ZHX10x0

Family of Transceivers

Product Specification

PS006905-0501

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Description

The ZILOG ZHX10x0 Family of transceivers 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 ZHX10x0 Family 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 ZHX10x0 Family meets the IEC825-Class 1 Eye Safety limits.

Two external shields are available to minimize radio frequency interference (RFI) and electromagnetic interference (EMI) problems. ZHX1000 is the full shield option for high EMI/RFI applications. ZHX1010 is the slim shield option for most applications.

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, 120 µA (typical) at 3 V
- Two form factors—Full shield (9.9 mm long x 4.2 mm wide x 4.0 mm high) and slim shield (9.9 mm long x 3.7 mm wide x 4.0 mm high)
- Three external components: two resistors and one capacitor
- Extended operating temperature range (–30 °C to +85 °C)

Pin Descriptions

The ZHX10x0 Family of transceivers uses the pins listed in Table 1. The pins are described in this section.

Table 1. Pin Out for the ZHX10x0 Family of Transceivers

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_{CC}	Supply voltage	–
6	GND	Ground	–

V_{CC} 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_{CC} pin.

GND Ground

(Power)

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

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 µA. 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).

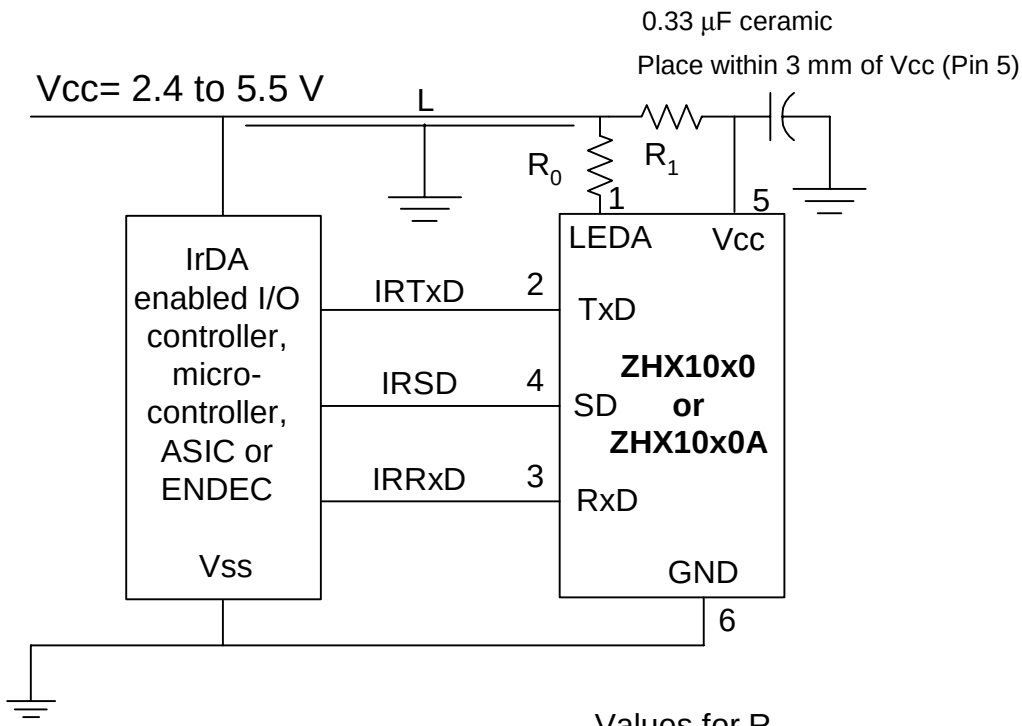
LEDA IRED Driver Anode

(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

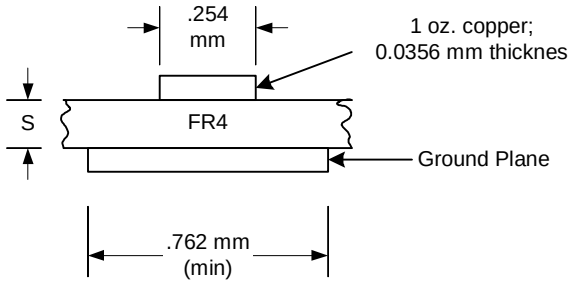
Figure 1 shows applications for the ZHX10x0 Family of transceivers.



Values for R_O

V_{LED}	2.4	3.0	3.3	4	4.5	5	5.5	Volts
R_O :	2.7	2.7	2.7	5.1	6.7	8.2	10.2	Ohms

Note: Lands to Pins 1, 2, 3, 4 and 5 should be 0.38 mm min. wide. Connect ground plane within 1.58 mm of pins



Values for R_1

S	.38mm (.015”)	.76mm (.030”)
R_1	68 Ohms	91 Ohms

Length, L, is not important.
Maintain land width constant without intermediate vias.
Make corners rounded not sharp

Figure 1. Application Block Diagrams

Electrical and Timing Specifications

Table 2 through Table 4 present the electrical and timing specifications for the ZHX10x0 Family of transceivers.

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit	Comment
Supply Voltage	Vcc	–0.3	6.0	V	
Power Dissipation	P_D		500	mW	
Junction Temperature	T_J		125	°C	
Storage Temperature		–55	85	°C	
Solder Temperature (10 seconds)			230	°C	
IRED Current			700	mA	20% duty cycle
Any Pin Voltage		–0.5	Vcc+0.5	V	

Table 3. Recommended Operating Conditions

Parameter	Symbol	Minimum	Maximum	Unit
Supply Voltage	Vcc	2.4	5.5	V
Ambient Operating Temperature	T_A	–30	85	°C

Table 4. Electrical Characteristics

Parameter	Condition	Min	Typical	Max	Unit
Operating Current (I_{CC})	No load, SD = TXD = “0” 3.0 V; T = 25 °C		120	200	µA
Shutdown Current (I_{SD})	SD = “V_{CC}”, Photodiode input current = 0		0.001	1	µA
Peak Current Transmit (I_{IRED}) Transmitter				300	mA
Radiant Intensity (I_E)($\pm$15°)	LED Peak I_F = 300 mA, TXD Logic “High”	40		100	mW/sr
Radiant Intensity	TXD Logic “Low”			0.3	mW/sr

Unless otherwise noted: V_{cc}/LEDA=2.4 V to 5.5 V, GND= 0 V, T_A= –30 °C to 85 °C

Table 4. Electrical Characteristics (Continued)

Parameter	Condition	Min	Typical	Max	Unit
Angle of Half Intensity			20		°
Optical Rise/Fall time			40		ns
Peak Wavelength		850	875	900	nm
Optical Overshoot				3	%
Receiver					
Detection Threshold Irradiance	±15 °		2.5	3.5	$\mu W/cm^2$
Overload Irradiance		500			$\mu W/cm^2$
Sunlight Ambient Rejection	No modulation	500			$\mu W/cm^2$
Digital Input/Output					
Input High (Logic 1) Voltage, V_{IH}	TXD, SD	0.6 V_{CC}		V_{CC} + 0.5 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	µA
Input Leakage	SD, TXD = “0”	–1		+1	µA
Input Current	TXD = “1”, SD = “0”	4		100	µA
AC Parameters	(C_{LOAD} = 25 pF)				
Transmit Output Pulse Width	TXD = 1 > 200 ms	18		150	µs
Recovery Delay from Shutdown to Full Sensitivity ($T_{RECOVERY}$)	SD = “1” →“0”			200	µs
Receiver Latency (T_L)			50	100	µs
Rise Time (T_R)	V_{CC} = 1.8–5.5 V		100		ns
Fall Time (T_F)	V_{CC} = 1.8–5.5 V		100		ns
Pulse Width (T_W) (RXD)	I_{DET} = 1 µA, 1.6-ms pulse	1.1	1.6	3.9	µs
Pulse Jitter (T_J) (RXD)	Irradiance = 3.5 mW/cm^2–500 mW/cm^2			400	ns
Pulse Delay (T_D) (RXD)	Irradiance = 3.5 mW/cm^2–500 mW/cm^2			1.8	µs
Unless otherwise noted: V_{cc}/LEDA=2.4 V to 5.5 V, GND= 0 V, T_A= –30 °C to 85 °C					

Transceiver Performance

Figure 2 and Figure 3 show the performance of the ZHX10x0 Family of transceivers.

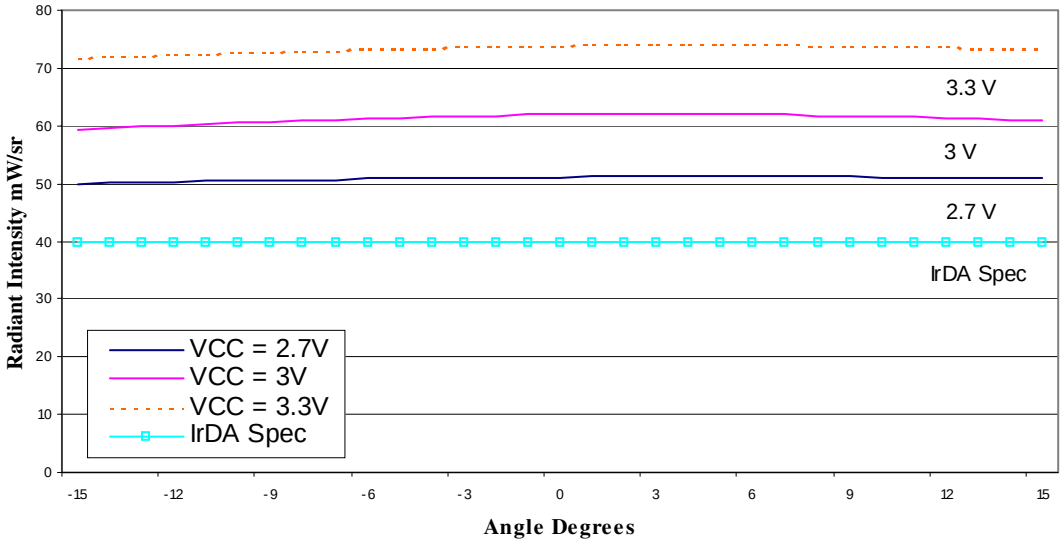


Figure 2. Typical Radiant Intensity (I_E) Versus Angle

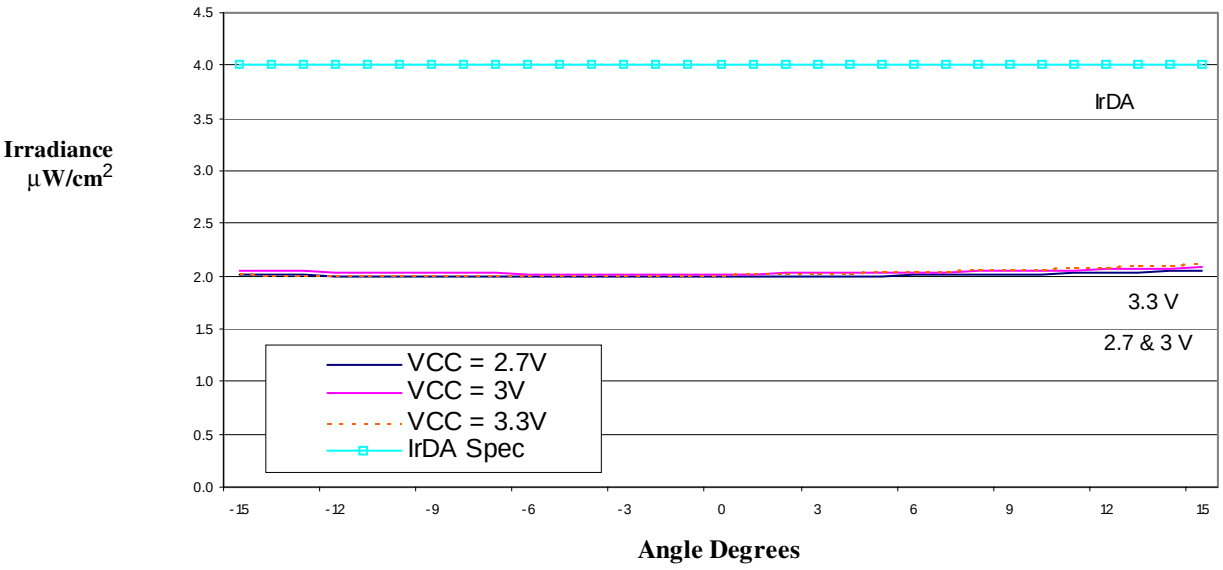
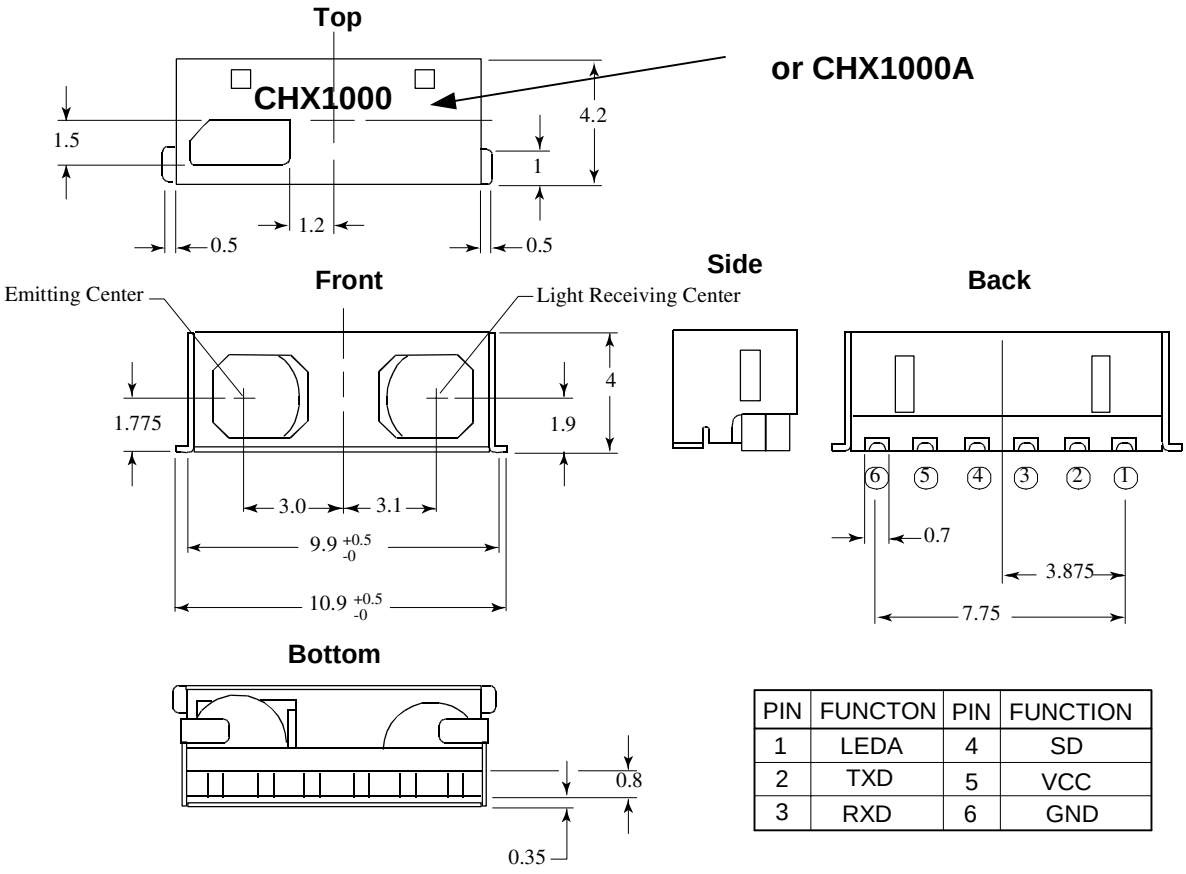


Figure 3. Typical Irradiance (Ee) Versus Angle at BER = 1 in 10^{-8}

Mechanical Drawings

Figure 4 and Figure 5 show the mechanical drawings for the ZHX1000 and ZHX1010, respectively.

Note: The ZiLOG ZHX10x0 Family of transceivers will continue to show the original Calibre part number.



PIN	FUNCTON	PIN	FUNCTION
1	LEDA	4	SD
2	TXD	5	VCC
3	RXD	6	GND

Unit: mm
Tolerance: 0.2

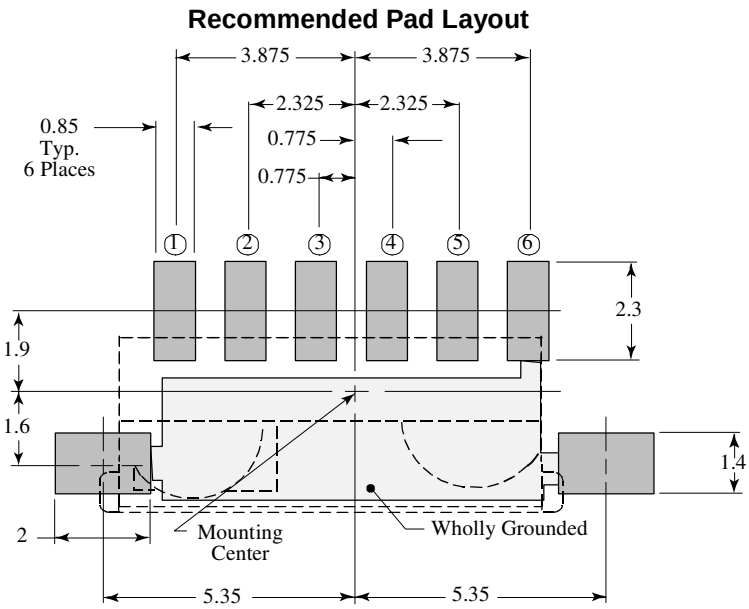
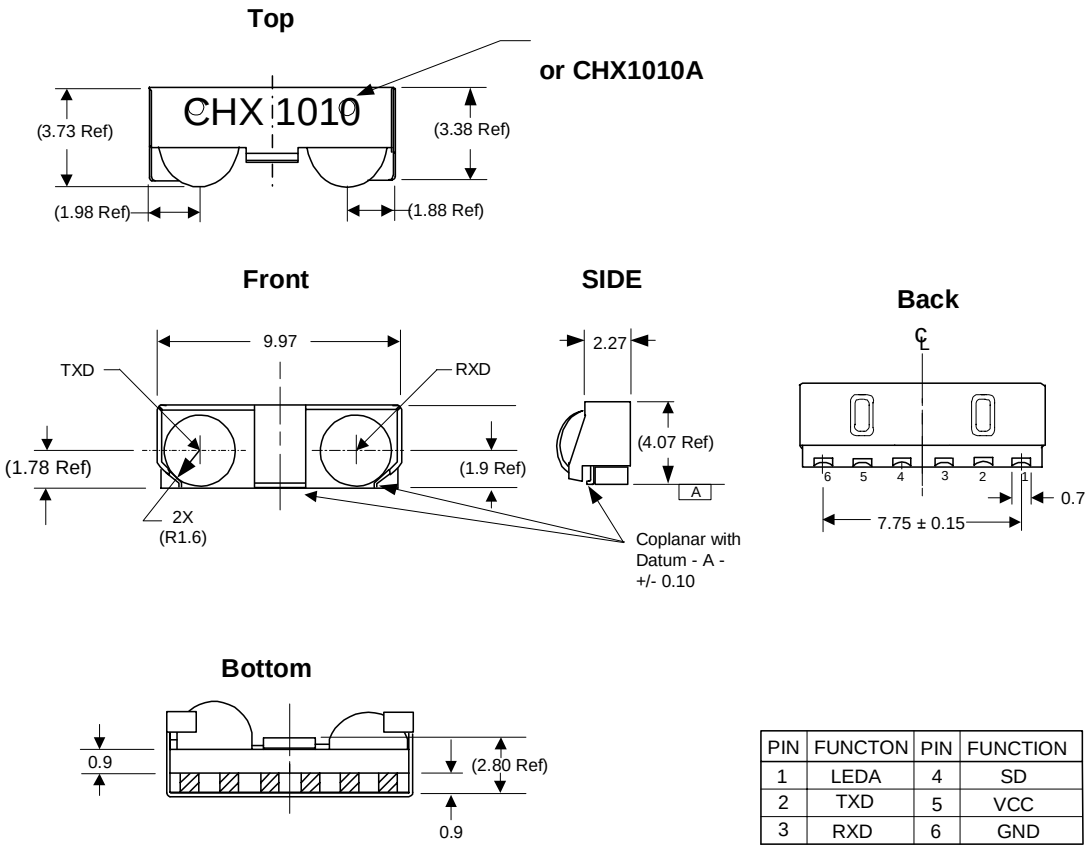


Figure 4. ZHX1000 Mechanical Drawing



PIN	FUNCTON	PIN	FUNCTION
1	LEDA	4	SD
2	TXD	5	VCC
3	RXD	6	GND

Recommended Pad Layout

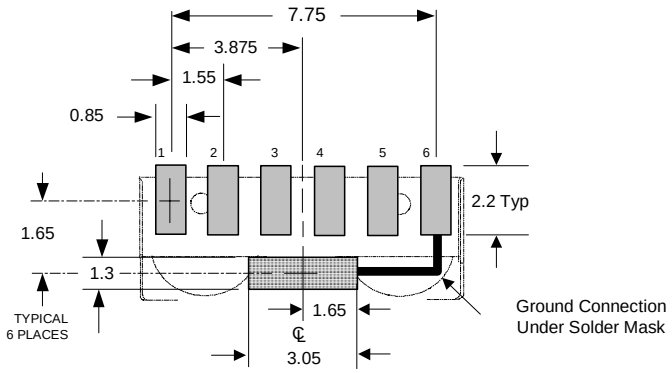


Figure 5. ZHX1010 Mechanical Drawing

ZHX10x0 Soldering and Cleaning Recommendations

Follow these recommendations to maintain the performance of the ZHX10x0 Family of transceivers.

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 ZHX10x0, shown in Figure 6, is recommended.

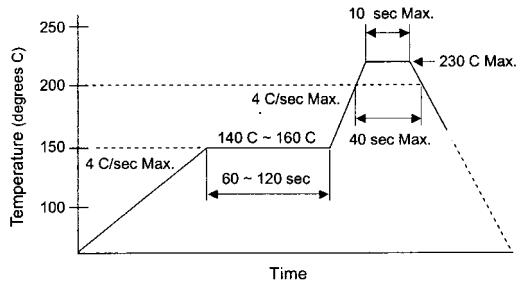


Figure 6. Temperature Profile at the Top Surface of ZHX10x0

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 ZHX10x0 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

ZHX10x0 Packing, Storage, and Baking Recommendations

Follow these recommendations to maintain the performance of the ZHX10x0 Family of transceivers.

Storage

To avoid moisture absorption, ZHX10x0 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 6 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-Proof Packing

In order to avoid moisture absorption during transportation and storage, ZHX10x0 reels are packed in aluminum envelopes that contain a desiccant with a humidity indicator. The indicator changes color from blue to pink as moisture is absorbed.

Taping Specifications

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

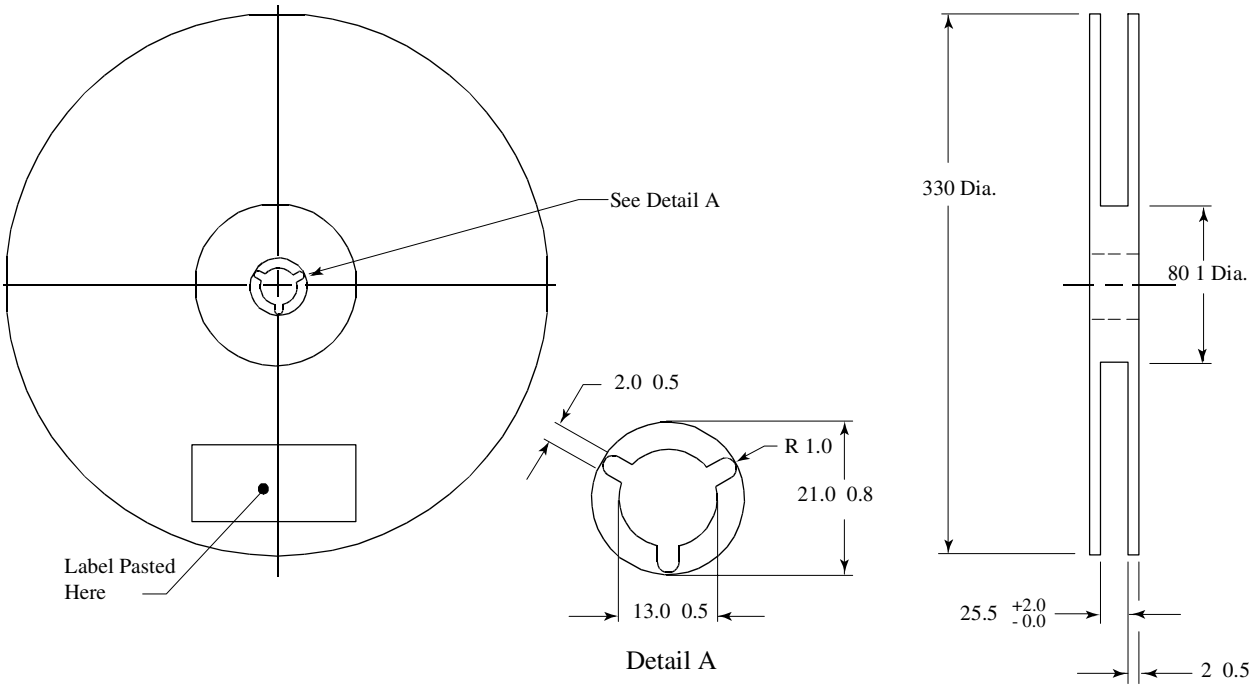


Figure 7. ZHX1000 Reel Dimensions (Unit: mm)

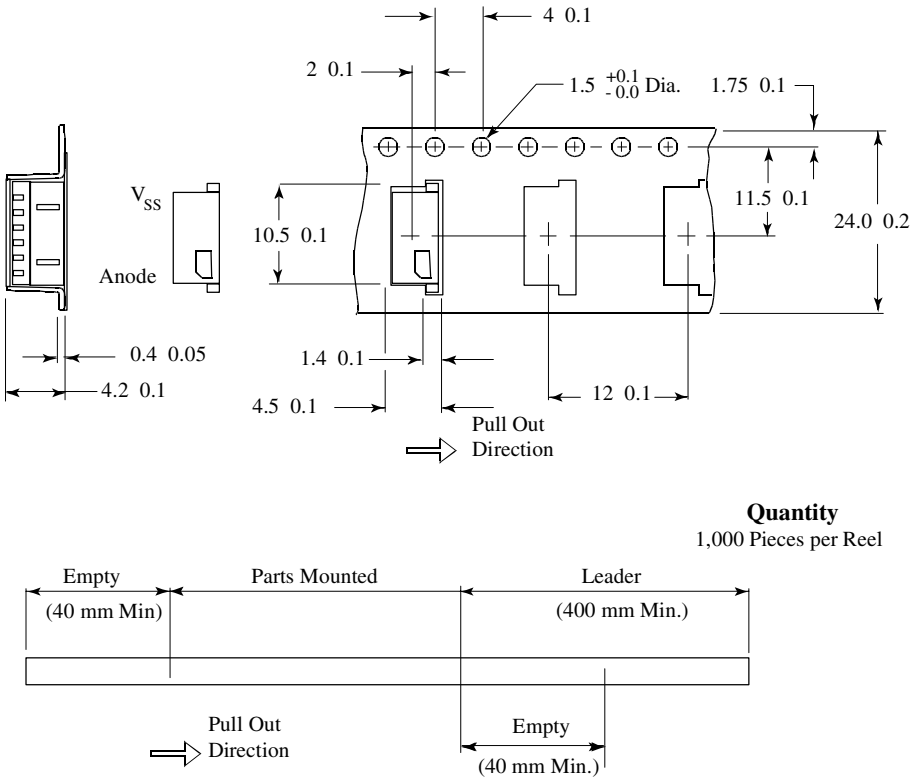


Figure 8. ZHX1000 Tape Dimensions and Configuration (Unit: mm)

Figure 9 and Figure 10 show the reel dimensions and tape dimensions and configuration for the ZHX1010.

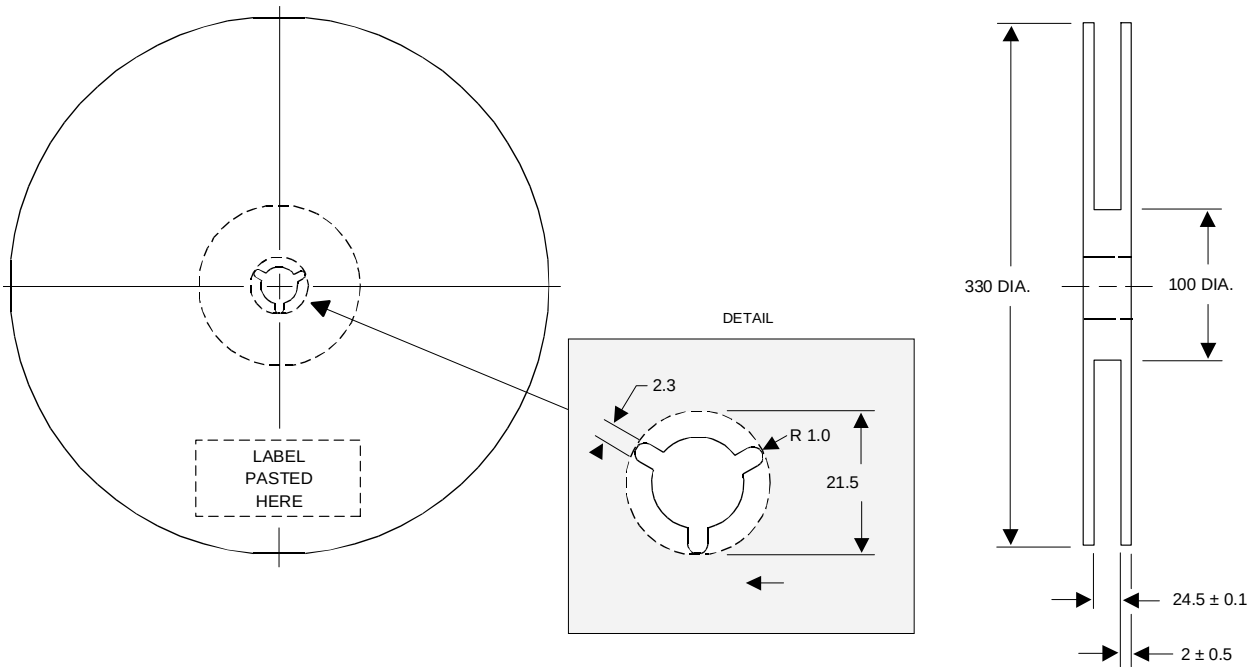


Figure 9. ZHX1010 Reel Dimensions (Unit: mm)

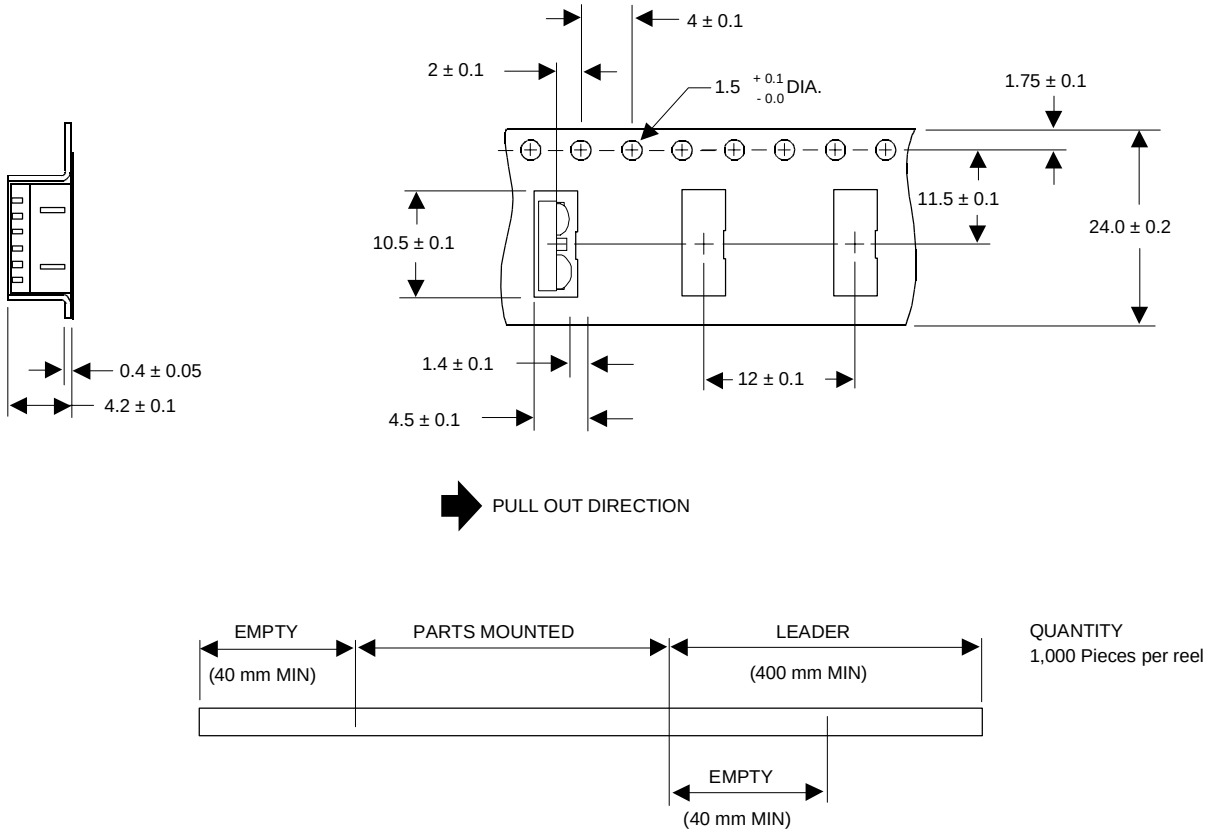


Figure 10. ZHX1010 Tape Dimensions and Configuration (Unit: mm)

Ordering Information

To order ZHX1000 (formerly Calibre CHX1000 or CHX1000A), use ZiLOG part number ZHX1000MV115THTR.

To order ZHX1010 (formerly Calibre CHX1010 or CHX1010A), use ZiLOG part number ZHX1010MV115THTR.

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 ZHX10x0 Family of transceivers specifications.

When you order ZHX1000MV115THTR, ZiLOG reserves the right to ship ZHX1000MQ115THTR if the availability will better meet your requested ship date.

When you order ZHX1010MV115THTR, ZiLOG reserves the right to ship ZHX1010MQ115THTR if the availability will better meet your requested ship date.

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The Document Control Number that appears in the footer of each page of this document contains unique identifying attributes, as indicated in the following table:

PS	Product Specification
NNNN	Unique Document Number
RR	Revision Number
MMYY	Month and Year Published

Customer Feedback Form

If you experience any problems while operating the ZHX10x0 Family of transceivers, 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

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Product Information

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

Return Information

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Email: tools@zilog.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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