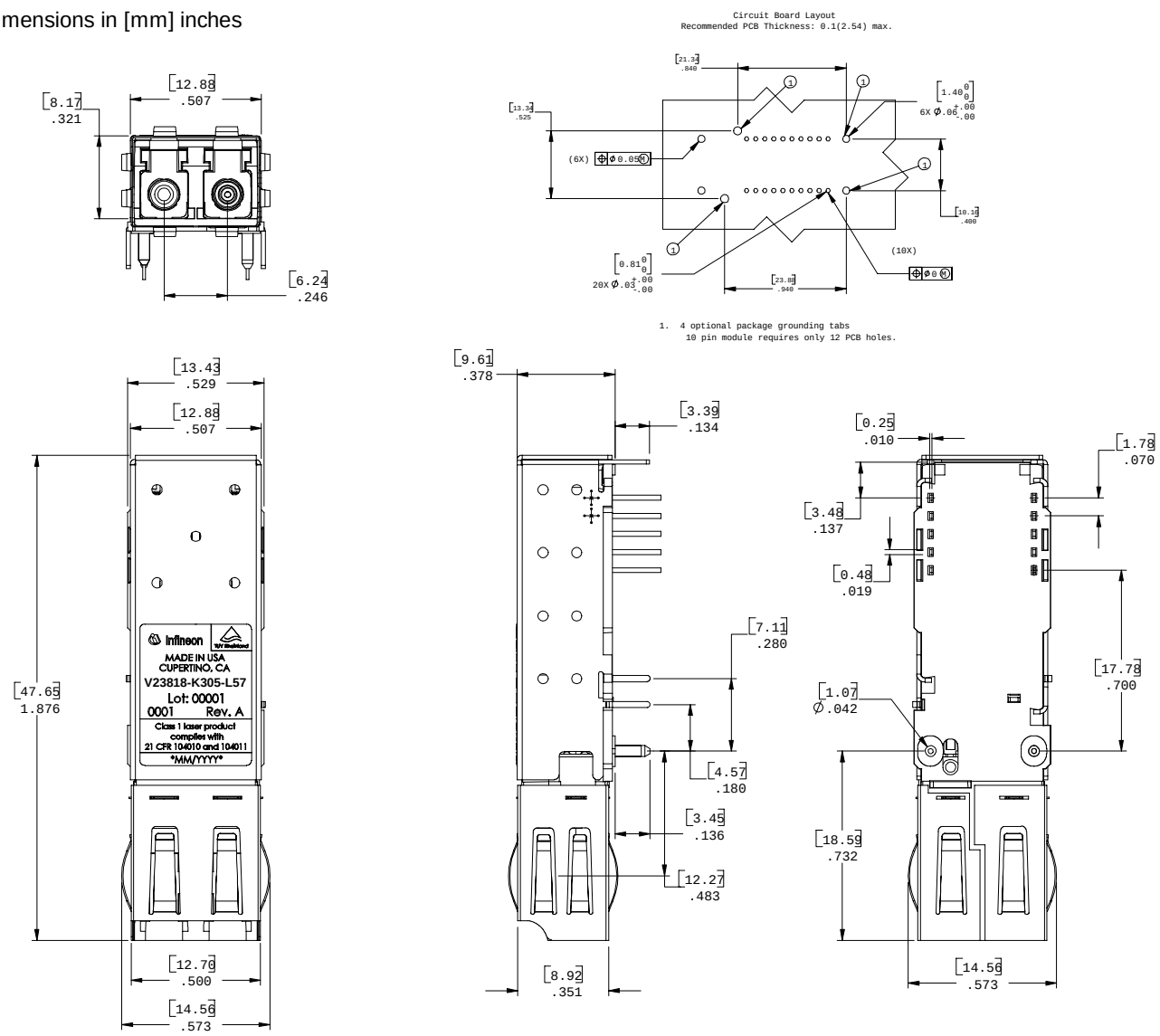
V23818-K305-L17/L57(*)

Small Form Factor
Multimode 850 nm 1.0625 GBd Fiber Channel
1.3 Gigabit Ethernet 2x5 Transceiver
with LC™ Connector

Preliminary

Dimensions in [mm] inches



***) Ordering Information**

Input	Output	Signal detect	Voltage	Part number
DC	DC	TTL	3.3 V	V23818-K305-L17
AC	AC			V23818-K305-L57

LC™ is a registered trademark of Lucent

FEATURES

- **Small Form Factor transceiver**
- **RJ-45 style LC™ connector system**
- **Half the size of SC Duplex 1x9 transceiver**
- **Single power supply (3.3 V)**
- **Extremely low power consumption**
- **PECL and LVPECL differential inputs and outputs**
- **System optimized for 62.5/50 µm graded index fiber**
- **Multisource footprint**
- **Small footprint for high channel density**
- **UL-94 V-0 certified**
- **ESD Class 2 per MIL-STD 883 Method 3015**
- **Compliant with FCC (Class B) and EN 55022**
- **For distances of up to 550 m**
- **Class 1 FDA and IEC laser safety compliant**

Absolute Maximum Ratings

Exceeding any one of these values may destroy the device immediately.

Package Power Dissipation..... 1.5 W
Data Input Levels (PECL) ..... V_{CC}+0.5 V
Differential Data Input Voltage ..... 1.6 V
Operating Ambient Temperature..... 0°C to 70°C
Storage Ambient Temperature..... –40°C to 85°C
Soldering Conditions, Temp/Time
(MIL-STD 883C, Method 2003) ..... 250°C/5.5s
V_{CC} max..... 5.5 V
ECL-Output current data ..... 50 mA

DESCRIPTION

The Infineon Gigabit Ethernet multimode transceiver—part of Infineon Small Form Factor transceiver family—is based on the Physical Medium Depend (PMD) sublayer and baseband medium, type 1000BASE-SX (short wavelength), Fiber channel DC 100-M5-SN-I and 100-M6-SN-I.

The appropriate fiber optic cable is 62.5 µm or 50 µm multimode fiber with LC™ connector.

Operating range for over each optical fiber type

Fiber type	Minimum range (meters)	Typ.
62.5 micron MFF	2 to 260	400
50.0 micron MFF	2 to 550	700
10 micron SFF	Not supported	

The Infineon Gigabit Ethernet multimode transceiver is a single unit comprised of a transmitter, a receiver, and an LC™ receptacle. This design frees the customer from many alignment and PC board layout concerns.

This transceiver supports the LC™ connectorization concept. It is compatible with RJ-45 style backpanels for high end Data Com and Telecom applications while providing the advantages of fiber optic technology.

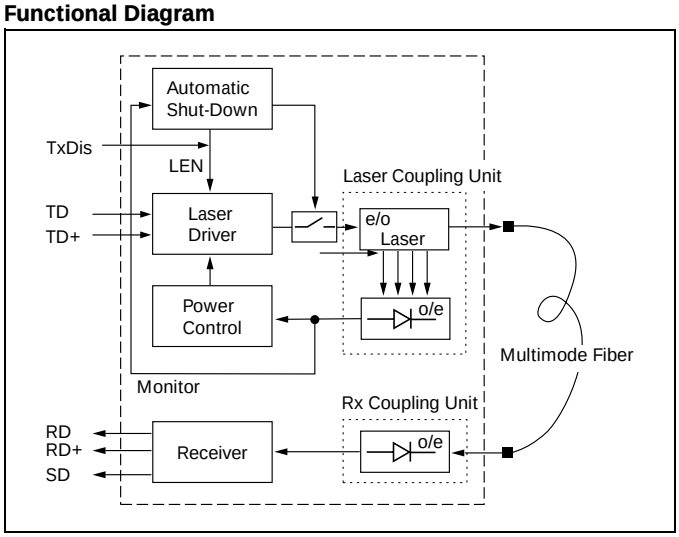
The module is designed for low cost SAN, LAN, WAN, Fiber channel and Gigabit Ethernet applications. It can be used as the network end device interface in mainframes, workstations, servers, and storage devices, and in a broad range of network devices such as bridges, routers, hubs, and local and wide area switches.

This transceiver operates at 1 and 1.25 Gbit/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 serial data via multimode 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 100 Ω 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 transmitter failures. A reset is only possible by turning the power off, and then on again.

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 current can be interrupted 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

Parameter	Symbol	Min.	Typ.	Max.	Units
Case Temperature	T_C	0		70	°C
Power Supply Voltage	V_{CC}–V_{EE}	3.1	3.3	3.5	V
Transmitter					
Data Input High Voltage DC/DC	V_{IH}–V_{CC}	-1165		-880	mV
Data Input Low Voltage DC/DC	V_{IL}–V_{CC}	-1810		-1475	
Data Input Differential Voltage AC/AC	V_{DIFF}	250		1600	
Receiver					
Input Center Wavelength	λ_C	770		860	nm

Transmitter Electro-Optical Characteristics

Transmitter	Symbol	Min.	Typ.	Max.	Units
Launched Power (Average)(1)	P_O	-9.5		–4	dBm
Center Wavelength	λ_C	830	850	860	nm
Spectral Width (RMS)	σ_I			0.85	
Relative Intensity Noise	RIN			–117	dB/Hz
Extinction Ratio (Dynamic)	ER	9			dB
Reset Threshold(2)	V_{TH}		2.7		V
Reset Time Out(2)	t_{RES}	140	240	560	ms
Rise Time, 20%–80%	t_R			0.26	ns
Supply Current			75		mA

Notes

1. Into multimode fiber, 62.5 µm or 50 µm diameter.
2. Laser power is shut down if power supply is below V_{TH} and switched on if power supply is above V_{TH} after t_{RES}.

Receiver Electro-Optical Characteristics

Receiver	Symbol	Min.	Typ.	Max.	Units
Sensitivity (Average Power)(1)	P_{IN}		–19	–17	dBm
Saturation (Average Power)	P_{SAT}	0			
Signal Detect Assert Level(2)	P_{SDA}		–24	–18	
Signal Detect Deassert Level(3)	P_{SDD}	–30	–27		
Signal Detect Hysteresis	P_{SDA}–P_{SDD}		3		dB
Signal Detect Assert Time	t_{ASS}			100	µs
Signal Detect Deassert Time	t_{DAS}			350	
Output Low Voltage DC/DC(6)	V_{OL}–V_{CC}	–1950		–1620	mV
Output High Voltage DC/DC(6)	V_{OH}–V_{CC}	–1100		–720	
Data Output Differential Voltage AC/AC(4)	V_{DIFF}	0.5	0.8	1.23	V
Return Loss of Receiver	A_{RL}	12			dB
Supply current(5)			60		mA

Notes

1. Average optical power at which the BER is 1 x 10E–12. Measured with a 2^7–1 NRZ PRBS and ER=9 dB.
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. AC/AC for data. Load 50 Ω to GND or 100 Ω differential. For dynamic measurement a tolerance of 50 mV should be added.
5. Supply current excluding Rx output load.
6. PECL compatible. Load is 50 Ω into V_{CC}–2V. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added.

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	TTL	3	Normal Operation: Logic "1" Output, represents that light is present at receiver input Fault Condition: Logic "0" Output
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 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
MS	MS Package Grounding Tabs	N/A	MS1 MS2 T1 T2 T3 T4	Mounting Studs and grounding Tabs are provided for transceiver mechanical attachment to the circuit board. They also provide an optional connection of the transceiver to the equipment chassis ground. The holes in the circuit board must be tied to chassis ground.

Regulatory Compliance

Feature	Standard	Comments
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD 883C Method 3015.4	Class 1 (>1000 V)
Immunity: Electrostatic Discharge (ESD) to the Duplex SC Receptacle	EN 61000-4-2 IEC 61000-4-2	Discharges of ±15kV with an air discharge probe on the receptacle cause no damage.
Immunity: Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 61000-4-3	With a field strength of 10 V/m rms, noise frequency ranges from 10 MHz to 1 GHz. No effect on transceiver performance between the specification limits.
Emission: Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B CISPR 22	Noise frequency range: 30 MHz to 6 GHz

EYE SAFETY

This laser based multimode 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.

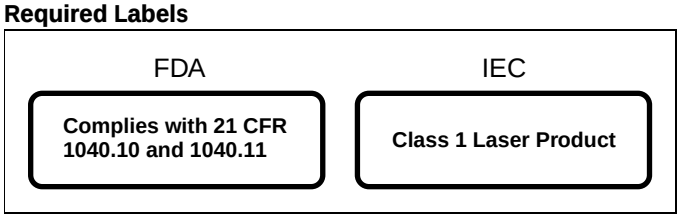
Note

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)).

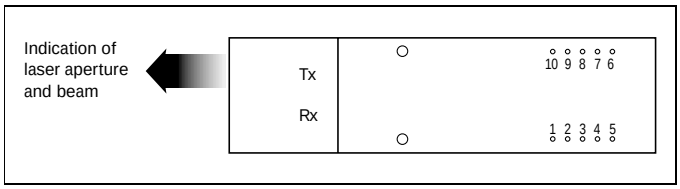
Laser Data

Wavelength	850 nm
Total output power (as defined by IEC: 50 mm aperture at 10 cm distance)	<400 µW
Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)	<70 µW
Beam divergence	12°

Required Labels

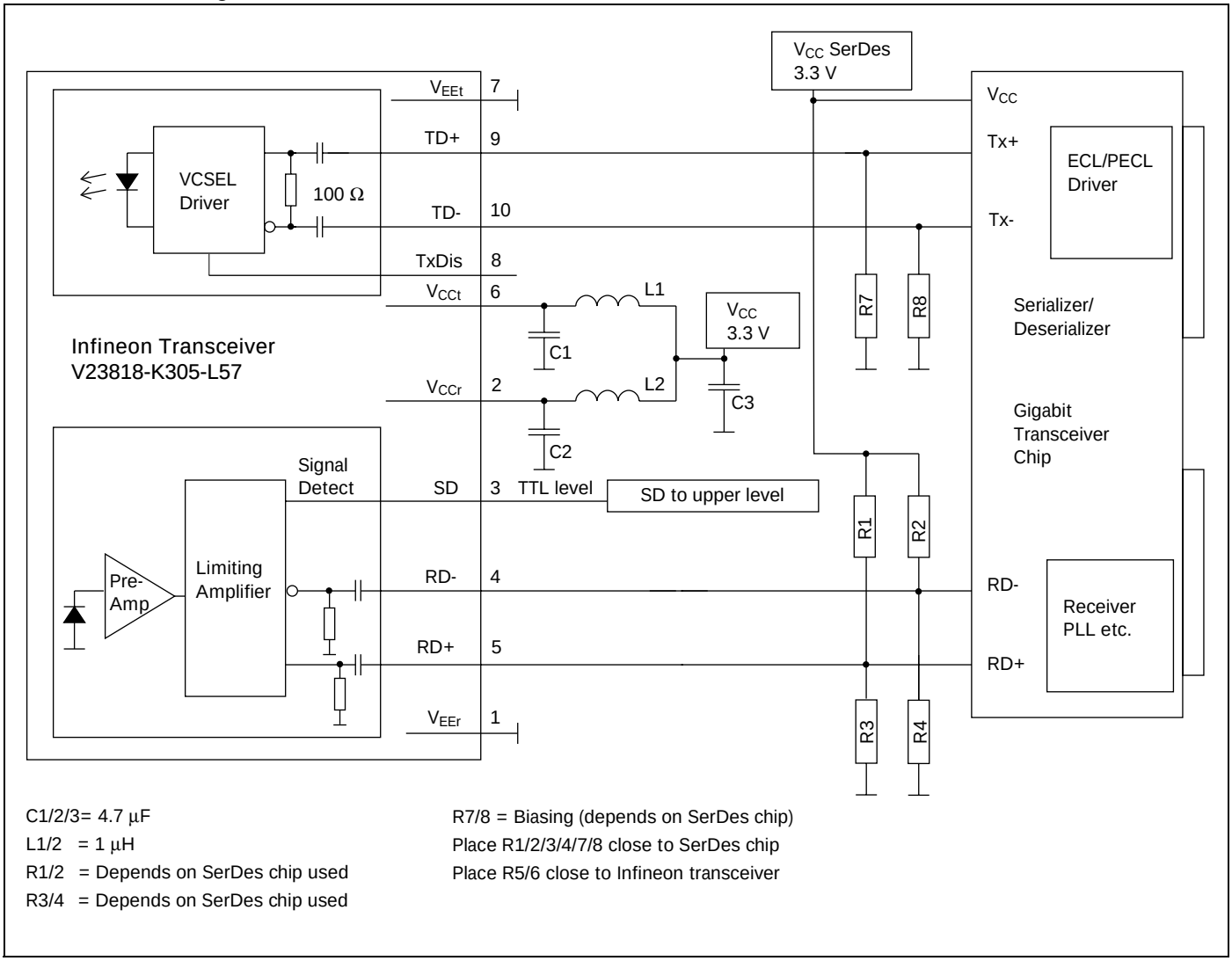


Laser Emission



APPLICATION NOTE

Multimode 850nm Gigabit Ethernet/Fibre Channel 2x5 Transceiver, AC/AC



C1/2/3= 4.7 µF
L1/2 = 1 µH
R1/2 = Depends on SerDes chip used
R3/4 = Depends on SerDes chip used

R7/8 = Biasing (depends on SerDes chip)
Place R1/2/3/4/7/8 close to SerDes chip
Place R5/6 close to Infineon transceiver

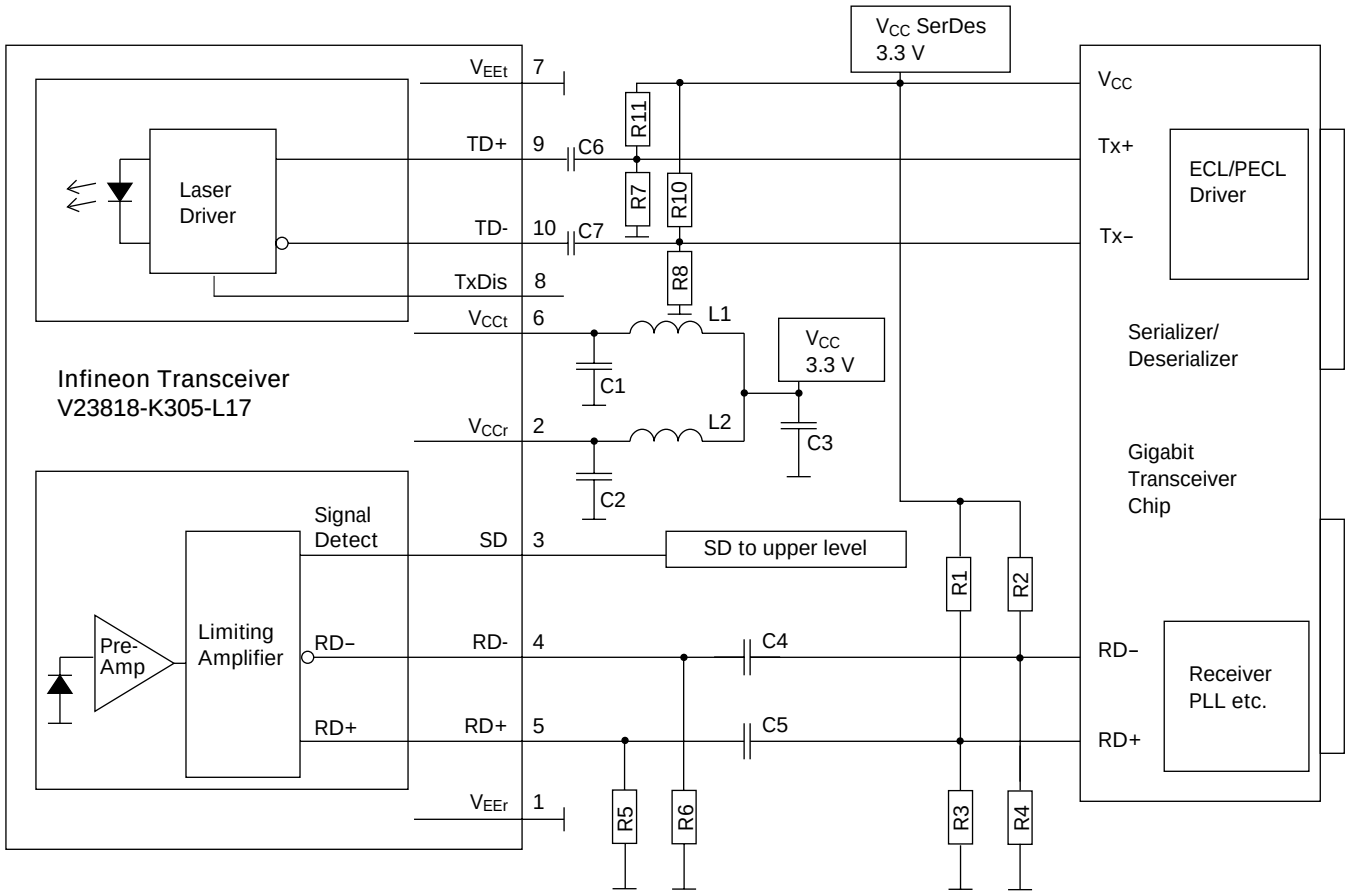
Values of R1/2/3/4 may vary as long as proper 50 Ω termination to V_{EE} or 100 Ω differential is provided. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module V_{CC}Rx/V_{CC}Tx.

The transceiver contains an automatic shutdown circuit. Reset is only possible if the power is turned off, and then on again. (V_{CC}Tx switched below V_{TH}).

Application Board available on request.

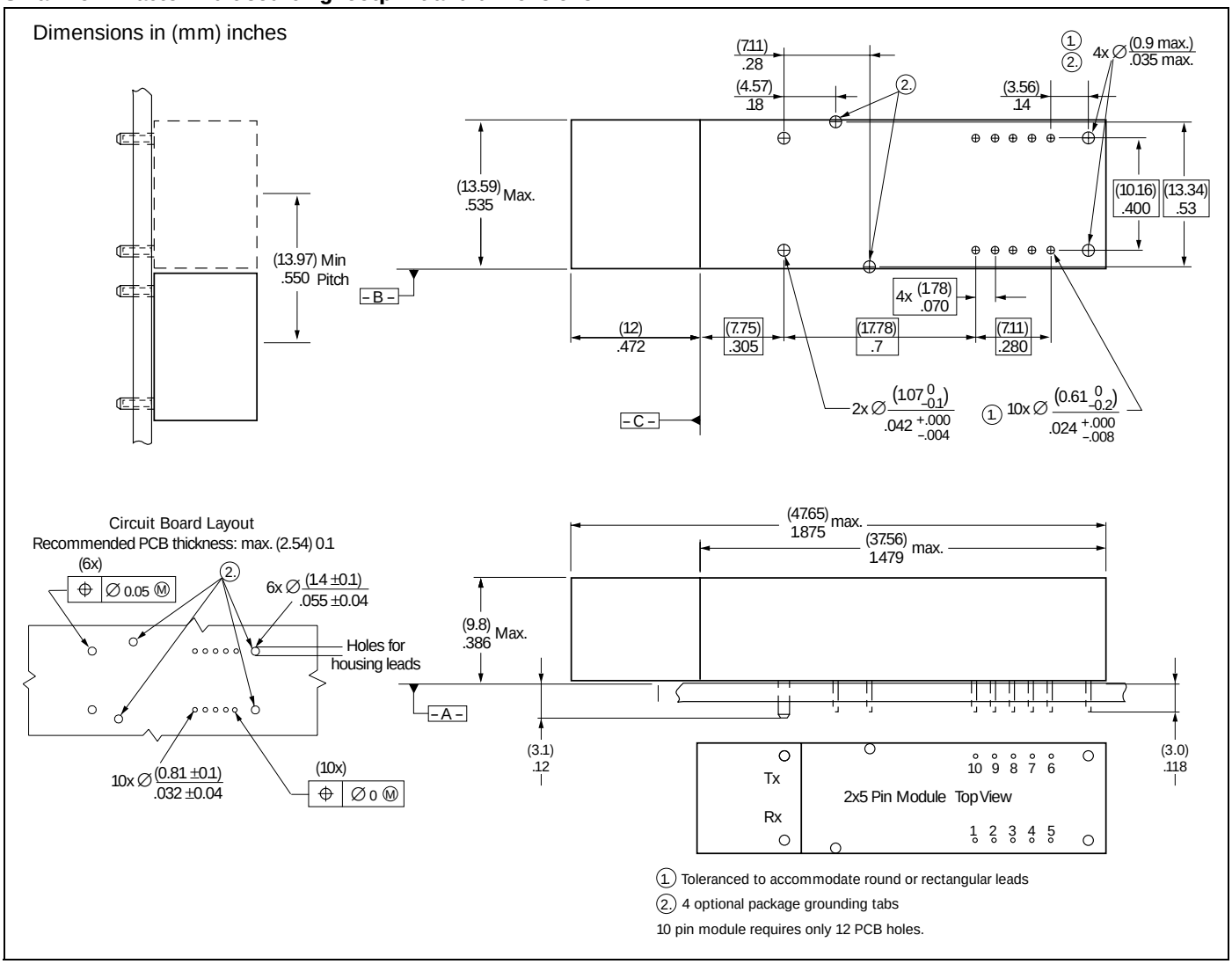
APPLICATION NOTE

Multimode 850nm Gigabit Ethernet 2x5 Transceiver DC/DC Version



C1/2/3 = 4.7 µF
C4/5/6/7 = 10 nF
L1/2 = 1 µH
R10/11 = 127 Ω
(depends on SerDes chip used)
R7/8 = 82 Ω
(depends on SerDes chip used)
R5/6 = 150 Ω
Place R1/2/3/4/7/8/10/11 close to SerDes chip,
depends on SerDes chip used,
see application note of SerDes supplier.

Small Form Factor multisourcing footprint and dimensions



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www.infineon.com/fiberoptics

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