

Features

- Operating voltage:2.4-5.5V
- Standby current:2.5uA/3V,5.5uA/5V
- Key Response Time: Normal Mode 60mS , 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
- LPMB pin selects the operating mode: Normal Mode or Standby Mode
- MOT0 pin selects the maximum duration of key press: Infinity or 16S
- OD pin selects the open drain output: Open drain output or CMOS output
- SM pin selects the output: Multi-key effective or single-key effective
- 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
SSOP16(150mil)(4.9mm x 3.9mm PP=1.27mm)

1 General Description

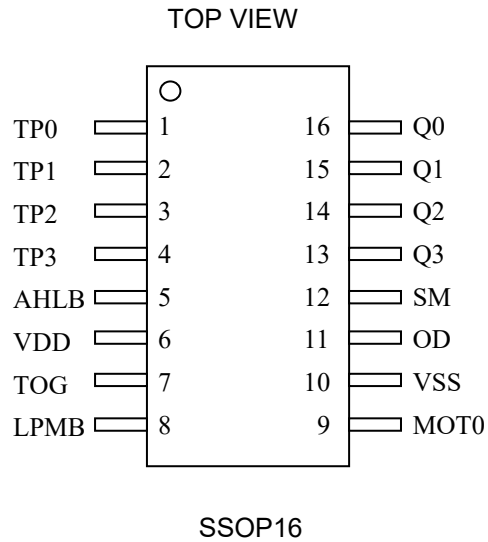
VKD104CB is a touch pad detector IC which offers 4 touch keys, It can detect human body contact using external touch pads. The high level of device integration enable applications to be implemented with a minimum number of external components.

It has 4 output pins, the output level, output mode, operating mode, maximum key on duration time, open drain output, Multi-key/Single-key effective can be selected through IO pin. Special internal circuitry is also employed to ensure excellent power noise rejection to reduce the possibility of false detections, increasing the touch switch application reliability under adverse environmental conditions.

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 touch key + IO operation in a wide variety of applications.

2 Pinouts and pin description

2.1 VKD104CB SSOP16 Pin Assignment



2.2 VKD104CB SSOP16 Pin Description

Pin No.	Pin name	I/O	Function Description
1	TP0	IN	Touch key input pin, Add a capacitor (0-50pF) to a touch key pin can fine tune the sensitivity
2	TP1	IN	Touch key input pin, Add a capacitor (0-50pF) to a touch key pin can fine tune the sensitivity
3	TP2	IN	Touch key input pin, Add a capacitor (0-50pF) to a touch key pin can fine tune the sensitivity
4	TP3	IN	Touch key input pin, Add a capacitor (0-50pF) to a touch key pin can fine tune the sensitivity
5	AHLB	IN—PL	Selects the output level: 1->Active level- low, 0->Active level- high(default)
6	VDD	VDD	Positive power supply
7	TOG	IN—PL	Selects the output mode: 1->Latch output, 0->Direct output(default)
8	LPMB	IN—PL	Selects the operating mode: 1->normal mode, 0->standby mode(default)
9	MOT0	IN—PH	Selects the Maximum output time: 1->Infinity (default) , 0->16S
10	VSS	VSS	Negative power supply
11	OD	IN—PH	Selects the open-drain output: 1->CMOS output(default), 0->open-drain output
12	SM	IN—PH	Selects output single key/multi key: 1->multi key (default) , 0->single key
13	Q3	OUT	Touch key output pin
14	Q2	OUT	Touch key output pin
15	Q1	OUT	Touch key output pin
16	Q0	OUT	Touch key output pin

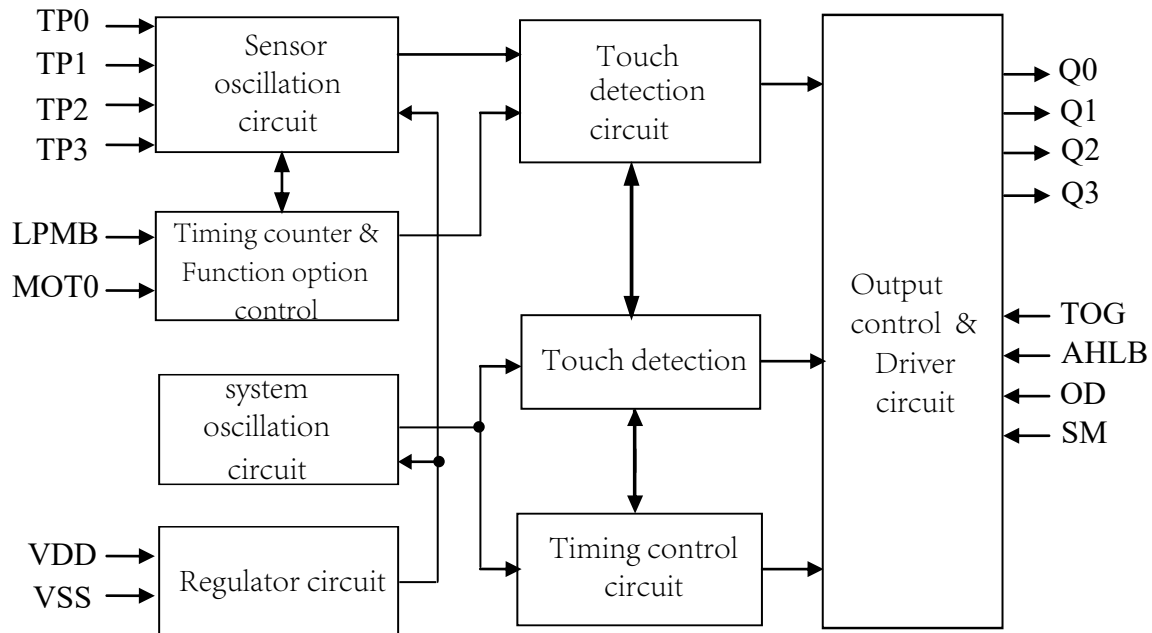
Notes:

IN—PH CMOS Input built-in pull-high resistor

IN—PL CMOS Input built-in pull-low resistor

3 Functional Description

3.1 Block diagram



3.2 Auto-calibration Function

The re-calibration period is about 1s within 8S after power-on. If there is a touch within 8S after power-on or there is no touch after 8S, the recalibration time will be switched to 4S.

3.3 Output mode

VKD104CB output pins are Q0~Q3, can be configured by input pin.

TOG	OD	AHLB	Output Function
NC	NC	NC	CMOS direct output,active level- high
NC	NC	VDD	CMOS direct output,active level- low
NC	VSS	NC	Open-drain direct output , active level-high
NC	VSS	VDD	Open-drain direct output , active level-low
VDD	NC	NC	CMOS latch output, power-on output 0
VDD	NC	VDD	CMOS latch output, power-on output 1
VDD	VSS	NC	Open-drain latch output , power-on output high resistance , active level-high
VDD	VSS	VDD	Open-drain latch output , power-on output high resistance , active level-low

SM	Multi-key/Single-key Output
NC	Multi-key,Can be pressed simultaneously.
VSS	Single-key,Only output the first touched key.

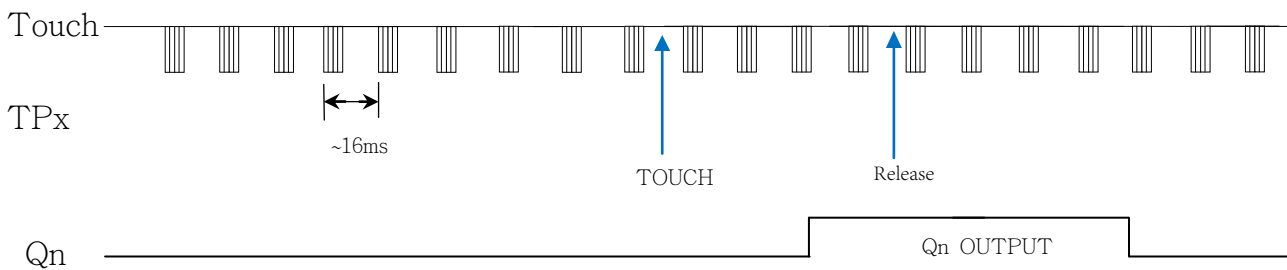
MOTO	Maximum duration of key press
NC	Infinity
VSS	16s,reset more than 16s

LPMB	Operating mode
NC	Standby mode
VDD	Normal mode

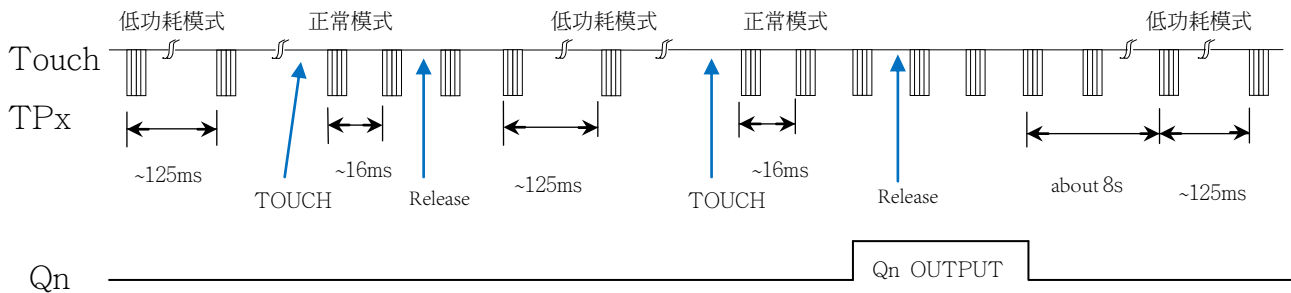
3.1 Operating modes

There are two operating modes for VKD104CB, the normal mode and the standby mode, selected by LPMB pin, When LPMB pin connect to VDD, VKD104CB enter the normal mode; When LPMB pin NC or connect to VSS, VKD104CB enter 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 8s, VKD104CB enter the normal mode.

Normal mode Timing diagram (LPMB connect to VDD) :



standby mode Timing diagram (LPMB NC or connect to VSS) :



3.5 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 VKD104CB 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.

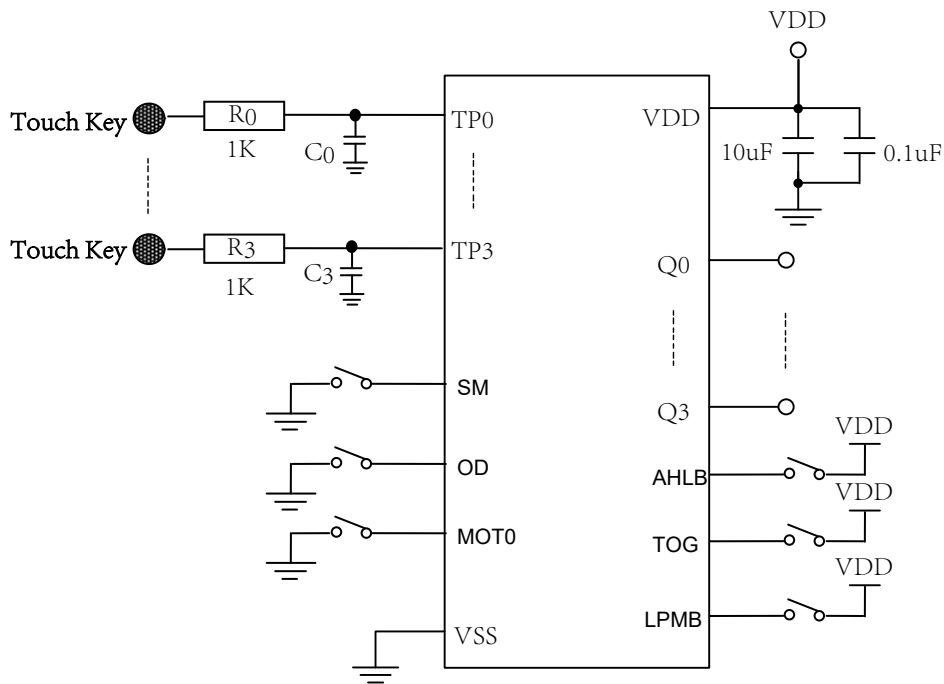
II. Panel Thickness

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) to a touch key can fine tune the sensitivity for single key, When adding the value of capacitor will decrease sensitivity

4 Application Circuits



5 Electrical characteristics

5.1 Absolute Maximum Ratings

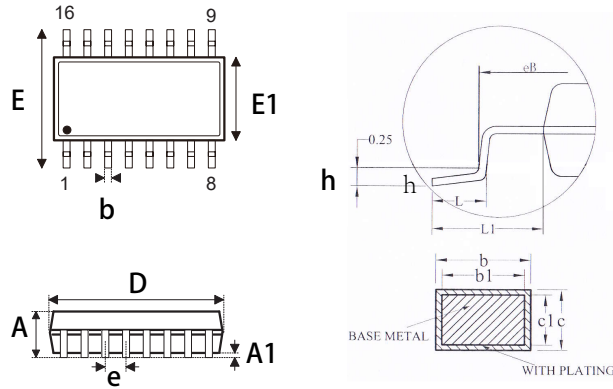
Item	Symbol	Ratings	Unit
Power voltage	VDD	-0.3~6.0	V
Input Voltage	VIN	$V_{SS}-0.3\sim V_{DD}+0.3$	V
Storage Temperature	TSTG	-50~+125	°C
Operating Temperature	TOTG	-40~+85	°C
Human Body Mode	ESD	≥ 5	KV

5.2 DC Characteristics

Item	Symbol	Min.	Typ.	Max	Unit	Test Conditions (25 °C)	
						VDD	Conditions
Operating voltage	VDD	2.4	3.0	5.5	V	—	—
Operating current	I _{OP}	—	13	—	μA	3.0V	normal mode
		—	16	—		5.0V	
Standby current	I _{ST}	—	2.5	—	μA	3.0V	standby mode
		—	5.5	—		5.0V	
Output Sink Current	I _{IL}	—	10	—	mA	3.0V	V _{OL} =0.6V
		—	15	—		5.0V	
Output Source Current	I _{OL}	—	-6	—	mA	3.0V	V _{OH} =2.4V
		—	-9	—		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-up resistor	R _{PH}	—	30k	—	ohm	3.0V	VDD=3V
Input pull-low resistor	R _{PL}	—	25k	—	ohm	3.0V	VDD=3V
Output Response Time	T _R	—	60	—	mS	3.0V	normal mode
		—	60	—		5.0V	normal mode
		—	160	—	mS	3.0V	standby mode
		—	160	—		5.0V	standby mode

6 Package Information

6.1 SSOP16(4.9mm x3.9mm PP=1.27mm):



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	---	---	1.75
A1	0.10	---	0.225
b	0.23	---	0.31
b1	0.22	0.25	0.28
c	0.20	---	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.635BSC		
h	0.25	---	0.50
L	0.50	---	0.80
L1	1.05REF		

7 Revision history

No.	Version	Date	Modify the content	Check
1	1.0	2018-08-10	Original version	Yes
2	1.1	2020-02-11	Update version	Yes

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