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VKD232C Datasheet

2ch Touch/One-to-one output

Rev.1.2

1 General Description

VKD232C is a 2-channel touch detection chip with low power consumption, wide operating voltage range and stable touch detection effect, which can widely meet the needs of different applications. This touch detection chip is specially designed to replace traditional buttons and is equipped with a built-in voltage regulation circuit to provide a stable voltage for the touch detection circuit. The size of the touch detection PAD can be designed within a reasonable range according to different sensitivities.

2 Key Features

- Operating voltage: 2.4-5.5V
- The operating current is 4μA@VDD=3.0V
  Standby current 2.5μA@VDD=3.0V
- Low-pressure reset function（LVR）
- Built-in dedicated voltage stabilizing circuit for touch detection
- The response time is approximately 60ms @VDD=3V
- Pins Q0-Q1 are CMOS outputs
  Direct output, low level effective, supports multi-key touch
- The sensitivity can be adjusted by an external capacitor (1 to 60pF)
- • Touch fool-proof function, with a maximum output time of approximately 16s
- After power-on, there is approximately 0.5 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
- The static electricity of HBM is greater than 5KV
- Available Packages:
  SOT23-6L(3mm x 3mm PP=0.95mm)

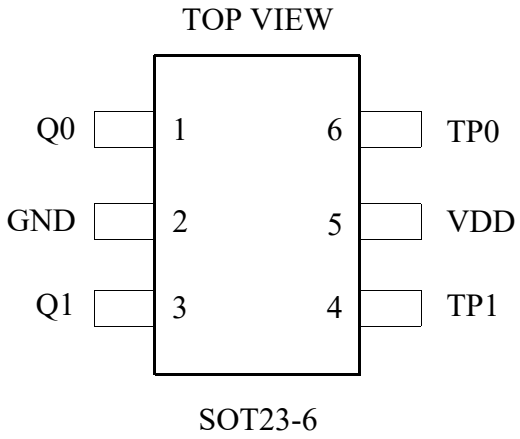
3 Product Selection

Part No.	Touch channel	Operating voltage	Normal mode /Standby	Output(/ Optional parameter)	Packaging
VKD232C	2	2.4-5.5V	4.0μA/2.5μA(3V)	Direct output, low level effective	SOT23-6L
VKD104CR	2	2.4-5.5V	13.0μA/2.5μA(3V)	Direct/latch high/low level	SOP8
VKD104CR-3H	3	2.4-5.5V	13.0μA/2.5μA(3V)	Directly output a high level and hold for 16 seconds to reset	SOP8
VKD104CC	4	2.4-5.5V	13.0μA/2.5μA(3V)	Direct/latch high/low level multi-key/ single key CMOS/ Open drain, long press to keep output/Long press for 16 seconds to reset	SOP16
VKD104CB	4	2.4-5.5V	13.0μA/2.5μA(3V)	Direct/latch high/low level multi-key/ single key CMOS/ Open drain, long press to keep output/Long press for 16 seconds to reset	SSOP16
VKD104	4	2.4-5.5V	13.0μA/2.5μA(3V)	Direct/latch high/low level multi-key/ single key CMOS/ Open drain, long press to keep output/Long press for 16 seconds to reset	DICE

4 Ordering Information

Part No.	Packaging	Tube Qty	Tray Qty	Box Qty	Total Qty	Notes
VKD232C	SOT23-6L		3000/tray	30000/box	120000 PCS	
VKD104CR	SOP8	100/tube		10000/box	100000 PCS	
VKD104CR-3H	SOP8	100/tube		10000/box	100000 PCS	
VKD104	DICE		400/tray	2000/box	4000 PCS	DICE
VKD104CC	SOP16	50/tube		5000/box	50000 PCS	
VKD104CB	SSOP16	100/tube		10000/box	100000 PCS	

5 Package Pinout Information(SOT23-6L)



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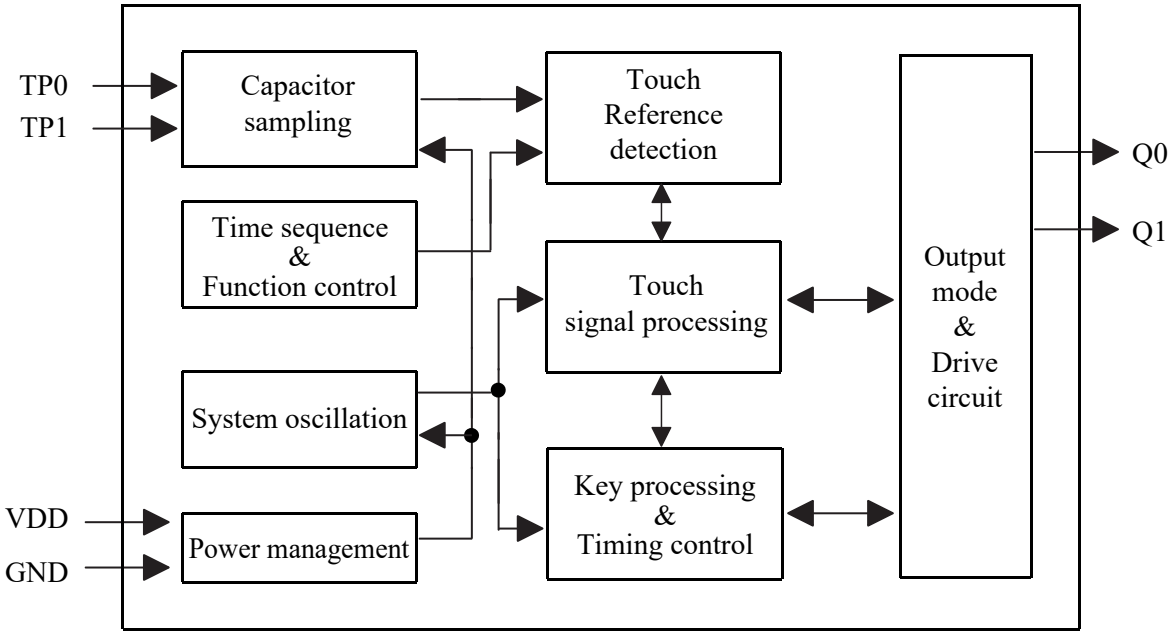
5.1 VKD232C/SOT23-6 Pin Description

No.	Name	I/O	Function
1	Q0	O	Touch output, low level is effective
2	GND	GND	Power supply ground
3	Q1	O	Touch output, low level is effective
4	TP1	I	Touch input，Fine-tune the sensitivity by connecting a small capacitor to ground (1-60pF)，It is the most sensitive when no capacitor is connected
5	VDD	VDD	Positive power supply
6	TP0	I	Touch input，Fine-tune the sensitivity by connecting a small capacitor to ground (1-60pF)，It is the most sensitive when no capacitor is connected

6 Functional Description

6.1 Block Diagram

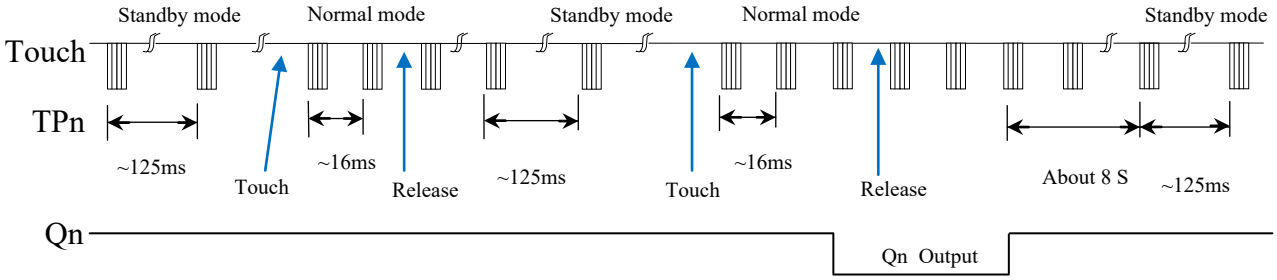


6.2 Output parameters

The VKD232C has an output range of Q0 to Q1, supports multi-key touch, has direct CMOS output, and is effective at low levels.

6.3 Operating Mode

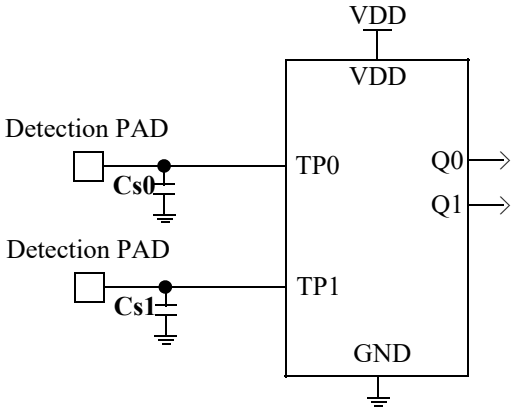
The VKD232C chip has two Operating modes: standby mode and normal mode. The key was touched and switched to the normal mode. The key less touch 8S automatically enters standby mode to reduce power consumption. When VDD=5V, the Qn output response is approximately 160 milliseconds in standby mode and about 60 milliseconds in normal mode.



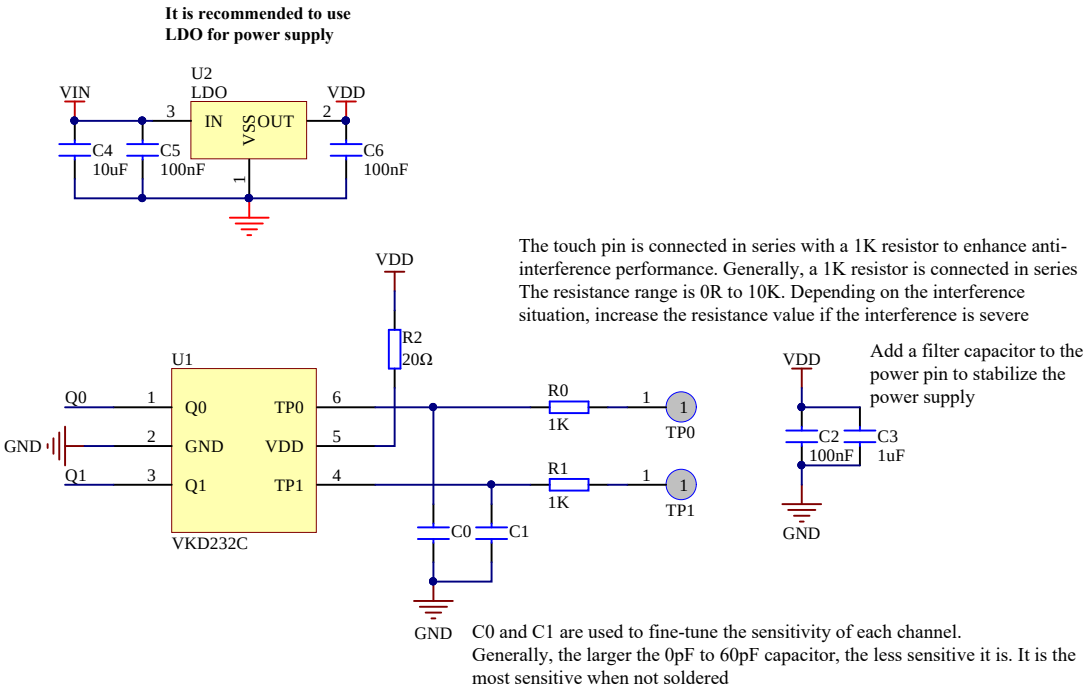
6.4 Sensitivity Adjustment

The size of the detection PAD connected on the PCB and the total load of the capacitance (parasitic capacitance and Cs capacitance) will affect the sensitivity. The sensitivity adjustment should be adjustd according to the actual application.
The following are some methods for externally adjusting the sensitivity:

1. Adjust the size of the detection PAD
   Under the condition that other factors remain unchanged, using a larger detection PAD size can increase the sensitivity; conversely, it will decrease the sensitivity. However, the detection PAD size must be used within the effective range.
2. Adjust the thickness of the medium (casing)
   Under the condition that other factors remain unchanged, using a thinner medium can increase sensitivity, while the opposite will reduce it. However, the thickness of the medium must be below the maximum limit value.
3. Adjust the Cs capacitance value (please refer to the figure below)
   Under the condition that other factors remain unchanged, the sensitivity is the highest when a Cs capacitor is not connected to GND on the touch PAD. The Cs capacitor is within the available range ($1 \le Cs \le 60pF$), and the larger the value of the Cs capacitor, the lower the sensitivity.



7 Application Circuits



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. Fine-tune the sensitivity of capacitors C0-C1(0~60pF) 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 adjustment must be based on the actual PCB application. For conventional applications, it is not necessary to connect capacitors. Capacitors with smaller temperature coefficients and greater stability, such as X7R and NPO, must be selected.
6. Resistors R0-R1 are mainly used to effectively prevent radio frequency interference and enhance anti-static capabilities. The common values range from 470R to 1K, with a maximum not exceeding 10K. They can be omitted in conventional applications.

8 Electrical Characteristics

8.1 Absolute Maximum Ratings

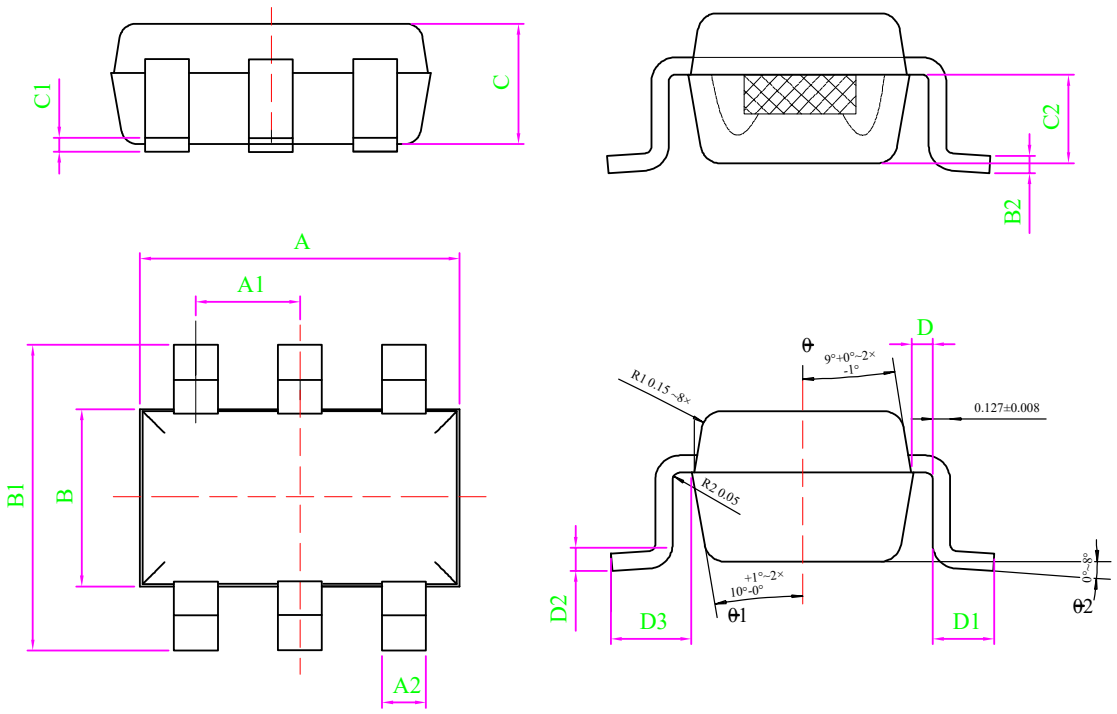
Parameter	Symbol	Ratings	Unit
Supply voltage	VDD	-0.3～6.0	V
Input Voltage	VIN	GND-0.3～VDD+0.3	V
Storage Temperature	T_{STG}	-50～+125	℃
Operating Temperature	T_{OTG}	-40～+85	℃
Human Body Mode	ESD	≧5	KV

8.2 DC Electrical Characteristics

Parameter	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	—	—
Working current	I_{OP}	—	4.0	10.0	μA	3.0V	Normal mode
Standby current	I_{ST}	—	2.5	4.0	μA	3.0V	Standby mode
Output perfusion current	I_{IL}	—	8	—	mA	3.0V	V_{OL}=0.6V
		—	16	—		5.0V	
Output source current	I_{OL}	—	-4	—	mA	3.0V	V_{OH}=2.4V
		—	-8	—		5.0V	V_{OH}=4.4V
Low-level Input	V_{IL}	—	—	0.2	VDD	VDD	Input low voltage
High-level Input	V_{IH}	0.8	—	1	VDD	VDD	Input high voltage
Output Response Time	T_R	—	60	—	mS	3.0V	Operating mode
		—	60	—		5.0V	Operating mode
		—	160	—	mS	3.0V	Standby mode
		—	160	—		5.0V	Standby mode

9 Package Information

9.1 SOT23-6L(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

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11 Revision History

No.	Version	Date	Modify the content	Check
1	1.0	2018-08-10	initial release	YES
2	1.1	2020-02-11	Add a reference circuit	YES
3	1.2	2025-07-08	Change Description	YES

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