

SFP-10GB-CW-61-ER-I-C

MSA and TAA 10GBase-CWDM SFP+ Transceiver (SMF, 1610nm, 40km, LC, DOM, -40 to 85C)

Features:

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 10x Gigabit Ethernet over CWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise
- Mobile Fronthaul CPRI/OBSAI

Product Description

This MSA compliant SFP+ transceiver provides 10GBase-CWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1610nm via an LC connector. It is capable of withstanding rugged environments and can operate at temperatures between -40 and 85C. The listed reach has been determined using a link budget calculation and tested in a standard environment. Actual link distances achieved will be dependent upon the deployed environment. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application to ensure seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

CWDM Available Wavelengths

Wavelengths	Min.	Typ.	Max.
47	1464.5	1471	1477.5
49	1484.5	1491	1497.5
51	1504.5	1511	1517.5
53	1524.5	1531	1537.5
55	1544.5	1551	1557.5
57	1564.5	1571	1577.5
59	1584.5	1591	1597.5
61	1604.5	1611	1617.5

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		4.0	V	1
Storage Temperature	TS	-40		85	°C	2
Operating Case Temperature	Tc	-40		85	°C	
Data Rate	DR	1.2		11.3	Gb/s	3
Bit Error Rate	BER			10 ⁻¹²		

Notes:

1. For electrical power interface
2. Ambient temperature
3. IEEE 802.3ae

Electrical Characteristics (V_{CC}=3.14V to 3.46V, T_C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
Power Supply Current	I _{CC}		400	450	mA	
Transmitter						
Input differential impedance	R _{IN}		100		Ω	
Differential data input swing	V _{IN} PP	120		850	mV	
Transmit Disable Voltage	V _D	2		V _{CC}	V	
Transmit Enable Voltage	V _{EN}	V _{EE}		V _{EE} +0.8	V	
Receiver						
Differential data output swing	V _{OUT} PP	300		850	mV	
Data output rise time/fall time (20%-80%)	t _r /t _f	28			ps	
LOS Fault	V _{LOS} A	2		V _{CC} HOST	V	
LOS Normal	V _{LOS} D	V _{EE}		V _{EE} +0.5	V	

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Output Optical Power	P _{TX}	-1		4	dBm	1
Optical Center Wavelength	λ _c	λ-6	λ	λ+6	nm	
Optical Modulation Amplitude	OMA	-5.2				2
Extinction Ratio	ER	8.2			dB	
Spectral Width (-20dB)	Δλ			0.6	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			2	dB	
Launch Power of OFF Transmitter	P _{OUT_OFF}			-30	dBm	1
Transmitter Jitter	According to IEEE 802.3ae requirement					
Receiver						
Optical Center Wavelength	λ _c	1260		1620	nm	
Average Receive Power	P _{RX}	-16		-1	dBm	
Receiver Sensitivity @10.3Gb/s	R _{X_SEN}			-16	dBm	3
Receiver Reflectance	TR _{RX}			-27	dB	
LOS Assert	LOS _A	-25			dBm	

LOS De-Assert	LOS _D			-18	dBm	
LOS Hysteresis	LOS _H	0.5			dB	

Notes:

1. Average
2. Per IEEE 802.3ae
3. Measured with worst ER: BER<10⁻¹²; 2³¹-1 PRBS

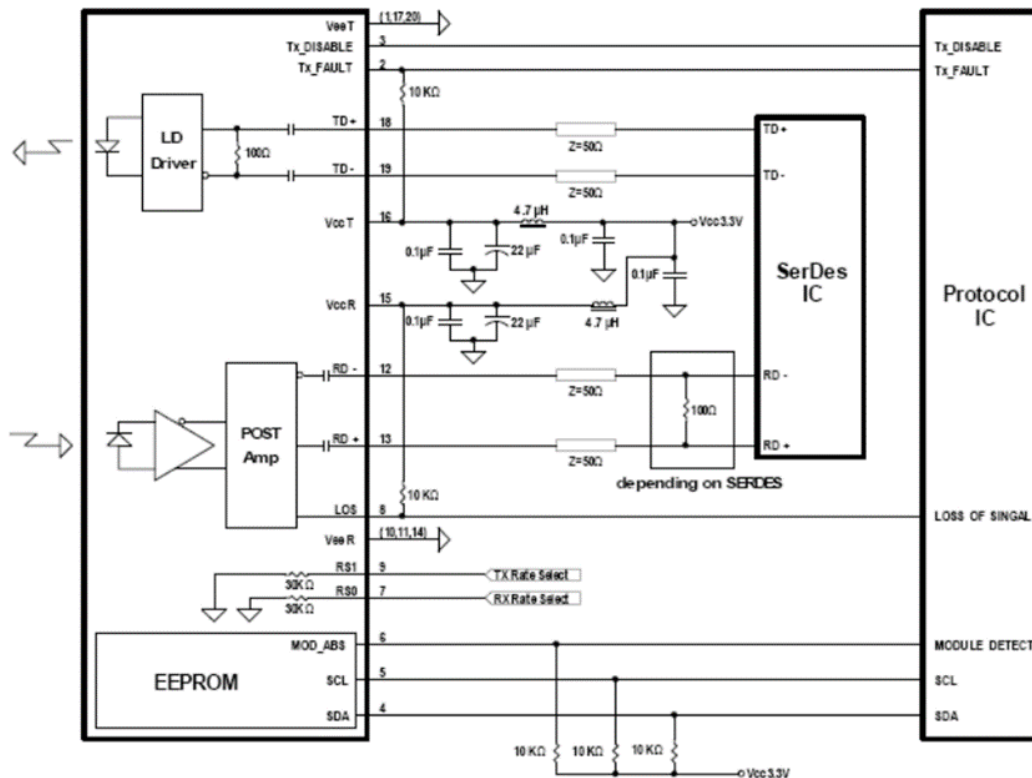
Pin Descriptions

Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	TX Fault	Transmitter Fault. LVTTTL-O	2
3	TX Disable	Transmitter Disable. Laser output disabled on high or open. LVTTTL-I.	3
4	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O.	
5	SCL	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTTL-I.	
6	MOD_ABS	Module Absent, Connect to VeeT or VeeR in Module.	4
7	RS0	Rate Select 0. Not used	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O.	2
9	RS1	Rate Select 1. Not used	5
10	VeeR	Receiver Ground (Common with Transmitter Ground).	1
11	VeeR	Receiver Ground (Common with Transmitter Ground).	1
12	RD-	Receiver Inverted DATA out. AC Coupled. CML-O.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O.	
14	VeeR	Receiver Ground (Common with Transmitter Ground).	1
15	VccR	Receiver Power Supply.	
16	VccT	Transmitter Power Supply.	
17	VeeT	Transmitter Ground (Common with Receiver Ground).	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML-I.	
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML-O.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

Notes:

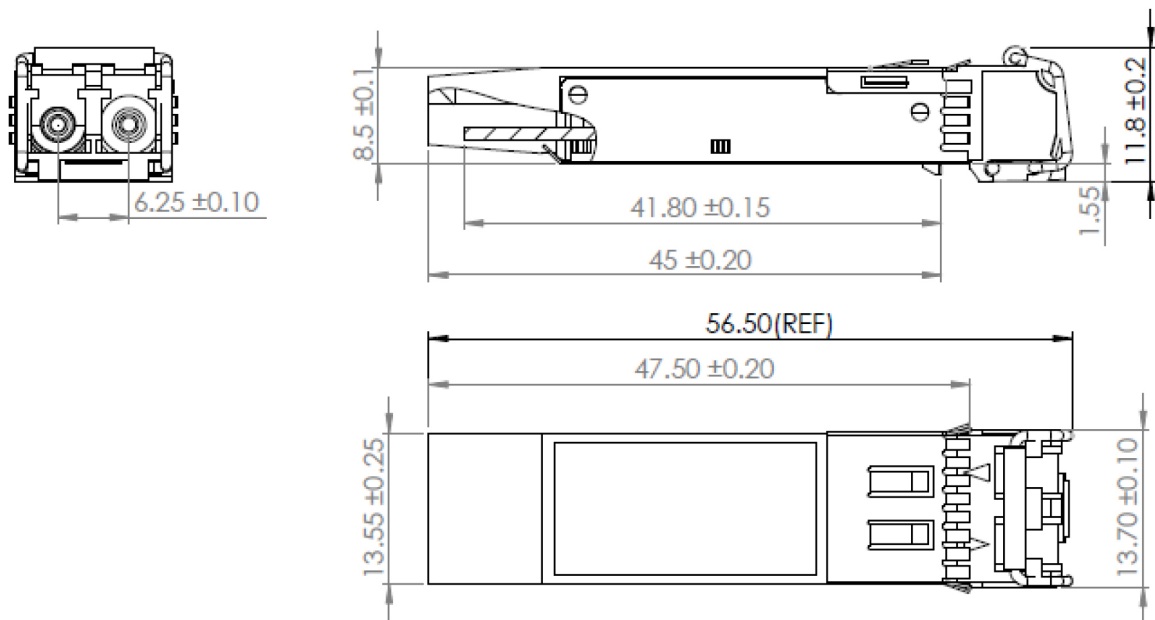
1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc_Host with resistor in the range 4.7KΩ to 10KΩ. Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx_Disable is an input contact with a 4.7KΩ to 10KΩ pull-up resistor to VccT inside module.

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|----|------|------------|
| 11 | VEER | 10 |
| | VEER | RS1 |
| 12 | RD- | Rx_LOS |
| | RD+ | RS0 |
| 13 | RD+ | RS0 |
| 14 | VEER | MOD_ABS |
| 15 | VccR | SCL |
| 16 | VccT | SDA |
| 17 | VEET | TX_DISABLE |
| 18 | TD+ | TX_FAULT |
| 19 | TD- | VEET |
| 20 | VEET | |



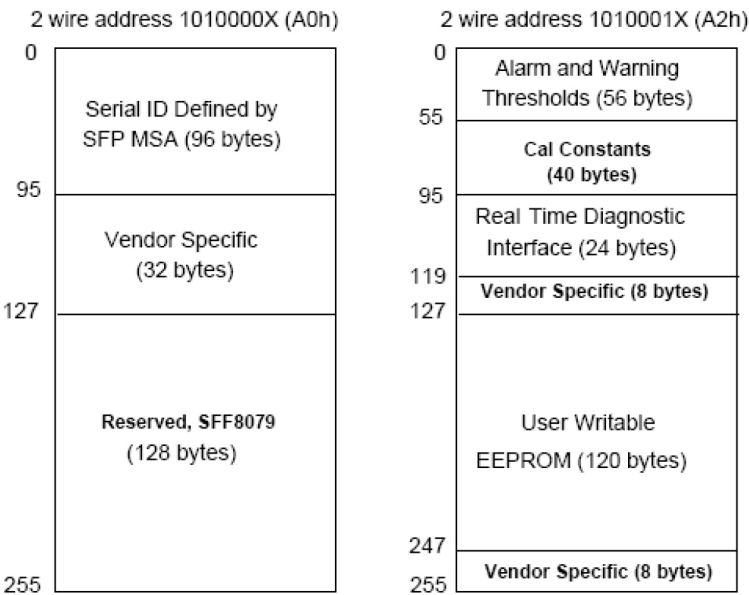
Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:



About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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