IQS924 Series Controllers
IQ Switch® - ProxSense® Series

Touch and Proximity DC Dimmer

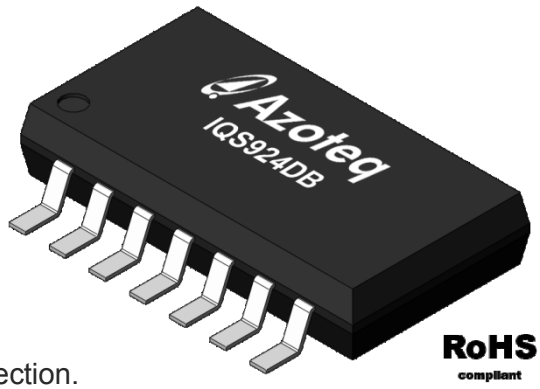
Unparalleled Features

- SOIC-14
- Sub 6uA current consumption
- Automatic tuning for optimal operation in various environments & compensation against sensitivity reducing objects

The IQS924DB ProxSense® IC is a fully integrated dual channel capacitive contact and proximity sensors with built in controllers for dimming applications. With market leading sensitivity and automatic tuning of the sense electrode, the IQS924 provides an extremely cost effective minimalist implementation requiring very few external components. The device is ready for use in a large range of lighting applications, while programming options allow flexible fine tuning in specialized applications.

Features

- 2 Channel capacitive touch and proximity sensor.
- Small Bom total solution.
- Integrated dimmer with various user interface options
- ATI: Auto Tuning Implementation to simplify electrode design and optimise system sensitivity.
- Various configurable low power modes.
- Dimming control by capacitive Touch.
- Separate proximity and dimming control channels.
- Find-In-The-Dark (FITD) light with capacitive proximity detection.
- LED backlight provides user feedback.
- Supply Voltage 1.8V to 3.3V.
- Extensive range of development tools available (VisualProxSense and USB dongles).



Representations only, not actual markings

Option Available

T_A	Device	Package
-40°C to 85°C	IQS924DB: DC-Dimmer +Battery Measurement	SOIC-14

Table of Contents

Functional Overview

1 Introduction

The IQS924DB is a two channel capacitive proximity and touch sensor featuring an internal voltage regulator and reference capacitor (Cs).The IQS924DB has an added channel used for the blocking channel.

Operating in self capacitance mode, two dedicated pins (CX1 and CX0) are available for the connection of sense electrodes. If projected capacitance is preferred in the application, the sensor electrode together with the transmitter electrode (CTX) is used.

Two pins are used for serial data communication through the I^2C^{TM} compatible protocol namely SCL, SDA.

A proximity or touch event is indicated on the PROX OUT pin when active or oscillating at 7.5 Hz respectively. The LOAD pin is typically buffered and used to drive a light source. The device automatically tracks slow varying environmental changes via various filters, detect noise and has an Auto Tuning Implementation (ATI) to tune the device for optimal sensitivity.

1.1 Applicability

All specifications, except where specifically mentioned otherwise, provided by this datasheet are applicable to the following ranges:

- Temperature -40°C to +85°C
- Supply voltage (V_{DDHI}) 1.8V to 3.3V

1.2 Typical Applications

- General LED Dimming
- Toys
- Camping lights
- Flash lights
- Floor/Corridor and stairway lighting
- Under cabinet lighting
- Replacement for electromechanical switches
- Proximity detection that enables backlighting activation (Patented)

1.3 Pin-outs and Descriptions

The pin-outs and pin descriptions for each of the IC variants are provided:

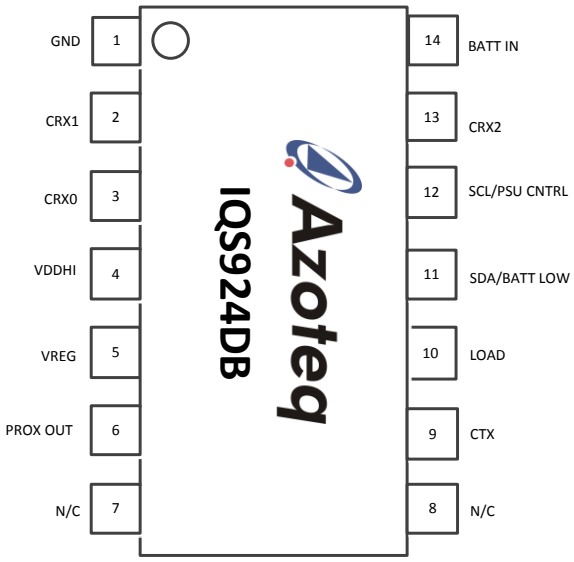


Figure 1.1 IQS924DB pin layout

Pin	IQS924DB	Function
1	VSS	Ground
4	VDDHI	Power Input
5	VREG	Regulator Pin
3	CRX0	Receive Electrode
2	CRX1	Receive Electrode
6	PROX OUT	Proximity Output
7	N/C	-
8	N/C	-
9	CTX	Transmit Electrode
10	LOAD	Load PWM Output
11	SDA/BATT LOW	I^2C^{TM} Data/ Battery low indicate
12	SCL/PSU CNTRL	I^2C^{TM} Clock/ Power supply control pin
13	CRX2	Block Channel
14	BATT IN	Battery input

Table 1.1 IQS924DB Pin Out Table

2 Analogue Functionality

When configured in self capacitance mode the analogue circuitry measures the capacitance of the sense electrodes attached to the Cx pins through a charge transfer process that is periodically initiated by the digital circuitry.

With the projected capacitance mode a CRX and CTX electrode is arranged in a suitable configuration that results in a mutual capacitance (Cm) between the two electrodes. CTX is charged up to a set positive potential during a charge cycle which results in a negative charge buildup at CRX.

The resulting charge displacement, through either projected or self capacitance, is then measured within the IQS924. The capacitance measurement circuitry makes use of an internal reference capacitor Cs and voltage reference (VREG).

The measuring process is referred to as a conversion and consists of the discharging of Cs and Cx capacitors, the charging of Cx and then a series of charge transfers from Cx to Cs until a trip voltage is reached. The number of charge transfers required to reach the trip voltage is referred to as the counts.

The analogue circuitry further provides functionality for:

- Power On Reset (POR) detection.
- Brown Out Detection (BOD).
- An on chip regulator further provides for accurate sampling and reduces BOM cost.

3 Digital Functionality

The digital processing functionality is responsible for various operations within the IQS924:

- Management of BOD and WDT events.
- Initiation of conversions at the selected rate.
- Processing of CS and execution of algorithms.
- Monitoring and automatic execution of the ATI algorithm.
- Signal processing and digital filtering.
- Detection of PROX and TOUCH events.
- Managing outputs of the device.
- Managing serial communications.
- Interpreting external inputs.
- Managing states together with user interactions and adjusting PWM output and prox events.

4 Device Operation

4.1.1 Sense Electrodes (CRX1 and CRX0)

The device has a two input pins for the connection of the sense electrodes namely CRX0 and CRX1. Each of the sense electrodes can trigger a proximity event when approached, however only CRX0 will trigger a touch event. It is therefore recommended that CRX1 be connected to an electrode that will ensure enough proximity detection range. CRX0 should be connected to an electrode whose placement will ensure a touch event at the correct location

For more information on electrode design methods please refer to the AZD008 application note.

4.1.2 Transmitter Electrode (CTX)

The transmitter electrode is used in projected capacitance mode. For more information on electrode design methods please refer to the AZD008 application note.

During the configuration process, the CTX pin is connected to the Configuration Tool. Please contact Azoteq for further information regarding the device configuration.

4.1.3 Proximity detect Output (PROX OUT)

PROX OUT is used to indicate a proximity event. This output pin has high current capabilities that can be used to directly drive an LED with a supply current of up to 20mA (Source) or 10mA (Sink).

If a proximity is detected, the PROX out pin becomes active. If a touch is made this pin oscillates at a 7.5Hz frequency.

4.1.4 Load Pin (LOAD)

The PWM used to control the Load brightness is set on this pin. The PWM duty cycle depends on the input received from the user. The minimum dimming level and dimming speed of the Load is adjustable with the OTP bits. It is recommended that the load be buffered with a BJT or FET since the LOAD pin has a current capability 10mA (Source) or 5mA (Sink).

4.1.5 I^2C^{TM} Compatible Communications (SCL and SDA)

The I^2C^{TM} compatible communications pins are used during the configuration process. Please contact Azoteq for further information regarding the device configuration.

4.2 Typical Connection Diagrams

4.2.1 IQS924DB

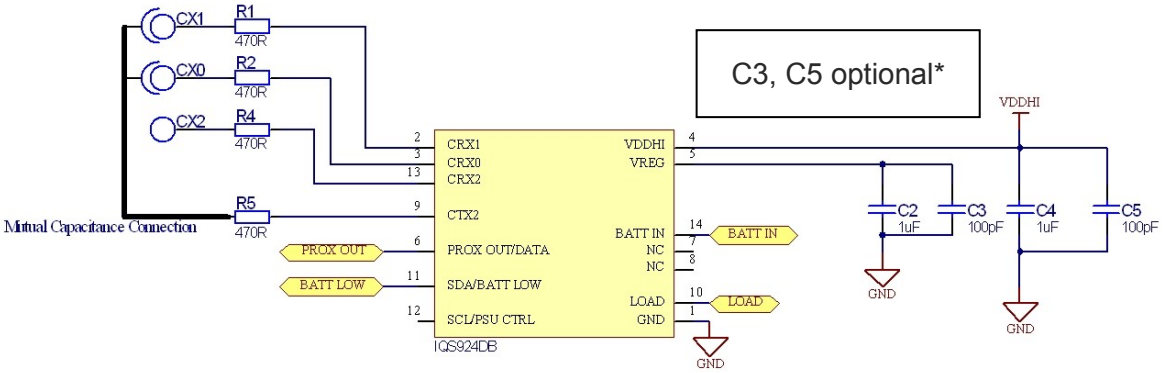


Figure 4.1 IQS924DB Suggested Connection Diagram

*Used for high frequency immunity

4.2.2 Battery Input pin (BATT IN)

The circuit illustrated in Figure 4.2 below is connected to the Battery Input pin. The operation of the battery measurement circuit relies on the 1V trip threshold of the internal comparator.

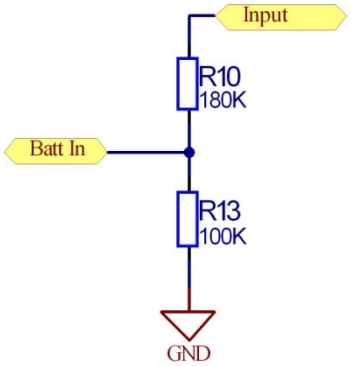


Figure 4.2 Typical connection diagram for the battery input.

Using the resistor configuration described in Figure 4.3, a trip voltage of 1V is reached when the Battery drops to a voltage of 2.9V. This value is easily adjustable by careful selection of R10 and R13.

4.2.3 Battery Low (BATT LOW)

The battery low indication pin (active High) becomes active whenever a battery low condition is observed. The BATT Low pin can therefore be used to visually indicate to the user that the batteries are now flat and need charging. A typical circuit diagram is provided in Figure 4.3. The BATT Low output serves the dual purpose of driving the LED and providing hysteresis in the battery measurement.

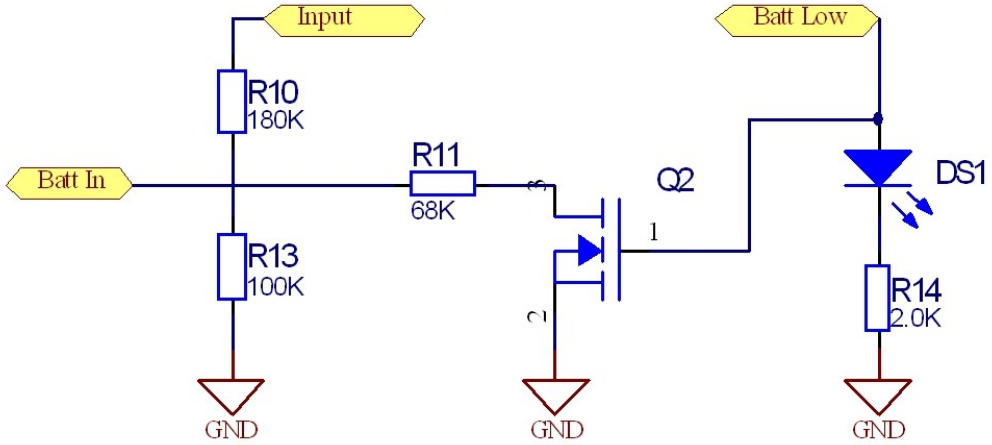


Figure 4.3 Typical connection diagram battery measurement and battery low output.

5 User Interface

5.1 IQS924DB

Main features

1. Adjustable proximity and touch thresholds.
2. Projected or Surface operation. (Independently selectable for both channels.)
3. Adjustable filter halt times (18s, always).
4. Adjustable sensitivity
5. Minimum dimming level selectable between 2.5% and 10%.
6. Smooth, continuous dimming.
7. Discrete dimming levels. These levels include: off, min dimming level, 33%, 100%.
8. Dimming speed selectable between 4s and 2s from min dimming level to completely on and back again.
9. Four selectable low power levels: 64ms, 10ms, 128ms, 512ms
10. 1- wire debug streaming
11. Prox output providing Find-in-the-Dark (FITD) functionality as well as visual indication when a touch is being made.
12. Prox on Load functionality.
13. No LED flicker. This is accomplished by switching at a frequency of 122Hz and using 10bit PWM resolution at low light levels.

User Interface (Refer to Figures 5.1 and 5.2)

Short touch: Touch lasting less than 1s

Long touch: Touch lasting more than 1s

1. From the off state: Upon triggering the proximity of the device, the result is indicated on the proximity out pin or (if selected by an OTP option) the load (FITD dimming level). The proximity timeout is also selectable by OTP options.
2. From the off state: a short touch switches on the load at the memory level. The memory level is default at 100% on. The light will remain at this level until further user interaction is detected.
3. A further touch turns the load off.
4. From the off state: a long touch will dim the load starting from the minimum dimming level and increasing at the speed set in the OTP bits until the touch is released. This will also activate the auto off feature. The load will switch off after 1h with no further user interaction. The memory position is set when the user releases the touch.
5. When the load is switched on and a long touch is made the load will start dimming the load downwards/upwards depending on the position. The memory position is set when the user releases the touch.
6. If the discrete dimming selection bit is enabled a touch from the off position will turn the load on to the maximum dimming level. From there a short touch (Within 2s of the last touch) will step through the discrete dimming levels (100%, 50%, Minimum). A short touch after longer then 2s of the last touch will switch the load off. When a long touch is made the load will start dimming downwards/upwards depending on the position.

5.2 Custom UI 1 (Refer to Figures 5.3 and 5.4)

To access this mode the Prox on load option **bank 2 bit 1** must be enabled and the UI selection must be set to Custom UI 1

Main features

1. To same main features as the IQS924 with added features.
2. The light will switch on with a proximity detection

User Interface

1. Same basic interface as the IQS924 with the following added functionality.
2. On proximity detection the light will switch on.
3. The light can be switched off by a touch detection.

5.3 Custom UI 2 (Refer to Figures 5.5 and 5.6)

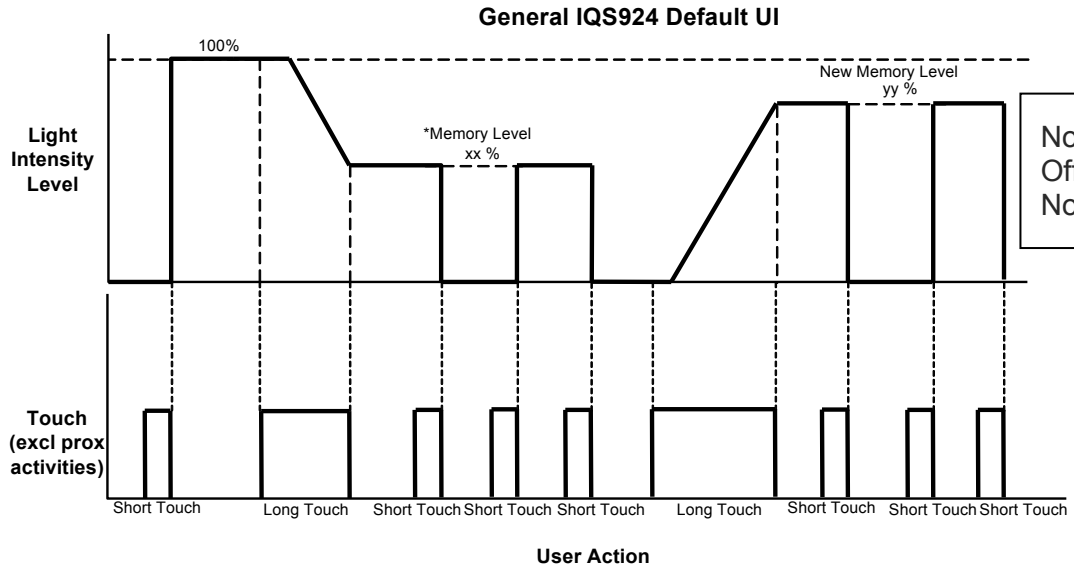
To access this mode the UI selection must be set to Custom UI 2

Main features

1. No memory mode
2. Switch on rising edge of touch for switch on.
3. Dimming stops at top or bottom of the cycle.

User Interface

1. On rising edge of touch the light switch on at 100%.
2. If touch is held the device will start dimming down to the minimum level and stop there.
3. A further long touch will start dimming to the 100% level and stop there.
4. A short touch will switch off the device.



Note: Soft On/ Soft Off option exists. Not shown.

Figure 5.1 IQS924 UI illustration

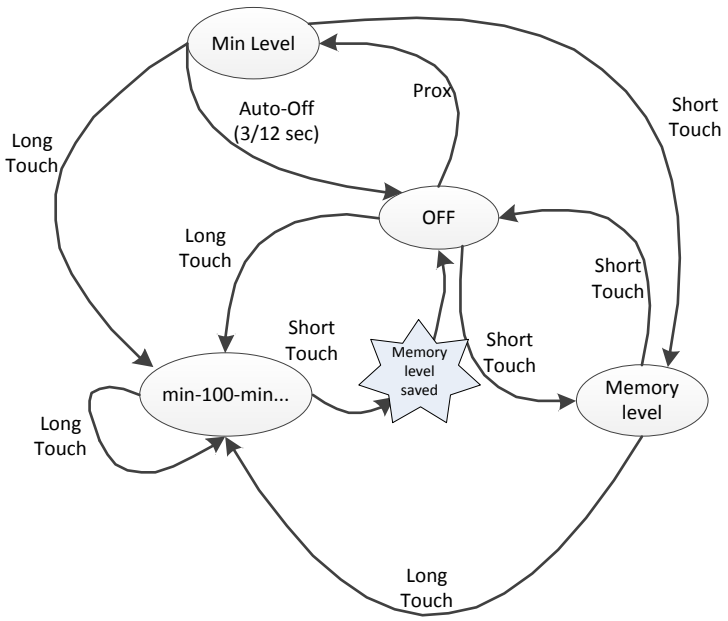


Figure 5.2 IQS924 flow diagram

*Memory = 100% after power cycle.

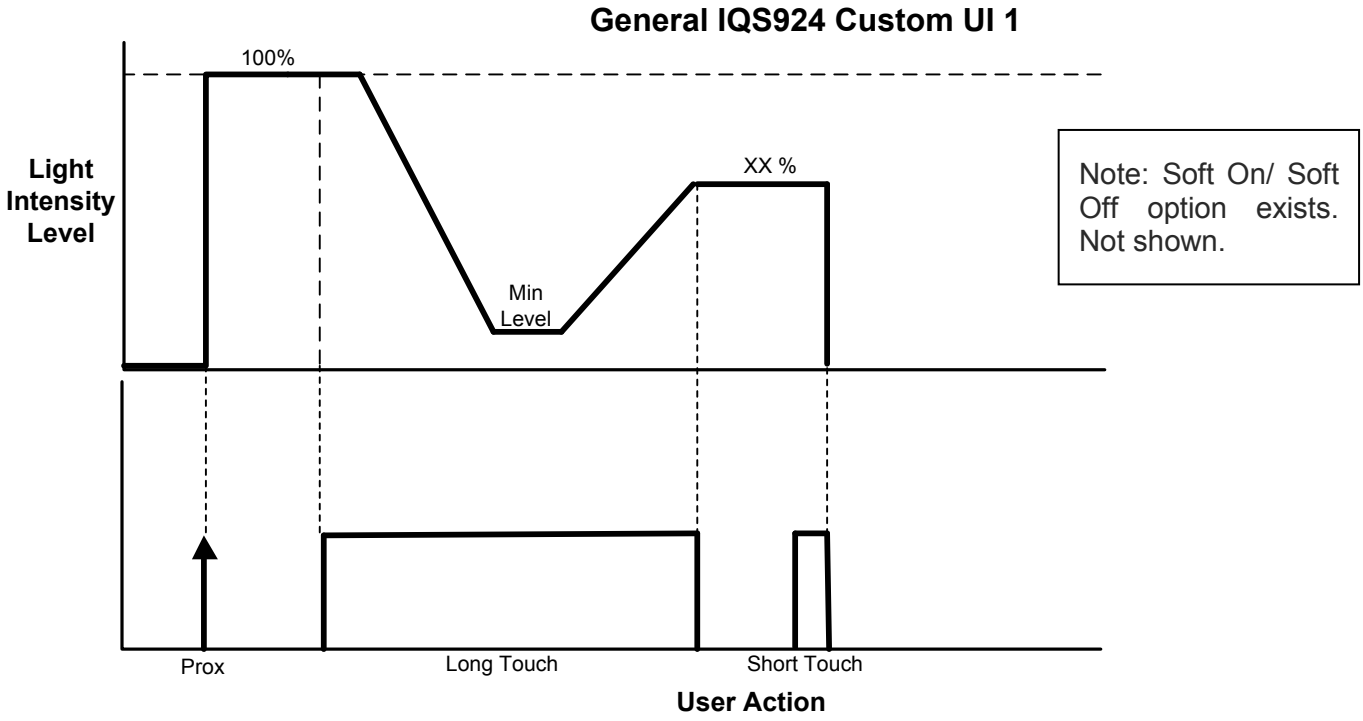


Figure 5.3 IQS924 Custom UI 1 illustration

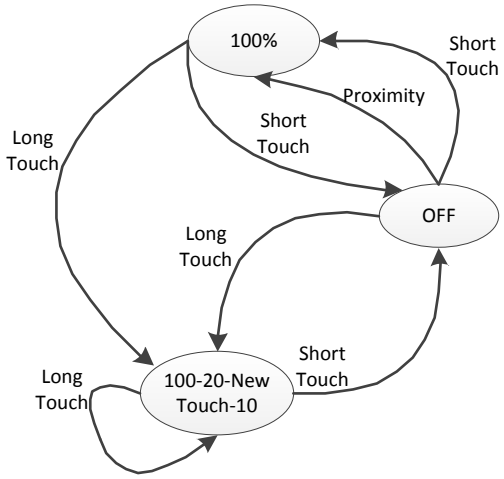


Figure 5.4 IQS924 Custom UI 1 flow diagram

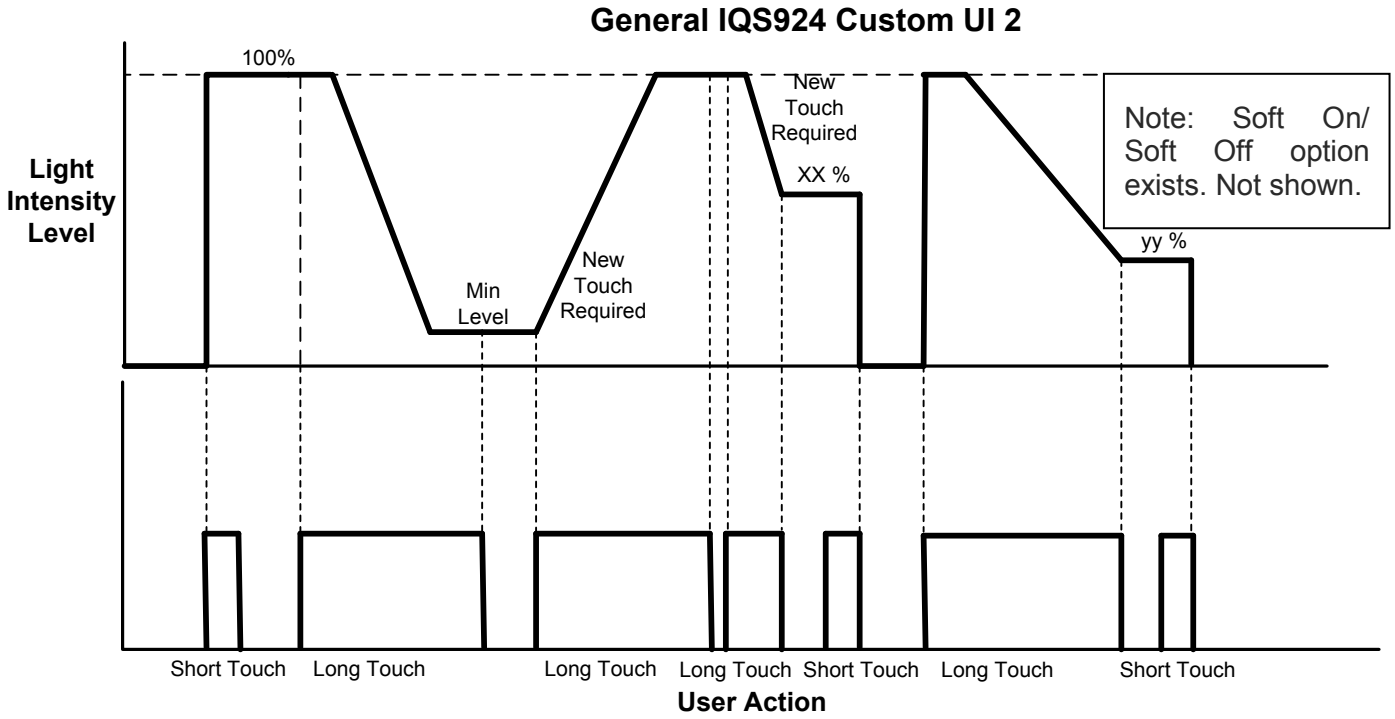


Figure 5.5 IQS924 Custom UI 2 illustration

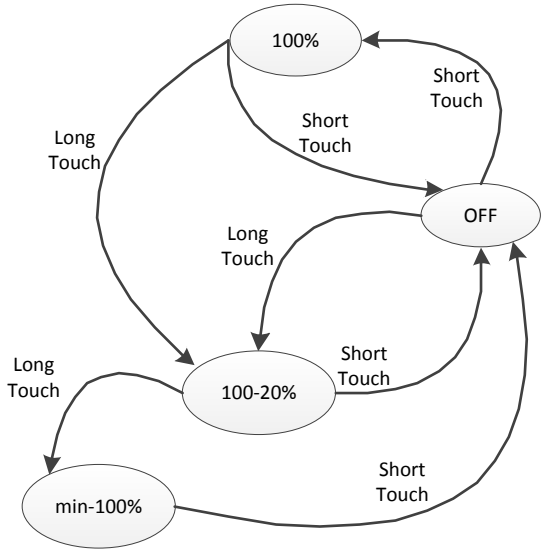


Figure 5.6 IQS924 Custom UI 2 flow diagram

6 Fuse Bit Selections

Table 6-1: User Selectable Configuration for IQS924 Options: Bank 0

X	NOISE $_{IMMUNITY}$	Min $_{LEVEL}$	T_{THR2}	T_{THR1}	T_{THR0}	P_{THR1}	P_{THR0}
bit 7							bit 0

Bank 0: bit 7 Not Used

Bank 0: bit 6 **NOISE $_{IMMUNITY}$**: Conductive noise (section 7)

0 = Enable

1 = Disabled

Bank 0: bit 5 **Min $_{LEVEL}$**: Minimum Dimming level

0 = 2.5%

1 = 10%

Bank 0: bit 4-2 **T_{THR2}:T_{THR0}:** Touch Thresholds on CH0

000 = 64

001 = 16 (Most Sensitive)

010 = 32

011 = 128

100 = 192

101 = 256

110 = 384

111 = 512 (Least Sensitive)

Bank 0: bit 1-0 **P_{THR1}: P_{THR0}:**Proximity Thresholds

00 = 4

01 = 2 (Most Sensitive)

10 = 8

11 = 16 (Least Sensitive)

Table 6-2: User Selectable Configuration for IQS924 Options: Bank 1

Dimm $_{OFF}$	T $_{HALT}$	TSLOPE $_{OFF}$	TSLOPE $_{ON}$	Prox $_{LOAD}$	Dimm $_{RATE}$	ATI $_{BASE1}$	ATI $_{BASE0}$
bit 7							bit 0

Bank 1: bit 7 **Dimm $_{OFF}$** : Dimm from off (Section 8)

0 = Disabled

1 = Enabled

Bank 1: bit 6 **T $_{HALT}$** : Halt time of Long Term Average (Section 9)

0 = 18s

1 = Always (Prox on 18s)

Bank 1: bit 5 **TSLOPE $_{OFF}$** : Soft/Hard Off

0 = Soft Off

1 = Hard Off

Bank 1: bit 4 **TSLOPE $_{On}$** : Soft/Hard On

0 = Hard On

1 = Soft On

Bank 1: bit 3 **Prox $_{LOAD}$** : Prox out when Load on (Section 10)

0 = Enabled

1 = Disabled

Bank 1: bit 2 **Dimm $_{RATE}$** : Touch Dimming Speed

0 = 4s (Slow)

1 = 2s (Fast)

Bank 1: bit 1-0 **ATI $_{BASE1}$: ATI $_{BASE0}$** : Mirror Base Select

00 = 200

01 = 100 (Most Sensitive)

10 = 250

11 = 400 (Least Sensitive)

Table 6-3: User Selectable Configuration for IQS924 Options: Bank 2

Bat $_{CHECK}$	FITD $_{Time}$	1 Wire $_{Stream}$	Dimming $_{UI}$	$LP_{MODE}1$	$LP_{MODE}0$	Prox $_{LOAD}$	Block $_{CHANNEL}$
bit 7							bit 0

Bank 2: bit 7 **Bat $_{CHECK}$** : Battery Check (Section 11)

0 = Disabled

1 = Enabled

Bank 2: bit 6 **FITD $_{TIME}$** : Find In The Dark (Section 12)

0 = 3s

1 = 12s

Bank 2: bit 5 **1 Wire $_{STREAM}$** : 1 Wire Streaming (Section 13)

0 = Disabled

1 = Enabled

Bank 2: bit 4 **Dimming $_{UI}$** : Dimming Mode (Section 14)

0 = Gradual Dimming

1 = Discreet levels

Bank 2: bit 3-2 **LP $_{MODE0}$: LP_{MODE1} :** Low Power Mode

00 = 64ms

01 = Normal Power (Fastest response time)

10 = 128ms

11 = 512ms (Lowest current consumption)

Bank 2: bit 1 **$ProxL_{ON}$:** Prox on Load (Section 15)

0 = Disabled

1 = Enabled

Bank 2: bit 0 **Block $_{CHANNEL}$** : Blocking Channel (Section 16)

0 = On

1 = Off

Table 6-4: User Selectable Configuration for IQS924 Options: Bank 3

X	X	X	X	Prox $_{MODE}$	Touch $_{MODE}$	Var $_{SELECT1}$	Var $_{SELECT0}$
bit 7							bit 0

Bank 3: bit 7-4 Not Used

Bank 3: bit 3 **Prox $_{MODE}$:** Proximity mode (Section 17.1)

0 = Self

1 = Projected

Bank 3: bit 2 **Touch $_{MODE}$:** Touch mode (Section 17.2)

0 = Projected

1 = Self

Bank 3: bit 1-0 **Var $_{SELECT1}$: Var $_{SELECT0}$:** Variant Selection (Section 5)

00 = Default UI

01 = Custom UI 1

10 = Custom UI 2

Table 6-5: User Selectable Configuration for IQS924 Options: Bank 4

X	X	X	X	Auto $_{OFF}$	X	X	X
bit 7							bit 0

Bank 4: bit 3 **Auto $_{OFF}$:** Auto Off in UI (Dim Up) (Section 18)

0 = Enabled

1 = Disabled

7 Conductive Noise (IEC61000-4-6) Immunity

Novel and propriety methods yields industry leading levels on conducted noise immunity. By a combination of on-chip HW circuits and software algorithms, the IQS924 can withstand very high levels of conducted noise.

Configuration: Bank0 bit6

Noise $_{IMMUNITY}$: Conducted Noise	
Bit	**Selection**
0	Enabled
1	Disabled

8 Adjust from off

With Dimm from off enabled the IQS924 will gradually adjust from an off position. With this option disabled the dimming will start form 100% on mode after a short touch occurred.

Configuration: Bank1 bit7

Dimm $_{OFF}$: Dimm from off	
Bit	**Selection**
0	Disabled
1	Enabled

9 Halt time of long term average

The Halt Timer is started when a proximity or touch event occurs and when it expires the LTA filter is recalibrated. Recalibration causes LTA < CS for self and LTA > CS for mutual capacitance, thus the disappearance of proximity or touch events.

Configuration: Bank1 bit6

T_{HALT}: Halt time of long term average	
Bit	**Selection**
0	18s
1	always (Prox on 18s)

10 Prox out when load on

If the load pin is high the user can select if the prox out pin must be activated when a proximity event is detected.

Configuration: Bank1 bit5

Prox $_{LOAD}$: Prox out when load on	
Bit	**Selection**
0	Enabled
1	Disabled

11 Battery Check

If Battery $_{CHECK}$ is enabled:

1. The battery voltage will be monitored. If battery low is detected the battery low output will be activated and the PSU_CTRL pin will activate to charge the battery. If the battery is fully charged the battery low and PSU_CTRL will be deactivated.

2. If the battery is low the device will have a 5 minute auto off time.

3. If the battery is low the device will switch to the battery low level (+-3% power) to preserve battery power.

Configuration: Bank2 bit7

Bat $_{CHECK}$: Battery check	
Bit	**Selection**
0	Disabled
1	Enabled

12 Find in the Dark Time

After a proximity event is detected the prox out pin will stay low for a selected time. This time is user selectable between 3s and 12s.

Configuration: Bank2 bit6

FITD $_{TIME}$: Battery check	
Bit	**Selection**
0	3s
1	12s

13 IQS924 1-wire Data Format

For a more complete description of the data streaming protocol, please refer to Application Note AZD017 on the Azoteq website.

The IQS924 has the capability to stream data to an MCU. This provides the designer the ability to obtain the parameters and sensor data within the device in order to aid design into applications. Data streaming is performed as a 1-wire data protocol on the PROX OUT pin. The output function of this pin is therefore lost when the device is configured in streaming mode. Data Streaming can be enabled as indicated below:

Configuration: Bank2 bit5

1 Wire $_{STREAM}$: 1 Wire Streaming	
Bit	**Selection**
0	Disabled
1	Enabled

Figure 13.1 illustrates the communication protocol for initialising and sending data with the 1-wire communication protocol.

1. Communications initiated by a START bit. Bit defined as a low condition for T_{START}.
2. Following the START bit, is a synchronisation byte (T_{INIT} = 0xAA). This byte is used by the MCU for clock synchronisation.
3. Following T_{INIT} the data bytes will be sent. With short data streaming mode enabled, 5 bytes of data will be sent, otherwise 8 bytes will be sent after each charge cycle.
4. Each byte sent will be preceded by a START bit and a STOP bit will follow every byte.
5. STOP bit indicated by taking pin 1 high. The STOP bit does not have a defined period.

Byte Definitions for Streaming Mode

Byte	Bit	Value
0	7:0	CS High byte
1	15:8	CS Low byte
2	23:16	LTA High byte
3	31:24	LTA Low byte
4	39 38 37 36 35 34 33 32	ATI busy Internal Use Zoom Active LP Active Light Present Battery Low Not Used Channel Indication 0 = CH1; 1 = CH2
5	47-40	Internal Use
6	55:48	Internal Use
7	63, 62 61 60 59, 58 57 56	Not Used Prox CH 1 Prox CH 0 Not Used Touch CH1 Touch CH0

Azoteq provides an application tool: “VisualProxSense” that can be utilised to capture and visualise the data streamed from the IQS924 (refer to application note AZD006 – VisualProxSense Overview).

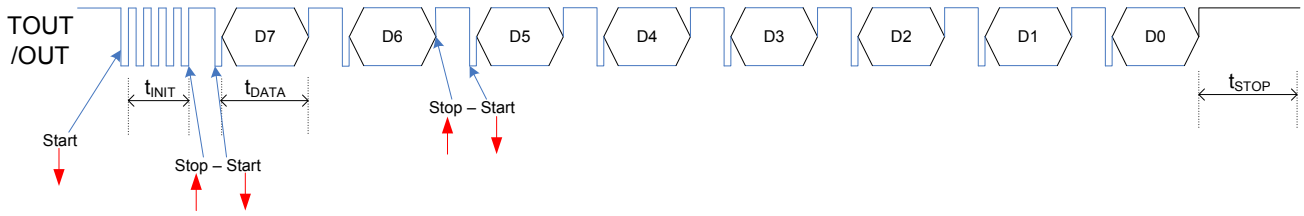


Figure 13.1 Debug: 1-wire streaming Debug Mode

14 Dimming mode

Dimming mode is selectable between gradual dimming and discrete steps. These levels include: off, min dimming level, 33%, 100%.

Configuration: Bank2 bit4

Dimming $_{UI}$: Dimming Mode	
Bit	**Selection**
0	Gradual Dimming
1	Discrete Levels

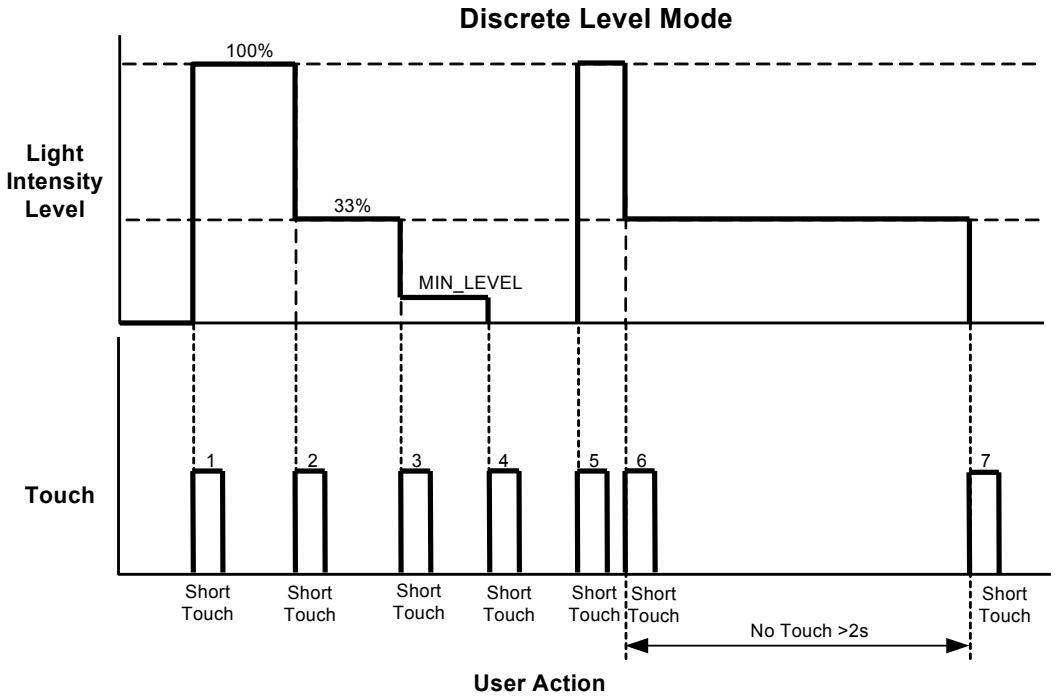


Figure 14.1 Discrete dimming level UI illustration

15 Prox on load

The user has the option to activate the Load pin whenever a proximity event has been detected.

Configuration: Bank2 bit4

ProxL $_{ON}$: Prox on Load	
Bit	**Selection**
0	Disabled
1	Enabled

16 Blocking Channel

When noise is detected on the blocking channel both the prox out pin as well as the load pin will be disabled. With the blocking channel enabled corrupted samples will also be blocked from being send the filters which may cause false triggers.

Configuration: Bank2 bit4

Block $_{CHANNEL}$: Blocking Channel	
Bit	**Selection**
0	On
1	OFF

17 Determine Touch or Prox

An event is determined by comparing the CS with the LTA. Since the CS reacts differently when comparing the self with the projected capacitance technology, the user should consider only the conditions for the technology used.

- Self: CS < LTA - Threshold
- Projected: CS > LTA + Threshold

Threshold can be either a Proximity or Touch threshold.

17.1 Proximity Mode

The Proximity mode can be set for either self or projected capacitance.

Configuration: Bank3 bit3

Prox $_{MODE}$: Proximity Mode	
Bit	**Selection**
0	Self
1	Projected

17.2 Touch Mode

The Touch mode can be set for either self or projected capacitance

Configuration: Bank3 bit2

Prox $_{MODE}$: Proximity Mode	
Bit	**Selection**
0	Projected
1	Self

18 Auto Off in UI

Auto off can be selected by enabling the following bit **Bank 4 bit 3**. For Auto off to be selected the Dimm from off bit **Bank 1 bit 7** must also be selected**.** When the load is switched off and a long touch is made the load will dim on starting from the minimum dimming level and increasing at the speed set in the fuse bits until the touch is released. This will also activate the auto off feature. The load will switch off after 1h with no further user interaction.

Auto $_{OFF}$: Auto Off in UI	
Bit	**Selection**
0	Enabled
1	Disabled

19 Specifications

19.1 Absolute Maximum Specifications

The following absolute maximum parameters are specified for the device:

Exceeding these maximum specifications may cause damage to the device.

- Operating temperature: -40°C to 85°C
- Supply Voltage (VDDHI – VSS): 3.6V
- Maximum pin voltage: VDDHI + 0.5V (may not exceed VDDHI max)
- Maximum continuous current (for specific Pins): 10mA
- Minimum pin voltage: VSS - 0.5V
- Minimum power-on slope: 100V/s
- ESD protection: ±4kV Human body model
- Package Moisture Sensitivity Level (MSL):
  - SOIC-14: 2

Table 19.1 IQS924 General Operating Conditions with conducted noise disabled[1]

DESCRIPTION	Conditions	PARAMETER	MIN	TYP	MAX	UNIT
Supply voltage		V_{DDHI}	1.8	3.3V	3.6	V
Internal regulator output	1.8 ≤ V_{DDHI}≤ 3.6	V_{REG}	1.62	1.7	1.79	V
Default Operating Current	3.3V	$I_{IQS924NP}$	-	190	230	µA
Low Power Setting 1*	3.3V, LP=64	$I_{IQS924LP64}$	-	40	50	µA
Low Power Setting 2*	3.3V, LP=128	$I_{IQS924LP128}$	-	20	25	µA
Low Power Setting 3*	3.3V, LP=512	$I_{IQS924LP512}$	-	6	8	µA

With conducted noise disabled transfer frequency = 4 MHz

All measurements done at 25°C

*To be finalized

[1]Operating current shown in this datasheet, does not include power dissipation through I^2C pull up resistors.

Table 19.2 General Operating Conditions with conducted noise enabled[1]

DESCRIPTION	Conditions	PARAMETER	MIN	TYP	MAX	UNIT
Supply voltage		V_{DDHI}	1.8	3.3V	3.6	V
Internal regulator output	$1.8 \leq V_{DDHI} \leq 3.6$	V_{REG}	1.62	1.7	1.79	V
Default Operating Current	3.3V	$I_{IQS924NP}$	-	550	660	µA
Low Power Setting 1*	3.3V, LP=64	$I_{IQS924LP64}$	-	110	132	µA
Low Power Setting 2*	3.3V, LP=128	$I_{IQS924LP128}$	-	45	55	µA
Low Power Setting 3*	3.3V, LP=512	$I_{IQS924LP512}$	-	12	15	µA

With conducted noise enabled transfer frequency = 16 MHz

All measurements done at 25°C

Table 19.3 Start-up and shut-down slope Characteristics

DESCRIPTION	Conditions	PARAMETER	MIN	MAX	UNIT
Power On Reset	V_{DDHI} Slope ≥ 100V/s @25°C	POR	1.2	1.6	V
Brown Out Detect	V_{DDHI} Slope ≥ 100V/s @25°C	BOD	1.15	1.6	V

*To be finalized

[1] Operating current shown in this datasheet, does not include power dissipation through I^2C pull up resistors.

20 Mechanical and Footprint Dimensions

20.1 IQS924DB packaging dimensions

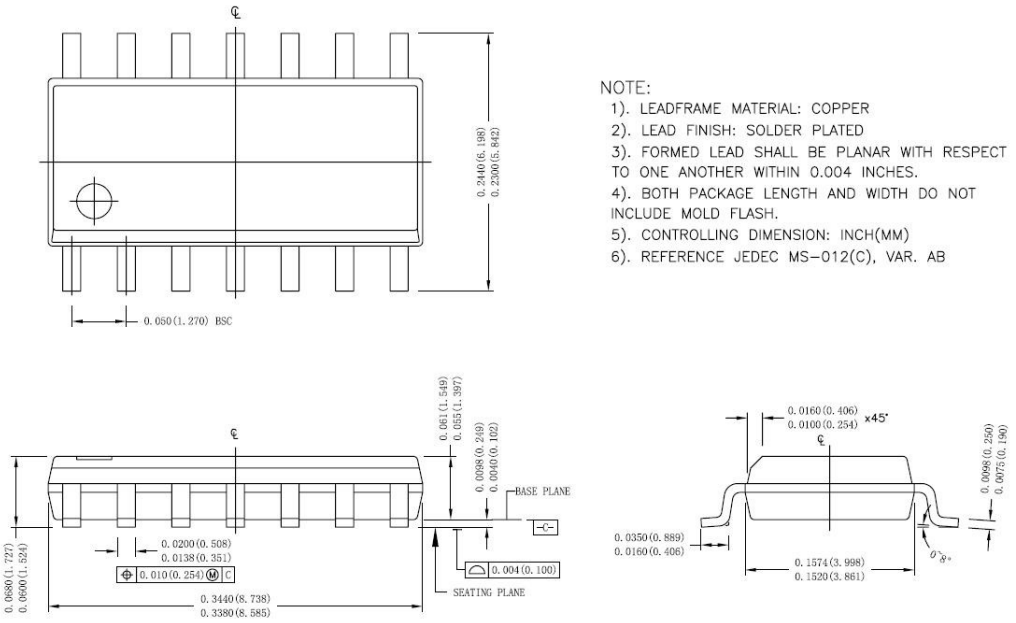


Figure 20.1 SOIC-14 Package information

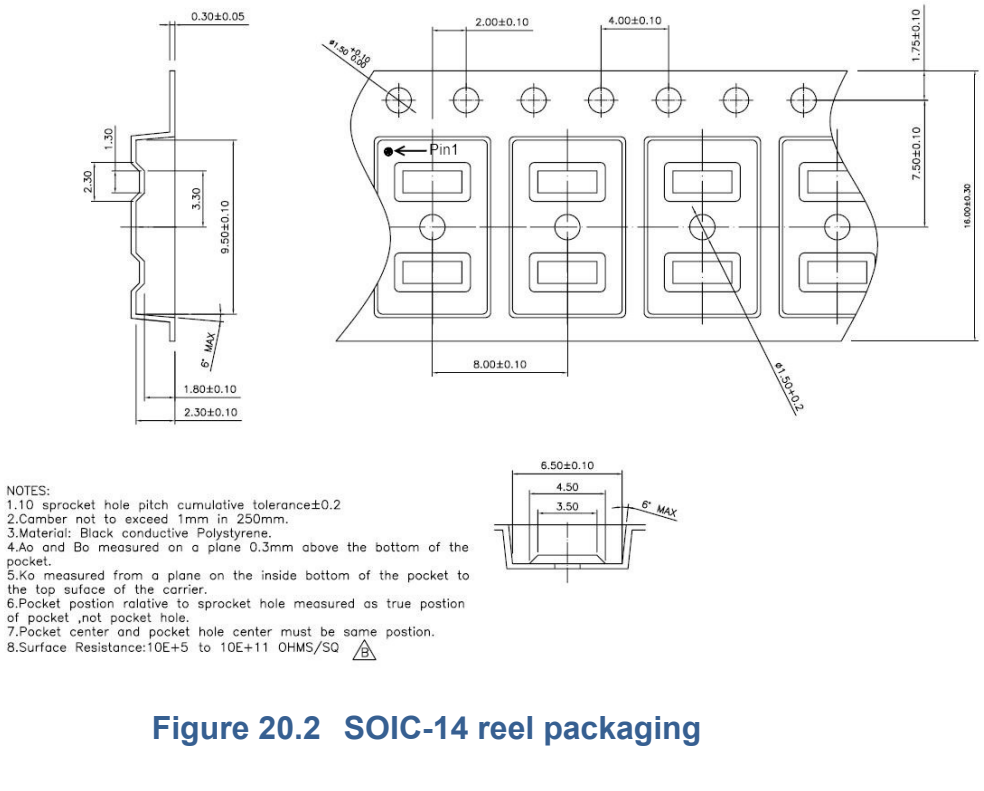


Figure 20.2 SOIC-14 reel packaging

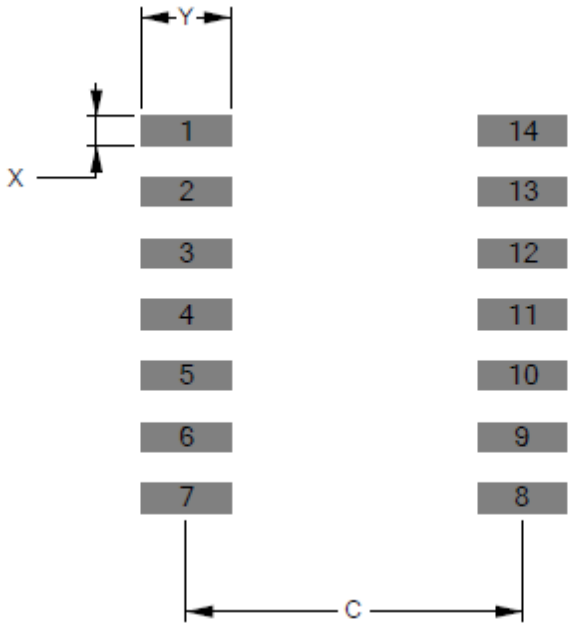


Figure 20.3 SOIC-14 Footprint information

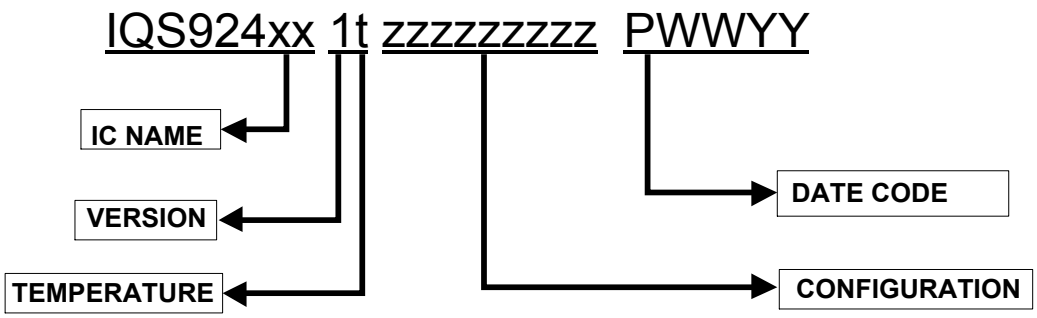
Table 20.1 Dimensions for the SOIC-14 footprint

Variable	Value [mm]
Pitch	1.27
C	7
Y	1.85
X	0.6

21 Revision History

Revision number	Changes
1.00	Original

22 Device marking



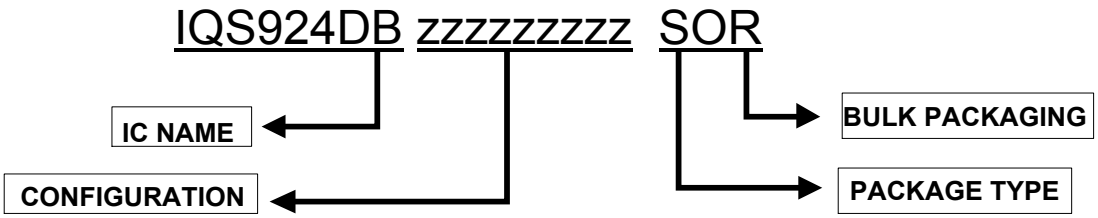
IC NAME	xx	=	DB
VERSION	1	=	IC version
TEMPERATURE RANGE	t	=	-40°C to 85°C (industrial)
CONFIGURATION	Z		
DATE CODE	P	=	Package House
	WW	=	Week
	YY	=	Year

23 Ordering Information

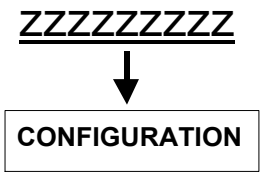
Order quantities will be subject to multiples of a full reel. Contact the official distributor for sample quantities. A list of the distributors can be found under the “Distributors” section of www.azoteq.com.

For large orders, Azoteq can provide pre-configured devices.

Top Device Marking



Bottom Device Marking



IC NAME	IQS924DB	=	IQS924DB
CONFIGURATION	zzzzzzzzz	=	IC Configuration (hexadecimal)
PACKAGE TYPE	SO	=	SOIC-14
BULK PACKAGING	R	=	Reel (2500pcs/reel)

24 Contact Information

	USA	Asia	South Africa
Physical Address	6507 Jester Blvd Bldg 5, suite 510G Austin TX 78750 USA	Rm2125, Glittery City Shennan Rd Futian District Shenzhen, 518033 China	109 Main Street Paarl 7646 South Africa
Postal Address	6507 Jester Blvd Bldg 5, suite 510G Austin TX 78750 USA	Rm2125, Glittery City Shennan Rd Futian District Shenzhen, 518033 China	PO Box 3534 Paarl 7620 South Africa
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Please visit www.azoteq.com for a list of distributors and worldwide representation.