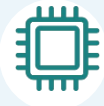




*AS60-EQ33101-CPLD
RoHS Compliant 10Gb/s SFP+ 1310nm 10km Optical Transceiver*



Brief Views

This 1310 nm DFB 10Gbps SFP+ transceiver is designed to transmit and receive optical data over single mode optical fiber for link length 10km.

The transceiver designs are optimized for high performance and cost effective to supply customers the best solutions for telecommunication.

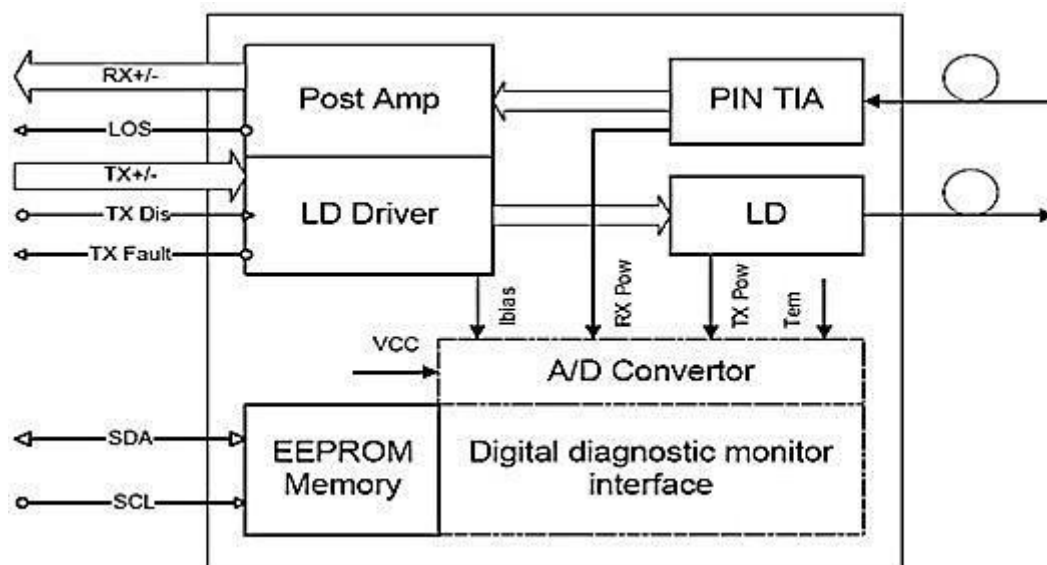
Functional Feature

- Optical interface compliant to IEEE 802.3ae 10GBASE-LR
- Electrical interface compliant to SFF-8431
- Digital Diagnostic Monitor Interface
- Hot pluggable
- 1310nm DFB transmitter, PIN photo-detector
- High transmission margin
- Low power consumption
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- Operating case temperature: 0 to 70 ° C
- Applicable for 10km SMF connection

APPLICATION

- 10GBASE-LR at 10.3125Gbps
- Other optical links

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	V _{CC}	-0.5	4.0	V	
Storage Temperature		-40	85	°C	
Relative Humidity			85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module

GENERAL OPERATING CHARACTERISTICS

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	Ethernet		10.3125		Gb/s	
	Fiber Channel		10.518			
Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
	V _{CC}				V	
Supply Current	I _{CC_s}				mA	
	I _{CC₃}			300	mA	
Operating Case Temp.	T _C	0		70	°C	

ELECTRICAL INPUT/OUTPUT CHARACTERISTICS

● Transmitter

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Diff. input voltage swing		120		820	mV _{pp}	1
Tx Disable input	H	V _{IH}	2.0	V _{CC} +0.3	V	
	L	V _{IL}	0	0.8		
Tx Fault output	H	V _{OH}	2.0	V _{CC} +0.3	V	2
	L	V _{OL}	0	0.8		
Input Diff. Impedance	Z _{in}		100		Ω	

- Receiver

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Diff. output voltage swing		340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0		V _{cc} +0.3	2
	L	VOL	0		0.8	

Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and V_{cc}+0.3V.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

OPTICAL CHARACTERISTICS

- Transmitter

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1290		1330	nm	
Ave. output power (Enabled)	P _o	-6		0	dBm	1
Extinction Ratio	ER	4			dB	1
RMS spectral width	Δλ			1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			50	ps	2
Optical modulation amplitude	OMA	-6.2			dBm	
Dispersion penalty				1	dB	
Output Optical Eye	Compliant with IEEE 802.3ae					

- Receiver

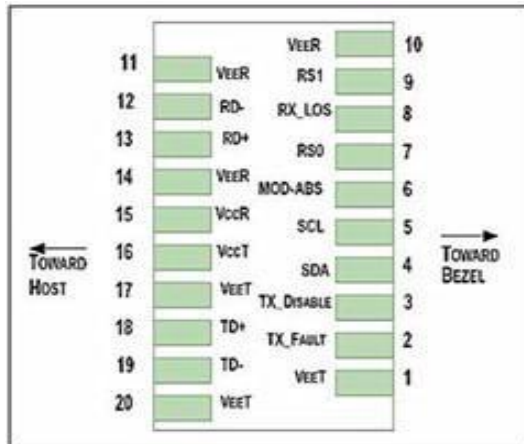
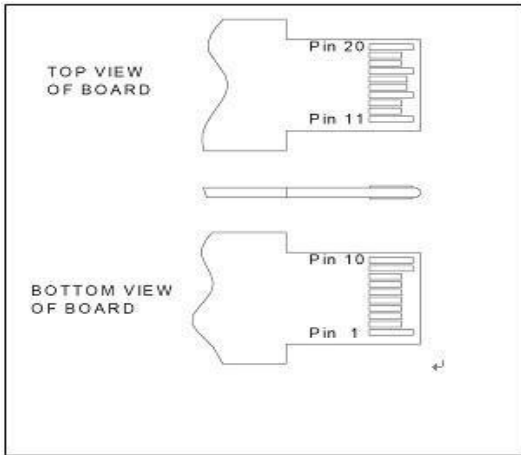
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1290	1310	1330	nm	
Sensitivity	P _{sen}			-14.4	dBm	3
Min. overload	P _{imax}	0.5			dBm	
LOS Assert	P _a	-30			dBm	
LOS De-assert	P _d			-16	dBm	
LOS Hysteresis	P _d -P _a	0.5		4	dB	

Note 1) Measured at 10.3125b/s with PRBS 2³¹ – 1 NRZ test pattern.

Note 2) 20%~80%

Note 3) Under the ER worst case, measured at 10.3125 Gb/s with PRBS 2³¹ - 1 NRZ test pattern for BER < 1x10⁻¹²

PIN DEFINITIONS AND FUNCTIONS

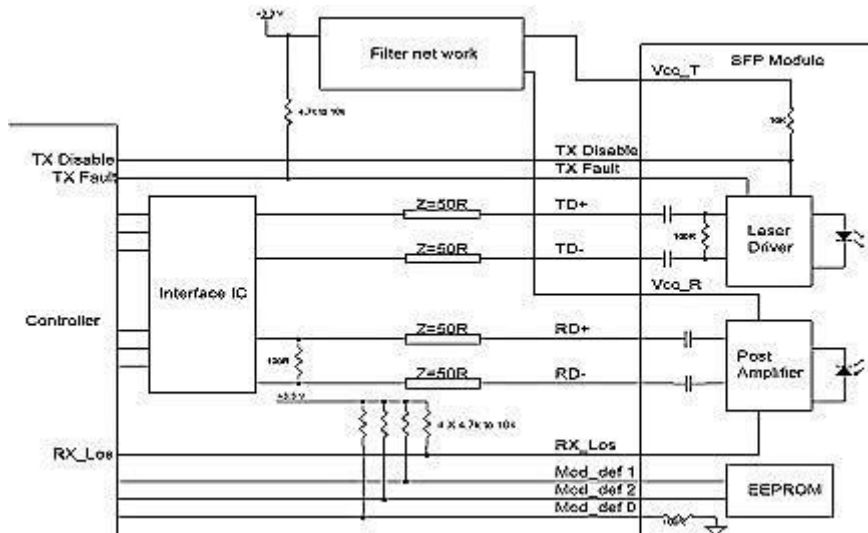


Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

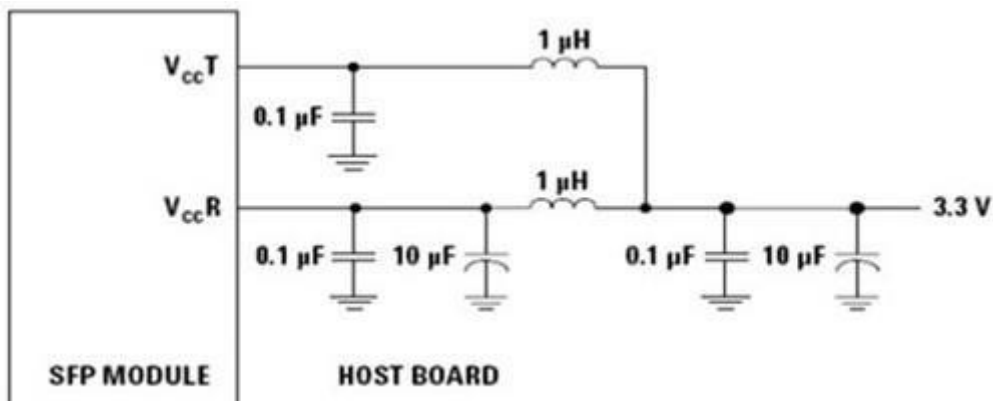
Notes:

- [1] Module circuit ground is isolated from module chassis ground within the module.
- [2].should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
- [3]Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
- [4] Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
- [5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

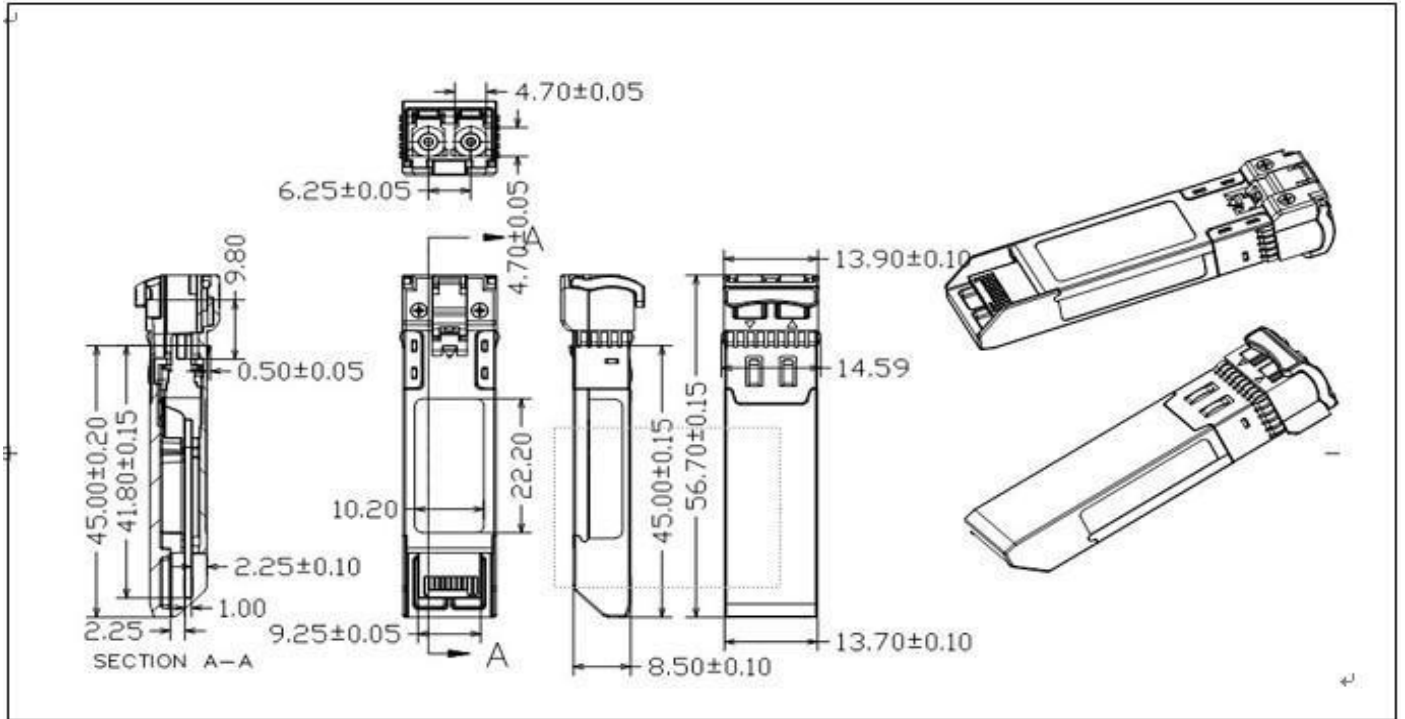
TYPICAL INTERFACE CIRCUIT



Recommended power supply filter



PACKAGE DIMENSIONS



ORDERING INFORMATION

Part Number	Description
AS60-EQ3310-CPLD	SFP+ PLUS,10.3125Gbps, 1310nm, 10km, 0~70°C, with DDM