ESP3162-10D(I)

6.25Gbps 1310nm 10KM SFP+ Optical

PRODUCT FEATURES

- Hot-pluggable SFP+ footprint
- Supports 2.1Gb/s to 6.25Gb/s bit rates
- Single 3.3V power supply
- Maximum link length of 10km
- 1310nm DFB transmitter, PIN photo-detector
- Duplex LC connector
- Power dissipation < 1W
- Built-in digital diagnostic functions
- Temperature Range:

  Commercial:0°C ~70°C

  Extended: -20 to +75°C

  Industrial: -40°C ~85°C

APPLICATIONS

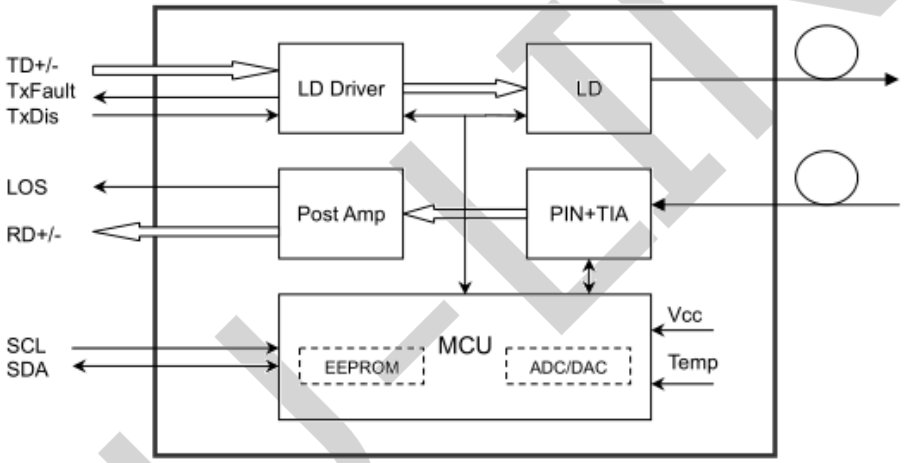
- OBSAI rates 6.144Gb/s, 3.072 Gb/s
- CPRI rates 4.9152 Gb/s,2.4576 Gb/s
- 2/4GFC Data Storage Channel
- Other Optical Links

DESCRIPTIONS

This 1310nm DFB 6.25Gbps SFP+ transceiver is designed to transmit and receive optical data over single mode. optical fiber for link length 10km.

The SFP+ 10km module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output 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.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
ESP3162-10D	6.144/ 6.25Gbps	DFB	SMF	10KM	LC	0~70℃	Y	Blue
ESP3162-10DE	6.144/ 6.25Gbps	DFB	SMF	10KM	LC	-20~75℃	Y	Blue
ESP3162-10DI	6.144/ 6.25Gbps	DFB	SMF	10KM	LC	-40~85℃	Y	Blue

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Storage Ambient Humidity	HA	5		85	%	

Power Supply Voltage	VCC	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+4			dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	Tcase	-40		85	°C	
Ambient Humidity	HA	5		85	%	
Power Supply Voltage	VCC	3.14	3.3	3.46	V	
Power Supply Current	ICC			300	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to1MHz
Transmission Distance				10	km	
Coupled fiber	Single mode fiber					ITU-T G.653

Electrical Characteristics

High-Speed Signal: Compliant to CEI-11G-SR

Low-Speed Signal: Compliant to SFF-8419

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)							
Differential Input Resistance		R_R_{din}	80	100	120	Ω	
Input Differential Voltage		R_V_{diff}	110	-	1050	mVpp	
Tx_Disable	Normal Operation	V_{IL}	-0.3	-	0.8	V	
	Laser Disable	V_{IH}	2.0	-	V_{CC}+0.3	V	
Receiver (Module Output)							
Differential Resistance		T_R_d	80	100	120	Ohm	
Output Differential Voltage		T_V_{diff}	360	-	770	mVpp	
Differential Termination Resistance Mismatch		T_R_{dm}	-	-	5	%	
Rx los	Normal Operation	V_{OL}	-0.3	-	0.4	V	
	Loss Signal	V_{OH}	2		VCCHOST	V	

Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Average Output Power	POUT	-8.2		0.5	dBm	1
Average Output Power(Laser Off)	POFF			-30	dBm	
Wavelength	λ	1260		1355	nm	
Spectrum Bandwidth @ -20dB	Δλ			1	nm	
Side mode suppression ratio(SMSR)	SMSR	30			dB	
Extinction ratio	ER	3.5			dB	
Transmitter and dispersion penalty (TDP)				3.2	dB	
RIN20OMA	RIN			-128	dB/Hz	
Optical return loss tolerance	ORLT	20			dB	
Receiver						
Wavelength	λ	1260		1620	nm	
Received Sensitivity	P_{IN}			-14.4	dBm	2
Optical Power Overload	P_{IN} (SAT)	0.5			dBm	
Damage threshold			1.5		dBm	
Receiver Reflectance	RFL			-12	dB	
Rx_LOS of Signal Assert	P_A	-30			dBm	
Rx_LOS of Signal De-assert	P_D			-18	dBm	
Rx_LOS of Signal Hysteresis	PHy	0.5		5	dB	
Optical Return Loss Tolerance	ORLT	20			dB	

Note：

1) Launched power (avg.) is power coupled into a single mode fiber with master connector. （Before of Life）

2) Measured with conformance test signal for BER = 10^–12.@6.25Gbps, PRBS=2^31-1,NRZ

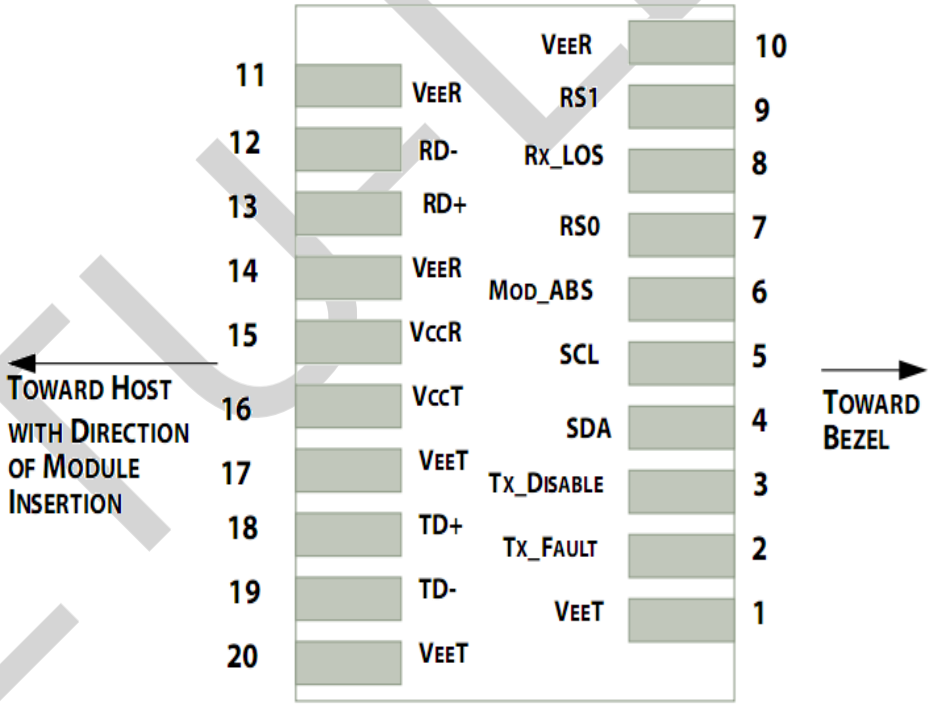
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	℃	Internal
Voltage	0 to 3.6	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	-8.2 to 0.5	±3	dB	Internal
Rx Input Power	-14.4 to0.5	±3	dB	Internal

Communication Interface Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
TX_Disable Assert Time	t_off			100	us	
TX_Disable Negate Time	t_on			2	ms	
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms	
TX_FAULT from Fault to Assertion	t_fault			100	us	
TX_Disable Time to Start Reset	t_reset	10			us	
Receiver Loss of Signal Assert Time	T_A,RX_LOS			100	us	
Receiver Loss of Signal Deassert Time	T_d,RX_LOS			100	us	
Rate-Select Chage Time	t_ratesel			10	us	

Pin Diagram



Pin out of Connector Block on Host Board

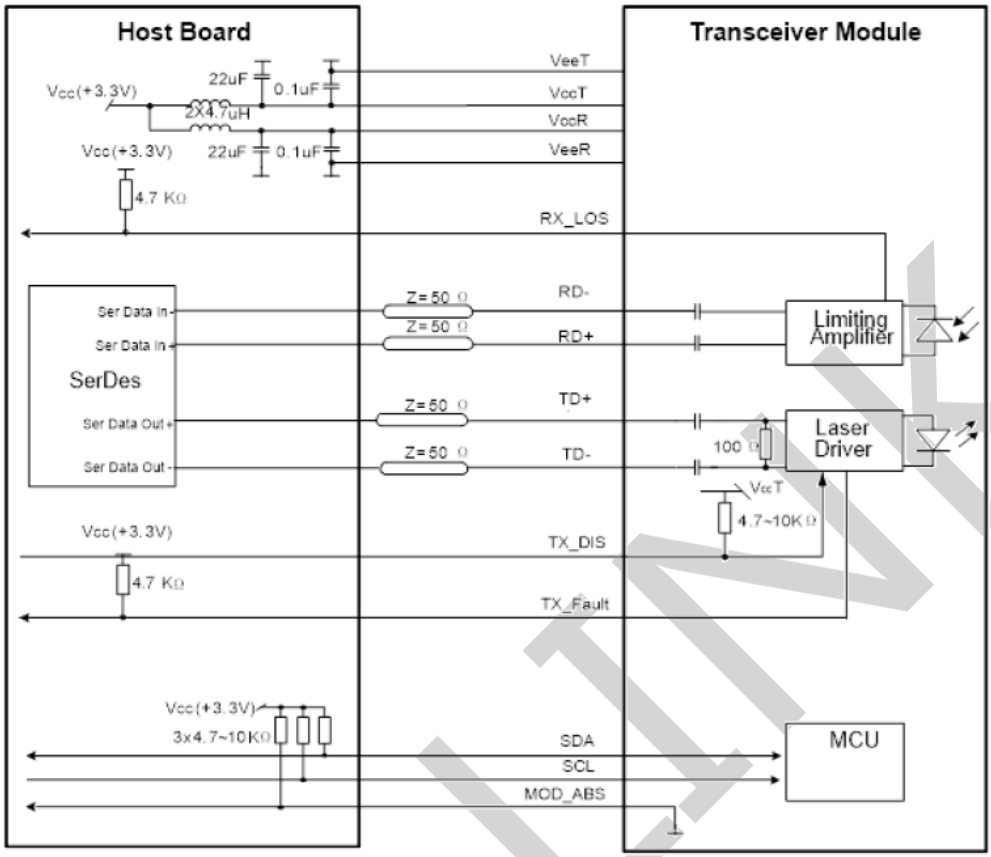
Pin Definitions

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

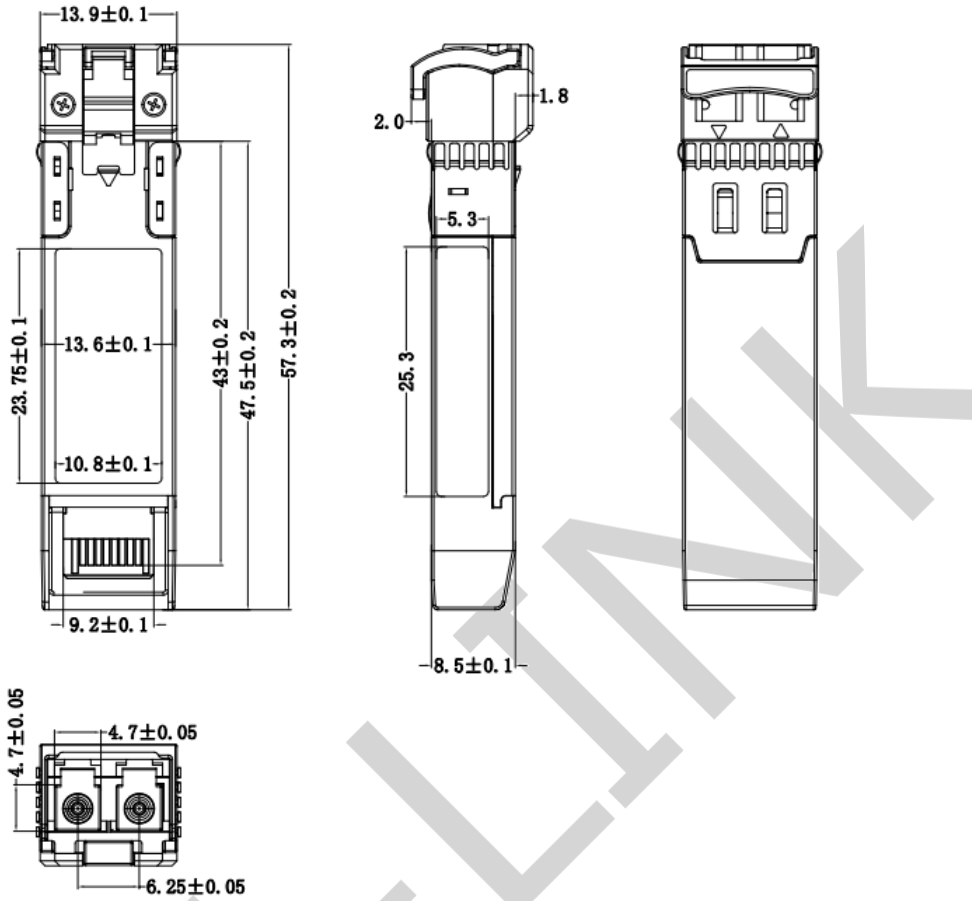
Notes:

1) Circuit ground is internally isolated from chassis ground.
2) T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3) Laser output disabled on T_{DIS}>2.0V or open, enabled on T_{DIS}<0.8V.
4) Should be pulled up with 4.7kΩ- 10kΩ host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5) Internally pulled down per SFF-8431 Rev 4.1.
6) LOS is open collector output. It should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 18, 2016	Preliminary datasheet
2.0	September 28,2023	Product upgrades
3.0	Aug 25, 2024	Format change

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