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VK36W2D Datasheet

2 channel water detection 1 to 1 output
Rev.1.2

Intellectual Property Statement:

1 General Description

The VK36W2D has 2 touch detection channel, which can be used to detect the process of water changing from none to some and vice versa. This chip has a high degree of integration and only requires a few external components to achieve the detection of touch buttons.

It provides 1-channel open-collector output function. The chip uses a special integrated circuit inside, which has a high power supply voltage suppression ratio. This can reduce the occurrence of key detection errors. This feature ensures that the chip still has high reliability in applications under adverse environmental conditions.

This touch chip features automatic calibration, low standby current, and voltage stability resistance, and is suitable for detecting single-point water levels.

2 Key Features

- Operating voltage: 2.2-5.5V
- Standby current 10μA/3.0V
- Power-on reset function（POR）
- Low-voltage reset function（LVR）
- Reliable touch button detection
- 4S Automatic Calibration Function
- 4S test detects no water and enters standby mode
- It is possible to conduct a reliable detection even if there is water before powering on.
- 2-point water level detection
- 1-on-1 direct output
- Has the function of resisting voltage fluctuations
- The detection can be carried out by using a metal probe to come into contact with the water, or by detecting the signal outside the water tank without coming into contact with the water.
- Available Packages:
  SOP8(150mil)(6.0mm x 3.9mm PP=1.27mm)

3 Application field

- Household appliance touch control sensing
- Beauty device / kitchen scale / fascial gun / Bluetooth headphones

4 Product Selection

Part No.	Voltage/Standby Current	Output	Packaging
VK36W1D	2.2V-5.5V/10μA-3V3(SLEEP)	1-to-1 direct output	SOT23-6
VK36W2D	2.2V-5.5V/10μA-3V3(SLEEP)	1-to-1 direct output	SOP8
VK36W4D	2.2V-5.5V/10μA-3V3(SLEEP)	1-to-1 direct output	SOP16/QFN16L
VK36W6D	2.2V-5.5V/10μA-3V3(SLEEP)	1-to-1 direct output	SOP16/QFN16L
VK36W8I	2.2V-5.5V/10μA-3V3(SLEEP)	I2C output	SOP16/QFN16L

5 Ordering Information

Part No.	Packaging	Tube Qty	Tray(reel)Qty	Box Qty	Total Qty	Notes
VK36W1D	SOT23-6		3000/reel	30000/box	120000 PCS	
VK36W2D	SOP8	100/tube		10000/box	60000 PCS	
VK36W4D	SOP16	50/tube		5000/box	50000 PCS	
	QFN16L		3000/reel	30000/box	120000 PCS	
VK36W6D	SOP16	50/tube		5000/box	50000 PCS	
	QFN16L		3000/reel	30000/box	120000 PCS	
VK36W8I	SOP16	50/tube		5000/box	50000 PCS	
	QFN16L		3000/reel	30000/box	120000 PCS	

6 Package Pinout Information(SOP8)

TOP VIEW

CR	1	8	TP1
CS	2	7	TP0
Q1	3	6	VDD
VSS	4	5	Q0
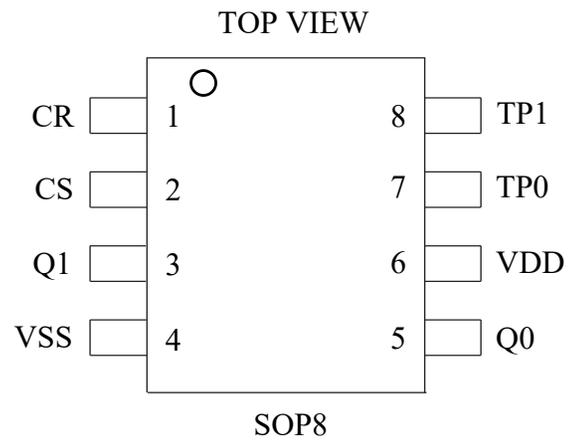
SOP8

For more information:

6.1   VK36W2D/SOP8 Pin Description

Pin Names	I/O	Function Description
1-CR	I	Reference capacitor
2-CS	I	Sensitivity adjustment, connect to ground capacitor (1-47nF)
3-Q1	O	Direct output, power-on output high
4-VSS	VSS	Negative power supply
5-Q0	O	Direct output, power-on output high
6-VDD	VDD	Positive power supply
7-TP0	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
8-TP1	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)

7　Functional Description

7.1　Block Diagram
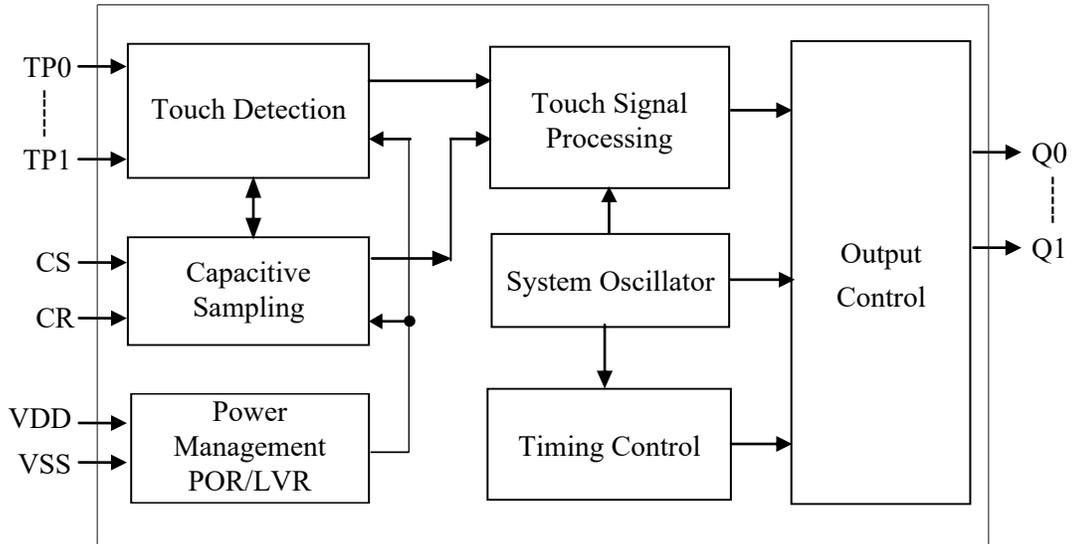
7.2 Auto-calibration Function

After power-on, the chip will perform initialization and obtain the first reference value. Subsequently, when there is no touch, the touch chip will automatically calibrate the reference value, enabling the reference value to dynamically change according to the external environment.

For example, this mechanism can achieve reliable touch detection when there is a temperature change or environmental noise.

7.3 Resistance To Voltage Fluctuations

The chip is equipped with an anti-voltage fluctuation function, which can prevent the occurrence of touch button malfunction caused by the sudden drop in working voltage due to the large current driving from the peripheral devices.

7.4 Operating Mode

The VK36W2D has two operating modes: standby mode and normal mode. After the system is powered on, it immediately checks for the presence of water. If it detects no water, it automatically enters the standby mode after 4 seconds. If it detects water, it switches to the normal mode.
When it detects water, the Q pin outputs a low level.
When it detects no water, the Q pin is in high impedance.

7.5   Sensitivity Adjustment

The sensitivity of VK36W2D is related to the size of the touch pad, the thickness of the casing, the size of the sensitivity capacitor, etc. The sensitivity should be adjusted according to the actual application of the product. The sensitivity can be adjusted from the following aspects:

1. Touch the area of the PAD
   Other conditions remaining the same, the larger the touch area, the more sensitive it will be. However, the area must be within the effective range.
2. The thickness of the shell
   If all other conditions remain the same, 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 the CS terminal to ground
   The CS adjusts the overall sensitivity. The higher the value, the more sensitive it is. The common values range from 1 to 47 nF. For some special applications, there are even values exceeding 200 nF.
4. Adjust the ground capacitance value of the CR terminal
   Adjust the capacitance value of the CR capacitor. The smaller the value, the more sensitive it is. The common values range from 1 to 10 pF.
5. Adjust the small capacitance between the touch pad and the ground
   Adjust the small for ground capacitor of the touch pin（TP）. The larger the capacitance, the higher the sensitivity. The common value is 1-50pF.
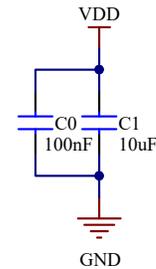
| Shell thickness (acrylic or glass)	CS Electrical value (for reference only)
<3mm	6.8nF/25V
3-6mm	10nF/25V
6-10mm	22nF/25V

8 Application Circuits

It is recommended to use LDO for power supply
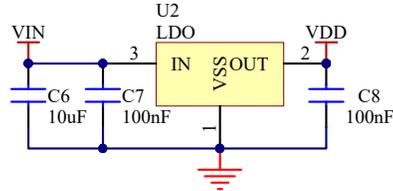
The power supply pin is stabilized by adding a filter capacitor.

C2 is used for the reference capacitor
C3 is used to adjust the overall sensitivity
Generally, C2 is selected as 10nf and C3 as 3pF, which
can meet the application requirements of most products
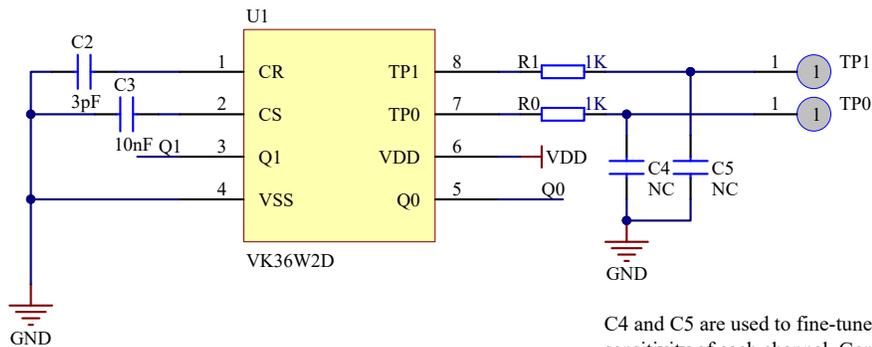
C4 and C5 are used to fine-tune the
sensitivity of each channel. Generally, the
larger the capacitance (from 0pF to 50pF),
the more sensitive it is.
The touch pins are connected in series with a
1K resistor to enhance anti-interference. The
resistance value of the 1K resistor is usually
in the range of 0R to 10K. Depending on the
interference situation, the resistance value
can be increased if the interference is severe.

9 Electrical Characteristics

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Voltage	VDD	-0.3～6.0	V
Input Voltage	V_{IN}	VSS-0.3～VDD+0.3	V
Storage Temperature	T_{STG}	-50～+125	℃
Operating Temperature	T_{OTG}	-40～+85	℃
Human Body Mode	ESD	4KV-8KV(Class 3A)	KV

9.1 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions（25 ℃） VDD	Conditions
Operating voltage	VDD	2.2	3.0	5.5	—	—	—
Low-voltage reset	LVR	—	2.0	2.1	—	—	—
Operating current	I_{OP}	—	1.2	—	mA	3.0V	CS=10nF
		—	2.2	—		5.0V	
Standby current	I_{ST}	—	8	—	μA	3.0V	CS=10nF
		—	33	—		5.0V	
Output sink current	I_{IL}	—	8	—	mA	3.0V	V_{OL}=0.6V
		—	20	—		5.0V	
Output source current	I_{OL}	—	-4	—	mA	3.0V	V_{OH}=2.6V
		—	-10	—		5.0V	V_{OH}=4.3V
Input low voltage	V_{IL}	—	—	0.3	VDD	VDD	Input low voltage
Input high voltage	V_{IH}	0.7	—	1	VDD	VDD	Input high voltage
Q pin pull resistance	R_{PL}	—	60k	—	ohm	3.0V	VDD=3V
Output response time	T_R	—	125	—	mS	3.0V	Normal mode
		—	125	—		5.0V	Normal mode
		—	150	—	mS	3.0V	Standby mode
		—	150	—		5.0V	Standby mode

10   Package Information

10.1 SOP8(150mil)(4.9mm x 3.9mm PP=1.27mm)
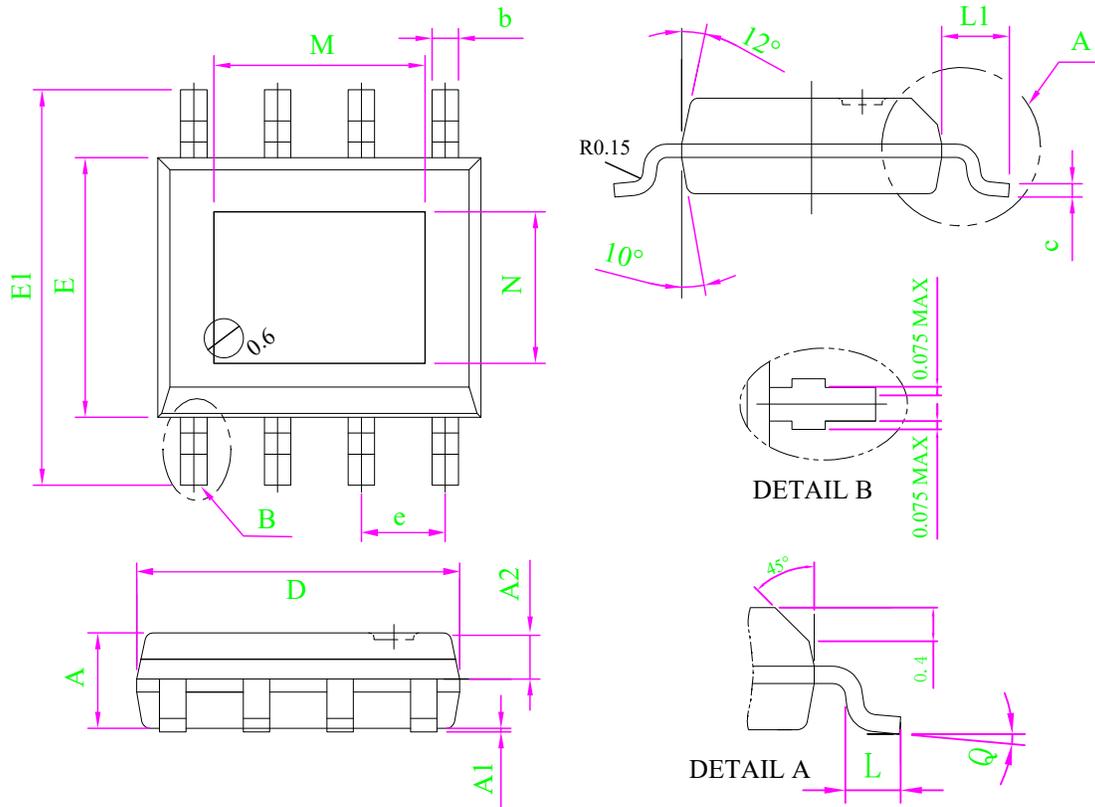
MILLIMETER			
SYMBOL	MIN	MID	MAX
A	1.35	1.45	1.55
A1	0.00	0.05	0.10
A2	0.65	0.70	0.75
b	0.35	0.40	0.45
c	0.18	0.20	0.22
D	4.70	4.90	5.10
e	-	1.27 TYP	-
E1	5.80	6.00	6.20
E	3.80	3.90	4.00
L	0.40	0.60	0.80
Q	0°	/	8°
M	3.10	3.20	3.30
N	2.20	2.30	2.40
L1	1.05 REF		

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12 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	2026-01-29	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/