



***ZHX1200***

***Low-Power SIR (IrMC)  
Transceiver***

**Product Specification**

PS007107-1101



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## Description

The ZiLOG ZHX1200 is the transceiver of choice for mobile communication applications in today's ultra compact, power-conscious, portable products, such as mobile phones, pagers, or personal data assistants (PDAs). Specifically designed to support Infrared Data Association (IrDA) IrMC low-power SIR (serial infrared) mode, the transceiver combines an infrared emitting diode (IRED) emitter, a PIN photodiode detector, a digital AC-coupled LED driver, and a receiver/decoder in a single, miniature package.

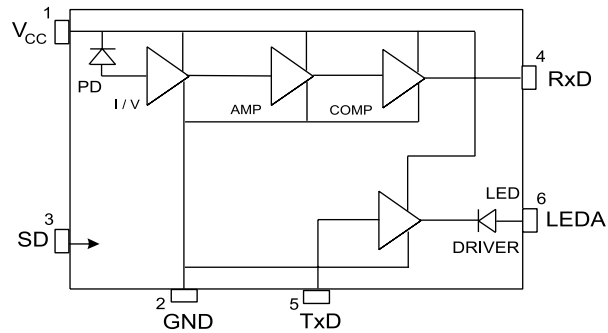
The ZiLOG ZHX1200 provides an efficient implementation of the low-power SIR standard in a small footprint format. Application circuit space is also minimized, as only one capacitor is required to complete the solution.

## Features

- Compliant to the IrDA Specification Low-Power SIR
- Low supply voltage range, 2.7 to 3.6 V
- 0.2  $\mu$ A (maximum) shutdown
- Low power, 95  $\mu$ A (typical) at 3.3 V
- Ultra small form factor (6.8 mm long x 2.8 mm wide x 2.2 mm high)
- External components: one resistor and one capacitor
- Extended operating temperature range ( $-30^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ )
- $I_{\text{LED}}=35\text{ mA}$  at 3.6 mW/sr
- Meets IEC 825-1 Class 1 Eye Safety Specifications

## Block Diagram

Figure 1 is the block diagram for the IrMC Transceiver.



**Figure 1. IrMC Transceiver Block Diagram**

Figure 2 shows a typical application of the IrMC transceiver.

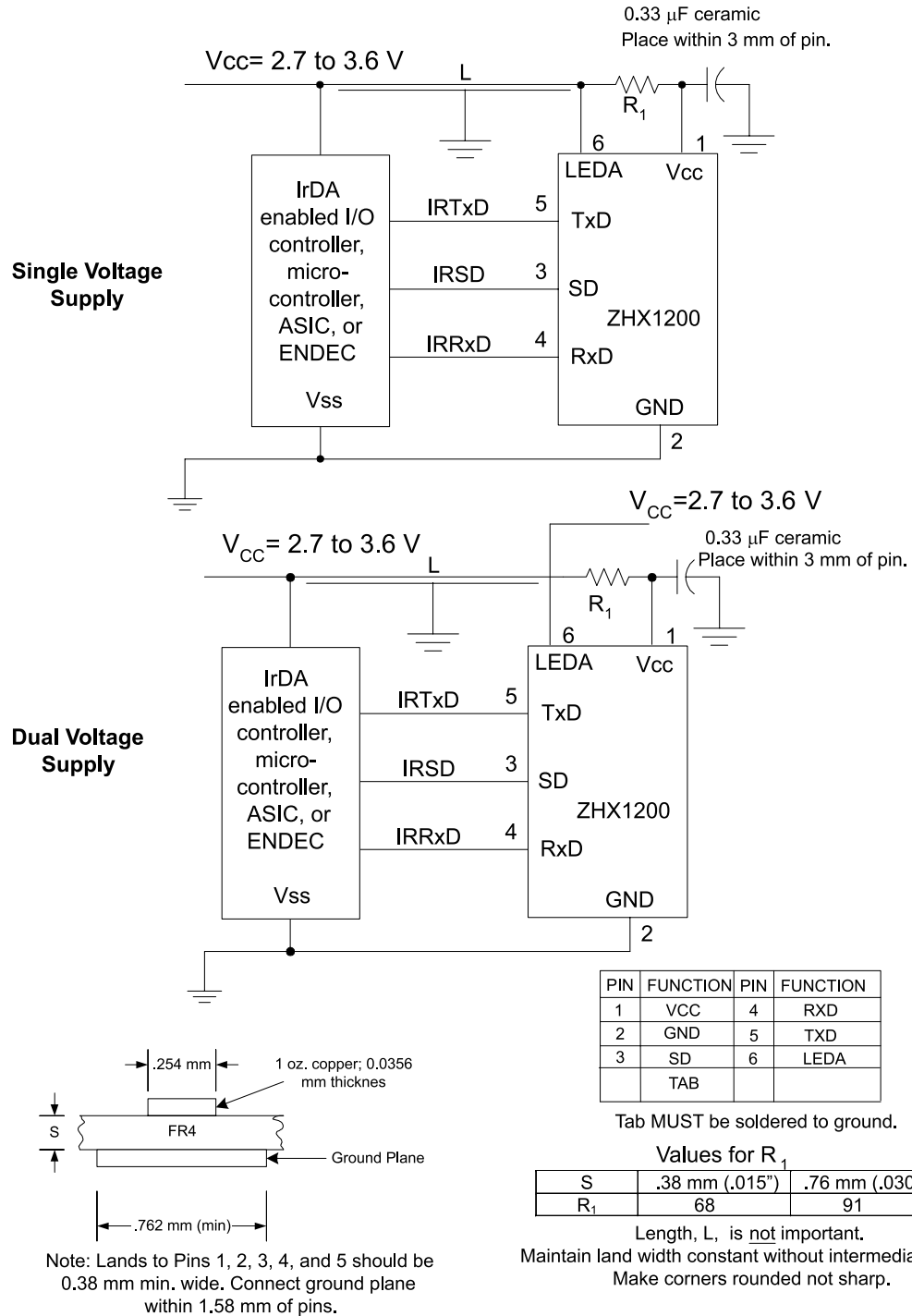


Figure 2. ZHX1200 Application Block Diagrams

## Pin Description

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

**Table 1. IrMC Transceiver Pin Out**

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

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

(Power)

Connect to positive power supply (2.7–3.6 V).

Place a 0.33-μF ceramic bypass capacitor 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; 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 0.2  $\mu$ A. Module shutdown current might be limited by the choice of capacitor used from  $V_{CC1}$  to ground.

### **LEDA IRED Driver Anode**

(Power)

This output is internally connected to the LED anode and is connected to the supply voltage. Current to the LED must be limited to a maximum of 50 mA (20% duty cycle maximum). The voltage range on this pad is 2.7–3.6 volts.

## Electrical and Timing Specifications

Table 2, Table 3, and Table 4 list the electrical and timing specifications.

**Table 2. Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit	Comment
Supply voltage	$V_{CC}$	0	7.0	V	$V_{CC}$ , GND
Input voltage	$V_{IN}$	GND–0.3	$V_{CC}+0.3$	V	TxD, SD
Output (Ext.) voltage	$V_{OUT}$	GND–0.3	$V_{CC}+0.3$	V	RxD
LED current	$I_{PULSE}$		50	mA	20% duty cycle, $T_a=25\text{ }^{\circ}\text{C}$ , $t_{ON}\leq 90\text{ }\mu\text{S}$
Storage temperature	$T_{ST}$	–40	100	$^{\circ}\text{C}$	
Solder temperature	$T_{SOL}$		260	$^{\circ}\text{C}$	

**Table 3. Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply voltage	$V_{CC}$	2.7	3.6	V
Ambient operating temperature	$T_{OP}$	–30	85	$^{\circ}\text{C}$

**Table 4. Electrical Characteristics**

Parameter	Symbol	Condition	Min	Typical	Max	Unit	Remarks
High-level input voltage	$V_{IH}$		$0.75V_{CC}$			V	TxD, SD
Low-level input voltage	$V_{IL}$				0.4	V	TxD, SD
High-level output voltage	$V_{OH}$	$I_{OH}=20\ \mu A$	$V_{CC}-0.3$			V	RxD
Low-level output voltage	$V_{OL}$	$I_{OL}=400\ \mu A$			0.3	V	RxD
Transmitter current	$I_{LED}$			35		mA	
Receive current	$I_S$	$V_{CC}=3.3\ V$		95	120	$\mu A$	SD=0 V, TxD=0 V
Standby current	$I_{STB}$				0.2	$\mu A$	SD= $V_{CC}$ , TxD=0 V
Optical rise/fall time	$t_{Rr}t_{Rf}$			40	200	nS	
RxD pulse width	$T_{PWA}$	SIR=115 Kbps	1.0	1.6	2.0	$\mu S$	
Shutdown time <sup>(1)</sup>	$T_{SD}$				1	$\mu S$	
Startup time <sup>(2)</sup>	$T_{STU}$				100	$\mu S$	
Latency <sup>(3)</sup>	$T_{RRT}$				60	$\mu S$	
Trans. radiant. intensity <sup>(4)</sup>	$I_E$	$I_{LED}=35\ mA$	3.6		28	mW/sr	$\theta_h$ , $\theta_v \leq (\pm 15^\circ)$
Minimum threshold irradiance <sup>(5)</sup>	$E_{emin}$	$V_{CC}=3.3\ V$			8.1	$\mu W/cm^2$	$\theta_h$ , $\theta_v \leq (\pm 15^\circ)$
Maximum input irradiance	$E_{emax}$	$V_{CC}=3.3\ V$	500			$mW/cm^2$	$\theta_h$ , $\theta_v \leq (\pm 15^\circ)$

Unless otherwise noted:  $V_{CC}=3.3\ V$ ,  $GND=0\ V$ ,  $T_A=+25\ ^\circ C$

(1) The time to go into standby mode after SD is high

(2) The time to revert to active mode after SD is low

(3) Time required to shift from transmit to receive

(4)  $\theta_h$  is the horizontal angle;  $\theta_v$  is the vertical angle.

(5) Noise dependent

(6) Time LED stays on when TxD is left high

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

Parameter	Symbol	Condition	Min	Typical	Max	Unit	Remarks
Angle of half intensity	$\theta$			20		°	Hor. and vert.
Light pulse rise, fall time	$t_{or}t_{of}$				200	nS	
Optical pulse width <sup>(6)</sup>	$t_{OPW}$			20		μS	TxD="H"
Optical overshoot	$t_{OPO}$				25	%	
Peak wavelength	$\lambda_p$			870		nm	

Unless otherwise noted:  $V_{CC}=3.3\text{ V}$ ,  $GND=0\text{ V}$ ,  $T_A=+25\text{ °C}$

(1) The time to go into standby mode after SD is high

(2) The time to revert to active mode after SD is low

(3) Time required to shift from transmit to receive

(4)  $\theta_h$  is the horizontal angle;  $\theta_v$  is the vertical angle.

(5) Noise dependent

(6) Time LED stays on when TxD is left high

Table 5 and Figure 3 show the truth table for the IrMC transceiver.

**Table 5. Truth Table**

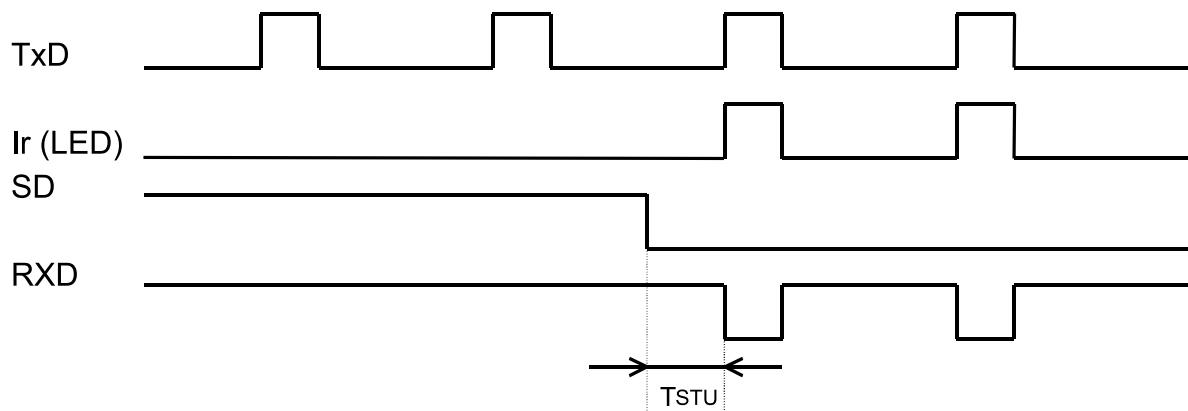
Input			Output	
SD	TxD	Ee	Ir(LED)	RxD
$V_{IL}$	$V_{IH}$	X	High(On)	NV
$V_{IL}$	$V_{IL}$	$Ee_{IH}$	Low(Off)	Low
$V_{IH}$	$V_{IH}$	X	Low(Off)	High
$V_{IH}$	$V_{IL}$	X	Low(Off)	High

X: Don't care

NV: Not valid

Ee: Input irradiance present at detector surface

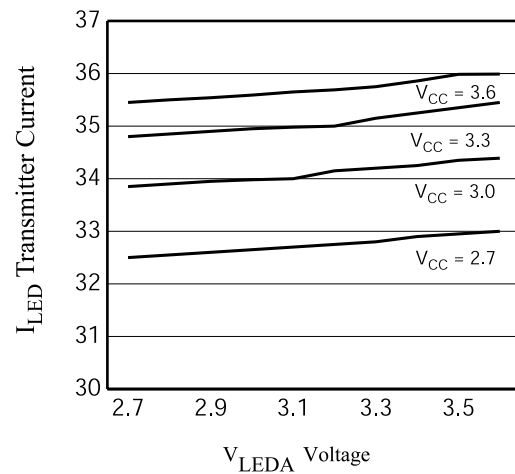
$Ee_{IH}$ :  $8.1 \mu W/cm^2 \leq Ee \leq 500 mW/cm^2$



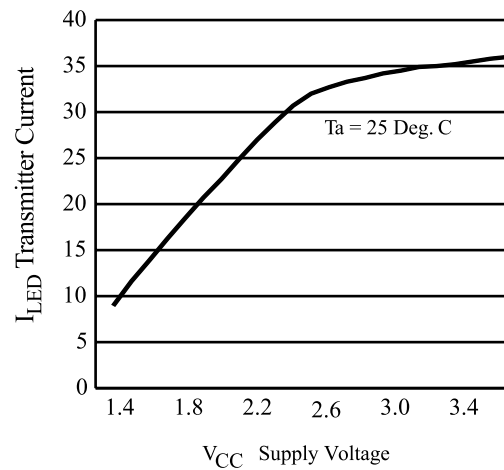
**Figure 3. Truth Table**

## Transceiver Performance

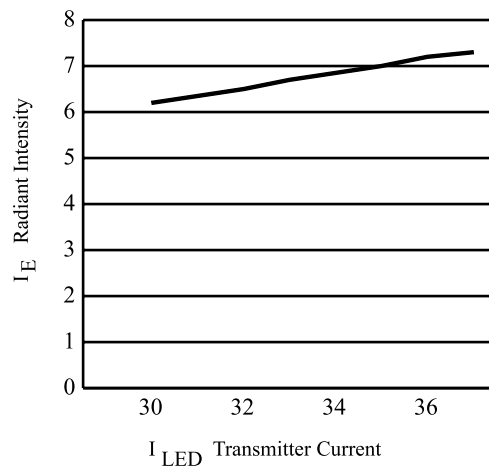
Figure 4 through Figure 10 show the performance of the IrMC transceiver.



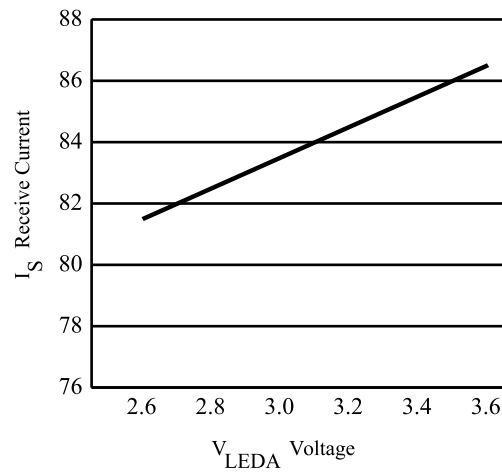
**Figure 4. Transmitter Current Versus LED Voltage (Ta=25 °C)**



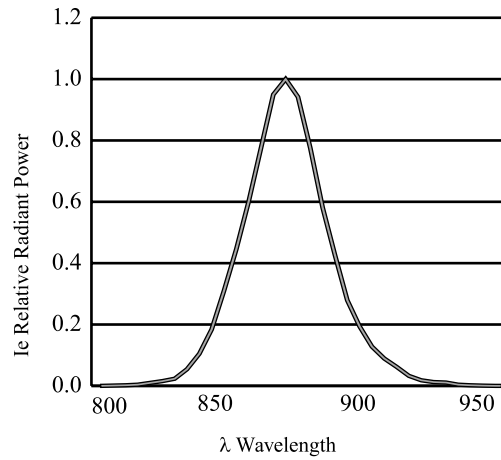
**Figure 5. Transmitter Current Versus Supply Voltage (Ta=25 °C)**



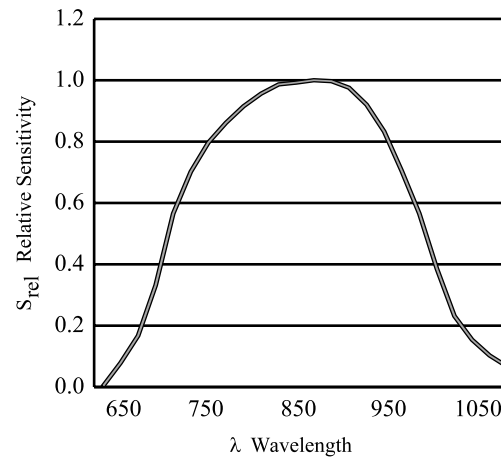
**Figure 6. Radiant Intensity Versus Transmitter Current ( $T_a=25^\circ C$ )**



**Figure 7. Receive Current Versus Supply Voltage ( $T_a=25^\circ C$ )**

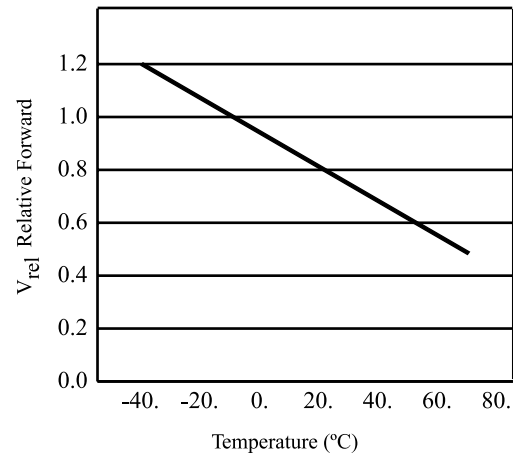


**Figure 8. LED Relative Radiant Power Versus Wavelength (Ta=25 °C)**



**Figure 9. Photodiode Relative Radiant Sensitivity Versus Wavelength (Ta=25 °C)**



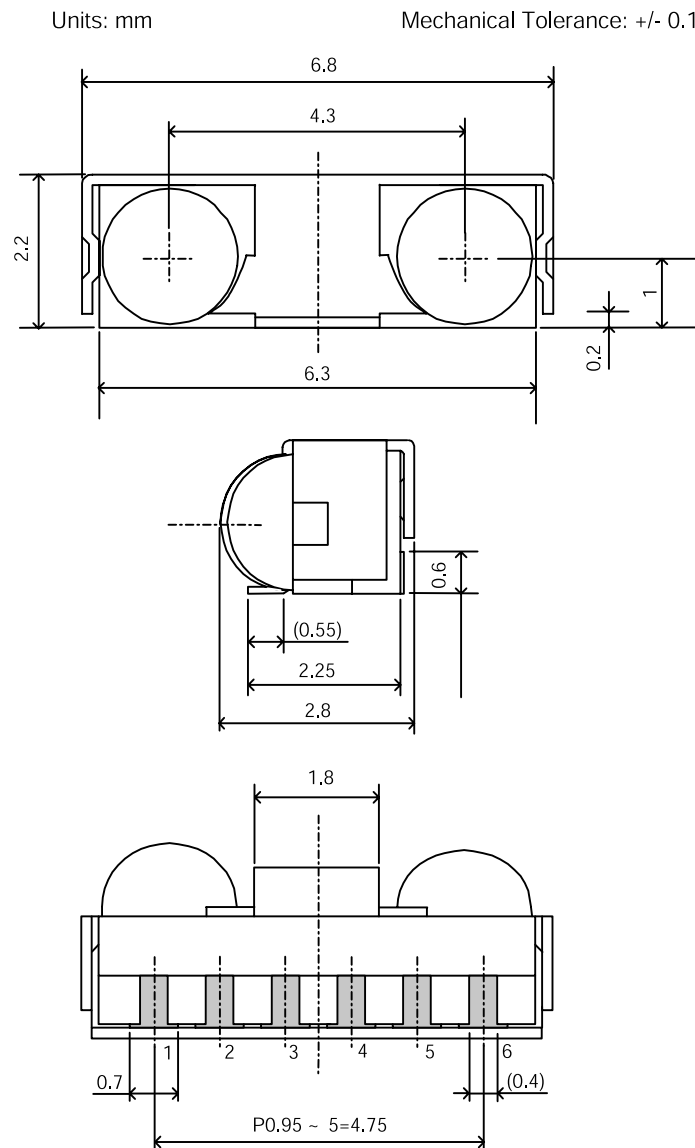


**Figure 10. Relative Forward Voltage Versus Ambient ( $I_F=35\text{ mA}$ )**

## Mechanical Specifications

Figure 11 shows the mechanical specifications for the IrMC transceiver.

► **Note:** The ZiLOG ZHX1200 transceiver will continue to show the original Calibre part number, CHX1200.



Note: The Shield tab must be soldered to the ground plane.

**Figure 11. ZHX1200 Mechanical Specifications**

## Pad Layout

Figure 12 shows the ZHX1200 pad layout.

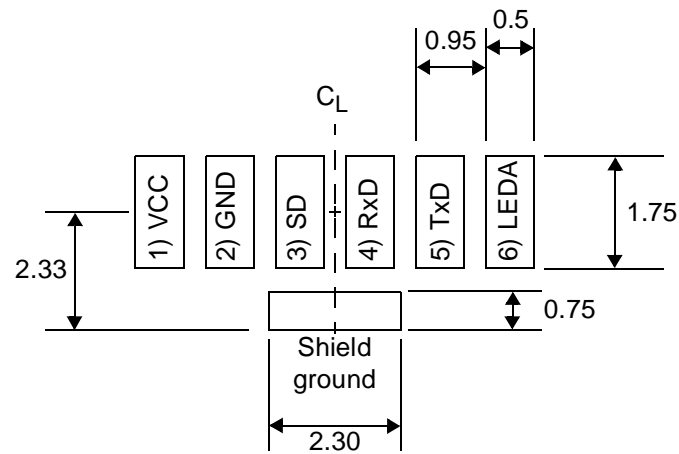
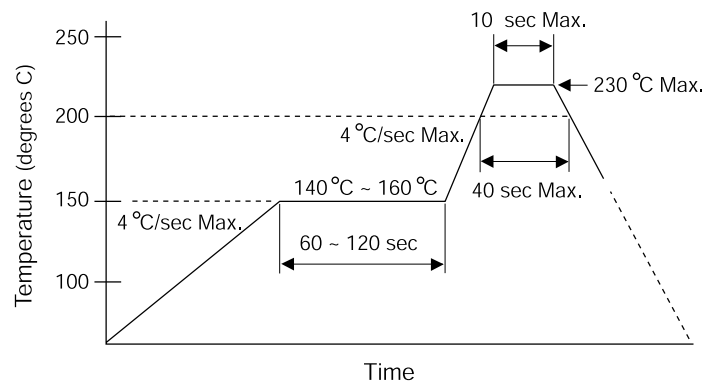


Figure 12. ZHX1200 Pad Layout

## Recommended Soldering Conditions

Follow these recommendations to maintain the performance of the ZHX1200 transceiver.

- With the soldering iron:  
Temperature at tip: no more than 280 °C  
Time: 3 seconds *maximum*
- Reflow:  
Preheat: 120 °C to 150 °C, 60 to 120 seconds  
Soldering: 230 °C, within 10 seconds  
Heating up and cooling down: 5 °C/second  
Number of soldering times: 2 times *maximum*
- The temperature profile at the top surface of ZHX1200, shown in Figure 13, is recommended.



**Figure 13. Temperature Profile for the Top Surface**

## Packing, Storing, and Baking Recommendations

Follow these recommendations to maintain the performance of the ZHX1200 transceiver.

### Moisture Prevention Guidelines

In order to avoid moisture absorption during transportation and storage, ZHX1200 reels are packed in aluminum envelopes (see Figure 14) 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.

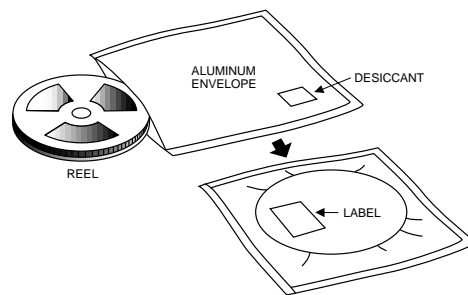


Figure 14. IrMC Transceiver Packaging

### Baking

Parts that have been stored over 12 months or unpacked over 72 hours must be baked under the following guidelines.

#### Reels

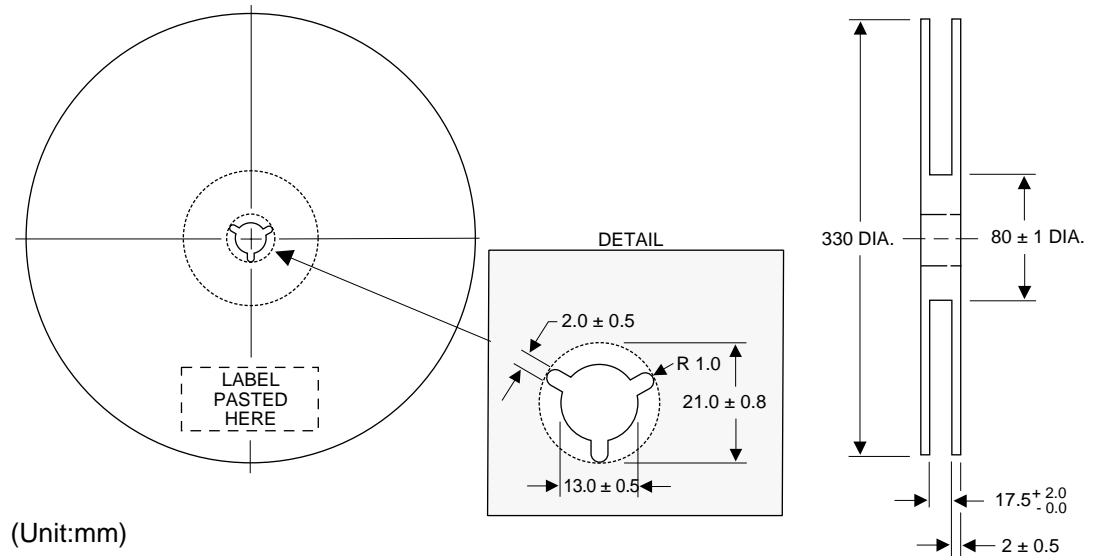
60 °C for 48 hours or more

#### Loose Parts

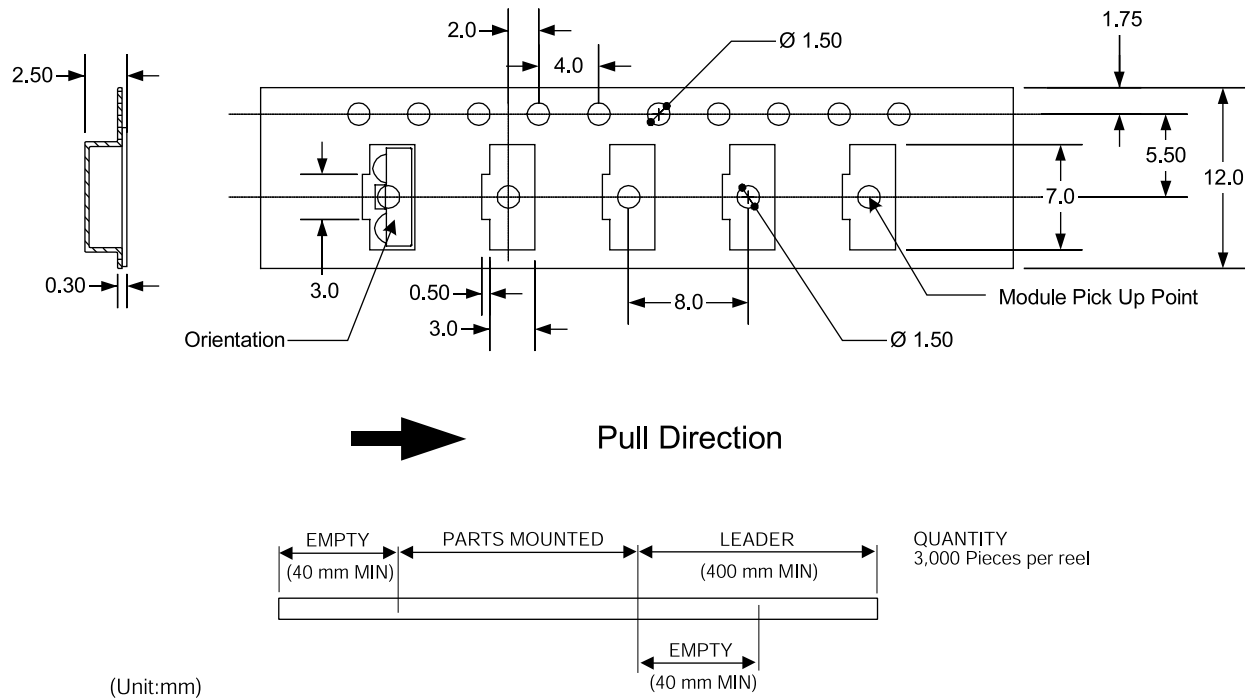
- 100 °C for 4 hours or more  
or
- 125 °C for 2 hours or more  
or
- 150 °C for 1 hour or more

## Taping Specifications (in accordance with JIS C 0806)

Figure 15 shows the reel dimensions, and Figure 16 shows the tape dimensions and configuration.



**Figure 15. Reel Dimensions**



**Figure 16. 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  
910 E. Hamilton Avenue, Suite 110, MS 4-3  
Campbell, CA 95008  
Fax: (408) 558-8536  
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.
