NEC

10Gbps WDM Transceiver

OD-BP093xSL1001

10Gbps 1.27μm/1.33μm WDM Bi-directional SFP Transceiver

1. Features

- Single fiber Bi-directional Optical Transceiver Consists of
  - -Transmitter
  - -Receiver with 2R function
  - -1.27/1.33um WDM function
- Lead-Free and RoHS Compliant
- 10.3125Gbps Data Rate
- 2-wire interface with integrated Digital Diagnostic monitoring
- Up to 10km on 9/125μm SMF (ITU-T G.652)
- Hot-pluggable SFP+ electrical interface
- Simplex LC/UPC type pluggable optical interface
- Loss of Signal (LOS) function
- Transmitter disable (TX_DISABLE) function
- Single +3.3V power supply

Applications
10G BASE-LR
10G BASE-BR10

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2. Product Number Information

OD–BP093xSL1001

Transmitter wavelength
1 : 1.27μm band
3 : 1.33μm band

3. Absolute Maximum Ratings

Parameter	Unit	Specification			Notes
		Min	Typ.	Max	
Storage Temperature	deg.C	-40		+85	
Supply Voltage (VccT, VccR)	V	-0.5		3.6	
Relative Humidity (non-condensing)	%	5		85	
Damage Threshold	dBm	5			

4. Operating Conditions

Parameter	Unit	Min.	Typ.	Max.	Notes
Operating Case Temperature	deg.C	-40		85	
Power supply Voltage (Vcc)	V	3.135	3.3	3.465	
Data Rate	Gbps		10.3125		
Control Input Voltage High	V	2		Vcc	
Control Input Voltage Low	V	0		0.8	
Link Distance (SMF)	km			10	9/125um ITU-T G.652

5. Optical Interface

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Transmitter						
Center Wavelength	λ_C	1260	1270	1280	nm	OD-BP0931SL1001
		1320	1330	1340	nm	OD-BP0933SL1001
Optical Spectral Width	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	-8.2		0.5	dBm	
Optical Extinction Ratio	ER	3.5			dB	
Average Launched Powe (Laser Off)	P_{OFF}			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3cp					
Receiver						
Center Wavelength	λ_C	1320	1330	1340	nm	OD-BP0931SL1001
		1260	1270	1280	nm	OD-BP0933SL1001
Receiver Sensitivity (Average power)	Sen			-14.4	dBm	
Input Saturation Power (overload)	Psat	0.5			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-17	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Launched power (avg.) is power coupled into a single mode fiber with master connector (BOL)
2. Measured with Light source 1270nm @1330nm, ER=3.5dB; BER=<1e-12@10.3125Gbps, PRBS=2^31-1 NRZ

6. Electrical Interface

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

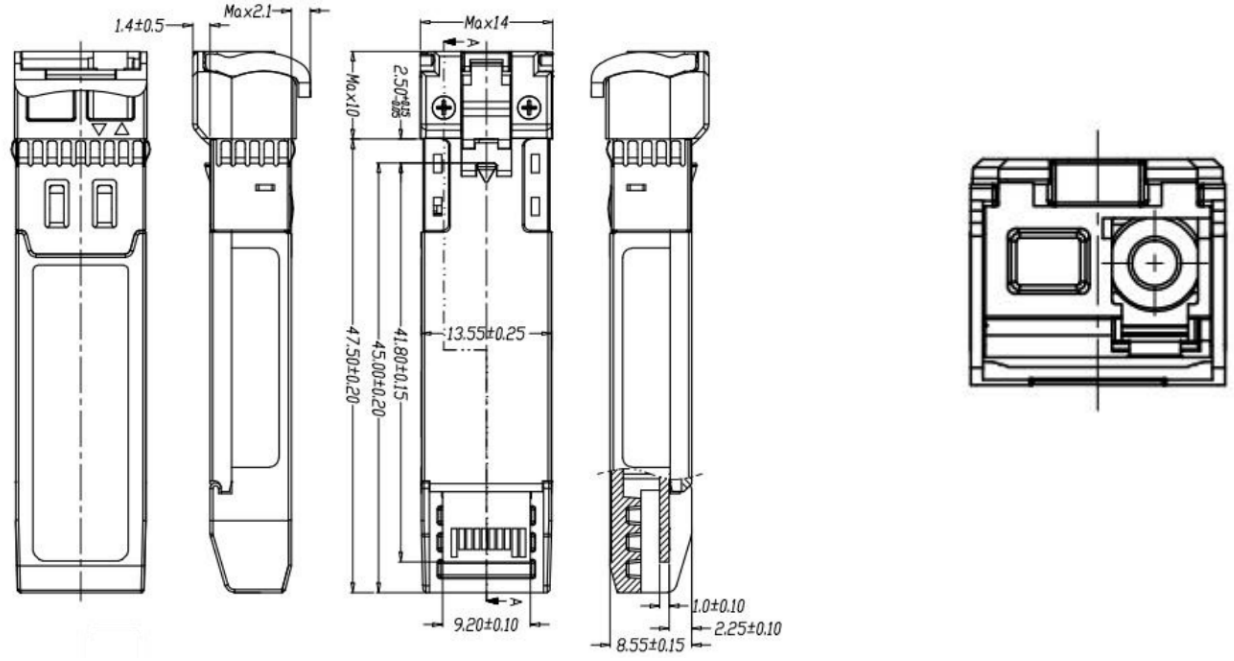
Parameters	Symbol	Min.	Typ.	Max.	Units	Notes
Power Consumption	p			1.5	W	
Transmitter						
Single-ended Input Voltage Tolerance		-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	Vin,pp	180		700	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee+0.8	V	2
Receiver						
Differential Output Voltage Swing	Vout,pp	300		850	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	3
Data output rise/fall time	Tr/Tf	28			ps	4
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	5
LOS De-assert Voltage	VlosL	Vee		Vee+0.8	V	5

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Input 100 ohms differential termination.
4. These are unfiltered 20-80% values.
5. Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

7. Outline Drawings

Dimensions are in millimeters. All dimensions are ±0.2mm unless otherwise specified. (Unit: mm)



(*) Bail color

Part number	Bail color
OD-BP0931SL1001	Aqua blue
OD-BP0933SL1001	Yellow Green

Figure. Transceiver outline

8. Pin Configuration

Pin No.	Symbol	Name/Description	Notes
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required(No function)	
8	LOS	Loss of Signal Indication. Logic 0 indicates normal operation.	5
9	RS1	No connection required(No function)	
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-Inverted DATA Output. AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground	1
18	TD+	Transmiter Non-Inverted DATA in. AC Coupled	
19	TD-	Transmitter Inverted DATA in. AC Coupled	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT is an open collector/drain output, which should be pulled up with 4.7kohm – 10kohm resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc+0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Should be pulled up with 4.7kohm – 10kohm on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. LOS is open collector/drain output. It should be pulled up with 4.7kohm – 10kohm on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

9. Digital Diagnostic Monitor Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode.

Parameter	Unit	Min.	Max	Notes
Temperature monitor absolute error	deg.C	-3	3	Over operating temp
Supply voltage monitor absolute error	V	-0.15	0.15	Full operating range
RX power monitor absolute error	dB	-3	3	
Bias current monitor	mA	-10%	+10%	
TX power monitor absolute error	dB	-3	3	

10. Ordering Information

Part Number	Fiber Optical Connector	Latch structure	Tx wavelength	Case Temperature
OD-BP0931SL1001	LC	Bail Latch	1.27μm band	-40 to +85 deg.C
OD-BP0933SL1001			1.33μm band	

- Revision history -

Revision	Date	Contents
P1E	8 July 2025	-

Areas of caution in the handling of laser diode products.

● This product complies with IEC 60825-1:2014, IEC 60825-1:2007 and 21 CFR 1040.10, which correspond to the category “Class 1 Laser Product” under IEC regulation and “Class I Laser product” under FDA regulation.

●During operations, the laser diode discharges red beams and infrared beams invisible to the eye. Since it is very hazardous if these beams directly, or bypassing through a lens, get in one’s eyes, please try to avoid this.

● Take proper Electrostatic-discharge (ESD) precautions while handling the device. The device is sensitive to ESD.

● May cause of damage if drop or subject to shock. This product includes optical parts.

●Caution-use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Areas of caution in handling GaAs.

There are some products in our catalogue that use GaAs. Please strictly adhere to the caution items appearing below, in order to prevent dangerous situations.

○Do not put the product in your mouth.

○Do not turn the product into a vaporous or powdered form through burning, grinding or chemical processing.

○When disposing of the product, follow related laws, and your company’s internal waste control regulations.

Areas of caution in handling optical fiber products.

●Be careful not to pierce your skins as the tips of optical fibers are extremely sharp. Especially you must attention in case of hazardous if they pierce one’s eyes.

● Do not apply extreme stress to optical fiber, or it may cause deterioration of characteristics or disconnection. The force of pull should be less than 200gf, and a radius for bending should be larger than R30 mm

● Do not hold only optical fiber or module package, because extreme stress is easy to apply to the optical fiber edge of the module

In generally, failure occurs in electronic components with a certain probability. We at NEC work to improve the quality and reliability of industrial electronic components, but it is impossible to reduce such probability to zero. This being the case, users of NEC industrial electronic components are requested to provide redundant design, counterburning design, malfunction prevention design and other safety design to prevent failures that may cause possible accidents involving injuries of death, fire, social damages, etc.

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