

# Fiber Optic SFP DFB 1310nm 2.67G Transceiver with APD Photodiode and DDMI

Data Sheet

**OFD3546**



The OFD3546 transceiver module operates at a wavelength of 1310 nm and at 2.67 Gb/s for OC-3, OC-12 and OC-48 long reach applications.

## Features

- Hot-pluggable
- Single +3.3 V supply
- Duplex LC connector interface
- Distributed Feedback 1310 type LD
- Low power dissipation
- OC-48/STM-16 Long Reach
- APD receiver
- Power Output: -2 to +3 dBm
- 50 km link distance
- Multi data rates from 100Mbps to 2.7Gbps
- Internal Digital Diagnostics calibration
- Digital Diagnostics Monitoring for SFF-8472 compatible
- Multi-Source Agreement (MSA) for Small Form Factor Pluggable (SFP) Compliant

## Applications

- Telecommunications and Data Communications system networks
- SONET OC-12, OC-48 LR-1/STM-16 L16.1
- SONET OC-3
- Gigabit Ethernet
- Point-to-Point networking
- Metro Access Rings
- 1x/ 2x Fiber Channel
- 100Base Fast Ethernet

## Description

The OFD3546 transceiver provides signal conversion and processing for serial optical data communication applications. It operates over single mode fiber by converting 1310 nm wavelength lightwave information into an electrical signal and vice versa at a data rate of 2.67 Gb/s.

Housed in a compact metal package, the transceiver module consists of a transmitter and receiver optical subassembly coupled with a duplex LC receptacle. A high-speed uncooled DFB laser diode operates as light source while an APD photodiode subsequently acts as a detector.

This dual-fiber connector transceiver is designed for use in telecom and datacom network systems at 2.67 Gb/s for SONET OC-3, OC-12, OC-48 LR-1/SDH STM-16 L16.1, Fast Ethernet, Gigabit Ethernet and 1x/2x Fiber Channel applications.

**Transceiver Monitoring Interface**

OFD3546 provides an enhanced 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 normal factory-set range. The monitoring interface makes use of two wire address 1010001X (A2h) and is backward compatible with the Small Form Pluggable Multi-Source Agreement (SFP MSA).

**Serial Identification (EEPROM)**

An SFP having module definition 4 provides access to sophisticated identification information that describes the SFP transceiver’s capabilities, standard interface, manufacturer and other information. An EEPROM containing the detailed product information and digital diagnostic function for the host equipment is accessed by the 2-wire serial CMOS EEPROM protocol. See SFP MSA for detailed description.

**Performance Specifications**

**Absolute Maximum 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	Minimum	Maximum	Unit
Storage Temperature	T <sub>S</sub>	-40	+85	°C
Supply Voltage	V <sub>CC</sub>	0	4.0	V
Relative Humidity	RH	5	85	%

**Recommended Operating Conditions**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T <sub>OP</sub>	0		70	°C
Supply Voltage	V <sub>CC</sub>	3.1	3.3	3.5	V
Supply Current	I <sub>TX</sub> + I <sub>RX</sub>		200	300	mA

**Safety**

**Laser Compliance Statement**

The OFD3546 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.

**Transmitter Electro-Optical Interface (T<sub>C</sub> = 0~70°C; V<sub>CC</sub>T,R = 3.1V < V<sub>CC</sub> < 3.5V)**

Parameter	Symbol	Minimum	Maximum	Unit
Transmitter Differential Input Voltage	TD +/-	400	2000	mVp-p
Optical Output Power <sup>1</sup>	P <sub>O</sub>	-2	+3	dBm
Optical Extinction Ratio <sup>1</sup>	E <sub>R</sub>	8.2		dB
Center Wavelength <sup>1</sup>	λ <sub>C</sub>	1280	1340	nm
Spectral Width <sup>1</sup>	Δλ		< 1	nm
Side Mode Suppression Ratio <sup>1</sup>	SMSR	30		dB
Optical Rise/ Fall Time <sup>2</sup>	t <sub>r</sub> / t <sub>f</sub>		0.15	nsec
Tx_Fault - HIGH	V <sub>Fault_H</sub>	2	V <sub>CC</sub>	V
Tx_Fault - LOW	V <sub>Fault_L</sub>	V <sub>ee</sub>	V <sub>ee</sub> + 0.5	V
Tx_Disable - High	V <sub>Disable_H</sub>	2	V <sub>CC</sub>	V
Tx_Disable - LOW	V <sub>Disable_L</sub>	V <sub>ee</sub>	V <sub>ee</sub> + 0.8	V

**Note:**

1. Measured at 2488.32 Mbps, PRBS 2<sup>23</sup>-1, NRZ.
2. 20%-80%

**Receiver Electro-Optical Specifications (T<sub>C</sub> = 0~70°C; V<sub>CC</sub>T,R = 3.1V < V<sub>CC</sub> < 3.5V)**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Receiver Differential Output Voltage	RD +/-	600	800		mVp-p
Receiver Overload <sup>1,2</sup>	P <sub>IN</sub> MAX	-8			dBm
Receiver Sensitivity <sup>1,2</sup>	P <sub>IN</sub> MAX			-28	dBm
Operating Center Wavelength	λ <sub>C</sub>	1270		1620	nm
Receiver LOS Assert Level <sup>2</sup>	P <sub>RX_LOS A</sub>	-45			dBm
Receiver LOS Deassert Level <sup>2</sup>	P <sub>RX_LOS D</sub>			-28.5	dBm
Receiver Loss of Signal Hysteresis <sup>2</sup>		0.5	2		dB

**Note:**

1. With BER better than or equal to 1x10<sup>-12</sup>.
2. Measured in center of eye opening with 2<sup>23</sup>-1 PRBS, NRZ.

**Pin Assignment**

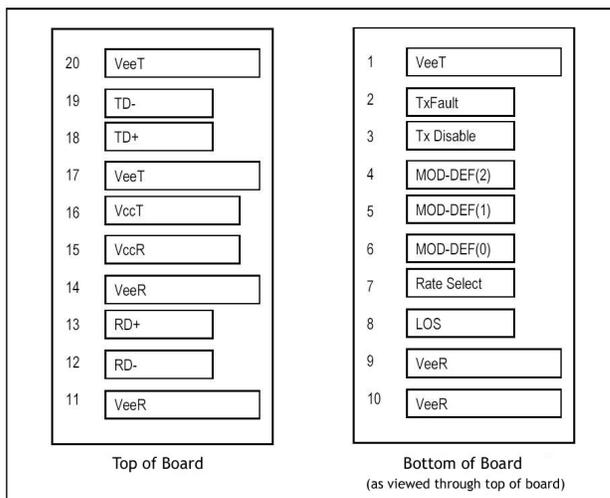


Figure 1. SFP Transceiver Electric Pad Layout

**OFD3546 SFP TRANSCEIVER DATA SHEET**

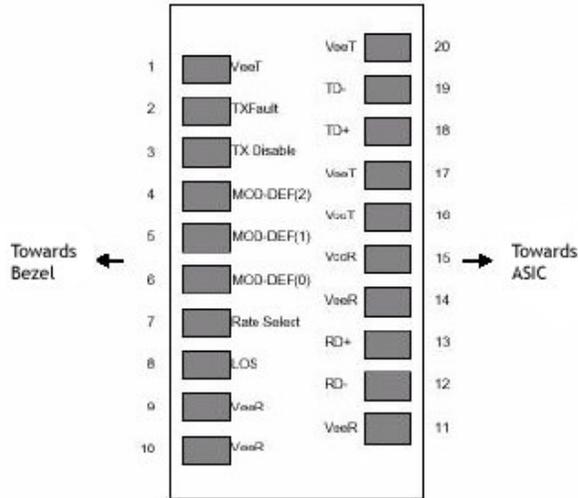


Figure 2. Diagram of Host Board Connector Block Pin

**Pin Description and Plug-in Sequence<sup>1</sup> (1-Grd, 2-Power, 3-Signal)**

Pin No.	Name	Description	Plug-in Sequence	Notes
1	VeeT	Transmitter Ground	1	Circuit ground is internally isolated from chassis ground.
2	TX Fault	Transmitter Fault Indication	3	Open-Collector outputs, asserted when LD and/or APC function fail.
3	TX Disable	Transmitter Disable	3	Disable when high voltage (>2.0V or Open).
4	MOD-DEF 2	Module Definition 2	3	Should be pulled up with 4.7k - 10 kΩ on host board to voltage between 2.0V and 5.5V. MOD-DEF (0) pulls line low to indicate module is plugged in.
5	MOD-DEF 1	Module Definition 1	3	See notes for Pin 4.
6	MOD-DEF 0	Module Definition 0	3	See notes for Pin 4.
7	Rate Select	Bandwidth Selection	3	No connection required.
8	LOS	Loss of Signal	3	LOS is Open-Collector output. Should be pulled up with 4.7k - 10kΩ on host board to a voltage between 2.0V and 5.5V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
9	VeeR	Receiver Ground	1	See notes for Pin 1.
10	VeeR	Receiver Ground	1	See notes for Pin 1.
11	VeeR	Receiver Ground	1	See notes for Pin 1.
12	RD-	Inv. Received Data Out	3	
13	RD+	Received Data Out	3	
14	VeeR	Receiver Ground	1	See notes for Pin 1.
15	VccR	Receiver Power	2	
16	VccT	Transmitter Power	2	

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17	VeeT	Transmitter Ground	1	See notes for Pin 1.
18	TD+	Transmit Data In	3	
19	TD-	Inv. Transmit Data In	3	
20	VeeT	Transmitter Ground	1	See notes for Pin 1.

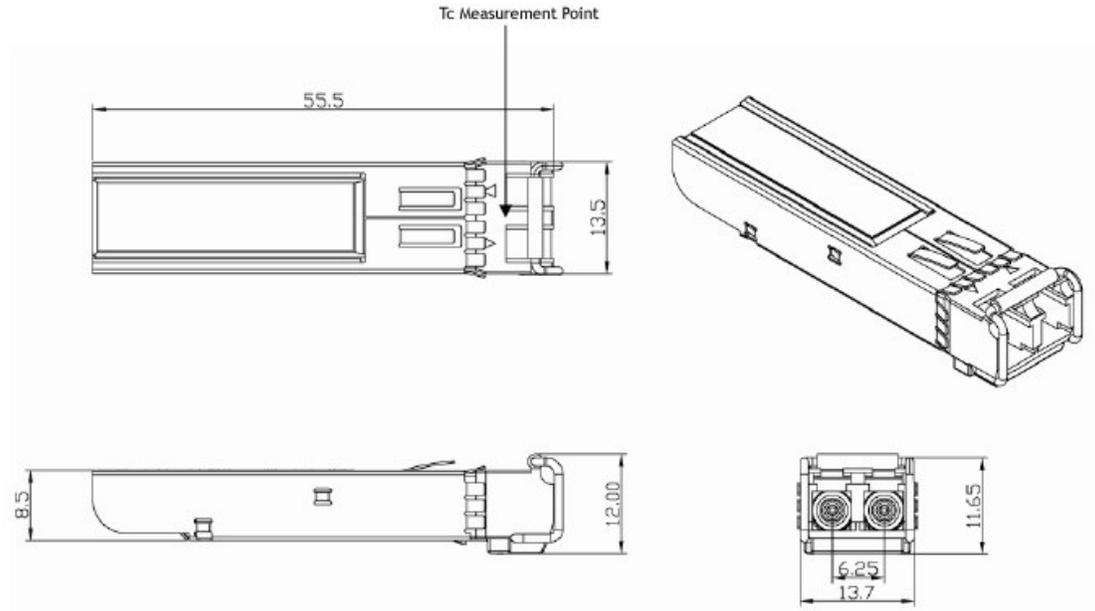
**Note:**

1. Pin engagement sequence during hot plugging.

**Physical Characteristics**

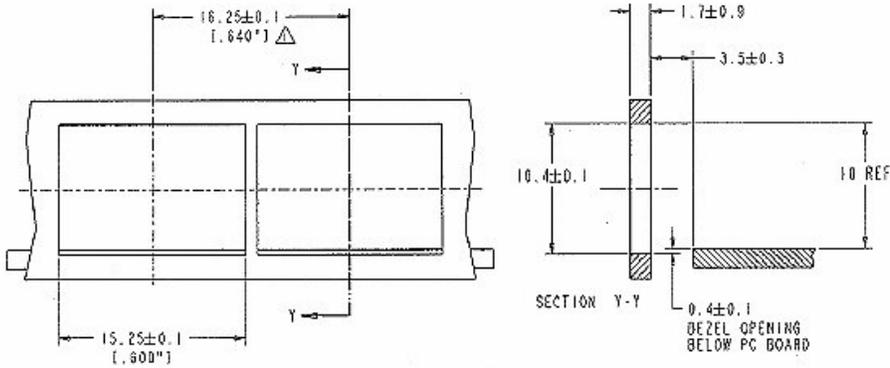
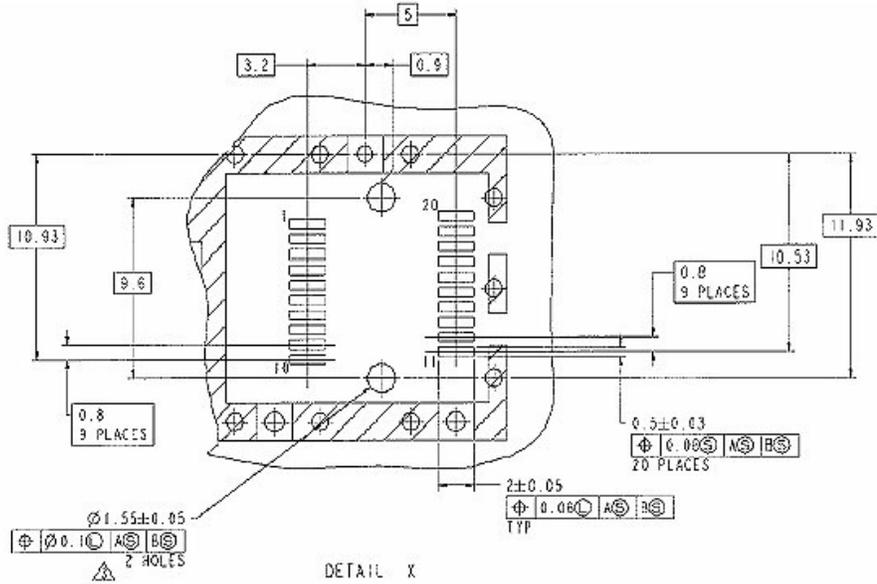
**Outline Diagram**

Dimensions for the device package are given in millimeters.





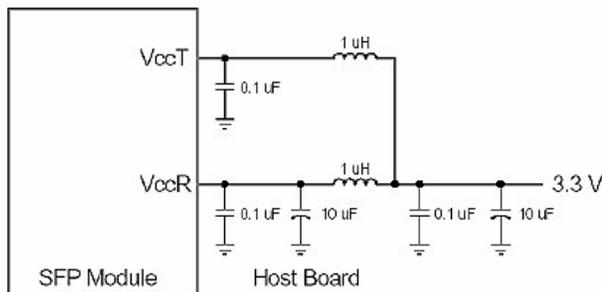
**OFD3546 SFP TRANSCEIVER DATA SHEET**



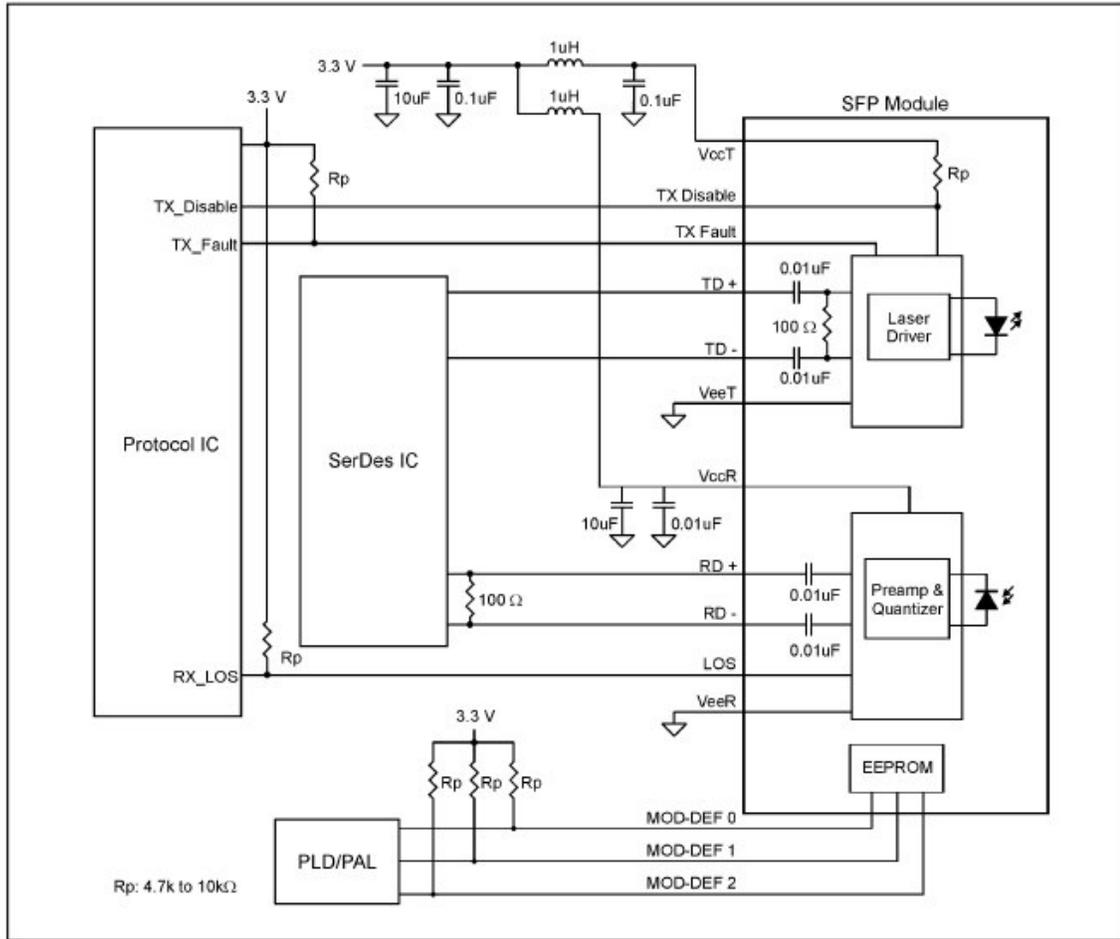
- NOTES:
- MINIMUM PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY
  - NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS

**Application Circuits**

**Recommended Host Board Supply Filtering Network**



Recommended Interface Diagram



Additional Information

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