VK36E4 Datasheet

4-channel touch 1-to-1 output

Rev.1.2

1 General Description

The VK36E4 is a 4-channel touch detection chip designed to replace traditional mechanical buttons, making it particularly suitable for compact, interference-resistant, and power-sensitive products.

This chip features excellent anti-interference capability, high penetration performance, a wide operating voltage range, and extremely low static current. The output mode supports active-low logic and provides multi-key detection and a 16-second long-press reset function. Internally, it adopts a specialized integrated circuit design with a high power supply rejection ratio, which effectively prevents false triggering and ensures reliable operation even in complex environments. Its package design contributes to achieving a waterproof, dustproof, aesthetically sealed front panel for the end product.

2 Key Features

- Operating voltage: 2.4-5.5V
- Operating current 20.0μA@VDD=3.0V
  Standby current 6.0μA@VDD=3.0V
- Power-on reset function（POR）
- Low-voltage reset function（LVR）
- The response time is approximately 45ms @VDD=3V
- The overall sensitivity is adjusted by connecting a capacitor to ground through the CS pin. The capacitance value ranges from 1 to 100nF. The larger the capacitance value, the more sensitive it is. It is not allowed not to connect a capacitor.
- Connect a small capacitor to the ground for fine-tuning the sensitivity of each touch channel to make the sensitivity of each channel consistent. The capacitance value ranges from 1 to 100pF. The larger the capacitance value, the less sensitive it is. It is most sensitive without connecting a capacitor.
- Built-in key debouncing, no need for external software to debouncing again
- Pins Q0 to Q3 are the output
  Output low level is effective, multi-key mode
  Press and hold the button for 16 seconds to reset
- After power-on, there is approximately 0.25 seconds of stabilization time during which all functions are disabled. Do not touch the detection point during this period
- Self-calibrate parameters according to environmental changes.
- It is relatively easy to pass the EMC test
- HBM Electrostatic 4KV-8KV(Class 3A)
- Available Packages:
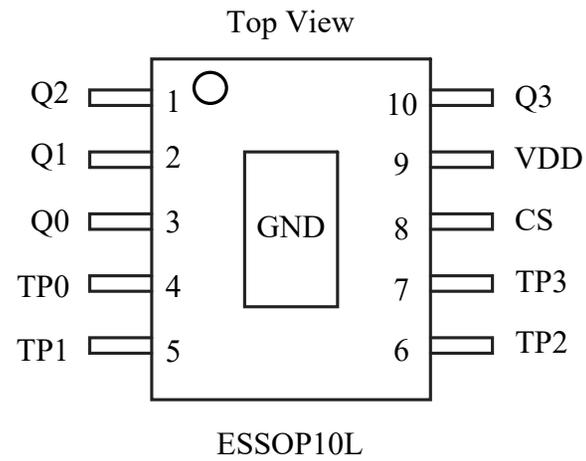 ESSOP10L(4.9mm x 3.9mm PP=1.00mm)

3 Product Selection

Part No.	Touch Channel	Working Voltage	Normal Mode/Standby	Output (/ Optional parameter)	Packaging
VK3601	1	2.4-5.5V	120μA/4μA(3V)	Direct CMOS output high/low level	SOT23-6
VK3602K	2	2.4-5.5V	60μA/8μA(3V)	Direct CMOS output high/low level	SOP8
VK3602XS	2	2.4-5.5V	60μA/8μA(3V)	Latch the CMOS output high/low level	SOP8
VK3603	3	2.4-5.5V	20μA/7μA(3V)	Direct CMOS output, low level effective	ESOP8
VK3604A	4	2.4-5.5V	20μA/7μA(3V)	Direct/latch high/low level multi-key/single-key CMOS/ Drain long press to keep output/ Long press for 16 seconds to reset	SOP16
VK3604B	4	2.4-5.5V	20μA/7μA(3V)	Direct/latch high/low level multi-key/single-key CMOS/ Drain long press to keep output/ Long press for 16 seconds to reset	TSSOP16
VK36E4	4	2.4-5.5V	20μA/6μA(3V)	Direct/latch high/low level multi-key/single-key CMOS/ Drain long press to keep output/ Long press for 16 seconds to reset	ESSOP10
VK36Q4	4	2.4-5.5V	20μA/6μA(3V)	Direct/latch high/low level multi-key/single-key CMOS/ Drain long press to keep output/ Long press for 16 seconds to reset	DFN10L
VK3606D	6	2.4-5.5V	20μA/7μA(3V)	Direct CMOS output, low level effective, multi-key mode, long press for 10 seconds to reset	SOP16
VK3610I	10	2.4-5.5V	45μA/9μA(3V)	I2C interface +INT pin, multi-key mode, hold for 10 seconds to reset	SOP16
VK3618I	18	2.4-5.5V	60μA/16μA(3V)	Two groups of touch correspond to I2C interface +INT pin, each group has 9 touch channels, multi-key mode, and reset after holding for 10 seconds	SSOP28

4 Ordering Information

Part No.	Packaging	Tube Qty	Tray(reel)Qty	Box Qty	Total Qty	Notes
VK3601	SOT23-6		3000/reel	30000/box	120000 PCS	
VK3602K	SOP8	100/tube		10000/box	60000 PCS	
VK3602XS	SOP8	100/tube		10000/box	60000 PCS	
VK3603	ESOP8		4000/reel	8000/box	64000 PCS	
VK3604A	SOP16	50/tube		5000/box	50000 PCS	
VK3604B	TSSOP16	100/tube		10000/box	100000 PCS	
VK36E4	ESSOP10		4000/reel	8000/box	64000 PCS	
VK36Q4	DFN10L		5000/reel		40000 PCS	
VK3606D	SOP16	50/tube		5000/box	50000 PCS	
VK3610I	SOP16	50/tube		5000/box	50000 PCS	
VK3618I	SSOP28	50/tube		5000/box	50000 PCS	

5 Package Pinout Information(ESSOP10L)

Top View

```
Q2  ┌──1 ○      10──┐  Q3
Q1  ┌──2          9──┐  VDD
Q0  ┌──3   GND    8──┐  CS
TP0 ┌──4          7──┐  TP3
TP1 ┌──5          6──┐  TP2
```

ESSOP10L

For more information:

5.1 VK36E4/ESSOP10L Pin Description

| No.	Name	I/O	Function Description
1	Q2	O	Touch output
2	Q1	O	Touch output
3	Q0	O	Touch output
4	TP0	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-100pF), and it is most sensitive when not connected
5	TP1	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-100pF), and it is most sensitive when not connected
6	TP2	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-100pF), and it is most sensitive when not connected
7	TP3	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-100pF), and it is most sensitive when not connected
8	CS	I	Sensitivity adjustment, connect to ground capacitance (1-100nF)
9	VDD	VDD	Positive power supply
10	Q3	O	Touch output
0	GND	GND	Negative power supply

6　Functional Description

6.1　Block Diagram
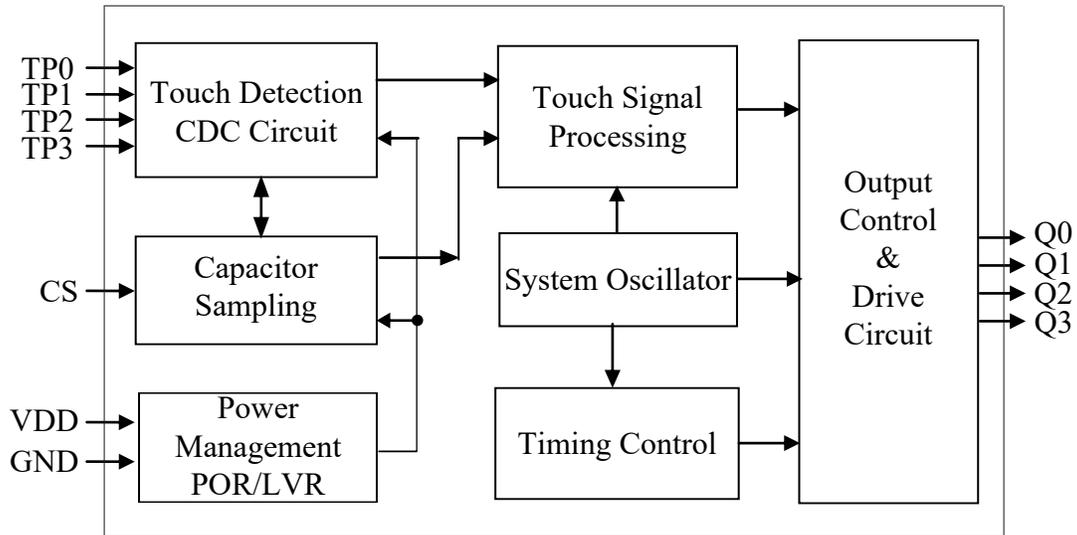


6.2　Output Parameters

The output of VK36E4 is a CMOS direct output (Q0 to Q3), which is effective at low levels and supports multi-key output. Press and hold for 16 seconds to reset the chip, and the output will return to the power-on state.
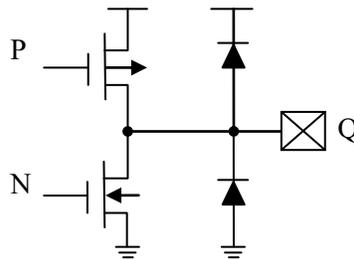
6.3 Working Mode

The VK36E4 chip has two working modes: standby mode and normal mode. The key was touched and switched to the normal mode. The keyless touch 4S automatically enters standby mode to reduce power consumption. When VDD=5V, the Qn output response is approximately 160 milliseconds in standby mode and about 48 milliseconds in working mode.
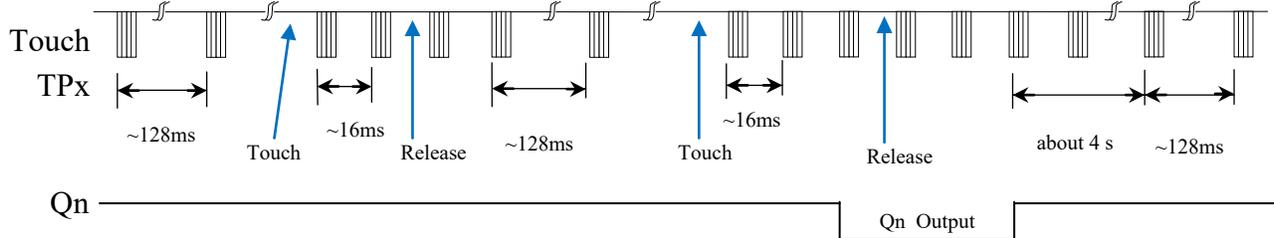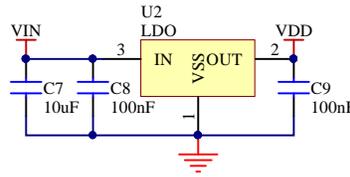

6.4 Sensitivity Adjustment

The sensitivity of VK36E4 is related to the size of the touch PAD, the thickness of the shell, the size of the sensitivity capacitance, etc. The sensitivity should be adjusted according to the actual application of the product. The sensitivity can be adjusted from the following four aspects:

1. Touch the area of the PAD
   Under other unchanged conditions, the larger the touch area, the more sensitive it is, but the area must be within the effective area.
2. The thickness of the shell
   Under other unchanged conditions, the thinner the casing, the higher the sensitivity; the thicker the casing, the lower the sensitivity. However, the thickness must not exceed the maximum limit.
3. Adjust the capacitance value of pin CS to ground
   CS adjusts the overall sensitivity, with the larger the value, the more sensitive it is. Commonly used values range from 1 to 100nF, and for some special applications, there are also those exceeding 200nF. CS capacitors should be selected with smaller temperature coefficients, such as X7R and NPO.
4. Adjust the small capacitance between the touch foot and the ground
   The sensitivity is fine-tuned by touching the small capacitance of the touch foot to the ground. The larger the capacitance, the lower the sensitivity. It is most sensitive without a capacitance. Common values range from 1 to 100pF.
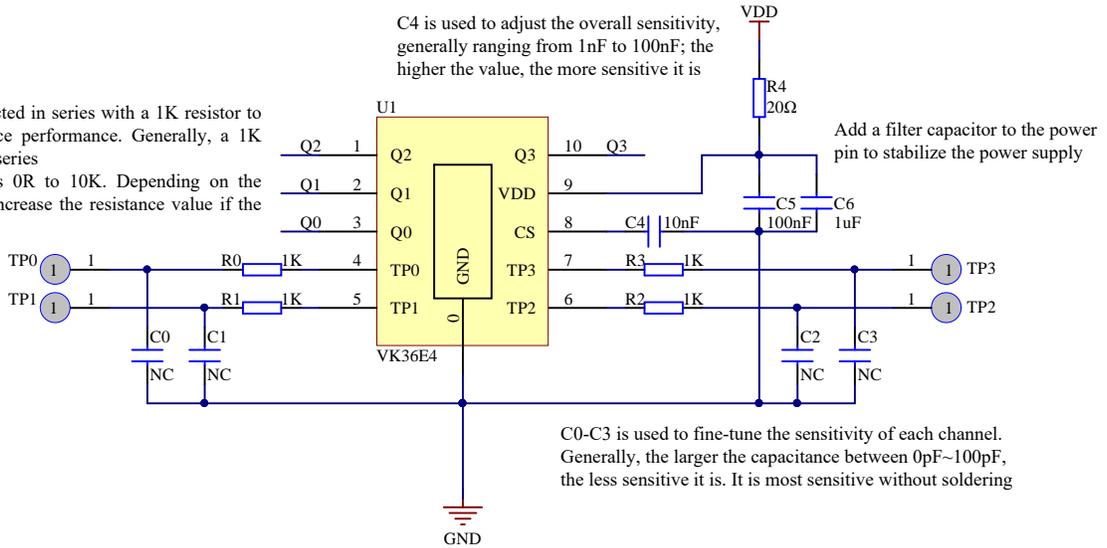
Shell thickness (acrylic or glass)	CS Electrical value (for reference only)
<3mm	10nF/25V
3-6mm	22nF/25V
6-10mm	47nF/25V

7 Application Circuits

It is recommended to use LDO for power supply

C4 is used to adjust the overall sensitivity, generally ranging from 1nF to 100nF; the higher the value, the more sensitive it is

The touch pin is connected in series with a 1K resistor to enhance anti-interference performance. Generally, a 1K resistor is connected in series
The resistance range is 0R to 10K. Depending on the interference situation, increase the resistance value if the interference is severe

Add a filter capacitor to the power pin to stabilize the power supply

C0-C3 is used to fine-tune the sensitivity of each channel. Generally, the larger the capacitance between 0pF~100pF, the less sensitive it is. It is most sensitive without soldering

Notes：

1. On the PCB, the length of the line from the touch PAD to the touch pin should be as short as possible, and the touch traces must not be parallel or cross with other lines.

2. The power supply must be stable. Fluctuations, rapid drift or interference in the supply voltage may cause abnormal sensitivity or false detection.

3. The board covering the PCB must not contain any metal or conductive materials, and the same applies to the surface coating.

4. A 0.1uF capacitor must be used between VDD and GND, and the distance from the VDD and GND pins of the chip should be the shortest. It is recommended to add a 20Ω resistor and a 1uF capacitor on the power supply.

5.CS adjusts the overall sensitivity. This capacitor must be connected and placed as close to the chip as possible. The larger it is, the more sensitive it is. Common values range from 1 to 100nF, and for some special applications, there are also those exceeding 200nF.CS capacitors should be selected with a smaller temperature coefficient and stability, such as X7R and NPO.

6. Fine-tune the sensitivity of capacitors C0-C3(0~100pF) to ensure consistent sensitivity across all channels. The smaller the capacitance value, the more sensitive it is. The highest sensitivity is achieved without connecting capacitors. Sensitivity adjustments must be made based on the actual PCB application. For conventional applications, it is not necessary to connect them. Capacitors with smaller temperature coefficients and greater stability, such as X7R and NPO, must be selected.

7. Resistors R0-R3 are mainly used to effectively prevent radio frequency interference and enhance anti-static capability. The common values range from 470R to 1K, with a maximum not exceeding 10K. Resistors should be placed as close as possible to the chip. For conventional applications, they can be omitted.

8 Electrical Characteristics

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Voltage	VDD	-0.3～6.0	V
Input Voltage	V_{IN}	GND-0.3～VDD+0.3	V
Storage Temperature	T_{STG}	-50～+125	℃
Operating Temperature	T_{OTG}	-40～+85	℃
Human Body Mode	ESD	≧4	KV

8.1 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions（25 ℃）	
						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

9 Package Information

9.1 ESSOP10L(4.9mm x 3.9mm PP=1.00mm)
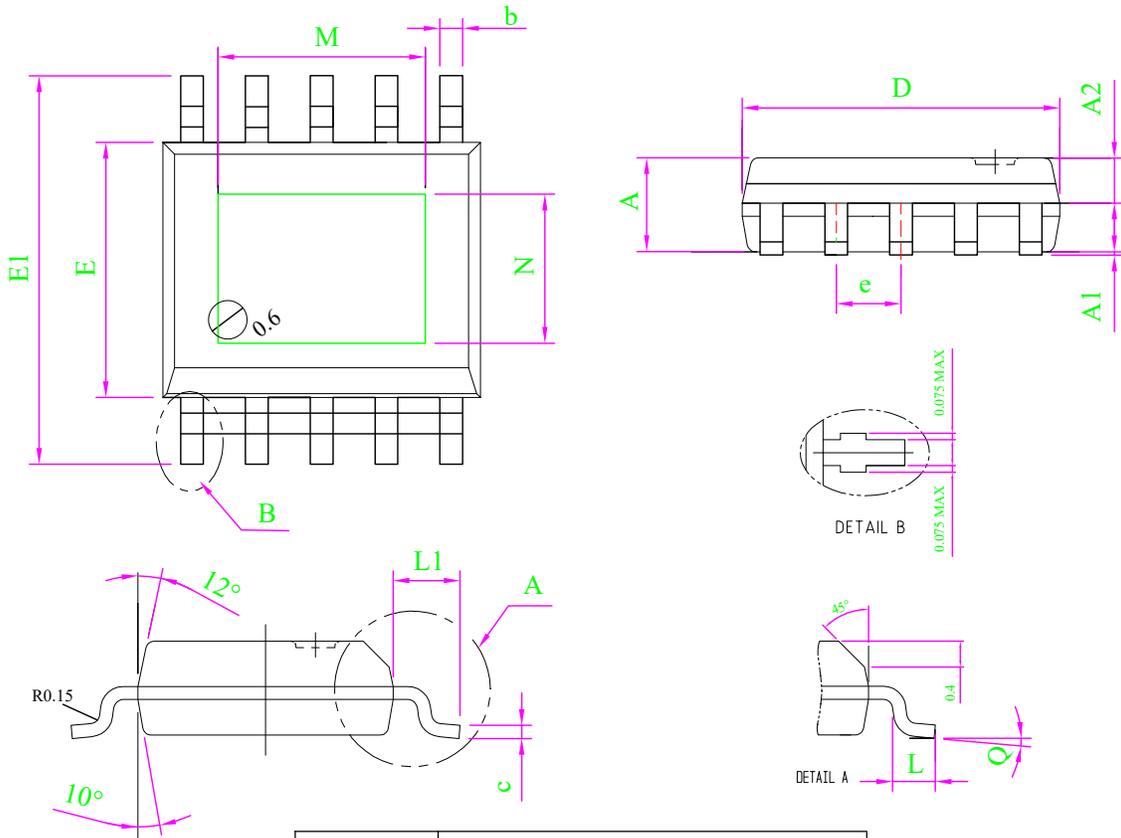
SYMBOL	MILLIMETER		
	MIN	MID	MAX
A	1.35	1.45	1.55
A1	0.00	0.04	0.08
A2	0.65	0.70	0.75
b	0.325	0.35	0.375
c	0.18	0.20	0.22
D	4.70	4.90	5.10
e	1.00 BSC		
E1	5.80	6.00	6.20
E	3.80	3.90	4.00
L	0.40	0.60	0.80
Q	0°	-	8°
M	3.10	3.30	3.50
N	1.90	2.10	2.30
L1	1.05 REF		

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11 Revision History

No.	Version	Date	Modify the content	Check
1	1.0	2018-08-10	Original version	YES
2	1.1	2020-02-11	Add reference circuit	YES
3	1.2	2025-12-12	Update version	YES

[1] Consult the recently published documents before starting or finishing the design.

[2] Since the release of this document，the device product status described in this document may have changed and may differ in several cases. The latest product status information can be found on the Internet at https://www.szvinka.com/