Alpha Bridge
ASFPP-10G-ER 1310nm
Datasheet

Alpha Bridge®
Technologies

Features

10Gb/s serial optical interface compliant to 802.3ae 10GBASE-ER/EW
- Electrical interface compliant to SFF-8431 specifications
- 1550nm cooled EML transmitter with TEC, PIN photo detector
- 2-wire interface for management specifications compliant with SFF 8472Standard
- Operating case temperature: 0 to 70 ⬚C
- All-metal housing for superior EMI performance
- Low power consumption, less than 1.
- Advanced firmware allow customer system encryption information to bestored in transceiver
- Cost effective SFP+ solution, enables higher port densities and greaterbandwidth.
- RoHS compliant

Applications

- 10GBASE-ER/EW
- 10GBASE-ER/EW + FEC
- 10G Storage system

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_c	-40	85	°C	
Operating Case Temperature	Tc	0	70	°C	
Supply Voltage	Vcc	0	3.6	V	
Relative Humidity	RH	5	95	%	
RX Input Average Power	Pmax	---	1.5	dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	Tc	0	70	°C	
Supply Voltage	Vcc	3.135	3.465	V	
Supply Current	ICC	---	450	mA	

Diagnostics

Parameter	Symbol	Accuracy	Unit	Notes
Temperature	Temp	± 3	°C	Over operating Temp
Voltage	VCC	± 0.1	V	Full operating range
Bias Current	Bias	± 10%	mA	
TX Power	TX	± 3 dB	dBm	
RX Power	RX	± 3 dB	dBm	-1dBm to -15dBm range

Transmitter Electro-optical Characteristics

Vcc = 3.135 V to 3.465 V, *T*C = 0 ☐ C to 70 ☐ C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate		---	10.3125	11.3	Gbps	
Power Consumption			1200	1500	mW	
Output Optical Power	Pout	-3	---	3	dBm	
Center Wavelength	°C	1530		1565	nm	
Relative Intensity Noise	RIN	---	---	-128	dB/Hz	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical spectrum width (-20dB)				1	nm	
Launched power	po	-3		3	dBm	
Launched power in OMA		-2.1	---		dBm	
Extinction Ratio	ER	-6	---		dB	
Transmitter Dispersion Penalty	TDP	---	---	2	dB	1
Average launch power of OFFtransmitter	Poff			-30	dBm	
Optical Return Loss Tolerance	RL	21	---		dB	
Single Ended Output VoltageTolerance		-0.3	---	4	V	
C common mode voltagetolerance		15	---	---	mV	
TX Input Diff Voltage	VI	180		700	mV	
TX Fault	VoL	-0.3		0.4	V	
	Voh	2.0		Vcc+0.3	V	
TX Disable	VoL	vee		Vee+0.8	V	
	Voh	2		Vcc	V	
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ			0.28	UI	

Note 1: : Path penalty is intended as the power penalty of the interface between back-to-back and the maximum applied dispersion

Receiver Electro-optical Characteristics

Vcc = 3.135 V to 3.465 V, *T*C = 0 ☐ C to 70 ☐ C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Center Wavelength	°C	1250	---	1600	nm	
Receiver Overload		-1			dBm	
Receiver Sensitivity	RSEN			-15.8	dBm	1
Receiver Sensitivity in OMA	Psens	---	---	-14.1	dBm	2
Receiver Reflectance	Rf			26	dB	
Stressed receiver Sensitivity in OMA		---	---	-11.3	dBm	
Vertical eye closure penalty				2.7	dB	3
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD	---	---	-16	dBm	
LOS Hysteresis		0.5			dB	
Stressed eye Jitter		0.3			UI	2
Receiver power damage				**5**	dBm	
Receive electrical 3dB upper cutofffrequency				12.3	GHz	
Single Ended Output Voltage Tolerance		-3.0	---	4	V	
RX Output Diff Voltage	Vo	300		850	mV	
RX Output Rise and Fall Time	Tr/Tf	30			ps	20% to 80%

| Total Jitter	TJ			0.7	UI	
Deterministic Jitter	DJ			0.42	UI	

Note 1: Average optical power shall be measured using the methods specified in TIA/EIA-455-95.

Note 2: Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER =1x 10-12 .

Note 3. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity. They arenot the required characteristic of the receive

Block Diagram of Transceiver
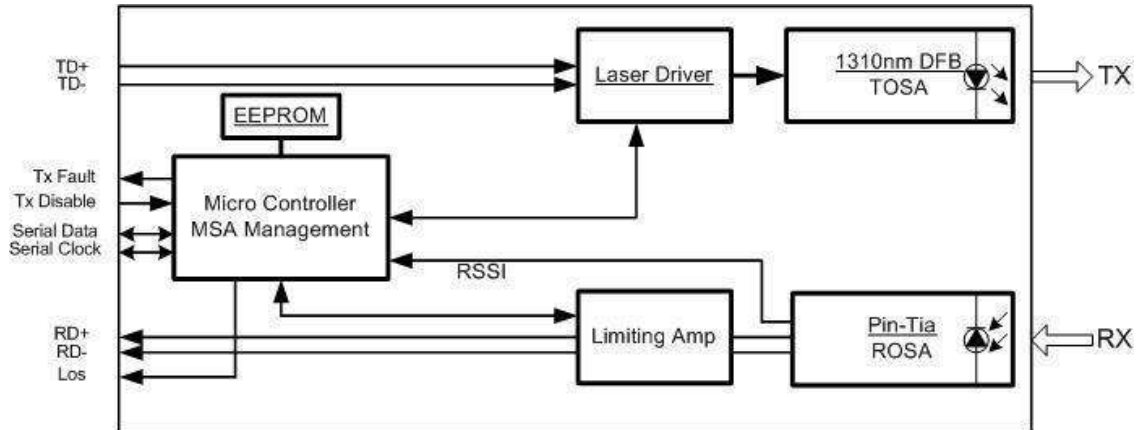
The SFP+ ER module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiveroutput impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI. SFI typicallyoperates over 200 mm of improved FR4 material or up to about 150mmof standard FR4 with one connector. The transmitter converts 10Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 10GBASE- LR standard. An open collector compatible Transmit Disable (Tx_Dis) is provided. Logic "1," or no connection on this pin will disable the laser from transmitting. Logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host witha resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor The receiver converts 10Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both thetransmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP+ isinstalled that the received signal strength is below the specified range. Such an indication typically points to non- installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

Pin Assignment
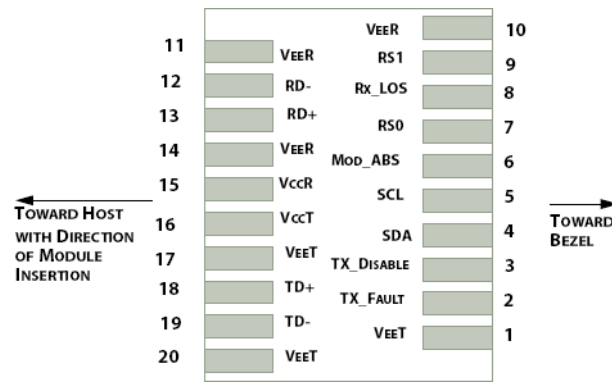
**Module Interface to Host**
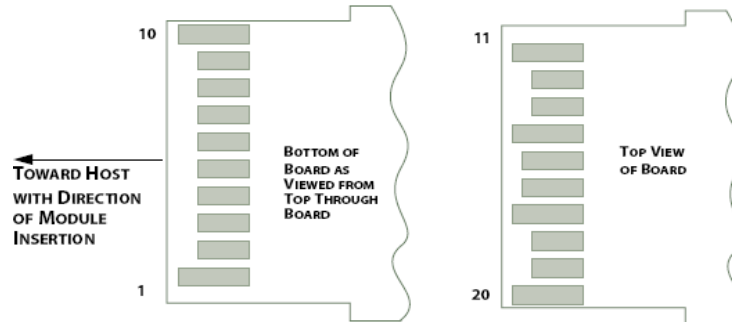
Module Contact Assignment

Pin Descriptions

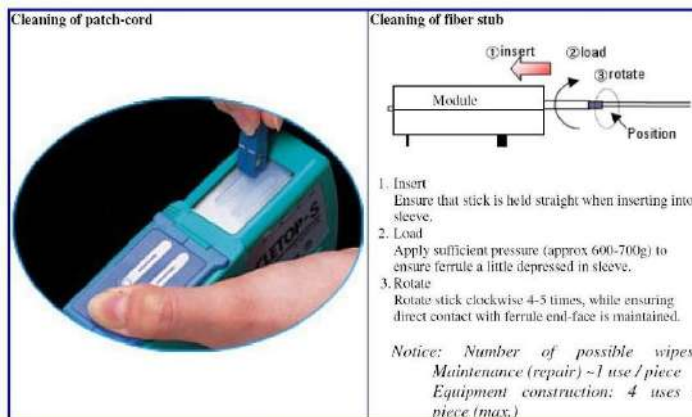| PIN	Logic	Symbol	Name /Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	3
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	4
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Absent, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select-Not used	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active low	3
9	LVTTL-I	RS1	Transmitter Rate Select-Not used	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

Note:
1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10KΩ to a voltage between 3.15V and 3.45V on the host board.
3. This contact is an open collector/drain output contact and shall be pulled up on the host board.
4. Tx_Disable is an input contact with a 4.7kΩ to 10kΩ pull up to VccT inside the module.

Dimensions
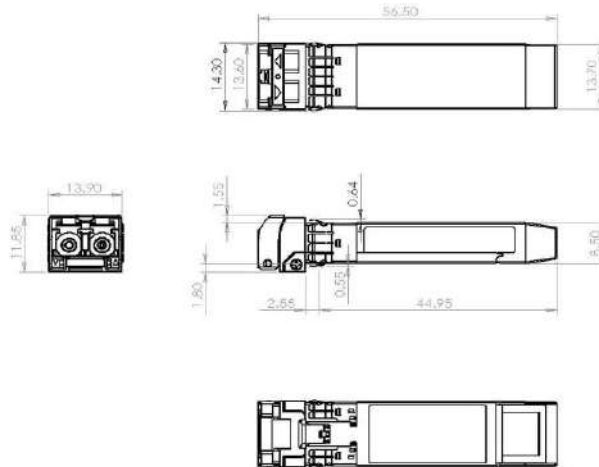
Optical Receptacle Cleaning Recommendations:

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating ofpatch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Ordering Information

Model Number	Part number	Reach	Input/Output	Signal Detect	Voltage	Temperature
ASFPP-10G-ER1310nm	OPAK-S40-15-CB	40km	AC/AC	TTL	3.3V	0°C to 70 °C

Note: All information contained in this document is subject to change without notice.