10G SFP+ ER Optical Transceiver
PN：OP3940D-13
Product Specification

Features:

- ✧ Supports 1.0 to 11.3Gb/s bit rates
- ✧ Hot-Pluggable SFP+ form factor
- ✧ Duplex LC connector
- ✧ Uncooled 1310nm DFB Transmitter，PIN Receiver
- ✧ Up to 40 km on 9/125μm SMF
- ✧ Built-in digital diagnostic functions
- ✧ Single +3.3V Power Supply
- ✧ Power dissipation <1.0W
- ✧ Operating case temperature: 0~70°C
- ✧ RoHS compliant

Applications:

- ✧ 10G Ethernet
- ✧ SDH/SONET
- ✧ Fibre Channel

Description:

Opway's OP3940D-13 is a very compact 10Gb/s optical transceiver module for serial optical communication applications at 10Gb/s. The OP3940D-13 converts a 10Gb/s serial electrical data stream to 10Gb/s optical output signal and a 10Gb/s optical input signal to 10Gb/s serial electrical data streams. The high speed 10Gb/s electrical interface is fully compliant with SFI specification.

The high performance 1310nm DFB transmitter and high sensitivity PIN receiver provide superior performance for Multiple applications up to 40km links.

The SFP+ Module compliants with SFF-8431, SFF-8432. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		+85	℃
Case Operating Temperature	T_A	0		+70	℃
Maximum Supply Voltage	Vcc	-0.5		4	V
Relative Humidity	RH	0		85	%

● Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			300	mA	
Power Consumption	P			1.0	W	
Transmitter Section:						
Input differential impedance	R_{in}		100		Ω	1
Differential input voltage swing	Vin,pp	100		1000	mV	
Transmit Disable Voltage	V_D	2		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+0.8	V	
Receiver Section:						
Differential output voltage swing	Vo	300		1000	mV	
LOS Fault	$V_{LOS\ fault}$	2		Vcc_{HOST}	V	2
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	2

Note:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

● Optical Characteristics

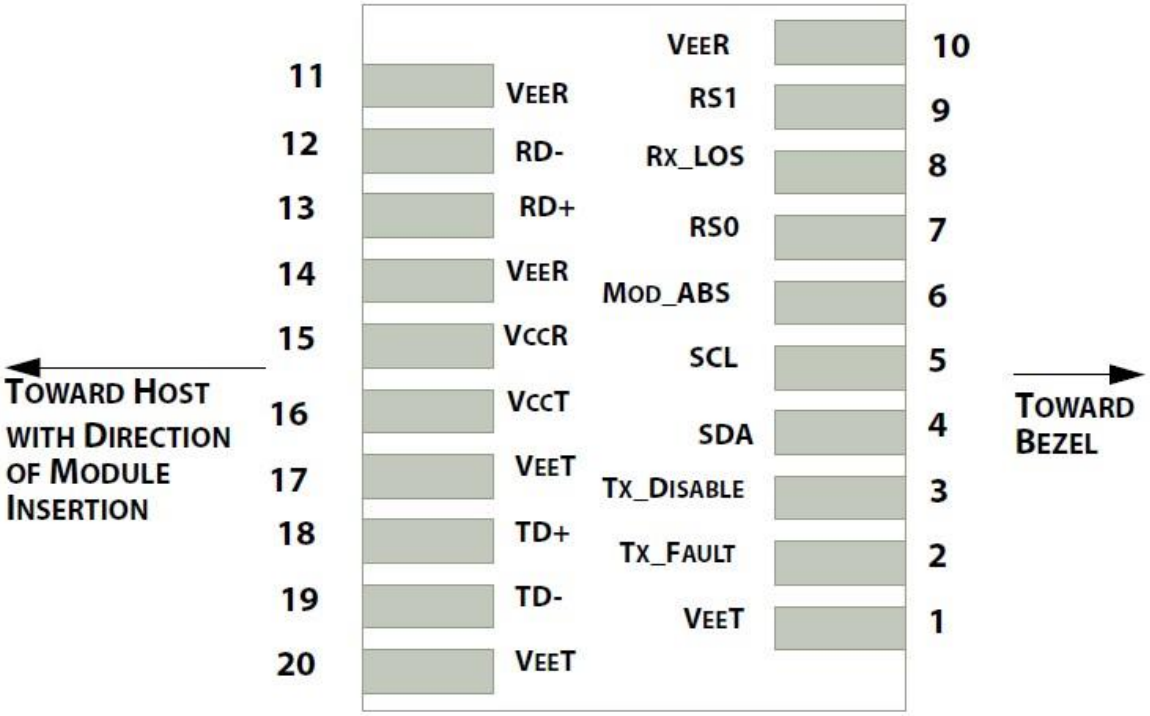
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λt	1260	1310	1355	nm	
Spectral width	△λ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	Pavg	-1		+4	dBm	
Laser Off Power	Poff			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Receiver Section:						
Center Wavelength	λr	1260		1620	nm	
Receiver Sensitivity	Sen			-15.5	dBm	1
Input Saturation Power(Overload)	Sat	0			dBm	

Los Assert	LOS_A	-30		-	dBm	
Los De-assert	LOS_D			-16	dBm	
Los Hysteresis	LOS_H	0.5			dB	

Note:

1. Measured with a PRBS 2^{31} -1 test pattern, @10.3125Gb/s, BER＜10^{-12}.

● Pin Assignment



● Pin Function Definitions

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDA	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate Select 0. Not Used	
8	LOS	Receiver Loss of Signal Indication	4
9	RS1	Rate Select 1. Not Used	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	

17	VeeT	Module transmitter ground	1
18	TD+	Transmitter non-inverted data out put	
19	TD-	Transmitter inverted data out put	
20	VeeT	Module transmitter ground	1

Notes:

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

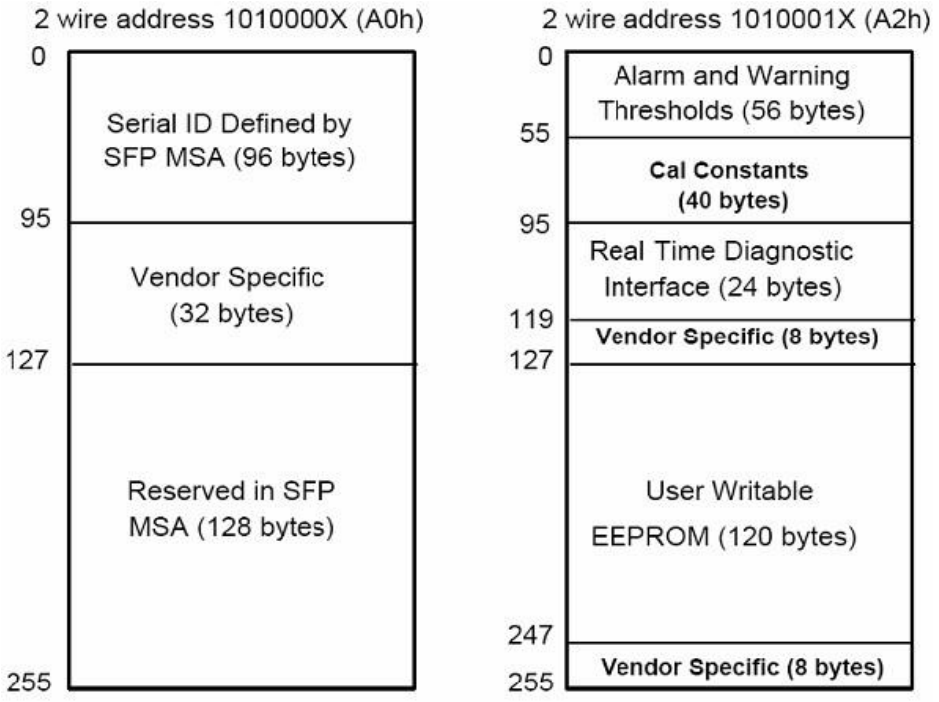
● SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFF -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I^2C interface at address A0h and A2h.

The memory is mapped in Table 1.

For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

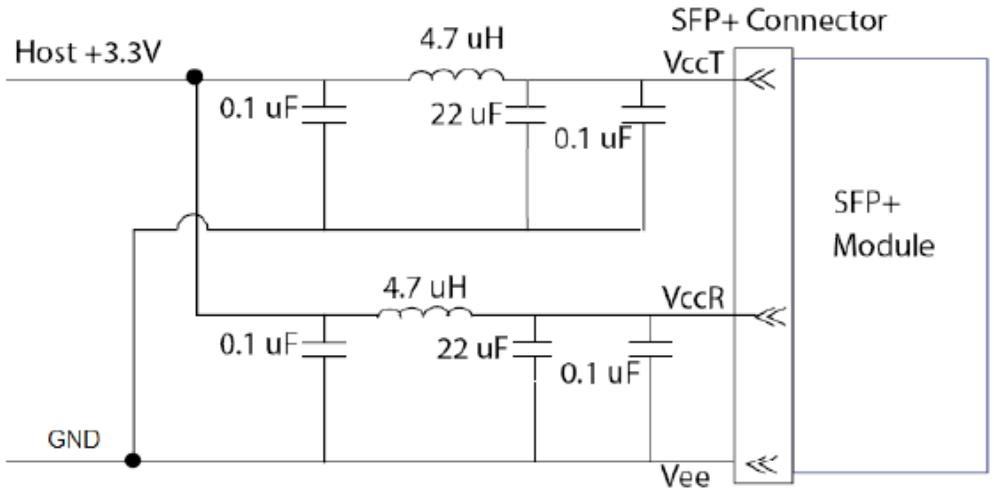
Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)



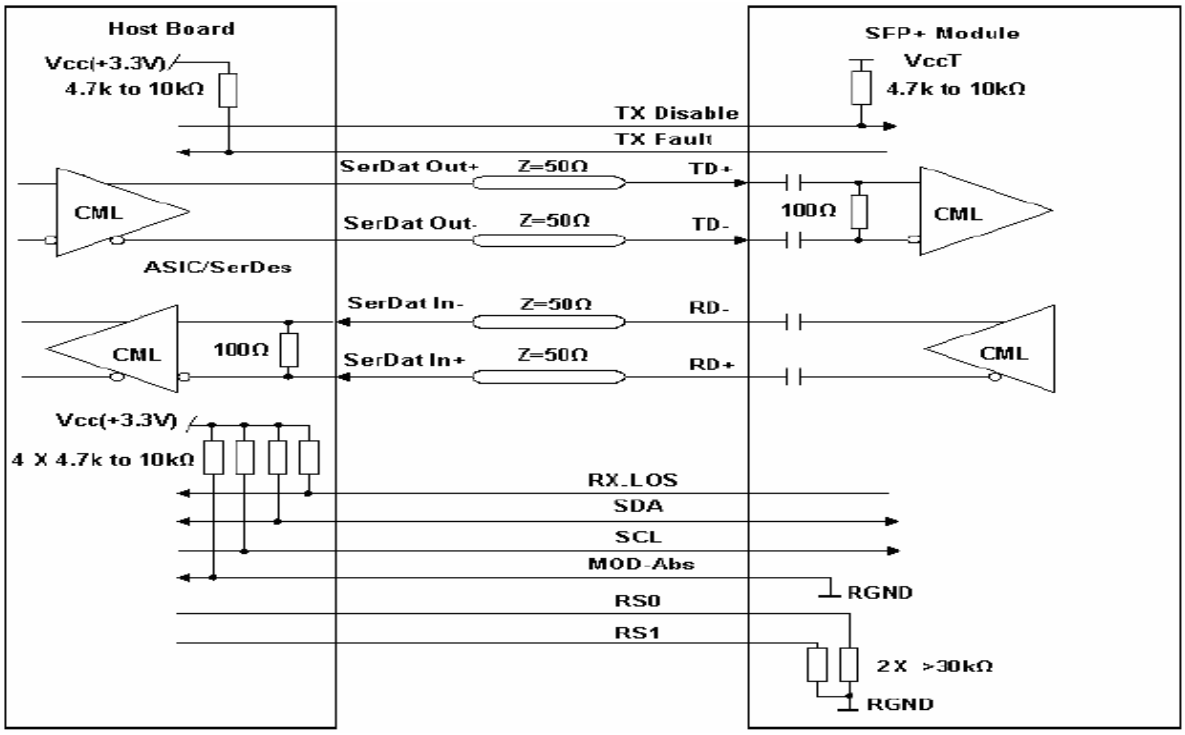
Digital Diagnostic Monitor Characteristics

Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	℃
98-99	VCC3 Internal Supply Voltage	±3.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dB
104-105	Rx Input Power	±3.0	dB

Recommended Circuit

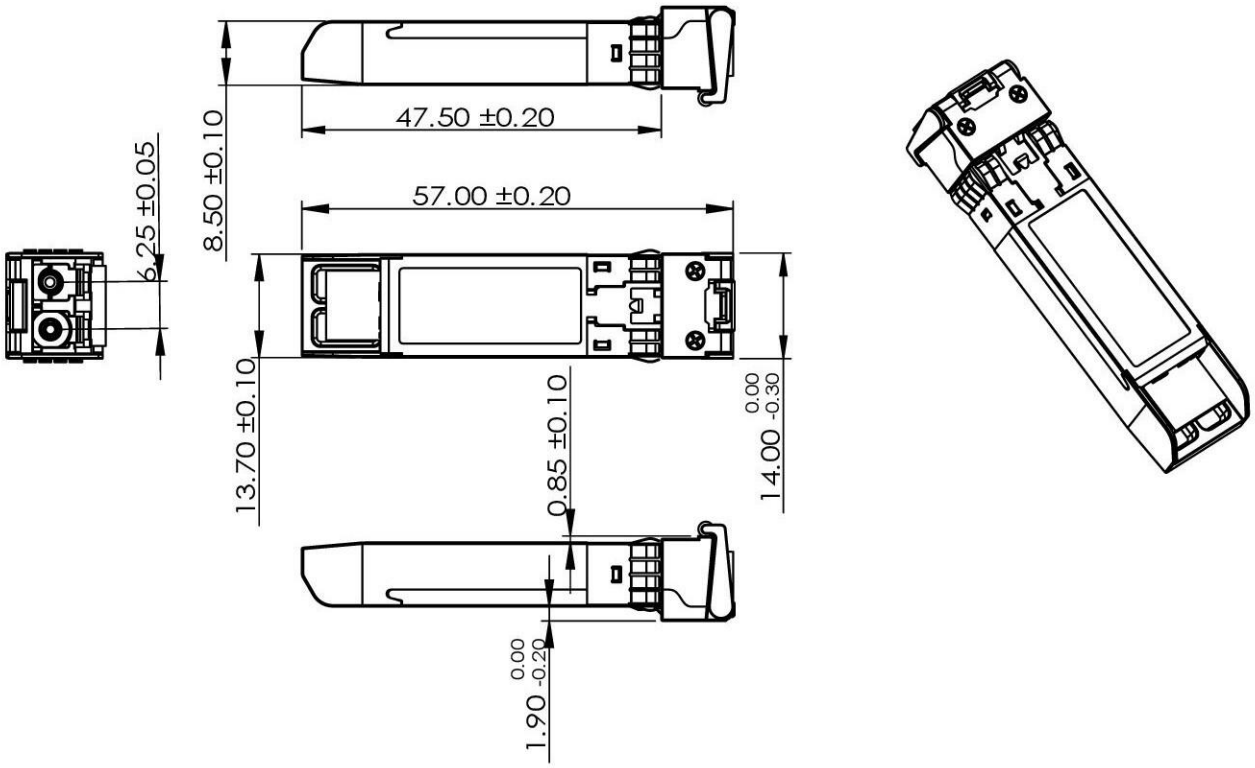


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

Mechanical Dimensions(Unit:mm)



Document Revision

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V1.0	2023-11-07	Kevin	Template update