



## QST1610

### QTouch, QWheel and QSlide sensor IC Wheel or slider plus seven extra keys with I2C interface

Target Specification

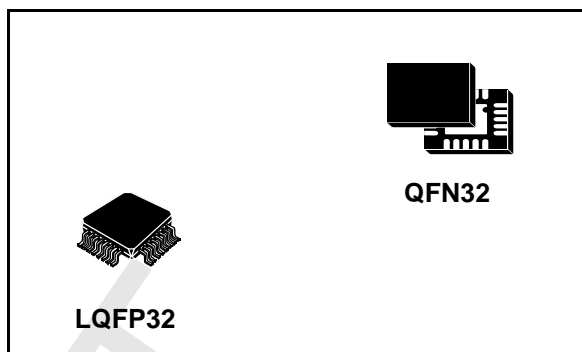
#### Features

- Patented charge-transfer design
- Wheel (or Slider) plus seven extra keys
- QMagic™ proximity effect for 'approach on' function
- Fast thermal drift tracking
- 1.8V ~3.6V single supply operation
- 100% autocal for life - no adjustments required
- I2C interface
- Fully debounced results
- Patented AKS™ Adjacent Key Suppression
- Spread-spectrum bursts for superior noise rejection
- RoHS compliant QFN32 package

#### Description

QST1610 IC is a self-contained, patented charge-transfer capacitive controller capable of detecting near-proximity or touch on up to seven electrodes and a wheel. It allows electrodes to project sense fields through any dielectric such as glass or plastic. These electrodes are laid out as a scroller (e.g. a wheel or slider) plus seven additional independent keys. Each key channel can be tuned for a unique sensitivity level by simply changing a corresponding external Cs capacitor, whereas the wheel/slider's sensitivity can be changed dynamically through I2C commands.

The wheel/slider uses a simple, inexpensive sensing element between three connection points. The QST1610 can report a single rapid touch anywhere along the sense elements, or it can track a finger moving along the wheel/slider's surface in real time.



The device also has a Sync mode which enables synchronization with additional similar parts and/or to an external source to suppress interference, and low power modes which conserve power. By using the charge-transfer principle, this device delivers a level of performance clearly superior to older technologies yet is highly cost-effective. Spread-spectrum burst technology provides superior noise rejection.

#### Applications

The device is designed specifically for human interfaces, like control panels, appliances, gaming devices, lighting controls, remote controls, or anywhere a mechanical wheel, slider, or switch may be found.

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# 1 Introduction

## 1.1 Main features

The QST1610 charge-transfer IC is a self-contained digital sensor IC offering the following features:

- A wheel (or slider) plus seven extra keys
- I<sup>2</sup>C communication interface
- Programmable auto-recalibration time-out: 10 s, 60 s or infinite
- Programmable AKS mode
- Programmable response time
- QMagic™ proximity effect for 'approach on' function

### Note about QMagic™

Key 4 (SNS\_K4) can be optimized for operation as a hand proximity sensor via the I<sup>2</sup>C interface. The proximity sensitivity of channel 4 can be increased by a higher value of Cs. The AKS mode should be set to mode 101 to ensure that the proximity key does not lock out other keys or the wheel/slider.

Note that proximity fields are often unstable especially in products that can move around, such as mobile phones and MP3 players. In particular, the proximity channel can "stick on" after a detection. As soon as possible after proximity channel 4 becomes active, it should be recalibrated via the serial interface (CalK = 1, Cal Key Num bits = 100) in order to clear the proximity channel.

Designing proximity electrodes requires care, so as to ensure that the electrode area is maximized while ensuring adequate and easy coupling to a finger as it approaches the equipment.

## 1.2 Pin description

Figure 1. 32-pin package pinout

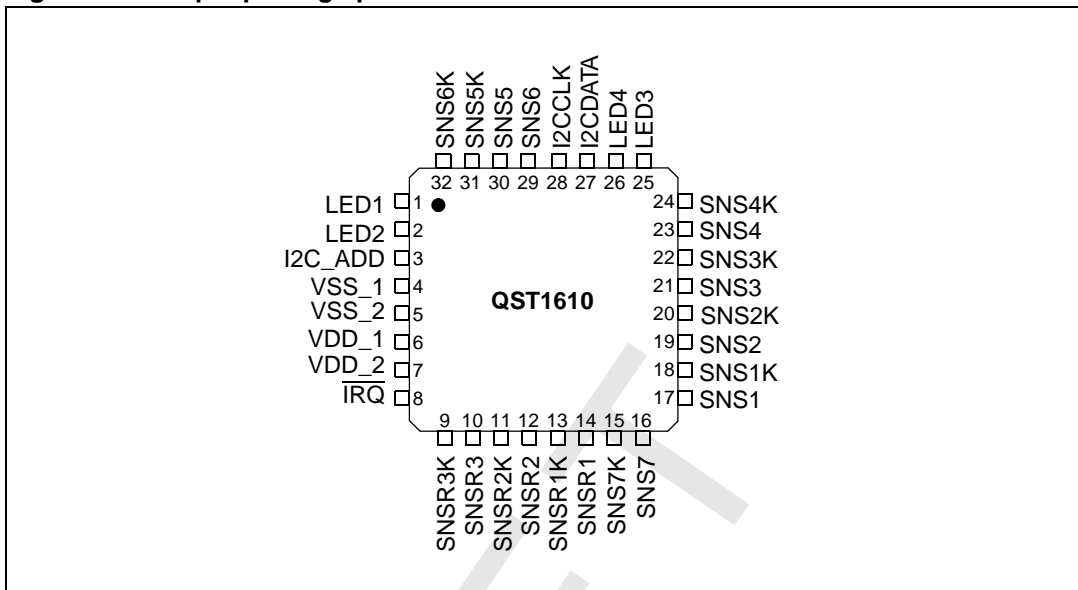


Table 1. Device pin description

Pin N°	Pin Name	Type	Function	If Unused
1	LED1	I	LED 1	
2	LED2	O/OD	LED 2	
3	I2C_ADD	O	I2C device address	
4	V <sub>SS_1</sub>	S	Digital ground voltage	
5	V <sub>SS_2</sub>	S	Digital ground voltage	
6	V <sub>DD_1</sub>	S	Digital supply voltage	
7	V <sub>DD_2</sub>	S	Digital supply voltage	
8	$\overline{\text{IRQ}}$	O	Interrupt line (active low)	
9	SNSR3K	I/O	Wheel/ slider R3 sense pin to Cs/electrode	Open
10	SNSR3	I/O	Wheel/ slider R3 sense pin to Cs/Rs	Open
11	SNSR2K	I/O	Wheel/ slider R2 sense pin to Cs/electrode	Open
12	SNSR2	I/O	Wheel/ slider R2 sense pin to Cs/Rs	Open
13	SNSR1K	I/O	Wheel/ slider R1 sense pin to Cs/electrode	Open
14	SNSR1	I/O	Wheel/ slider R1 sense pin to Cs/Rs	Open
15	SNS7K	I/O	Key 7 sense pin to Cs/electrode	Open
16	SNS7	I/O	Key 7 sense pin to Cs/Rs	Open
17	SNS1	I/O	Key 1 sense pin to Cs/Rs	Open

Table 1. Device pin description

Pin N°	Pin Name	Type	Function	If Unused
18	SNS1K	I/O	Key 1 sense pin to Cs/electrode	Open
19	SNS2	I/O	Key 2 sense pin to Cs/Rs	Open
20	SNS2K	I/O	Key 2 sense pin to Cs/electrode	Open
21	SNS3	I/O	Key 3 sense pin to Cs/Rs	Open
22	SNS3K	I/O	Key 3 sense pin to Cs/electrode	Open
23	SNS4	I/O	Key 4 sense pin to Cs/Rs	Open
24	SNS4K	I/O	Key 4 sense pin to Cs/electrode	Open
25	LED3	O	LED 3	
26	LED4	O	LED 4	
27	I2CDATA <sup>1)</sup>	OD	I2C serial data	
28	I2CCLK <sup>1)</sup>	OD	I2C serial clock	
29	SNS6	I/O	Key 6 sense pin to Cs/Rs	Open
30	SNS5	I/O	Key 5 sense pin to Cs/Rs	Open
31	SNS5K	I/O	Key 5 sense pin to Cs/electrode	Open
32	SNS6K	I/O	Key 6 sense pin to Cs/electrode	Open