



VKD104CR Datasheet

2-channel touch 1-to-1 output

Rev.1.2

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1 General Description

VKD104CR is a 2-channel touch detection chip designed to replace traditional mechanical buttons. It features low power consumption, a wide operating voltage range, and stable detection performance, making it suitable for various applications. The chip includes an built-in voltage regulator to provide stable power for the touch detection circuit, and the touch pad size can be flexibly designed according to sensitivity requirements.

With high integration, the chip requires minimal external components. It allows output level and mode configuration for both channels via IO pins during power-on. The internal specialized circuit design offers high power supply rejection ratio, effectively minimizing false triggers and ensuring high reliability even in challenging environments.

2 Key Features

- Operating voltage: 2.4-5.5V
- Operating current 13.0 μ A@VDD=3.0V
Standby current 2.5 μ A@VDD=3.0V
- Built-in dedicated voltage stabilizing circuit for touch detection
- The response time is approximately 60ms @VDD=3V
- The sensitivity can be adjusted by an external capacitor (1 to 60pF)
- Built-in key debouncing, no need for external software to debouncing again
- The touchless 8S has entered standby mode
- Keep outputting without leaving the touch
- Pins Q0-Q1 are CMOS outputs
The output level is selected by the MHL pin as either high level active or low level active
The output mode is selected by the MDT pin as direct output or latched output
- 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:
SOP8(150mil)(4.9mm x 3.9mm PP=1.27mm)

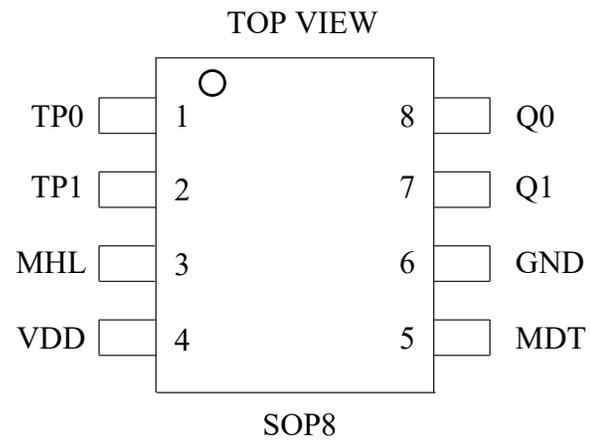
3 Product Selection

Part No.	Touch Channel	Working 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(reel)Qty	Box Qty	Total Qty	Notes
VKD232C	SOT23-6L		3000/reel	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	
VKD104CC	SOP16	50/tube		5000/box	50000 PCS	
VKD104CB	SSOP16	100/tube		10000/box	100000 PCS	

5 Package Pinout Information(SOP8)



For more information: [Page 9](#)

5.1 VKD104CR/SOP8 Pin Description

No.	Name	I/O	Function Description
1	TP0	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-60pF), and it is most sensitive when not connected
2	TP1	I	Touch input: Connect a small capacitor to ground to fine-tune the sensitivity (1-60pF), and it is most sensitive when not connected
3	MHL	I-RL	Select output level: 1-> low level effective, 0-> high level effective (default)
4	VDD	VDD	Positive power supply
5	MDT	I-RL	Select the output mode: 1-> latch output, 0-> direct output (default)
6	GND	GND	Negative power supply
7	Q1	O	Touch output
8	Q0	O	Touch output

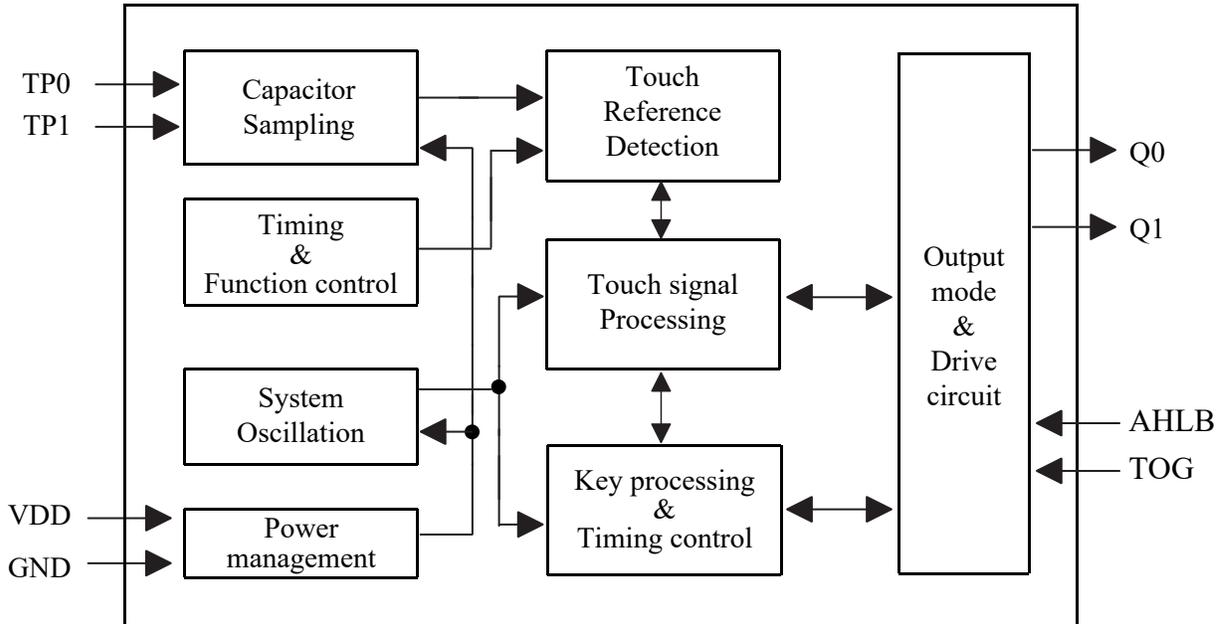
Note:

I—RH The CMOS input has an internal pull-up resistor

I—RL The CMOS input has a built-in pull-down resistor

6 Functional Description

6.1 Block Diagram



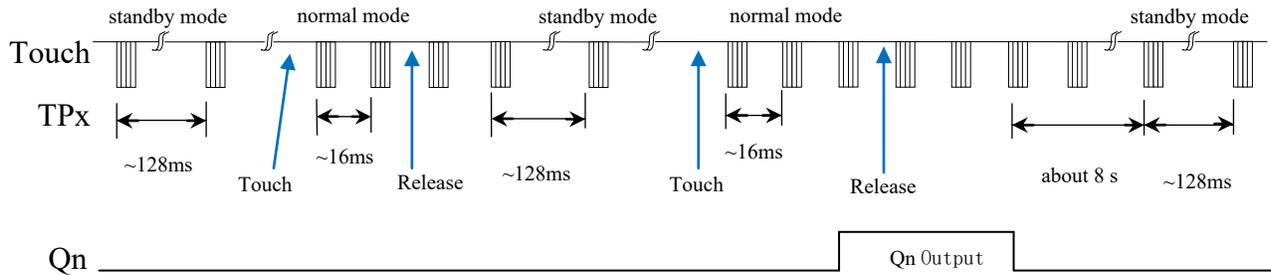
6.2 Output Parameters

The VKD104CR has an output range of Q0 to Q1, supports multi-key touch, and its output parameters are configurable.

MDT	MHL	Configure output parameters
NC	NC	Direct CMOS output, high level effective
NC	VDD	Direct CMOS output, low level effective
VDD	NC	Latch CMOS output, power-on output 0
VDD	VDD	Latch CMOS output, power-on output 1

6.3 Operating Mode

The VKD104CR chip has two Operating modes: standby mode and normal mode. The key was touched and switched to the normal mode. The keyless 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 needs to be made according to the actual application.

The following are some methods for externally adjusting the sensitivity:

1. Adjust the size of the detection P

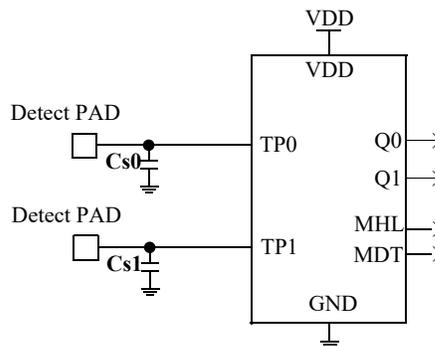
Under the condition that other factors remain unchanged, using a larger detection PAD size can increase the sensitivity; conversely, it will decrease the sensitivity. However, the detection PAD size must be used within the effective range.

2. Adjust the thickness of the medium (casin

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.

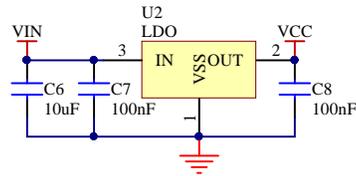
3. Adjust the Cs capacitance value (please refer to the figure belo

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 ($1 \leq C_s \leq 60\text{pF}$), and the larger the value of the Cs capacitor, the lower the sensitivity.



7 Application Circuits

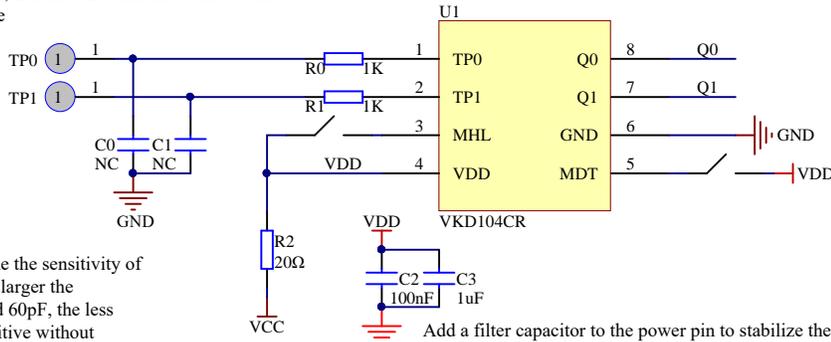
It is recommended to use an LDO for power supply



MHL	Select the output level
NC	High output efficiency (default)
VDD	Low output efficiency
MDT	Select the output mode
NC	Direct output (default)
VDD	Latch output

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



C0 to C1 are used to fine-tune the sensitivity of each channel. Generally, the larger the capacitance between 0pF and 60pF, the less sensitive it is. It is most sensitive without soldering

Add a filter capacitor to the power pin to stabilize the 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. Fine-tune the sensitivity of capacitors C0-C1(0~60oF) 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

Absolute Maximum Ratings

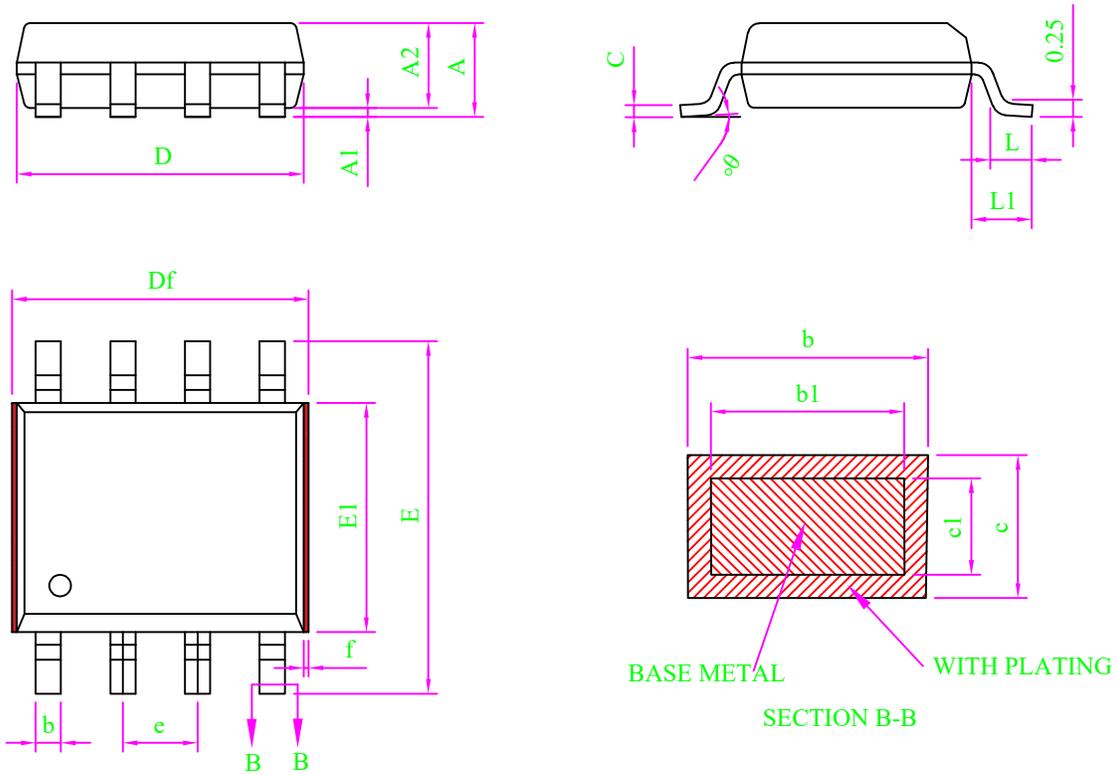
Parameter	Symbol	Ratings	Unit
Power Voltage	VDD	-0.3~6.0	V
Input Voltage	V _{IN}	GND-0.3~VDD+0.3	V
Storage Temperature	T _{STG}	-50~+125	°C
Operating Temperature	T _{OTG}	-40~+85	°C
Human Body Mode	ESD	≧5	KV

8.1 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions(25 °C)	
						VDD	Conditions
Operating voltage	VDD	2.4	—	5.5	V	—	Internal voltage stabilization enabling
Standby current	IST	2.2	2.3	2.4	V	—	—
Operating current	IOP	—	13	—	μA	3.0V	Working mode, VDD=3V
Standby current	IST	—	2.5	—	μA	3.0V	Standby mode, VDD=3V
Input low voltage	VIL	0	—	0.2	VDD	—	Input low voltage
Input high voltage	VIH	0.8	—	1	VDD	—	Input high voltage
Output sink current	VIL	—	0.8	—	mA	3.0V	VDD=3V, VOL=0.6V
Output source current	VOL	—	-4.0	—	mA	3.0V	VDD=3V, VOH=2.4V
Input pull-down resistor	RPL	—	25k	—	ohm	3.0V	VDD=3V
Output response time	TR	—	60	—	mS	3.0V	Operating mode
		—	160	—		3.0V	Standby mode

9 Package Information

9.1 SOP8(150mil)(4.9mm x 3.9mm PP=1.27mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	-	-	1.75
A1	0.10	0.15	0.20
A2	1.35	1.45	1.55
b	0.39	-	0.47
b1	0.38	0.41	0.43
c	0.20	-	0.25
c1	0.19	0.20	0.21
D	4.78	4.88	4.98
Df	4.93	-	5.33
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.51	0.66	0.81
L1	0.95	1.05	1.15
θ	0	-	8°
f	0.05	-	0.20

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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	2025-11-26	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/>