



ZHX2010

***Side-Look FIR
Transceiver***

Product Specification

PS007009-0302

ZiLOG Worldwide Headquarters • 532 Race Street • San Jose, CA 95126-3432
Telephone: 408.558.8500 • Fax: 408.558.8300 • www.ZiLOG.com



This publication is subject to replacement by a later edition. To determine whether a later edition exists, or to request copies of publications, contact:

ZiLOG Worldwide Headquarters

532 Race Street
San Jose, CA 95126-3432
Telephone: 408.558.8500
Fax: 408.558.8300
www.ZiLOG.com

ZiLOG is a registered trademark of ZiLOG Inc. in the United States and in other countries. All other products and/or service names mentioned herein may be trademarks of the companies with which they are associated.

Document Disclaimer

©2002 by ZiLOG, Inc. All rights reserved. Information in this publication concerning the devices, applications, or technology described is intended to suggest possible uses and may be superseded. ZILOG, INC. DOES NOT ASSUME LIABILITY FOR OR PROVIDE A REPRESENTATION OF ACCURACY OF THE INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED IN THIS DOCUMENT. ZILOG ALSO DOES NOT ASSUME LIABILITY FOR INTELLECTUAL PROPERTY INFRINGEMENT RELATED IN ANY MANNER TO USE OF INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED HEREIN OR OTHERWISE. Devices sold by ZiLOG, Inc. are covered by warranty and limitation of liability provisions appearing in the ZiLOG, Inc. Terms and Conditions of Sale. ZiLOG, Inc. makes no warranty of merchantability or fitness for any purpose. Except with the express written approval of ZiLOG, use of information, devices, or technology as critical components of life support systems is not authorized. No licenses are conveyed, implicitly or otherwise, by this document under any intellectual property rights.



Table of Contents

Description	1
Features	1
Block Diagram	2
Applications	3
Pin Description	4
VCC Positive Supply	4
GND	4
TAB	4
TXD Transmit Data	5
RXD Receive Data	5
SD Shutdown	5
Electrical and Timing Specifications	7
Transceiver Performance	10
Mechanical Specifications	12
Soldering and Cleaning Recommendations	13
Reflow Soldering	13
Manual Soldering	13
Cleaning	14
Packing, Storing, and Baking Recommendations	15
Storage	15
Baking	15
Moisture-Proof Packing	16
Taping Specifications (in accordance with JIS C 0806)	17
Customer Feedback Form	18
Customer Information	18
Product Information	18
Return Information	18
Problem Description or Suggestion	18



List of Figures

Figure 1. FIR Transceiver Block Diagram	2
Figure 2. Application Block Diagram	3
Figure 3. Timings for 4 Mbit/s Bandwidth Operation	6
Figure 4. Typical I _e Versus Angle	10
Figure 5. Typical S _{IR} E _e Versus Angle	10
Figure 6. Typical F _{IR} E _e Versus Angle	11
Figure 7. ZHX2010 Mechanical Specifications	12
Figure 8. Temperature Profile for the Top Surface	13
Figure 9. FIR Transceiver Packaging	16
Figure 10. Reel Dimensions	17
Figure 11. Tape Dimensions and Configuration	17

List of Tables

Table 1. FIR Transceiver Pin Out	4
Table 2. Absolute Maximum Ratings	7
Table 3. Recommended Operating Conditions	7
Table 4. DC Electrical Operating Characteristics	7
Table 5. AC Electrical Characteristics	9
Table 6. Optical Characteristics	9

Description

The ZiLOG ZHX2010 is an ideal side-look transceiver for applications in today's ultracompact power-conscious portable products, such as notebook PCs, mobile phones, digital cameras, portable printers, handheld computers, or personal data assistants (PDAs). Designed to support all IrDA at up to 4 Mb/s and LocalTalk™ and Sharp ASK™ modes, the transceiver combines an infrared emitting diode (IRED) emitter, a PIN photodiode detector, a programmable LED driver, and a differential receiver in a single, miniature package.

The ZiLOG ZHX2010 provides an efficient implementation of the IrDA-Data 1.4 standard in a small footprint format. Application circuit space is also minimized, as only two external components (a terminating resistor and a decoupling capacitor) are required to implement a complete IrDA transceiver solution.

The ZHX2010 is capable of legacy-mode power management and bandwidth switching.

Features

- IrDA-Data, SIR, LocalTalk™, and Sharp ASK™
- Data rates from 2400 bps–4 Mbits/s
- Ultracompact package: 9.8 mm long x 4.8 mm wide x 4.0 mm high
- On-chip LED protection circuit
- Supply voltage 2.7–5.25 V
- Low power consumption: 2 mA at 2.7 V / 3 mA at 5.25 V (typical)
- Ambient light and noise rejection circuitry
- Power shutdown mode (~50 nA typical)
- No external resistor required for LED bias
- Extended operating temperature range (–30 °C to +85 °C)
- Meets IEC 825-1 Class 1 Eye Safety Specifications

Block Diagram

Figure 1 is the block diagram for the FIR transceiver.

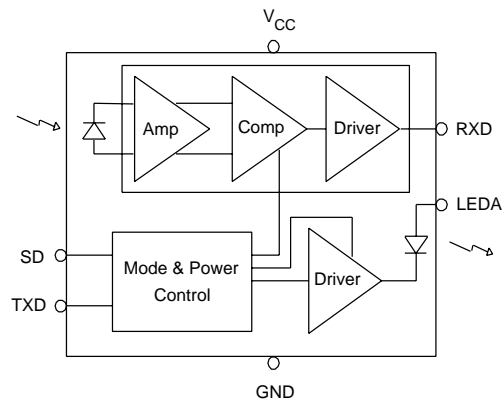


Figure 1. FIR Transceiver Block Diagram

Applications

The ZHX2010 can be used in the following applications:

- Notebook PCs
- Digital still or video cameras
- Portable printers
- Cellular telephones
- Personal digital assistants
- Handheld or battery-operated equipment

Figure 2 shows a typical application of the FIR transceiver.

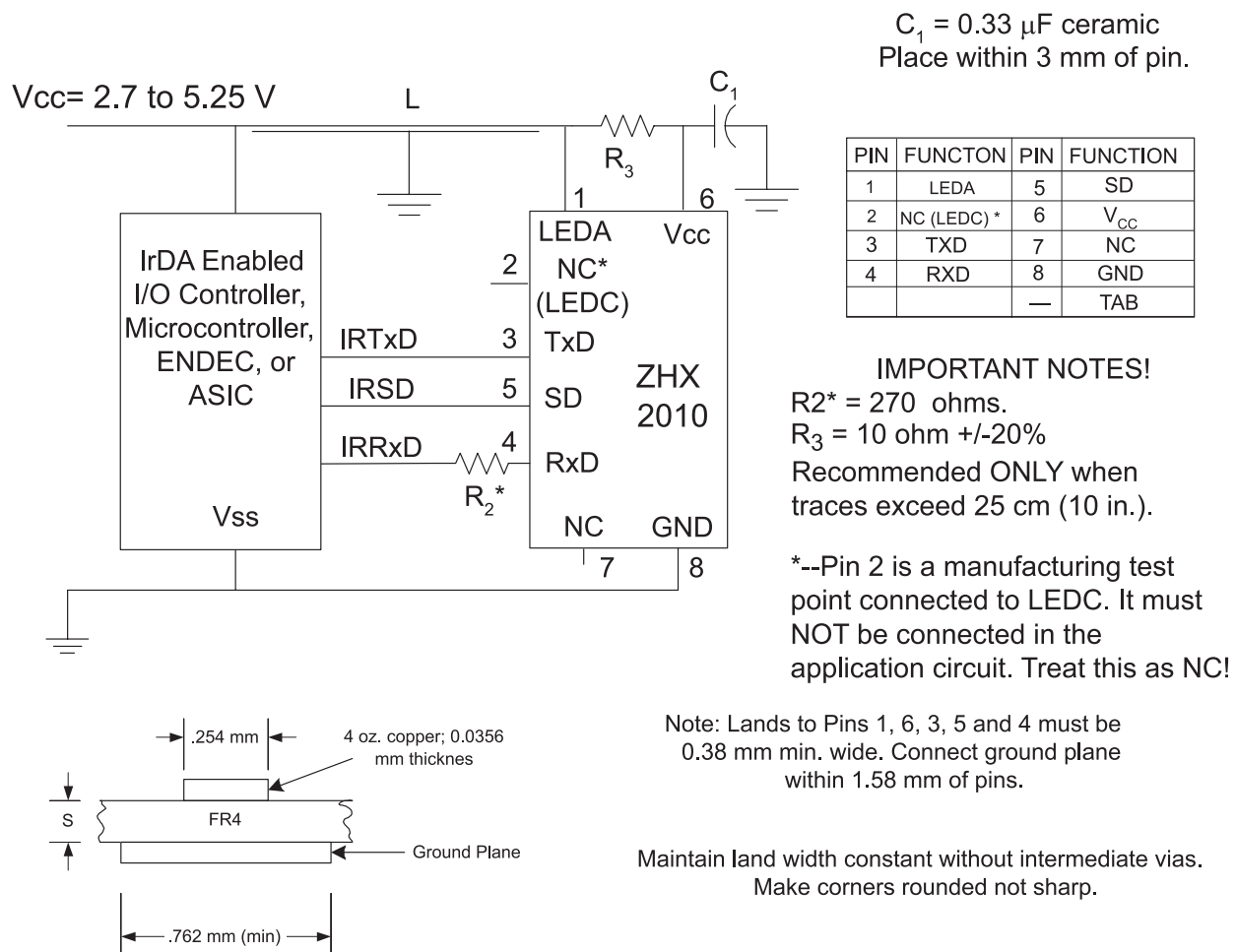


Figure 2. Application Block Diagram

Pin Description

Table 1 lists the pin out for the FIR transceiver. The pins are described in this section.

Table 1. FIR Transceiver Pin Out

Pin	Name	Function	I/O
1	LEDA	IREDA anode	—
2	NC(LED C)	Do not connect	—
3	TXD	Transmitter input	I
4	RXD	Receiver output	O
5	SD	Enables shutdown	I
6	V _{CC}	Supply voltage	—
7	NC	Not connected	—
8	GND	Ground	—
—	TAB	Shield ground	—

V_{CC} Positive Supply

(Power)

Connect to positive power supply (2.7–5.25 V).

Place a 0.33 μ F, 6 V, +/-20% ceramic bypass capacitor as close as possible to the V_{CC} pin.

GND

(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 when SD is low. An on-chip protection circuit disables the IRED driver if the TX pin is asserted for longer than 100 μ s. When used in conjunction with the SD pin, this pin also provides control signals to the internal digital serial control interface and legacy mode subsystems.

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 push-pull CMOS driver capable of driving a standard CMOS or TTL load. No external pull-up or pull-down resistor is required.

SD Shutdown

(Input, active high)

This CMOS input pad functions as a shutdown switch and as a mode switch, allowing bandwidth changes.

Shutdown and Legacy Mode Bandwidth Switching

Assertion of this pin high for a period of time exceeding 500 m places the module into legacy shutdown mode, reducing current consumption to \sim 50 nA. On the falling edge of this signal, the state of the TX pin is sampled and used to set receiver low bandwidth (TX = Low) or high bandwidth (TX = High) mode.

The transceiver powers on with the upper limit of the receiver bandwidth set to 1.152 Mbits/s operation. To set the bandwidth for operation at 4 Mbits/s, apply the timings shown in Figure 3 to the SD and the TX inputs.

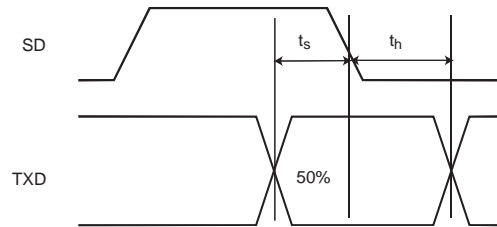


Figure 3. Timings for 4 Mbit/s Bandwidth Operation

- **Note:** The internal LED driver is disabled when SD is active and is not enabled until the next rising edge of TX. This ensures that the LED is not active during bandwidth adjustment.

It is recommended that the SD pin be connected to GND if the bandwidth adjustment and shutdown modes are not required.

Electrical and Timing Specifications

Table 2 through Table 6 list the electrical and timing specifications.

Table 2. Absolute Maximum Ratings

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit	Comment
Supply voltage		V_{CC}	-0.5		5.5	V	
Power dissipations		P_D			500	mW	
Junction temperature		T_J			125	°C	
Storage temperature range		T_{stg}	-25		85	°C	
Soldering temperature	20 s at 215 °C			215	240	°C	
Average IRED current		$I_{LED(DC)}$			150	mA	
Rep. pulsed IRED current		$I_{LED(RP)}$			600	mA	<90 μ s, t_{on} <25%
Peak IRED current		$I_{LED(PK)}$			1	A	<2 μ s
TXD input voltage		I_{TXD}	-0.5		$V_{CC}+0.5$	V	
RXD output voltage		I_{RXD}	-0.5		$V_{CC}+0.5$	V	

Table 3. Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply voltage	V_{CC}	2.7	5.25	V
Ambient operating temperature	T_{amb}	-30	85	°C

Table 4. DC Electrical Operating Characteristics

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit	Comment
Supply current, listening		I_{CC}	1	2.5	3	mA	
Supply current, receiving		I_{CC}	1	5	7	mA	No load; no pull-up resistors
Supply current, shutdown		I_{CC}		50	100	nA	

Specifications hold over the recommended operating conditions unless otherwise noted. Unspecified test conditions can be anywhere in their operating range. All typical values are at 25 °C unless otherwise noted.

Table 4. DC Electrical Operating Characteristics (Continued)

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit	Comment
Turn-on time	SD-RX enable	T_{on}			200	μs	
Receiver							
RX output low voltage		V_{OL}			0.5	V	
Static sink current on RX	2.2 k Ω load	I_{OL}	1.2		1.9	mA	
RX output high voltage		V_{OH}	$V_{CC}-0.5$			V	
Static source current on RX	2.2 k Ω load	I_{OH}	1.2		1.9	mA	
RX edge rates	All data rates	t_r, t_f	20		40	ns	
RX resistive load		R_{Load}			2.2	k Ω	
RX capacitive load		C_{Load}			50	pF	
Turnaround time		TAT			200	μs	TXD-Min Popt. RXD
Transmitter							
Input voltage low		V_{IL}	0		0.8	V	TXD, SD
Input voltage high		V_{IH}	1.4		$V_{CC}+0.2$	V	TXD, SD
Input capacitance		C_i			5	pF	
LED optical rise/fall time LED		t_r, t_f			40	ns	Integrated
Peak transmit current		I_{LED}	10		600	mA	25% duty cycle
Average transmit current		I_{LED}	5		150	mA	25% duty cycle
SIR TX pulse width		T_{XPD}	1.41		22.13	μs	
MIR TX pulse width		T_{XPD}	147		261	ns	
FIR TX pulse width		T_{XPD}	115		135	ns	

Specifications hold over the recommended operating conditions unless otherwise noted. Unspecified test conditions can be anywhere in their operating range. All typical values are at 25 °C unless otherwise noted.

Table 5. AC Electrical Characteristics

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
RX rise time	R=2 k Ω , C=50 pF	t _r	10	20	40	ns
RX fall time	R=2 k Ω , C=50 pF	t _f	10	20	40	ns
TX setup to SD high/low		t _s	200			ns
TX hold from SD high/low		t _h	200			ns
RX pulse width	9.6 kbps	t _{pw}	0.8		20	μ s
RX pulse width	1.152 Mbps	t _{pw}	100		800	ns
RX pulse width	4 Mbps, single	t _{pw}	60		165	ns
RX pulse width	4 Mbps, double	t _{pw}	185		290	ns
Output delay at 40 mW/cm ²	<1.2 Mbps	t _d		1	2	μ s
Receiver latency		t _L			100	μ s
RX valid after shutdown		t _{RXDEN}			60	μ s
LED protection timeout		t _{LEDP}			100	μ s

Table 6. Optical Characteristics

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Minimum detection irradiance	SIR: 9.6–115 kbps	E _{MIN}		2	3	μ W/cm ²
	MIR: 1.152 Mbps	E _{MIN}		2.5	4	μ W/cm ²
	FIR: 4 Mbps	E _{MIN}		7		μ W/cm ²
Output radiant intensity		I _E	100	140	320	mW/sr
Peak wavelength		I _P	860		900	nm
Optical overshoot					25	%



Transceiver Performance

Figure 4 through Figure 6 show the performance of the FIR transceiver.

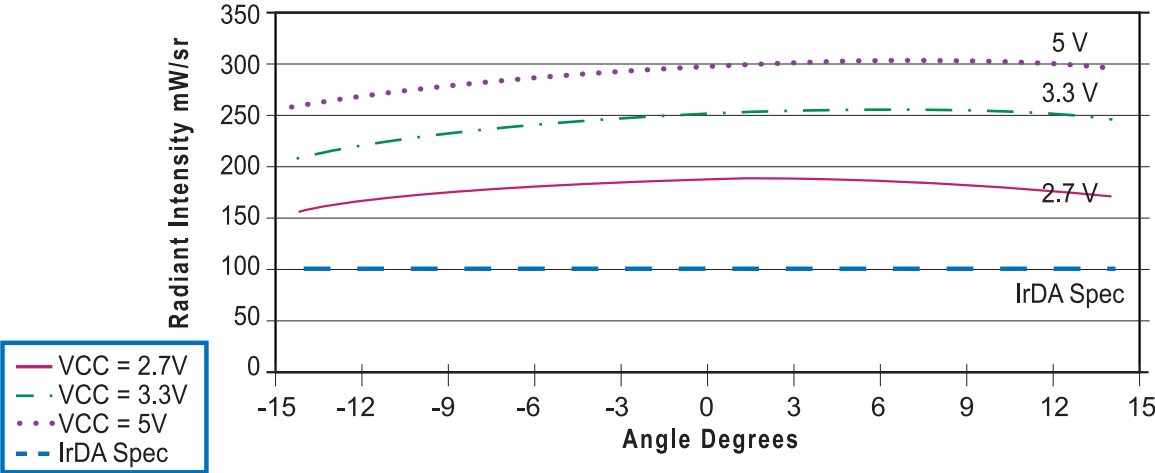


Figure 4. Typical Ie Versus Angle

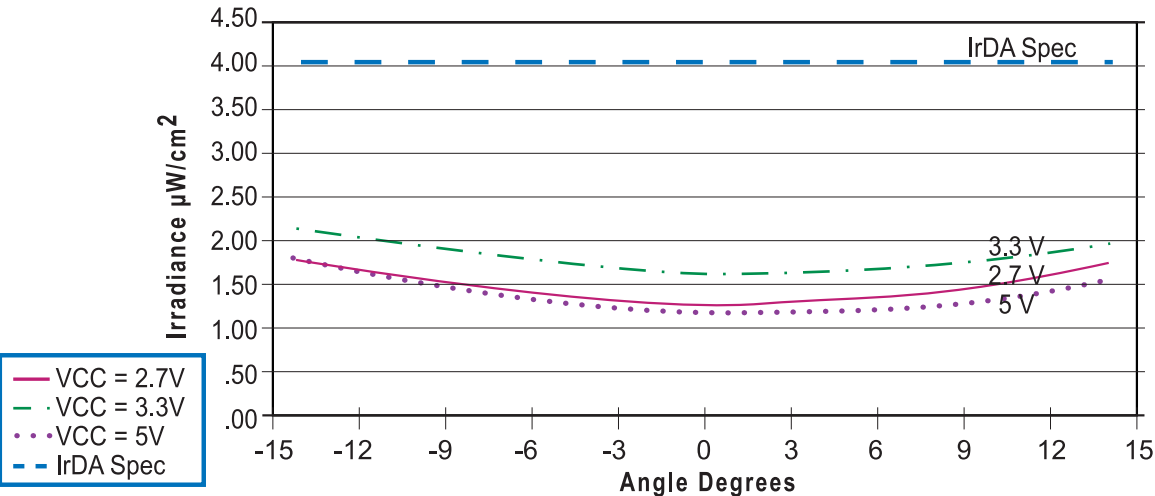


Figure 5. Typical SIR Ee Versus Angle

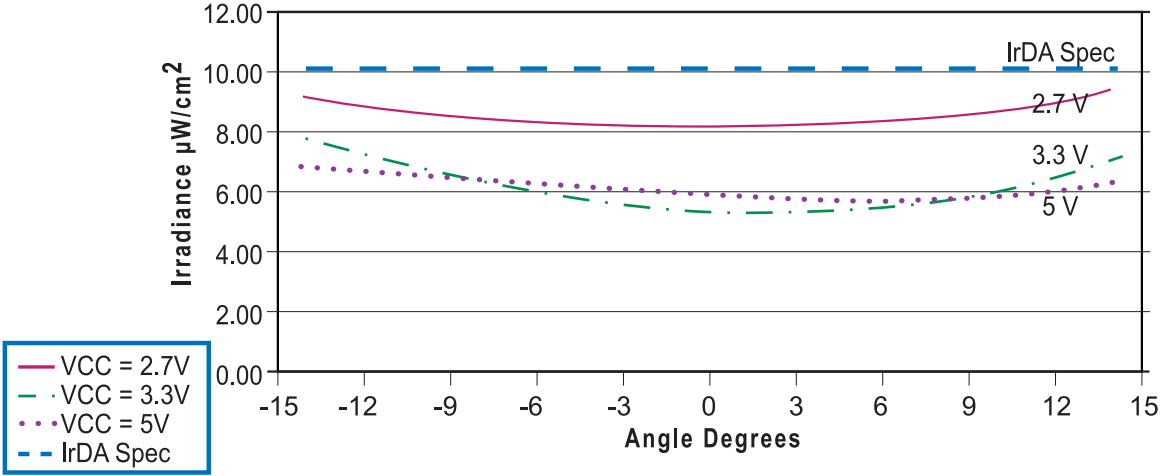


Figure 6. Typical FIR Ee Versus Angle

Mechanical Specifications

Figure 7 shows the mechanical specifications for the FIR transceiver.

- **Note:** The ZiLOG ZHX2010 transceiver will continue to be marked as the original Calibre part number, CHX2010.

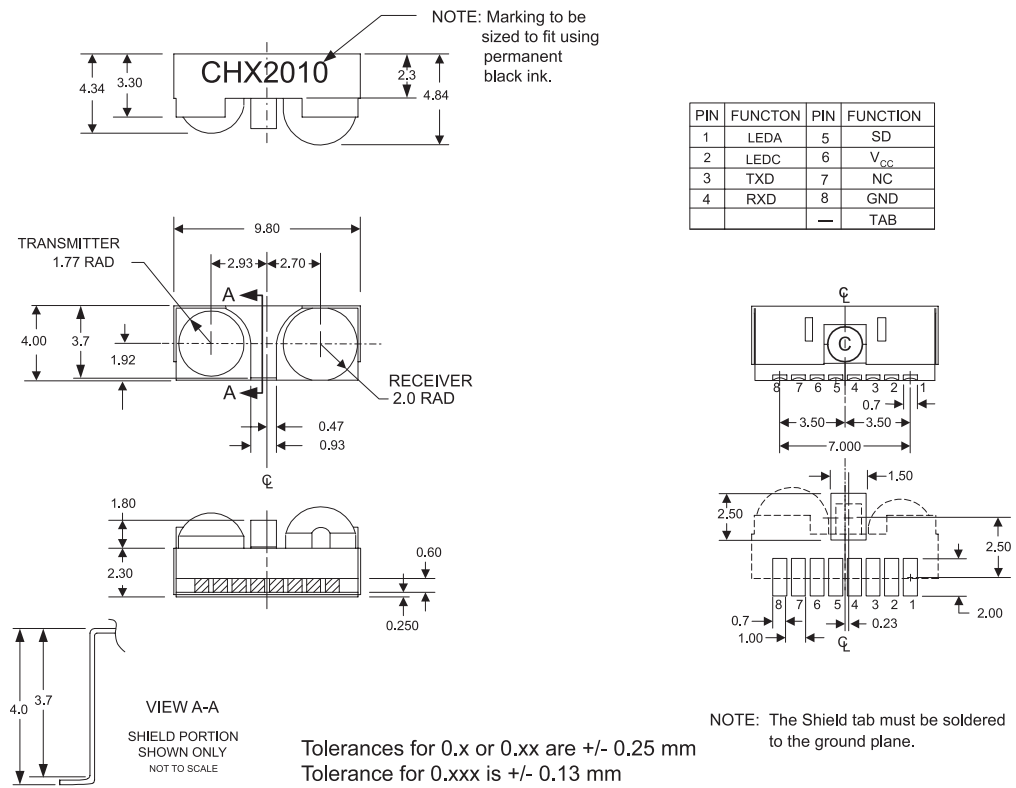


Figure 7. ZHX2010 Mechanical Specifications

Soldering and Cleaning Recommendations

Follow these recommendations to maintain the performance of the ZHX2010 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 ZHX2010, shown in Figure 8, is recommended.

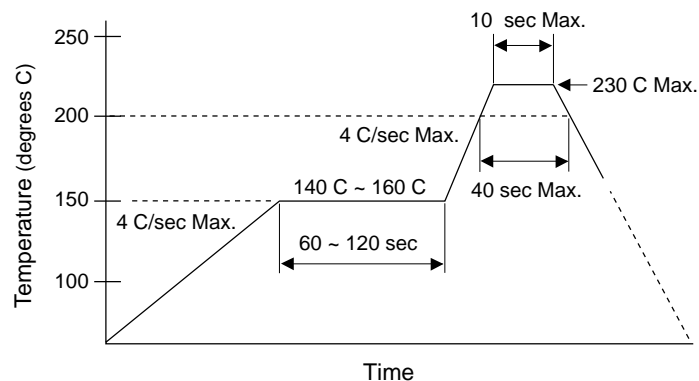


Figure 8. Temperature Profile for the Top Surface

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 ZHX2010 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

Packing, Storing, and Baking Recommendations

Follow these recommendations to maintain the performance of the ZHX2010 transceiver.

Storage

To avoid moisture absorption, ZHX2010 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-Proof Packing

In order to avoid moisture absorption during transportation and storage, ZHX2010 reels are packed in aluminum envelopes (see Figure 9) that contain a desiccant with a humidity indicator. The indicator changes color from blue to pink as moisture is absorbed.

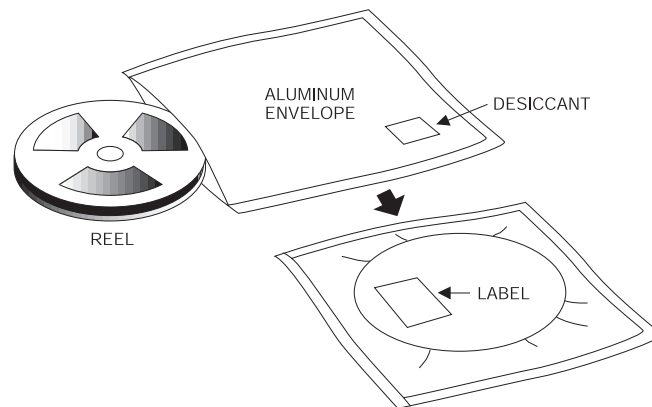


Figure 9. FIR Transceiver Packaging

Taping Specifications (in accordance with JIS C 0806)

Figure 10 shows the reel dimensions, and Figure 11 shows the tape dimensions and configuration.

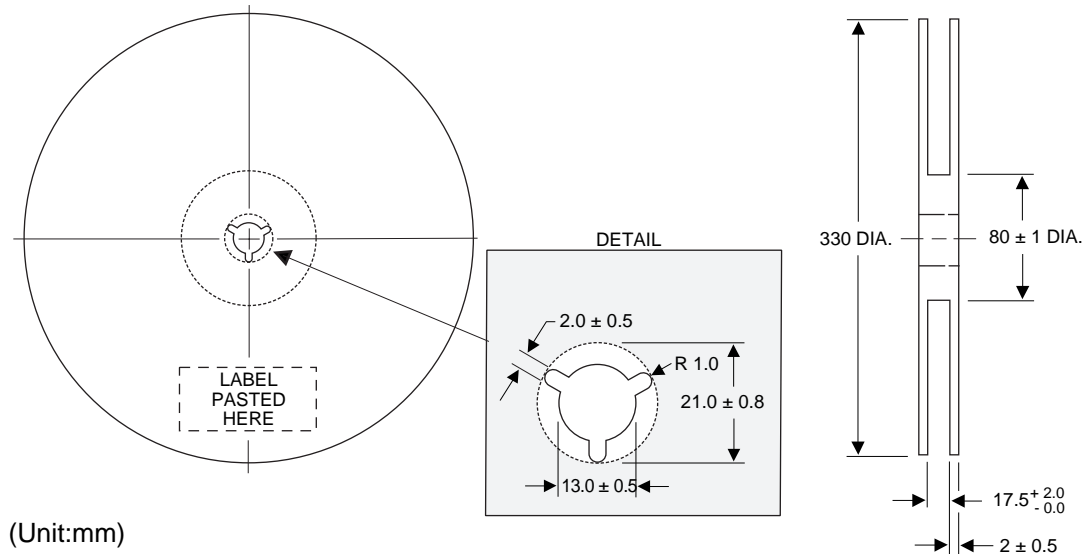


Figure 10. Reel Dimensions

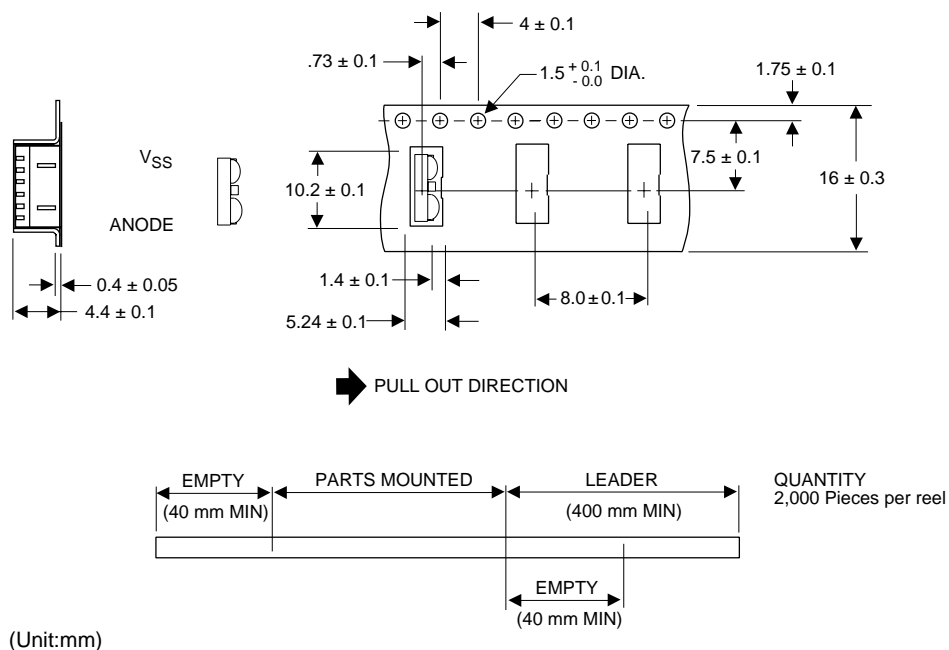


Figure 11. Tape Dimensions and Configuration



Customer Feedback Form

If you experience any problems while operating this product, 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@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.
