World Leader in Capacitive Proximity Sensing

Azoteq Announces the IQS213 SwipeSwitch™ - Robust Capacitive Sensing for Harsh Environments

Azoteq on October 19th announced the release to market of the IQS213. The IQS213 is Azoteq's latest addition to the ProxSense® family of capacitive proximity and touch controllers. The IQS213 offers capacitive sensing in applications previously not suited for capacitive sensing, including harsh and wet environments.

The IQS213 SwipeSwitch™ is a fully integrated two- or three-channel capacitive SwipeSwitch™ sensor with market-leading sensitivity and automatic tuning of the sense electrodes. The IQS213 provides a minimalist implementation requiring few external components, with programming options and an I2C-compatible interface that allow configuration for specialized applications.

Continued on Page 4

Content

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

ProxSense®'s Triple Action Switch

Azoteq's ProxSense® allows you to have the flexibility to design your switch in many ways. One example of this flexibility is to use a Triple Action Switch.

If you were going to use the Triple Action Switch to turn on a light inside your house, here are the three actions that I can perform.

1. Use Proximity for the Find-in-the-dark illumination of the light switch
2. A light touch of the switch would turn the light on at 50%
3. A full press would turn on the light at 100%

The IQS128 would be a good example of an IC to use for this function. The IQS128 can stream data out for you to be able see the difference in capacitance of proximity, a light touch, and a full press.

The IQS904A and IQS904D are also great options for lighting fixtures with their Find-in-the-Dark and Dimming features!

To see a video on the Triple Action Switch, watch Azoteq's Air Button video. This video can be found here.

Wake-up on Proximity

Using Azoteq's Proximity Sensing, electronics can be put into a sleep mode until proximity is detected

Using the IQS128 for Proximity Sensing

The IQS128 is a one channel device that works well when using to sense capacitive proximity. There are several ways to design your electrode to reach a level of proximity that works for your project.

A couple of ways to design your electrode are:

- Have a thin trace that forms a loop in the area that you want to sense proximity
- Have a small copper pad where you would like proximity sensing and a button press

For more information, please contact your nearest sales office.

Origins of Electrical Fast Transient Burst Testing

Whenever a substantial current along an inductive path is interrupted by a mechanical switch, a large voltage will develop across the switch contacts.

The magnitude of this voltage is proportional to the total inductance of the path and the rate of change of the current. If the voltage becomes large enough, air breakdown may occur between the contacts, i.e. there will be an arc of ionized air connecting the two contacts with an extremely small impedance. Therefore voltage across the switch contacts will reduce to almost zero.

As the arc is extinguished, breaking the current path again, another large voltage will develop across the switch contacts due to the inductive path.

However, the switch contacts would have moved slightly further apart by now. So air breakdown occurs at a higher voltage than before, and it takes more time before the arc forms.

This process will continue until the switch contacts reach a point where the inductive energy stored in the current path cannot produce a voltage high enough to cause an arc.

Figure 1 illustrates the above, and the resulting transient waveform qualitatively.

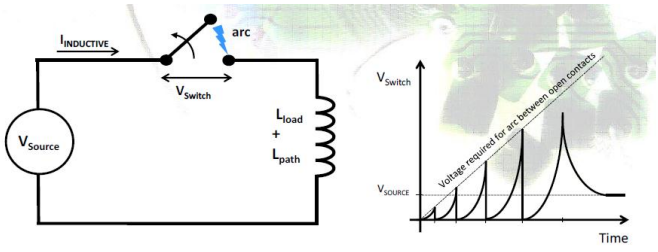

Figure 1: High frequency transients due to arcing contacts in an inductive path.

Such transients are especially severe and prevalent in heavy industry and electrical switching installations, where high current contactors and relays result in severe arcing.

But even in typical residential and commercial applications, high frequency transients due to the above mechanisms in main switches, (power drills, etc.) will be encountered, albeit at lower voltage levels.

The above is the basis for the EFT/B immunity requirement imposed on a large number of electronic products today.

With typical transient rise times in the nano-second range, frequencies of a few hundred MHz can be realized. EFT/B testing is more applicable to mains powered equipment, although off-line products might also be required to be immune.

It is also obvious that rise time, inter-transient period and amplitude are very much application specific, with factors such as the switch opening time, mechanical aspects and path inductance influencing the resultant transient train.

However, in an effort to have at least some testing standard in place, the IEC published 61000-4-4. It needs to be stressed that conformance to IEC 61000-4-4 does not guarantee immunity to all real world EFT/B events.

However, chances are that a product with high immunity under IEC 61000-4-4 will also suffer less from other types of EFT/B events in the field.

Information about EFT/B testing can be found here.

Page 1 Continued

"The IQS213 enables applications previously not suited for capacitive sensing, including waterproof flashlights, hand mixers, toothbrushes and shavers. With no more holes for the mechanical switch, cost is saved on the hermetically sealed housing, whilst at the same time new degrees of freedom are opened up on the man-machine interface," said Jean Viljoen, Azoteq's marketing manager for Europe and Asia.

The IQS213 is further suitable for applications such as unlocking a mobile phone, where the sensor can run in a sub-2 microampere mode with the touch screen completely turned off. The patented swipe algorithm will prevent any accidental activation, making it an indispensable companion to the mobile phone touch screen.

See SwipeSwitch™ in action

Applications:

- Sanitary ware, toys, office equipment
- Flashlights, headlamps, keychain lights
- Splash-proof / waterproof devices
- Swipe-to-unlock / Wake-from-standby applications
- Replacement for electromechanical switches

Pricing and availability

The IQS213 will be priced at $0.27 in 1K quantities. Samples, production quantities and evaluation kits are available now from Mouser (http://www.mouser.com/azoteq).

More information on the IQS213 can be obtained at http://www.azoteq.com.

SwipeSwitch™ Features

- 2- or 3-channel (mutual or self-capacitance) input device
- Swipe function or differentiated touch and distributed proximity electrode
- Variable user interface with adjustable swipe function configuration
- Automatic tuning of the sense electrodes to the environment
- Auto-off and advanced auto-off warning function
- Supply voltage: 1.8V to 3.6V
- Internal voltage regulator and reference capacitor
- Advanced on-chip digital signal processing
- OTP (one time programmable) options available
- I2C-compatible interface
- Low power modes (sub-2 microampere)
- Variable proximity and touch thresholds
- Small outline MSOP-10 package

Signal-to Noise Ratio in a Capacitive System

The signal-to-noise ratio (SNR) in capacitive touch systems can be defined as the ratio between the "increase/decrease in counts due to a touch activity" and the "RMS (root-mean-square) value of noise present in the system", taken over a certain number of samples.

In general, the basic SNR for a specific application may depend on the actual/physical device setup and factors like system sensitivity and sampling frequency can influence the relevant SNR measurement.

In order to eliminate the effects of human error introduced into the characterization of a device's SNR measurements, the touch activity can be emulated by coupling a passive load (external capacitor) to the sense antenna. For emulating a moderate to strong touch activity, a 1-2 pF load can be applied.

For more information on how to calculate a device's signal-to-noise ratio, more information can be found here!

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

Distributors

Worldwide
Mouser Electronics
+1 800 346 6873
Sales@mouser.com

Worldwide
Future Electronics
+1 514 694 7710

Taiwan
Holy Stone Enterprise Co. Ltd
Terry Chiang
+886 2 2659 6722 ext 302
terrychiang@holystone.com.tw

South Korea
PCTRONIX Corp
Sunny Baek
+82 2 886 0401/2
sunny@pctronix.co.kr

South Korea
SPCorporation
Moon Pack
+82 16 729 6070
+82 2 3012 6070
mpack671@yahoo.co.kr

China
Infortech
Summer Yin
+86 21 51087875 ext 355
summer_yin@infortech.net.cn

South East Asia
Locus Marketing Pte. Ltd
Sam Liew
+65 6299 7308
+65 6292 5848
samliew@locus.com.sg

Representatives

USA- Southern California
O'Donnell South
+1 310 781 2255
sales@odas.com

USA- Northern California
O'Donnell Associates North
+1 408 456 2950
wepich@odonnell.com

Europe – UK, Ireland
Clere Electronics
+44 (0) 1635 291666
peb@clere.com

USA- GA, NC, SC, TN, MS, AL
Quantum Marketing, Inc
+1 310 781 2255
jeannette.ayerbe@qmirep.com

USA- TX, LA
Logic 1 Sales
+1 512 656 4686
david_lykes@logic1sales.com

USA- NY, NJ, PA, DE, MD, VA
Analectro
+1 856 795 6676
sales@analectro.com

Central Europe
ActiveRep GmbH
+49 (0) 812 2227 9270
+49 (0) 171 3098 721
brendon.hutton@activerep.com