

OPB1250-353DxR / OPB1250-533DxR

1.25G BiDi SFP Transceiver, SMF, 1310nm-TX/1550nm-RX or 1550nm-TX/1310nm-RX, 3km, LC, DDM



Features

- Support up to 1.25Gb/s data links
- Compliant with SFP MSA standard
- Hot pluggable SFP footprint
- Single 3.3V power supply
- Built-in Digital Diagnostic Monitor Interface
- Simplex LC connector for Bi-Directional transmission
- 1310nm FP laser and 1550nm PIN photo detector
- 1550nm FP laser and 1310nm PIN photo detector
- Applicable for 3km SMF connection
- Low power dissipation <0.8W
- Metal enclosure provides lower EMI
- RoHS compliant and lead-free
- Operating Temperature: Standard 0~70°C, Industrial -40~85°C

Applications

- 1G Fiber Channel, Switch to Switch Interface
- Gigabit Ethernet, Switched Backplane Applications
- Broadband aggregation and wireless infrastructure
- Router/Server Interface
- Other Optical networking

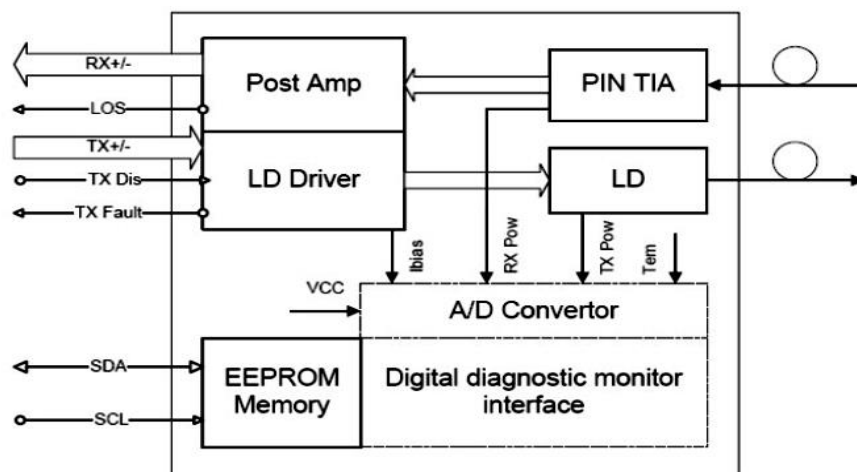
Description

Optcore OPB1250-35(53)3DxR family are high-performance, cost-effective SFP BiDi modules supporting dual data rate of 1.25Gbps/1.0625Gbps and 3km transmission distance with SMF. The transceiver consists of three sections: an FP laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA), and an MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with the SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

This series 1G BiDi SFP 3km transceiver provides two versions for different applications.

- The standard commercial-grade BiDi SFP transceiver (OPB1250-353DCR / OPB1250-533DCR) supports operating temperature 0~70° for commercial applications and at a lower cost.
- The Industrial grade BiDi SFP transceiver (OPB1250-353DTR / OPB1250-533DTR) supports operating temperature -40~85°C. It is made with robust and reliable components to meet the needs of Industrial Ethernet application under harsh industrial environmental conditions, such as industrial automation, government, rail, and intelligent transportation systems (ITSs), military, oil and gas, mining, and outdoor applications.

Functional Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	T _s	-40	85	°C	
Operating Humidity	RH	5	95	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			220	mA	
Case Operating Temperature	T _c	0		70	°C	Standard
		-40		85	°C	Industrial
Data Rate			1.25		Gbps	Gigabit Ethernet

			1.06		Gbps	Fiber Channel
Transmission Distance				3	km	9/125μm SMF

Optical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Operating Wavelength	λ	1270	1310	1360	nm	OPB1250-353DxR
		1510	1550	1570		OPB1250-533DxR
Ave. output power (Enabled)	P _{AVE}	-11		-3	dBm	1
Extinction Ratio	ER	9			dB	1
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS spectral width	$\Delta\lambda$			3	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ns	2
Dispersion penalty	TDP			3.9	dB	
Output Optical Eye	Compliant with IEEE802.3 z (class 1 Laser safety)					
Receiver						
Operating Wavelength	λ	1510	1550	1570	nm	OPB1250-353DxR
		1270	1310	1360		OPB1250-533DxR
Receiver Sensitivity	P _{SEN1}			-20	dBm	3
Overload	P _{AVE}	-3			dBm	3
LOS Assert	Pa	-35			dBm	
LOS De-assert	Pd			-21	dBm	
LOS Hysteresis	Pd-Pa	0.5			dB	

Note :

1. Measured at 1.25Gbps with PRBS 2^7-1 NRZ test pattern.
2. Unfiltered, measured with a PRBS 2^7-1 test pattern @1.25Gbps
3. Measured at 1250 Mb/s with PRBS 2^7-1 NRZ test pattern for BER < 1×10^{-12}

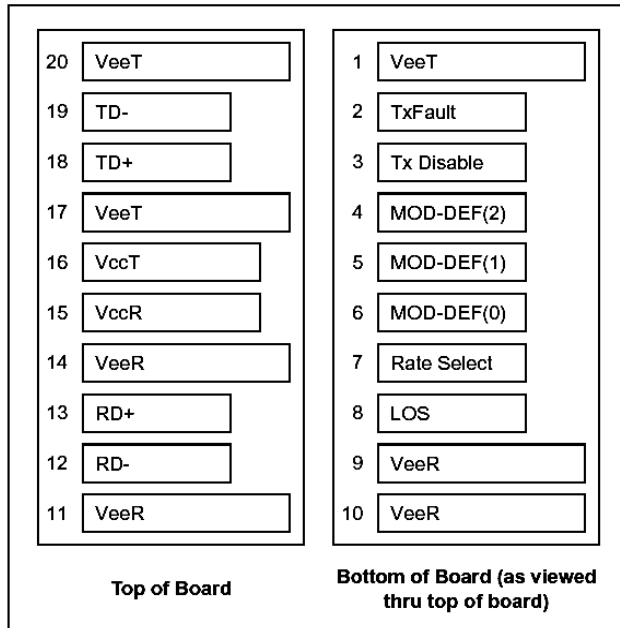
Electrical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Differential data input swing	$V_{IN,PP}$	120		820	mVpp	1
Tx Disable Input-High	V_{IH}	2.0		$V_{CC}+0.3$	V	
Tx Disable Input-Low	V_{IL}	0		0.8	V	
Tx Fault Output-High	V_{OH}	2.0		$V_{CC}+0.3$	V	2
Tx Fault Output-Low	V_{OL}	0		0.8	V	2
Input differential impedance	R_{in}		100		Ω	
Receiver						
Differential data output swing	$V_{out,pp}$	340	650	800	mVpp	3
Rx LOS Output-High	V_{ROH}	2.0		$V_{CC}+0.3$	V	2

Rx LOS Output-Low	VROL	0		0.8	V	2
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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.

Pin Definitions**Pin Descriptions**

Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	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)	Model present indication	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V _{EER}	Receiver ground	1	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inverse Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	

18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V _{EET}	Transmitter Ground	1	

Notes:

1. 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 V_{cc}+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.
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 4.7k~10kΩ resistor. Its states are:
Low (0 to 0.8V): Transmitter on (>0.8V, < 2.0V): Undefined
High (2.0 to 3.465V): 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 V_{ccT} or V_{ccR}.
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
4. LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V_{cc}+0.3V. 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.
5. RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6. TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

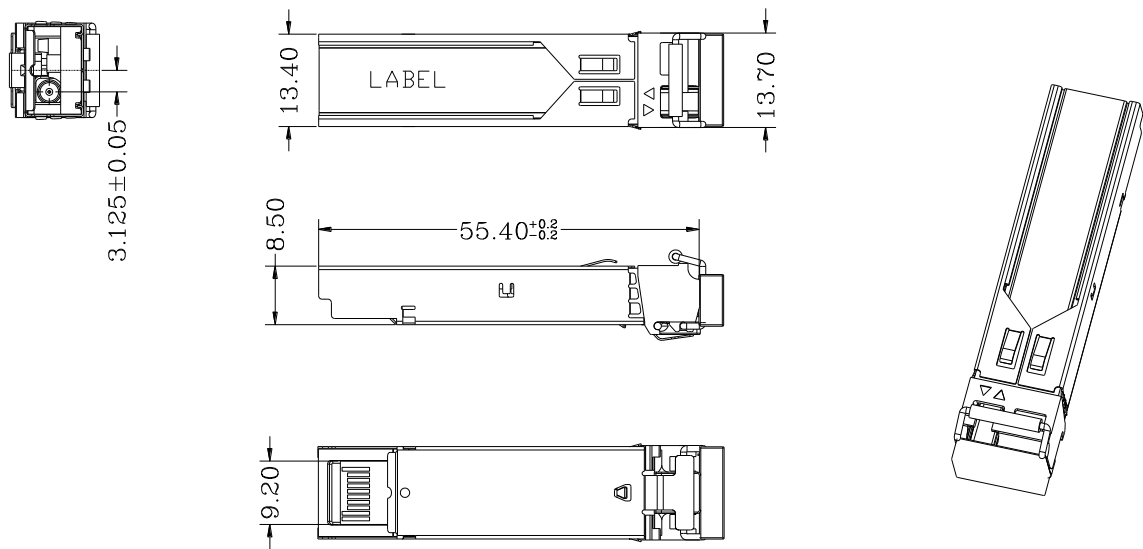
Digital Diagnostic Functions

Optcore 1.25Gb/s BiDi SFP 3km optical transceiver supports the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the EEPROM 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.

Optcore 1.25Gb/s BiDi SFP 3km optical transceiver provides an optional enhanced digital diagnostic monitoring (DDM/DOM) interface. It 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 alarm and warning flags system, which alerts end-users when particular operating parameters are outside of a factory set normal range.

Digital diagnostics for this 1.25G BiDi SFP 3km optical transceiver is internally calibrated by default.

Mechanical Dimensions



Units in mm
Tolerance without indication is ±0.1mm

Ordering Information

Part number	Description
OPB1250-353DCR	1.25G BiDi SFP Transceiver, SMF, 1310nm-TX/1550nm-RX, 3km, LC, DDM, 0°C~+70°C
OPB1250-533DCR	1.25G BiDi SFP Transceiver, SMF, 1550nm-TX/1310nm-RX, 3km, LC, DDM, 0°C~+70°C
OPB1250-353DTR	1.25G BiDi SFP Industrial Transceiver, SMF, 1310nm-TX/1550nm-RX, 3km, LC, DDM, -40°C~+85°C
OPB1250-533DTR	1.25G BiDi SFP Industrial Transceiver, SMF, 1550nm-TX/1310nm-RX, 3km, LC, DDM, -40°C~+85°C

 Warnings

Process plug

The transceiver module is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles. It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

Handling Precautions

The transceiver module is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety

The transceiver module is a Class 1 laser product per international standard IEC 60825-1. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Appendix A. Document Revision

Version No	Date	Description
DS/V180227/EN	2018-02-27	Preliminary datasheet
DS/V2.0/EN	2024-10-23	Delete Non-DDM and extend temperature P/N
DS/V4.0/EN	2025-04-25	Update Logo, datasheet template, product image

For more product information, visit us on the web at www.optcore.net



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