



Small Form Factor Bi-Directional Transceiver Module for Gigabit Ethernet

SFBD-1250E4K1

FEATURES

- Compliant with SFF transceiver MSA specification
- Compliant with IEEE 802.3ah, 1000BASEBX
- Single + 3.3V power supply
- 1310nm DFB laser
- Laser class 1 product which comply with the requirements of IEC 60825-1 and IEC 60825-2



Description

The SFBD-1250xxxx series are 3.3V small Form Factor Bi-Directional Transceiver Module designed expressly for high-speed communication applications that require rates of up to 1.25Gbit/sec. It is compliant with the Gigabit Ethernet standards, as well as the SFF Multisource Agreement (MSA).

The post-amplifier of the SFBD-1250xxxx also includes a signal detect circuit that provides a TTL logic-high output when an unusable optical signal level is detected.

The SFBD-1250xxxx transceiver is a class 1 eye safety product. The optical power levels, under normal operation, are at eye safe level.

APPLICATIONS

- Fibre Channel
- WDM Application
- Gigabit Ethernet

Performance

- SFBD-1250E4K1 data link up to 20km in 9/125um single mode fiber.



Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Supply Voltage	VCC	0		5	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Ambient Operating Temperature	TA	0		70	°C	
Supply Voltage	VCC	3.135	3.3	3.465	V	

Electrical Characteristics

(TA=0 °C to 70 °C, VCC=3.135V to 3.465V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total Supply Current SFBD-1250XXXX	ICCT			250	mA	
Transmitter						
Transmitter Data input voltage-High	V _{IH} -V _{CC}	-1.165		-0.880	V	
Transmitter Data input voltage-Low	V _{IL} -V _{CC}	-1.810		-1.475	V	
Transmitter Disable Input-High	V _{DISH}	2		V _{CC} +0.3	V	
Transmitter Disable Input-Low	V _{DISL}	0		0.8	V	
Receiver						
Receiver Data output voltage-High	V _{OH} -V _{CC}	-1.045		-0.740	V	
Receiver Data output voltage-Low	V _{OL} -V _{CC}	-1.950		-1.620	V	
SD Output Voltage-High	V _{SDH}	2		V _{CC} +0.3	V	
SD Output Voltage-Low	V _{SDL}	0		0.8	V	

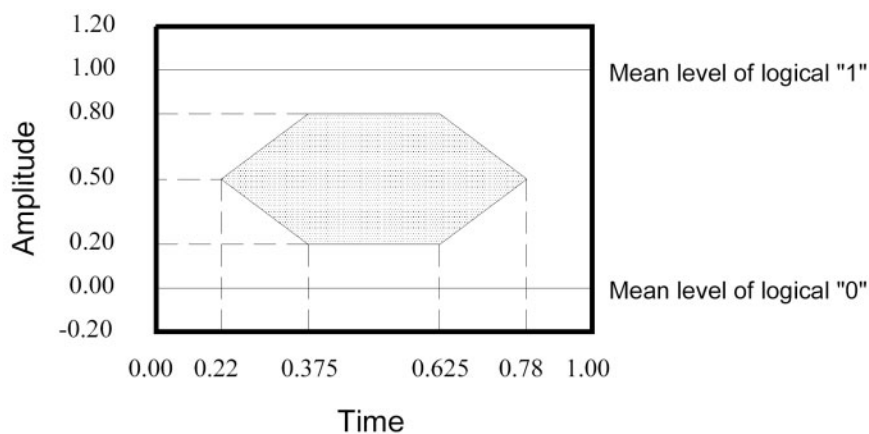
Optical Characteristics

($T_A=0\text{ }^{\circ}\text{C}$ to $70\text{ }^{\circ}\text{C}$, $V_{CC}=3.135\text{V}$ to 3.465V , Data Rate= 1.25Gb/sec , PRBS= 2^7-1 NRZ, 9/125 μm SMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Output Optical Power (Avg.)	P _O	-6		-1	dBm	
Optical Extinction Ratio		9			dB	
Center Wavelength	λ _C	1260		1360	nm	
Spectral Width(RMS) (-20dB width)	σ			0.88	nm	
Side-mode Suppression Ratio	SMSR	30			dB	
Optical Rise/Fall time	t _r /t _f			300	psec	1
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					
Receiver						
Sensitivity (Avg.)	P _{IN}			-24	dBm	2
Input Optical Wavelength	λ	1480		1580	nm	
SD-Asserted (Avg.)	P _A			-24	dBm	
SD-De-asserted (Avg.)	P _D	-32			dBm	
SD-Hysteresis	P _A -P _D	0.5			dB	
Overload	P _O	-1			dBm	

Notes:

- These are unfiltered 20%~80% values
- The sensitivity is provided at a BER of 1×10^{-12} or better with an input signal consisting of 1.25Gb/s, 2^7-1 PRBS.



Mask of the eye diagram for the optical transmit signal



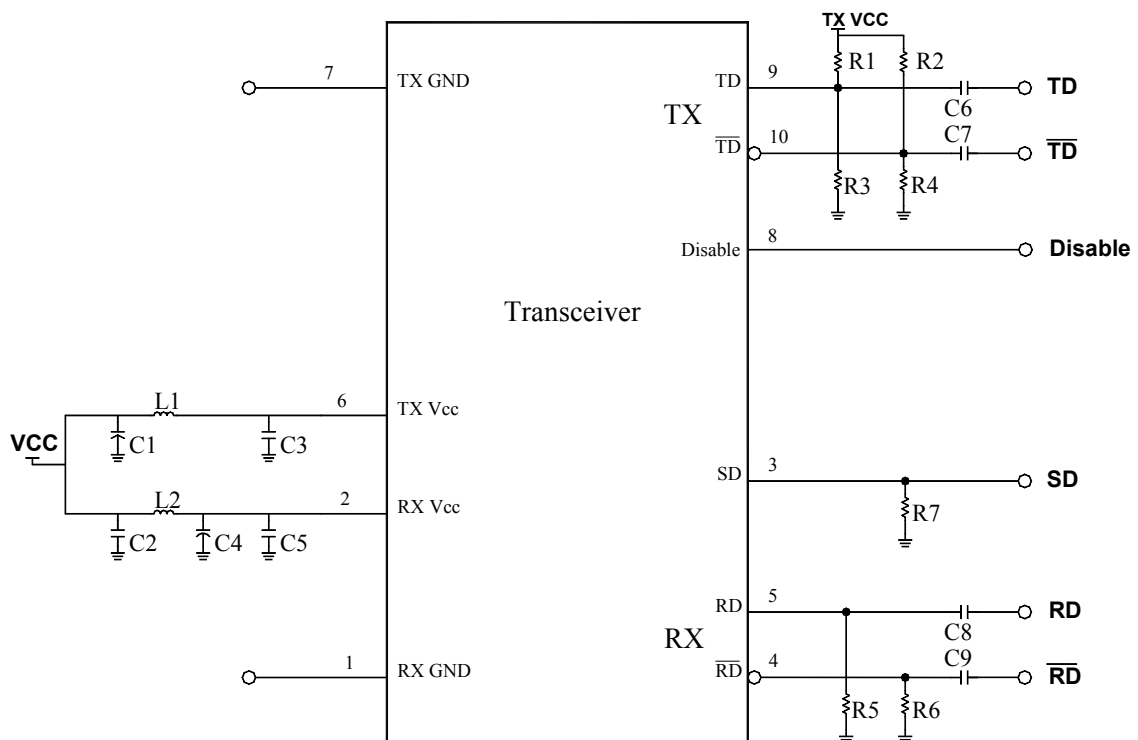
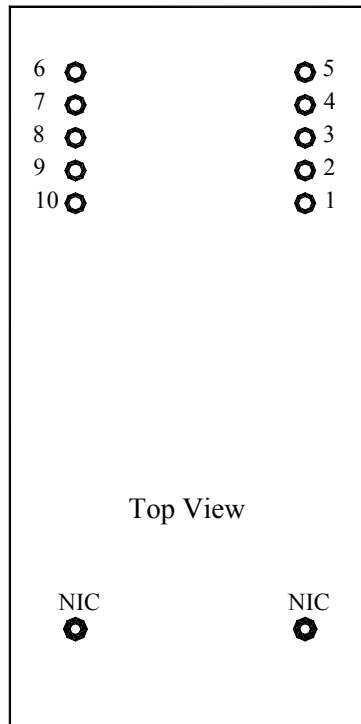
Recommend Circuit Schematic

- 6 Transmitter Power Supply
- 7 Transmitter Ground
- 8 Disable
- 9 Transmitter Input Data
- 10 Transmitter Input Data Bar

- 6
- 7
- 8
- 9
- 10
- 5
- 4
- 3
- 2
- 1

- 5 Receiver Output Data
- 4 Receiver Output Data Bar
- 3 Signal Detect
- 2 Receiver Power Supply
- 1 Receiver Ground

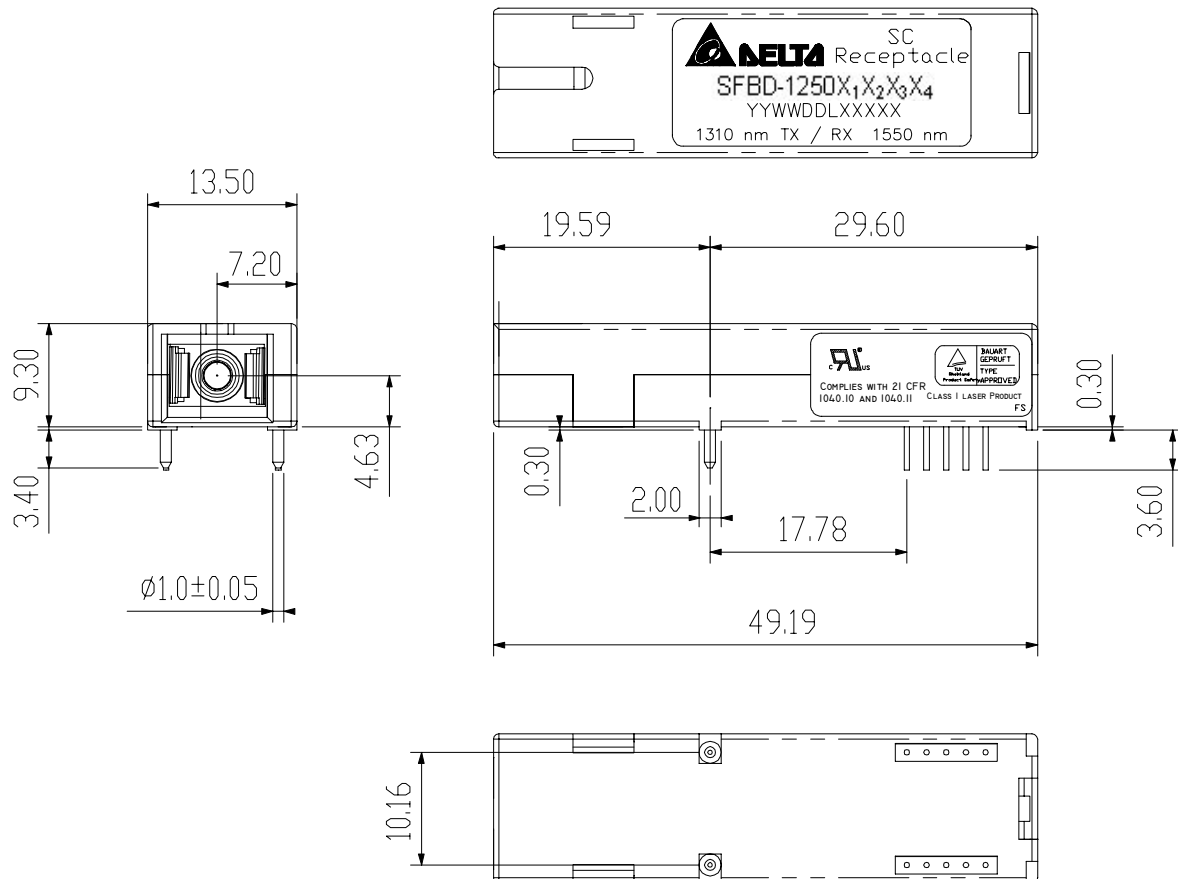
Note:
 $R1=R2=82\ \Omega$
 $R3=R4=130\ \Omega$
 $R5=R6=150\ \Omega$
 $R7=270\ \Omega$
 $C1=C4=10\mu F$
 $C2=C3=C5=C6=C7=C8=C9=100\ nF$
 $L1=L2=1\ \mu H$ or ferrite inductor





Standard SFBD-1250E4K1 series (preliminary)

Package Outline Drawing Unit : mm



DIMENSIONAL TOLERANCES +/-0.2



Standard SFBD-1250E4K1 series (preliminary)

Regulatory Compliance

Feature	Reference	Performance
Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B (CISPR 22A)	(1) Satisfied with electrical characteristics of product spec. (2) No physical damage
Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	
Electrostatic Discharge to the Duplex LC Receptacle	EN 61000-4-2 IEC 1000-4-2 IEC 801.2	
Electrostatic Discharge to the Electrical Pins	MIL-STD-883E Method 3015.7	
Eye Safety	US FDA CDRH AEL Class 1 EN 60950: 2000 EN 60825-1: 1994+A11+A2 EN 60825-2: 2000	CDRH File # 0321539-00 TUV Certificate No. R50032471
Component Recognition	Underwriters Laboratories and Canadian Standards Association Joint Component Recognition for Information Technology Equipment Including Electrical Business Equipment	UL File # E239394



Ordering information for SFP modules

SFBD-1250X₁X₂X₃X₄

X₁: Wavelength

E: Tx 1310nm / Rx 1550nm
F: Tx 1550nm / Rx 1310nm
V: Tx 1310nm / Rx 1490nm
W: Tx 1490nm / Rx 1310nm

X₂: Power Supply Voltage and SD Level

2: 3.3V, PECL SD Level
4: 3.3V, TTL SD Level

X₃: Distance

Q: 10km
K: 20km
L: 30km
M: 40km

X₄: Connector type

1: SC Receptacle
6: MU-J Pigtail