



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





***ZHX2022***

***FIR Transceiver***

**Product Specification**

PS021802-1005



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  
[www.ZiLOG.com](http://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**

©2005 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concerning the devices, applications, or technology described is intended to suggest possible uses and may be superseded.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
Applications .....	2
Parts Table .....	2
Block Diagram .....	3
Pinout and Pin Description .....	3
Electrical and Timing Specifications .....	5
Recommended Circuit Diagram .....	11
I/O and Software .....	13
Mode Switching .....	13
Setting to the High Bandwidth Mode (0.576 Mbit/s to 4.0 Mbit/s) .....	14
Setting to the Lower Bandwidth Mode (2.4 kbit/s to 115.2 kbit/s) .....	15
Recommended SMD Pad Layout .....	15
ZHX2022 Soldering and Cleaning Recommendations .....	16
Reflow Soldering .....	16
Manual Soldering .....	16
Cleaning .....	16
Current Derating Diagram .....	17
Mechanical Specifications .....	18
Taping Specifications .....	19
Customer Feedback Form .....	22
Customer Information .....	22
Product Information .....	22
Return Information .....	22
Problem Description or Suggestion .....	22



## List of Figures

Figure 1. FIR Transceiver Block Diagram .....	3
Figure 2. Pinout .....	3
Figure 3. Application Block Diagram .....	12
Figure 4. Mode Switching Timing Diagram .....	14
Figure 5. Pad Layout (mm) .....	15
Figure 6. Temperature Derating Diagram .....	17
Figure 7. Package Dimensions in mm .....	18
Figure 8. Reel Dimensions in mm .....	19
Figure 9. Tape Dimensions in mm .....	20
Figure 10. Tape Dimensions in mm .....	21

## List of Tables

Table 1. Pin Description .....	4
Table 2. Absolute Maximum Ratings .....	5
Table 3. Eye Safety Information .....	6
Table 4. Electrical Characteristics—Transceiver .....	6
Table 5. Optoelectronic Characteristics—Receiver .....	8
Table 6. Optoelectronic Characteristics—Transmitter .....	9
Table 7. Recommended Application Circuit Components .....	13
Table 8. Truth Table .....	14

## Description

Whether you need to mount the IrDA transceiver so that its communication is parallel or perpendicular to the plane of the PCB, the ZiLOG ZHX2022 is the solution for applications in portable products, such as USB Adapters, notebook PCs, printers, mobile phones, digital cameras, handheld devices, or personal data assistants (PDAs). Designed to support all IrDA data rates up to 4 Mbits/second as well as LocalTalk™ and Sharp ASK™ modes, the transceiver combines an infrared emitting diode (IRED) emitter, a PIN photodiode detector, an IRED driver, and an integrated AGC (Automatic Gain Control) and amplification receive circuit in a single, miniature package.

The ZiLOG ZHX2022 provides an efficient implementation of the IrDA-Data 1.4 standard in a small footprint format. Application circuit space is also minimized, as only three external components (current-limiting resistor, terminating resistor, and a decoupling capacitor) are required to implement a complete IrDA transceiver solution.

The ZHX2022 is capable of both mode select and legacy-mode bandwidth switching.

## Features

- Supply voltage 2.7 V to 5.5 V, operating idle current (receive mode) < 3 mA, shutdown current < 5  $\mu$ A over full temperature range
- Surface mount package, top and side view, 9.7 mm x 4.7 mm x 4.0 mm
- Operating temperature: –30 °C to 85 °C
- Storage temperature: –40 °C to 85 °C
- Transmitter wavelength typically 886 nm, supporting IrDA® and Remote Control
- Tri-state-receiver output, floating in shut down with a weak pull-up
- Eye safety class 1 (IEC60825-1, ed. 2001), limited LED on-time, LED current is controlled, no single fault to be considered



## Applications

- Notebook computers, desktop PCs, palmtop computers (Win CE, Palm PC), PDAs
- Digital still and video cameras
- Printers, fax machines, photocopiers, screen projectors
- Telecommunication products (cellular phones, pagers)
- Internet TV boxes, video conferencing systems
- External infrared adapters (dongles)
- Medical and industrial data collection

## Parts Table

Part	Description	Quantity/ Reel
ZHX2022MV040THTR	Oriented in carrier tape for side-view surface mounting	1,000 pieces
ZHX2022TV040THTR	Oriented in carrier tape for top-view surface mounting	1,000 pieces

- **Note:** All ZiLOG devices are available lead free. ZHX2022 has always been lead free. These devices meet or exceed RoHS Directive 2002/95/EC. For additional information, please see the ZiLOG Quality and Reliability web page at <http://www.zilog.com/quality/index.asp>.

## Block Diagram

Figure 1 is the block diagram for the FIR transceiver.

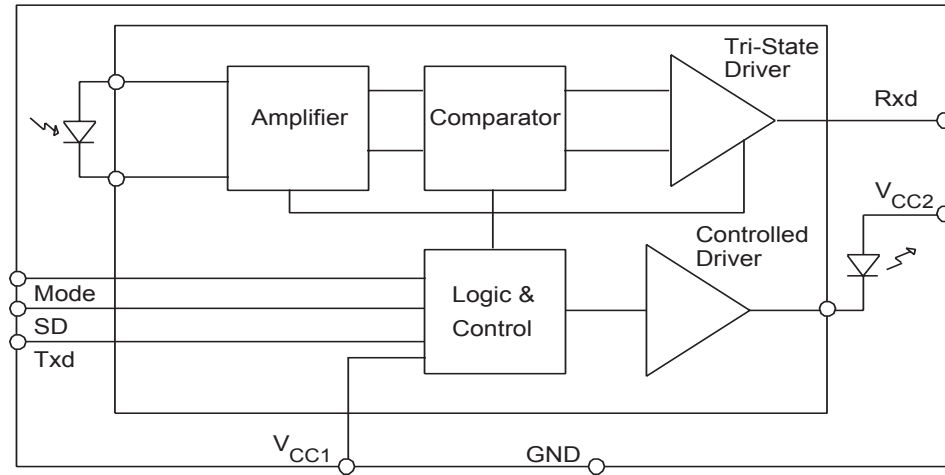
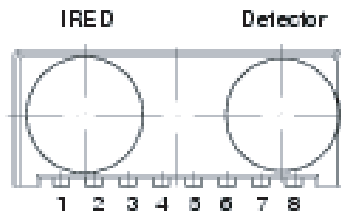


Figure 1. FIR Transceiver Block Diagram

## Pinout and Pin Description



17067

Figure 2. Pinout



**Table 1. Pin Description**

Pin Number	Function	Description	I/O	Active
1	V <sub>CC2</sub> LEDA	Connect LEDA directly to either V <sub>CC1</sub> (regulated) or to V <sub>CC2</sub> (unregulated) or battery. For voltages higher than 3.6 V, an external resistor might be necessary for reducing the internal power dissipation.		
2	LEC	IREC cathode, internally connected to driver transistor. <i>Do not connect.</i>		
3	Txd	This input is used to transmit serial data when SD is low. An on-chip protection circuit disables the LED driver if the Txd pin is asserted for longer than 80 μs. When used in conjunction with the SD pin, this pin is also used to receiver speed mode.	I	HIGH
4	Rxd	Received Data Output, push-pull CMOS driver output capable of driving a standard CMOS or TTL load. No external pull-up or pull-down resistor is required. <b>Floating with a weak pull-up of 500 kΩ (typical) in shutdown mode.</b>	O	LOW
5	SD	Shutdown, also used for dynamic mode switching. Setting this pin active places the module into shutdown mode. On the falling edge of this signal, the state of the Txd pin is sampled and used to set receiver low bandwidth (Txd=Low, SIR) or high bandwidth (Txd=High, MIR and FIR) mode. Will be overwritten by the mode pin input, which must float, when dynamic programming is used.	I	HIGH
6	V <sub>CC1</sub>	Supply voltage (regulated)		
7	Mode	HIGH: High speed mode, MIR and FIR; LOW: Low speed mode, SIR only (see “Mode Switching” on page 13).	I	
7	Mode	The mode pin can also be used to indicate the dynamically programmed mode. The maximum load is limited to 50 pF. High indicates FIR/MIR mode, low indicates SIR mode	O	
8	GND	Ground		

## Electrical and Timing Specifications

► **Notes:** Reference point: Ground Pin 8, unless otherwise noted

Typical values are for *design aid only*, not guaranteed nor subject to production testing.

**Table 2. Absolute Maximum Ratings**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Supply voltage range, transceiver	$0\text{ V} < V_{CC2} < 6\text{ V}$	$V_{CC1}$	-0.5		+6	V
Supply voltage range, transmitter	$0\text{ V} < V_{CC1} < 6\text{ V}$	$V_{CC2}$	-0.5		+6.5	V
Input currents	For all pins, except IRED anode pin				10	mA
Output sinking current					25	mA
Power dissipation	See derating curve (Figure 6).	$P_D$			500	mW
Junction temperature		$T_J$			125	°C
Ambient temperature range (operating)		$T_{amb}$	-30		+85	°C
Storage temperature range		$T_{stg}$	-40		+85	°C
Soldering temperature	See “ZHX2022 Soldering and Cleaning Recommendations” on page 16.				240	°C
Average output current		$I_{RED(DC)}$			125	mA
Repetitive pulse output current	$< 90\ \mu\text{s}$ , $t_{on} < 20\%$	$I_{RED(RP)}$			600	mA
IRED anode voltage		$V_{IREDA}$	-0.5		+6.5	V
Voltage at all inputs and outputs	$V_{in} > V_{CC1}$ is allowed	$V_{IN}$			5.5	V
Load at mode pin when used as mode indicator					50	pF

► **Notes:** Reference point pin: GND, unless otherwise noted

Typical values are for *design aid only*, not guaranteed nor subject to production testing.

**Table 3. Eye Safety Information**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Virtual source size	Method: (1 - 1/e) encircled energy	d	2.5	2.8		mm
Maximum Intensity for Class 1	IEC60825-1 or EN60825-1, edition January 2001	$I_e$			* 500**	mW/sr

\* Due to the internal limitation measures, the device is a “class1” device.

\*\* IrDA specifies the maximum intensity with 500 mW/sr.

► **Notes:**  $T_{amb}=25\text{ }^{\circ}\text{C}$ ,  $V_{CC}=2.7\text{ V}$  to 5.5 V, unless otherwise noted.

Typical values are for *design aid only*, not guaranteed nor subject to production testing.

**Table 4. Electrical Characteristics—Transceiver**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Supply voltage		$V_{CC}$	2.7		5.5	V
Dynamic supply current (Idle) <sup>1</sup>	SD=Low, $E_e=0\text{ klx}$	$I_{CC}$		2	3	mA
Dynamic supply current (Idle) <sup>1</sup>	SD=Low, $E = 1\text{ klx}^2$	$I_{CC}$		2	3	mA

1) Receive mode only. In transmit mode, add additional 85 mA (typical) for IRED current. Add Rxd output current depending on Rxd load.

2) Standard Illuminant A

3) The typical threshold level is between  $0.5 \times V_{CC2}$  ( $V_{CC}=3\text{ V}$ ) and  $0.4 \times V_{CC}$  ( $V_{CC}=5.5\text{ V}$ ). It is recommended to use the specified min/max values to avoid increased operating current.

ESD > 4000 V (HBM), Latchup > 200 mA

EMI immunity > 550 V/m for GSM frequency and other mobile telephone bands / (700 MHz to 2000 MHz, no external shield)

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

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Shutdown supply current	SD=High, Mode=Floating E <sub>e</sub> =0 klx	I <sub>SD</sub>			2.0	μA
	SD=High, Mode=Floating E <sub>e</sub> =1 klx <sup>2</sup>	I <sub>SD</sub>			2.5	μA
	SD=High, T=85 °C, Mode=Floating, not ambient light sensitive	I <sub>SD</sub>			5	μA
Operating temperature range		T <sub>A</sub>	-25		+85	°C
Output voltage low	I <sub>OL</sub> =1 mA, C <sub>load</sub> =15 pF	V <sub>OL</sub>			0.4	V
Output voltage high	I <sub>OH</sub> =500 μA, C <sub>load</sub> =15 pF	V <sub>OH</sub>	0.8 x V <sub>CC</sub>			V
	I <sub>OH</sub> =250 μA, C <sub>load</sub> =15 pF	V <sub>OH</sub>	0.9 x V <sub>CC</sub>			V
Output Rxd current limitation high state	Short to Ground				20	mA
Output Rxd current limitation low state	Short to V <sub>CC1</sub>				20	mA
Rxd to VCC1 impedance	SD=High	R <sub>Rxd</sub>	400	500	600	kΩ
Input voltage low (Txd, SD, Mode)		V <sub>IL</sub>	0.5		0.5	V
Input voltage high (Txd, SD, Mode)	CMOS level <sup>3</sup>	V <sub>IH</sub>	V <sub>CC</sub> - 0.5		V <sub>CC</sub> +0.5 V	
	TTL level, V <sub>CC1</sub> =4.5 V	V <sub>IH</sub>	2.4			V
Input leakage current (Txd, SD)		I <sub>L</sub>	-10		+10	μA
Input leakage current Mode		I <sub>ICH</sub>	-2		+2	μA
Input capacitance (Txd, SD, Mode)		C <sub>I</sub>			5	pF

1) Receive mode only. In transmit mode, add additional 85 mA (typical) for I<sub>RED</sub> current. Add Rxd output current depending on Rxd load.

2) Standard Illuminant A

3) The typical threshold level is between 0.5 x V<sub>CC2</sub> (V<sub>CC</sub>=3 V) and 0.4 x V<sub>CC</sub> (V<sub>CC</sub>=5.5 V). It is recommended to use the specified min/max values to avoid increased operating current.

ESD > 4000 V (HBM), Latchup > 200 mA

EMI immunity > 550 V/m for GSM frequency and other mobile telephone bands / (700 MHz to 2000 MHz, no external shield)

► **Notes:**  $T_{amb}=25\text{ }^{\circ}\text{C}$ ,  $V_{CC}=2.7\text{ V}$  to  $5.5\text{ V}$ , unless otherwise noted.

Typical values are for *design aid only*, not guaranteed nor subject to production testing.

**Table 5. Optoelectronic Characteristics—Receiver**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Minimum detection threshold irradiance, SIR mode	9.6 kbit/s to 115.2 kbit/s $\lambda=850\text{ nm}$ to $900\text{ nm}$	$E_e$		25 (2.5)	35 (3.5)	$\text{mW}/\text{m}^2$ $(\mu\text{W}/\text{cm}^2)$
Minimum detection threshold irradiance, MIR mode	1.152 Mbit/s $\lambda=850\text{ nm}$ to $900\text{ nm}$	$E_e$		65 (6.5)		$\text{mW}/\text{m}^2$ $(\mu\text{W}/\text{cm}^2)$
Minimum detection threshold irradiance, FIR mode	4.0 Mbit/s $\lambda=850\text{ nm}$ to $900\text{ nm}$	$E_e$		80 (8.0)	90 (9.0)	$\text{mW}/\text{m}^2$ $(\mu\text{W}/\text{cm}^2)$
Maximum detection threshold irradiance	$\lambda=850\text{ nm}$ to $900\text{ nm}$	$E_e$		5 (500)		$\text{kW}/\text{m}^2$ $(\text{mW}/\text{cm}^2)$
No detection receiver input irradiance	*	$E_e$	4 (0.4)			$\text{mW}/\text{m}^2$ $(\mu\text{W}/\text{cm}^2)$
Rise time of output signal	10% to 90%, 15 pF	$t_r$ (Rxd)	10		40	ns
Fall time of output signal	90% to 10%, 15 pF	$t_f$ (Rxd)	10		40	ns
Rxd pulse width of output signal, 50% SIR mode	input pulse length $1.4\text{ }\mu\text{s} < P_{Wopt} < 25\text{ }\mu\text{s}$	$t_{PW}$	1.5	1.8	2.1	$\mu\text{s}$
Rxd pulse width of output signal, 50% MIR mode	input pulse length $P_{Wopt}=217\text{ ns}$ , 1.152 kbit/s	$t_{PW}$	110	250	270	ns
Rxd pulse width of output signal, 50% FIR mode	input pulse length $P_{Wopt}=125\text{ ns}$ , 4.0 Mbit/s	$t_{PW}$	100		140	ns
	input pulse length $P_{Wopt}=250\text{ ns}$ , 4.0 Mbit/s	$t_{PW}$	225		275	ns
Stochastic jitter, leading edge	input irradiance= $100\text{ mW}/\text{m}^2$ , 4.0 Mbit/s				20	ns

**Note:** All timing data measured with 4 Mbit/s are measured using the IrDA<sup>®</sup> FIR transmission header. The data given here are valid 5  $\mu\text{s}$  after starting the preamble.

\*This parameter reflects the backlight test of the IrDA physical layer specification to guarantee immunity against light from fluorescent lamps.



**Table 5. Optoelectronic Characteristics—Receiver (Continued)**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
	input irradiance=100 mW/m <sup>2</sup> , 1.152 Mbit/s				40	ns
	input irradiance=100 mW/m <sup>2</sup> , 576 kbit/s				80	ns
	input irradiance=100 mW/m <sup>2</sup> , ≤ 115.2 kbit/s				350	ns
Receiver start up time	After completion of shutdown programming sequence Power on delay				500	μs
Latency		t <sub>L</sub>		170	300	μs

**Note:** All timing data measured with 4 Mbit/s are measured using the IrDA<sup>®</sup> FIR transmission header. The data given here are valid 5 μs after starting the preamble.

\*This parameter reflects the backlight test of the IrDA physical layer specification to guarantee immunity against light from fluorescent lamps.

► **Notes:** T<sub>amb</sub>=25 °C, V<sub>CC</sub>=2.7 V to 5.5 V, unless otherwise noted.

Typical values are for *design aid only*, not guaranteed nor subject to production testing.

**Table 6. Optoelectronic Characteristics—Transmitter**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
IRED operating current, switched current limiter	See derating curve (Figure 6). For 3.3 V operations, no external resistor needed. For 5 V application, that might be necessary depending on operating temperature range.	I <sub>D</sub>	500	550	600	mA
Output leakage IRED current		I <sub>IRED</sub>	-1		1	μA

\*Typically, the output pulse duration will follow the input pulse duration t and will be identical in length t. However, at pulse duration larger than 80 μs, the optical output pulse duration is limited to 85 μs. This pulse duration limitation can already start at 20 μs.



**Table 6. Optoelectronic Characteristics—Transmitter (Continued)**

Parameter	Test Conditions	Symbol	Min	Typical	Max	Unit
Output radiant intensity recommended application circuit	$\alpha=0^\circ, 15^\circ$ Txd=High, SD=Low, VCC1=VCC2=3.3 V Internally current-controlled, no external resistor	$I_e$	120	170	350	$\text{mW}/\text{m}^2$ ( $\mu\text{W}/\text{cm}^2$ )
Output radiant intensity	VCC1=5.0 V, $\alpha=0^\circ, 15^\circ$ Txd=Low or SD=High, (Receiver is inactive as long as SD=High)	$I_e$			0.04	$\text{kW}/\text{m}^2$ ( $\text{mW}/\text{cm}^2$ )
Output radiant intensity, angle of half intensity		$\alpha$		$\pm 24$		$\text{mW}/\text{m}^2$ ( $\mu\text{W}/\text{cm}^2$ )
Peak - emission wavelength		$\lambda_p$	880		900	nm
Spectral bandwidth		$\Delta\lambda$		40		nm
Optical rise time, fall time		$t_{ropt},$ $t_{fopt}$	10		40	$\mu\text{s}$
Optical output pulse duration	input pulse width 217 ns, 1.152 kbit/s	$t_{opt}$	207	217	227	ns
	input pulse width 125 ns, 4.0 Mbit/s	$t_{opt}$	117	125	133	ns
	input pulse width 250 ns, 4.0 Mbit/s	$t_{opt}$	242	250	258	ns
	input pulse width $0.1 \mu\text{s} < t_{Txd} < 80 \mu\text{s} *$	$t_{opt}$		$t_{Txd}$		ns
	input pulse width $t_{Txd} > 80 \mu\text{s}$ *	$t_{opt}$	20		85	ns
Optical overshoot					25	ns

\*Typically, the output pulse duration will follow the input pulse duration  $t$  and will be identical in length  $t$ . However, at pulse duration larger than  $80 \mu\text{s}$ , the optical output pulse duration is limited to  $85 \mu\text{s}$ . This pulse duration limitation can already start at  $20 \mu\text{s}$ .

## Recommended Circuit Diagram

ZiLOG transceivers integrate a sensitive receiver and a built-in power driver. The combination of both needs a careful circuit board layout. The use of thin, long, resistive, and inductive wiring should be avoided. The inputs (Txd, SD, Mode) and the output Rxd should be directly (DC) coupled to the I/O circuit. See Figure 3 and Table 7.

The resistor R1 is only necessary for higher operating voltages and elevated temperatures (see derating curve in Figure 6) to avoid too high internal power dissipation.

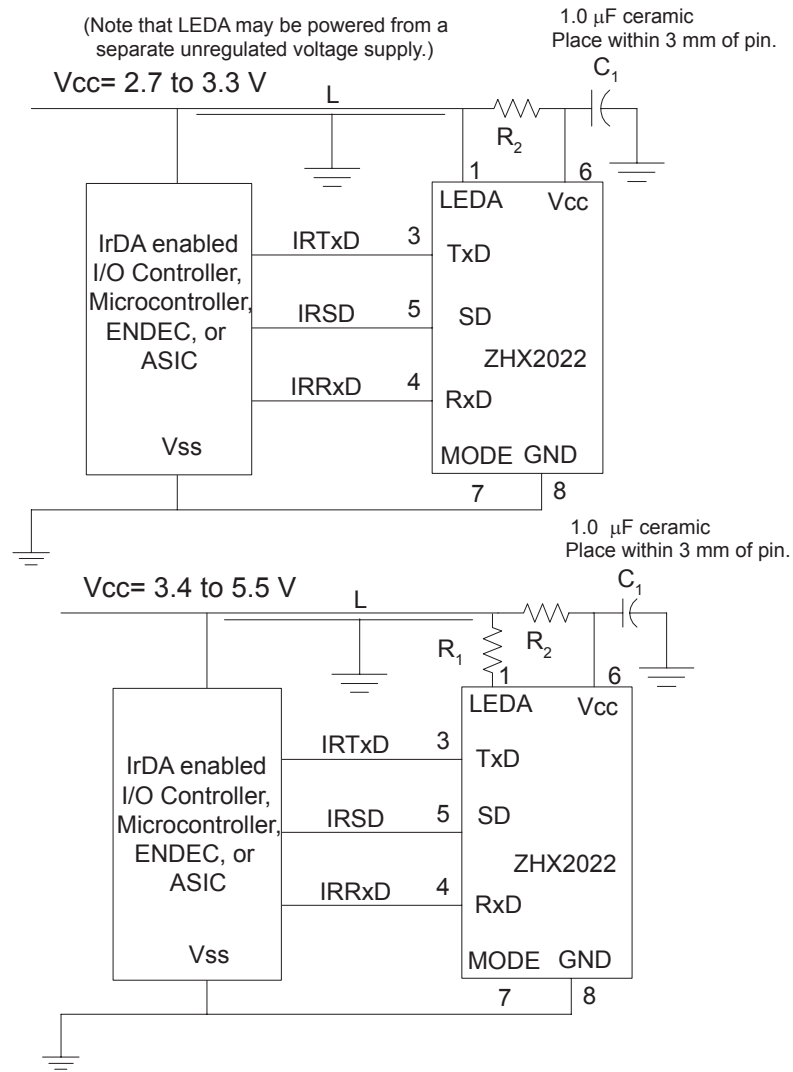
The capacitor C1 combined with the resistor R2 is the low pass filter for smoothing the supply voltage. R2 and C1 are optional and dependent on the quality of the supply voltage  $V_{CCX}$  and injected noise. An unstable power supply with dropping voltage during transmission may reduce sensitivity (and transmission range) of the transceiver.

The placement of these parts is critical. It is strongly recommended to position C1 as near as possible to the transceiver power supply pins.

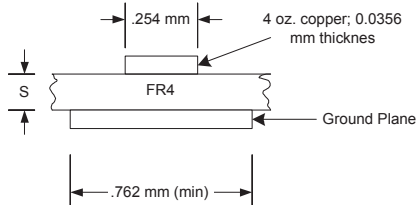
In addition, when connecting the described circuit to the power supply, low impedance wiring should be used.

Keep in mind that basic RF-design rules for circuit design should be taken into account. Especially longer signal lines should not be used without termination. For example, see *The Art of Electronics*, Paul Horowitz, Wienfield Hill, 1989, Cambridge University Press, ISBN: 0521370957.





Note: Lands to Pins 1, 6, 3, 4, 5, and 7 should be 0.38 mm min. wide. Connect ground plane within 1.58 mm of pins.



Value for  $R_1$ - For Vcc  $\leq$  3.3 V, use 0 ohm.  
For Vcc > 3.3 V, use 2 ohm.

Values for  $R_2$

S	.38 mm (.015")	.76 mm (.030")
$R_2$	68	91

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

Figure 3. Application Block Diagram

**Table 7. Recommended Application Circuit Components**

Component	Recommended Value
C1	1.0 $\mu$ F, Ceramic
R1	<b>5 V supply voltage:</b> 2 $\Omega$ , 0.25 W (recommended using two 1 $\Omega$ , 0.125 W resistor in series) <b>3.3 V supply voltage:</b> no resistors necessary; the internal controller is able to control the current
R2	68 or 91 $\Omega$ , 0.125 W

## I/O and Software

In the description, already different I/Os are mentioned. Different combinations are tested and the function verified with the special drivers available from the I/O suppliers. In special cases, refer to the I/O manual, the ZiLOG application notes, or contact directly ZiLOG Sales, Marketing or Application.

## Mode Switching

The ZHX2022 is in the SIR mode after power on as a default mode; therefore, the FIR data transfer rate has to be set by a programming sequence using the Txd and SD inputs as described in the following sections or selected by setting the Mode Pin. The Mode Pin can be used to statically set the mode (Mode Pin: LOW: SIR, HIGH: 0.576 Mbit/s to 4.0 Mbit/s). If not used or in standby mode, the mode input should float or should not be loaded with more than 50 pF. The low frequency mode covers speeds up to 115.2 kbit/s. Signals with higher data rates should be detected in the high frequency mode. Lower frequency data can also be received in the high frequency mode but with reduced sensitivity. See Figure 4 and Table 8.

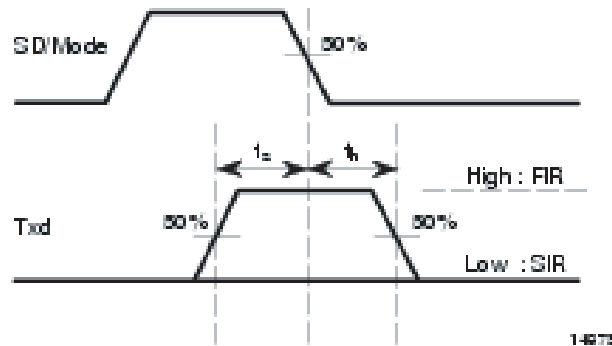


Figure 4. Mode Switching Timing Diagram

Table 8. Truth Table

Inputs			Outputs	
SD	Txd	Optical Input Irradiance $\text{mW/m}^2$	Rxd	Transmitter
high	x	x	weakly pulled (500 $\text{k}\Omega$ to VCC1)	0
low	high	x	high	$I_e$
low	high > 80 $\mu\text{s}$	x	high	0
low	low	< 4	high	0
low	low	> Min. Detection Threshold Irradiance < Max. Detection Threshold Irradiance	low (active)	0
low	low	> Max. Detection Threshold Irradiance	x	0

To switch the transceivers from low frequency mode to the high frequency mode and vice versa, the programming sequences described in the following sections are required.

### Setting to the High Bandwidth Mode (0.576 Mbit/s to 4.0 Mbit/s)

1. Set SD input to logic “HIGH”.
2. Set Txd input to logic “HIGH”. Wait  $t_s > 200 \text{ ns}$ .
3. Set SD to logic “LOW” (this negative edge latches state of Txd, which determines the speed setting).

4. After waiting  $t_h > 200$  ns, Txd can be set to logic “LOW”. The hold time of Txd is limited by the maximum allowed pulse length.

After that, Txd is enabled as normal Txd input, and the transceiver is set for the high bandwidth (576 kbit/s to 4 Mbit/s) mode.

### Setting to the Lower Bandwidth Mode (2.4 kbit/s to 115.2 kbit/s)

1. Set SD input to logic “HIGH”.
2. Set Txd input to logic “LOW”. Wait  $t_s > 200$  ns.
3. Set SD to logic “LOW” (this negative edge latches state of Txd, which determines speed setting).
4. Txd must be held for  $t_h > 200$  ns.

After that Txd is enabled as normal Txd input and the transceiver is set for the lower bandwidth (9.6 kbit/s to 115.2 kbit/s) mode.

## Recommended SMD Pad Layout

The leads of the device should be soldered in the center position of the pads. For more configurations, see inside the device drawing.

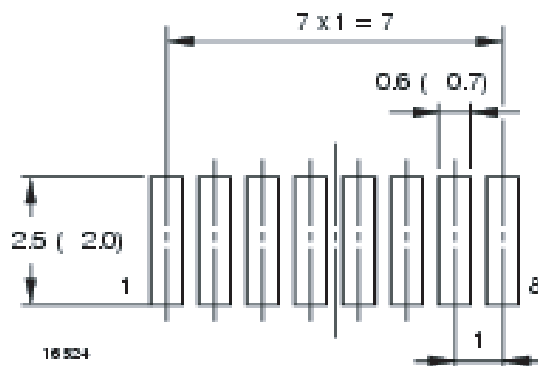


Figure 5. Pad Layout (mm)

► **Note:** Leads of the device should be at least 0.3 mm within the ends of the pads.

## ZHX2022 Soldering and Cleaning Recommendations

Follow these recommendations to maintain the performance of the ZHX2022 transceivers.

### Reflow Soldering

- ▶ **Note:** Please refer to ZiLOG's Lead-Free Solder Reflow: Packaging Application Note (AN0161, <http://www.zilog.com/docstools.asp>) for more information about the solder profile.

### 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 ZHX2022 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

## Current Derating Diagram

Figure 6 shows the maximum operating temperature when the device is operated without external current limiting resistor. A power dissipating resistor of  $2\ \Omega$  is recommended from the cathode of the IRED to Ground for supply voltages above 4 V. In that case the device can be operated up to  $85\ ^\circ\text{C}$ , too.

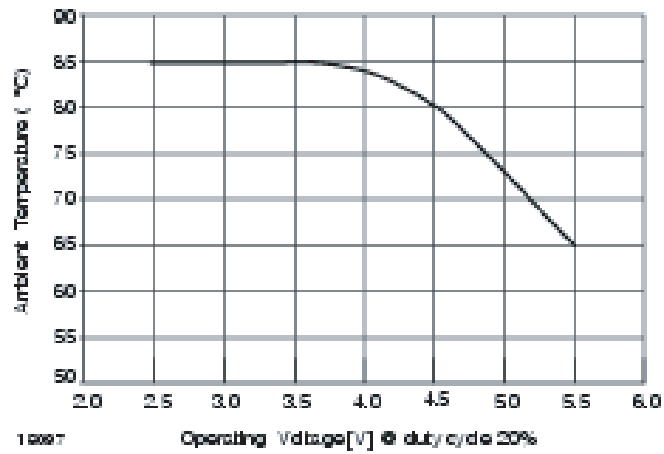


Figure 6. Temperature Derating Diagram

## Mechanical Specifications

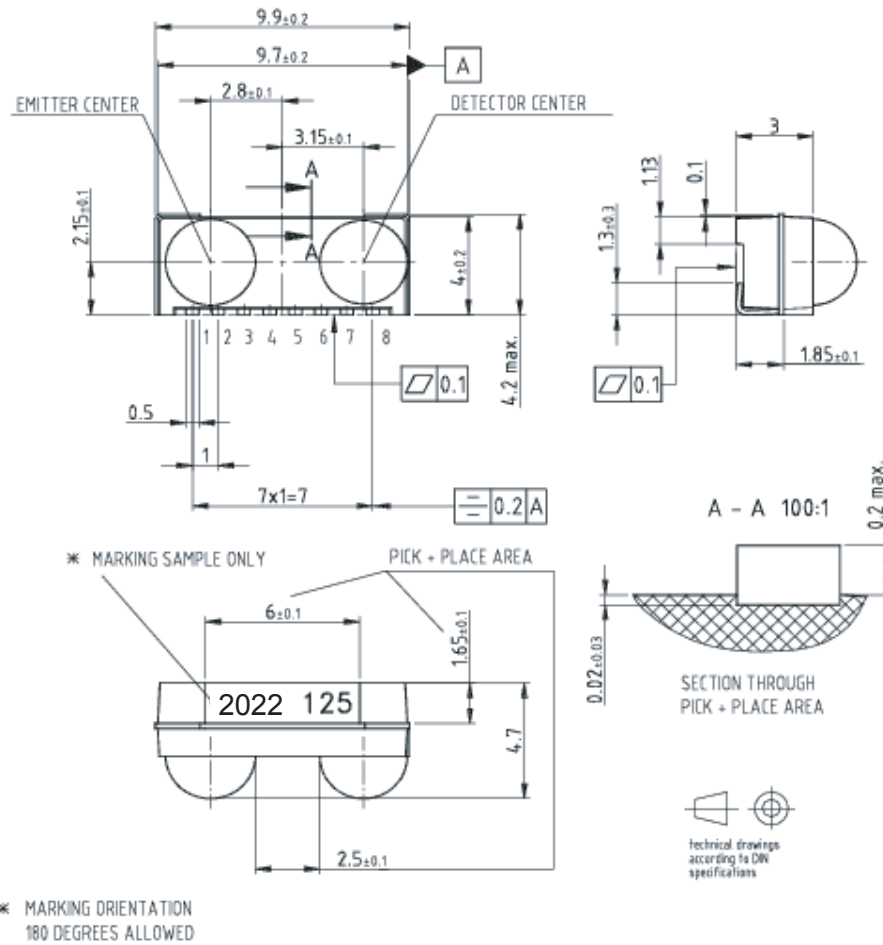


Figure 7. Package Dimensions in mm

## Taping Specifications

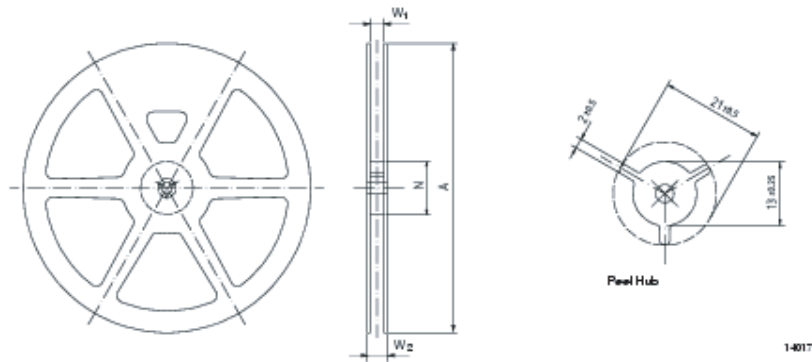
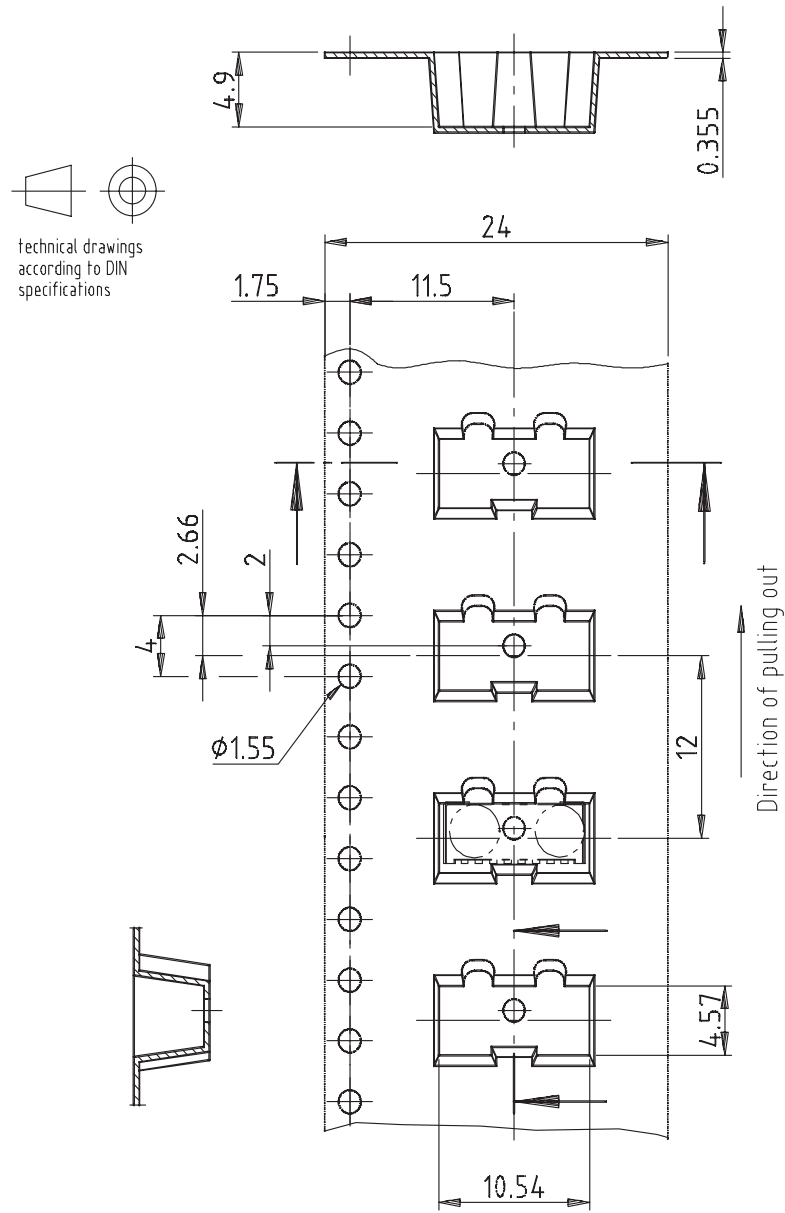


Figure 8. Reel Dimensions in mm

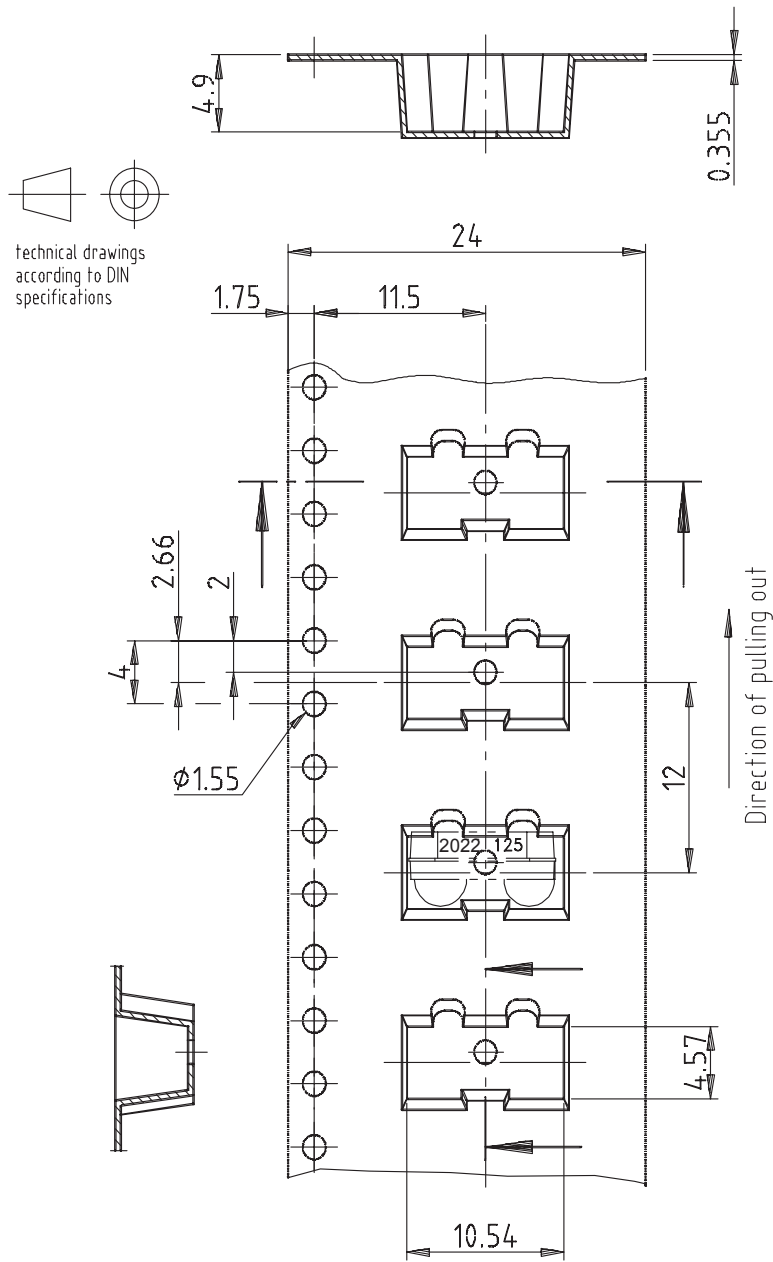
Version	Tape Width	A max.	N	$W_1$ min.	$W_2$ max.	$W_3$ min.	$W_3$ max.
mm	mm	mm	mm	mm	mm	mm	mm
C	24	330	60	24.4	30.4	23.9	27.4





18269

Figure 9. Tape Dimensions in mm



18283

Figure 10. Tape Dimensions in mm