



VK36W8I Datasheet

8-channel water level detection I2C output

Rev.1.2

Intellectual Property Statement:

Shenzhen Vinka Microelectronics Co., Ltd. (hereinafter referred to as “the Company”) owns legally registered intellectual property rights in both domestic and international jurisdictions. Any unauthorized use of the Company’s products or patented technologies by individuals or organizations is strictly prohibited.

The Company reserves the right to take legal action against any infringement, and to seek full compensation for damages or unlawful gains.

The Company’s name and trademarks are legally protected and may not be used or imitated without explicit written permission. No implied or express license shall be granted under any circumstances.

1 General Description

The VK36W8I has 8 touch detection channels, which can be used to detect the water level at 8 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 I2C output function, which facilitates communication with external MCU and achieves the purposes of equipment installation and touch pin detection. The chip internally adopts a special integrated circuit, featuring a high power supply voltage suppression ratio, which can reduce the occurrence of key detection errors. This characteristic ensures that the chip maintains high reliability even in adverse environmental conditions. This touch chip features automatic calibration, low standby current, and voltage stability resistance, providing a simple and effective solution for the application of detecting 8-point water levels.

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.
- 8 o'clock water level measurement
- I2C output + INT interrupt pin
- Any channel has the OUT_FLAG output signal indicating the presence of water.
- 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 make contact with the water, or by detecting the signal outside the water tank without making 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)

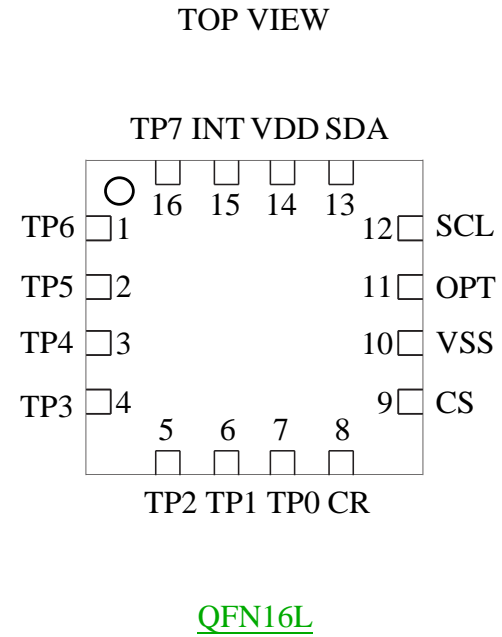
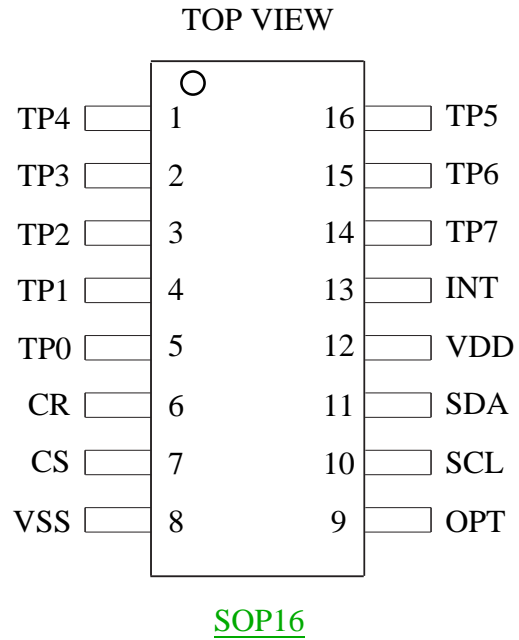
3 Product Selection

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)



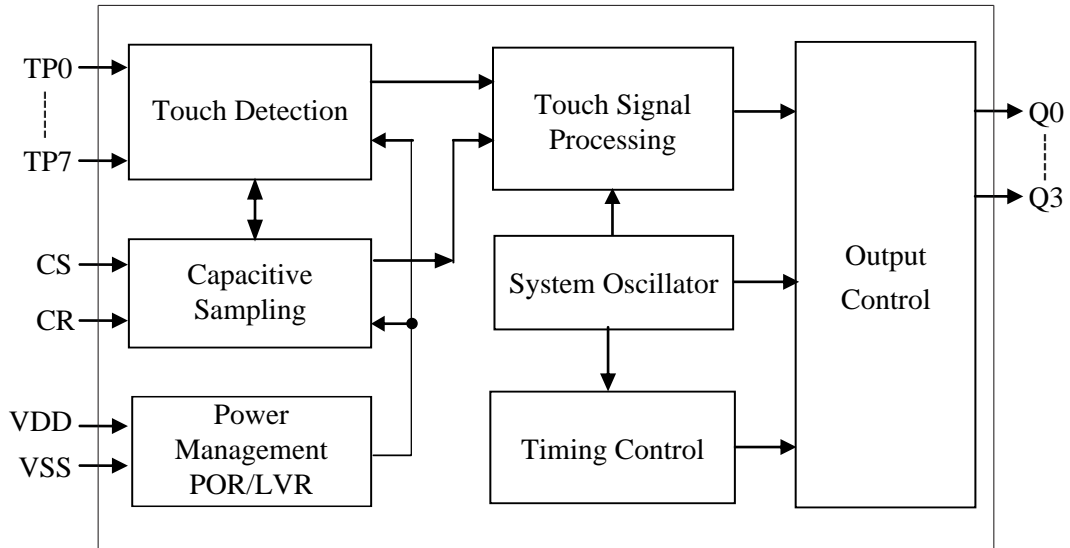
For more information: Page 11-12

5.1 VK36W8I /SOP16/QFN16L Pin Description

Pin Names		I/O	Function Description
QFN16L	SOP16		
3-TP4	1-TP4	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
4-TP3	2-TP3	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
5-TP2	3-TP2	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
6-TP1	4-TP1	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
7-TP0	5-TP0	I	Touch input, connect to ground with a small capacitor for fine-tuning sensitivity (1-50pF)
8-CR	6-CR	I	Reference capacitor
9-CS	7-CS	I	Sensitivity adjustment, connecting ground capacitor (1-47nF)
10-VSS	8-VSS	VSS	Negative power supply
11-OPT	9-OPT	I	Select the output level. When powered on: Open circuit - I2C/SDA pin outputs high, GND - I2C/SDA outputs low
12-SCL	10-SCL	I	I2C clock input
13-SDA	11-SDA	I/O	I2C data input/output
14-VDD	12-VDD	VDD	Positive power supply
15-INT	13-INT	O	Interrupt output, power-on output high
16-TP7	14-TP7	O	Touch input. Connect a ground capacitor to fine-tune the sensitivity (1-50pF). No connection results in the highest sensitivity.
1-TP6	15-TP6	O	Touch input. Connect a ground capacitor to fine-tune the sensitivity (1-50pF). No connection results in the highest sensitivity.
2-TP5	16-TP5	O	Touch input. Connect a ground capacitor to fine-tune the sensitivity (1-50pF). No connection results in the highest sensitivity.

6 Functional Description

6.1 Block Diagram



6.2 Automatic Calibration

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 Working Mode

The VK36W8I has two working modes: standby mode and normal mode.

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

If all 8 channels are detected as being dry, 4S will automatically enter the standby mode;

If any channel is detected as having water, it will switch to the normal mode;

If the water status of any channel changes from dry to wet, the INT pin will output a 20ms low pulse signal;

If the water status of any channel changes from wet to dry, the INT pin will output a 20ms low pulse signal;

OPT	Select the output of the valid level
VSS	The I2C and INT pins are powered on and the output is low; When there is no water, there is a 20ms high pulse output from the INT pin; When there is water, there is a 20ms low pulse output from the INT pin.
NC	The I2C and INT pins are powered up and output a high level; When there is no water, there is a water signal, and the INT pin outputs a 20ms low pulse; When there is water but no water before that, the INT pin outputs a 20ms high pulse.

Data format: INT + I2C data key value.

When the Clock pin receives the clock signal, the touch chip will generate an 8-bit data byte and transfer it from the Data pin. Among them, TP0 corresponds to bit 0 of the first byte, and TP7 corresponds to bit 7 of the first byte.

The OPT is floating during power-on.																			
Touch Pin	I2C data corresponding key value				INT	Touch Pin	I2C data corresponding key value				INT								
	B7	B6	B5	B4			B3	B2	B1	B0		B7	B6	B5	B4	B3	B2	B1	B0
TP0 Touch	1	1	1	1	1	1	1	0	0	TP0 Release	1	1	1	1	1	1	1	1	1
TP1 Touch	1	1	1	1	1	1	0	1	0	TP1 Release	1	1	1	1	1	1	1	1	1
TP2 Touch	1	1	1	1	1	0	1	1	0	TP2 Release	1	1	1	1	1	1	1	1	1
TP3 Touch	1	1	1	1	0	1	1	1	0	TP3 Release	1	1	1	1	1	1	1	1	1
TP4 Touch	1	1	1	0	1	1	1	1	0	TP4 Release	1	1	1	1	1	1	1	1	1
TP5 Touch	1	1	0	1	1	1	1	1	0	TP5 Release	1	1	1	1	1	1	1	1	1
TP6 Touch	1	0	1	1	1	1	1	1	0	TP6 Release	1	1	1	1	1	1	1	1	1
TP7 Touch	0	1	1	1	1	1	1	1	0	TP7 Release	1	1	1	1	1	1	1	1	1

Note: When powered on, I2C data =1111, 1111, INT output pin level =1

When powering on, OPT is connected to GND.																			
Touch Pin	I2C data corresponding key value				INT	Touch Pin	I2C data corresponding key value				INT								
	B7	B6	B5	B4			B3	B2	B1	B0		B7	B6	B5	B4	B3	B2	B1	B0
TP0 Touch	0	0	0	0	0	0	0	1	1	TP0 Release	0	0	0	0	0	0	0	0	0
TP1 Touch	0	0	0	0	0	0	1	0	1	TP1 Release	0	0	0	0	0	0	0	0	0
TP2 Touch	0	0	0	0	0	1	0	0	1	TP2 Release	0	0	0	0	0	0	0	0	0
TP3 Touch	0	0	0	0	1	0	0	0	1	TP3 Release	0	0	0	0	0	0	0	0	0
TP4 Touch	0	0	0	1	0	0	0	0	1	TP4 Release	0	0	0	0	0	0	0	0	0
TP5 Touch	0	0	1	0	0	0	0	0	1	TP5 Release	0	0	0	0	0	0	0	0	0
TP6 Touch	0	1	0	0	0	0	0	0	1	TP6 Release	0	0	0	0	0	0	0	0	0
TP7 Touch	1	0	0	0	0	0	0	0	1	TP7 Release	0	0	0	0	0	0	0	0	0

Note: When powered on, the I2C data =0000 0000 , INT output pin level =0

6.5 Sensitivity Adjustment

The sensitivity of VK36W6D 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.

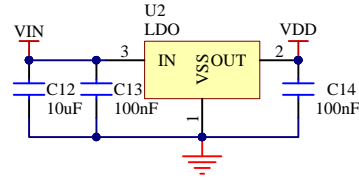
5. Adjust the small capacitance between the touch pad and the ground

Adjust the sensitivity of the small capacitance for touching the ground with your foot. 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

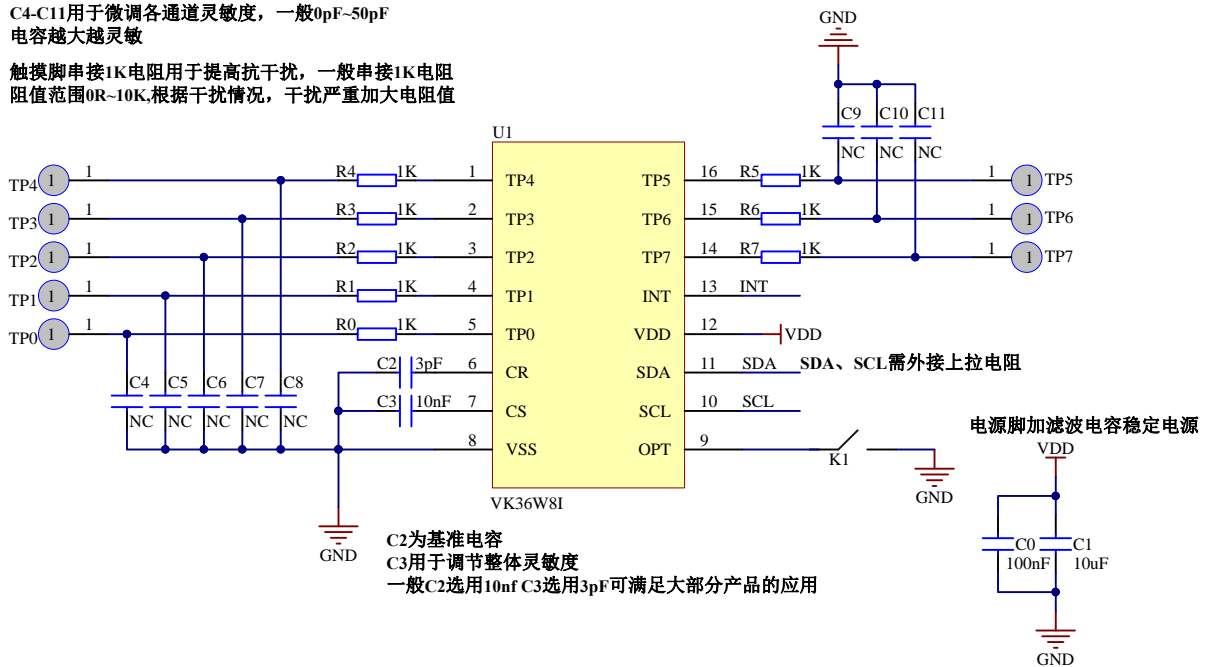
8 参考电路

建议电源用LDO



C4-C11用于微调各通道灵敏度，一般0pF-50pF
电容越大越灵敏

触摸脚串接1K电阻用于提高抗干扰，一般串接1K电阻
阻值范围0R-10K,根据干扰情况，干扰严重加大电阻值



9 电气特性

9.1 极限参数

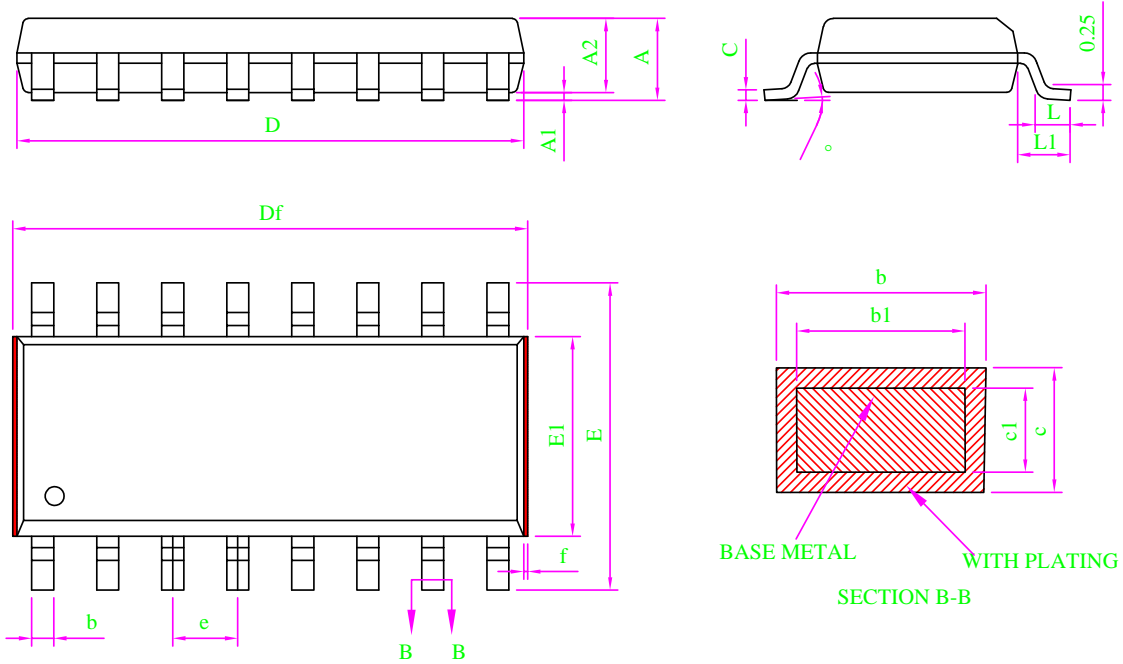
特性	符号	极限值	单位
电源电压	VDD	-0.3~6.0	V
输入电压	VIN	VSS-0.3~VDD+0.3	V
存贮温度	TSTG	-50~+125	
工作温度	TOTG	-40~+85	
静电(HBM)	ESD	4KV-8KV(Class 3A)	KV

9.2 直流参数

名称	符号	最小值	典型值	最大值	单位	测试条件 (25)	
						VDD	条件
工作电压	VDD	2.2	3.0	5.5	—	—	—
低压复位	LVR	—	2.0	2.1	—	—	—
工作电流	I _{OP}	—	1.3	—	mA	3.0V	CS=10nF
		—	2.2	—		5.0V	
待机电流	I _{ST}	—	10	—	μA	3.0V	CS=10nF
		—	33	—		5.0V	
输出灌电流	I _{IL}	—	4	—	mA	3.0V	V _{OL} =0.6V
		—	8	—		5.0V	
输出源电流	I _{OL}	—	-2	—	mA	3.0V	V _{OH} =2.6V
		—	-4	—		5.0V	V _{OH} =4.3V
输入低电压	V _{IL}	—	—	0.3	VDD	VDD	输入低电压
输入高电压	V _{IH}	0.7	—	1	VDD	VDD	输入高电压
INT引脚上拉电阻	R _{PH}	—	60k	—	ohm	3.0V	VDD=3V
输出响应时间	T _R	—	125	—	mS	3.0V	工作模式
		—	125	—		5.0V	工作模式
		—	150	—	mS	3.0V	待机模式
		—	150	—		5.0V	待机模式

10 封装信息

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

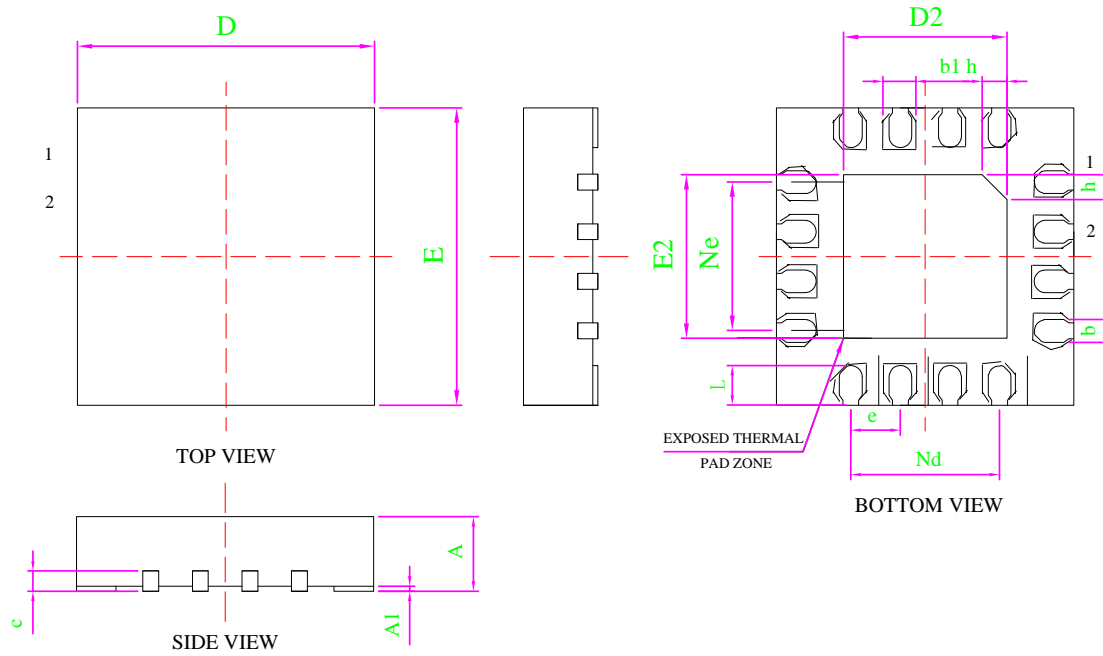


Note:

- 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
	0	-	8°
f	0.05	-	0.20

10.2 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 载体尺寸 (miL)	75*75		

11 免责声明

保修和责任 —— 本文档中的信息是正确可靠的，但我公司对于这些信息的准确性和完整性不作任何保证。对于此类信息的使用后果不负任何责任。在任何情况下，深圳市永嘉微电科技有限公司(以下简称本公司)不会承担任何间接、意外发生、惩罚性的相关性的损害赔偿，不管这些损害赔偿是基于侵权（包括疏忽）、保修、违约合同或是其他法律理论。

变更的权利 —— 本公司有权在任何时间对此文件发布的信息做出任何改动。更改过的文件将会取代之前所有公布的信息。您可随时查看我们的官网：

<https://www.szvinka.com/>

适用性 —— 本公司的产品并非是为那些用于对生命和安全有重大关系的系统和设备而设计的。对于使用本公司的产品而导致的故障，造成的人身伤害、甚至死亡、或是严重的财产或环境损害的应用程序。如果本公司的产品应用在此类的设备或应用程序中，本公司对此造成的风险将不承担任何的责任，因此这些风险由客户自行承担。

应用 —— 在这里所有描述有关产品的任何应用程序仅用于说明的目的。在没有进一步测试或修改的情况下，本公司对该应用程序的指定用途是否合适不作任何表示或保证。本公司不负责协助应用程序或客户的产品设计。同时客户应自行负责决定我司的产品是否适合应用计划产品、计划的应用程序以及第三方客户的使用。

客户应适当的提供设计和运行，保障措施以尽量减少其产品与应用的相关风险。如因客户的应用或产品的弱点或缺陷所产生的，或因使用其他第三方的产品而造成的任何缺陷、损失、费用支出等问题，本公司不承担任何责任。客户应负责为其使用本公司产品的第三方客户做必要的产品或应用的测试，以避免使用不当而造成不必要的损失。本公司对在此方面不承担任何责任。

商业销售条件 —— 本公司的产品销售条款适用于通用的商业销售条款。如有其他要求可另出一份单独有效的书面协议，在此种情况下，将适用该单独有效的书面协议条款和条件。关于客户采购本公司的产品，本公司在此明确拒绝适用客户的通用条款和条件。

出口控制 —— 本文档描述的产品以及其项目可能受出口管制条例限制。出口可能需事先获得国家机关许可。

12 历史版本

No.	版本	日期	修订内容	检查
1	1.0	2019-12-10	原始版本	YES
2	1.1	2020-05-11	添加参考电路	YES
3	1.2	2024-11-25	更新内容	YES

[1] 在开始或完成设计之前，请查阅最近发布的文件。

[2] 自本档发布以来，本档中描述的设备产品状态可能已经发生了变化，并且在多个情况下可能会有所不同。最新的产品状态信息可在互联网上查询，网址为 <https://www.szvinka.com/>