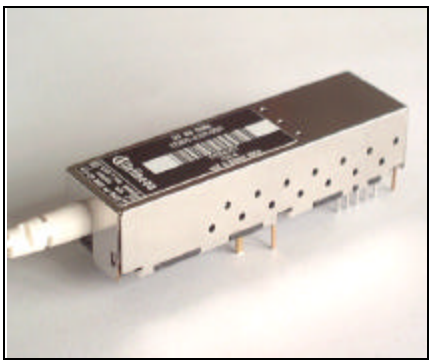
Bi-Directional Pigtail SFF Transceiver
155 Mbit/s, 1310 nm Tx / 1550 nm Rx

V23870-Ax131-xx00
V23870-Ax132-xx00

This BIDI®-TRX is a bi-directional Small Form Factor (SFF) transceiver designed for full-duplex communication over a single fiber. The single fiber concept saves overall system costs by eliminating one fiber, allowing for doubling of capacity without installing new fibers, and simplifying fiber management.



Features

- Single fiber solution saving overall system cost
- Suitable for data rates up to 155 Mbit/s
- Single mode fiber pigtail with different connector options
- Industry standard 2x5 SFF MSA footprint
- Integrated WDM filter for dual wavelength Tx/Rx operation at 1310/1550 nm
- 1310 nm FP laser diode transmitter with laser driver
- 1550 nm PIN diode receiver with pre- and post-amplifier
- 3.3 V power supply
- Class 1 laser product

Applications

- Access Networks, e.g. media converters for Fiber-In-The-Loop (FITL), Point-to-Point (P2P), and Passive Optical Networks (PON)
- Inter-system communication between Servers, Switches, Routers, Add-Drop-Multiplexers, Cross Connects, etc. in Central Offices, Data Storage Networks, High Speed Server Farms, etc.
- Digital Video and Closed Circuit Television (CCTV) applications for Transport, Traffic, and Security

For ordering information see next page.

Ordering Information

V23870 - Ax13x - xx00

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

Temperature Range:
1: 0 ... +70 °C(@ Ambient)
2: -40 ... +85 °C (@ Case)

Connector:
A: Pigtail without Connector
B: SC/PC 0°
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

Pin Configuration

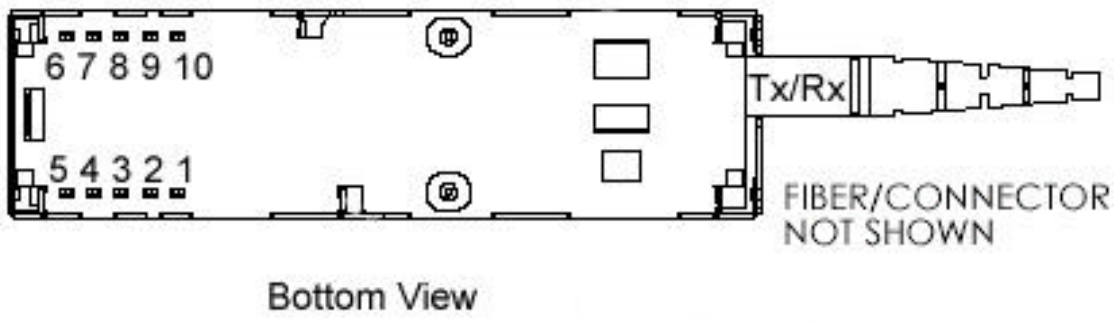


Figure1

Pin Description

Pin No.	Symbol	Level/Logic	Function	Description
1	V_{EEr}	N/A	Receiver Signal Ground	
2	V_{CCr}	N/A	Receiver Power Supply	
3	SD	see options on Page 2	Signal Detect	Normal operation: Logic 1 output, represents that light is present at receiver input. Fault condition: Logic 0 output. Recommended termination of 510 Ω to V_{EEr} for PECL.
4	RD–	PECL	Received Data Out Not	
5	RD+	PECL	Received Data Out	
6	V_{CCt}	N/A		Transmitter power supply
7	V_{EEt}	N/A		Transmitter signal ground
8	TxDis	TTL Input	Transmitter Disable/ Enable	A low/open signal switches the laser on. A high signal switches the laser off.
9	TD+	PECL	Transmit Data	Transmitter Data In
10	TD–	PECL	Transmit Data Not	Transmitter Data In Not
MS1 MS2	MS	N/A	Mounting Studs	Mounting Studs are provided for transceiver mechanical attachment to the circuit board.
T1 T2 T3 T4	HL	N/A	Housing Leads	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.

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, and a singlemode fiber pigtail. This design frees the customer from many alignment and PC board layout concerns.

This transceiver operates at 155 Mbit/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 single mode cable.

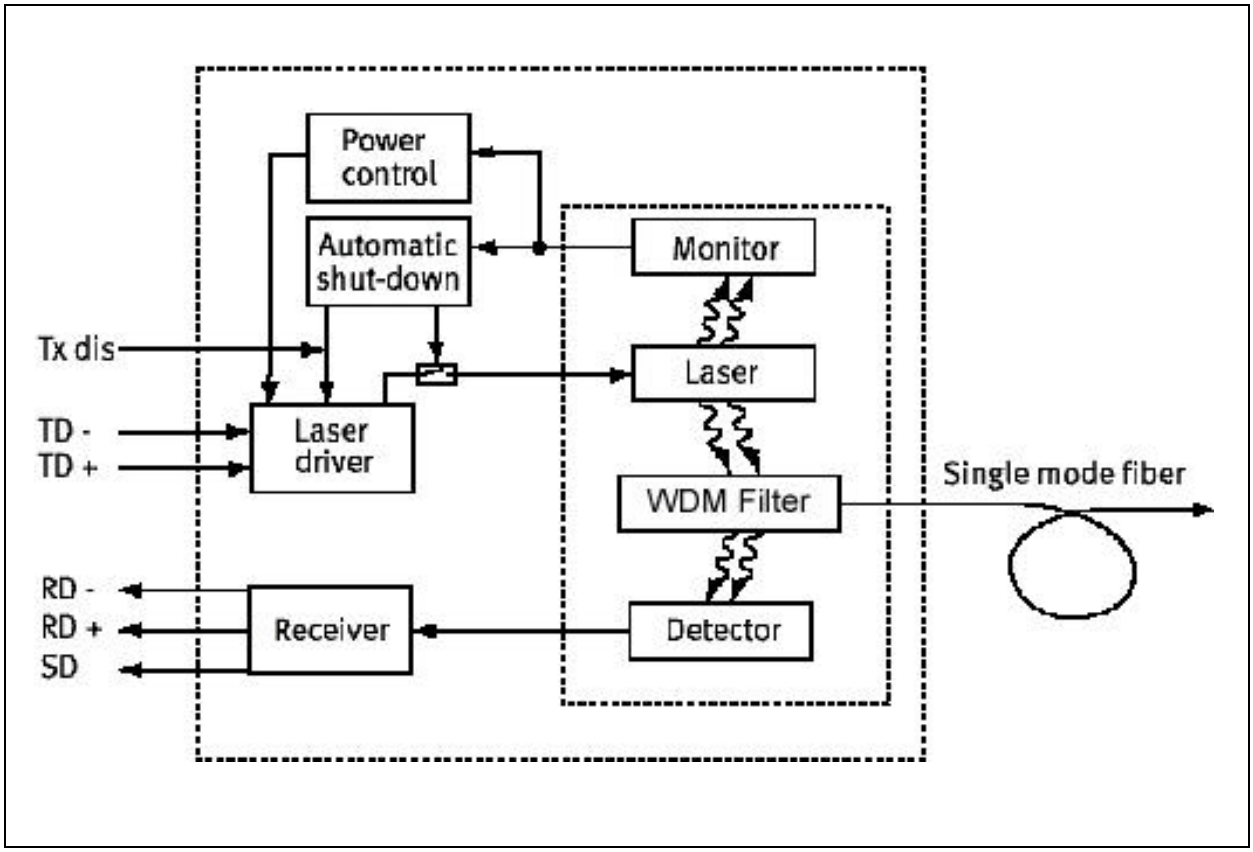


Figure2 Functional Diagram

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

The transmitter converts PECL compatible electrical serial data (TD+ and TD-) into optical serial data. Data lines are differentially 100 Ohm 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

Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Storage Ambient Temperature		–40	85	°C
Power Dissipation (without Rx load) V23870-Ax131-xx00 V23870-Ax132-xx00			 1.0 1.2	W
Power Supply Voltage			5	V
Soldering Conditions Temp/Time Iron Soldering Only			400/10	°C/s

Recommended Operating Conditions

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Operating Temperature Range at Ambient[1)]	T_A	0		+70	°C
Operating Temperature Range at Case[2)]	T_C	–40		+85	
Power Supply Voltage	V_{CC}–V_{EE}	3.1	3.3	3.53	V

1) For V23870-Ax131-xx00.
2) For V23870-Ax132-xx00.

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

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Average Launched Power[1]	$P_{out, max}$	–9		–3	dBm
Average Launched Power[2]		–14		–8	
Emission Wavelength Range	λ	1260		1360	nm
Spectral Bandwidth (RMS)	σ_λ			3.0	nm
Extinction Ratio (Dynamic)	ER	8.5			dB
Jitter (pkpk)	J_{PP}			1	ns
Rise Time (20% - 80%)[3]	t_R			2.5	ns
Fall Time (20% - 80%)[3]	t_F			2.5	ns
Eye Diagram	ITU-T G.957 mask pattern				
Data Input Differential Voltage	V_{DIFF}	250		1600	mV
Reset Threshold[4]	V_{TH}	2.5	2.75	2.99	V
Reset Time-out[4]	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[5]	I_{TX}			135	mA
Max. Tx Supply Current[6]				185	

[1] For V23870-A313x-xx00 and into single mode fiber, 9 µm diameter.
[2] For V23870-A113x-xx00 and into single mode fiber, 9 µm diameter.
[3] Rise and fall times are measured with the OC-3 filter ON.
[4] 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}.
[5] For V23870-Ax131-xx00.
[6] For V23870-Ax132-xx00.

Receiver Electro-Optical Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Receiving Wavelength Range	λ_R	1480		1600	nm
Sensitivity (Average Power)[1]	P_{IN}			–30	dBm
Saturation (Average Power)	P_{SAT}	–3.0			dBm
Signal Detect Assert Level[2]	P_{SDA}			–30.5	dBm
Signal Detect Deassert Level[3]	P_{SDD}	–41			dBm
Signal Detect Hysteresis	$P_{SDA} - P_{SDD}$	0.5	4	6	dB
PECL Data Voltage Out High[4]	V_{OH}-V_{CC}	-1.200		-0.820	V
PECL Data Voltage Out Low[4]	V_{OL}-V_{CC}	-1.900		-1.580	V
TTL Data Voltage Out High[5]	V_{OH}-V_{CC}	2.4		Vcc	V
TTL Data Voltage Out Low[4]	V_{OL}-V_{CC}	Vee		0.5	V
Data Output Differential Voltage[6]	V_{DIFF}	0.5	0.8	0.93	V
Signal Detect Assert Time	t_{ASS}			100	µs
Signal Detect Deassert Time	t_{DAS}			350	µs
Rise/Fall Time (20% - 80%)	t_R, t_F			1.5	ns
S/X Ratio	SX	10			dB
Max. Rx Supply Current[7]	I_{RX}		60	130	mA

[1] 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-T G.957.

[2] 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.

[3] A decrease in optical power below the specified level will cause the Signal Detect to change from a high state to a low state.

[4] DC coupling for data with load of 50 Ω to Vcc-2V

[5] DC coupling for data with load of 50 Ω

[6] AC coupling for data. Load 50 Ω to GND or 100 Ω differential. For dynamic measurement a tolerance of 50 mV should be added.

[7] Supply current excluding Rx output load.

Module Electro-Optical Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Receiver Reflectance[1)]	ORL	14			dB

[1)] Source wavelength is 1550nm, BIDI Tx and Rx is Off.

Fiber Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
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
Jacket Diameter		0.8		1	mm
Bending Radius		30			mm
Tensile Strength Fiber Case		5			N
Length[see Figure 3]	L	0.9		1.1	m

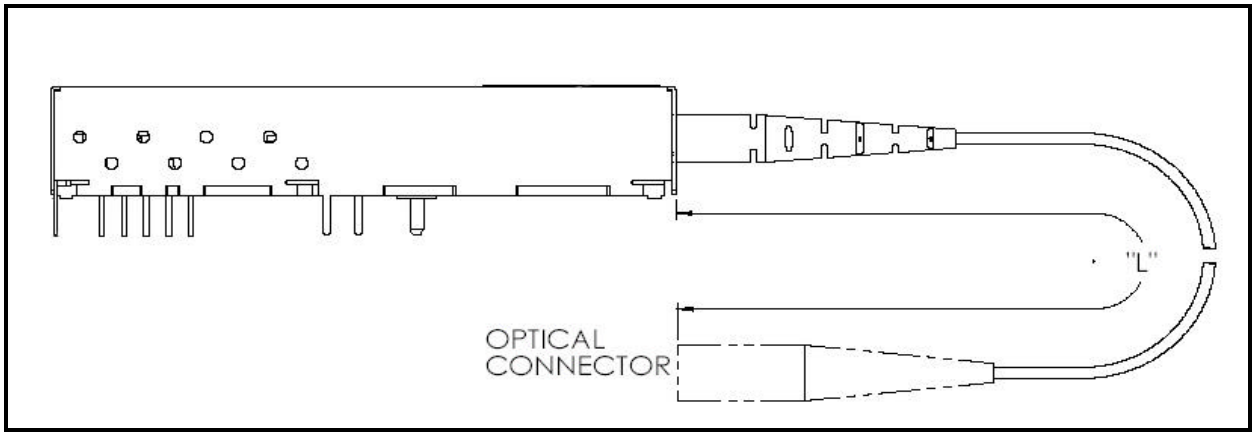


Figure3 Pigtail Length Description

Eye Safety

This laser based single mode 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.

Attention: 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)).

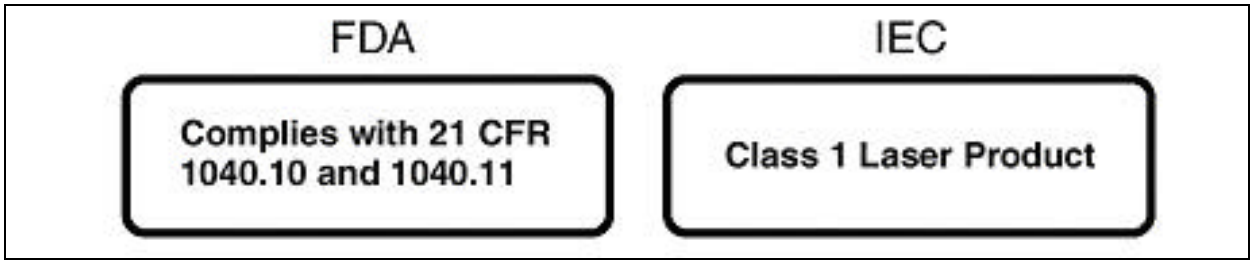


Figure4 Required Labels

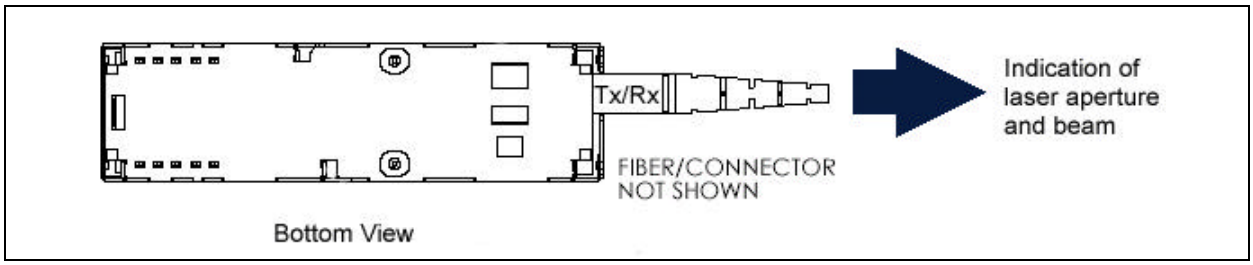
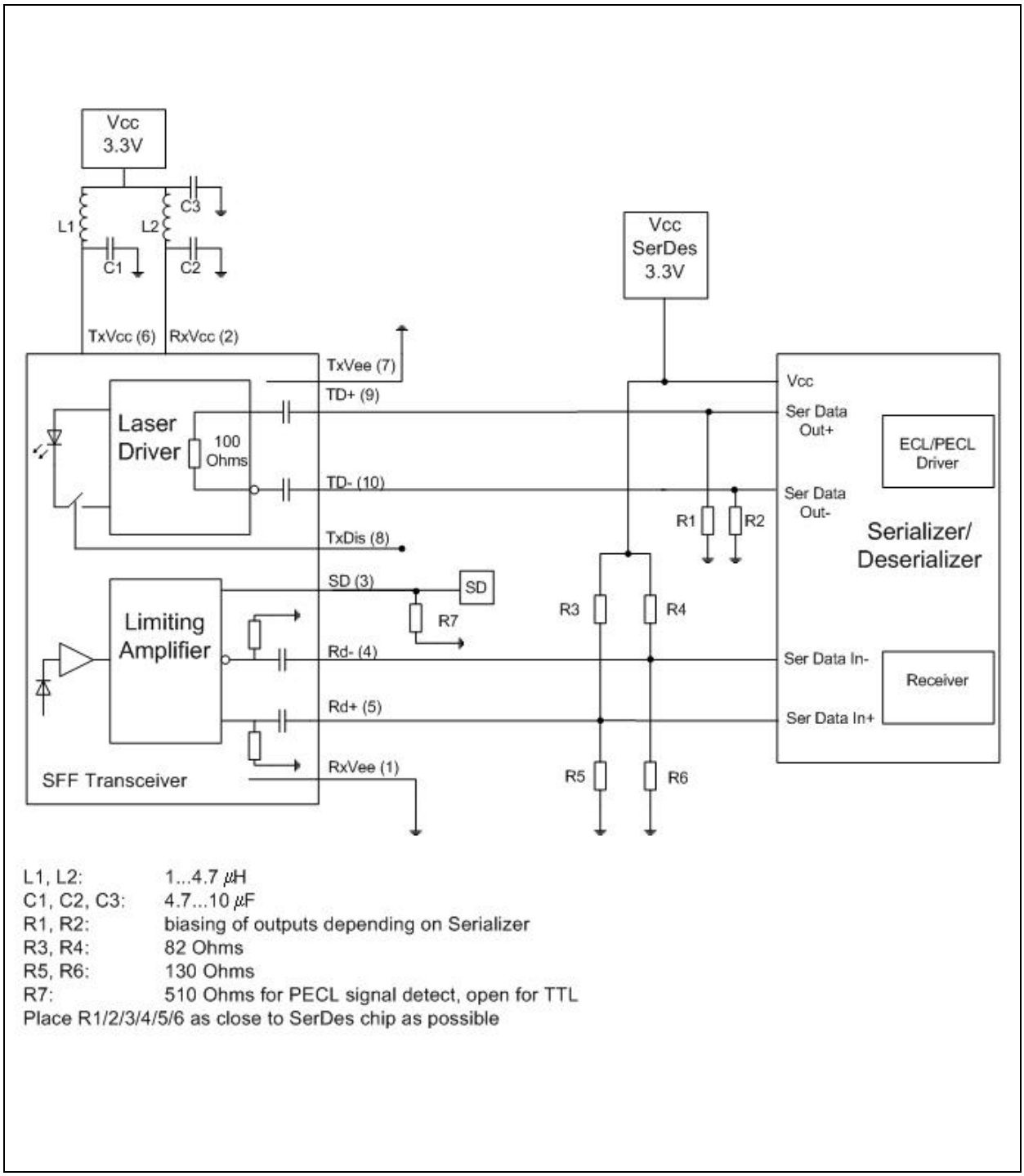


Figure5 Laser Emission

Application Notes

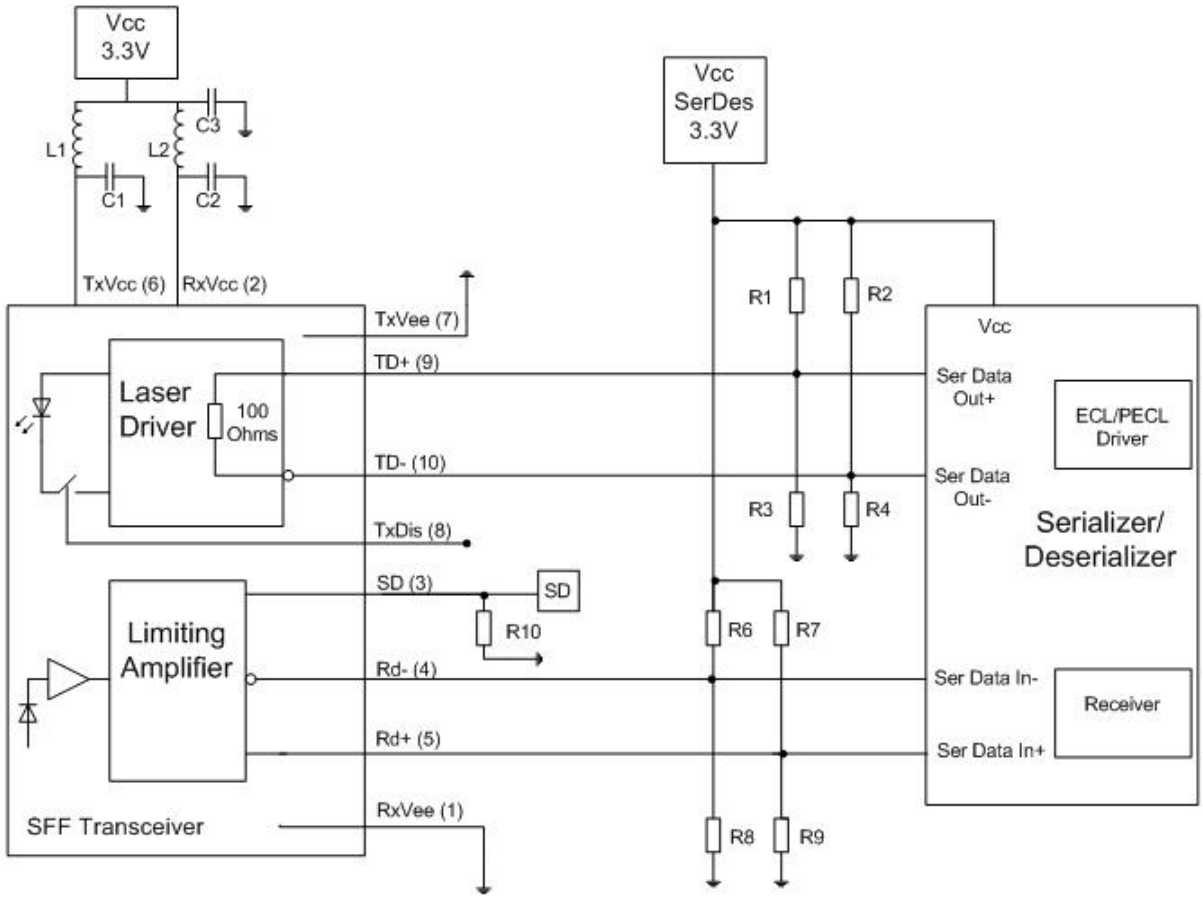
AC/AC Coupling



L1, L2: 1...4.7 µH
C1, C2, C3: 4.7...10 µF
R1, R2: biasing of outputs depending on Serializer
R3, R4: 82 Ohms
R5, R6: 130 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

Figure6

DC/DC Coupling



L1, L2: 1...4.7 µH
C1, C2, C3: 4.7...10 µF
R1, R2 130 Ohms
R3, R4: 82 Ohms
R6, R7: 130 Ohms
R8, R9: 82 Ohms
R10: 510 Ohms for PECL signal detect, open for TTL
Place R1/2/3/4 as close to transceiver as possible
Place R6/7/8/9 as close to SerDes as possible

Figure7

Transceiver Assembly/Soldering

Recommended requirements

- o avoid temperatures on fiber and connector above 85°C
- o only iron soldering permitted
- o 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, method 2

Package Outlines

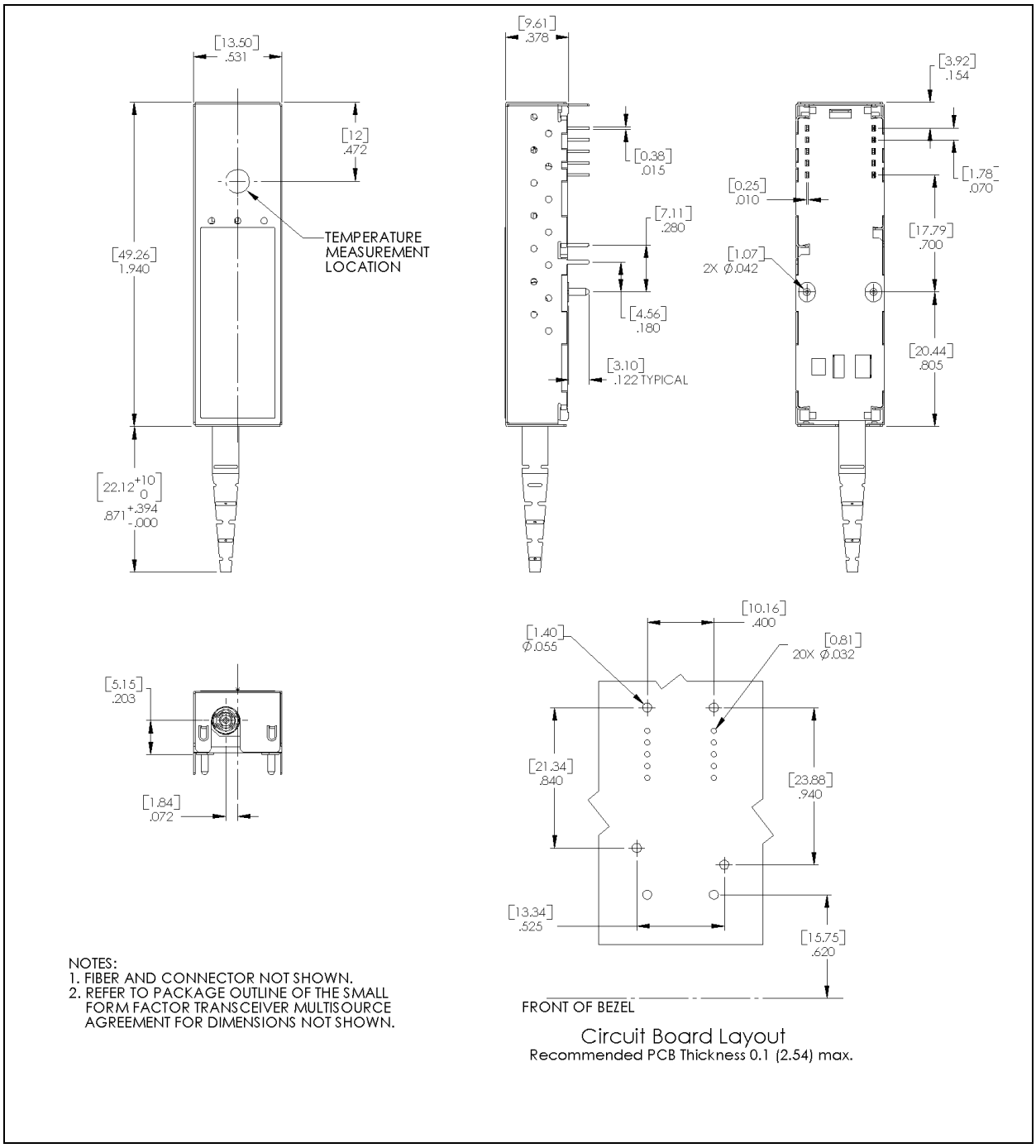


Figure8

V23870-Ax131-xx00
V23870-Ax132-xx00

Revision History: 2003-06-13 DS0

Previous Version:

Page	Subjects (major changes since last revision)
9	Fiber length tolerance
2	Better defined operating temperature condition
all	new datasheet format

For questions on technology, delivery and prices please contact the Infineon Technologies Offices in Germany or the Infineon Technologies Companies and Representatives worldwide: see our webpage at http://www.infineon.com.

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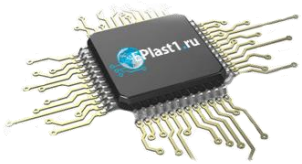
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