



Gigabit Ethernet-BiDi



1x9 Package, Simplex SC Connector,
 -40°C ~ 85°C, Extended Temp. Range

GENERAL DESCRIPTION

The S1250 series *Bi-directional* optic transceiver modules provide physical layer interfaces for **Gigabit Ethernet** at the data rate of 1.25GBd over single mode fiber.

The outline of the transceiver modules is compliant with industry standard 1 x 9 SIP (Single Inline Package) with a Simplex SC connector interface.

APPLICATIONS

- Gigabit Ethernet equipment interconnect
- Other data links with single mode fiber at similar data rates

ORDERING INFORMATION

PART NUMBER	TEMP	VOL, LOGIC INTERFACE	LD TYPE	DIST
S1250-BD1-F3CA-P1(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVPECL/PECL	1310nm FP	20km
S1250-BD1-F3CA-T2(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVTTTL/TTL	1310nm FP	20km
S1250-BD1-D5CA-P1(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVPECL/PECL	1550nm DFB	20km
S1250-BD1-D5CA-T2(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVTTTL/TTL	1550nm DFB	20km
S1250-BD1-D3MA-P1(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVPECL/PECL	1310nm DFB	40km
S1250-BD1-D3MA-T2(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVTTTL/TTL	1310nm DFB	40km
S1250-BD1-D5MA-P1(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVPECL/PECL	1550nm DFB	40km
S1250-BD1-D5MA-T2(-Z)	0°C ~ 70°C (-40°C ~ 85°C)	3.3 / 5.0V, LVTTTL/TTL	1550nm DFB	40km

FEATURES

- Full compliance with the physical layer of IEEE 802.3z Gigabit Ethernet at 1.25 GBd
- Linking distance up to 20~40 km over SMF
- 1310 / 1550nm LD transmitter and InGaAs PIN photodiode receiver
- Industry standard multisource 1 X 9 SIP
- Single 3.3 or 5.0 V power supply
- RoHS compliance
- Simplex SC connector interface
- DC or AC coupled LVPECL or PECL differential input and output interfaces
- SD (Signal Detect) indicator
- Operating temperature from 0 °C to 70°C or -40°C to 85°C
- Compatibility of wave solder and aqueous wash process with the dust cap plugged



Absolute Maximum Ratings

Stresses beyond the Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameter	Symbol	Min.	Typ.	Max.	Units
Storage Temperature	T_S	-40		85	°C
Storage Temperature (for -Z)		-40		100	
Supply Voltage	V_{CC}	0		6.0	V
Data Input Voltage	V_{IN}	-0.5		VCC	V
Differential Input Voltage (p-p)	V_D			2.0	V
Output Current	I_O			50	mA
Lead Soldering Temperature (Wave Solder)	T_{SOLD}			260	°C
Lead Soldering Time (Wave Solder)	t_{SOLD}			10	s
Lead Soldering Temperature (Hand Solder)	T_{SOLD}			350	°C
Lead Soldering Time (Hand Solder)	t_{SOLD}			5	s

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Ambient Temperature	T_A	0		70	°C
Ambient Temperature (for -Z)		-40		85	
Supply Voltage	V_{CC}	3.10		5.25	V
Data Input Voltage (Low)	$V_{IL} - V_{CC}$	-1.72		-1.64	V
Data Input Voltage (High)	$V_{IH} - V_{CC}$	-1.02		-0.92	V
Data and Signal Detect Output Load	R_L		50		Ω
Differential Input Voltage (p-p)	V_D			2.0	V

Transmitter Electrical Characteristics ($T_A = -40^\circ\text{C}$ to 85°C)

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply Current	I_{CC}			150	mA
Power Dissipation	P_{DISS}			0.5	W
Data Input Current (Low)	I_{IL}	-350	0		μA
Data Input Current (High)	I_{IH}		16	350	μA



Receiver Electrical Characteristics (T_A = -40°C to 85°C)

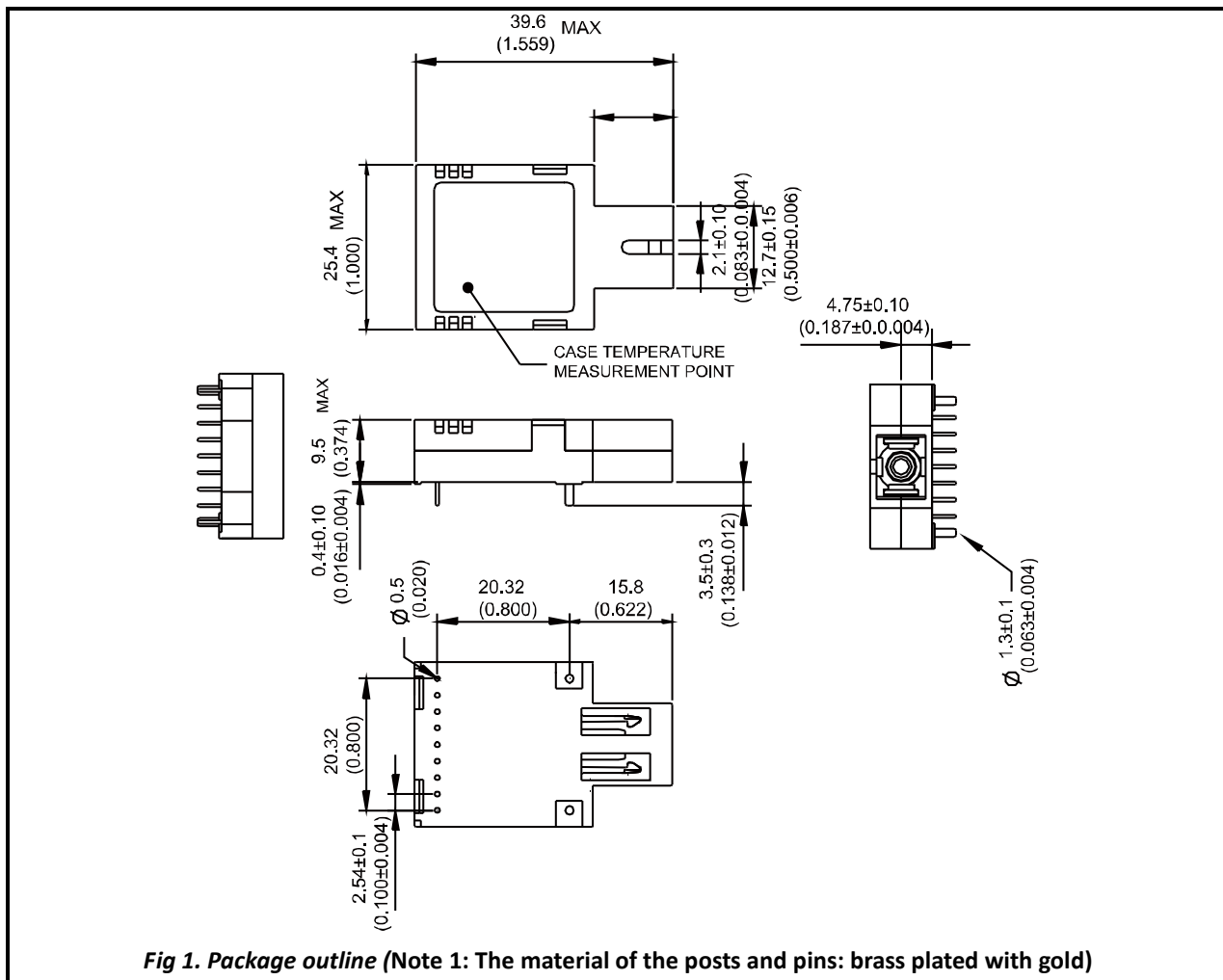
Parameter	Symbol	Min.	Typ.	Max.	Units	
Supply Current	I _{CC}			100	mA	
Power Dissipation	P _{DISS}			0.5	W	
Data Output Voltage (Low)	V _{OL} - V _{CC}	-1.72		-1.64	V	
Data Output Voltage (High)	V _{OH} - V _{CC}	-1.02		-0.92	V	
Data Output Rise Time	t _r			0.5	ns	
Data Output Fall Time	t _f			0.5	ns	
Signal Detect Output Voltage (Low)	for -P1	V _{OL} - V _{CC}	-1.72		-1.64	V
Signal Detect Output Voltage (High)		V _{OH} - V _{CC}	-1.02		-0.92	V
Signal Detect Output Voltage (Low)	for -T2	V _{OL}	0		0.5	V
Signal Detect Output Voltage (High)		V _{OH}	V _{CC} -0.8		V _{CC}	V
Signal Detect Output Rise Time	tr		0.18	0.22	ns	
Signal Detect Output Fall Time	tf		0.18	0.22	ns	
Power Supply Noise Rejection	PSNR		50		mV	

Transmitter Optical Characteristics (T_A = -40°C to 85°C)

Parameter	Symbol	Min.	Typ.	Max.	Units	
Output Optical Power (BOL) 9/125 μm, NA = 0.275 Fiber	P _O	20km	-9	-3	dBm	
		40km	-3	+2		
Optical Extinction Ratio	ER	10			dB	
Output Optical Power at Logic Low State	P _{O(L)}		-55	-45	dBm	
Output Eye Pattern	Compliant with IEEE 802.3z eye mask.					
Center Wavelength	λ _c	For S1250-BD1-X3XX-P1(-Z)	1270	1310	1380	nm
		For S1250-BD1-X5XX-P1(-Z)	1480	1550	1580	
Optical Spectral Width (FWHM)	Δλ	For S1250-BD1-F3XX-P1(-Z)			9.4	nm
		For S1250-BD1-DXXX-P1(-Z)			1.0	
Optical Spectral Width (RMS)	Δλ	For S1250-BD1-F3XX-P1(-Z)			4.0	nm
		For S1250-BD1-DXXX-P1(-Z)			1.0	
Optical Rise Time	tr			0.26	ns	
Optical Fall Time	tf			0.26	ns	


Receiver Optical Characteristics ($T_A = -40^{\circ}\text{C}$ to 85°C)

Parameter	Symbol	Min.	Typ.	Max.	Units
Minimum Input Optical Power at Window Edge	$P_{I(\min)}$	20km	-22	-20	dBm
		40km	-24	-22	
Minimum Input Optical Power at Eye Center	$P_{I(\min)}$	20km	-23	-21	dBm
		40km	-25	-23	
Maximum Input Optical Power	$P_{I(\max)}$			0	dBm
Receiving Wavelength	$\Delta\lambda$	For S1250-BD1-X3XX-P1(-Z)	1480	1600	nm
		For S1250-BD1-X5XX-P1(-Z)	1260	1360	
Signal Detect Asserted	P_A			-20	dBm
Signal Detect Deasserted	P_D	-35			dBm
Signal Detect Hysteresis	$P_A - P_D$	1.0			dB
Signal Detect Assert Time (off to on)	t_{sda}	0	2	100	μs
Signal Detect Deassert Time (on to off)	t_{sdd}	0	5	350	μs

Package outline DIMENSIONS ARE IN MILLIMETERS (INCHES).


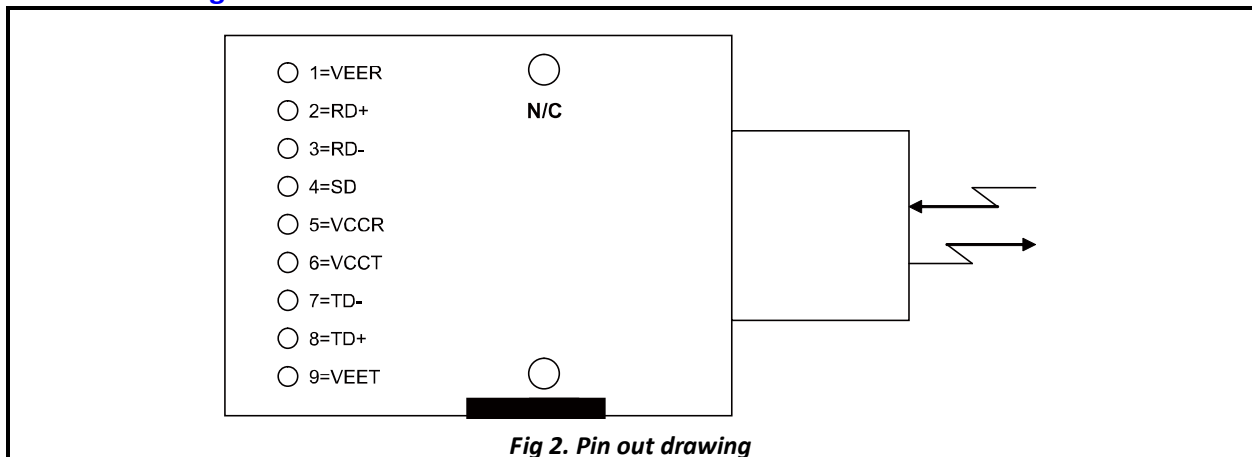


Pin Assignment

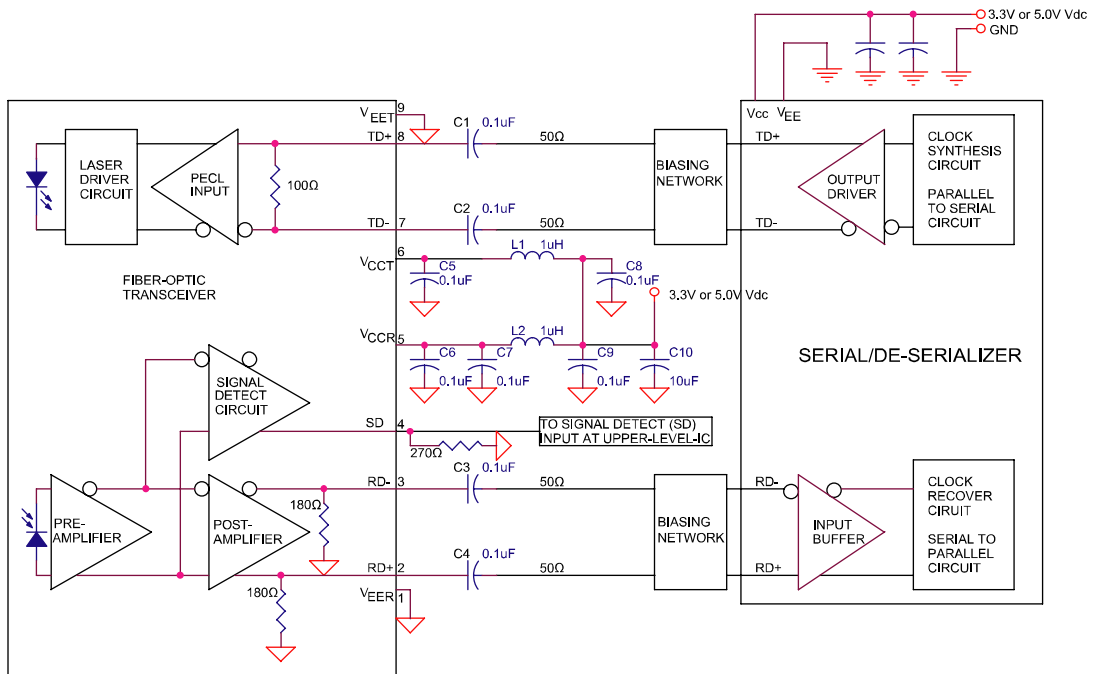
The pin out diagram and the detailed description of each pin is listed in the following table and figure.

Pin	Name	Description
1	VEER	Receiver Signal Ground. Connect to the receiver ground plane.
2	RD+	Receiver Differential Data Output Positive. Terminate with standard LVPECL or PECL interface circuit at the input of following device. (See the recommended circuit.)
3	RD-	Receiver Differential Data Output Negative. Terminate with standard LVPECL or PECL interface circuit at the input of following device. (See the recommended circuit.)
4	SD	Signal Detect Output. Terminate with standard interface circuit at the input of following device. (See the recommended circuit.)
5	VCCR	Receiver Power Supply. Connect to the receiver +3.3V or +5.0V power supply via the recommended filter circuit.
6	VCCT	Transmitter Power Supply. Connect to the transmitter +3.3V or +5.0V power supply via the recommended filter circuit.
7	TD-	Transmitter Differential Data Input Negative. Terminate with standard LVPECL or PECL interface circuit at the input. (See the recommended circuit.)
8	TD+	Transmitter Differential Data Input Positive. Terminate with standard LVPECL or PECL interface circuit at the input. (See the recommended circuit.)
9	VEET	Transmitter Signal Ground. Connect to the transmitter signal ground plane.

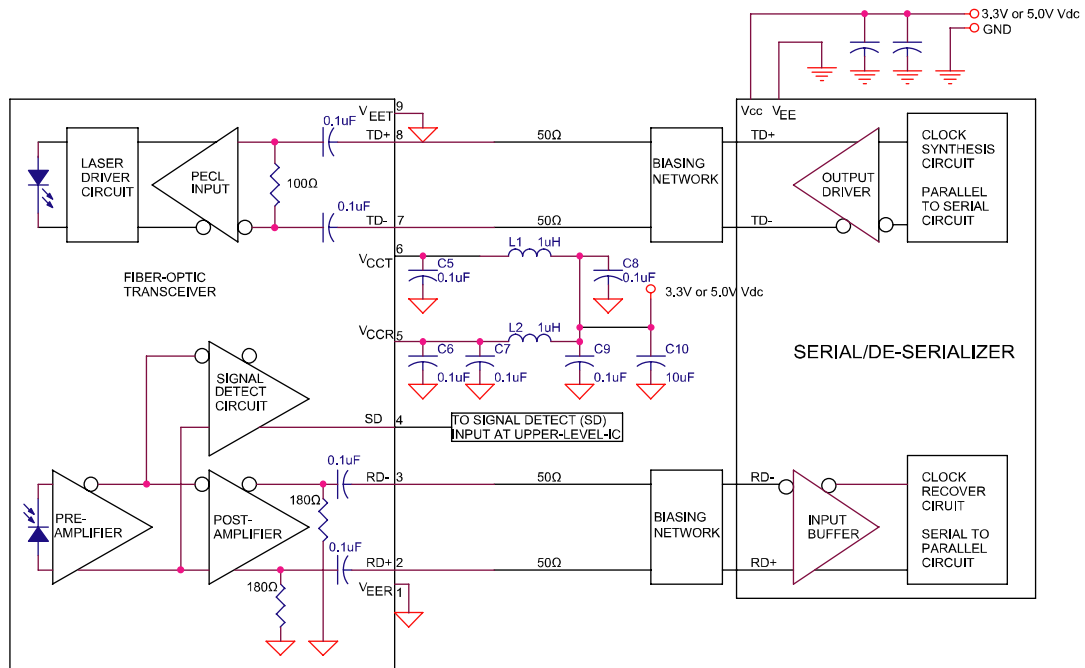
Pin Out Drawing



Design Guide (Recommend Circuit)



FOR S1250-BD1-XXA-P1(-Z)



FOR S1250-BD1-XXA-T2(-Z)

Fig. 3. Recommended application circuit.