



- ✧ Single +3.3V Power Supply
- ✧ Maximum power dissipation <1W
- ✧ Industrial /Extended/ Commercial operating temperature range: -40°C to 85°C/-5°C to 85°C/0°C to 70°C Version available
- ✧ RoHS compliant and Lead Free

Features:

- ✧ Up to 2.67Gb/s Data Links
- ✧ Hot-Pluggable
- ✧ Single LC connector
- ✧ Up to 40 km on 9/125µm SMF
- ✧ 1490nm DFB laser transmitter
- ✧ 1550nm PIN photo-detector

Applications:

- ✧ SONET OC-48 / SDH STM -16
- ✧ SONET OC-12 / SDH STM -4
- ✧ SONET OC-3 / SDH STM -1
- ✧ Gigabit Ethernet
- ✧ 1×/2× Fibre Channel

Description:

OPWAY's OP5640-45 Transceivers are a high performance, cost effective module which have a Single LC optics interface. They are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The receiver section uses a PIN receiver and the transmitter uses a 1490 nm DFB laser, up to 16dB link budge ensure this module SONET OC-48 / SDH STM -16 40km application.

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T _s	-40		+85	°C
Supply Voltage	V _{CC}	-0.5		4	V
Relative Humidity	RH	0		85	%

● Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T _c	-40		85	°C
		-5		85	°C
		0		+70	°C
Supply Voltage	V _{CC}	3.135		3.465	V
Supply Current	I _{cc}			300	mA
Inrush Current	I _{surge}			I _{cc} +30	mA
Maximum Power	P _{max}			1	W

● **Electrical Characteristics**($T_{OP} = 0$ to 70 °C, $V_{CC} = 3.0$ to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Input differential impedance	R_{in}	90	100	110		
Single ended data input swing	$V_{in PP}$	250		1200	mVp-p	
Transmit Disable Voltage	V_D	$V_{cc} - 1.3$		V_{cc}	V	2
Transmit Enable Voltage	V_{EN}	V_{ee}		$V_{ee} + 0.8$	V	
Transmit Disable Assert Time	$T_{dessert}$			10	us	
Receiver Section:						
Single ended data output swing	$V_{out,pp}$	300		800	mv	3
LOS Fault	$V_{losfault}$	$V_{cc} - 0.5$		V_{CC_host}	V	5
LOS Normal	$V_{los norm}$	V_{ee}		$V_{ee} + 0.5$	V	5
Power Supply Rejection	PSR	100			mVpp	6

Note:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

● **Optical Parameters**($T_{OP} = 0$ to 70 °C, $V_{CC} = 3.0$ to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_c	1470	1490	1510	nm	
Spectral Width	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Output Power	P_{out}	-2		+3	dBm	1
Extinction Ratio	ER	8.2			dB	
Optical Rise/Fall Time	t_r / t_f			260	ps	2
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Generated Transmitter Jitter (peak to peak)	J_{TXp-p}			0.07	UI	
Total Generated Transmitter Jitter (rms)	J_{TXrms}			0.007	UI	
Eye Mask for Optical Output	Compliant with eye mask Telcordia GR-253-GORE					
Receiver Section:						
Optical Input Wavelength	λ_c	1530	1550	1570	nm	
Receiver Overload	P_{ol}	-9			dBm	3
RX Sensitivity	Sen			-19	dBm	3

RX_LOS Assert	LOS _A	-35				dBm
RX_LOS De-assert	LOS _D				-19	dBm
RX_LOS Hysteresis	LOS _H	0.5				dB
General Specifications:						
Data Rate	BR	155			2667	Mb/s
Bit Error Rate	BER				10 ⁻¹²	
Max. Supported Link Length on 9/125μm SMF@2.5Gb/s	L _{MAX}		40			km
Total System Budget	LB	16				dB

Note

1. The optical power is launched into SMF.
2. 20-80%.
3. Measured with PRBS 2⁷-1 at 10⁻¹² BER

● Pin Assignment:

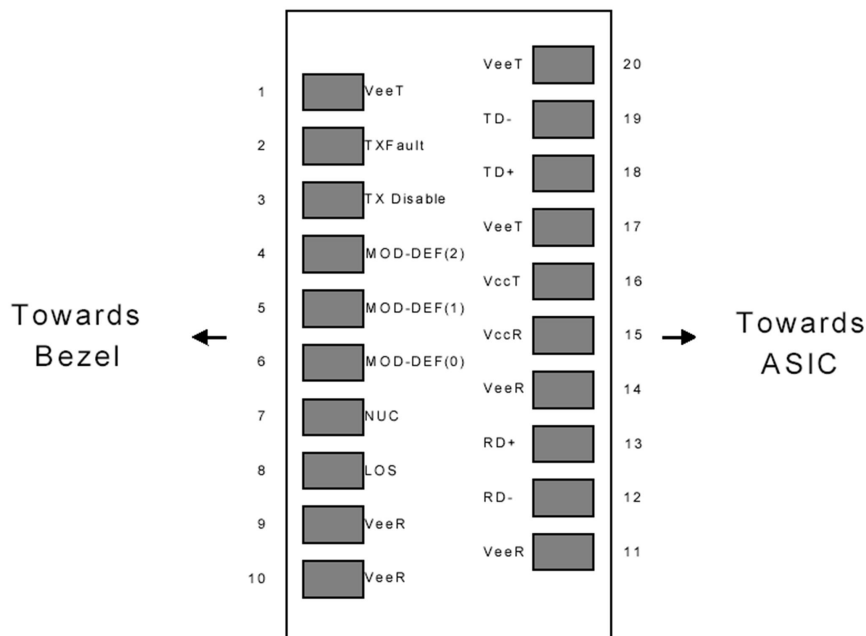


Diagram of Host Board Connector Block Pin Numbers and Names

● Pin Description:

Pin No	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	
3	TX Disable	Transmitter Disable	3	2
4	MOD-DEF2	Module Definition	2	3
5	MOD-DEF1	Module Definition 1	3	3
6	MOD-DEF0	Module Definition 0	3	3
7	Rate Select	Not Connected	3	4
8	LOS	Loss of Signal	3	5
9	VeeR	Receiver Ground	1	1
10	VeeR	Receiver Ground	1	1
11	VeeR	Receiver Ground		1

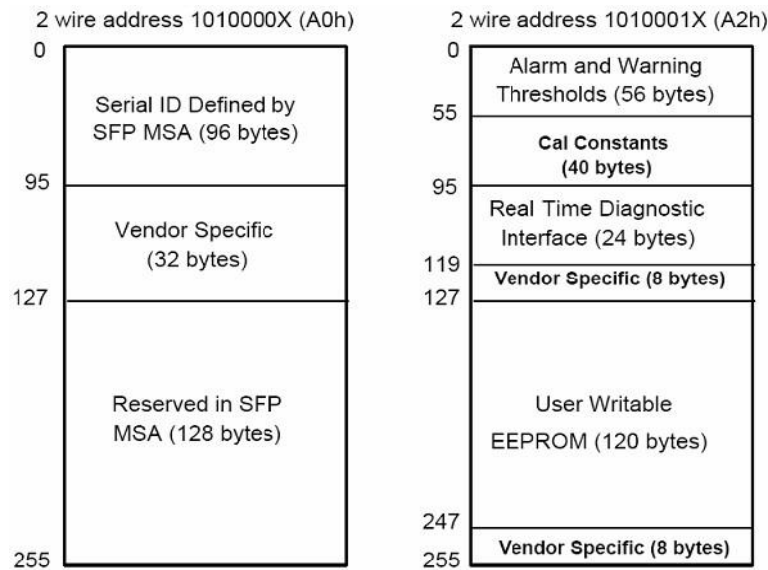
12	RD-	Inv. Received Data Out	3	6
13	RD+	Received Data Out	3	6
14	VeeR	Receiver Ground	3	1
15	VccR	Receiver Power	2	1
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	6
19	TD-	Inv. Transmit In	3	6
20	VeeT	Transmitter Ground	1	

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

● SFP Module EEPROM Information

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules can be accessed through the I²C interface at address A0h.



EEPROM Serial ID Memory Contents (A0h):

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	

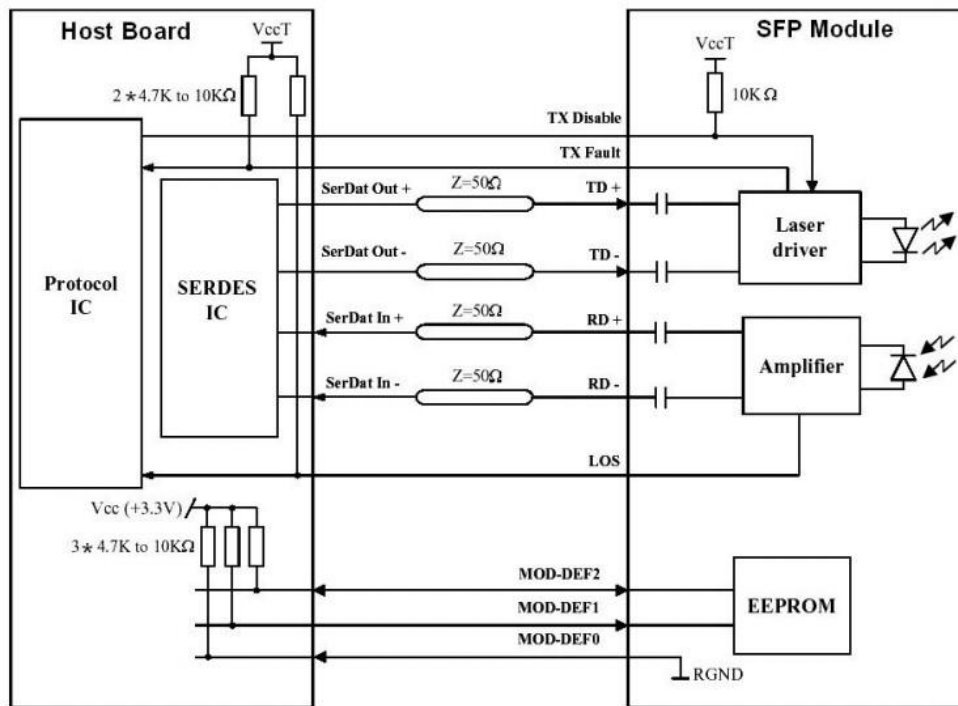
11	1	Encoding	NRZ(03h)
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: OPWAY
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "OP5640-45" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	OPWAY's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	OPWAY specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

● Regulatory Compliance

The OP5640D-45 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

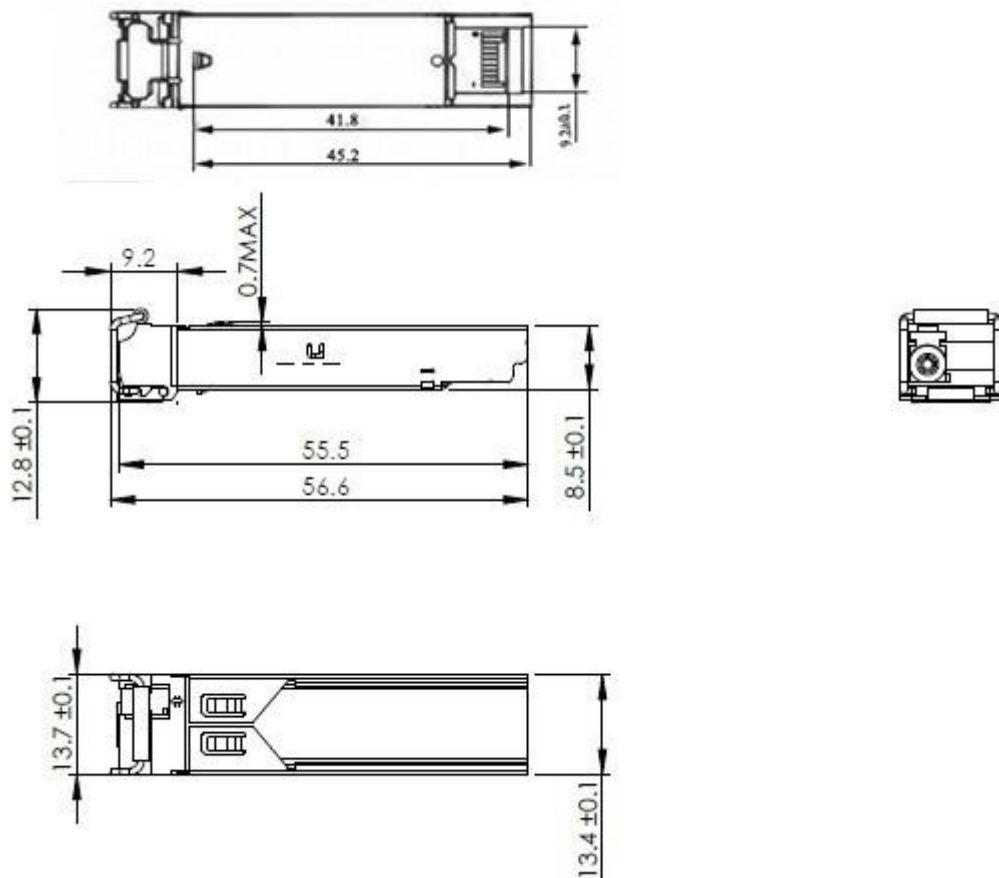
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Single LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

● Recommended Circuit:



SFP Host Recommended Circuit

Mechanical Dimensions:



Mechanical Drawing

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