SFP-10GBASE-LR-20-I-C

MSA and TAA Compliant 10GBase-LR SFP+ Transceiver (SMF, 1310nm, 20km, LC, DOM, -40 to 85C)

Features:

- Compliant with IEEE802.3ae 10GBASE-LR/LW
- Compliant with MSA SFP+ Specification SFF-8431
- 1310nm DFB-LD Transmitter
- Distance up to 20km
- Single 3.3V Power Supply and TTL Logic Interface
- Duplex LC Connector
- Industrial Temperature -40 to 85 Celsius
- Hot-Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free

Applications:

- 10GBase-LR Ethernet
- 8x/10x Fibre Channel
- Access, Datacenter and Enterprise
- Mobile Fronthaul CPRI/OBSAI

Product Description

This MSA Compliant SFP+ transceiver provides 10GBase-LR throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow 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."

TAA COMPLIANT

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.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Maximum Supply Voltage	Vcc	-0.5		3.6	V
Storage Temperature	Tstg	-40		85	°C
Operating Case Temperature	Ti	-40		85	°C
Relative Humidity	RH			95	%
Baud Rate	10GBASE-LR 10GBASE-LW		10.31 9.95		Gbps

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	Vcc	3.15	3.3	3.45	V	
Module Supply Current	Icc			300	mA	
Surge Current	Isurge			30	mA	
Transmitter						
LVPECL Inputs (Differential)	VIN	150		1200	mVp-p	AC Coupled Inputs, 1
Input AC Common-Mode Voltage		0		25	mV	RMS
Input Impedance (Differential)	ZIN	85	100	115	Ω	RIN > 100kΩ @ DC
Differential Input S-Parameter	SDD11			-10	dB	
Differential to Common-Mode Conversion	SCD11			-10	dB	
Tx_Fault High	VOH	2		Vcc	V	
Tx_Fault Low	VOL	0		0.8	V	
Tx_Disable High	VIH	2		Vcc+0.3	V	Io=400uA, Host_Vcc
Tx_Disable Low	VIL	0		0.8	V	Io=-4.0mA
Receiver						
CML Outputs (Differential)	VOUT	350		700	mVp-p	AC Coupled Outputs, 1
Output AC Common-Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	ZOUT	90	100	110	Ω	

			Min.		Max.	Unit	Notes
Differential Output S-Parameter		SD22			-10	dB	
Rx_LOS	Loss of Signal (LOS)	VOH	2		Vcc+0.3		
	Normal Operation	VOL	0		0.8		
MOD_DEF (0.2)		VOH	2			V	
		VOL	0		0.5	V	2

Notes:

1. LVPECL Logic. Internally AC coupled.
2. With serial ID.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Average Output Power	Po	-6		2	dBm	1
Extinction Ratio	ER	3.5			dB	
Center Wavelength	λC	1270	1310	1355	nm	
Spectral Width (RMS)	Δλ			1	nm	
Average Power of Off Transmitter	Poff			-30	dBm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Tx_Disable Time to Start Reset	T_Reset	10			us	
Time to Initialize (Include Reset of Tx_Fault)	T_Init			300	ms	
Tx_Fault from Fault to Assertion	T_Fault			100	us	
Total Jitter	TJ			0.28	UI(p-p)	
Data Dependent Jitter	DDJ			0.1	UI(p-p)	
Uncorrelated Jitter	UJ			0.023	RMS	
Receiver						
Center Wavelength	λC	1260		1600	nm	
Receiver Sensitivity	Pmin			-14.4	dBm	2
Receiver Overload	P_{MAX}	0.5			dBm	
Return Loss	ORL			-12	dB	
LOS De-Assert	LOSD			-16	dBm	
LOS Assert	LOSA	-28			dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Output is coupled into a 9/125um SMF. The -4.7dBm is reference IEEE 802.3ae. The typical value is -1dBm.
2. Minimum average optical power measured at the BER less than $1E^{-12}$, back-to-back. The measure pattern is PRBS $2^{31}-1$.

Pin Descriptions

| Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground.	1
2	Tx_Fault	Transmitter Fault. LVTTL-O. "High" indicates a fault condition.	2
3	Tx_Disable	Transmitter Disable. LVTTL-I. "High" or "open" disables the transmitter.	3
4	SDA	2-Wire Serial Interface Data. LVCMOS-I/O. MOD-DEF2.	4
5	SCL	2-Wire Serial Interface Clock. LVCMOS-I/O. MOD-DEF1.	4
6	MOD_ABS	Module Absent (Output). Connected to VeeT or VeeR in the module.	5
7	RS0	N/A.	6
8	Rx_LOS	Receiver Loss of Signal. LVTTL-O.	2
9	RS1	N/A.	6
10	VeeR	Receiver Ground.	1
11	VeeR	Receiver Ground.	1
12	RD-	Inverse Received Data Out. CML-O.	
13	RD+	Received Data Out. CML-O.	
14	VeeR	Receiver Ground.	
15	VccR	+3.3V Receiver Power.	
16	VccT	+3.3V Transmitter Power.	
17	VeeT	Transmitter Ground.	1
18	TD+	Transmitter Data In. CML-I.	
19	TD-	Inverse Transmitter Data In. CML-I.	
20	VeeT	Transmitter Ground.	1

Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to Host_Vcc.
3. This input is internally biased high with a 4.7KΩ to 10KΩ pull-up resistor to VccT.
4. 2-Wire Serial Interface Clock and Data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that, on the host board, requires a 4.7KΩ to 10KΩ pull-up resistor to the

Host_Vcc.

6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1. Rx Rate Select is set at Bit 3, Byte 110, and Address A2h, and Tx Rate Select is set at Bit 3, Byte 118, and Address A2h. **Note:** Writing a "1" selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.
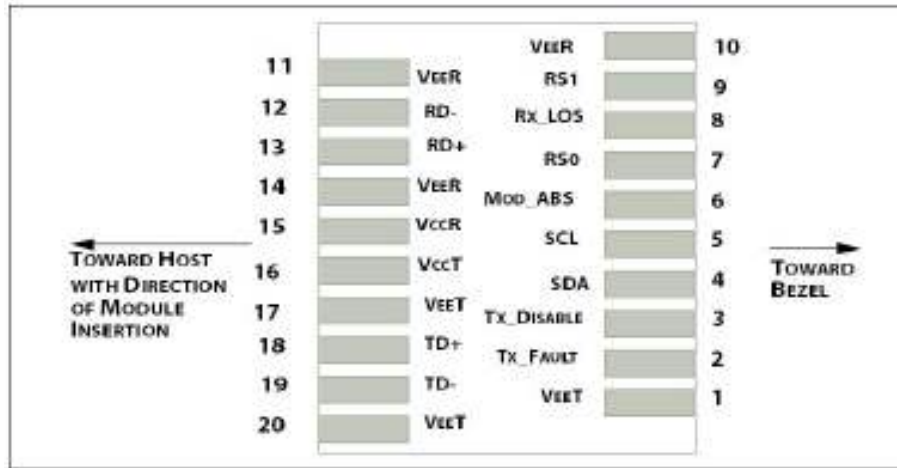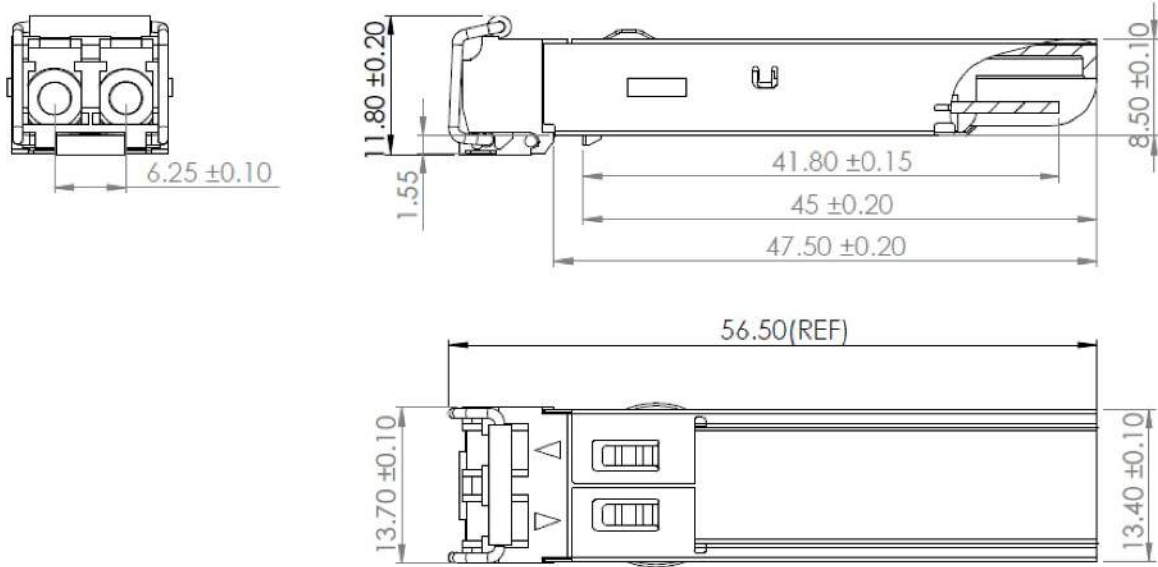

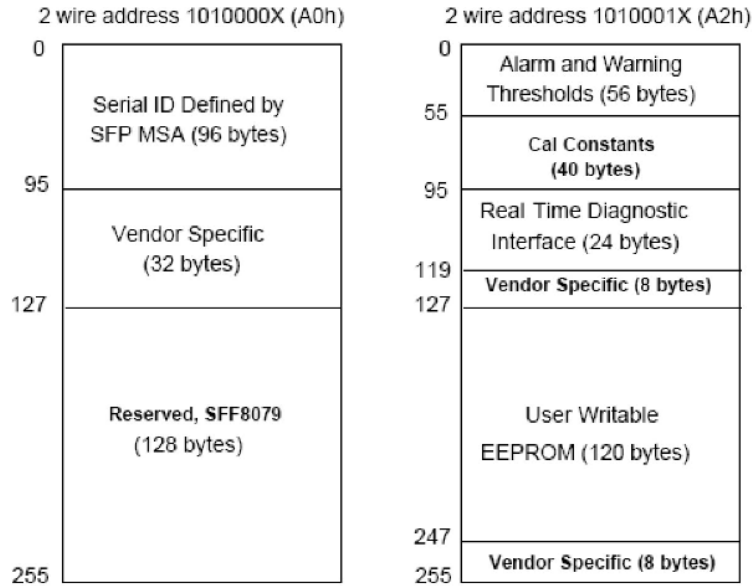Host PCB SFP28 Pad Assignment

Recommended Circuit Schematic
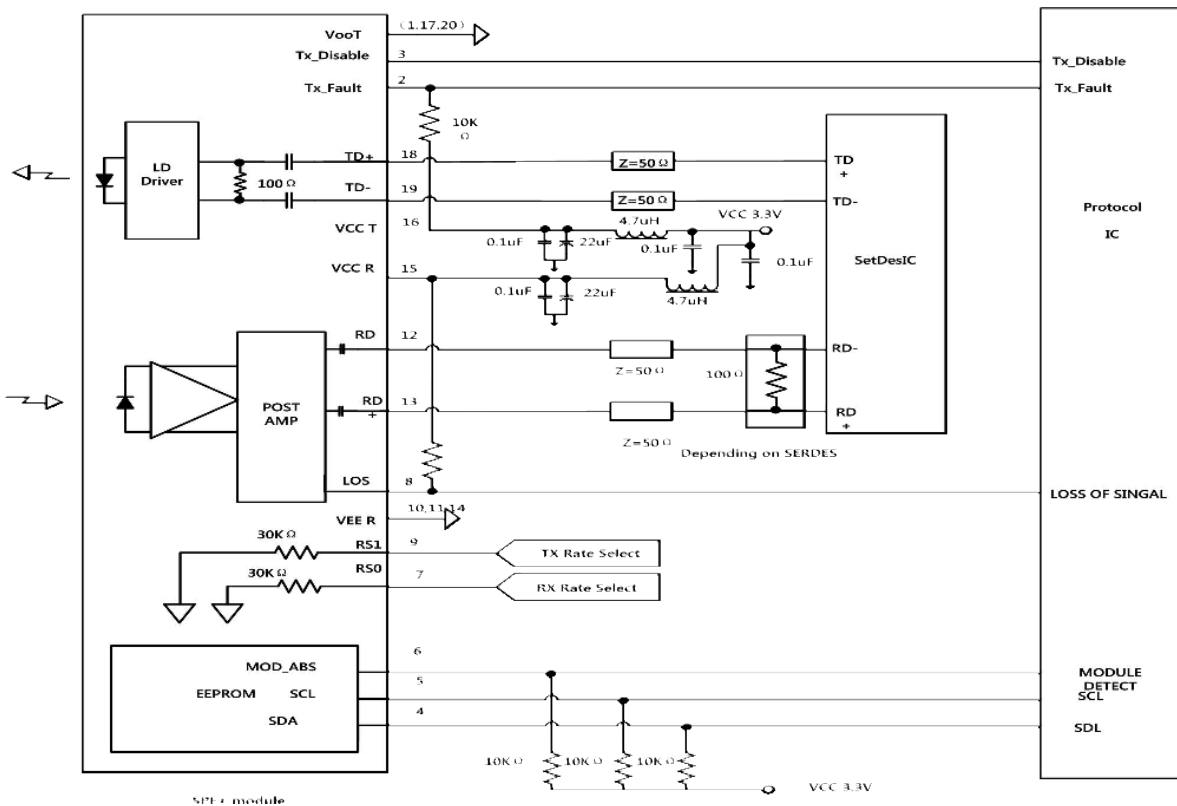
Mechanical Specifications

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 experience comes as standard; for over 15 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 over 90 optical switching and transport platforms.

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 400G 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.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. 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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