

Features

- Operating voltage: 2.4-5.5V
- standby current: 6uA/3.0V, 12uA/5V
- Power-On Reset (POR)
- Low Voltage Reset (LVR)
- Key Response Time:
 - Normal Mode 48mS
 - Standby Mode 160mS
- CMOS-Direct Output, Active level- low, Provide multi-key effective output
- Maximum key on duration time 16S
- Auto-calibration Function
- Sensitivity adjustment using an external capacitor(1-47nF) on CS pin
- Add a capacitor (0-50pF) to a touch key pin can fine tune the sensitivity for single key
- After power-on have about 0.25S stable-time, during the time do not touch the key .
- Package:
 - ESSOP10L(4.9mm x 3.9mm PP=1.00mm)

1 General Description

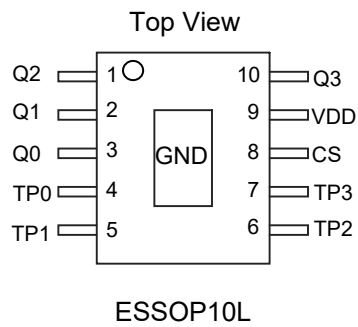
VK36E4 is a touch pad detector IC which offers 4touch keys,It can detect human body contact using external touch pads. The high level of device integration enable applications to be implemented with a minimum number of external components.

It has 4 CMOS-Direct Output 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 4 touch key + IO operation in a wide variety of applications.

2 Pinouts and pin description

2.1 VK36E4 ESSOP10L Pin Assignment

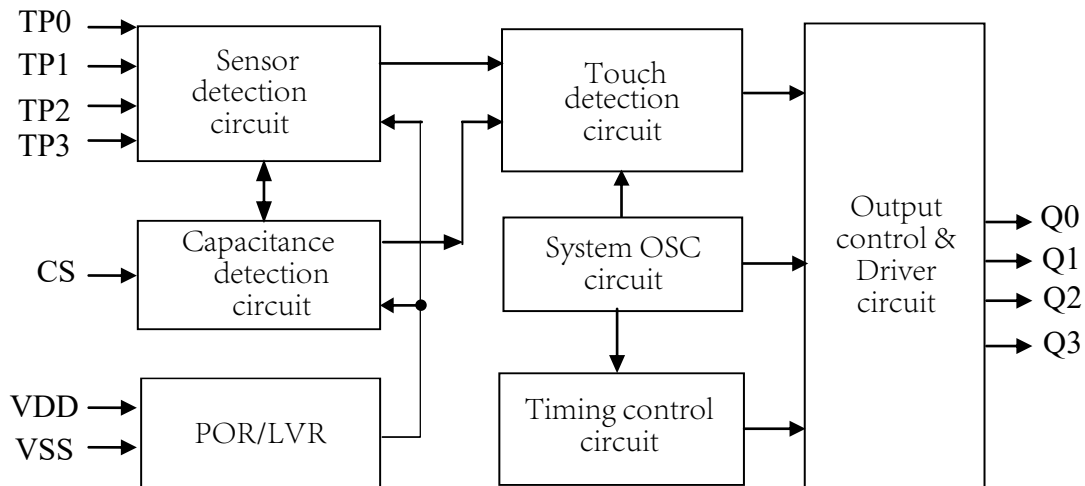


2.2 VK36E4 ESSOP10L Pin Description

Pin No.	Pin name	I/O	Function Description
1	Q2	OUT	Touch key output pin,Active level- low
2	Q1	OUT	Touch key output pin,Active level- low
3	Q0	OUT	Touch key output pin,Active level- low
4	TP0	IN	Touch key input pin
5	TP1	IN	Touch key input pin
6	TP2	IN	Touch key input pin
7	TP3	IN	Touch key input pin
8	CS	IN	Capacitance detection,the larger the capacitance the higher the sensitivity(1-47nF)
9	VDD	VDD	Positive power supply
10	Q3	OUT	Touch key output pin,Active level- low
0	GND	VSS	Negative power supply

3 Functional Description

3.1 Block diagram

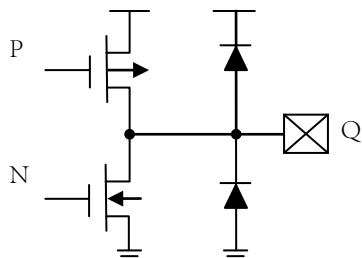


3.2 Auto-calibration Function

The re-calibration period is about 64 mS within 4S after power-on. Power on after 4S then it returns to standby mode, then the re-calibration period change to about 1S

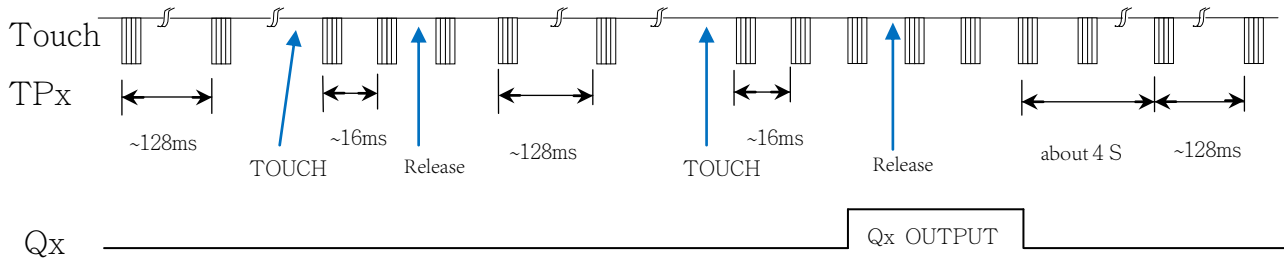
3.3 Output mode

CMOS Direct output(Q0~Q3) ,Active level- low,Provide multi-key effective output.
Maximum key on duration time 16S.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.



3.4 Operating Mode

There are two operating modes for VK36E4, the normal mode and the standby mode. If any key is pressed, the device will be waken up and will then enter the normal mode .If no key press,After 4S, the system will then return to the standby mode again,it will be saving power. When VDD=5V ,at standby mode output response time about 160ms, at detective mode output response time about 48 ms.



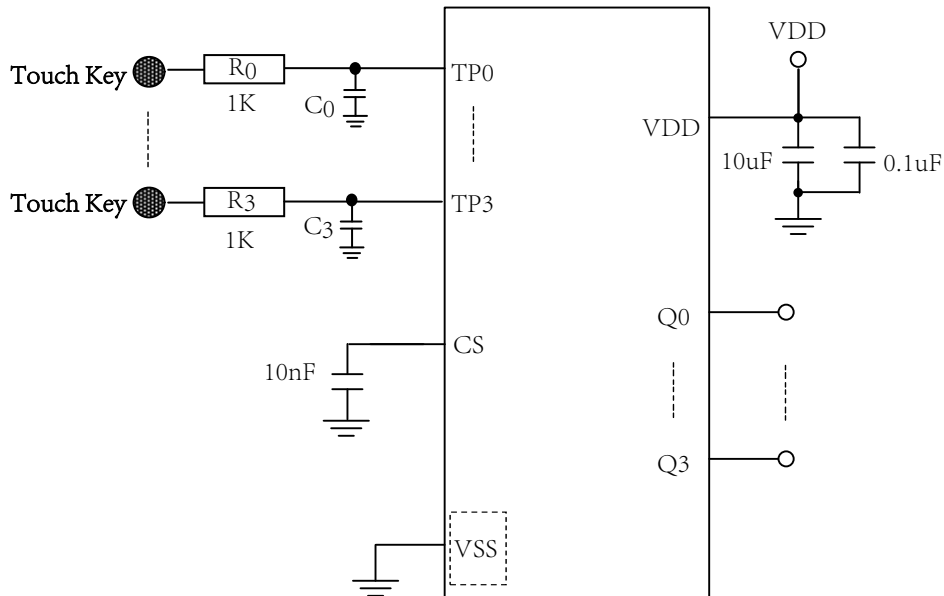
3.5 Sensitivity Adjustment

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 VK36E4 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. Value of CS
Under other conditions are fixed. CS pin to VSS capacitor Cs can adjust sensitivity, When adding the value of CS will increase sensitivity in the useful range (1nF-47nF) .
- IV. 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 .

Panel Thickness (Acrylic or Glass)	CS value (only reference)
<3mm	6.8nF/25V
3-6mm	10nF/25V
6-10mm	22nF/25V

4 Application Circuits



5 Electrical characteristics

5.1 Absolute Maximum Ratings

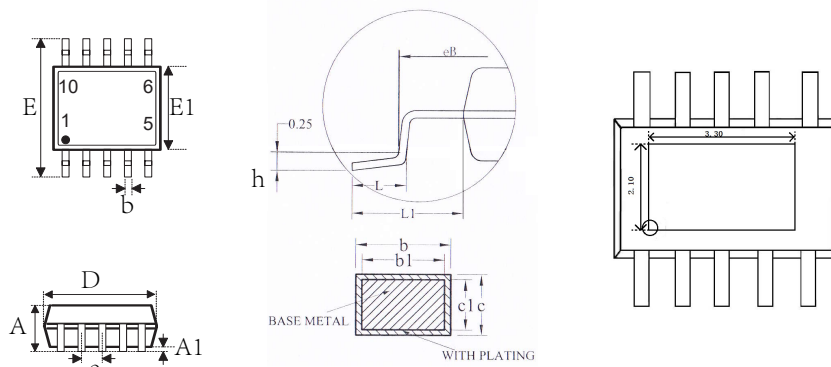
Item	Symbol	Ratings	Unit
Power voltage	VDD	-0.3~6.0	V
Input Voltage	VIN	$V_{SS}-0.3 \sim V_{DD}+0.3$	V
Storage Temperature	TSTG	-50~+125	°C
Operating Temperature	TOTG	-40~+85	°C
Human Body Mode	ESD	≥ 4	KV

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}	—	20	40	μA	3.0V	CS=10nF
		—	30	60		5.0V	
Standby current	I _{ST}	—	6	12	μA	3.0V	CS=10nF
		—	12	24		5.0V	
Output Sink Current	I _{IL}	—	10	—	mA	3.0V	V _{OL} =0.5V
		—	14	—		5.0V	
Output Source Current	I _{OL}	—	-6	—	mA	3.0V	V _{OH} =2.8V
		—	-9	—		5.0V	V _{OH} =4.5V
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
Output Response Time	T _R	—	45	—	mS	3.0V	normal mode
		—	48	—		5.0V	normal mode
		—	150	—	mS	3.0V	standby mode
		—	160	—		5.0V	standby mode

6 Package Information

6.1 ESSOP10L(4.9mm x3.9mm PP=1.00mm):



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.50	1.60	1.70
A1	0.02	--	0.08
b	0.30	0.40	0.45
b1	0.28	0.38	0.42
c	0.18	0.20	0.22
c1	0.13	0.15	0.18
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.00BSC		
h	0.10	--	0.25
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 content	Yes

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