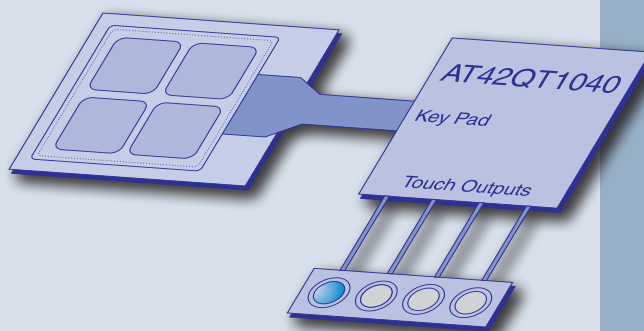


AT42QT1040

Low-cost Touch Sensor Controller for Mobile Devices

The AT42QT1040 (QT1040) IC is a convenient and easy-to-use touch sensor controller for up to four capacitive touch keys. The device comes in an ultra-small 20-pin 3 mm x 3 mm VQFN package, making it ideal for use in space-constrained mobile devices. This new low-cost IC makes it possible to replace mechanical buttons in mobile and consumer devices with Atmel's QTouch™ technology.

- 4-channel touch sensor IC
- 4 outputs for per-channel touch indication
- Low operating voltage 1.8 to 5.5 V
- Ultra-low power consumption (31 μ A, 64 ms between acquisitions, 1.8 V)
- Option to configure output as proximity sensor
- 2 response speed settings
- Debug output provided to aid design
- RoHS-compliant package



Key Sensitivity

The channels on the QT1040 are individually configurable for sensitivity to support a wide range of front panel materials and thicknesses. It is possible to configure any one of the channels as a proximity sensor that can be used to illuminate "hidden until lit" keys on an approaching hand.

Response Speed

The response speed can be configured either for low latency (16 ms), or for a slightly slower response (64 ms) with the benefit of reduced power consumption. The setting used depends on product requirements.

Reliability

As with all Atmel devices, the QT1040 is extremely reliable, thanks to Atmel's patented technology.

Tightly spaced key pads can prove a challenge when using capacitive touch buttons: nearby fingers can cause false detections, or a hovering hand can activate channels. Atmel's patented Adjacent Key Suppression™ (AKS™) technology overcomes these issues. AKS isolates the key with the largest signal, and then suppresses signals from all other keys whilst the selected key is pressed, so false key detections do not occur.

Self-calibration

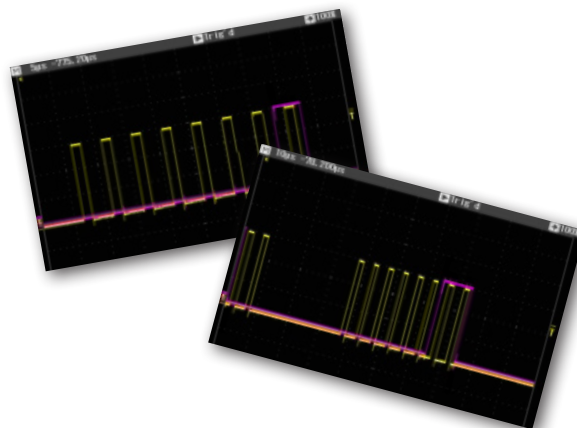
The device automatically self-calibrates within 0.1 seconds of applying power. If a touch key is miscalibrated at power-on (for example, if a finger is held over the key), the device automatically recalibrates as the finger is removed. Similarly, a recalibration takes place if a channel is triggered for longer than a specified time-out period.

Auto Drift Compensation

Drift compensation algorithms constantly adjust the reference level in the device to ensure that the keys remain calibrated even if there is a large change in background capacitance.

Debugging Output

The QT1040's debugging mode can be used to watch selected variables in the device. Data is clocked at a rate of 200 kHz, which means that channels can be monitored with great accuracy. The ability to log the behavior of the device in this way means quicker isolation and resolution of issues, and a shorter design life cycle.



System	
Number of keys	Up to 4
Number of I/O lines	4 output channels
Key outline sizes	Typically 8–10 mm advised, although they can be smaller; and of varied shapes
Key spacings	7 mm center to center typical; depends on panel thickness
Signal processing	Adjacent Key Suppression, noise filtering, self-calibration on start-up, automatic drift compensation

Electrical and Environmental Specifications

Recommended Operating Conditions	
Power supply	1.8V to 5.5V
Power supply ripple + noise	±5 mV
Environmental Specifications	
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to + 125°C
DC Specifications	
Supply current, slow mode, 64 ms between acquisitions	31 µA @ 1.8V
Supply current, fast mode, 16 ms between acquisitions	104 µA @ 1.8V
Package Options	
20-pin 3 mm x 3 mm x 0.85 mm VQFN RoHS compliant	

More Information?

The QT1040 datasheet is available from our website – www.atmel.com/products/touch

There is also an evaluation kit available (EVK1040A) that allows you to experiment with different configurations and settings. It is supplied ready to use, with documentation.

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