



# VK3601 Datasheet

Single-channel touch direct output

Rev.1.2

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## 1 General Description

VK3601 is a single-channel touch detection chip designed to replace traditional mechanical buttons, making it particularly suitable for compact electronic products with high requirements for interference resistance and low power consumption.

The chip features excellent anti-interference capability, high penetration performance, a wide operating voltage range, and low static current. It supports output level configuration via the IO pin during power-on. With a specialized internal integrated circuit design, it achieves a high power supply rejection ratio, effectively preventing false triggering and ensuring high reliability even in harsh environments. This design also facilitates the creation of a waterproof, dustproof, and aesthetically sealed product panel.

## 2 Key Features

- Operating voltage: 2.4-5.5V
- Standby current 4 $\mu$ A/3.0V 8 $\mu$ A/5V
- Power-on reset function (POR)
- Low-voltage reset function (LVR)
- The touch output response time is 45mS in working mode and 125mS in standby mode.
- 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.
- The sensitivity of the touch channel is fine-tuned by connecting a small capacitor to the ground. 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.
- Pin Q is the output  
The output level is selected by the MHL pin as either high level effective or low level effective. Press and hold the key continuously to output
- 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:  
SOT23-6(3mm x 3mm PP=0.95mm)

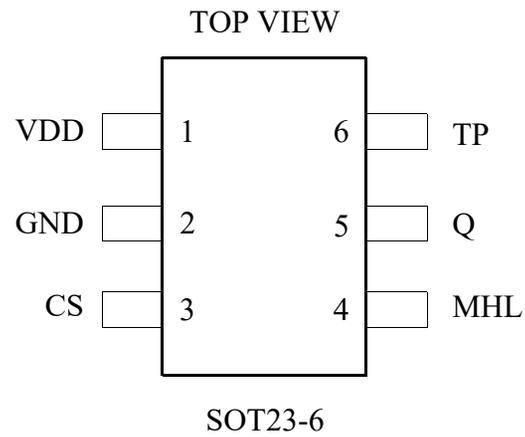
### 3 Product Selection

Part No.	Touch Channel	Working Voltage	Normal Mode/Standby	Output (/ Optional parameter)	Packaging
VK3601	1	2.4-5.5V	120 $\mu$ A/4 $\mu$ A(3V)	Direct CMOS output high/low level	SOT23-6
VK3602K	2	2.4-5.5V	60 $\mu$ A/8 $\mu$ A(3V)	Direct CMOS output high/low level	SOP8
VK3602XS	2	2.4-5.5V	60 $\mu$ A/8 $\mu$ A(3V)	Latch the CMOS output high/low level	SOP8
VK3603	3	2.4-5.5V	20 $\mu$ A/7 $\mu$ A(3V)	Direct CMOS output, low level effective	ESOP8
VK3604A	4	2.4-5.5V	20 $\mu$ A/7 $\mu$ A(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	20 $\mu$ A/7 $\mu$ A(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	20 $\mu$ A/6 $\mu$ A(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	20 $\mu$ A/6 $\mu$ A(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	20 $\mu$ A/7 $\mu$ A(3V)	Direct CMOS output, low level effective, multi-key mode, long press for 10 seconds to reset	SOP16
VK3610I	10	2.4-5.5V	45 $\mu$ A/9 $\mu$ A(3V)	I2C interface +INT pin, multi-key mode, hold for 10 seconds to reset	SOP16
VK3618I	18	2.4-5.5V	60 $\mu$ A/16 $\mu$ A(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( SOT23-6)



For more information: [Page 9](#)

## 5.1 VK3601/SOT23-6 Pin Description

No.	Name	I/O	Function Description
1	VDD	VDD	Positive power supply
2	GND	GND	Negative power supply
3	CS	I	Sensitivity adjustment, connect to ground capacitance (1-100nF)
4	MHL	I-RH	Select the output level: 1-> low level is effective (default), 0-> high level is effective
5	Q	O	Touch output
6	TP	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-100pF), and it is most sensitive when not connected

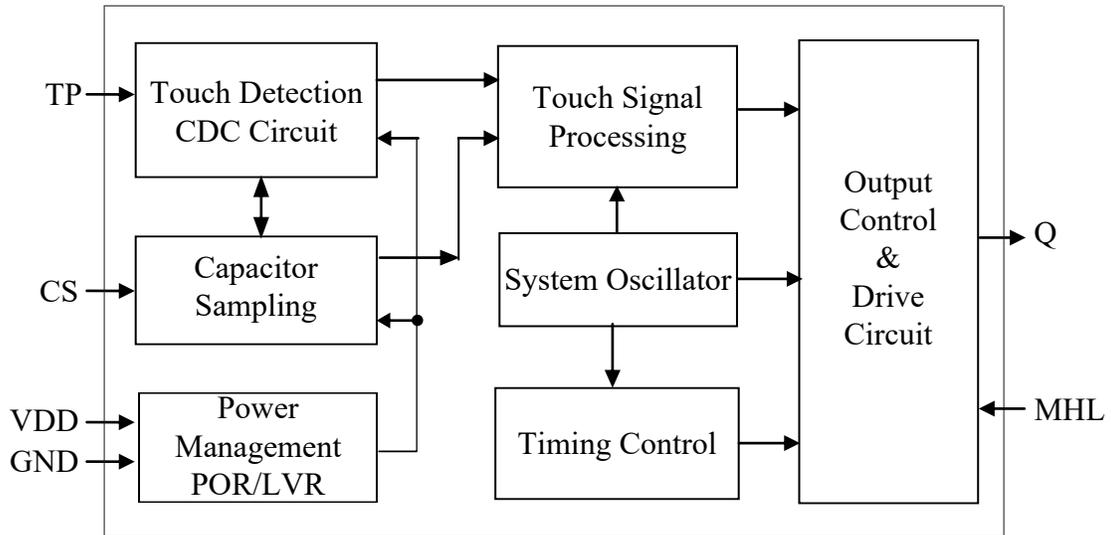
Notes:

Input - RH CMOS input with built-in pull-up resistor

Input - RL CMOS input with built-in pull-down resistor

## 6 Functional Description

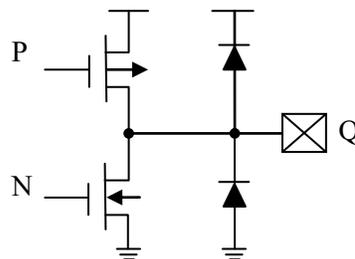
### 6.1 Block Diagram



### 6.2 Output Parameters

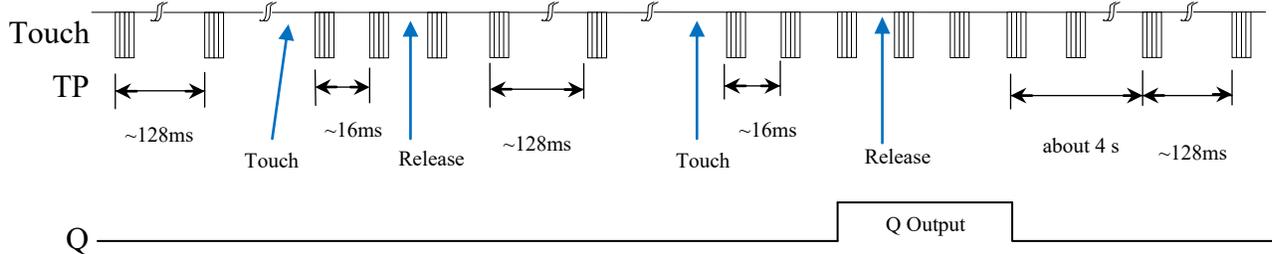
The output of VK3601 is a direct CMOS output of Q.

MHL selects the output effective level: 0-> high level effective 1-> low level effective (default)



### 6.3 Working Mode

The VK3601 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  $V_{DD}=5V$ , the Q output response is approximately 132 milliseconds in standby mode and about 48 milliseconds in working mode.



### 6.4 Sensitivity Adjustment

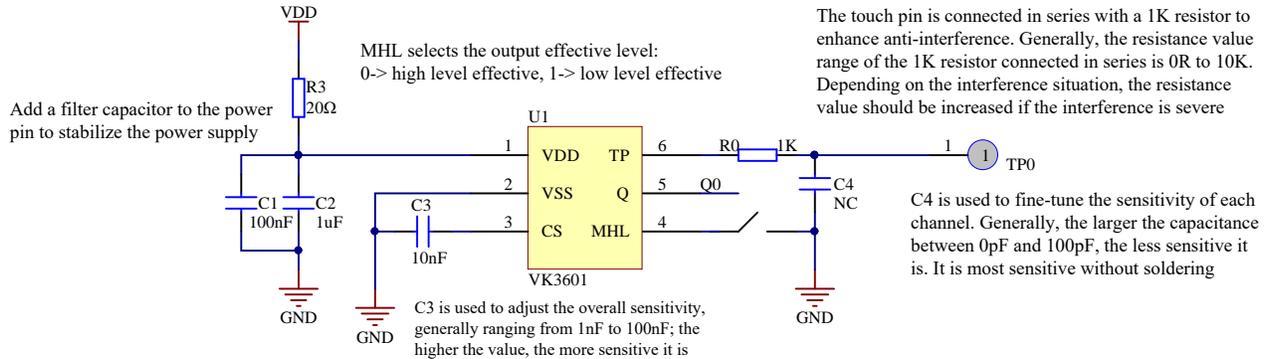
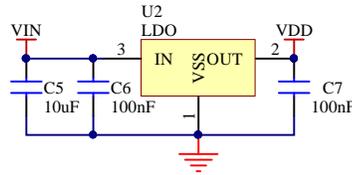
The sensitivity of VK3601 is related to the size of the touch PAD, the thickness of the shell, the size of the sensitivity capacitance, etc. The sensitivity should be adjusted according to the actual application of the product. The sensitivity can be adjusted from the following four aspects:

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



### 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 capacitor C0(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 a capacitor. Sensitivity adjustment must be made based on the actual PCB application. For conventional applications, it can be left unconnected. Capacitors with smaller temperature coefficients and greater stability, such as X7R and NPO, must be selected.
7. Resistor R0 is mainly used to effectively prevent radio frequency interference and enhance anti-static capability. Its common value ranges from 470R to 1K, with a maximum not exceeding 10K. The resistor should be placed as close as possible to the chip. For conventional applications, it can be omitted.

## 8 Electrical Characteristics

### Absolute Maximum Ratings

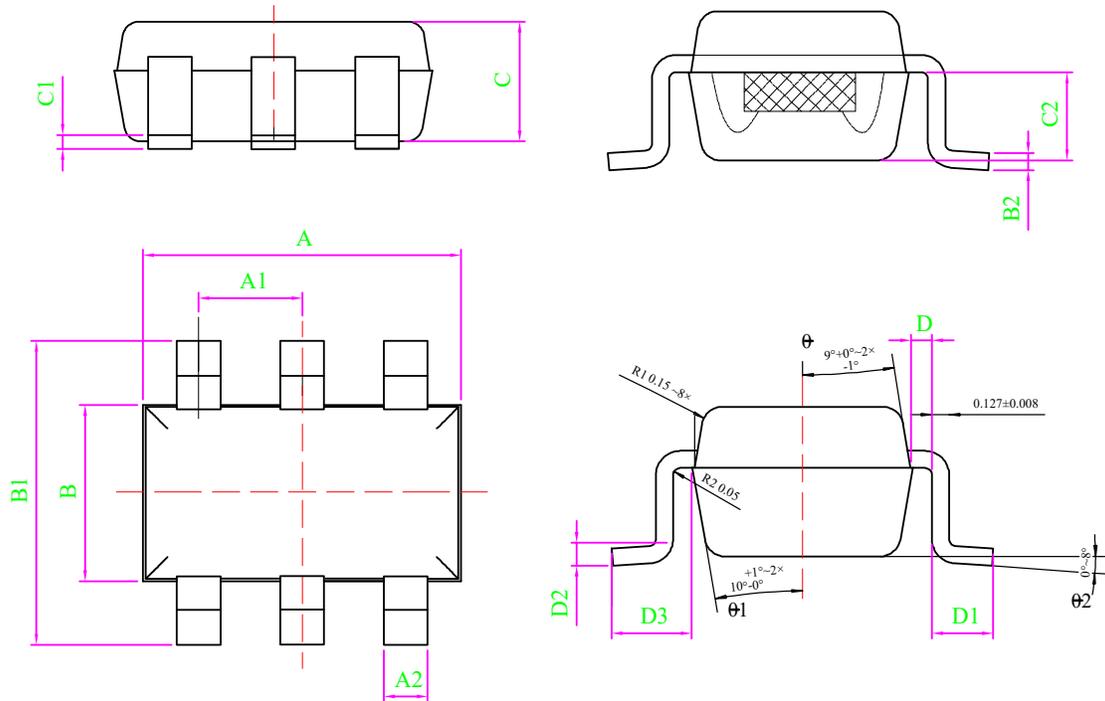
Parameter	Symbol	Ratings	Unit
Power Voltage	VDD	-0.3~6.0	V
Input Voltage	V <sub>IN</sub>	GND-0.3~VDD+0.3	V
Storage Temperature	T <sub>STG</sub>	-50~+125	°C
Operating Temperature	T <sub>OTG</sub>	-40~+85	°C
Human Body Mode	ESD	≧4	KV

### 8.1 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions (25 °C)	
						VDD	Conditions
Operating voltage	VDD	2.4	3.0	5.5	V	—	—
Operating current	I <sub>OP</sub>	—	120	130	μA	3.0V	CS=10nF
		—	200	240		5.0V	
Standby current	I <sub>ST</sub>	—	4	8	μA	3.0V	CS=10nF
		—	8	16		5.0V	
Output sink current	I <sub>IL</sub>	—	8.0	—	mA	3.0V	V <sub>OL</sub> =0.5V
		—	12.0	—		5.0V	
Output source current	I <sub>OL</sub>	—	-3.5	—	mA	3.0V	V <sub>OH</sub> =2.8V
		—	-5.0	—		5.0V	V <sub>OH</sub> =4.5V
Input low voltage	V <sub>IL</sub>	—	—	1/3	VDD	VDD	Input low voltage
Input high voltage	V <sub>IH</sub>	2/3	—	1	VDD	VDD	Input high voltage
Output response time	T <sub>R</sub>	—	45	—	mS	3.0V	Normal mode
		—	48	—		5.0V	Normal mode
		—	125	—	mS	3.0V	Standby mode
		—	132	—		5.0V	Standby mode

## 9 Package Information

### 9.1 SOT23-6(3mm x 3mm PP=0.95mm)



MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	2.72	2.92	3.12
A1	0.90	0.95	1.00
A2	0.30	0.35	0.40
B	1.40	1.60	1.80
B1	2.60	2.80	3.00
B2	0.12	0.128	0.135
C	1.00	1.10	1.20
C1	0.04	-	0.10
C2	0.60	0.65	0.70
D	0.03	0.08	0.13
D1	0.30	-	0.60
D2	0.25TYP		
D3	0.60	0.65	0.70

## 10 Disclaimer

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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	2025-12-15	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/>