



***ZHX1403***

***SIR UltraSlim™  
Transceivers***

**Preliminary Product Specification**

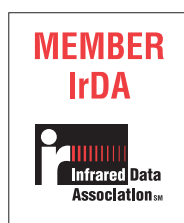
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## Description

The ZILOG ZHX1403 for PDAs, internet appliances, medical electronics, and general-purpose interactive handheld devices is the smallest, lowest power, and highest functional standard-power (0–1 meter minimum range) transceiver available.

The ZILOG ZHX1403 features exclusive AlwaysOn™ technology that allows the transceiver to “listen” for an IrDA communication at a typical current of 6  $\mu$ A, allowing the default mode to be left on with negligible effect on the battery life.

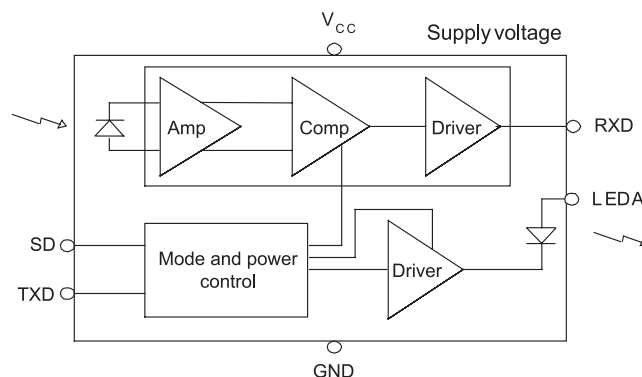
The UltraSlim form factor (7.3 mm long x 2.8 mm wide x 1.9 mm high) allows placement in virtually any small device (see Figure 1). Application circuit space is also minimized because only two external components are required.



**Figure 1. UltraSlim Form**

The ZHX1403 is designed to support IrDA-Data SIR mode (115.2 Kbits/s) and provides typical data links with other standard-power IrDA transceivers up to 1.0 meter away.

The transceiver combines an IRED emitter, a PIN photodiode, and a unique driver/control ASIC in a single package, as shown in Figure 2.



**Figure 2. ZHX1403 Block Diagram**

The ZILOG ZHX1403 also features a shutdown control that minimizes current draw to 0.1  $\mu$ A typical.

## Features

- Compliant to IrDA Data Specification 1.4 Standard Power SIR
- Low-power supply voltage range: 2.4 to 3.6 V
- ZHX1403 listening current: only 6  $\mu$ A (typically) at 3.0 V (ZiLOG exclusive)
- UltraSlim package: 7.3 mm long x 2.8 mm wide x 1.9 mm high
- Extended operating temperature range:  $-30^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Internal current source eliminates need for a current-limiting resistor for IR LED
- Meets IEC 825-1 Class 1 eye safety specifications

## Pin Description

Table 1 lists the pin out for the ZHX1403 transceivers. The pins are described in this section.

**Table 1. ZHX1403 Transceiver Pin Out**

Pin	Name	Function	I/O
1	NC	NC (future use)	—
2	V <sub>CC</sub>	Supply voltage	—
3	GND	Ground	—
4	SD	Shutdown	I
5	RXD	Receiver output	O
6	TXD	Transmitter input	I
7	LEDA	IREDA anode	—
—	TAB	Shield connection	—

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

(Power)

Connect to positive power supply (2.4–3.6 V). Filter with a 1.0- $\mu$ F ceramic bypass capacitor and terminating resistor 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.

## **SD Shutdown**

(Input, active high)

This input is used to place the transceiver into a shutdown mode.

## **RXD Receive Data**

(Output, active low)

This output provides 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 LS series TTL load. No external resistor is required.

## **TXD Transmit Data**

(Input, active high)

This CMOS input is used to transmit serial data and has an internal pull-down resistor that is enabled during shutdown.

## **LEDA LED Driver**

(Output, active low)

This output is internally connected to the LED anode and contains an internal current source. The voltage range on this pad is 2.2–4.2 volts.

## **TAB Shield Connection**

The shield tab must be soldered to ground for proper operation.

Application Block Diagrams

Figure 3 shows the application block diagrams for the ZHX1403 transceivers.

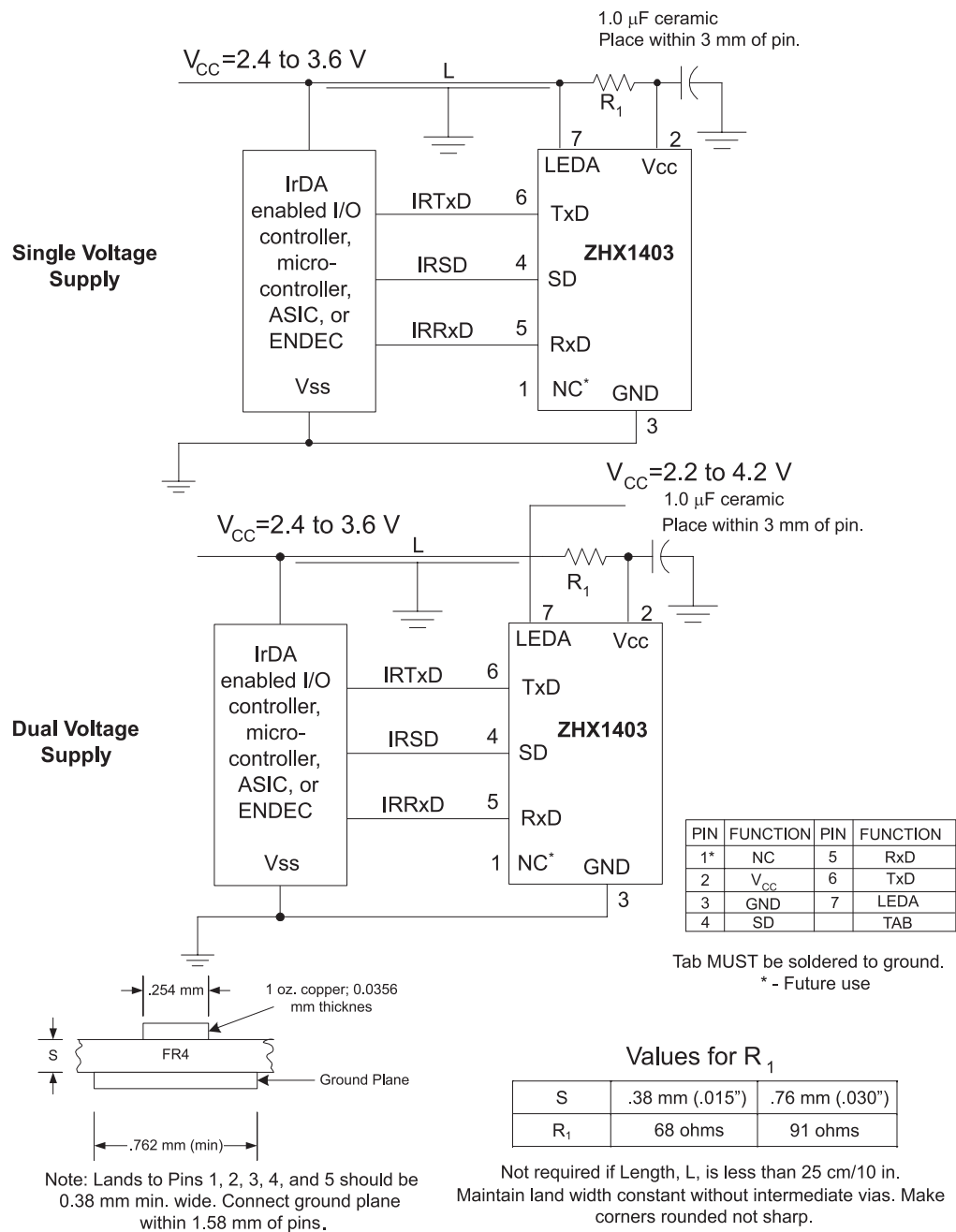


Figure 3. ZHX1403 Application Block Diagrams



## 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	$V_{CC}$	-0.3	3.6	V	$V_{CC}$ , GND
Supply voltage	$V_{LED}$	-0.3	4.4	V	
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
Storage temperature	$T_{ST}$	-40	100	°C	
Solder temperature	$T_{SOL}$		230	°C	

**Table 3. Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply voltage	$V_{CC}$	2.4	3.6	V
Supply voltage, LEDA	$V_{LED}$	2.2	4.2	V
Ambient operating temperature	$T_{OP}$	-30	85	°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	$V_{OH}$	$I_{OH}=-100\ \mu A$	$V_{CC}-0.4$			V	RXD
Low-level output voltage	$V_{OL}$	$I_{OL}=100\ \mu A$			0.4	V	RXD
Transmitter current	$I_{LED}$			260	320	mA	
Listening current	$I_{CC}$			6		$\mu A$	
Receive current	$I_{CC}$			100	125	$\mu A$	Idle

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

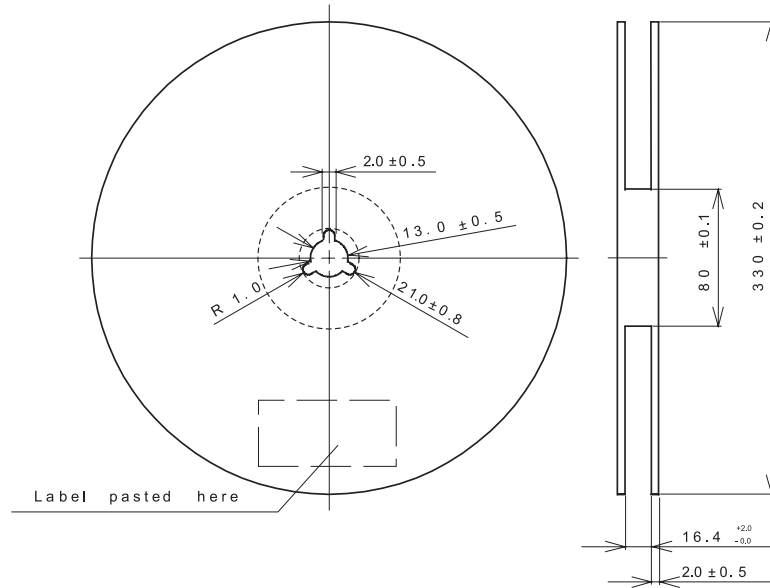
Parameter	Symbol	Condition	Min	Typical	Max	Unit	Remarks
Standby current	$I_{STB}$			0.1	1.0	$\mu A$	SD= $V_{CC}$ , TXD=0 V
RXD pulse width	$t_{PWA}$	SIR $\leq$ 115.2 Kbps	1.0		5	$\mu s$	Input pulse=1.6 $\mu s$ ; rise/fall time<600 ns
Power shutdown time	$T_{SD}$			1		$\mu s$	
Startup time	$T_{STU}$			200		$\mu s$	
Latency	$T_{RRT}$			150		$\mu s$	
Transmitter LED timeout				130	270	$\mu s$	Protects LED when TXD is left high
Rise/fall time	$T_r, T_f$	Cload=25 pF	10		40	ns	
Trans. radiant intensity	$I_E$	$I_{LED}$ =260 mA	40		100	mW/sr	On-axis
Minimum threshold irradiance	$E_{emin}$	$V_{CC}$ =3.3 V			4	$\mu W/cm^2$	$\theta_h, \theta_v \leq (\pm 15^\circ)$
Maximum input irradiance	$E_{emax}$	$V_{CC}$ =3.3 V	500			mW/cm <sup>2</sup>	$\theta_h, \theta_v \leq (\pm 15^\circ)$
Peak wavelength	$\lambda_p$			870		nm	

Unless otherwise noted:  $V_{CC}$ =3.3 V, GND=0 V, TA=25 °C

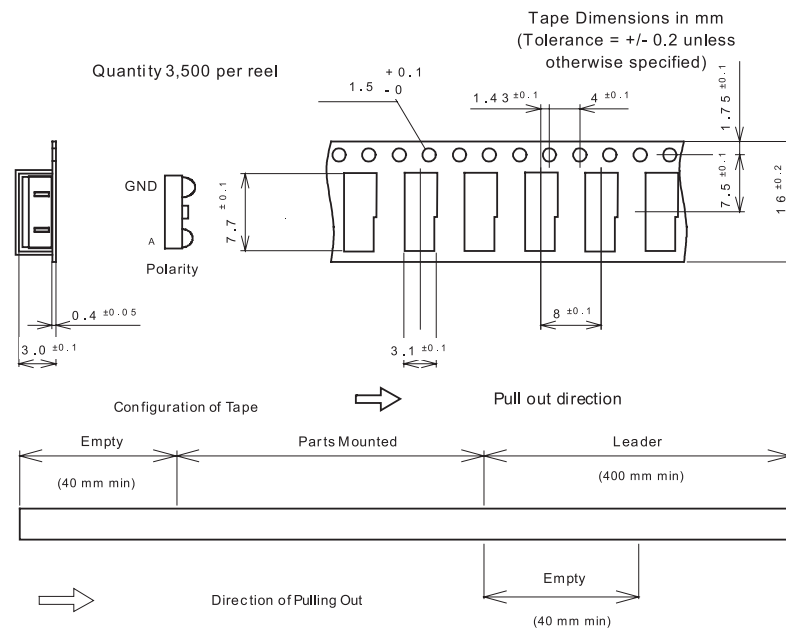
Note: To minimize power dissipation, the part has been designed for optimal operation in 1.6  $\mu s$  mode. If used in the 3/16<sup>th</sup> pulse duration mode, some devices will exhibit a phantom RxD pulse at 9.6 Kbits/s.

## ZHX1403 Tape and Reel Specifications

Figure 4 shows the ZHX1403 reel specifications, and Figure 5 shows the ZHX1403 tape specifications.



**Figure 4. ZHX1403 Reel Specifications**



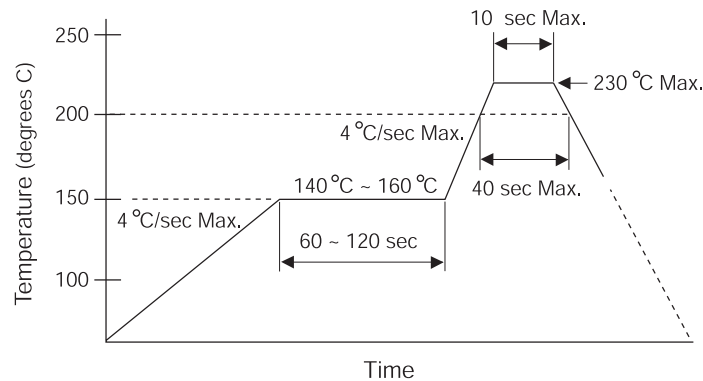
**Figure 5. ZHX1403 Tape Specifications**

## ZHX1403 Soldering and Cleaning Recommendations

Follow these recommendations to maintain the performance of the ZHX1403 transceivers.

### Reflow Soldering

- Reflow soldering paste is recommended.
- Preheat: 140 °C~160 °C, 60 to 120 seconds
- Heating up and cooling down: 5 °C/second
- Maximum number of reflows: 2
- The temperature profile at the top surface of the ZHX1403 transceivers, shown in Figure 6, is recommended.



**Figure 6. Temperature Profile for the Top Surface**

### Manual Soldering

- Use 63/37 or silver solder.
- Temperature at solder iron tip: no more than 280 °C
- Finish soldering within 3 seconds.
- Handle only after the ZHX1403 transceivers have cooled off.

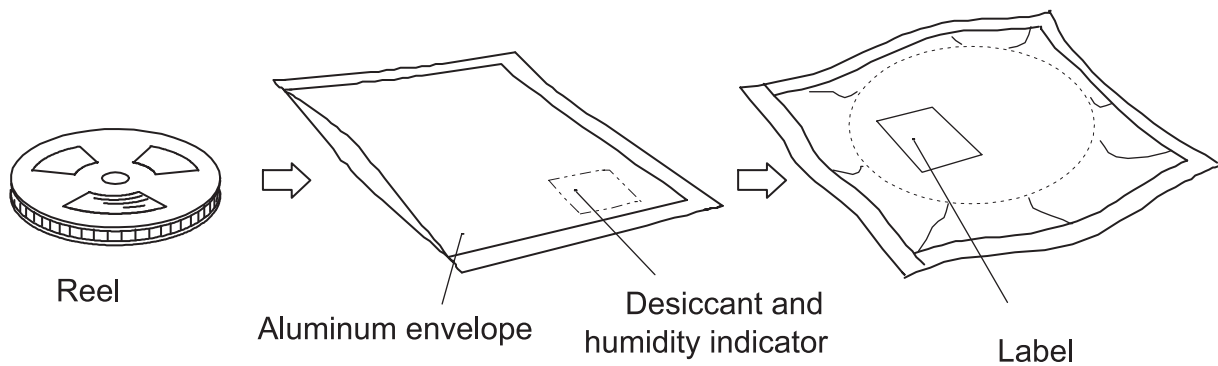
### Cleaning

Perform cleaning 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

## Moisture Prevention Guidelines

To avoid moisture absorption during transportation and storage, ZHX1403 reels are packed in aluminum envelopes (see Figure 7) 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 must store these parts in a controlled environment to prevent moisture entry. Please read the label on the aluminum bag for indicator instructions.



**Figure 7. ZHX1403 Packaging**

## Baking

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

### Reels

60 °C for 48 hours or more

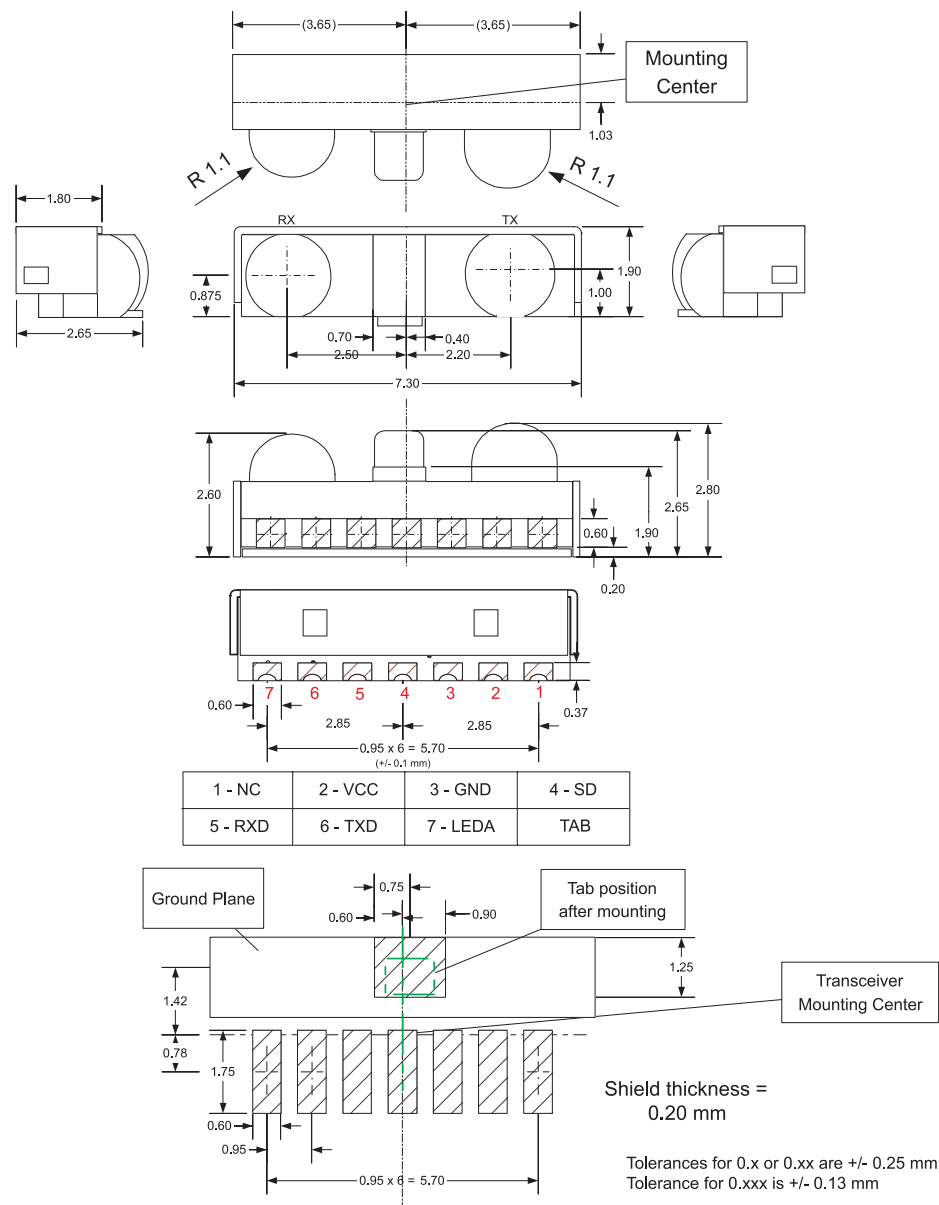
### Loose Parts

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

## Mechanical Specification

Figure 8 shows the mechanical specification for the ZHX1403 transceivers.

- **Note:** The ZHX1403 transceivers will be marked as follows:  
ZHX1403 = Z1403



**Figure 8. ZHX1403 Mechanical Specification**



## Ordering Information

Use the following information to order the ZHX1403 transceivers:

ZHX1403MA115THTR      with AlwaysOn Listen      3500 per reel

## 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@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.