

10G SFP+ BIDI Optical Transceiver 60km**FEATURES:**

Up to 11.3Gbps Data Links
 Up to 60km transmission on SMF Power dissipation<1.5W
 1270nm DFB laser and PIN receiver for ESFPB-8823-60DL 1330nm DFB laser and PIN receiver for ESFPB-8832-60DL 2-wire interface with integrated Digital Diagnostic monitoring EEPROM with Serial ID Functionality
 Compliant with SFP+ MSA with LC connector Single + 3.3V Power Supply
 Case operating temperature: Commercial: 0°C to +70°C Industrial: -40°C to +85°C

APPLICATIONS:

10GBASE-BX
 10G SONET/SDH, OTU2/2e

STANDARD:

Compliant with SFF-8472
 Compliant to SFF-8431 RoHS
 Compliant.

PRODUCT DESCRIPTION:

ESFPB-88XX-60DL is hot pluggable 3.3V Small-Form-Factor transceiver module. It designed expressly for high-speed communication applications that require rates up to 11.3Gbps, it designed to be compliant with SFF-8472 and FP+ MSA. The module data link up to 60km in 9/125um single mode fiber.

Absolute Maximum Ratings:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	VCC	-0.3	-	4	V	

Recommended Operating Conditions:

Parameter	Symbol	Min	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	°C	Commercial
		-40	-	85	°C	Industrial
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		300	mA	
Data Rate	BR		10.312	11.3	Gbps	



Transmission Distance	TD	-	60	km	
Coupled fiber	Single mode fiber				9/125um SMF

Optical Characteristics:

Note:

Parameter	Symbol	Min.	Typ.	Max	Un	Note
Transmitter						
Average Launched Power	P _{Out}	0	-	5	dB	
Average Launched Power(Laser Off)	P _{off}	-	-	-30	dB	Note (1)
Center Wavelength Range	λ C	1260	1270	1280	nm	ESFPB-8823-60DL
		1320	1330	1340	nm	ESFPB-8832-60DL
Side mode suppression ratio	SMSR	30	-	-	dB	
Spectrum Bandwidth(-20dB)	σ	-	-	1	nm	
Extinction Ratio	ER	3.5		-	dB	Note (2)
Output Eye Mask	Compliant with IEEE 802.3ae					Note (2)
Receiver						
Input Optical Wavelength	λ IN	1320	1330	1340	nm	ESFPB-8832-60DL
		1260	1270	1280	nm	ESFPB-8823-60DL
Receiver Sensitivity	P _{sen}	-	-	-20	dB	Note (3)
Input Saturation Power (Overload)	P _{SAT}	-6	-	-	dB	Note (3)
LOS Assert	LOSA	-38	-	-	dB	
LOS De-assert	LOSD	-	-	-21	dB	
LOS -Hysteresis	P _{Hys}	0.5	-	5	dB	

1. The optical power is launched into SMF
2. Measured with RPBS 2³¹-1 test pattern @10.3125Gbs
3. Measured with RPBS 2³¹-1 test pattern @10.3125Gbs BER=<10⁻¹²
- 4.

Electrical Interface Characteristics:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total power supply current	I _{cc}	-		450	mA	
Transmitter						
Differential Data Input Voltage	V _{DT}	180	-	700	mVp-p	
Differential line input Impedance	R _{IN}	85	100	115	Ohm	



Transmitter Fault Output-High	VFaultH	2.4	-	V _{cc}	V	
Transmitter Fault Output-Low	VFaultL	-0.3	-	0.8	V	
Transmitter Disable Voltage- High	VDisH	2	-	V _{cc} +0.3	V	
Transmitter Disable Voltage- low	VDisL	-0.3	-	0.8	V	
Receiver						
Differential Data Output Voltage	VDR	300	-	850	mV _{p-p}	
Differential line Output Impedance	ROUT	80	100	120	Ohm	
Receiver LOS Pull up Resistor	RLOS	4.7	-	10	KOhm	
Data Output Rise/Fall time	tr/tf		-	38	ps	
LOS Fault	VLOS fa	V _{cc} -		V _{cc} HOS T	V	
LOS Normal	VLOS no	V _{ee}		V _{ee} +0.8	V	

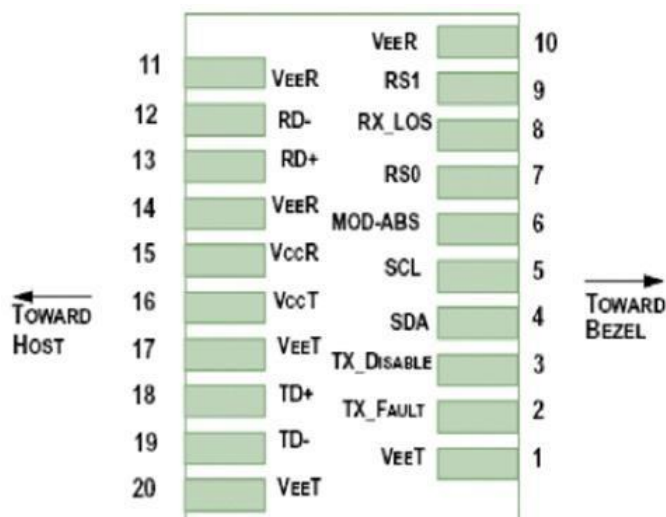
Pin Description:

Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Symbol	Name/Description	NOT
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	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_AB	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	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 TDIS <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.

Digital Diagnostic Functions:

ESFPB88XX-60DL transceivers support the 2-wire serial communication protocol as defined in the SFP+MSA. The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

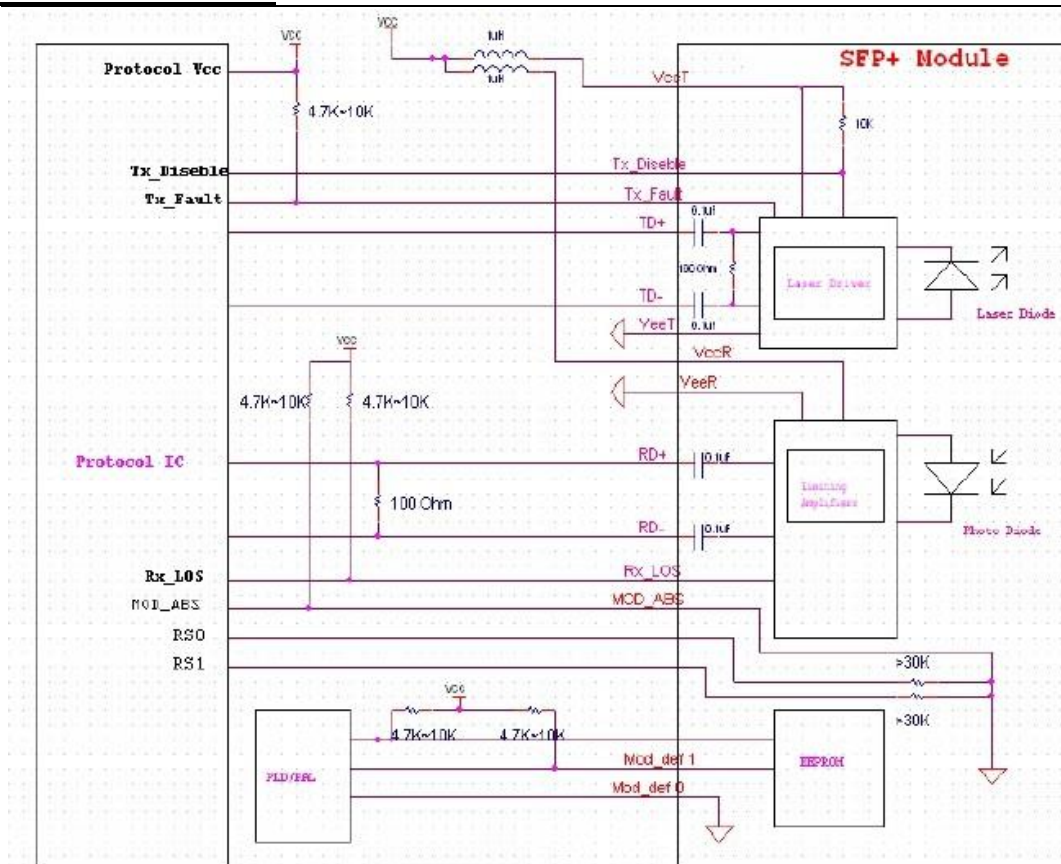
Additionally, SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.



Recommended Interface Circuit:



Outline Dimensions:

Order Information:

Part Number	Product Description		
10GSF1270-60LAT	BIDI SFP+	Tx1270nm/Rx1330nm	60km LC DDM
10GSF1330-60LAT	BIDI SFP+	Tx1330nm/Rx1270nm	60km LC DDM

