

OPB2488-35(53)20xxR

2.5Gb/s Bi-Directional SFP Transceiver, SMF, Tx1310/Rx1550nm or Tx1550/Rx1310nm, 20km

Features

- Supports 2.5Gbps/2.125Gbps bit rates
- Bi-Directional LC connector
- Hot pluggable SFP footprint
- 1310nm DFB laser and 1550nm PIN photo detector
- 1550nm DFB laser and 1310nm PIN photo detector
- Applicable for 20km SMF connection
- Low power consumption, < 0.8W
- Supports Digital Diagnostic Monitor Interface
- Compliant with SFP MSA and SFF-8472
- Very low EMI and excellent ESD protection
- RoHS compliant and Lead Free
- Operating Temperature: Standard 0~70°C Extended -10~85°C Industrial -40~85°C



Applications

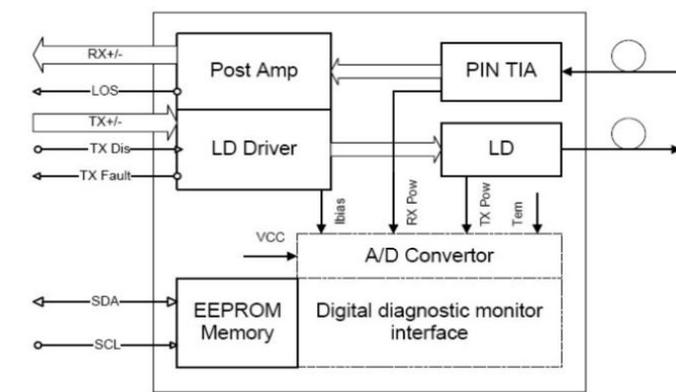
- Gigabit Ethernet
- SONET OC-48 / SDH STM-16
- 1X & 2X Fiber Channel
- Other optical transmission systems

Description

Optcore OPB2488-35(53)20xxR family are high performance, cost effective SFP BiDi modules supporting dual data-rate of 2.5Gbps/2.125Gbps and 20km transmission distance with SMF. The transceiver consists of three sections: a DFB 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.

There are three versions of the series 2.5G SFP BiDi optical transceiver modules for different applications. The Standard grade (0~70°C) is for commonly commercial application, the Extended grade (-10~85°C) is for Extended temperature application, and the Industrial grade (-40~85°C) is made with robust and reliable components to meet the needs of Industrial Ethernet application under harsh environmental conditions.

Functional Diagram



Absolute Maximum Ratings

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

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V	
Power Supply Current	I _{cc}			220	mA	
Case Operating Temperature	T _c	0		70	°C	Standard
		-10		85	°C	Extended
		-40		85	°C	Industrial
Data Rate	DR		2.5		Gbps	STM-16 / OC-48
			2.125			2x Fibre Channel
Transmission Distance				20	km	9/125µm SMF

Optical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Operating Wavelength	λ	1270	1310	1360	nm	OPB2488-3520DxR
		1510	1550	1570		OPB2488-5320DxR
Ave. output power (Enabled)	P _{AVE}	-5		0	dBm	1
Extinction Ratio	ER	8.2			dB	1
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS spectral width	$\Delta\lambda$			1	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	OPB2488-3520DxR
		1270	1310	1360		OPB2488-5320DxR
Receiver Sensitivity	P _{SEN1}			-19	dBm	3
Overload	P _{AVE}	-3			dBm	3
LOS Assert	P _a	-35			dBm	
LOS De-assert	P _d			-20	dBm	
LOS Hysteresis	P _d -P _a	0.5			dB	

Note :

1. Measured at 2.5Gbps with PRBS 2²³- 1 NRZ test pattern.

- 2. Unfiltered, measured with a PRBS 2²³-1 test pattern @2.5Gbps
- 3. Measured at 2.5Gbps with PRBS 2²³- 1 NRZ test pattern for BER < 1x10⁻¹²

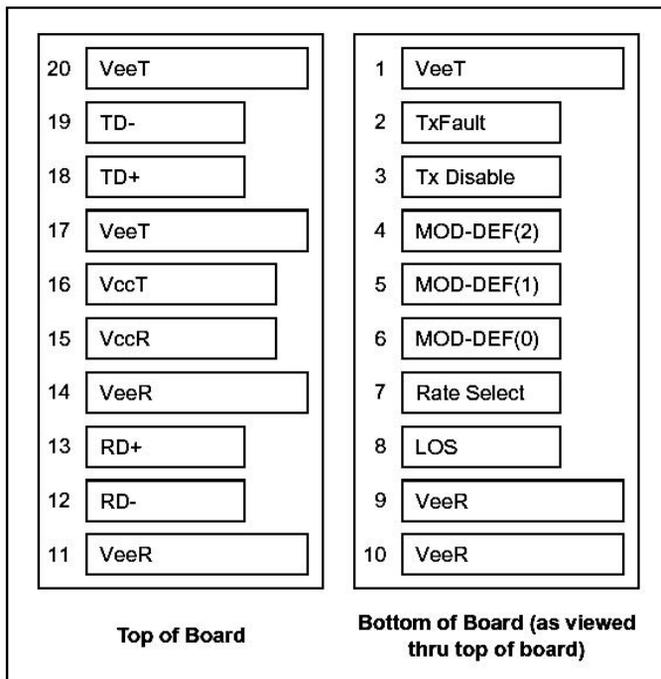
Electrical Characteristics (T_{OP(C)} = 0 to 70°C, T_{OP(I)} = -40 to 85°C, V_{CC} = 3.13 to 3.47 V)

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Differential data input swing	VIN,PP	120		820	mVpp	1
Tx Disable Input-High	VIH	2.0		Vcc+0.3	V	
Tx Disable Input-Low	VIL	0		0.8	V	
Tx Fault Output-High	VOH	2.0		Vcc+0.3	V	2
Tx Fault Output-Low	VOL	0		0.8	V	2
Input differential impedance	Rin		100		Ω	
Receiver						
Differential data output swing	Vout,pp	340	650	800	mVpp	3
Rx LOS Output-High	VROH	2.0		Vcc+0.3	V	2
Rx LOS Output-Low	VROL	0		0.8	V	2

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
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Digital Diagnostic Functions

Optcore 2.5Gb/s SFP BiDi optical transceiver 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, Optcore 2.5Gb/s SFP BiDi optical transceiver provide an optional 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 8 bit 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 module. 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 this 2.5G SFP BiDi optical transceiver is internally calibrated by default.

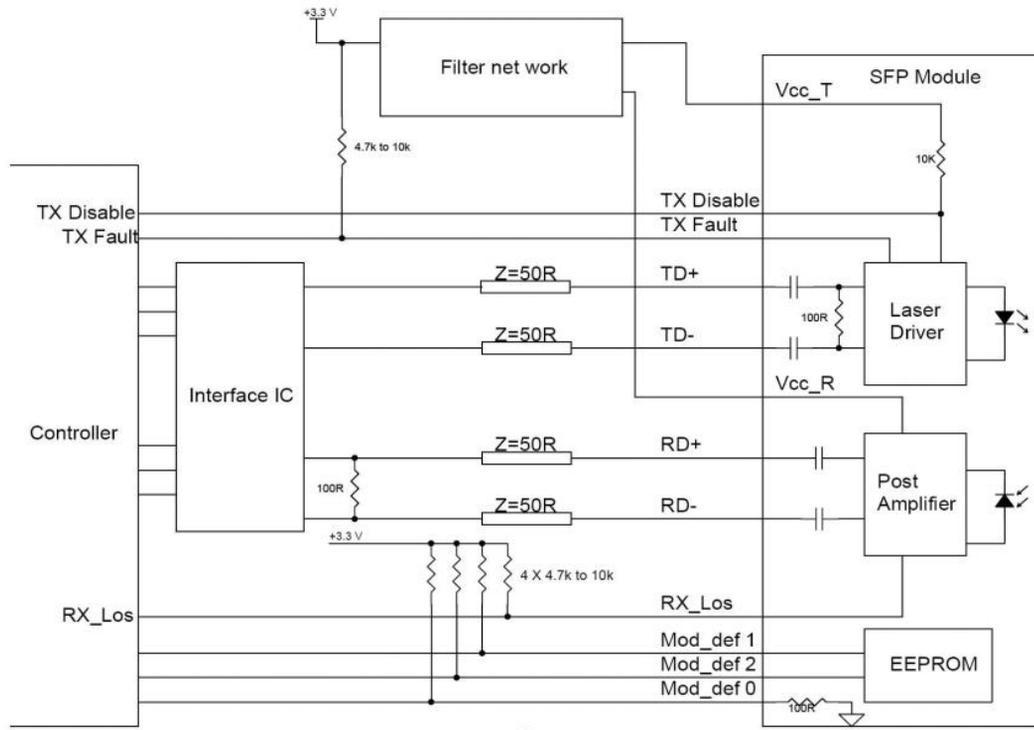
The STM-16 / OC-48 BiDi SFP transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

Parameter	Symbol	Units	Min.	Max.	Accuracy	Note
Transceiver temperature	D _{Temp-E}	°C	-45	+90	±5°C	1
Transceiver supply voltage	D _{Voltage}	V	2.8	4.0	±3%	
Transmitter bias current	D _{Bias}	mA	2	80	±10%	2
Transmitter output power	D _{Tx-Power}	dBm	-8	-3	±3dB	
Receiver average input power	D _{Rx-Power}	dBm	-21	0	±3dB	

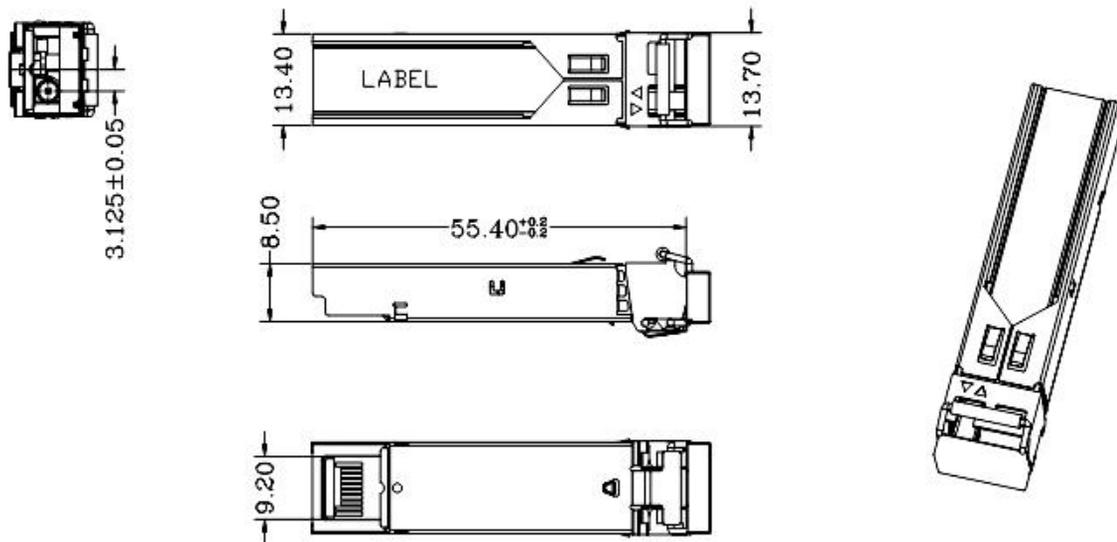
Notes:

1. When Operating temp.=0~70 °C, the range will be min=-5,Max=+75
2. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser
3. Internal/ External Calibration compatible.

Typical Interface Circuit



Mechanical Dimensions



Units in mm
Tolerance without indication is ±0.1mm

Ordering information

Part number	Description
OPB2488-3520NCR	2.5G BiDi SFP Transceiver, SMF, Tx:1310nm/Rx:1550nm, 20km, LC, 0°C~+70°C
OPB2488-5320NCR	2.5G BiDi SFP Transceiver, SMF, Tx:1550nm/Rx:1310nm, 20km, LC, 0°C~+70°C
OPB2488-3520DCR	2.5G BiDi SFP Transceiver, SMF, Tx:1310nm/Rx:1550nm, 20km, LC, DDM, 0°C~+70°C
OPB2488-5320DCR	2.5G BiDi SFP Transceiver, SMF, Tx:1550nm/Rx:1310nm, 20km, LC, DDM, 0°C~+70°C
OPB2488-3520DER	2.5G BiDi SFP Transceiver, SMF, Tx:1310nm/Rx:1550nm, 20km, LC, DDM, -10°C~+85°C
OPB2488-5320DER	2.5G BiDi SFP Transceiver, SMF, Tx:1550nm/Rx:1310nm, 20km, LC, DDM, -10°C~+85°C
OPB2488-3520DTR	2.5G BiDi SFP Industrial Transceiver, SMF, Tx:1310nm/Rx:1550nm, 20km, LC, DDM, -40°C~+85°C

OPB2488-5320DTR	2.5G BiDi SFP Industrial Transceiver, SMF, Tx:1550nm/Rx:1310nm, 20km, LC, DDM, -40°C~+85°C
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Warnings

Process plug

The transceiver optics 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 optics 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 optics 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.

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



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