FORMERICAOE

Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP28

Optical Transceivers

Ordering Information

T A S – A 1 E B 1 – F A Q

| Model Name	Voltage	Category	Device type	Interface	LOS	Temperature	Distance
TAS-A1EB1-FAQ	3.3V	With DDMI	1310 nm DFB	AC / AC Coupling	LVTTL	0°C ~ +70°C	10km

Features

➢ **25Gb/s serial optical interface**

➢ **1310nm DFB transmitter, PIN photo- detector**

➢ **2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers**

➢ **Operating case temperature: 0 to 70°C**

➢ **Advanced firmware allow customer system encryption information to be stored in transceiver**

➢ **Cost effective SFP28 solution, enables higher port densities and greater bandwidth**
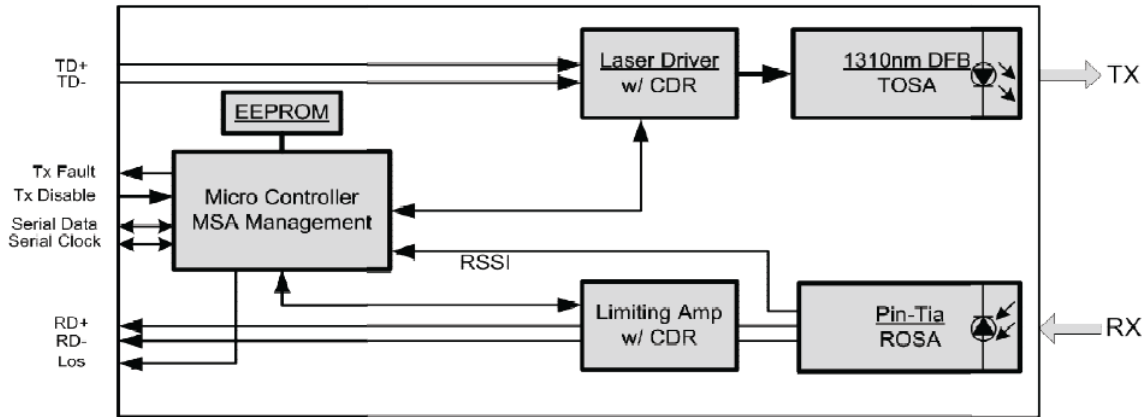
➢ **RoHS compliant**

Applications

➢ **High-speed storage area networks**

➢ **Computer cluster cross-connect**

➢ **Custom high-speed data pipes**

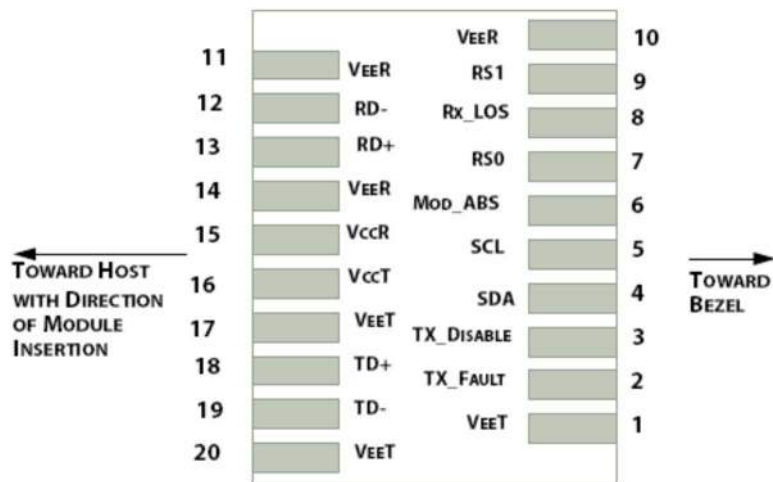## Proposed Application Schematics
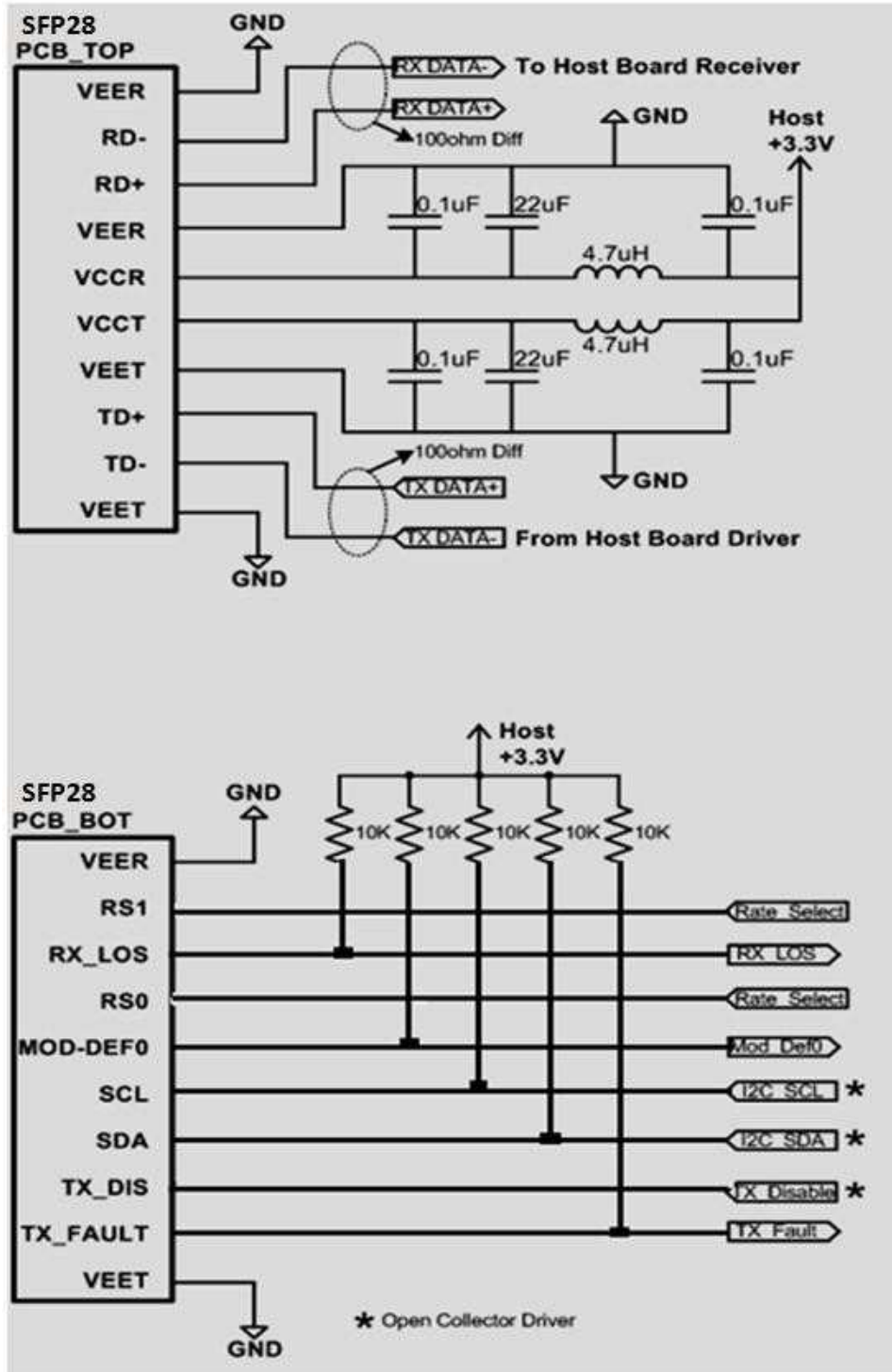
Transceiver Block Diagram

Pin Definition and Descriptions

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
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 Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select, default is high for 8G/10G application, when set to low by system, transceiver will set the bandwidth to under 4.25G to improve the sensitivity at low data rate	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select, default input is high for 8G/10G application, when set to low by system, transceiver will set the TX optical output to be compliant with low data rate fiber channel specifications	
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 Transmitter 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-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	0	3.6	V
Storage Temperature	Ts	-40	85	°C
Operating Case Temperature	Top	0	70	°C
Relative Humidity	RH	5	95	%

Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameters	Symbol	Min.	Typical	Max	Unit
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Power Supply Current	Icc			450	mA
Operating Case Temperature	T_C	0	25	70	°C
Date Rate ,each Lane			25.78125		Gb/s

Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ	1295		1325	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	PO AVG	-7	-	2	dBm	
Average Optical Power (OMA)	POMA	-4		2.2	dBm	1
Launch Power in OMA minus. Transmitter and Dispersion Penalty (TDP)		-5			dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Laser Off Power	Poff	-	-	-30	dBm	
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	RT			-12	dB	
Transmitter eye mask definition		(X1, X2, X3, Y1, Y2, Y3) = (0.31, 0.4, 0.45, 0.34, 0.38, 0.4)				2
Receiver						
Center Wavelength	λ	1260		1350	nm	
Average Receive Power		-13.3		2	dBm	
Receive Power (OMA)				2.2	dBm	

Damage Threshold	TD	3.5			dBm	3
Receiver Sensitivity (OMA)	Sens	-	-	-11.3	dBm	for BER = 5×10^{-5}
Stressed Sensitivity (OMA)		-	-	-8.8	dBm	4
Receiver Reflectance		-	-	-26	dB	
LOS Assert	LOSA	-30			dBm	
LOS Deassert	LOSD			-14	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Conditions of Stressed Receiver Sensitivity Test (Note 5)						
Vertical Eye Closure Penalty, each Lane			1.9		dB	
Stressed Eye J2 Jitter			0.27		UI	
Stressed Eye J4 Jitter			0.39		UI	
SRS Eye Mask Definition		(X1,X2, X3, Y1, Y2, Y3)= (0.24, 0.5, 0.5, 0.24, 0.24, 0.4)				2

Notes:

1. **Even if the TDP < 1 dB, the OMA min must exceed the minimum value specified here.**
2. **Hit ratio 5x10-5 per sample.**
3. **The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.**
4. **Measured with conformance test signal at receiver input for BER = 5×10^{-5}.**
5. **Vertical eye closure penalty, stressed eye J2 jitter, stressed eye J4 jitter, and SRS eye mask definition are test conditions for measuring stressed receiver sensitivity. They are not the required characteristics of the receiver.**

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over temp
Laser power monitor absolute error	DMI_TX	-2	2	dB	1
RX power monitor absolute error	DMI_RX	-2	2	dB	1
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full range
Bias current monitor	DMI_Ibias	-10%	10%	mA	

Notes:

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Power Consumption		-		1.5	W	
Transmitter						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance	TP1			10	%	At
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11,SCD11)	TP1			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1				
Receiver						

Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22,SCD22)	TP4			See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10-15 probability	TP4	0.57			UI	

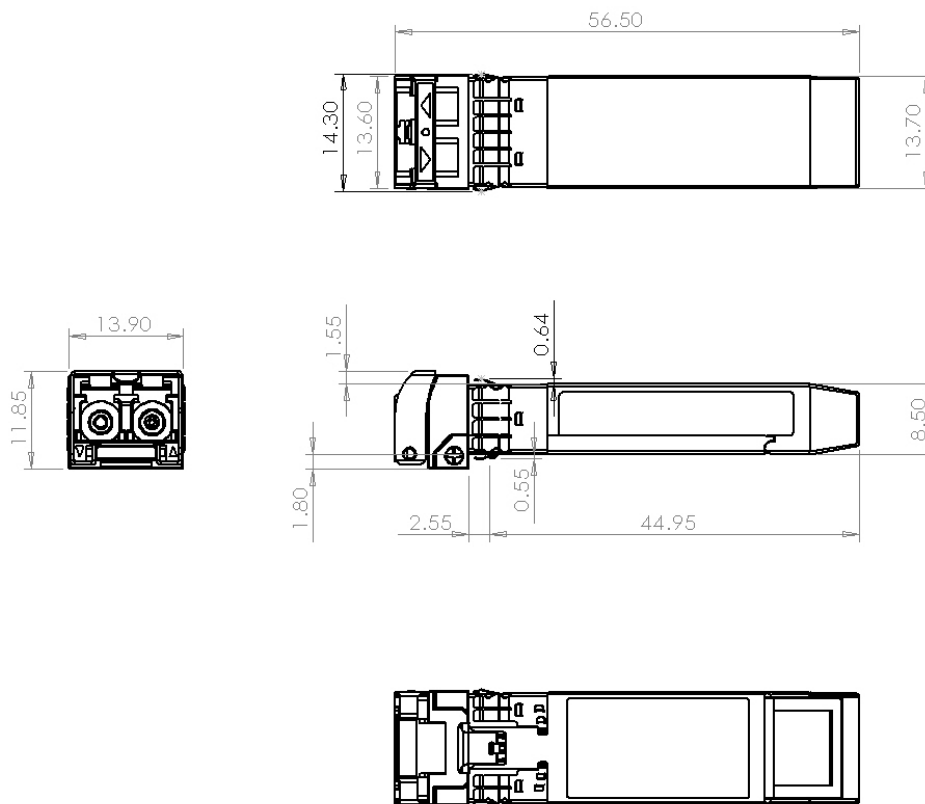| (EW15)						
Eye Height at 10-15 probability (EH15)	TP4	228			mV	

Notes:

1. **Vcm is generated by the host. Specification includes effects of ground offset voltage.**
2. **From 250MHz to 30GHz.**

Mechanical

Comply to SFF-8432 rev. 5.0, the improved Pluggable form factor specification.

ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

LASER Safety

This is a Class 1 Laser Product according to IEC / EN 60825-1: 2014 (Third Edition). This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007)

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