

## OSP125-xx2xCR

100BASE-FX SGMII SFP Optical Transceiver with PHY,2km Reach

### Features

- LC type pluggable optical interface
- FP laser transmitter
- PIN photo-detector
- Up to 2km on 50/125µm MMF
- Hot-pluggable SFP footprint
- Low power consumption <1.3W
- The metal shell shielding electromagnetic interference
- RoHS compliant and lead-free
- Single +3.3V power supply
- Built-in PHY supporting SGMII Interface
- 100BASE-LX operation
- ROHS compliant and lead-free
- Operating Temperature:0~70°C



### Applications

- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

### Description

Optcore SGMII Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA), and are designed for SGMII MAC interface to 100BASE-LX (The SGMII MAC Interface implements a modified 1000BASE-X Auto-Negotiation to indicate link, duplex, and speed to the MAC). SGMII SFP transceivers are 100BASE-FX SFP Fast Ethernet Interface Converter on Gigabit SFP Ports. The transceiver consists of four sections: the standard SFP part, the PHY part built with SGMII interface, the 1310nm FP laser and the PIN photo-detector. The module data link up to 2km in 50/125um multi mode fiber.



**Related Products**

- OSP125-3110xCR 100BASE-FX SGMII SFP Transceiver, 125Mb/s, SMF, 1310nm, 10km, 0°C~+70°C
- OPB125-xx10xCR 100BASE-FX SGMII BIDI SFP Transceiver, 125Mb/s, SMF, 1310/1550nm, 10km, 0°C~+70°C

**Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%
Signal Input Voltage		-0.3	Vcc+0.3	V
Receiver Damage Threshold		0		dBm

**Recommended Operating Conditions**

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			300	mA
Data Rate			125		Mbps

**Specification of Transmitter**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	POUT	-20		-14	dBm	
Extinction Ratio	ER	8.2			dB	
	$\lambda_c$	1270	1310	1350	nm	FP Laser
Transmitter OFF Output Power	P <sub>Off</sub>			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Output Eye Mask	Compliant with G.957(class 1 laser safety)					Note (1)

Note (1): Transmitter eye mask definition

**Specification of Receiver**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	$\lambda_{IN}$	1270	1310	1610	nm	PIN-TIA
Receiver Sensitivity	P <sub>IN</sub>			-32	dBm	Note (1)
Input Saturation Power (Overload)	P <sub>SAT</sub>	-8			dBm	
Loss Of Signal Assert	P <sub>A</sub>	-42			dBm	

Los Of Signal De-assert	$P_D$			-33	dBm	Note (2)
LOS Hysteresis	$P_A-P_D$	0.5	2	6	dB	

Note (1): Measured with Light source 1310nm, ER=9dB; BER =  $<10^{-12}$  @PRBS=2<sup>23</sup>-1 NRZ

Note (2): When SD De-Assert, the RX-LOS output is signal output.

### Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Total Supply Current	$I_{CC}$			A	mA	Note (1)
Transmitter Disable Input-High	$V_{DISH}$	2		$V_{CC}+0.3$	V	
Transmitter Disable Input-Low	$V_{DISL}$	0		0.8	V	
Transmitter Fault Input-High	$V_{DISL}$	2		$V_{CC}+0.3$	V	
Transmitter Fault Input-Low	$V_{TxFH}$	0		0.8	V	
<b>Receiver</b>						
Total Supply Current	$I_{CC}$			B	mA	Note (1)
LOSS Output Voltage-High	$V_{LOSH}$	2		$V_{CC}+0.3$	V	LVTTTL
LOSS Output Voltage-Low	$V_{LOSL}$	0		0.8	V	

Note (1): A (TX) + B (RX) = 400mA (Not include termination circuit)

### Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	$t_{on}$			1	ms
Tx Disable Assert Time	$t_{off}$			10	$\mu$ s
Time To Initialize, including Reset of Tx Fault	$t_{init}$			300	ms
Tx Fault Assert Time	$t_{fault}$			100	$\mu$ s
Tx Disable To Reset	$t_{reset}$	10			$\mu$ s
LOS Assert Time	$t_{loss\_on}$			100	$\mu$ s
LOS De-assert Time	$t_{loss\_off}$			100	$\mu$ s
Serial ID Clock Rate	$f_{serial\_clock}$			400	KHz
MOD_DEF (0:2)-High	$V_H$	2		$V_{CC}$	V
MOD_DEF(0:2)-Low	$V_L$			0.8	V

### Digital Diagnostic Functions

OPTCORE OSP125-312DCR transceivers 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 SFP transceivers provide a unique 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.

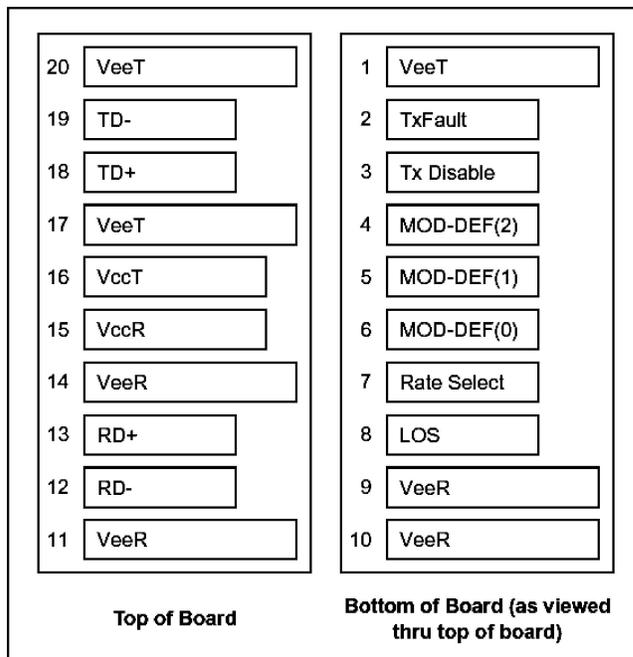
The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface 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. 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 the OSP125-312DCR are internally calibrated by default.

**Pin Definitions**

Pin Diagram



**Pin Descriptions**

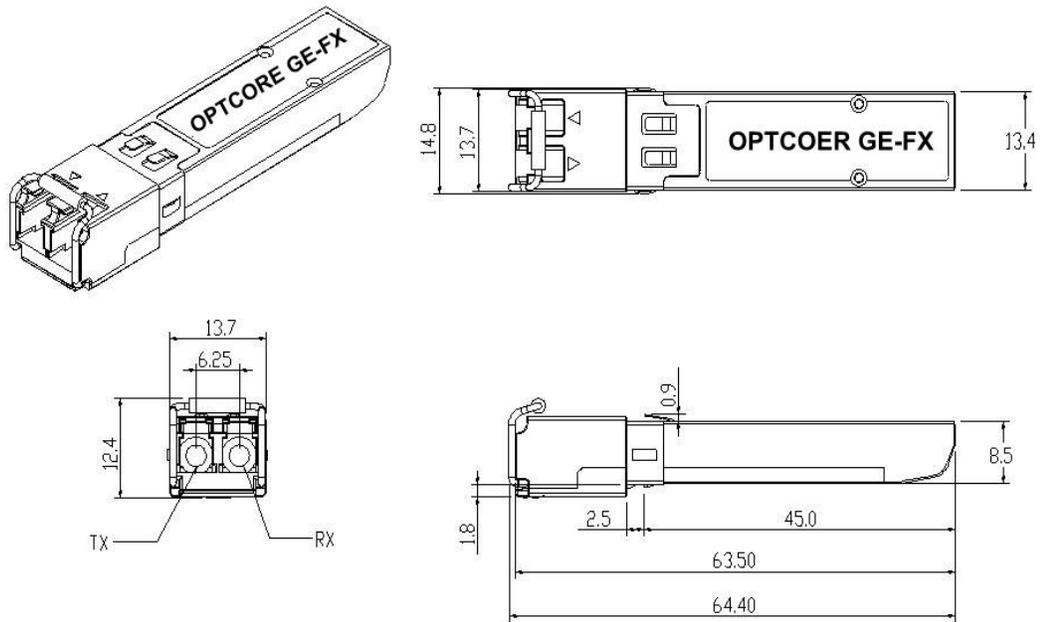
Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

**Notes:**

Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:  
 Low (0 to 0.8V): Transmitter on  
 (>0.8V, < 2.0V): Undefined  
 High (2.0 to 3.465V): Transmitter Disabled  
 Open: Transmitter Disabled
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V<sub>ccT</sub> or V<sub>ccR</sub>.  
 Mod-Def 0 is grounded by the module to indicate that the module is present  
 Mod-Def 1 is the clock line of two wire serial interface for serial ID  
 Mod-Def 2 is the data line of two wire serial interface for serial ID
- LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

### Outline Specification



### Ordering information

Part number	Description
OSP125-312DCR	100BASE-FX SGMII SFP for Gigabit Ethernet SFP port, 1310nm, 2km, DDM
OSP125-312NCR	100BASE-FX SGMII SFP for Gigabit Ethernet SFP port, 1310nm, 2km

### Warnings

**Handling Precautions:** This device 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:** 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](http://www.optcore.net)



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