



Application Note: AZD007 IQ Switch[®] - ProxSenseTM Series

USBProg.exe Overview (WinXP)

Table of Contents

1	Introduction:1
2	Single Channel ProxSense™ IC Programming Configuration:1
3	Multi-Channel ProxSense™ IC Programming Configuration:

1 Introduction:

The ProxSense[™] Proximity and Touch detection ICs contain **OTP** (One Time Programmable) options which can be set by the designer. These OTP options aid the designer in configuring the ICs for custom designs. USBProg.exe and the CTxxx (Configuration Tool xxx) can be used to easily configure these OTP options.

Please refer to Application Note: AZD005 for installation guide and firmware update of USBProg.exe and Configuration Tools (CTxxx).

2 Single Channel ProxSense[™] IC Programming Configuration:

(IQS123, IQS124, IQS125, IQS126, IQS127)

Steps to initialise the Module:

- 1. Connect CT120/CT200 to computer via USB cable.
- 2. Connect IQS1xx Configuration Header of Module to CTxxx (see Table 1 and Figure 1)
 - In-Circuit or 0
 - Place IQS1xx IC in Programming socket 0
 - Both cases require VDD/V_{REG} capacitor to GND = 1uF populated.

The pins required to program the OTP options on the IQS12x series of ICs should be connected to the programmer (CTxxx) as in Table 1:



Table 1: Hardware	e interface	description:	IQS1xx -	Programmer
-------------------	-------------	--------------	----------	------------

	IQS		CT100 / CT000 pip			
IQS123, IQS124, IQS125	IQS126	IQS127 D	IQS127 S	IQS127C (CapPO)		#: 20-pin Box Header
		VSS			\leftrightarrow	1
						2
		VDDHI			\leftrightarrow	3
VI	DD				\leftrightarrow	4
C	S	POUT	SHLD	POUT	\leftrightarrow	5
		CX			\leftrightarrow	6
		\leftrightarrow	7			
			8			
					\leftrightarrow	9
OUT	POUT				\leftrightarrow	10



Figure 1: 20 pin Box Header on CT120/CT200

- **3.** Open USBProg vX.XX.exe (v6.2.0 or later).
- **4.** Select relevant device on first menu (the IQS1xx IC should be connected via USB using the CTxxx Configuration Tool (in circuit / programming socket) when selecting a device).
- 5. Click on "Read Chip". This should read the current settings on the IC, and display it in the right-hand column. (If the IC is in default mode, this should all be in a black font)
- 6. Refer to the relevant IC's datasheet to change each OTP function's options using the dropdown boxes.



- 7. Click on "Program Chip" after the correct selection has been made. (Note: Each Function can only be programmed once, as it is One Time Programmable (OTP))
- 8. Please Note: After programming, Click "Read Chip". The "OPTION" and "READ" columns should now match for successful "Program Chip" result.

Example of USBProg.exe (IQS127S):

Step 3: Open USBProg & Step 4: Select IQS127

Options:	I0S127S		IC Data:	
Proximity/Touch Output	Touch	~		
OUT Logic Select	Active Low	~		
UT Function	Active	~		
roximity Threshold	2 (Most Sensitive)	~		
ouch Threshold	1/16	~		
ower Mode	Boost Mode	~		
HALT Timing	18.6s	~		
ana Tanm Naisa Filtan (LTN)	Enabled	~		
ong term Noise Filter (LIN)				
ong Term Noise Filter (LIN) ebug Mode	Disabled	×		
ebug Mode	Disabled	×		
e: For more information regarding the function duct, please refer to the applicable datashee	Disabled ons and options of the t.	×	Set S	election 00000
e: For more information regarding the function duct, please refer to the applicable datashee Messages:	Disabled	Reset Selection	Set S Package Type:	election 00000

Figure 2: USBProg.exe – IQS127S

The latest version of USBProg.exe can be downloaded from www.azoteq.com



Step 5: Read Chip

Device Switch Mode Help					
Options:	IQS127S		IC Data: 🔪		
Proximity/Touch Output	Touch	~	Touch		
OUT Logic Select	Active Low	~	Active Low		
OUT Function	Active	~	Active		
Proximity Threshold	2 (Most Sensitive)	~	2 (Most Sensitive)		
Touch Threshold	1/16	~	1/16		
Power Mode	Boost Mode	~	Boost Mode		
THALT Timing	18.6s	~	18.6s		
Long Term Noise Filter (LTN)	Enabled	~	Enabled		
Debug Mode	Disabled	~	Disabled		Click on " Read Chip ".
					C displayed when IC is still
					in the un-configured state
lote: For more information regarding the function	is and options of the		Set Selection 00000	`	in the un-configured state
lote: For more information regarding the functio roduct, please refer to the applicable datasheet or Messages:	is and options of the		Set Selection 00000		in the un-configured state
lote: For more information regarding the function roduct, please refer to the applicable datasheet og Messages: Configuration Tool 'CT200' detect	ns and options of the Program Chip Beart S	ielection	Set Selection 000000 Package Type: TS0T23-6		in the un-configured state
lote: For more information regarding the function roduct, please refer to the applicable datasheet og Messages: Configuration Tool 'Cf200' detect Valid firmmare version detected: Device ID : 0318	ns and options of the Program Chip Beset S P1. 16 Read Chip More Op	ielection ptions V	Set Selection 00000 Package Type: TS0T23-6 ¥ Bulk Packaging: Reel ¥		in the un-configured state
lote: For more information regarding the function roduct, please refer to the applicable datasheet og Messages: Configuration Tool 'CT200' detect Valid firmemare verzion detected: Rolid EI memare verzion detected: DS1275 gelected	Is and options of the Program Chip Beeft S 1. 16 Read Chip More Op Clear Messages	ielection ptions V	Set Selection 00000 Package Type: TS0T23-6 Bulk Packaging: Reel Part Number For Indexing Numperset: TQ51275 00000 TS R		in the un-configured state

Figure 3: USBProg.exe – IQS127S IC Data

Step 6: IC Options



Figure 4: USBProg.exe – IQS127S Changed IC data



Step 7: Program Chip



Figure 5: USBProg.exe – IQS127S Programmed IC

Note: Each option on the IC can only be configured once, as it is OTP (One Time Programmable).





3 Multi-Channel ProxSense[™] IC Programming Configuration:

(IQS132, IQS 133, IQS221, IQS240)

Steps to initialise the Module:

- 1. Connect CT120/CT200 to computer via USB cable (IQS13x compatible with CT200 only).
- 2. Connect IQSxxx Configuration Header of Module to CTxxx (see Table 2 and Figure 6) o In-Circuit or
 - Place IQSxxx IC in Programming socket
 - Both cases require VDD capacitor = 1uF to GND populated.
 - Both cases require ICTRL resistor = $43k\Omega$ to GND populated.

The pins required to program the OTP options on the multi-channel IQSxxx series of ICs should be connected to the programmer (CTxxx) as in Table 2:

IQS13x Pin Name	IQS2xx Pin Name		CT120/CT200 pin #: 20 pin Box Header**
VS	SS	\leftrightarrow	1
		\leftrightarrow	2
VDI	DHI	\leftrightarrow	3
	VDD	\leftrightarrow	4
	ZC	\leftrightarrow	5
	MOSI	\leftrightarrow	6
TO0	SOMI	\leftrightarrow	7
	RDY	\leftrightarrow	8
TO1	SCK	\leftrightarrow	9
	/SS	\leftrightarrow	10

Table 2: Hardware interface description: IQSxxx – Programmer

**This header correspond 1:1 with the standard headers used on most Azoteq PCBs.









- **3.** Open USBProg vX.XX.exe (v6.2.0 or later).
- **4.** Select relevant device on first menu (the IQSxxx IC should be connected via USB using the CTxxx Configuration Tool (in circuit / programming socket) when selecting a device).
- 5. Click on "Read Chip". This should read the current settings on the IC, and display it in the right-hand column. (If the IC is in default mode, this should all be in a black font)
- 6. Refer to the relevant IC's datasheet to change each OTP function's options using the dropdown boxes.
- 7. Click on "Program Chip" after the correct selection has been made. (Note: Each Function can only be programmed once, as it is One Time Programmable (OTP))
- 8. Please Note: After programming, Click "Read Chip". The OPTION and READ columns should now match for successful "Program Chip" result.

The latest version of USBProg.exe can be downloaded from www.azoteq.com

Example of USBProg (IQS221):

Step 3: Open USBProg
&
Step 4: Select IQS221

	I0S221		IC Data:	
Sensitivity Selection: Output Mode:	External	Touch and Prox sliders are disabled 8 Channels Direct Mode		
	H [7:0]	Touch		
Least C	CH [8]	Mest User Defined T04:		
D C	B A	Low Y		
		Droy		
Least L		Prox Level Selection:		
Least L K	<u>,,,,,,,,,,</u> J I HG FE	Most		
Additional Low Power Mo	ide Disable	d	2	
Charge Period in LP	LP1		1	
Fast Charge Selection	TSAMPL	.E = ±20ms		
IIR Halt Selection	20 Sec	Halt	1	
Zoom Option	Enabled	1	2	
Shield	Disable	d	1	
CONVDIV	250kHz	5		
	Enabled	1	6	

Figure 7: USBProg.exe – IQS221

Note: The IQS221 has an enhanced opening page on the USBProg. This page includes choosing the Sensitivity and Output Mode

This enables the designer to choose whether the IC Sensitivity Settings is selected internally

(programmed) or externally (with resistors options). If used internally, the page will

designer to use the greyedout sliders to choose Sensitivity settings.

expand enabling the

of the IQS221.



Step 5: Read Chip & Advanced Mode

Azoteq USBProg V6.2.0.1	18						
File Device Switch Mode Help							
Options: IQS221				IC Data: 🔻			
Sensitivity Selection:	External 🗸	Touch and Prox slid	ers are disabled	External	~		
Output Mode:	Dir-A 🗸	8 Channels Direct	t Mode	Dir-A			
	CH [7:0]	,	Louish				Click on " Read Chip ".
Least	0	Most	ouch	T.	0		
D C	B A]		D C	ВА	1.1	Default IC settings will be
Least C	0	Most Low		1	0		displayed when IC is still in
	B A			b c	ВА		the un-configured state
	P [7:0]		Prox				the arr configured state.
Least		Most Prov	Level Selection:				
L	I H F	Defaul	t 🗸	Default	1 1 1		
Land C	P [8]	Mart			1		
L K	J I HG FE	- MAX		L K J	I HG FE		
Additional Low Power M	Aode Disable	d	~	Disabled			Advanced Mode: Clicking
Charge Period in LP	LP1	N-	*	LP1			on "Advanced Mode"
Fast Charge Selection	TSAMP	$LE = \pm 20 ms$	~	TSAMPLE = ±20ms			anablas the designer to
IIR Halt Selection	20 Sec	Halt	Y	20 Sec Halt			enables the designer to
Zoom Option	Enable	ŧ	*	Enabled			change additional options on
Shield	Disable	d	*	Disabled			the IC. These options are for
CONVDIV	250kHz	~	~	250kHz			more advanced designs
Noise Detection	Enable	1	~	Enabled			more advanced designs
	the second second second	6 H					
product, please refer to the appli	oing the functions and options o icable datasheet.	rtne	Simple Mode	Set S	Selection 000000		
Log Messages:		Program Chip	Reset Selection	Package Type:	50-32		
Valid firmware version	detected: 01.16	Read Chin	More Options	Bulk Packaging:	Tube		
Device ID : 0603 IQS221 selected		Clear Messages		Part Number For	TO5221 000000 SO T		
IC data read successful	11γ			Ordering Purposes:		L L	
1		Exit			Export Order Details ?	J	









Step 7: Program Chip



Figure 10: USBProg.exe – IQS221 Programmed IC

Note: Each option on the IC can only be configured once, as it is OTP (One Time Programmable).

IQ Switch®, ProxSense™, AirButton® and the IQ Logo are trademarks of Azoteq

The information appearing in this Application Note is believed to be accurate at the time of publication. However, Azoteq assumes no responsibility arising from the use of the information. The applications mentioned herein are used solely for the purpose of illustration and Azoteq makes no warranty or representation that such applications will be suitable without further modification, nor recommends the use of its products for application that may present a risk to human life due to malfunction or otherwise. Azoteq products are not authorized for use as critical components in life support devices or systems. No licenses to patents are granted, implicitly or otherwise, under any intellectual property rights. Azoteq reserves the right to alter its products without prior notification. For the most up-to-date information, please contact ProxSenseSupport@azoteq.com or refer to the website : <u>www.azoteq.com</u>