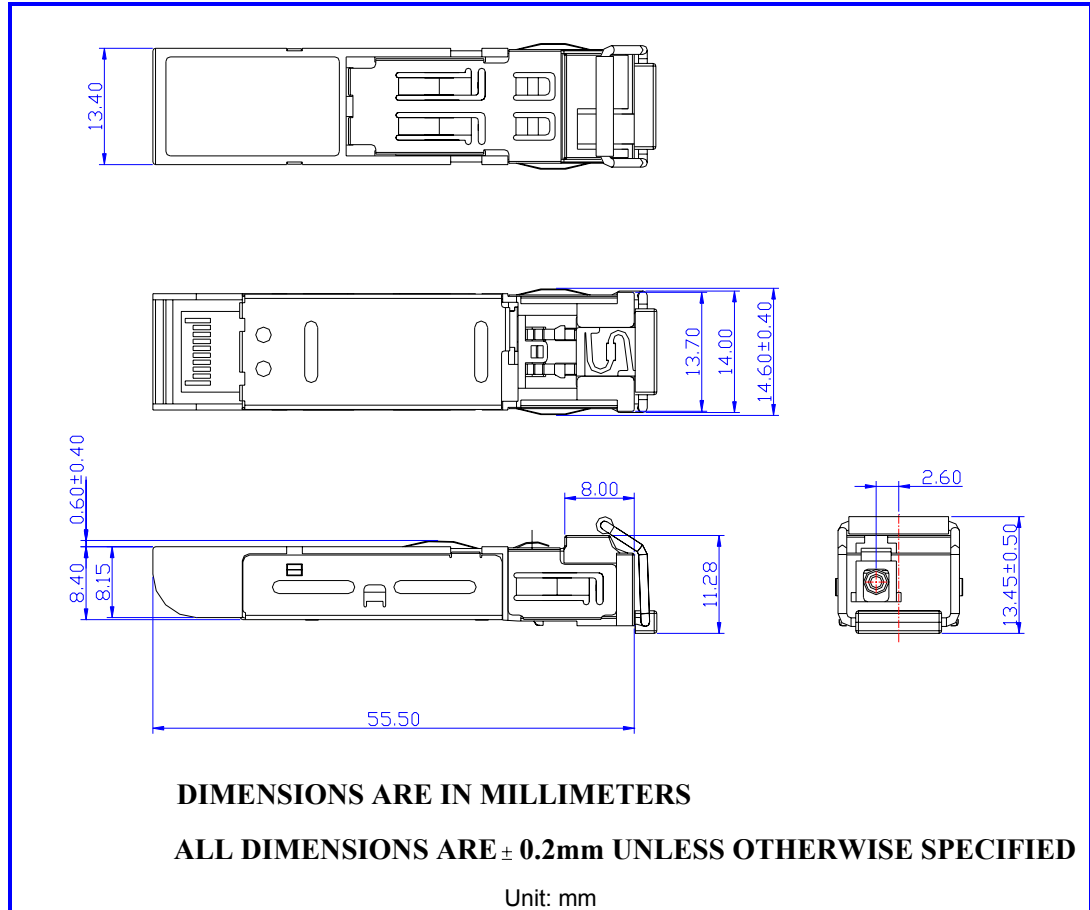
The TX_Disable signal can be set to high (TTL logic "1") to turn off the laser output.

Receive Loss (RX_LOS)

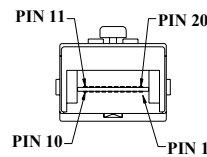
The RX_LOS is set to high (TTL logic "1") when the incoming optical signal falls below the sensitivity threshold of the receiver. This signal is also a TTL-level signal.

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Dimensions



Pin Assignment



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Pin Assignment

Pin	Signal Name	Description
1	T_{GND}	Transmit Ground,
2	TX_FAULT	Transmit Fault, TTL High, open collector
3	$TX_DISABLE$	Transmit Disable, internally pulled-up
4	$MOD_DEF (2)$	SDA Serial Data Signal, external pull-up is recommended
5	$MOD_DEF (1)$	SCL Serial Clock Signal, external pull-up is recommended
6	$MOD_DEF (0)$	Connected to Ground internally
7	$RATE_SELECT$	No connection
8	RX_LOS	Receiver Loss of Signal, TTL High, open collector
9	R_{GND}	Receiver Ground
10	R_{GND}	Receiver Ground
11	R_{GND}	Receiver Ground
12	$RX-$	Receive Data Bar, Differential PECL, AC coupled internally
13	$RX+$	Receive Data, Differential PECL, AC coupled internally
14	R_{GND}	Receiver Ground
15	V_{CCR}	Receiver Power Supply
16	V_{CCT}	Transmitter Power Supply
17	T_{GND}	Transmitter Ground
18	$TX+$	Transmit Data, Differential PCEL, AC coupled internally
19	$TX-$	Transmit Data Bar, Differential PCEL, AC coupled internally
20	T_{GND}	Transmitter Ground

Notes:

- TX_Fault is an open collector/drain output, and should be pulled up with a 4.7K ~ 10K resistor on the host board. High output state indicates a laser fault. Low output states indicates normal operation.
- TX_Disable is an input used to shut down the transmitter optical output. It is pulled up internally with a 4.7K resistor. Its operation are:
 Low (0 – 0.8V): Transmitter on
 High (2.0 – 3.46V): Transmitter Disabled
 Open (pulled-up internally): Transmitter Disabled
- Mod_Def 0, 1, and 2 are the module definition pins. They should be pulled up with a 4.7K~10K resistor on the host board. The module pulls the Mod-Def 0 to ground to indicate that the module is present. Mod-Def 1 is the clock, and Mod-Def 2 is the data of two-wire serial interface.
- LOS (Loss of Signal) is an open collector/drain output, and should be pulled up with a 4.7K ~ 10K resistor. High output state indicates the received optical power is below the receiver sensitivity. Low output state indicates normal operation.

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