

## Fiber Optic 1x9 Transceiver For 1310 FP 155 Mb/s with SC Connector

Data Sheet

OFN2133



### Features

- 1310 nm Fabry-Perot (FP) laser diode with fiber stub in optical receptacle
- Industry Standard 1x9 Output Footprint
- Data Rate: 155 Mbps
- Duplex SC Connector, singlemode fiber
- Single +3.3V Power Supply
- Plastic housing
- PECL differential data inputs and outputs
- PECL compatible Signal Detect (SD)
- ESD Class 2 per MIL-STD 883D Method 3015.7
- FCC (Class B) and EN 55022 Compliant
- Compliance with IEC60793-2 Type B1.1 fibers for distances up to 15 km

### Applications

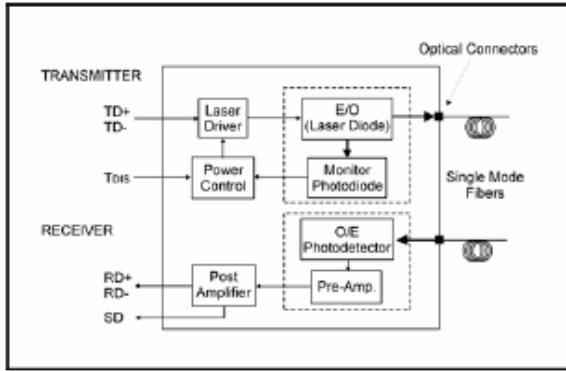
- Fast Ethernet
- FDDI
- ATM/ SONET OC-3/ SDH STM-1
- Singlemode fiber links
- Optical-Electrical Interface Conversion
- LAN, SAN, WAN
- Mainframes/Workstations/Servers/Storage Devices
- Bridges/Routers/Hubs/Local and Wide Area Switches

### Description

The OFN2133 is a high performance industry standard 1x9 transceiver module that combines a fiber optic transmitter and receiver with an electrical subassembly. It operates with a single +3.3V power supply at a data rate of 155 Mb/s.

Housed in a compact plastic package, the transceiver module consists of a transmitter and receiver optical subassembly coupled with duplex SC receptacle. A high-speed 1310 nm Fabry-Perot (FP) laser diode operates as light source while a photodiode subsequently acts as a detector. This transceiver is specially developed for distances of up to 15 km with 9/125  $\mu\text{m}$  singlemode fibers compliant with IEC 60793-2 Type B1.1.

**Functional Diagram**



**Functional Diagram**

The OFN2133 transceiver is designed to transmit serial data via singlemode cable. The receiver component converts the optical serial data into PECL compatible electrical data (RD+ and RD-). The Signal Detect (SD, active high) shows whether an optical signal is present.

The transmitter component converts PECL compatible electrical serial data (TD+ and TD-) into optical serial data. The transmitter contains a laser driver circuit that drives the modulation and bias current of the laser diode. The currents are controlled by a power control circuit to guarantee constant output power of the laser over temperature and aging. The power control uses the output of the monitor PIN diode (mechanically built into the laser coupling unit) as a controlling signal, to prevent the laser power from exceeding the operating limits.

**Safety**

**Laser Compliance Statement**

The OFN2133 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.

**Laser Data**

Wavelength	1310 nm
Total output power (as defined by IEC: 50 mm aperture at 10 cm distance)	<400 μW
Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)	<70 μW
Beam divergence	12°

**Note**

Failure to adhere to the above restrictions could result in a modification that is considered an act of “manufacturing”, and will require under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).

**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	Typical	Maximum	Unit
Storage Temperature	T <sub>s</sub>	-40		85	°C
Operating Temperature	T <sub>A</sub>	0		70	°C
Power Supply Voltage	V <sub>cc</sub>	-0.5		6	V
Differential Data Input Voltage				V <sub>cc</sub> +0.5	V
Soldering Conditions, Temperature/Time (MIL-STD 883C, Method 2003)				260/10	°C/sec

**Transmitter Electro-Optical Characteristics (T<sub>A</sub>=25°C)**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage	V <sub>ccT</sub>	3.0	3.3	3.6	V
Launched Power (Ave.) <sup>1</sup>	P <sub>o</sub>	-15		-8	dBm
Center Wavelength	λ <sub>c</sub>	1280	1310	1340	nm
Spectral Width (RMS)	Δλ			2	nm
Relative Intensity Noise	RIN			-120	dB/Hz
Extinction Ratio (Dynamic)	ER	10			dB
Optical Rise Time, 20%-80%	t <sub>R</sub>			3.0	ns
Optical Fall Time, 20%-80%	t <sub>F</sub>			3.0	ns
Data Input PECL HIGH	V <sub>IH</sub>	2.15			V
Data Input PECL LOW	V <sub>IL</sub>			1.85	V
Supply Current	I <sub>TX</sub>		90	110	mA

Note:

1. Into a singlemode fiber, 9-μm core diameter.

**Receiver Electro-Optical Characteristics (T<sub>A</sub>=25 °C)**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage	V <sub>CCR</sub>	3.0	3.3	3.6	V
Sensitivity (Ave. Power) <sup>1</sup>	P <sub>SEN</sub>			-34	dBm
Saturation (Ave. Power)	P <sub>SAT</sub>	-3			dBm
Operating Center Wavelength	λ <sub>R</sub>	1100		1650	nm
Signal Detect Assert Level <sup>3</sup>	P <sub>SDA</sub>			-34	dBm
Signal Detect Deassert Level <sup>4</sup>	P <sub>SDD</sub>	-47			dBm
Signal Detect Hysteresis	P <sub>SDA</sub> -P <sub>SDD</sub>	1		4	dB
Signal Detect Assert Time	t <sub>SDA</sub>			100	μs
Signal Detect Deassert Time	t <sub>SDD</sub>			350	μs
Data PECL Output HIGH	V <sub>OH</sub>	2.25			V
Data PECL Output LOW	V <sub>OL</sub>			1.65	V
Output Data Rise/Fall Time, 10%-90%	tr, tf		1.0	2.0	ns
Supply Current <sup>5</sup>	I <sub>RX</sub>		60	75	mA

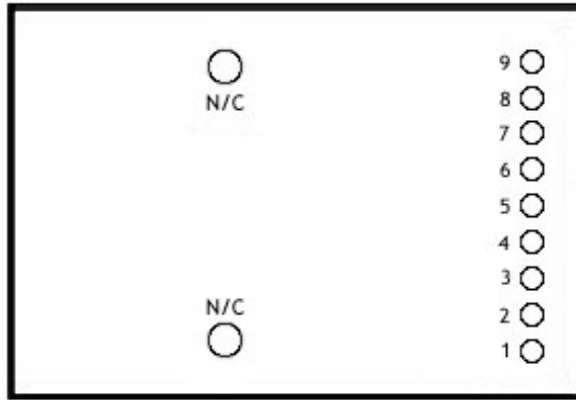
Notes:

1. Average optical power at which the BER is 1x10<sup>-10</sup>. Measured with a 2<sup>23</sup>-1 NRZ PRBS and ER=10 dB.
2. Measurement is made through a 9/125 μm singlemode fiber.
3. Optical power above which the SIGNAL DETECT toggles from Low to High state.
4. Optical power below which the SIGNAL DETECT toggles from High to Low state.
5. Supply current including Rx outputs into a 50Ω load.

**Regulatory Compliance**

Feature	Standard	Comments
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD 883D Method 3015.7	Class 1 (>1000V)
Immunity: Electrostatic Discharge (ESD) to the Duplex SD Receptacle	EN 61000-4-2 IEC 1000-4-2	Discharges of ±15kV with an air discharge probe on the receptacle cause no damage.
Immunity: Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	With a field strength of 3 V/m rms, noise frequency ranges from 10 MHz to 1 GHz. No effect on transceiver performance between the specification limits.
Emission: Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B CISPR 22	Noise frequency range: 30 MHz to 5 GHz

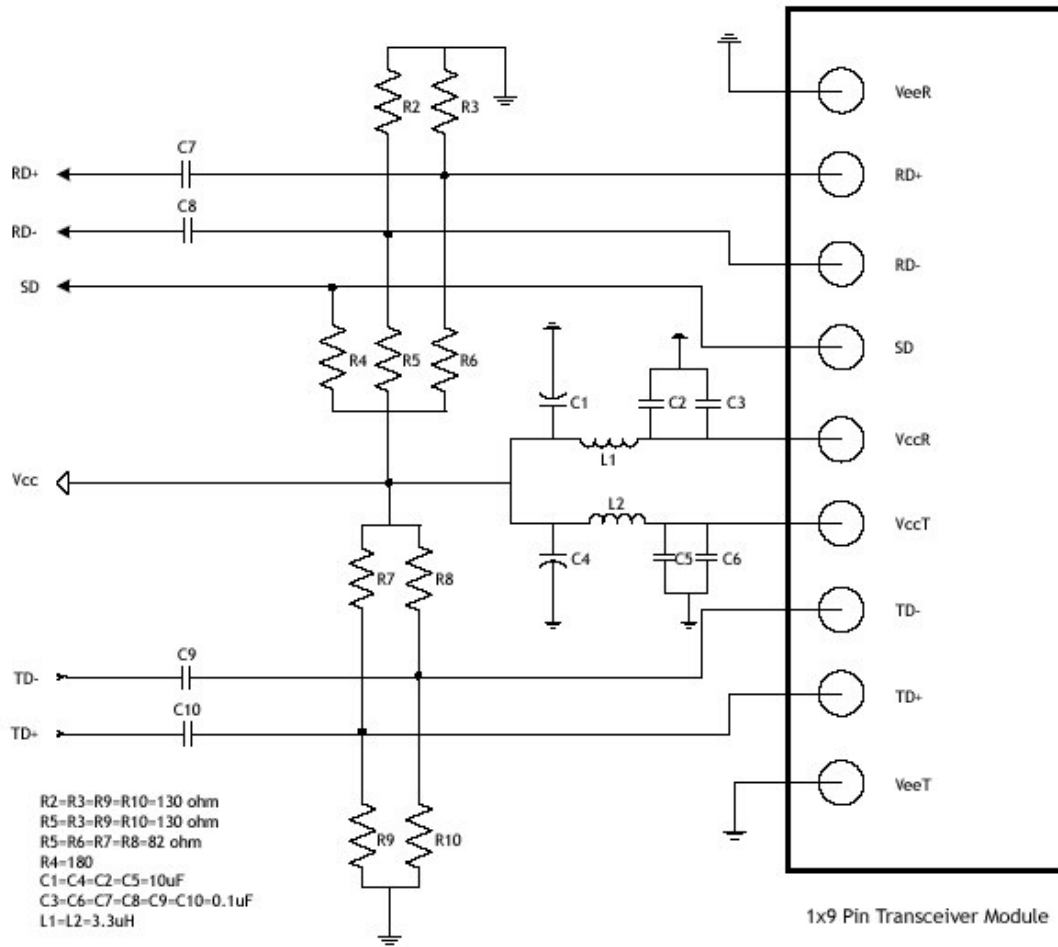
Pin Diagram



Pin Assignment

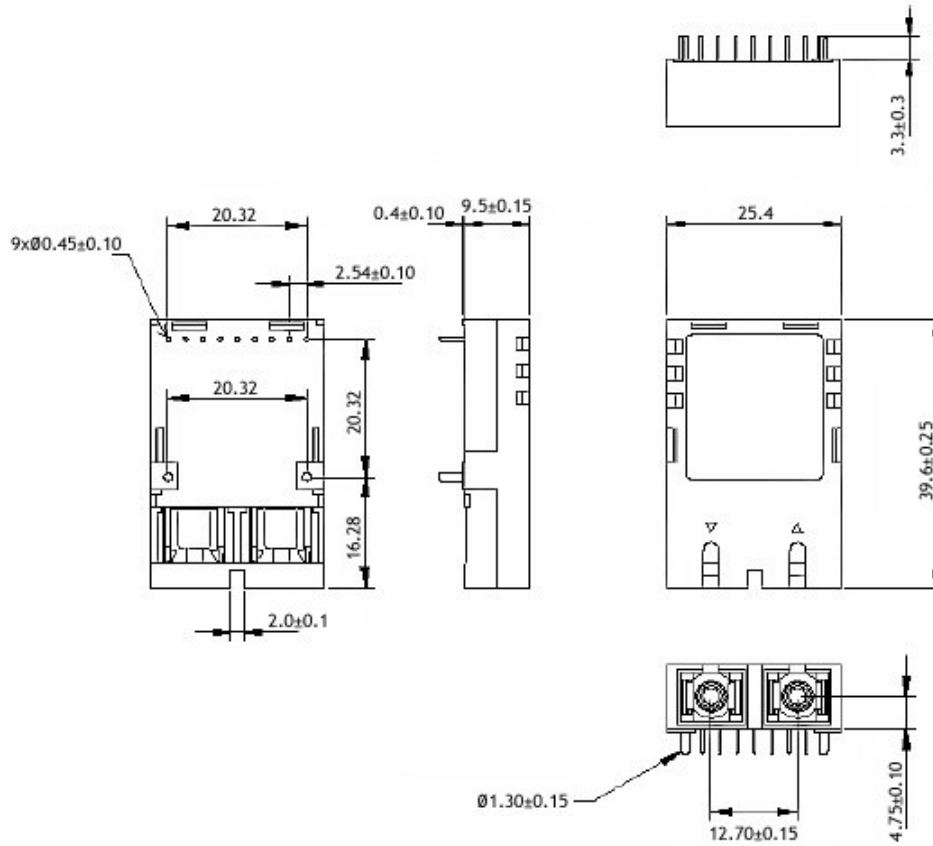
Pin No.	Symbol	Name/ Description
1	VeeR	Receiver Signal Ground
2	RD+	Receiver Data Non-inverted Differential Output
3	RD-	Receiver Data Inverted Differential Output
4	SD	Signal Detect is a PECL or TTL output. A high level indicates a received optical signal.
5	VccR	Receiver Power Supply
6	VccT	Transmitter Power Supply
7	TD-	Transmitter Data Inverted Differential Input
8	TD+	Transmitter Data Non-inverted Differential Input
9	VeeT	Transmitter Signal Ground
Mounting Posts		The mounting posts are provided for transceiver mechanical attachment to the circuit board. They should not be connected to the circuit ground but can be connected to the chassis ground.

Recommended Interface Diagram



### Package Outline Diagram

Dimensions for the device are  $\pm 0.2\text{mm}$  unless otherwise specified.



### Additional Information

#### Contact

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