OSP155-312xxR

155Mb/s SFP Optical Transceiver Module, Multi-Mode, 1310nm, 2km Reach

Features

- Supports 155Mbps bit rates
- Duplex LC connector
- Hot pluggable SFP footprint
- 1310nm FP laser transmitter and PIN photo-detector
- 1km with 62.5/125μm MMF, 2km with 50/125μm MMF
- Low power consumption, < 0.6W
- Optional Digital Diagnostic Monitor Interface
- Compliant with SFP MSA and SFF-8472
- Very low EMI and excellent ESD protection
- ROHS compliant and Lead Free
- Operating Temperature: Standard 0~70ºC Extended -10~85ºC Industrial -40~85ºC

Applications

- SDH STM-1, S-1.1,L-1.1, L-1.2
- SONET OC-3 IR1,LR1,LR2
- 100BASE-FX Ethernet
- Other Optical networking

Description

Optcore's OSP155-312xxR is a high performance small form factor pluggable (SFP) transceiver module for duplex optical data communications such as 100BASE-FX Fast Ethernet, SDH STM-1 and SONET OC-3. This SFP module provides 2km transmission distance over 50μm multi-mode fiber at a nominal wavelength of 1310nm. The transmitter section uses a 1310nm FP laser that is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses a high-speed InGaAs PIN photodiode (PD) and trans-impedance preamplifier. The 155Mbps SFP module series is fully compliant with SFP Multi-Sourcing Agreement (MSA) and SFF-8472. For further information, please see SFP MSA and SFF-8472 standard.

There are three versions of the series 155Mbps SFP MMF 2km optical transceiver modules for different applications. The Standard grade (0~70ºC) is for commonly commercial application, the Extended grade (-10~85ºC) is for Extended temperature application, and the Industrial grade (-40~85ºC) is made with robust and reliable components to meet the needs of Industrial Ethernet application under harsh environmental conditions.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	T_S	-40	85	°C	
Operating Humidity	RH	5	85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			180	mA	
Operating Case Temperature	Tc	0		70	°C	Standard
		-10		85	°C	Extended
		-40		85	°C	Industrial
Data Rate	DR		155		Mbps	OC-3/STM-1
			100			100M
Transmission Distance				2	km	50/125μm SMF

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ_C	1270	1310	1360	nm	
Average Output Power	P0ut	-19		-14	dBm	1
Spectral Width (RMS)	σ			4	nm	
Extinction Ratio	ER	10			dB	1
Optical Rise/Fall Time	Tr-Tf			0.26	ns	2
Dispersion penalty	T_{DP}			3.9	dB	
Output Optical Eye	Compliant with IEEE802.3 z &ITU G.957 Compliant (class 1 Laser safety)					
Receiver						
Center Wavelength	λ_C	1270	-	1610	nm	
Receiver Sensitivity				-28	dBm	3
Receiver Overload		-3			dBm	3
LOS De-Assert	LOSD			-30	dBm	
LOS Assert	LOSA	-45			dBm	
LOS Hysteresis		0.5			dB	

Note :

1. Measured at 155Mbps with PRBS 2^{23}– 1 NRZ test pattern.
2. Unfiltered, measured with a PRBS 2^{23}-1 test pattern @155Mbps
3. Measured at 155Mb/s with PRBS 2^{23}– 1 NRZ test pattern for BER < $1x10^{-10}$

Electrical Characteristics ($T_{OP(C)}$ = 0 to 70°C, $T_{OP(I)}$ =-40 to 85°C,V_{CC} = 3.13 to 3.47 V)

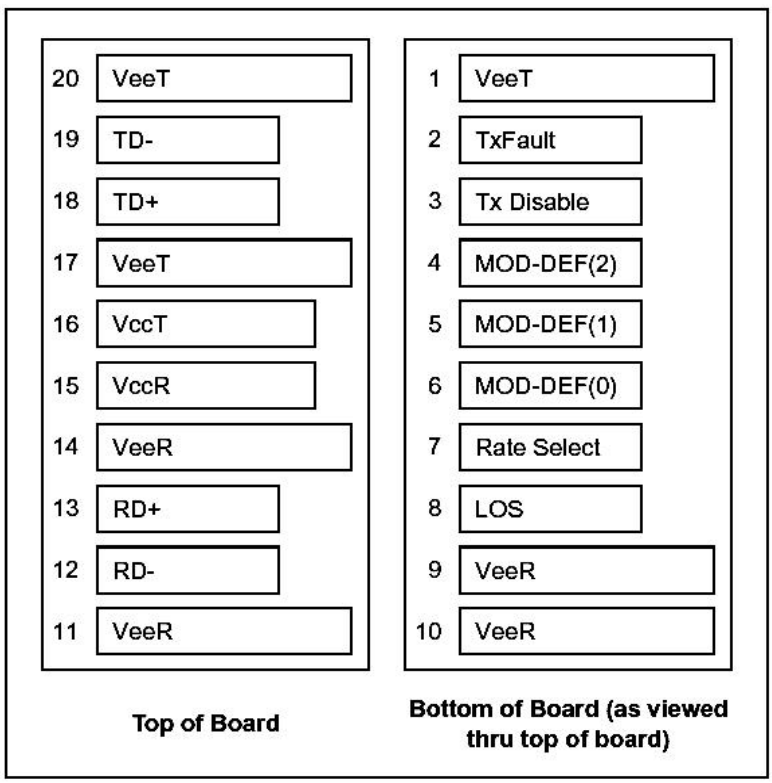
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Differential data input swing	VIN,PP	300		1800	mVpp	1
Tx Disable Input-High	VIH	2.0		Vcc+0.3	V	
Tx Disable Input-Low	VIL	0		0.8	V	

Tx Fault Output-High	VOH	2.0		Vcc+0.3	V	2
Tx Fault Output-Low	VOL	0		0.8	V	2
Input differential impedance	Rin		100		Ω	
Receiver						
Differential data output swing	Vout,pp	370		1800	mVpp	3
Rx LOS Output-High	VROH	2.0		Vcc+0.3	V	2
Rx LOS Output-Low	VROL	0		0.8	V	2

Notes:

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

Pin Definitions



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	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)	Model present indication	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4

9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inverse Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

1. 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 Vcc+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.
2. 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
3. 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 VccT or VccR.

   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
4. LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+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.
5. 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.
6. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Digital Diagnostic Functions

Optcore 155Mb/s SFP multimode 2km optical transceiver 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 155Mb/s SFP multimode 2km optical transceiver provide an optional 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

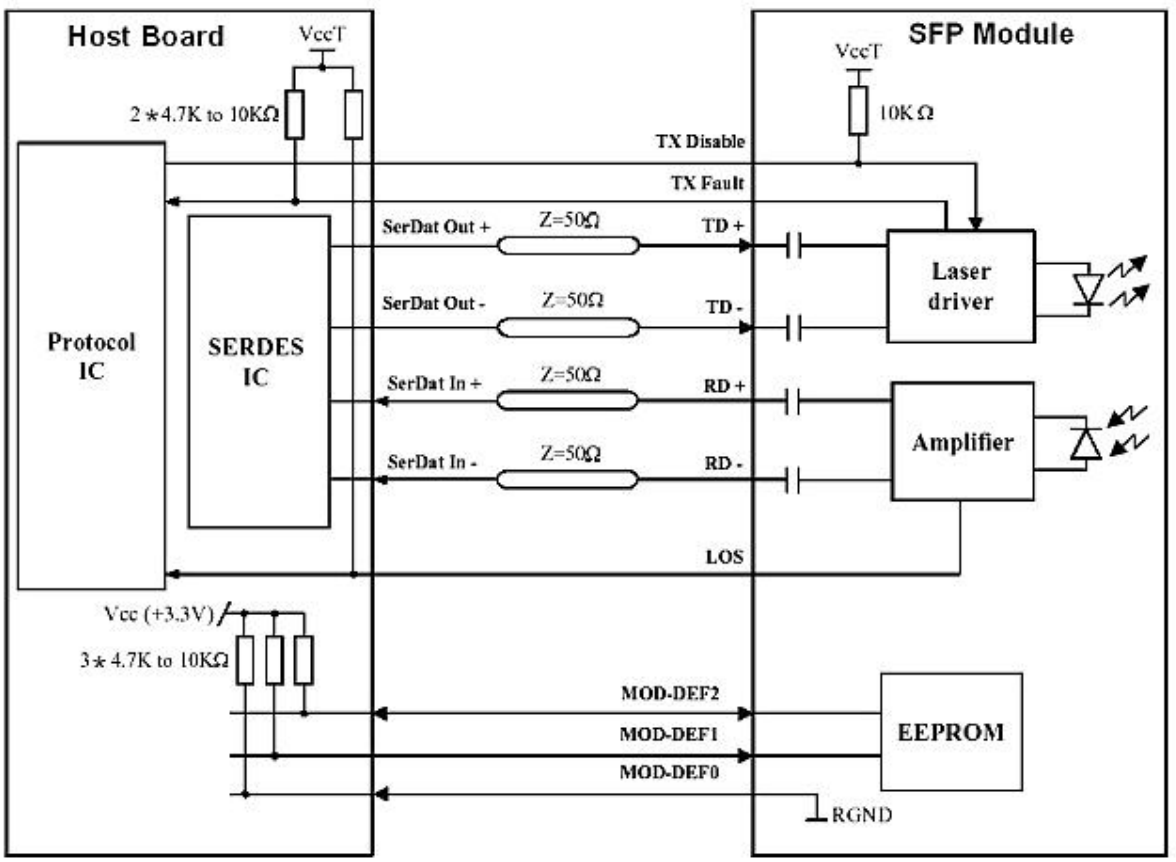
defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

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.

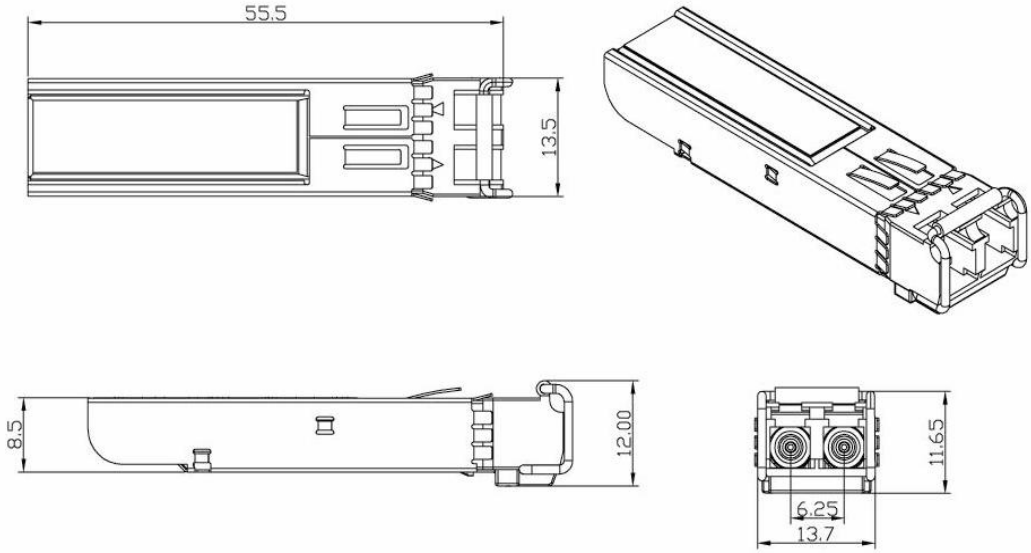
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. 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 module. 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 this optical transceiver is internally calibrated by default.

Recommended Interface Circuit



Mechanical Dimensions



Ordering information

Part number	Description
OSP155-312NCR	155Mb/s SFP Transceiver,MultiMode, 1310nm, 2km, LC, 0ºC~+70ºC
OSP155-312DCR	155Mb/s SFP Transceiver, MultiMode, 1310nm, 2km, LC, DDM, 0ºC~+70ºC
OSP155-312NER	155Mb/s SFP Extended Transceiver, MultiMode, 1310nm, 2km, LC, -10ºC~+85ºC
OSP155-312DER	155Mb/s SFP Extended Transceiver,MultiMode,1310nm, 2km, LC, DDM, -10ºC~+85ºC
OSP155-312NTR	155Mb/s SFP Industrial Transceiver, MultiMode, 1310nm, 2km, LC, -40ºC~+85ºC
OSP155-312DTR	155Mb/s SFP Industrial Transceiver, MultiMode, 1310nm, 2km, LC, DDM,-40ºC~+85ºC

Warnings

Process plug

The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles.It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

Handling Precautions

The transceiver optics 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

The transceiver optics is a Class 1 laser product per international standard IEC 60825-1. 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