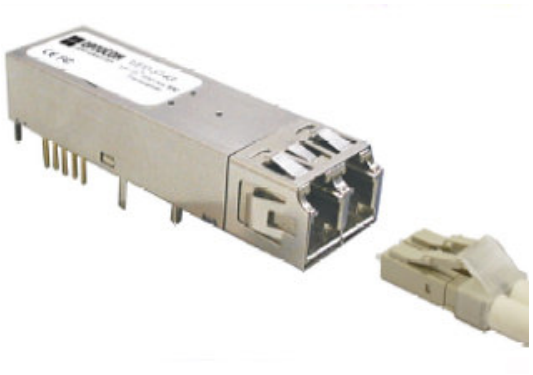
Fiber Optic SFF 2x5 850 nm VCSEL 1.25 Gbps Lightwave Transceiver

Data Sheet

OSF2300



Features

- 850 nm Vertical Cavity Surface Emitting Laser (VCSEL)
- Multimode fiber
- LC Duplex interface
- Single power supply (3.3V)
- IEEE 802.3 Gigabit Ethernet 1000BASE-SX compliant
- Fiber Channel (100-M5-SN-I, 100-M6-SN-I) compliant
- Industry Standard Small Form Factor (SFF) package
- Multisource 2x5 footprint
- Internally terminated and AC coupled data IO
- Signal detect (SD) TTL compatible
- ESD Class 2 per MIL-STD 883D Method 3015.7
- FCC (Class B) and EN 55022 compliant
- For distances up to 550 m with 50/125 µm multimode fibers

Applications

- Fiber-to-the-Desktop
- ATM/SONET
- Switches/bridges/routers/servers
- Gigabit Ethernet
- Low cost LAN, SAN, WAN
- High-speed computer links
- Switching System
- FDDI

Description

The OSF2300 Gigabit Ethernet multimode transceiver is based on the Physical-Medium-Dependent (PMD) sublayer and baseband medium, type 1000BASE-SX (short wavelength). It conforms to the Small Form Factor (SFF) Multi-Source Agreement (MSA) in 10 pin version (2x5 footprint). The appropriate fiber optic cable is a 62.5/125 µm or 50/125 µm multimode fiber with LC connectors.

The transceiver module is a single unit comprised of a transmitter, receiver, and duplex LC receptacle. The module is specially developed for distances of up to 550 m with 50/125 µm multimode fibers.

This transceiver operates at 1.25 Gb/s from a single power supply (+3.3V). The differential data inputs and outputs are internally terminated and AC coupled.

Functional Description of 2x5 Pin Row Transceiver

The OSF2300 transceiver is design to transmit serial data via multimode cable. The receiver components 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 converts PECL compatible electrical serial data (TD+ and TD-) into optical serial data. Data lines are differentially 100Ω terminated.

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

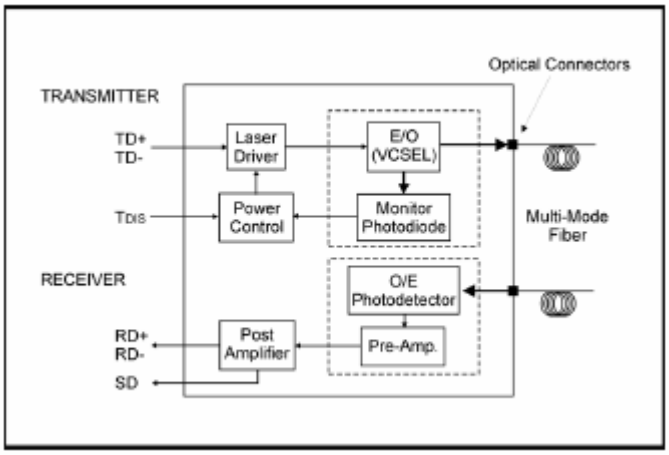
The OSF2300 is classified as a Class I Laser Product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated under recommended operating conditions. Because the transceiver is designed to be inherently eye safe, it does not require open fiber control thus eliminating 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	850 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°

Functional Diagram



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	Ts	-40	+85	°C
Operating Temperature	To	0	+70	°C
Power Supply Voltage	Vcc	-0.5	5.0	V
Differential Data Input Voltage			Vcc+0.5	V
Soldering Conditions, Temp/Time (MIL-STD 883C, Method 2003)	T/t		250/5.5	°C/sec

Transmitter Electro-Optical Characteristics (T_A=25°C)

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage	Vcc	3.15	3.30	3.45	V
Launched Power (Average) [1]	Po	-9.5		-3	dBm
Center Wavelength	λc	770	850	860	nm
Spectral Width (RMS)	Δλ			0.85	nm
Relative Intensity Noise	RIN			-117	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}	Vcc-1.3		Vcc	V
Transmitter Enable Voltage	V_{EN}	Vee		Vee+0.8	V
Supply Current	I_{TX}			130	mA

Note:
1. Into a multimode fiber, 50-µm core diameter.

Receiver Electro-Optical Specifications (T_A=25°C)

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage	Vcc	3.15	3.30	3.45	V
Sensitivity (Average Power)[1]	P_{SEN}		-19	-17	dBm
Saturation (Average Power)	P_{SAT}	-3			dBm
Stressed Receive Sensitivity [2]	P_{STR}			-13.5	dBm
Operating Center Wavelength	λ_R	770		860	nm
Signal Detect Assert Level [3]	P_{SDA}			-18	dBm
Signal Detect Deassert Level [4]	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

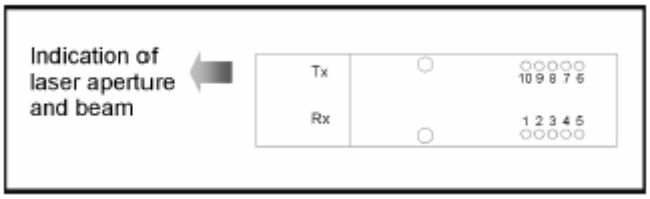
Signal Detect Output Voltage – LOW (TTL)	V_{SD_L}	0	0.6	V
Signal Detect Output Voltage – HIGH (TTL)	V_{SD_H}	2.3	Vcc	V
Output Data Rise/Fall Time, 20%-80%	tr, tf		400	ps
Return Loss of Receiver	RL	12		dB
Supply Current [5]	I_{RX}		130	mA

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. **Measurement is made through a 50/125 µm multimode 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 50 Ω 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 LC 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

Connection Diagram



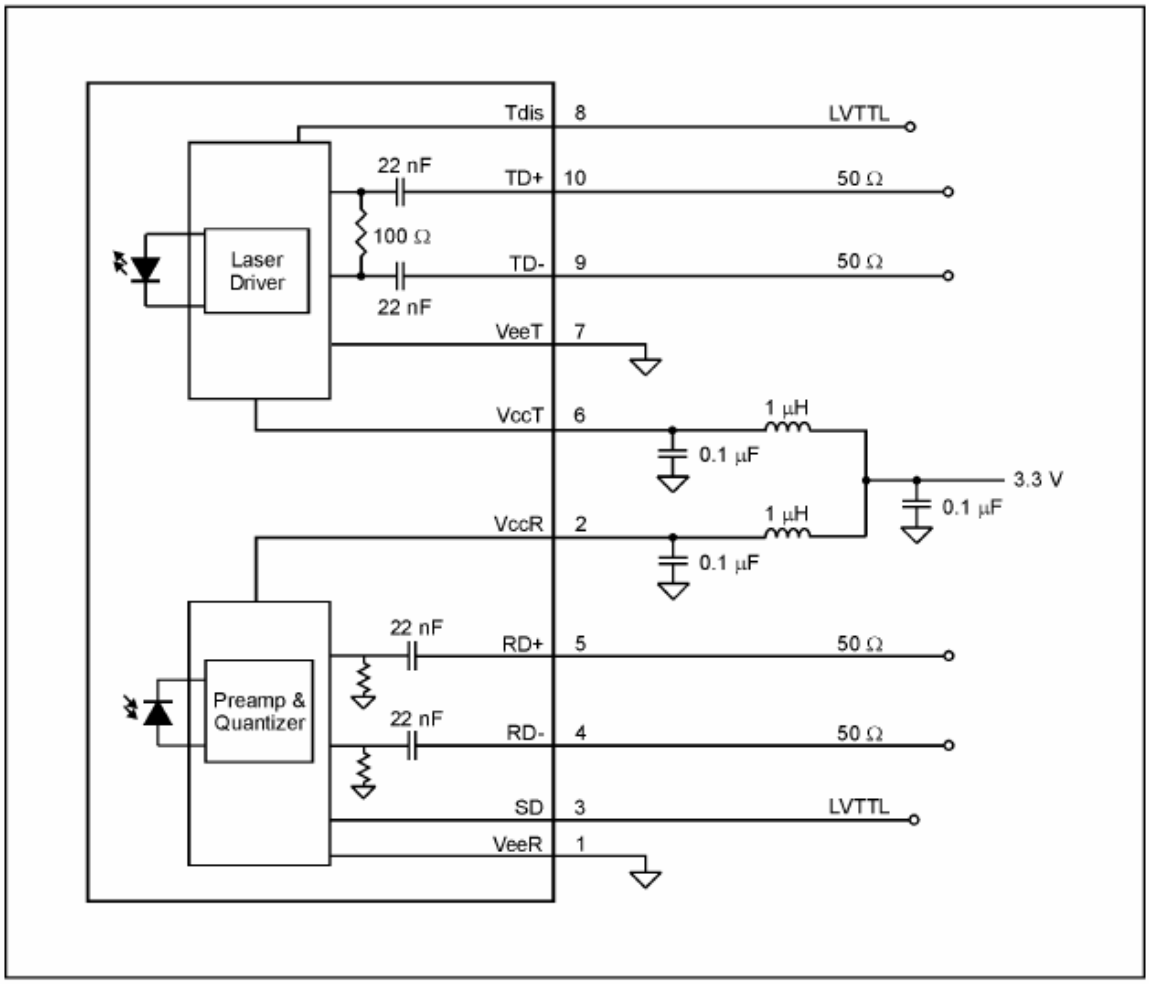
Pin Description

Pin Name		Level/ Logic	Pin#	Description
VeeR	Receiver Signal Ground	N/A	1	Receiver Signal Ground
VccR	Receiver Power Supply	N/A	2	Receiver Power Supply
SD	Signal Detect	TTL compatible	3	Normal Operation: Logic "1" Output, represents that light is present at receiver input. Fault Condition: Logic "0" Output
RD-	Received Data Out Not	PECL, AC coupled	4	Receiver Data Out Not
RD+	Received Data Out	PECL, AC coupled	5	Receiver Data Out
VccT		N/A	6	Transmitter Power Supply
VeeT		N/A	7	Transmitter Signal Ground

T_{DIS}	Transmitter Disable	TTL compatible	8	Transmitter Laser Control
TD+	Transmit Data	PECL, AC coupled	9	Transmitter Data In
TD-	Transmit Data Not	PECL, AC coupled	10	Transmitter Data Not In
MS	Mounting Stud	N/A	MS	The mounting studs are provided for transceiver mechanical attachment to the circuit board. They also provide an optional connection of the transceiver to the equipment chassis ground. The holes is the circuit board must be tied to the chassis ground.

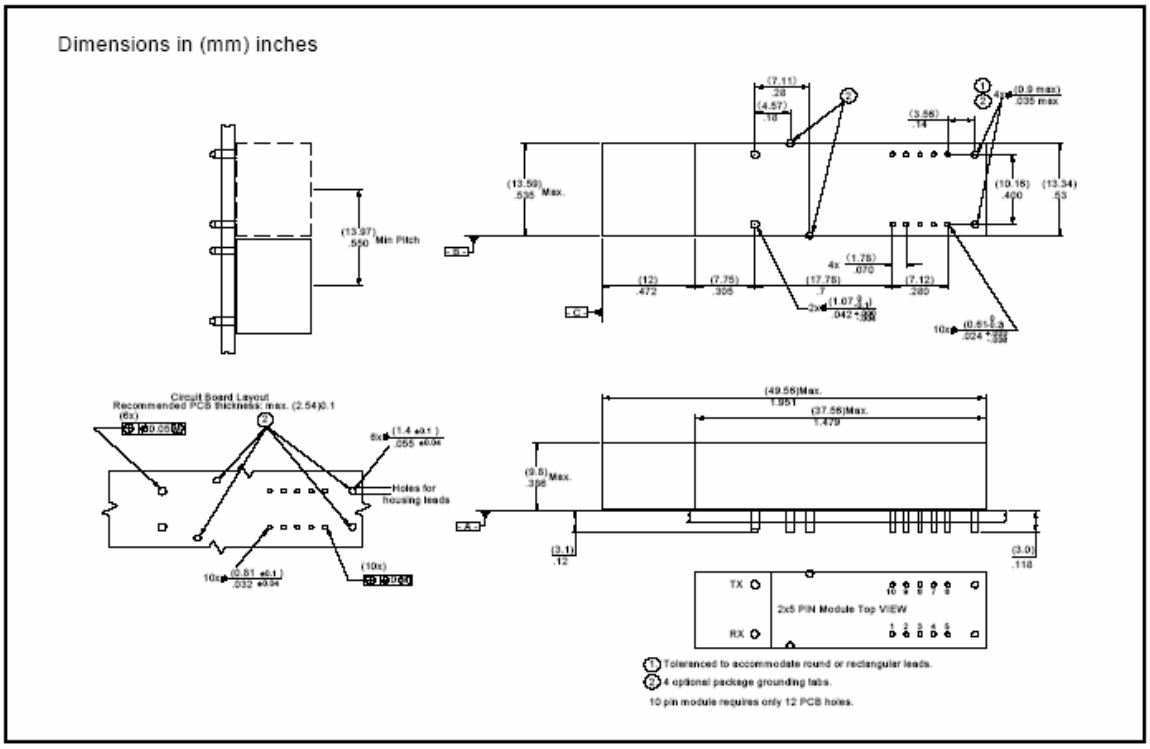
Application Notes

Recommended Interface Diagram



Physical Characteristics

Outline Diagram



Additional Information

Contact

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