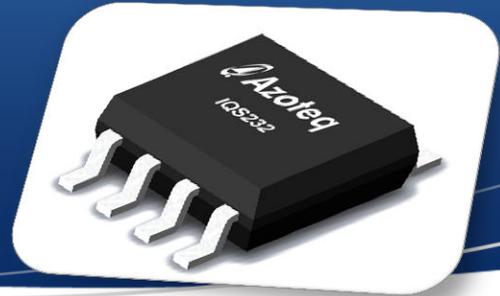




World Leader in Capacitive Proximity Sensing



## IQS232 Low Cost Capacitive Proximity and Touch Controller

Azoteq's IQS232 will be released to market on July 6<sup>th</sup>, 2012. The IQS232 makes it very easy to add proximity and touch keys to an existing design since the device is stand-alone and no driver software is required. The power consumption is only 3.5 microampere, which is up to 100 times better than competitive devices.

The IQS232 uses advanced analog and digital circuitry to achieve unparalleled proximity and touch performance. The high sensitivity enables the IQS232 to work reliably through glass up to 25 mm thick and achieves proximity detection up to 250 mm. The device can operate from 1.8 to 3.6V and achieves power consumption as low as 3.5 microampere while still sensing proximity and touch. The IQS232 can also be used in I2C mode that allows for full control of the sensor functions from a host controller.

The IQS232 is Azoteq's fourth device in the 1.8V ProxSense family with more controllers to follow in Q3 and Q4 of 2012. The expanding feature sets include stand-alone devices, self and mutual capacitive sensors and lower cost single-channel devices in small packages.

## Articles

- Page 1 IQS232 Low Cost Capacitive Proximity and Touch Controller
- Page 2 Improving Sensitivity in Portable Units
- Page 3 Introducing the RS100
- Page 3 Azoteq has New and Updated GUIs
- Page 5 Why testing mobile projects wirelessly is important



To enable next generation capacitive user interfaces and intelligent switch applications for users to interact naturally with products through capacitive proximity and touch

## Improving Sensitivity in Portable Units

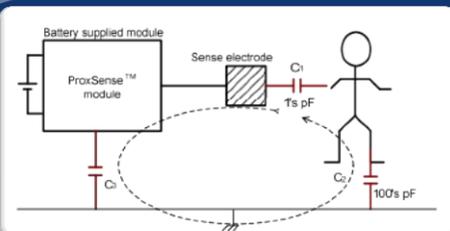
A number of methods could be used to improve sensitivity in portable units. In general, no special steps need to be taken for devices to change the touch sensitivity, but may be required for small battery powered devices requiring proximity detection.

- The physical size of the system can be enlarged
- If possible a large ground plane can be added to the system. The designer should aim not to have the ground planes too close to the electrode on devices without the ATI feature. If the system allows, bonding the ground plane (or the module) to physical surfaces like the floor or a wall will improve sensitivity.
- The module can be connected to other battery supplied equipment (effectively enlarging the ground coupling surface).
- In some cases, enlarging the sense electrode may improve sensitivity.
- Using a driven shield improves sensitivity in portable devices.
- In small portable devices, the closeness of ground planes and components may reduce the sensitivity on the sensor due to parasitic capacitance.



### Better Sensitivity

Reducing the thickness of the overlay material or using an overlay with better dielectric value will improve sensitivity (glass is better than plastic)



## Capacitive Sensors in Portable Devices

A capacitive sensor relies on a closed loop to perform sensing (very much like electrical current requires a closed loop to flow). Having a battery supplied portable unit vs. a well-grounded unit, impacts on the sensitivity of the sensor.

In portable devices, the capacitive loop is formed by the body of the person activating the sensor, then the electrical path through the electrode and module, then through module to earth and finally the body of the person coupling with earth.

## Azoteq has New and Updated GUIs

Azoteq has added new and improved Graphical User Interfaces (GUIs). Be sure to be up to date with the latest software.

Below is an example of the IQS259 GUI and some features for you to use.

The screenshot shows the Azoteq IQS259 GUI with several callout boxes:

- Scope View:** Points to the 'Scope' button in the Streaming section.
- Start/Stop Streaming:** Points to the 'Start' and 'Stop' buttons in the Streaming section.
- Indicates Channel number and Prox (Blue) or Touch (Red):** Points to the bar chart showing data for channels 0-9.
- Switch between constant streaming and only event information:** Points to the 'Event Mode' and 'Streaming Mode' radio buttons in the Comms section.
- Only allows one channel to be selected:** Points to the 'Channels' list where only one channel is checked.
- Adjust the Touch Threshold:** Points to the 'Touch THR % of LTA' row in the compensation table.
- Adjust the Proximity Threshold:** Points to the 'Prox Thresholds' row in the compensation table.
- Set when the IC times out and Auto-Tunes itself:** Points to the 'Halt Time' dropdown in the LTA Filter section.

Channels	0	1	2	3	4	5	6	7	8	9
Count:	1020	518	514	519	507	512	500	503	510	514
LTA:	1021	518	514	519	507	512	500	502	510	514
Delta:	-1	0	0	0	0	0	0	1	0	0

Compensation	53	26	32	40	34	44	28	34	34	129
Sens:	4	3	3	3	3	3	3	3	3	2
Multiplier:	6	5	6	8	7	9	6	7	7	3
Comp:										
Base:	200	200	200	200	200	200	200	200	200	50
Touch THR % of LTA:	13	13	13	13	13	13	13	13	13	13
Prox Thresholds:	4	4	4	4	4	4	4	4	4	4

## Introducing the RS100

The behavior of a battery powered capacitive system will change if a wire connection is made from the device to a PC.

The system will therefore be changed if an Azoteq dongle such as the DS100 or CT210 is connected. For example: If a dongle is used to view data on a PC to choose thresholds, these thresholds may no longer be acceptable once the dongle is disconnected. The Azoteq RS100 is a configuration tool extension which allows for wireless interaction

with ProxSense® devices.

The RS100 supports the same functionality as that of the DS100 Data Streamer, but no wired connection is made between the PC and the capacitive system.

The only wired connection to the system is to the RS100 remote dongle, which should have a very small impact, as it is also battery operated.

More information can be found [here](#).

## Azoteq USB-dongle usage

The Azoteq USB-dongles available for commercial use are listed in table below. The dongles are connected to a computer via a mini-USB cable and are used:

1. As an interface to program OTP bits which is available on certain ICs (to customize an IC for a certain design), see table Table 3-1 found in application note AZD026
2. To perform serial communication between computer and IC via:
  - 1-wire Communication Protocol
  - SPI
  - I2C

Azoteq provides software used for programming OTP(One Time Programmable) bits. This software is known as USBProg and is intended for prototyping purposes. More information regarding USBProg can be found in application note AZD007.

Azoteq provides software used for the serial streaming of data to a computer utilizing the Azoteq USB dongles.

This software is known as VisualProxSense and is intended for prototyping purposes. For some IQS ICs there exists a separate GUI. More information regarding the VisualProxSense application can be found in application note AZD006.



## Programming OTP bits

When Programming Azoteq's ICs with OTP bits, the proper tool is needed.

With our USBProg software and a CT210/CT220, you can connect the ICs to your computer using the evaluation kit used in conjunction to your IC.

Azoteq dongle	Description	Device Supported	Data Streaming	Programming
CT120 (EOL)	1 <sup>st</sup> Generation programmer and data streamer	IQS123	ONLY IQS123	X
CT200 (EOL)	2 <sup>nd</sup> Generation programmer and data streamer	ALL-Streaming	√*	IQS121, IQS127, IQS128, IQS132, IQS133, IQS142, IQS143, IQS152, IQS155, IQS158, IQS221, IQS240, IQS904
CT210	3 <sup>rd</sup> Generation programmer and data streamer	ALL	√*	√
DS100	Data Streaming Dongle	ALL	√*	X
RS100 <sup>2</sup>	Wireless Data Streaming Dongle	ALL	√*	X
CT220 <sup>3</sup>	3 <sup>rd</sup> Generation In-circuit production programmer and data streamer	ALL	√*	√

\* Excludes IQS904.

## Why testing mobile projects wirelessly is important

With more and more products being powered by batteries, the ability to test while not connected to the power grid becomes indispensable. The RS100 can help you in this way when testing products that include Azoteq's Touch Sensors.

Two reasons we need electric isolation in projects are:

- When you connect a normal CT/DS tool to the device you improve the ground coupling thereby giving a false impression of the sensitivity. Usually by improving it.
- Safety. With multiple ground loops the possibility exists for damaging equipment and electrical shock when the DUT ground differs from the equipment or human.

More information on the RS100 can be found [here](#).



The RS100 is recommended for the characterization of portable capacitive systems.

### Sales

#### Azoteq International

Jean Viljoen

+27 21 863 0033

jean.viljoen@azoteq.com

#### Azoteq USA

Kobus Marneweck

+1 512 538 1995

kobusm@azoteq.com

#### Azoteq Asia

Lina Yu

+86 (138) 2696 0845

linayu@azoteq.com.cn

### Representatives

#### USA- Southern California

O'Donnell South

+1 310 781 2255

sales@odas.com

#### USA- GA, NC, SC, TN, MS, AL

Quantum Marketing, Inc

+1 310 781 2255

jeannette.ayerbe@qmirep.com

#### USA- PA, NY

Analectro

+1 856 795 6676

sales@analectro.com

#### USA- Northern California

O'Donnell Associates North

+1 408 456 2950

wepich@odonnell.com

#### USA- TX, LA

Logic 1 Sales

+1 512 656 4686

david\_lykes@logic1sales.com

#### Central Europe

ActiveRep GmbH

+49 (0) 812 2227 9270

+49 (0) 171 3098 721

brendon.hutton@activerep.com

#### Europe – UK, Ireland

Clere Electronics

+44 (0) 1635 291666

peb@clere.com

Distributors

Worldwide  
Mouser Electronics  
+1 800 346 6873

Worldwide  
Future Electronics  
+1 514 694 7710

Taiwan  
Holy Stone Enterprise Co. Ltd  
+886 2 2659 6722 ext 302

South Korea  
PCTRONIX Corp  
+82 2 886 0401/2

South Korea  
SPCorporation  
+82 16 729 6070

South East Asia  
Locus Marketing Pte. Ltd  
+65 6299 7308