Application Note

Recommended Circuits and PCB Layout Considerations for SIR Transceivers

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Document Disclaimer

A Word About Part Marking

In July 2000, Calibre Inc. became a part of ZiLOG. Before this time, parts were designated by and marked with a part number staring with “C”, for example, CHX1010. After the merger with ZiLOG, designations were changed to the ZiLOG system, and part numbers began with “Z”; for example, CHX1010 became ZHX1010MV115THTR. To minimize changes to the customers’ drawings, parts were still marked (using ink or engraving) with the original Calibre designation; for example, ZHX1010MVL115THTR still carries the part marking CHX1010. This part marking will continue on all “legacy” Calibre parts unless specifically noted in a data sheet or by formal letter of notification. In this publication, the part number has been abbreviated to the base number of ZHX1000 or ZHX1010.

ZHX1000/ZHX1010/ZHX1810

The ZHX10x0/ZHX1810, while robust by design, require layout considerations to maximize performance and to eliminate potential inductance problems.

In personal data assistant (PDA) layout, it is customary to use a single voltage supply. This supply is typically located some distance away from the transceiver, and often there is an inductance associated with running long narrow traces. To minimize the inductive effect, it is recommended that a terminating resistor be used in conjunction with a decoupling capacitor as shown in Figure 1. The RXD output is connected internally to VCC by a 20 kΩ load. The inputs (TXD, SD) and the output (RXD) must be directly (DC) coupled to the I/O circuit. Capacitive coupling is not necessary and must be avoided. ZHX10x0 automatically switches off the output if the input is accidentally kept active longer than approximately 180 µs (see the ZHX10x0 Family of Transceivers Product Specification).

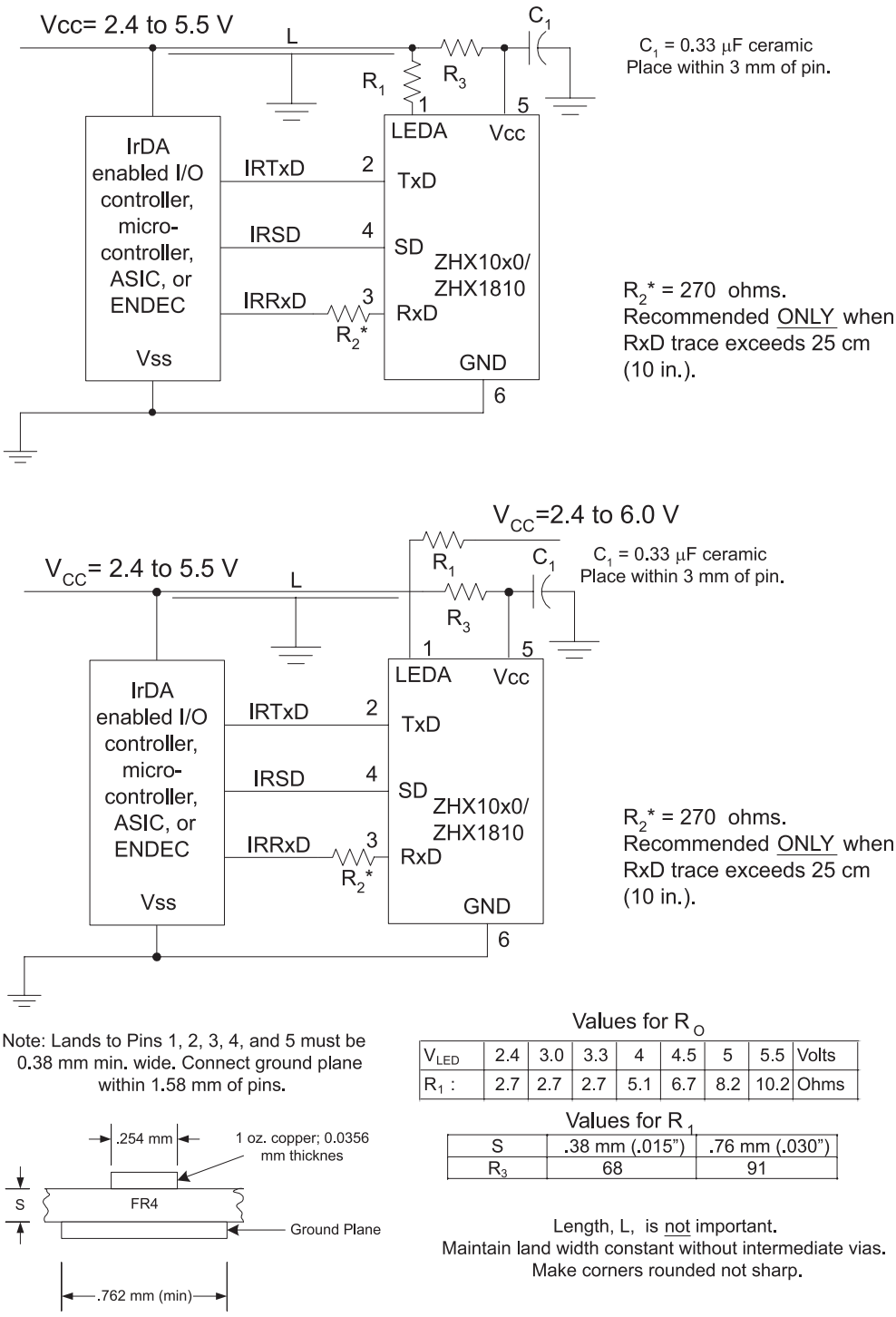

Figure 1. Application Block Diagrams

If needed, the voltage supplies can be separated. Regulated power can be reserved for use by the receiver section of the transceiver while an unregulated power source that requires no control circuitry meets the higher current needs of the IRED. ZHX10x0 permits the use of an IRED supply voltage as high as 6 volts while the transceiver supply voltage can be as low as 2.4 volts.

The decoupling capacitor is dependent upon the quality of regulated power supply voltage V_{CC}. In most applications, a .33 µF (typical) ceramic is sufficient. The supply voltage V_{CC} has to source less than 1 mA typically in 3-V applications in receive mode plus an additive base current of the drive transistor of the IRED depending on the driver transistor current.

In a ZHX10x0/ZHX1810 application circuit, R_1 is used for controlling the current through the IR emitter. For increasing the output power, reduce the values. For reducing the output power, increase the value. The upper drive current limitation depends on the duty cycle and is given by the absolute maximum ratings. For an IrDA-compatible application with a 5-volt operating voltage, a current control resistor of 8.2 Ohms is recommended. For 3.3-volt operation, 2.7 Ohms is recommended. The value of the terminating resistor, R_3, is a function of the printed circuit board (PCB) thickness. Refer to Figure 1 for values of R_1 and R_3. For designs where the RxD trace exceeded 25 cm (10 in.), an additional terminating resistor R_2 is recommended. This is the *only* instance that requires this resistor.

Shutdown

The ZHX1000/ZHX1010 can be shut down while keeping the IRED connected to the power supply LEDA by enabling SD. LEDA can be maintained as an unregulated power supply. VCC can also remain connected to the regulated power supply. For the ZHX1000/ZHX1010, the voltage at LEDA and VCC is limited to a maximum of 6.0 V. The recovery time from shutdown to full sensitivity is less than 200 µs.

Board Layout

Board layout is a very important aspect of the overall design. While ZiLOG transceivers are designed to minimize problems, care must be taken when laying out the PCB. Thin or long resistive and inductive wiring and traces must be avoided. ZiLOG will provide Gerber files and samples of the described boards. The Gerber files can be used with most CAD tools to expedite the IrDA subsystem design of the product. Refer to Figure 2.

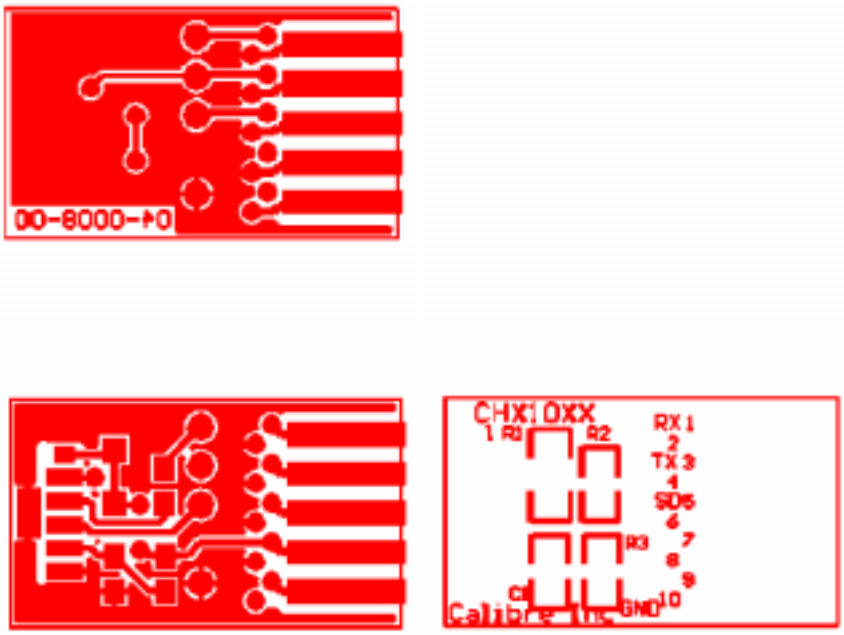

Figure 2. PCB Layout