



VK36W4D Datasheet

4 channel water detection 1 to 1 output

Rev.1.2

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1 General Description

The VK36W4D has 4 touch detection channels, which can be used to detect the water level at 4 points. This chip has a high degree of integration and only requires a few external components to achieve the detection of touch buttons.

It provides 4 output functions. The chip uses a special integrated circuit internally, with a high power supply voltage suppression ratio, which can reduce the occurrence of button detection errors. This feature ensures that the chip still has high reliability in adverse environmental conditions. This touch chip has an automatic calibration function, low standby current, and anti-voltage fluctuation characteristics. It provides a simple and effective implementation method for the application of detecting the water level at 4 points.

2 Key Features

- Operating voltage: 2.2-5.5V
- Standby current 10 μ A/3.0V
- Power-on reset function (POR)
- Low-voltage reset function (LVR)
- 4S Automatic Calibration Function
- Reliable touch button detection
- 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.
- 4-point water level detection
- 1-to-1 direct output
- There is a water W_FLAG output signal in any channel.
- When powering on, does the OPT pin select the output as being high-active or low-active
- External capacitors (1nF - 47nF) connected to the dedicated pins are used to adjust the sensitivity.
- Very few peripheral components
- 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:
 - SOP16(150mil)(9.9mm x 3.9mm PP=1.27mm)
 - QFN16L(3.0mm x 3.0mm PP=0.5mm)

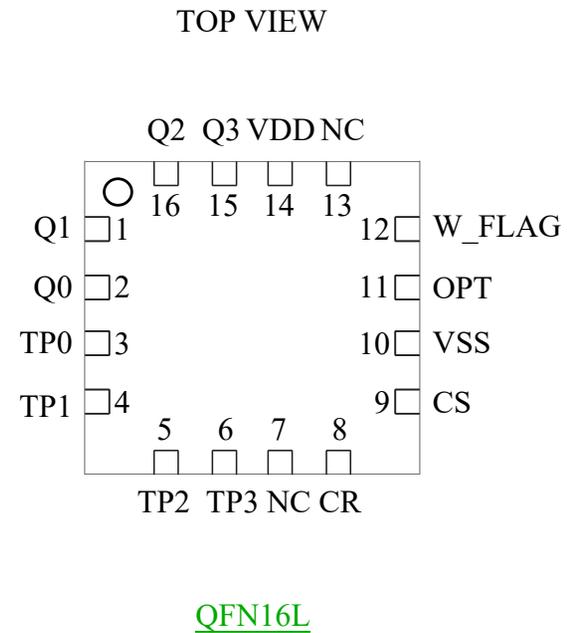
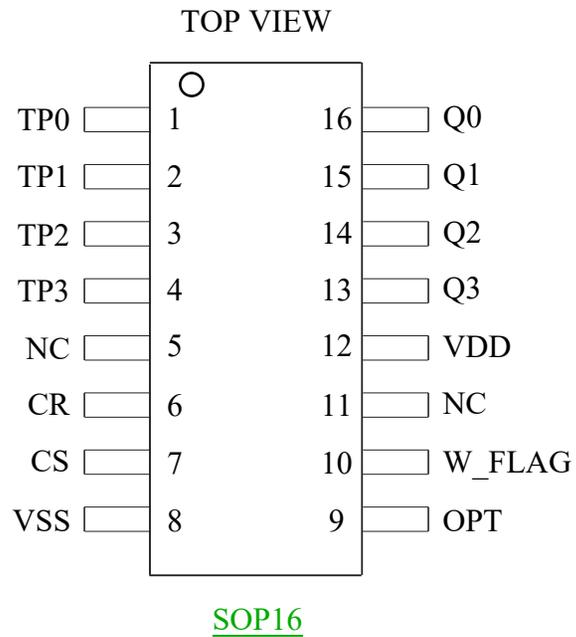
3 Product Selection

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

4 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	

5 Package Pinout Information(SOP16/QFN16L)



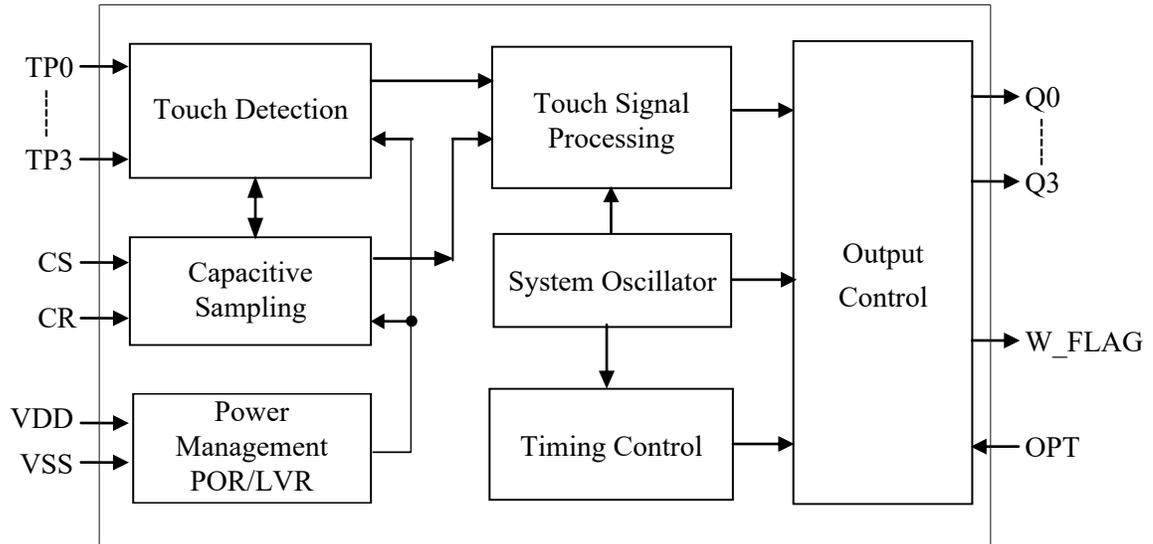
For more information: Page 11-12

5.1 VK36W4D/SOP16/QFN16L Pin Description

Pin Names		I/O	Function Description
SOP16	QFN16L		
1-TP0	3-TP0	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
2-TP1	4-TP1	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
3-TP2	5-TP2	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
4-TP3	6-TP3	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
5-NC	7-NC	-----	NC
6-CR	8-CR	I	Reference capacitor
7-CS	9-CS	I	Sensitivity adjustment, connect to ground capacitor (1-47nF)
8-VSS	10-VSS	VSS	Negative power supply
9-OPT	11-OPT	I	Select output level: Open circuit -> Low level valid, VSS -> High level valid
10-W_FLAG	12-W_FLAG	O	With water mark, direct output, power-on output high (default), OPT pin selection
11-NC	13-NC	-----	NC
12-VDD	14-VDD	VDD	Positive power supply
13-Q3	15-Q3	O	Touch output
14-Q2	16-Q2	O	Touch output
15-Q1	1-Q1	O	Touch output
16-Q0	2-Q0	O	Touch output

6 Functional Description

6.1 Block Diagram



6.2 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.

6.3 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.

6.4 Operating Mode

The output of VK36W4D is Q0 to Q3. It has two operating modes: standby mode and normal mode.

After power-on, it immediately detects whether there is water or not;

If it detects no water, the 4S automatically enters the standby mode;

If it detects water, it switches to the normal mode;

If it detects water, the corresponding signal at pin Q is output;

If it detects no water, the corresponding signal at pin Q is output;

If any of the four channels detects water, the W_FLAG pin outputs a signal.

OPT	Select the output of the valid level
VSS	The Q pin and the W_FLAG pin are valid when at a high level. No water output 0
NC	The Q pin and the W_FLAG low level are valid, and there is no water output 1.

6.5 Sensitivity Adjustment

The sensitivity of VK36W4D 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.

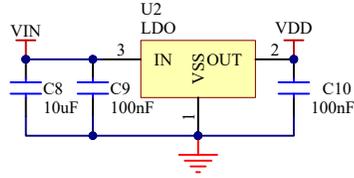
5. Adjust the small capacitance between the touch pad and the ground

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.

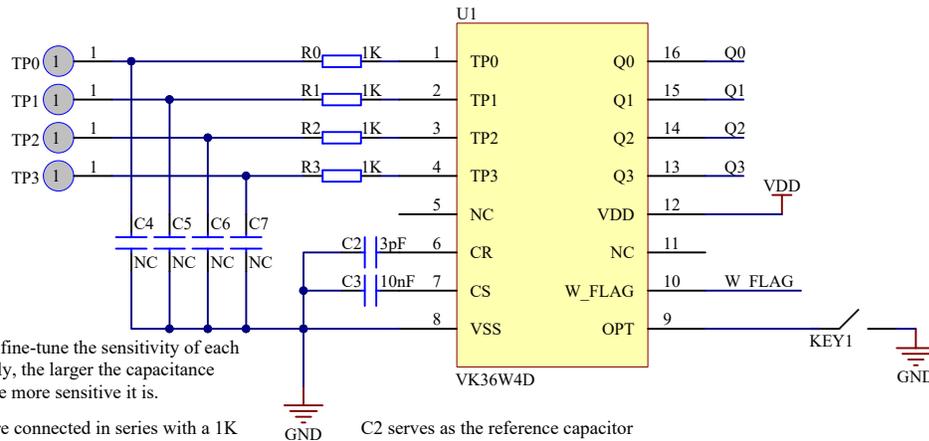
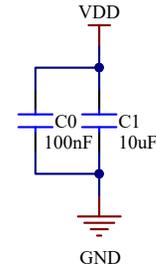
Shell thickness (acrylic or glass)	CS Electrical value (for reference only)
<3mm	6.8nF/25V
3-6mm	10nF/25V
6-10mm	22nF/25V

7 Application Circuits

It is recommended to use LDO for power supply



The power supply pin is stabilized by adding a filter capacitor.



C4-C7 is used to fine-tune the sensitivity of each channel. Generally, the larger the capacitance (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.

C2 serves as 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

8 Electrical Characteristics

Absolute Maximum Ratings

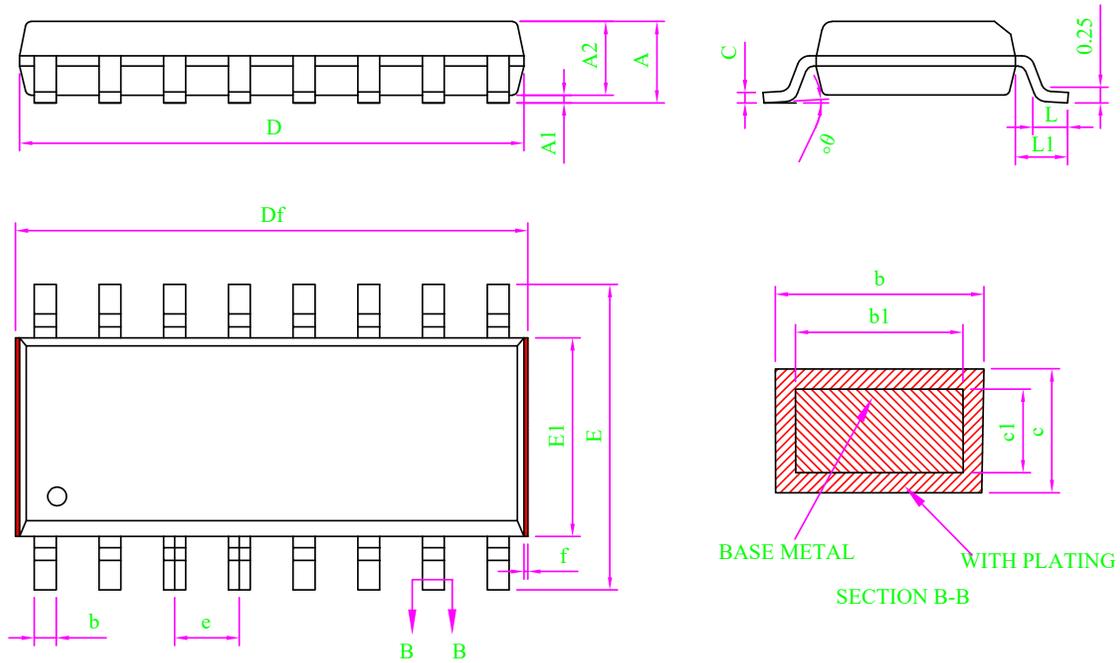
Parameter	Symbol	Ratings	Unit
Power Voltage	VDD	-0.3~6.0	V
Input Voltage	V _{IN}	VSS-0.3~VDD+0.3	V
Storage Temperature	T _{STG}	-50~+125	°C
Operating Temperature	T _{OTG}	-40~+85	°C
Human Body Mode	ESD	4KV-8KV(Class 3A)	KV

8.1 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions (25 °C)	
						VDD	Conditions
Operating voltage	VDD	2.2	3.0	5.5	—	—	—
Low-voltage reset	LVR	—	2.0	2.1	—	—	—
Operating current	I _{OP}	—	1.3	—	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}	—	4	—	mA	3.0V	V _{OL} =0.6V
		—	8	—		5.0V	
Output source current	I _{OL}	—	-2	—	mA	3.0V	V _{OH} =2.6V
		—	-4	—		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
OPT 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

9 Package Information

9.1 SOP16(9.9mm x 3.9mm PP=1.27mm)

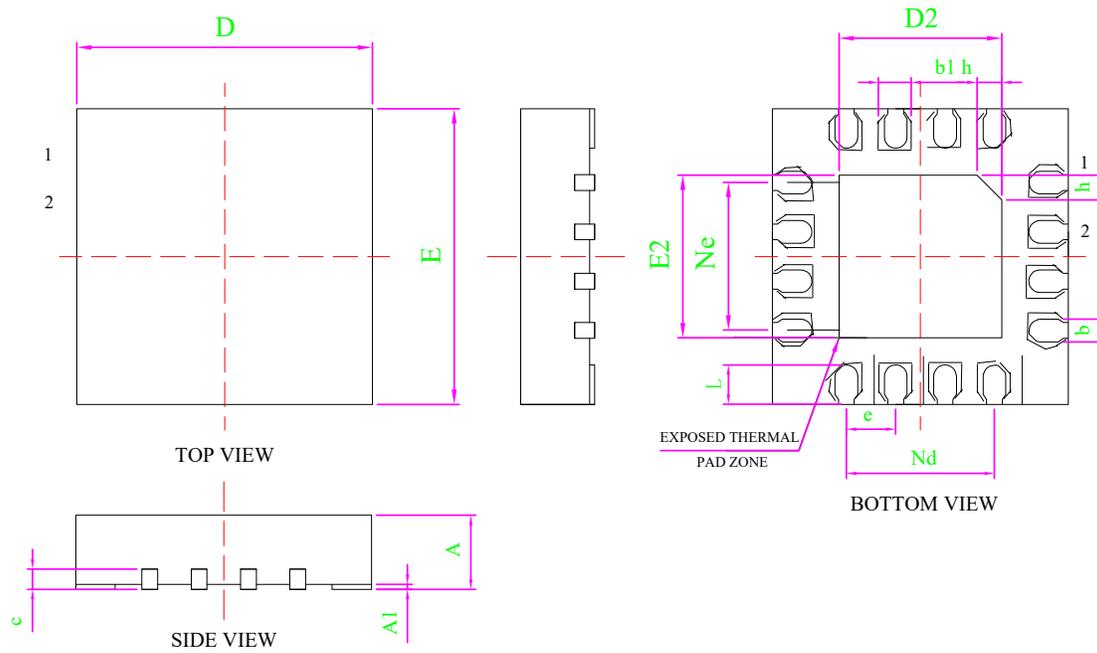


Note:

- All dimension are in mm.
Dim D&E1 does not include plastic flash; Df includes plastic flash(f);
Flash: Plastic residual around body edge after de junk/singulation.
- Dim b does not include dambar protrusion/intrusion.
- Plating thickness 0.007mm-0.020mm

MILLIMETER			
SYMBOL	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	9.80	9.90	10.00
Df	9.90	-	10.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.51	0.66	0.81
L1	0.95	1.05	1.15
θ	0	-	8°
f	0.05	-	0.20

9.2 QFN16L(3.0mm x 3.0mm PP=0.5mm)



Dimensions			
SYMBOL	MIN	NOMINAL	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.18	0.25	0.30
b1	0.30	0.35	0.40
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.50BSC		
Ne	1.50BSC		
Nd	1.50BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
h	0.20	0.25	0.30
L/F carrier size (mil)	75*75		

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	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/>