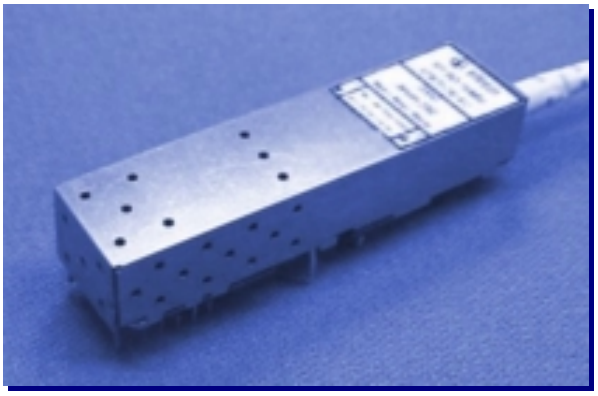
Preliminary Data Sheet



V23870-Ax311-xx00(*)
V23870-Ax312-xx00(*)

Bi-Directional Pigtail SFF Transceiver
155 Mb/s, 1550 nm Tx / 1310 nm Rx

FEATURES

- **Integrated Wavelength Division Multiplexer (WDM)**
- **Bi-Directional Transmission in 2nd and 3rd optical window**
- **Single fiber solution, singlemode fiber pigtail with different connector options**
- **Data rate up to 155 Mbit/s**
- **FP Laser Diode with Multi-Quantum Well structure, wavelength 1550 nm**
- **Class 1 Laser Product**
- **Incorporated laser driver and PIN-TIA Receiver with post-amplifier**
- **2x5 Small Form Factor Package with Multisource Footprint**

Absolute Maximum Ratings

Operating case temperature
- V23870-Ax311-xx00 ..... 0 to 70 °C
- V23870-Ax312-xx00 ..... -40 to 85 °C

Storage Ambient Temperature ..... -40 to 85 °C
Supply voltage ..... 3.53 V
Soldering Conditions Temp/Time
- Iron Soldering only ..... 400 °C / 10 s

***) Ordering Information**

V23870 - Ax31x - xx00

Average Launched Power:
1: -8 ... -14 dBm
3: -3 ... -9 dBm

Temperature Range:
1: 0 ... +70 °C
2: -40 ... +85 °C

Connector:
A: Pigtail Only
B: SC
C: SC/APC 8°
F: MU
H: MU-J
K: LC

Coupling:
(Tx/Rx, Signal Detect)
1: AC/AC, PECL SD
2: DC/DC, PECL SD
5: AC/AC, TTL SD
6: DC/DC, TTL SD

DESCRIPTION

The Infineon BIDI® transceiver – part of Infineon's Small Form Factor transceiver family – is based on the Physical Medium Depend (PMD) sublayer and baseband medium.

Infineon's BIDI-TRX is designed to handle multiple data rates and can be designed into Fast Ethernet, FDDI, Fiber Channel, ATM-155, SDH STM-1, SONET OC-3, CCTV and other applications as well as different FTTx applications according to the 100 Mbps EFM standard (IEEE 802.3ah). It is suitable for both, short haul applications and distances of 20 km and beyond.

The appropriate fiber optic cable is the 9µm singlemode fiber pigtail with different connector options.

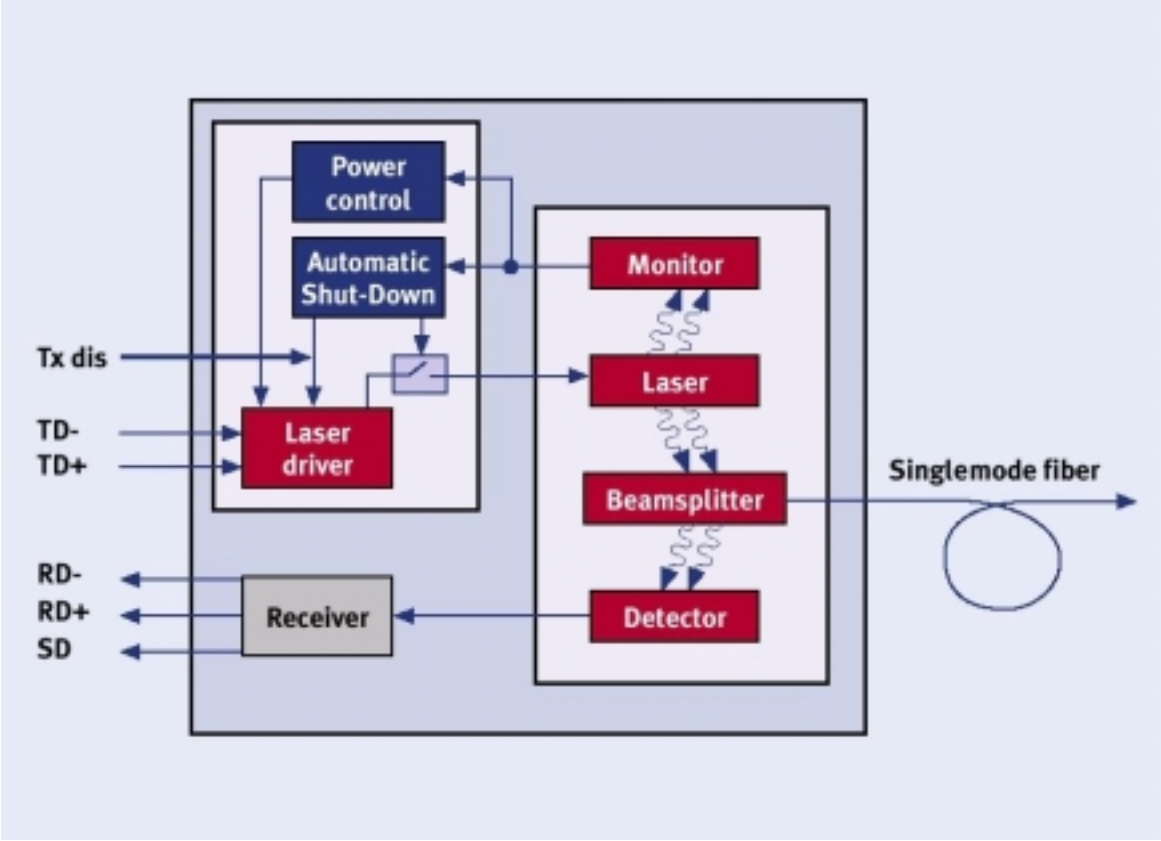
The Infineon BIDI transceiver is a single unit comprised of a transmitter, a receiver, WDM filter or beam splitter, and a singlemode fiber pigtail. This design frees the customer from many alignment and PC board layout concerns.

This transceiver operates at 155Mb/s from a single power supply (+3.3 V). The full differential data inputs and outputs are PECL and LVPECL compatible.

Functional Description of 2x5 Pin Row Transceiver

This transceiver is designed to transmit and receive serial data via a singlemode cable.

Functional Diagram



The receiver component converts the optical serial data into PECL compatible electrical data (RD and RDnot). The Signal Detect (SD, active high) shows whether an optical signal is present.

The transmitter converts PECL compatible electrical serial data (TD and TDnot) into optical serial data. Data lines are differentially 100Ω terminated.

The transmitter contains a laser driver circuit that drives the modulation and bias current of the laser diode. The currents are controlled by a power control circuit to guarantee constant output power of the laser over temperature and aging.

The power control uses the output of the monitor PIN diode (mechanically built into the laser coupling unit) as a controlling signal, to prevent the laser power from exceeding the operating limits.

Single fault condition is ensured by means of an integrated automatic shutdown circuit that disables the laser when it detects laser fault to guarantee the laser Eye Safety.

The transceiver contains a supervisory circuit to control the power supply. This circuit makes an internal reset signal whenever the supply voltage drops below the reset threshold. It keeps the reset signal active for at least 140 milliseconds after the voltage has risen above the reset threshold. During this time the laser is inactive.

The laser can be disabled by the TxDis input.

Technical Data

The electro-optical characteristics described in the following tables are valid only for use under the recommended operating conditions.

Recommended Operating Conditions	Symbol	Min.	Typ.	Max.	Unit
Operating Temperature Range at Case[1]	T_C	0		+70	°C
Operating Temperature Range at Case[2]	T_C	-40		+85	°C
Power Supply Voltage	V_{CC}-V_{EE}	3.1	3.3	3.53	V
Transmitter					
Data Input Differential Voltage	V_{DIFF}	250		1600	mV
Receiver					
Input Center Wavelength	λ_C	1270		1350	nm

[1] For V23870-Ax311-xx00
[2] For V23870-Ax312-xx00

Transmitter	Symbol	Min.	Typ.	Max.	Unit
Average Launched Power[3]	$P_{out,max}$	-9		-3	dBm
Average Launched Power[4]	$P_{out,max}$	-14		-8	dBm
Emission wavelength center of range[5]	λ	1510	1550	1590	nm
Spectral bandwidth (RMS)	σ_λ			3.0	nm
Temperature coefficient of emission wavelength	$\Delta\lambda(T)$			0.5	nm/K
Extinction Ratio (Dynamic)	ER	8.5			dB
Jitter (pkpk)	J_{PP}			1	ns
Rise Time (20% - 80%)[6]	t_R			2.5	ns
Fall Time (20% - 80%)[5]	t_F			2.5	ns
Eye diagram	ITU G.957 mask pattern				
RIN Noise	RIN			-120	dB/√Hz
Reset Threshold[7]	V_{TH}	2.5	2.75	2.99	V
Reset Timeout[7]	t_{RES}	140	240	560	ms
Power on Delay	t_{PWR_ON}	88	111	140	ms
Shut Off Time for TxDis	t_{DIS}			6	ms
Max Tx Supply Current	I_{TX}	90		135	mA

[3] For V23870-A331x-xx00 and into single mode fiber, 9 µm diameter
[4] For V23870-A131x-xx00 and into single mode fiber, 9 µm diameter
[5] $P_{opt} = P_{out,max}$ at T=25°C
[6] Rise and fall times are measured with the OC-3 filter ON
[7] Laser power is shut down if power supply is below V_{TH} and switch on if power supply is above V_{TH} after t_{RES}.

Receiver	Symbol	Min.	Typ.	Max.	Unit
Receiving wavelength center of range[8]	λ_R	1270	1310	1350	nm
Sensitivity (Average Power)[9]	P_{IN}			-30	dBm
Saturation (Average Power)	P_{SAT}	-3.0			dBm
Signal Detect Assert Level[10]	P_{SDA}			-30.5	dBm
Signal Detect Deassert Level[11]	P_{SDD}	-41			dBm
Signal Detect Hysteresis	P_{SDA}-P_{SDD}	0.5	4	6	dB
Signal Detect Assert Time	t_{ASS}			100	µs
Signal Detect Deassert Time	t_{DAS}			350	µs
Data Output Differential Voltage[12]	V_{DIFF}	0.4	0.8	1.0	V
Rise/Fall Time	t_R; t_F			1.5	ns
S/X Ratio	SX	10			dB
Max Rx Supply Current[13]	I_{RX}		60	130	mA

Module Electro-Optical Characteristics	Symbol	Min.	Typ.	Max.	Unit
Optical Isolation[14]	ORL	14			dB

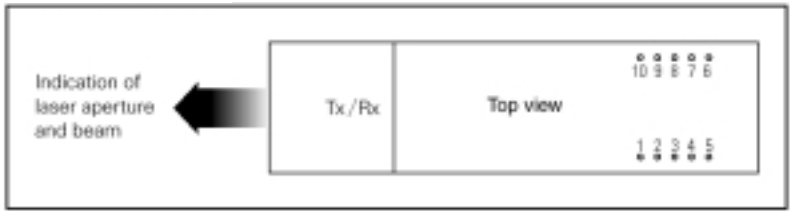
[8] $P_{opt} = P_{out,max}$ at T=25°C
[9] Minimum average optical power at which the BER is less than1x10E–10. Measured with a 10^{23} –1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3, and ITU G.957.
[10] An increase in optical power above the specified level will cause the SIGNAL DETECT output to switch from a Low state to a High state.
[11] A decrease in optical power below the specified level will cause the SIGNAL DETECT to change from a High state to a Low state.
[12] AC/AC for data. Load 50Ω to GND or 100Ω differential. For dynamic measurement a tolerance of 50mV should be added.
[13] Supply current excluding Rx output load.
[14] Source wavelength is 1310 nm, BiDi Tx and Rx is Off

Fiber Data
The mechanical fiber characteristics are described in the following table.

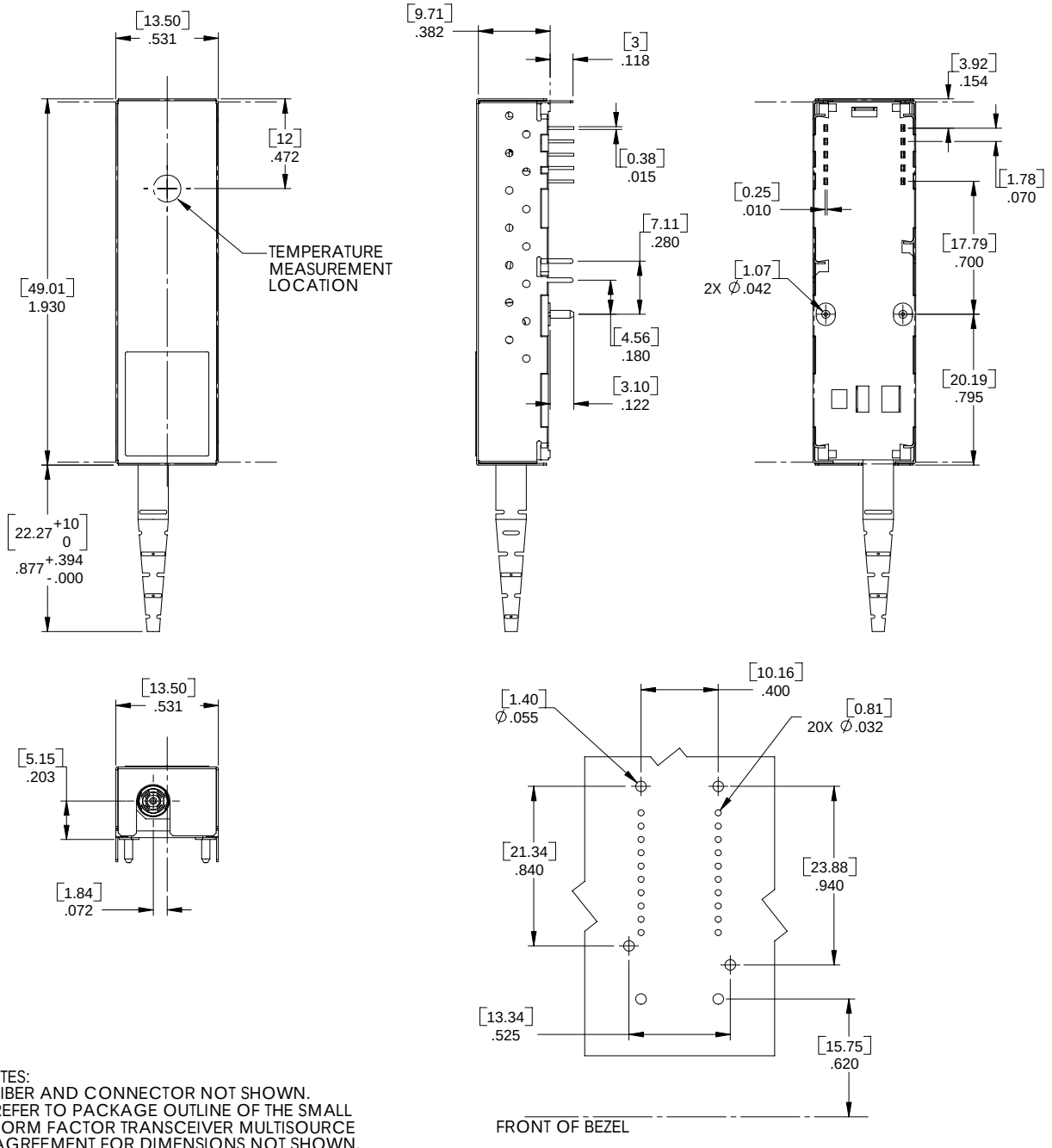
Fiber Characteristics	Min.	Typ.	Max.	Unit
Mode Field Diameter	8	9	10	µm
Cladding Diameter	123	125	127	µm
Mode Field/Cladding Concentricity Error			1	µm
Cladding Non-circularity			2	%
Mode Field Non-circularity			6	nm
Cut off Wavelength	1270			nm
Jacket Diameter	0.8		1	mm
Bending Radius	30			mm
Tensile Strength Fiber Case	5			N
Length	0.8		1.2	m

Pin Description

Pin Name		Level/ Logic	Pin#	Description
V_{EEr}	Receiver Signal Ground	N/A	1	
V_{CCr}	Receiver Power Supply	N/A	2	
SD	Signal Detect	see options on page 1	3	Normal Operation: Logic “1” Output, represents that light is present at receiver input Fault Condition: Logic “0” Output Recommended Termination of 510 Ω to Vee_r for PECL
RD–	Received Data Out Not	PECL	4	
RD+	Received Data Out	PECL	5	
V_{CCt}		N/A	6	Transmitter Power Supply
V_{EEt}		N/A	7	Transmitter Signal Ground
TxDis	Transmitter Disable/Enable	TTL-Input	8	A low/open signal switches the laser on. A high signal switches the laser off.
TD+	Transmit Data	PECL	9	Transmitter Data In
TD–	Transmit Data Not	PECL	10	Transmitter Data In Not
MS	Mounting Studs	N/A	MS1 MS2	Mounting Studs are provided for transceiver mechanical attachment to the circuit board.
HL	Housing Leads	N/A	T1 T2 T3 T4	The transceiver Housing Leads are provided for additional signal grounding. The holes in the circuit board must be included and be tied to signal ground.



Technical drawings



NOTES:
1. FIBER AND CONNECTOR NOT SHOWN.
2. REFER TO PACKAGE OUTLINE OF THE SMALL FORM FACTOR TRANSCEIVER MULTISOURCE AGREEMENT FOR DIMENSIONS NOT SHOWN.

Circuit Board Layout
Recommended PCB Thickness 0.1 (2.54) max.

EYE SAFETY

This laser based singlemode transceiver is a Class 1 product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. To meet laser safety requirements the transceiver shall be operated within the maximum operating limits.

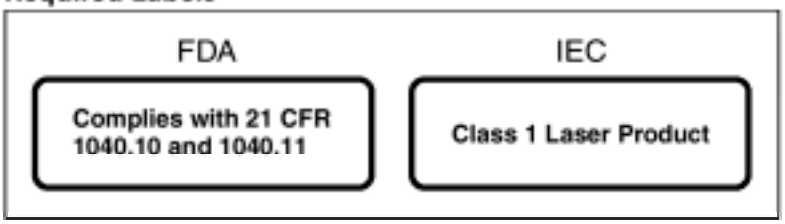
Caution

All adjustments have been made at the factory prior to shipment of the devices. No maintenance or alteration to the device is required.

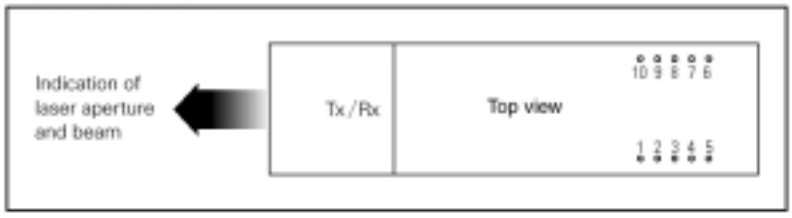
Tampering with or modifying the performance of the device will result in voided product warranty.

Note: Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing," and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).

Required Labels



Laser Emission



APPLICATION NOTES

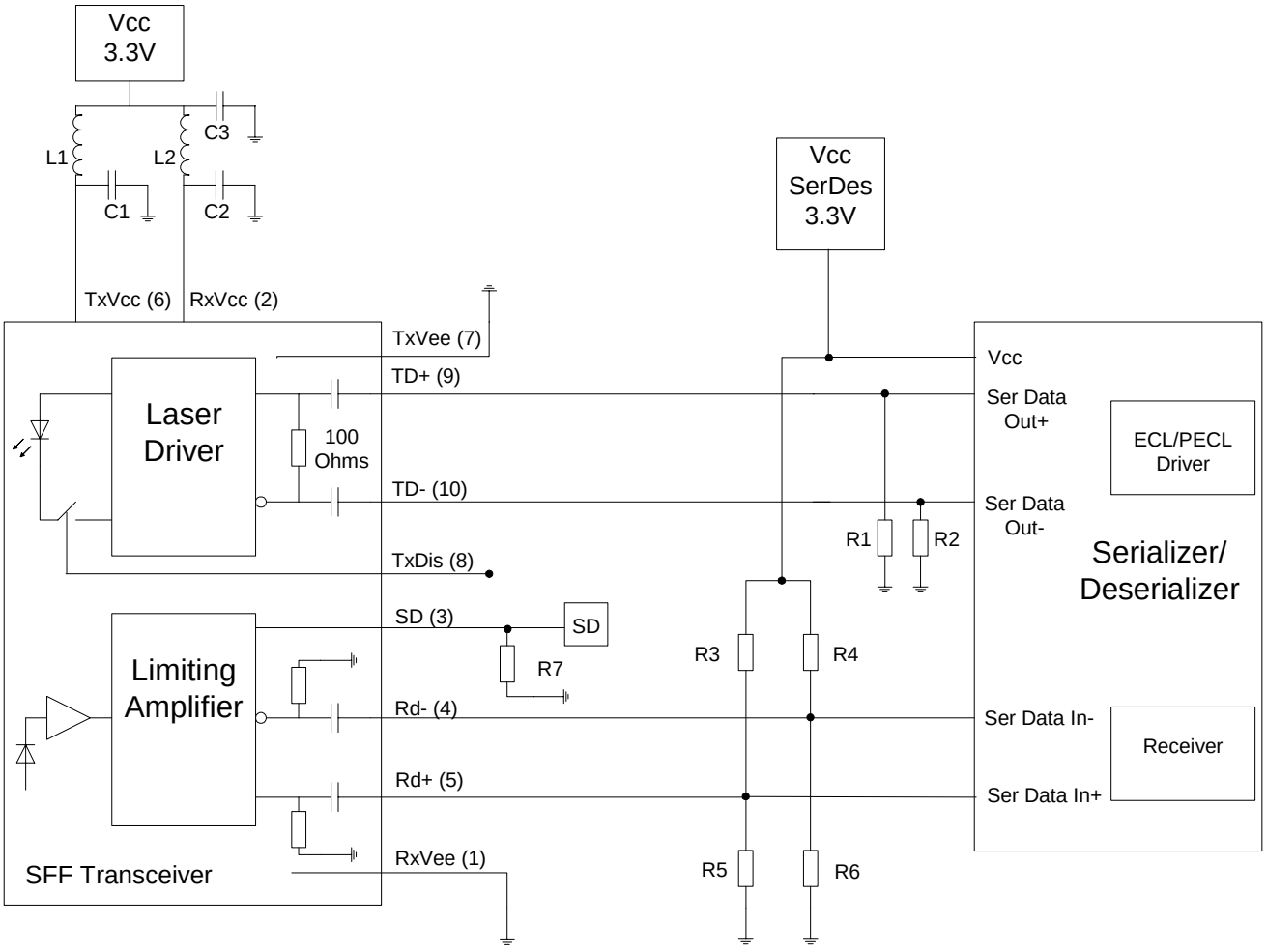
Transceiver Assembly/Soldering

<u>Recommended requirements</u>

- **avoid temperatures on fiber and connector above 85°C**
- **only iron soldering permitted**
- **single pin or simultaneous pin soldering valid**

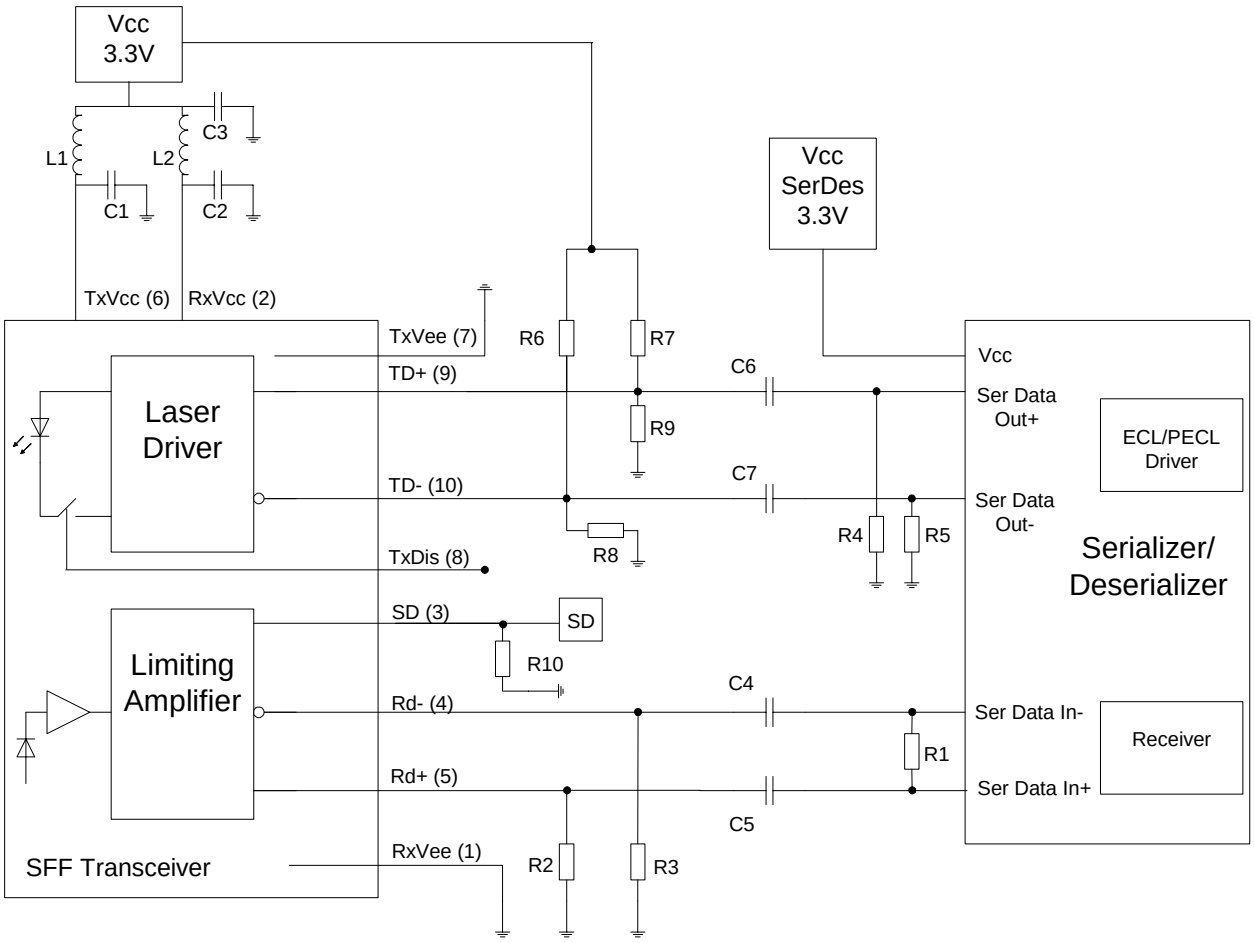
Type	Conditions	Standard
Iron - soldering	iron tip temp. < 400 °C solder time < 10 sec	IEC 68 2-20 test Tb, methode 2

AC/AC coupling



L1, L2: 1...4.7 µH
C1, C2, C3: 4.7...10 µF
R1, R2: biasing of outputs depending on Serializer
R3, R4: 127 Ohms
R5, R6: 80 Ohms
R7: 510 Ohms for PECL signal detect, open for TTL
Place R1/2/3/4/5/6 as close to SerDes chip as possible

DC/DC coupling



L1, L2: 1...4.7 µH
C1, C2, C3: 4.7...10 µF
C4, C5, C6, C7: 100 nF
R1: 100 Ohms
R2, R3: 150 Ohms
R4, R5: biasing of outputs depending on Serializer
R6, R7: 127 Ohms
R8, R9: 80 Ohms
R10: 510 Ohms for PECL signal detect, open for TTL
Place R1/4/5 as close to SerDes as possible
Place R2/3 as close to transceiver as possible