# Features

- Operating voltage:2.4-5.5V
- Standby current: 1.5uA/3V
- Operating current: 4.0uA/3V
- Low Voltage Reset（LVR）
- Built in special voltage stabilizing circuit for touch detection
- Key Response Time：Normal Mode 46mS，Standby Mode 160mS
- AHLB pin selects the output level：Active level- high or Active level- low
- TOG pin selects the output mode：Direct output or Latch output
- Add a capacitor（0-50pF） to a touch key pin can fine tune the sensitivity for single key
- After power-on have about 0.5S stable-time, during the time do not touch the key .
- Auto-calibration Function
- Package
  SOT23-6L(3mm x 3mm PP=0.95mm)

# 1 General Description

VKD233hh is a touch pad detector IC which offers 1 touch keys，It can detect human body contact using external touch pads. The high level of device integration enable applications to be implemented with a minimum number of external components.

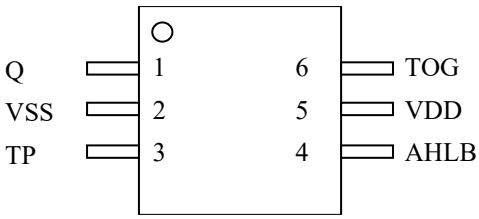
It has 1 Output pin，the output level, output mode can be selected through IO pin. Built in special voltage stabilizing circuit for touch detection is also employed to reduce the possibility of false detections.

With auto-calibration, low standby current, excellent resistance to voltage fluctuation and other features, this range of touch key devices provide a simple and effective means of implementing 1 touch key + IO operation in a wide variety of applications.

# 2 Pinouts and pin description

## 2.1 VKD233HH SOT23-6L Pin Assignment

TOP VIEW




SOT23-6

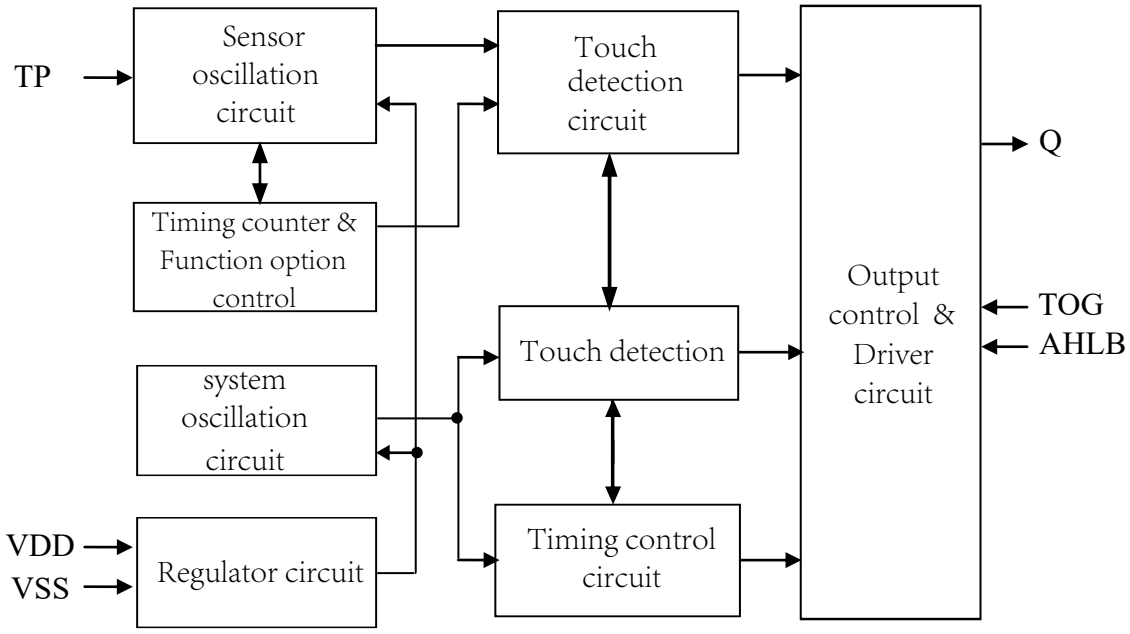
## 2.2 VKD233HH SOT23-6L Pin Description

| Pin No. | Pin name | I/O | Function Description |
|---|---|---|---|
| 1 | Q | OUT | Touch key output pin |
| 2 | VSS | VSS | Negative power supply |
| 3 | TP | IN | Touch key input pin，Add a capacitor（0-50pF） to a touch key pin can fine tune the sensitivity |
| 4 | AHLB | IN—PL | Selects the output level：1->Active level- low，0->Active level- high(default) |
| 5 | VDD | VDD | Positive power supply |
| 6 | TOG | IN—PL | Selects the output mode：1->Latch output，0->Direct output(default) |

Notes：
IN—PL CMOS Input built-in pull-down resistor

# 3 Functional Description

## 3.1 Block diagram




## 3.2 Auto-calibration Function

After power on, the environmental change system automatically calibrates the reference value.

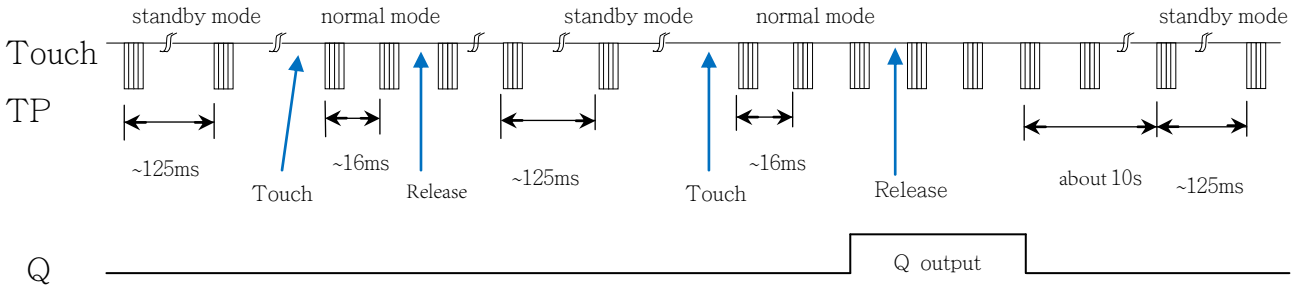
## 3.3 Output mode

VKD233HH output pin is Q， output function can be selected by input pin.

| TOG | AHLB | Output Function |
|---|---|---|
| NC | NC | CMOS direct output,active level- high |
| NC | VDD | CMOS direct output,active level- low |
| VDD | NC | CMOS latch output, power-on output 0 |
| VDD | VDD | CMOS latch output, power-on output 1 |

## 3.4 Operating modes

There are two operating modes for VKD233HH, the normal mode and the standby mode. In normal mode, the response speed is faster and the power consumption is higher. In standby mode, power consumption is reduced, and the response speed will be slower when first touched,After that, the response speed will be the same as the normal working mode, Automatically switch to normal mode to work. If no key is pressed within 10s, it enter the standby mode.




## 3.5 Max Key On Duration Time

To minimise the possibility of unintentional switch detections, such as undesired objects covering the sensing electrodes, the devices include a Maximum Key On duration time function. To implement this function the devices include an internal timer, which starts running after each switch detection. If the key on time of a touch key exceeds a value of about 16S, then the device will re-calibrate the key state, obtain a new reference value, while the output status is reset to the initial state.

## 3.6 Sensitivity Adjustment

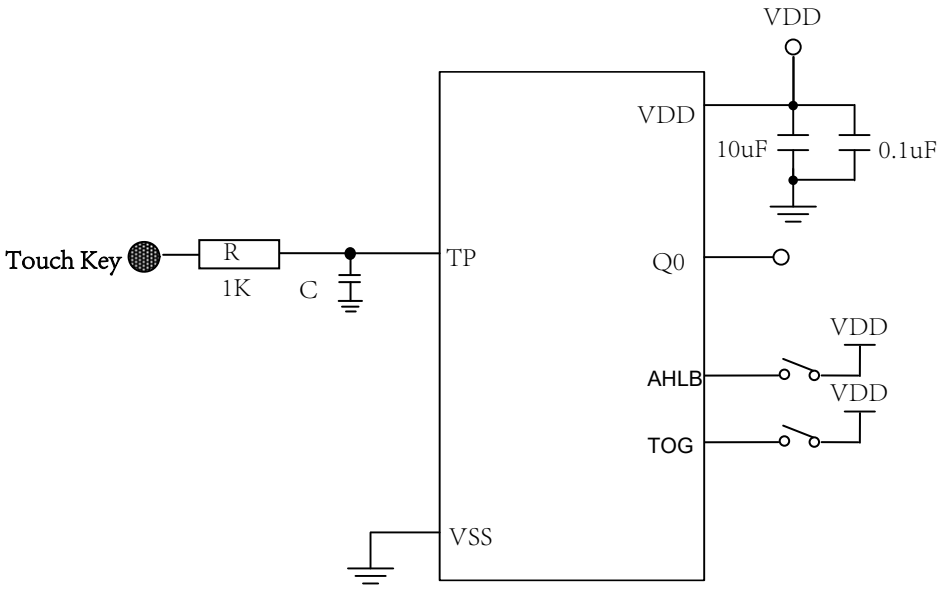
The touch PAD size and capacitance of connecting line on PCB can affect the sensitivity. The sensitivity adjustment must according to the practical application on PCB. The VKD233HH offers some methods for adjusting the sensitivity outside:

I. Touch PAD Size
Under other conditions are fixed. Using a larger Touch PAD size can increase sensitivity. Otherwise it can decrease sensitivity. But the touch PAD size must use in the effective scope.

II. Panel Thickness
Under other conditions are fixed. Using a thinner panel can increase sensitivity. Otherwise it can decrease sensitivity. But the panel thickness must be below the maximum value.

III. Capacitor to a touch key pin
Add a capacitor（0-50pF(NPO,X7R)） to a touch key can fine tune the sensitivity for single key,When adding the value of capacitor will decrease sensitivity

# 4 Application Circuits




Precautions:

1. On the PCB, the wire length from the touch pad to the IC pin should be as short as possible. And this wiring shall not be parallel or cross with other lines.
2. The power supply must be stable. If the voltage of the power supply drifts or drifts or shifts rapidly, it may cause abnormal sensitivity or false detection.
3. The board covered on the PCB must not contain metal or conductive components, and the surface coating is the same.
4. A capacitor must be connected in series between VDD and VSS; and the wiring with the shortest distance from the VDD and VSS pins of the device IC should be taken.

# 5 Electrical characteristics

## 5.1 Absolute Maximum Ratings

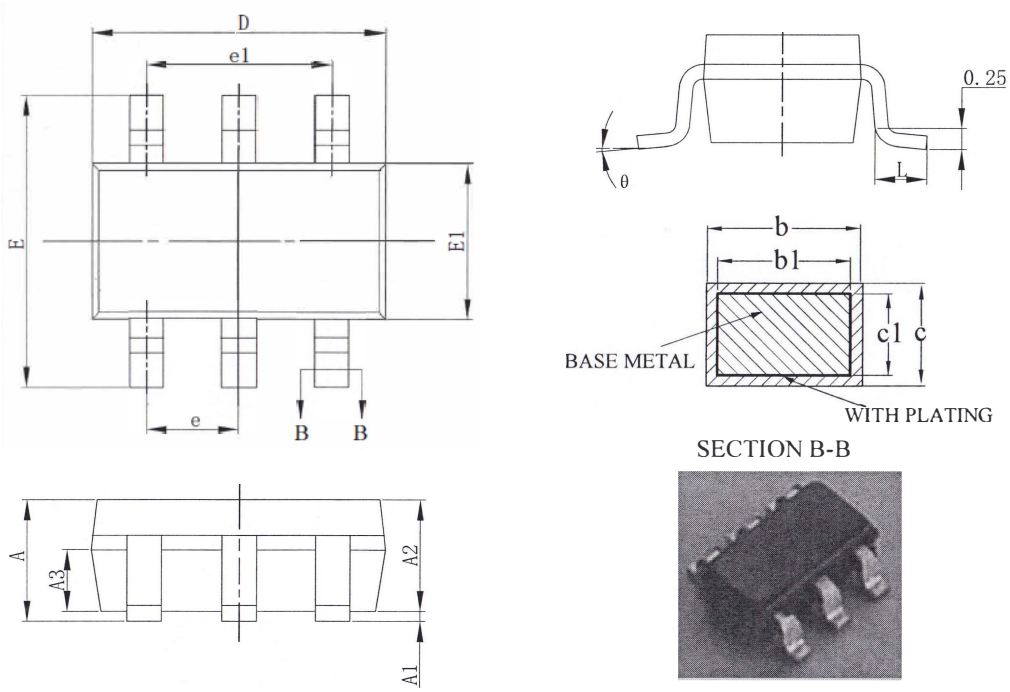
| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Power voltage | VDD | -0.3～6.0 | V |
| Input Voltage | VIN | $V_{SS}$-0.3～$V_{DD}$+0.3 | V |
| Storage Temperature | TSTG | -50～+125 | ℃ |
| Operating Temperature | TOTG | -40～+85 | ℃ |
| Human Body Mode | ESD | ≧5 | KV |

## 5.2 DC Characteristics

| Item | Symbol | Min. | Typ. | Max | Unit | Test Conditions（25℃） | |
|---|---|---|---|---|---|---|---|
| | | | | | | VDD | Conditions |
| Operating voltage | VDD | 2.4 | 3.0 | 5.5 | V | — | — |
| Internal voltage regulator | VREG | 2.2 | 2.3 | 2.4 | V | — | — |
| Operating current | $I_{OP}$ | — | 4.0 | 8.0 | μA | 3.0V | Operating mode |
| Standby current | $I_{ST}$ | — | 1.5 | 3.0 | μA | 3.0V | Standby mode |
| Output Sink Current | $I_{IL}$ | — | 8 | — | mA | 3.0V | $V_{OL}$=0.6V |
| | | — | 15 | — | | 5.0V | |
| Output Source Current | $I_{OL}$ | — | -4 | — | mA | 3.0V | $V_{OH}$=2.4V |
| | | — | -8 | — | | 5.0V | $V_{OH}$=4.4V |
| Input Low Voltage | $V_{IL}$ | — | — | 0.2 | VDD | VDD | Input Low Voltage |
| Input High Voltage | $V_{IH}$ | 0.8 | — | 1 | VDD | VDD | Input High Voltage |
| Input pull-low resistor | $R_{PL}$ | — | 25k | — | ohm | 3.0V | VDD=3V |
| Output Response Time | $T_R$ | — | 46 | — | mS | 3.0V | normal mode |
| | | — | 46 | — | | 5.0V | normal mode |
| | | — | 160 | — | mS | 3.0V | standby mode |
| | | — | 160 | — | | 5.0V | standby mode |

# 6 Package Information

## 6.1 SOT23-6L(3mm x3mm PP=0.95mm):




| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | --- | --- | 1.25 |
| A1 | 0.04 | --- | 0.10 |
| A2 | 1.00 | 1.10 | 1.20 |
| A3 | 0.55 | 0.65 | 0.75 |
| b | 0.38 | --- | 0.48 |
| b1 | 0.37 | 0.40 | 0.43 |
| c | 0.11 | --- | 0.21 |
| c1 | 0.10 | 0.13 | 0.16 |
| D | 2.72 | 2.92 | 3.12 |
| E | 2.60 | 2.80 | 3.00 |
| E1 | 1.40 | 1.60 | 1.80 |
| e | 0.95BSC | | |
| e1 | 1.90BSC | | |
| L | 0.30 | --- | 0.60 |
| θ | 0 | --- | 8° |

# 7 Revision history

| No. | Version | Date | Modify the content | Check |
|---|---|---|---|---|
| 1 | 1.0 | 2019-12-10 | Original version | Yes |
| 2 | 1.1 | 2020-05-11 | Update version | Yes |
| | | | | |
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