



***ZHX1000***

***SIR Transceiver***

**Product Specification**

PS015004-0702



**Warning:** Do not use the ZHX1000 SIR transceiver in new designs.



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# Table of Contents

|                                                            |    |
|------------------------------------------------------------|----|
| Description .....                                          | 1  |
| Features .....                                             | 1  |
| Pin Descriptions .....                                     | 2  |
| VCC Positive Supply .....                                  | 2  |
| GND Ground .....                                           | 2  |
| TAB .....                                                  | 2  |
| TXD Transmit Data .....                                    | 2  |
| RXD Receive Data .....                                     | 3  |
| SD Shutdown .....                                          | 3  |
| LEDA IRED Driver Anode .....                               | 3  |
| Recommended Application Circuit .....                      | 4  |
| Electrical and Timing Specifications .....                 | 5  |
| Transceiver Performance .....                              | 7  |
| Mechanical Drawings .....                                  | 8  |
| ZHX1000 Soldering and Cleaning Recommendations .....       | 9  |
| Reflow Soldering .....                                     | 9  |
| Manual Soldering .....                                     | 9  |
| Cleaning .....                                             | 10 |
| ZHX1000 Packing, Storage, and Baking Recommendations ..... | 10 |
| Storage .....                                              | 10 |
| Baking .....                                               | 10 |
| Moisture Prevention Guidelines .....                       | 11 |
| Taping Specifications .....                                | 12 |
| Ordering Information .....                                 | 13 |
| Customer Feedback Form .....                               | 14 |
| Customer Information .....                                 | 14 |
| Product Information .....                                  | 14 |
| Return Information .....                                   | 14 |
| Problem Description or Suggestion .....                    | 14 |



## List of Figures

|           |                                                                             |    |
|-----------|-----------------------------------------------------------------------------|----|
| Figure 1. | Application Block Diagrams . . . . .                                        | 4  |
| Figure 2. | Typical Radiant Intensity ( $I_E$ ) Versus Angle . . . . .                  | 7  |
| Figure 3. | Typical Irradiance ( $E_e$ ) Versus Angle at BER = 1 in $10^{-8}$ . . . . . | 7  |
| Figure 4. | ZHX1000 Mechanical Drawing . . . . .                                        | 8  |
| Figure 5. | Temperature Profile at the Top Surface . . . . .                            | 9  |
| Figure 6. | ZHX1000 SIR Transceiver Packaging . . . . .                                 | 11 |
| Figure 7. | ZHX1000 Reel Dimensions (Unit: mm) . . . . .                                | 12 |
| Figure 8. | ZHX1000 Tape Dimensions and Configuration (Unit: mm) . . . . .              | 13 |

## List of Tables

|          |                                                   |   |
|----------|---------------------------------------------------|---|
| Table 1. | Pin Out for the ZHX1000 SIR Transceiver . . . . . | 2 |
| Table 2. | Absolute Maximum Ratings . . . . .                | 5 |
| Table 3. | Recommended Operating Conditions . . . . .        | 5 |
| Table 4. | Electrical Characteristics . . . . .              | 5 |



## Description

The ZiLOG ZHX1000 SIR transceiver is the ideal choice for applications in today's ultra-compact and power-conscious portable products, such as mobile phones, digital cameras, portable printers, handheld computers, or personal data assistants (PDAs). Designed to support the SIR (serial infrared) Infrared Data Association (IrDA) Data standard (2.4–115.2 Kbps, 1 meter minimum), LocalTalk™, and Sharp ASK™ modes, the transceiver combines an infrared emitting diode (IRED), a PIN photodiode detector, a digital AC coupled IRED driver, and a receiver/decoder with noise discrimination circuitry in a single, miniature package.

The ZiLOG ZHX1000 SIR transceiver provides an efficient implementation of the IrDA-Data standard in a small footprint format. Application circuit space is also minimized, as only two external resistors and one capacitor are needed to complete the IrDA transceiver solution. The ZHX1000 SIR transceiver meets the IEC825-Class 1 Eye Safety limits.

A full external shield minimizes radio frequency interference (RFI) and electromagnetic interference (EMI) problems.

## Features

- Compliant to IrDA SIR Specifications (2.4–115.2 Kbps, 1 meter minimum)
- Wide supply voltage range, 2.4 to 5.5 V
- Low power, 90  $\mu$ A (typical) at 3 V
- Full-shield option: 9.9 mm long x 4.2 mm wide x 4.0 mm high
- Two external components: one resistor and one capacitor
- Extended operating temperature range (–30 °C to +85 °C)
- Meets the IEC 825-1 Class 1 Eye Safety Specifications



## Pin Descriptions

The ZHX1000 SIR transceiver uses the pins listed in Table 1. The pins are described in this section.

**Table 1. Pin Out for the ZHX1000 SIR Transceiver**

| Pin | Name            | Function              | I/O |
|-----|-----------------|-----------------------|-----|
| 1   | LEDA            | IRED anode            | —   |
| 2   | TXD             | Transmitter input     | I   |
| 3   | RXD             | Receiver output       | O   |
| 4   | SD              | Enables shutdown mode | I   |
| 5   | V <sub>CC</sub> | Supply voltage        | —   |
| 6   | GND             | Ground                | —   |
| —   | TAB             | Shield ground         | —   |

### V<sub>CC</sub> Positive Supply

(Power)

Connect to positive power supply (2.4–5.5 V).

Place a .33-μF ceramic bypass capacitor (optional) as close as possible to the V<sub>CC</sub> pin.

### GND Ground

(Power)

Connect to ground of the power supply. A solid ground plane is recommended for proper operation.

### TAB

(Shield)

The Shield tab must be soldered to the ground plane.

### TXD Transmit Data

(Input, active high)

This CMOS input is used to transmit serial data.



This input has an internal pull-down resistor that is disabled (open-circuited) during shutdown. TXD has integrated digital AC coupling that prevents inadvertent “always on” IREDs; therefore, no external AC coupling components are required for input signals between GND and  $V_{CC}$ .

### **RXD Receive Data**

(Output, active low).

This output indicates received serial data. It is a tri-state, slew rate controlled CMOS output (tri-stated during shutdown) driver capable of driving a standard CMOS or LSTTL load. No external resistor is required.

### **SD Shutdown**

(Input, active high)

This input is used to place the integrated circuit into shutdown mode. Maximum current draw in shutdown mode is 1  $\mu$ A. Module shutdown current might be limited by the choice of capacitor used from  $V_{CC}$  to ground. A 0.1-mF ceramic capacitor with very high DC impedance (1–10 G ohm) is required to minimize shutdown current to nanoamp levels. During shutdown, the output is tri-stated, and the TXD input pull-down resistor is disabled (open circuited).

### **LEDA IRED Driver Anode**

(Output, active low).

This output is internally connected to the IRED anode and is connected to LEDA through a current limiting resistor. Current to the IRED must be limited to a maximum of 500 mA (20% duty cycle maximum). The maximum voltage on this pad is limited to +5.5 volts or  $V_{CC}$ .

## Recommended Application Circuit

Figure 1 shows applications for the ZHX1000 SIR transceiver.

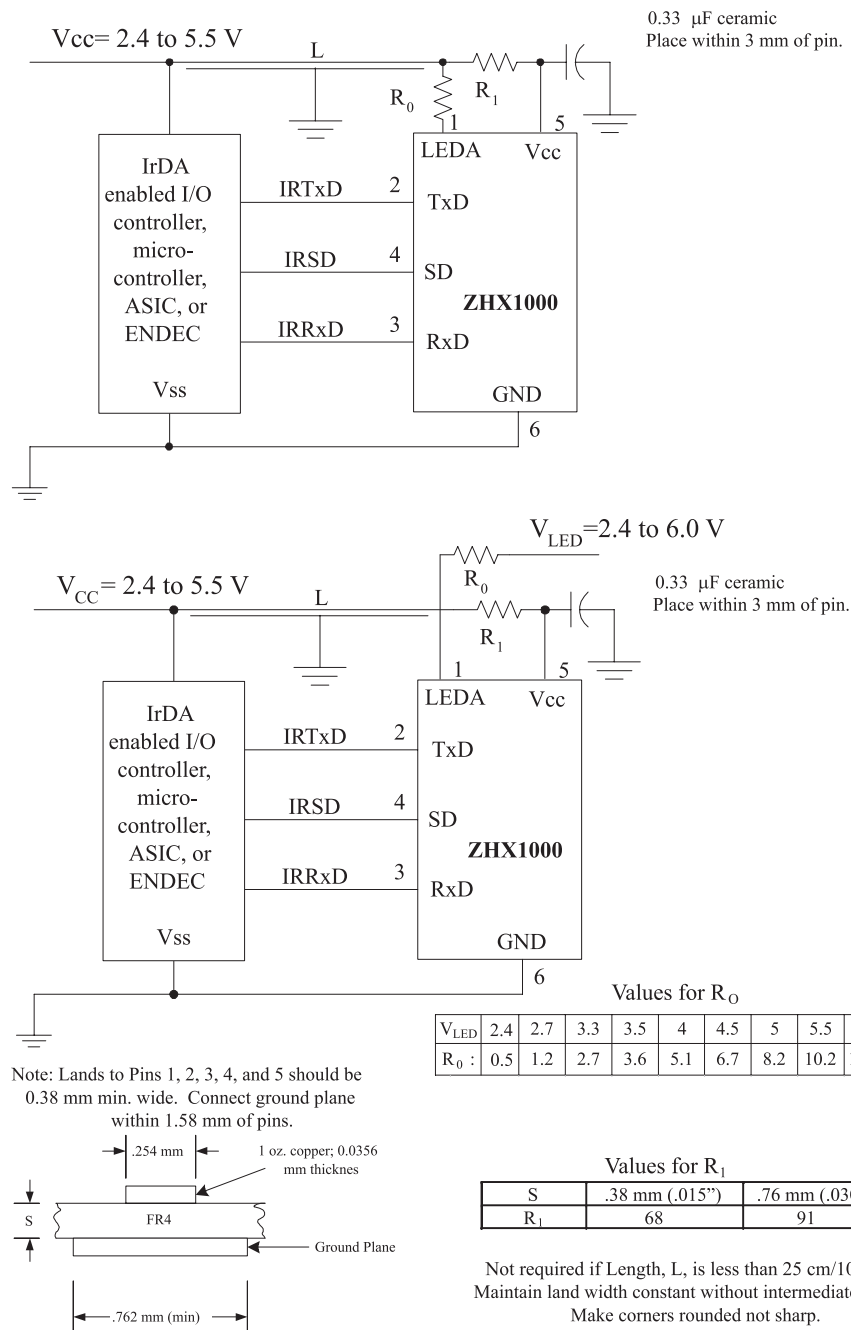


Figure 1. Application Block Diagrams





## Electrical and Timing Specifications

Table 2 through Table 4 present the electrical and timing specifications for the the ZHX1000 SIR transceiver.

**Table 2. Absolute Maximum Ratings**

| Parameter                       | Symbol           | Minimum | Maximum              | Unit | Comment        |
|---------------------------------|------------------|---------|----------------------|------|----------------|
| Supply Voltage                  | V <sub>CC</sub>  | -0.3    | 6.0                  | V    |                |
| Power Dissipation               | P <sub>D</sub>   |         | 500                  | mW   |                |
| Junction Temperature            | T <sub>J</sub>   |         | 125                  | °C   |                |
| Storage Temperature             |                  | -55     | 85                   | °C   |                |
| Solder Temperature (10 seconds) |                  |         | 230                  | °C   |                |
| IRED Current                    | I <sub>LED</sub> |         | 700                  | mA   | 20% duty cycle |
| Any Pin Voltage                 |                  | -0.5    | V <sub>CC</sub> +0.5 | V    |                |

**Table 3. Recommended Operating Conditions**

| Parameter                     | Symbol          | Minimum | Maximum | Unit |
|-------------------------------|-----------------|---------|---------|------|
| Supply Voltage                | V <sub>CC</sub> | 2.4     | 5.5     | V    |
| Ambient Operating Temperature | T <sub>A</sub>  | -30     | 85      | °C   |

**Table 4. Electrical Characteristics**

| Parameter                                                | Condition                                                | Min | Typical | Max | Unit  |
|----------------------------------------------------------|----------------------------------------------------------|-----|---------|-----|-------|
| Operating Current (I <sub>CC</sub> )                     | No load, SD = TXD = "0"<br>3.0 V; T = 25 °C              |     | 90      | 150 | μA    |
| Shutdown Current (I <sub>SD</sub> )                      | SD = "V <sub>CC</sub> ", Photodiode<br>input current = 0 |     |         | 1   | μA    |
| Peak Current Transmit (I <sub>LED</sub> )<br>Transmitter |                                                          |     | 300     |     | mA    |
| Radiant Intensity (I <sub>E</sub> )(±15°)                | LED Peak I <sub>F</sub> = 300 mA,<br>TXD Logic "High"    | 40  |         | 100 | mW/sr |
| Radiant Intensity                                        | TXD Logic "Low"                                          |     |         | 0.3 | mW/sr |
| Angle of Half Intensity                                  |                                                          |     | 20      |     | °     |



**Table 4. Electrical Characteristics (Continued)**

| Parameter                                                                                                                        | Condition                                                                   | Min          | Typical | Max                      | Unit                      |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------|---------|--------------------------|---------------------------|
| Optical Rise/Fall time                                                                                                           |                                                                             |              | 40      |                          | ns                        |
| Peak Wavelength                                                                                                                  |                                                                             | 850          | 875     | 900                      | nm                        |
| Optical Overshoot                                                                                                                |                                                                             |              |         | 3                        | %                         |
| Receiver                                                                                                                         |                                                                             |              |         |                          |                           |
| Detection Threshold Irradiance                                                                                                   | $\pm 15^\circ$                                                              |              | 2       | 3                        | $\mu\text{W}/\text{cm}^2$ |
| Overload Irradiance                                                                                                              |                                                                             | 500          |         |                          | $\mu\text{W}/\text{cm}^2$ |
| Sunlight Ambient Rejection                                                                                                       | No modulation                                                               | 500          |         |                          | $\mu\text{W}/\text{cm}^2$ |
| Digital Input/Output                                                                                                             |                                                                             |              |         |                          |                           |
| Input High (Logic 1) Voltage, $V_{IH}$                                                                                           | TXD, SD                                                                     | $0.6 V_{CC}$ |         | $V_{CC} + 0.5 \text{ V}$ | V                         |
| Input Low (Logic 0) Voltage, $V_{IL}$                                                                                            | TXD, SD                                                                     | -0.5         |         | $0.2 V_{CC}$             | V                         |
| Output High (Logic 1) Voltage, $V_{OH}$                                                                                          | RXD/ = -250 mA @ 1.8 V                                                      | 2.2          |         |                          | V                         |
| Output Low (Logic 0) Voltage, $V_{OL}$                                                                                           | RXD/ = 1 mA                                                                 |              |         | 0.4                      | V                         |
| Output Leakage (RXD, Anode)                                                                                                      | SD = "1"                                                                    | -1           |         | +1                       | $\mu\text{A}$             |
| Input Leakage                                                                                                                    | SD, TXD = "0"                                                               | -1           |         | +1                       | $\mu\text{A}$             |
| Input Current                                                                                                                    | TXD = "1", SD = "0"                                                         | 4            |         | 100                      | $\mu\text{A}$             |
| AC Parameters                                                                                                                    | $(C_{LOAD} = 25 \text{ pF})$                                                |              |         |                          |                           |
| Transmit Output Pulse Width                                                                                                      | TXD = 1 > 200 ms                                                            | 18           |         | 150                      | $\mu\text{s}$             |
| Recovery Delay from Shutdown to Full Sensitivity ( $T_{RECOVERY}$ )                                                              | SD = "1" $\rightarrow$ "0"                                                  |              |         | 200                      | $\mu\text{s}$             |
| Receiver Latency ( $T_L$ )                                                                                                       |                                                                             |              | 100     |                          | $\mu\text{s}$             |
| Rise Time ( $T_R$ )                                                                                                              | $V_{CC} = 1.8\text{--}5.5 \text{ V}$                                        |              | 100     |                          | ns                        |
| Fall Time ( $T_F$ )                                                                                                              | $V_{CC} = 1.8\text{--}5.5 \text{ V}$                                        |              | 100     |                          | ns                        |
| Pulse Width ( $T_W$ ) (RXD)                                                                                                      | $I_{DET} = 1 \mu\text{A}$ , 1.6-ms pulse                                    | 1.1          | 1.6     | 3.9                      | $\mu\text{s}$             |
| Pulse Jitter ( $T_J$ ) (RXD)                                                                                                     | Irradiance = $3.5 \text{ mW}/\text{cm}^2$ –<br>$500 \text{ mW}/\text{cm}^2$ |              |         | 400                      | ns                        |
| Pulse Delay ( $T_D$ ) (RXD)                                                                                                      | Irradiance = $3.5 \text{ mW}/\text{cm}^2$ –<br>$500 \text{ mW}/\text{cm}^2$ |              |         | 1.8                      | $\mu\text{s}$             |
| Unless otherwise noted: $V_{CC}/LEDA=2.4 \text{ V}$ to $5.5 \text{ V}$ , GND= 0 V, $T_A=-30^\circ\text{C}$ to $85^\circ\text{C}$ |                                                                             |              |         |                          |                           |

## Transceiver Performance

Figure 2 and Figure 3 show the performance of the ZHX1000 SIR transceiver.

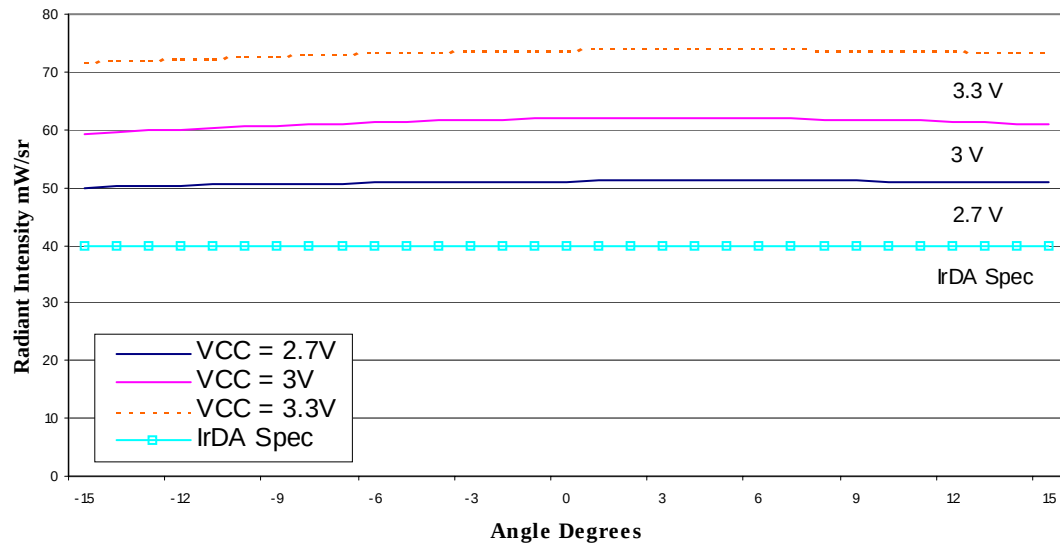


Figure 2. Typical Radiant Intensity ( $I_E$ ) Versus Angle

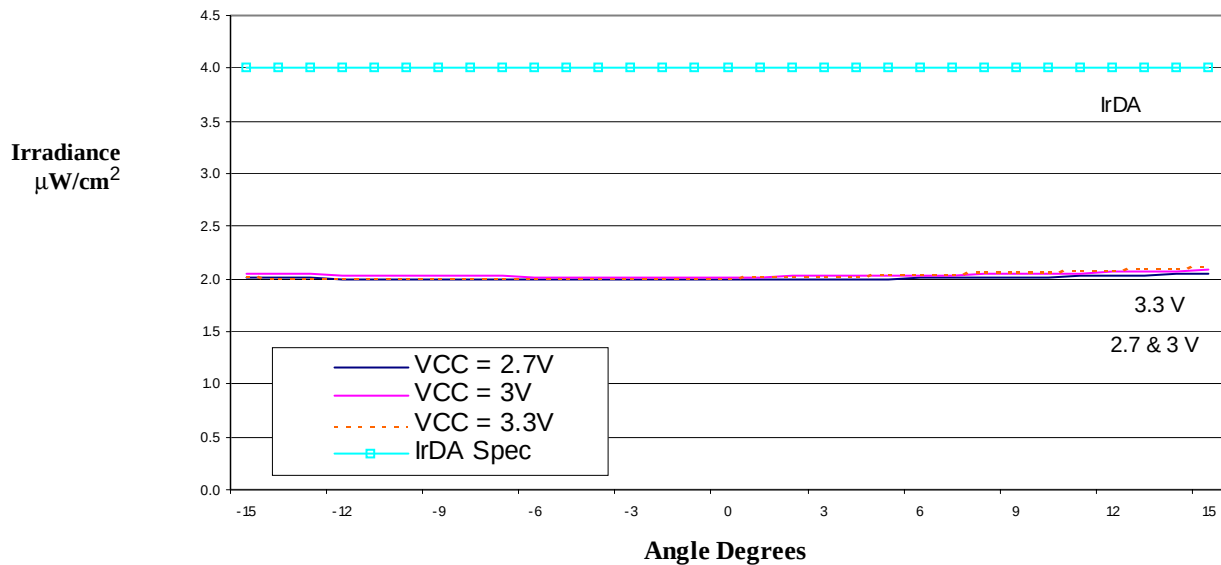


Figure 3. Typical Irradiance ( $E_e$ ) Versus Angle at BER = 1 in  $10^{-8}$

## Mechanical Drawings

Figure 4 shows the mechanical drawings for the ZHX1000 SIR transceiver.

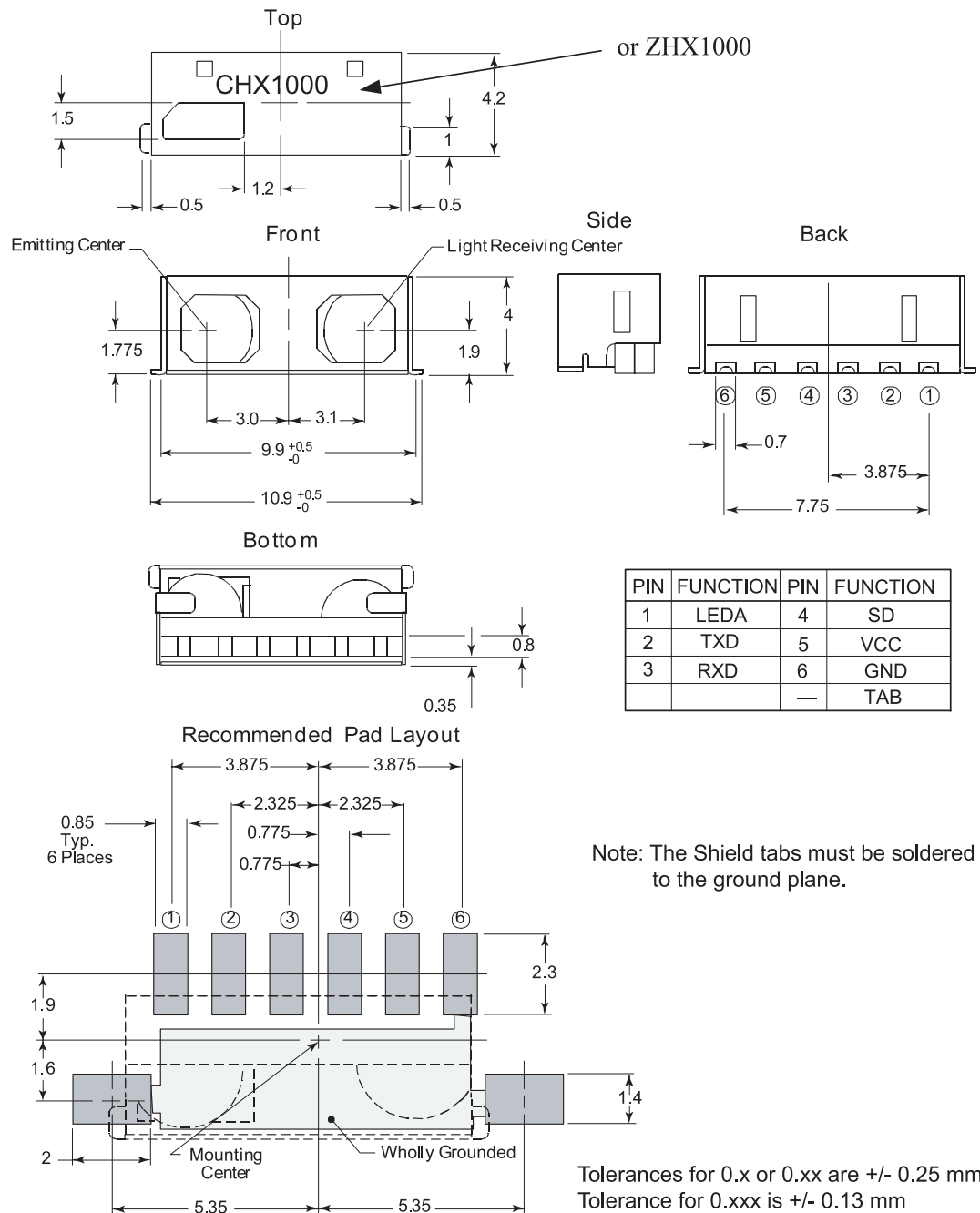


Figure 4. ZHX1000 Mechanical Drawing

## ZHX1000 Soldering and Cleaning Recommendations

Follow these recommendations to maintain the performance of the ZHX1000 transceiver.

### Reflow Soldering

- Reflow soldering paste is recommended:  
Melting temperature: 178 °C ~ 192 °C  
Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask is between 0.2 mm and 0.25 mm for screen printing.
- Number of soldering times: 2 times *maximum*
- The temperature profile at the top surface of the ZHX1000 SIR transceiver, shown in Figure 5, is recommended.

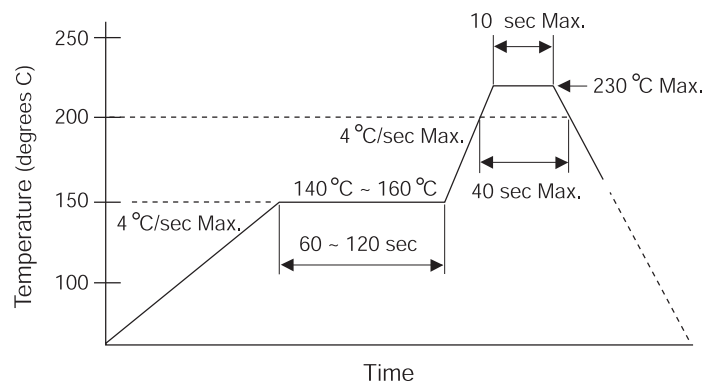


Figure 5. Temperature Profile at the Top Surface

### Manual Soldering

- Use 63/37 or silver solder.
- Use a soldering iron of 25 W or smaller. Adjust the temperature of the soldering iron below 300 °C.
- Finish soldering within 3 seconds.
- Handle only after the ZHX1000 SIR transceiver has cooled off.



## Cleaning

Perform cleaning after soldering under the following conditions:

- Cleaning agent: Alcohol
- Temperature and time: 30 seconds below 50 °C or 3 minutes below 30 °C
- Ultrasonic cleaning: Below 20 W

## ZHX1000 Packing, Storage, and Baking Recommendations

Follow these recommendations to maintain the performance of the ZHX1000 SIR transceiver.

### Storage

To avoid moisture absorption, ZHX1000 reels must remain in the original, unopened moisture-proof packing. Parts must be soldered within 48 hours after unpacking. Reels that have been unpacked, but will not be soldered within 48 hours, must be stored in a desiccator.

### Baking

Parts that have been stored over 12 months or unpacked over 48 hours must be baked under the following guidelines.

#### Reels

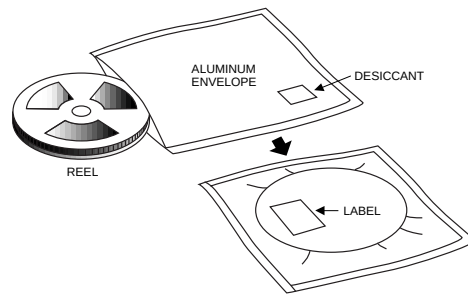
60 °C for 48 hours or more

#### Loose Parts

- 100 °C for 4 hours or more  
or
- 125 °C for 2 hours or more  
or
- 150 °C for 1 hour or more

## Moisture Prevention Guidelines

In order to avoid moisture absorption during transportation and storage, ZHX1000 reels are packed in aluminum envelopes (see Figure 6) that contain a desiccant with a humidity indicator. While this packaging is an impediment to moisture absorption, it is by no means absolute, and no warranty is implied. The user should store these parts in a controlled environment to prevent moisture entry. Please read the label on the aluminum bag for indicator instructions.



**Figure 6. ZHX1000 SIR Transceiver Packaging**

## Taping Specifications

Figure 7 and Figure 8 show the reel dimensions and tape dimensions and configuration for the ZHX1000 SIR transceiver.

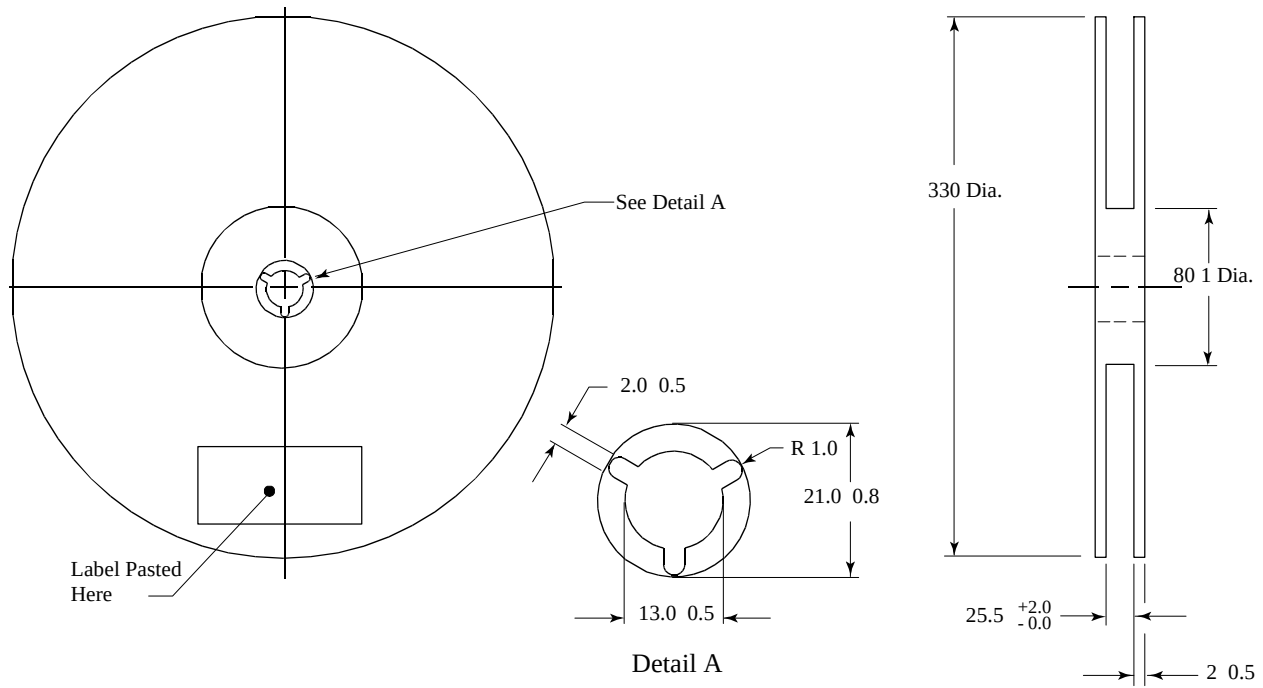


Figure 7. ZHX1000 Reel Dimensions (Unit: mm)



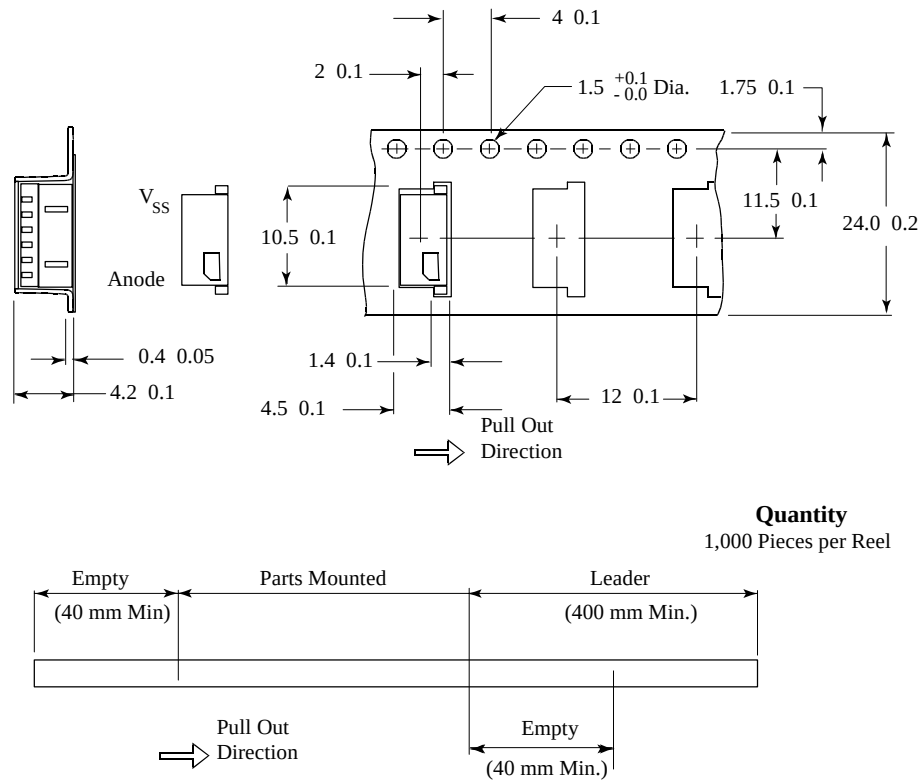


Figure 8. ZHX1000 Tape Dimensions and Configuration (Unit: mm)

## Ordering Information

To order the ZHX1000 (formerly Calibre CHX1000) SIR transceiver, use ZiLOG part number ZHX1000MV115THTR.

► **Notes:** In order to ensure the lowest possible lead times, ZiLOG uses two different fab sources for the transceiver IC. Both of these ICs have been extensively tested and qualified to meet the ZHX1000 SIR transceiver specifications.



**Warning:** Do not use the ZHX1000 SIR transceiver in new designs.



## Customer Feedback Form

If you experience any problems while operating the ZHX1000 SIR transceiver, or if you note any inaccuracies while reading this product specification, please copy and complete this form, then mail or fax it to ZiLOG (see "Return Information," below). We also welcome your suggestions!

### Customer Information

|                |         |
|----------------|---------|
| Name           | Country |
| Company        | Phone   |
| Address        | Fax     |
| City/State/Zip | email   |

### Product Information

|                                |
|--------------------------------|
| Serial # or Board Fab #/Rev #  |
| Software Version               |
| Document Number                |
| Host Computer Description/Type |

### Return Information

ZiLOG  
System Test/Customer Support  
532 Race Street  
San Jose, CA 95126-3432  
Fax: (408) 558-8300  
Email: tools@zillog.com

### Problem Description or Suggestion

Provide a complete description of the problem or your suggestion. If you are reporting a specific problem, include all steps leading up to the occurrence of the problem. Attach additional pages as necessary.

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