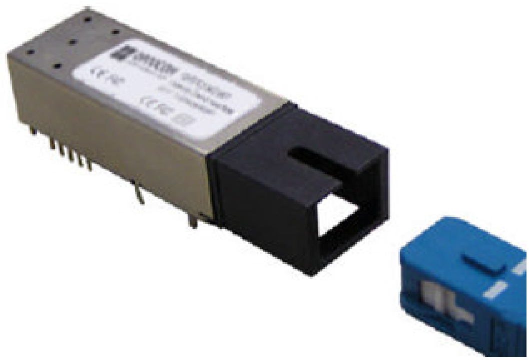
Fiber Optic Bi-Directional SFF 2x5 Transceiver For 1.25 Gb/s and Tx 1310 FP / Rx 1550 PIN

Data Sheet

OBF2331



Features

- Data rate of up to 1.25 Gb/s
- Single fiber solution with WDM
- Singlemode fiber with SC connector
- 1310 nm FP laser diode with fiber stub in receptacle
- 2x5 Footprint compliant with Small Form Factor (SFF) Multi-Source Agreement (MSA)
- Single power supply (+3.3V)
- DC coupled differential PECL inputs and outputs
- TTL compatible Signal Detect (SD)
- Class 1 laser product
- 2 km link distance

Applications

- Gigabit Ethernet
- Fiber Channel
- FTTx with 1000 Mb/s Ethernet First Mile (EFM) standard

Description

The OBF2331 is a bi-directional WDM single fiber transceiver designed to handle data rates of up to 1.25 Gb/s from a single power supply (+3.3V). The module uses a WDM filter to couple the optic transmitter and receiver signals into a single 9/125 µm singlemode fiber through an SC connector. The full differential data inputs and outputs are PECL compatible.

The transmitter consists of a high reliability InGaAsP 1310 nm Fabry-Perot (FP) laser diode coupled to a singlemode fiber through the SC connector.

The hybrid bipolar fiber optic receiver consists of an InGaAs PIN (P-type/ Intrinsic/ N-type detector) photodiode for high-speed operation and a transimpedance preamplifier for excellent noise immunity. The module is also compatible with industry standard hand and wave soldering processes.

Safety

Laser Compliance Statement

The OBF2331 is classified as a Class I Laser Product and complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated under recommended operating conditions. Because the transceiver is designed to be inherently eye safe, it does not require open fiber control thus eliminating complex electronics or mechanics.

Caution – use of device other than those specified herein may result in hazardous laser radiation exposure or other damage. Please embrace all customary precautions and discretion while handling this device.

Performance Specifications

Absolute Maximum Transmitter Ratings

Stresses in excess of the absolute maximum ratings can cause damage to the optical device. Operations of the optical device are suggested to remain within the recommended operating conditions. Exposure to the absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Value	Unit
Storage Temperature	T_{stg}	-40 to +85	°C
Operating Temperature	T_{op}	-20 to +70	°C
Soldering Temperature	S_{temp}	240	°C
Soldering Time	S_{time}	10	sec
Continuous Forward Current		250	mA

Recommended Operating Transmitter Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	Vcc-Vee	3.3	V
Operating Current		170	mA

Transmitter Electro-Optical Characteristics (T_A=25℃, V_{CC}=3.3V)

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Averaged Launched Power into 9/125 µm fiber	P_{OUT}	-10		-3	dBm
Supply Voltage	V_{CC}	3.15	3.30	3.45	V
Center Wavelength	λc	1270	1310	1355	nm
Spectral Width (RMS)	Δλ			4	nm
Relative Intensity Noise	RIN			-120	dB/Hz
Extinction Ratio (Dynamic)	ER	9			dB
Optical Rise Time, 20%-80%	t_R			260	ps
Optical Fall Time, 20%-80%	T_F			260	ps
Total Contributed Jitter	TJ			225	ps
Input Differential Voltage Swing	V_{IN}	0.3		1.6	V
Transmitter Disable Voltage	V_{DIS}	V_{CC}-1.3		V_{CC}	V
Transmitter Enable Voltage	V_{EN}	V_{EE}		V_{EE}+0.8	V
Supply Current	I_{TX}			170	mA

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Operating Temperature	T_{op}	-20 to +70	°C
Soldering Temperature	S_{temp}	240	°C
Soldering Time	S_{time}	10	sec
Supply Voltage (V_{CC}-V_{EE})		3.6	V

Recommended Operating Receiver Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	Vcc-Vee	3.3	V
Operating Current		130	mA

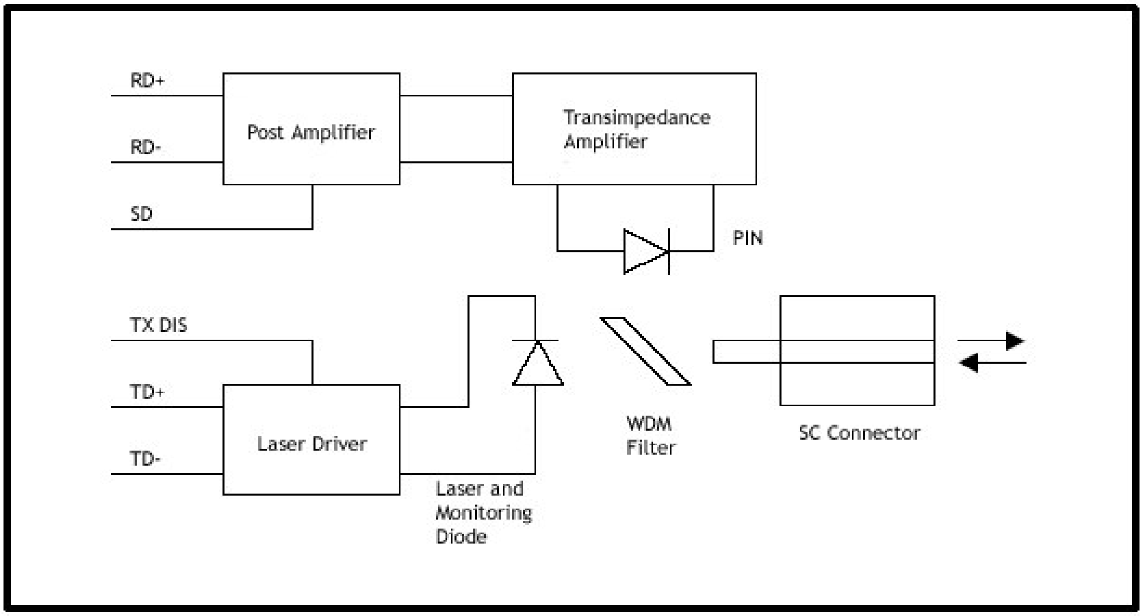
Receiver Electro-Optical Characteristics (T_A=25°C, V_{CC}=3.3V)

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Receiving Wavelength Center of Range	λ_R	1480		1500	nm
Sensitivity (Average Power)[1]	P_{SEN}		-21	-19	dBm
Saturation (Average Power)	P_{SAT}	-3			dBm
Rise/Fall Time (20%-80%)	t_R / t_F			400	ps
Signal Detect Assert Level[2]	P_{SDA}			-19	dBm
Signal Detect Deassert Level[3]	P_{SDD}	-30			dBm
Signal Detect Hysteresis	P_{SDA} - P_{SDD}	0.5		5	dB
Signal Detect Assert Time	t_{SDA}			100	µs
Signal Detect Deassert Time	t_{SDD}			350	µs
Differential Data Output Voltage Swing	V_{OUT}	0.4		1.6	V
Optical Crosstalk	OCT			-45	dB

Notes:

1. **Average optical power at which the BER is $1x10^{-12}$. Measured with a 2^7-1 NRZ PRBS and ER = 9 dB.**
2. **Optical power above which the SIGNAL DETECT toggles from Low to High state.**
3. **Optical power below which the SIGNAL DETECT toggles from High to Low state.**

Block Diagram



Optical Subassembly

An InGaAsP laser with monitoring diode, an InGaAs PIN photodiode, a transimpedance amplifier, and a wavelength division multiplexing (WDM) filter are integrated to form the bi-directional single fiber optical subassembly (OSA). Light signals over wavelengths of 1310 nm and 1550 nm are respectively transmitted and received through a 9/125 µm singlemode fiber via an SC connector. The WDM filter is designed to pass transmitting signals at 1310 nm but also reflects receiving 1550 nm signals to suppress extensive optical cross talk. The PIN photodiode together with the transimpedance amplifier converts the received optical serial data into an electrical signal.

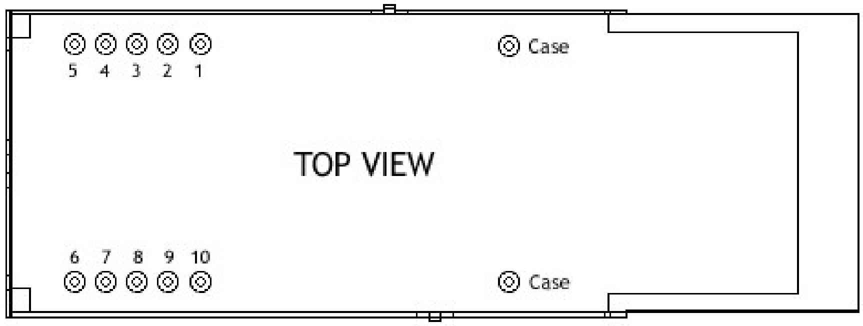
Transmitter

The transmitter contains a laser circuit that drives the modulation and bias current of the laser diode. A power control circuit controls the currents while the output from the monitoring diode acts as the controlling signal. The transmitter converts PECL compatible electrical serial data (TD+ and TD-) into optical serial data. Data lines are 100 Ω terminated. The laser can be disabled by TX DIS input.

Receiver

The post amplifier converts the serial data from transimpedance amplifier into PECL compatible data (RD+ and RD-). The Signal Detect (SD, active high) shows whether an optical signal is present.

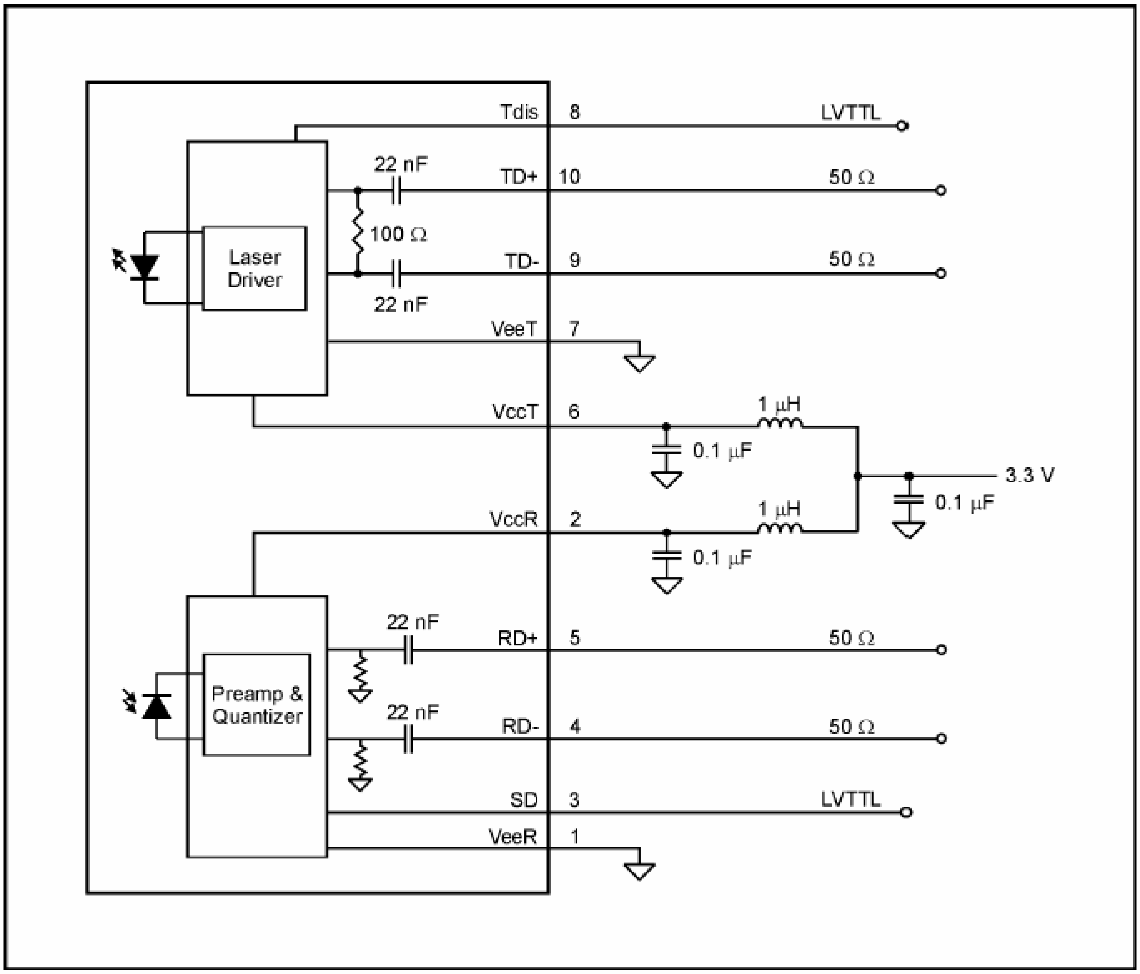
Connection Diagram



Pin Assignment and Description

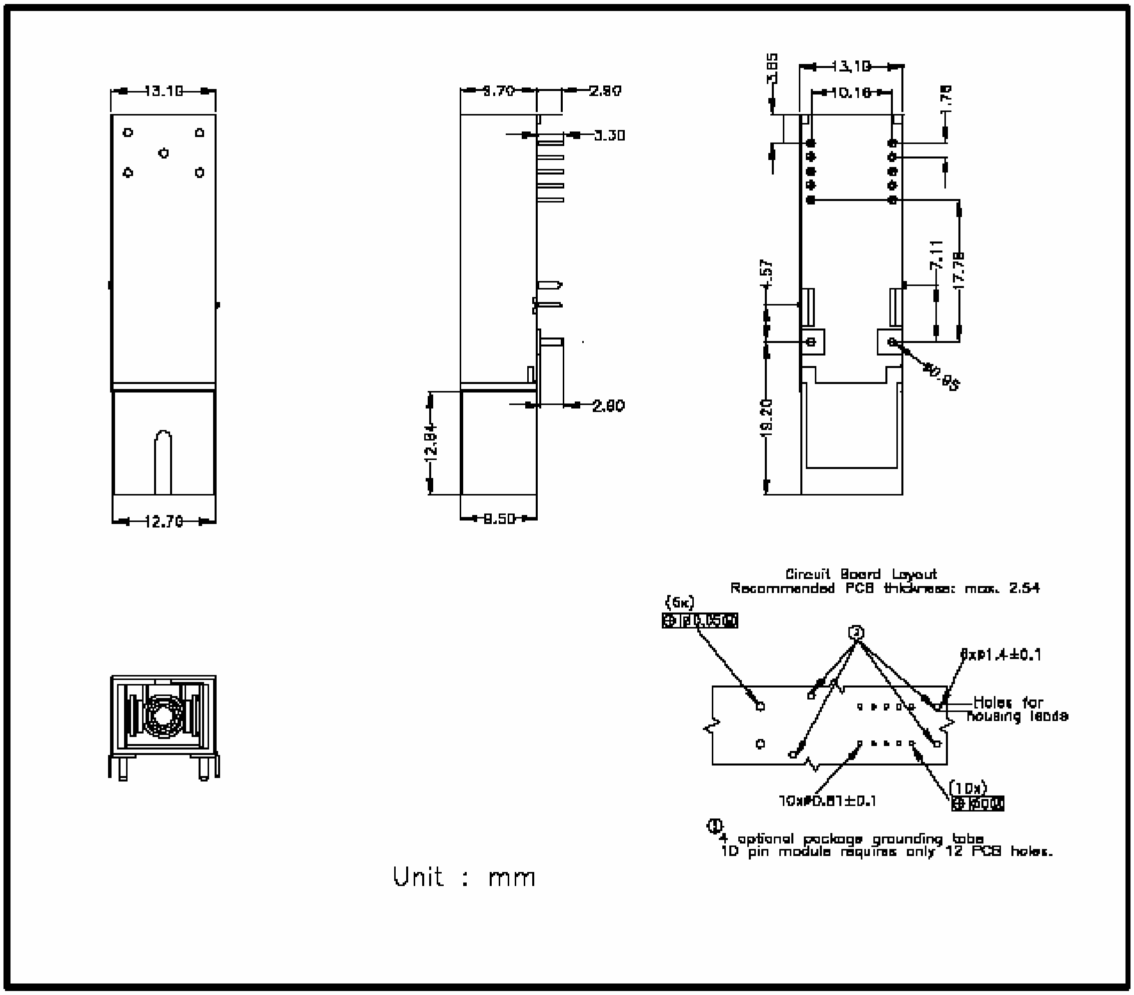
PIN	Symbol	Name	Level/Logic	Description
1	RX GND	Receiver Signal Ground	N/A	
2	VccR	Receiver Power Supply	N/A	
3	SD	Signal Detect	TTL	Logic “1” output represents that light is present at receiver input. Logic “0” output represents no optical signal is detected.
4	RD-	Received Data Out Not	PECL	
5	RD+	Received Data Out	PECL	
6	VccT	Transmitter Power Supply	N/A	
7	TX GND	Transmitter Signal Ground	N/A	
8	TX DIS	Transmitter Disable/Enable	TTL-Input	A low/open signal switches the laser ON. A high signal switches the laser OFF.
9	TD+	Transmitter Data In	PECL	
10	TD-	Transmitter Data In Not	PECL	

Recommended Circuit Schematic



Package Outline Diagram

Dimensions for the device package are given in millimeters.



Notes:

1. **Dimensions refer to SC connector.**
2. **Refer to package outline of the Small Form Factor (SFF) Multi-Source Agreement (MSA) for dimensions not shown.**

Additional Information

Contact

For additional information, product specifications, or information about Optocom:

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