

OP-1G31-10

1.25G SFP Module, SM 1310nm 10km Duplex LC

Features

- Operating data rate up to 1.25Gbps
- 1310 FP laser transmitter and PIN photodetector
- Single 3.3V power supply
- Hot-pluggable SFP footprint
- Duplex LC connector interface
- Metal Enclosure for lower EMI
- Up to 10km transmission on 9/125μm SMF
- Compliant with SFP MSA and digital diagnostic SFF-8472
- Class 1 laser safety certified
- Compliant with RoHS



Applications

- 1x Fiber Channel
- Gigabit Ethernet Switches and Routers
- Other Optical Links

Description

OPTINET Small Form Factor Pluggable (SFP) transceiver is designed for data communication on Single-mode fiber and operates at a nominal wavelength of 1310nm up to 10km. The transceiver consists of five sections: the FP laser transmitter, the LD driver, the PIN photodiode, the limiting amplifier and the MCU control unit. It compatible with Small Form Factor Pluggable Multi-Sourcing Agreement (MSA).

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	85	°C
Supply Voltage	Vcc	-0.5	4	V
Operating Humidity	RH	5	95	%
Power Consumption			1.2	W

Recommended Operating Conditions

Parameter			Symbol	Min.	Typical	Max.	Unit
Operating	Case	Commercial	Tc	0		70	°C



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Temperature	Extended	T _c	-10		85	°C
	Industrial	T _c	-40		85	°C
Power Supply Voltage		V _{cc}	3.15	3.3	3.45	V
Power Supply Current		I _{cc}			300	mA
Data Rate		-		1.25		Gbps

Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter					
Centre Wavelength	λ_c	1260	1310	1360	nm
Average Output Power	P _o	-9		-3	dBm
Extinction Ratio	E _r	9			dB
Spectral Width(RMS)	σ	-	-	3	nm
Optical Rise/Fall Time (20%~80%)	t _r /t _f			0.26	ns
Total Jitter	T _j			0.43	UI
Output Optical Eye Mask	Compliant with IEEE 802.3z				
Receiver					
Center Wavelength	λ_c	1260		1610	nm
Receiver Sensitivity	S			-22	dBm
Receiver Overload	P _{in}	-3			dBm
LOS De-Assert	LOS _D			-24	dBm
LOS Assert	LOS _A	-35			dBm
LOS Hysteresis		0.5		4	dB

Notes:

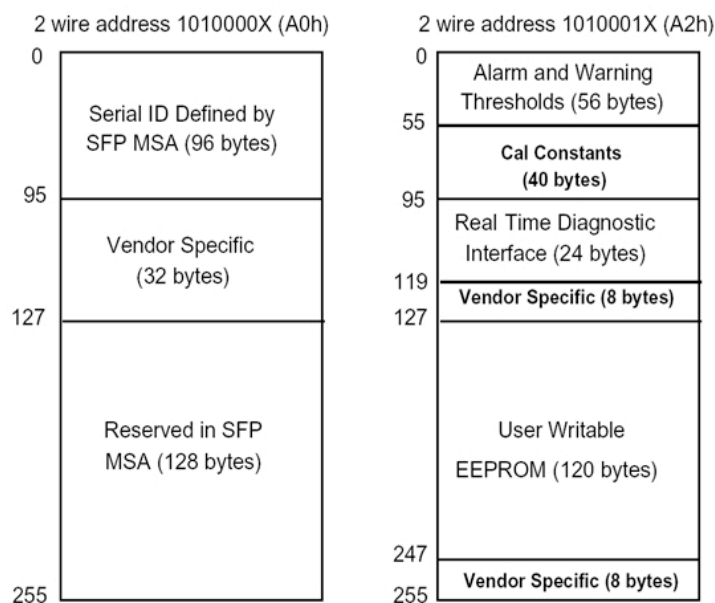
1. PECL input, internally AC-coupled
2. The optical power is launched into SMF
3. Filtered measured with a PRBS 2⁷-1 test pattern @1.25Gbps, BER ≤ 1x10⁻¹²

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Transmitter					
Data Input Swing Differential	V _{in}	400		2000	mV
Input Differential Impedence	Z _{in}	85	100	115	ohm
TX Disable	Disable	2		V _{cc}	V
	Enable	0		0.8	V
TX Fault	Fault	2		V _{cc} +0.3	V

	Normal		0		0.8	V
Receiver						
Data Output Swing Differential		Vout	400		2000	mV
Rx_LOS	High		2		Vcc+0.3	V
	Low		0		0.8	V

Digital Diagnostic Memory Map



The SFP MAS defines a 256-byte memory map in EEPROM describing the transceiver's manufacturer, part no, standard interfaces, serial no and other information, which is accessible over a 2 wire serial interface at address A0h. The memory contents are shown in below table:

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	MOD4
2	1	Connector	07	LC
3-10	8	Transceiver	XXX	1000Base-LX
11	1	Encoding	01	8B10B
12	1	BR, nominal	0D	1.25bps
13	1	Reserved	00	
14	1	Length (9um)-km		10KM
15	1	Length (9um)		
16	1	Length (50um)		
17	1	Length (62.5um)		

18	1	Length (copper)	00	Not Compliant
19	1	Reserved	00	
20-35	16	Vendor name	57 49 4E 54 4F 50 20 20 20 20 20 20 20 20 20 20	
36	1	Reserved	00	
37-39	3	Vendor OUI	00 00 00	
40-55	16	Vendor PN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	根据公司(ASC II)
56-59	4	Vendor rev	31 2E 30 20	V1.0
60-61	2	Wavelength	06 0E	1310nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum of bytes 0~62
64-65	2	Options	00 1A	LOS, TX_FAULT and TX_DISABLE
66	1	BR, max	00	
67	1	BR, min	00	
68-83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASC II
84-91	8	Vendor date code	xx xx xx xx xx xx 20 20	Year, Month, Day
92	1	Diagnostic Monitoring type	XX	Diagnostics (External. Cal)
93	1	Enhanced option	XX	Optional Alarm/warning flags, Soft TX_FAULT and Soft TX_LOS monitoring)
94	1	SFF-8472	XX	Diagnostics (SFF-8472 Rev 9.4)
95	1	CC_EXT	XX	Check sum of bytes 64~94
96-255	160	Vendor specific		

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X (A2h). It allows real-time access to transceiver's working temperature, laser bias current, transmitted optical power, receiver sensitivity and supply voltage. Please see Figure 2. for detailed information:

Parameter		Range	Accuracy	Calibration
Temperature	Commercial	0 to 70°C	±3°C	Internal
	Extended	-10 to 80°C	±3°C	Internal

	Industrial	-40 to 85°C	±3°C	Internal
Voltage		3.0 to 3.6V	±10%	
Bias Current		0 to 80mA	±10%	
Tx Power			±3dB	
Rx Power			±3dB	

Pin Definitions

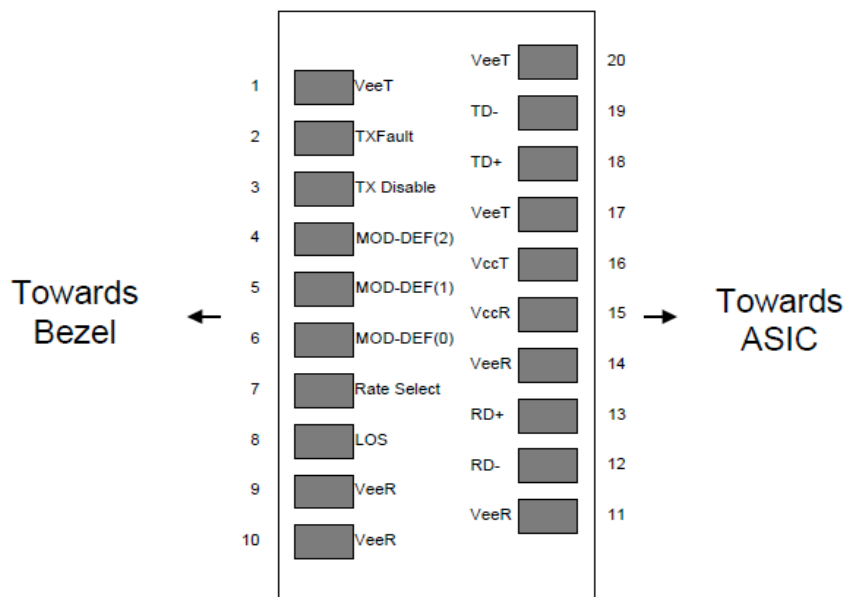


Diagram of Connector Block Pins on Host Board

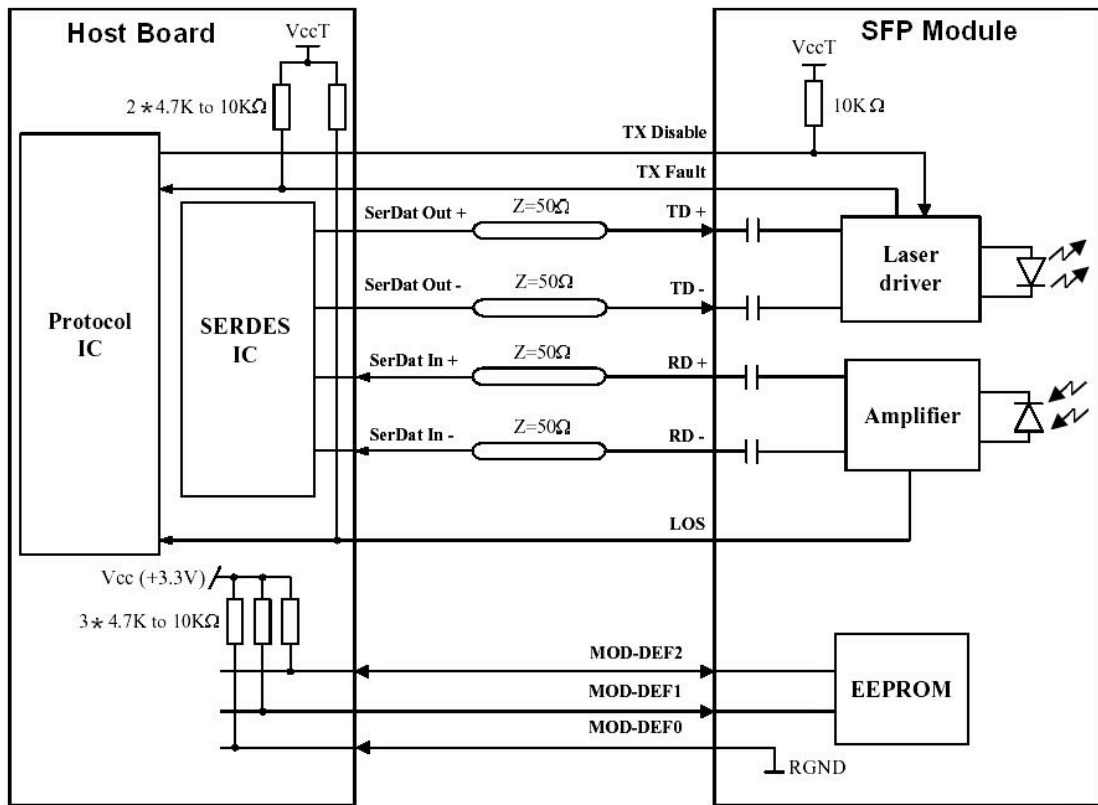
Pins	Name	Description	NOTE
1	VeeT	Transmitter Ground	
2	Tx Fault	Transmitter Fault Indication	1
3	Tx Disable	Transmitter Disable	2
4	MOD DEF2	Module Definition 2	3
5	MOD DEF1	Module Definition 1	3
6	MOD DEF0	Module Definition 0	3
7	Rate Select	Not Connected	
8	LOS	Loss of Signal	4
9	VeeR	Receiver Ground	
10	VeeR	Receiver Ground	
11	VeeR	Receiver Ground	
12	RD-	Inv. Received Data Output	5
13	RD+	Received Data Output	5

14	VeeR	Receiver Ground	
15	VccR	Receiver Power	
16	VccT	Transmitter Power	
17	VeeT	Transmitter Ground	
18	TD+	Transmit Data Input	6
19	TD-	Inv. Transmit Data Input	6
20	VeeT	Transmitter Ground	

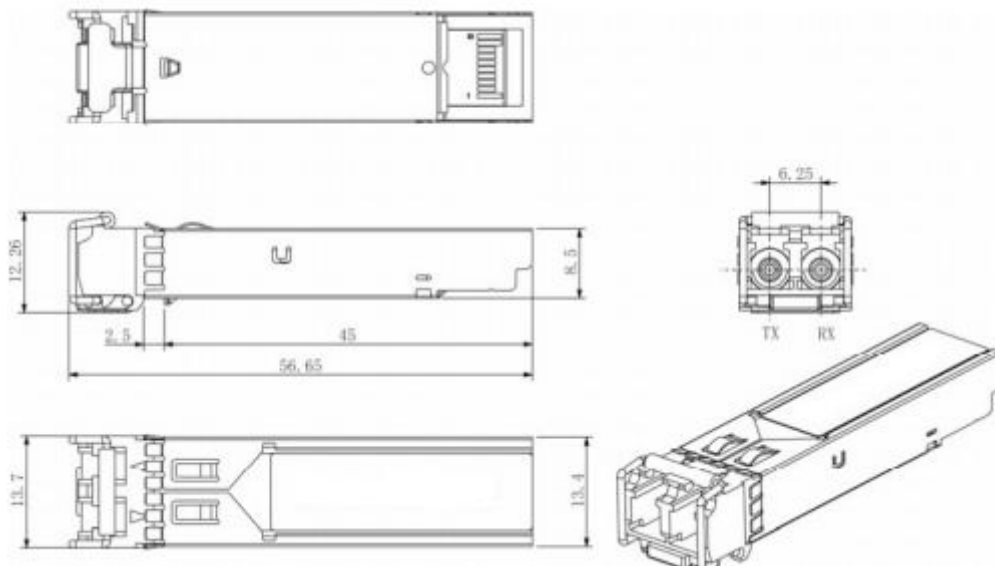
Notes:

- 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.
- 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 (0~0.8V): Transmitter on
(>0.8V, <2.0V): Undefined
High (2.0~3.3V): Transmitter Disabled
Open: Transmitter Disabled
- MOD-DEF 0,1,2 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
- LOS 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 loss of signal. In the low state, the output will be pulled to less than 0.8V.
- These are the differential receiver output. They are internally AC-coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical Diagram





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Ordering Information

Part No	Data Rate	Wavelength	Reach	Temp	DDM
OP-1G31-10	1.25Gbps	1310nm	10KM	0~70℃	No
OP-1G31-10E	1.25Gbps	1310nm	10KM	-10~80℃	No
OP-1G31-10I	1.25Gbps	1310nm	10KM	-45~85℃	No
OP-1G31-10D	1.25Gbps	1310nm	10KM	0~70℃	Yes
OP-1G31-10ED	1.25Gbps	1310nm	10KM	-10~80℃	Yes
OP-1G31-10ID	1.25Gbps	1310nm	10KM	-45~85℃	Yes

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.