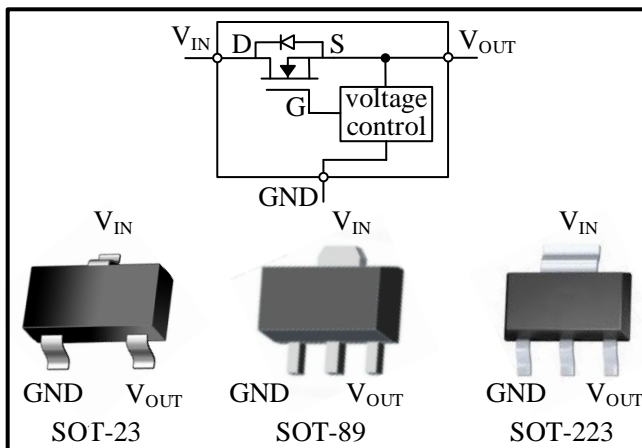


### 190V MOSvp™ Voltage Regulator / Overvoltage Protector

#### General Features

- Typical Output Voltage: 16.5V @  $I_{OUT}=1mA$
- Maximum Input Voltage: 190V
- Maximum Output Current: 30 mA
- Blocks Surges up to 180V
- Very High-speed Transient Response
- Excellent Temperature Characteristics
- Overvoltage Protection
- Very High Reliability
- RoHS Compliant
- Halogen-free Available

$V_{IN}$	$R_{DS(ON)}$ (Typ.)	$I_{OUT}$
190V	7 $\Omega$	30mA



#### Applications

- Industrial Control
- Automotive
- Photovoltaic
- Overvoltage Protection
- Voltage Source
- Current Source

#### Ordering Information

Part Number	Package	Marking	Remark
AKZ16V15R	SOT-23	16V15R	Halogen Free
AKX16V15R	SOT-89	16V15R	Halogen Free
AKS16V15R	SOT-223	16V15R	Halogen Free

#### Absolute Maximum Ratings

$T_A = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	AKZ16V15R	AKX16V15R	AKS16V15R	Unit
V <sub>IN</sub>	Input Voltage to GND <sup>[1]</sup>	190			V
V <sub>SGND</sub>	Source to GND Voltage	±21			V
I <sub>OUT</sub>	Continuous V <sub>OUT</sub> Current <sup>[1]</sup>	30	50	70	mA
P <sub>D</sub>	Power Dissipation	0.5	1.0	1.5	W
T <sub>L</sub>	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300			°C
T <sub>J</sub>	Operating Temperature Range	-55 to 125			
T <sub>STG</sub>	Storage Temperature Range	-55 to 150			

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

#### Thermal Characteristics

Symbol	Parameter	AKZ16V15R	AKX16V15R	AKS16V15R	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	250	125	83	K/W



# AKZ16V15R/AKX16V15R/AKS16V15R

## Provisional datasheet

### Electrical Characteristics

T<sub>A</sub> = 25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V <sub>IN</sub>	Input Voltage to GND	--	--	190	V	T <sub>J</sub> = -40°C to +125°C
V <sub>OUT</sub>	Output Voltage	--	--	20	V	V <sub>IN</sub> = 25 to 190 V, I <sub>OUT</sub> = 0 μA
		--	17	--	V	V <sub>IN</sub> = 25 to 190 V, I <sub>OUT</sub> = 10 to 100 μA
		--	16.5	--	V	V <sub>IN</sub> = 25 to 190 V, I <sub>OUT</sub> = 0.1 to 1 mA
		13	16	--	V	V <sub>IN</sub> = 25 to 60 V, I <sub>OUT</sub> = 3 to 10 mA
BV <sub>DSV</sub>	Drain-to-Source Breakdown Voltage	180	--	--	V	V <sub>GND</sub> = -21 V I <sub>DS</sub> = 250 μA
R <sub>DS(ON)</sub>	Static On-state Resistance <sup>[1]</sup>	--	7	--	Ω	V <sub>SGND</sub> = 0 V I <sub>DS</sub> = 100 mA

### Source-Drain Diode Characteristics

T<sub>A</sub> = 25°C unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
V <sub>SD</sub>	Diode Forward Voltage	--	--	1.2	V	I <sub>SD</sub> = 100 mA V <sub>GND</sub> = -21 V

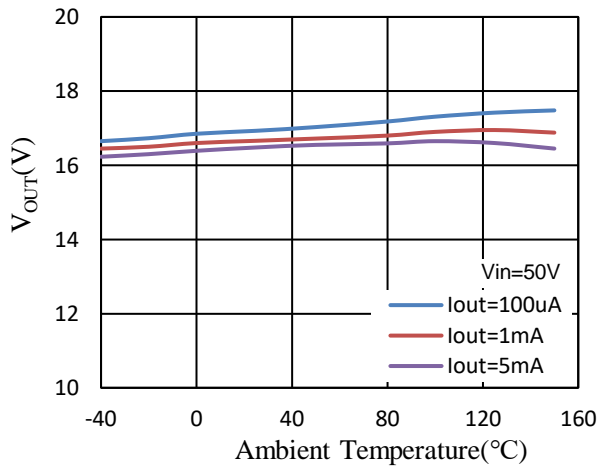
NOTE:

[1] Cannot exceed the Power Dissipation of the device.

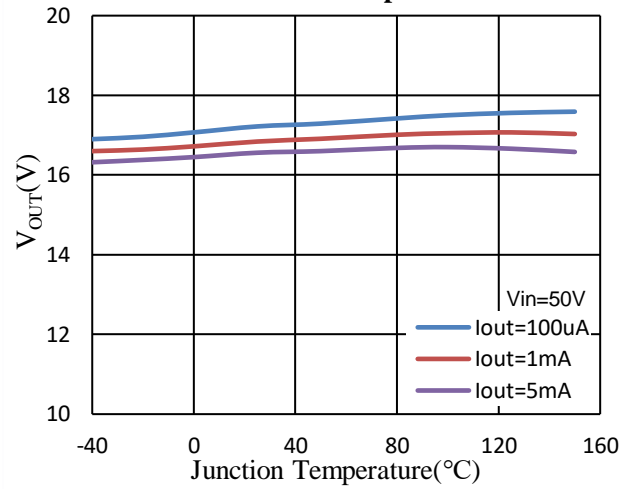
[2] Pulse width ≤ 380 μs, duty cycle ≤ 2%.

### Typical Characteristics

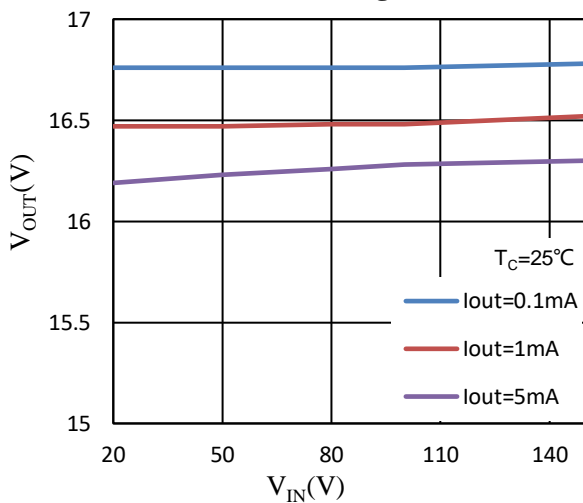
**Figure 1. Output Voltage( $V_{OUT}$ ) vs. Ambient Temperature**



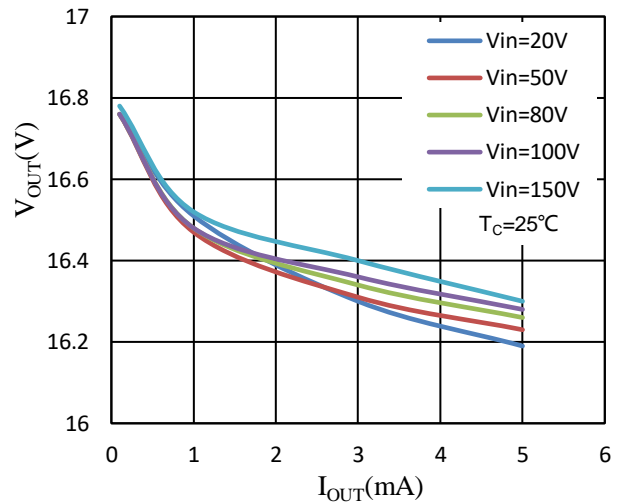
**Figure 2. Output Voltage( $V_{OUT}$ ) vs. Junction Temperature**



**Figure 3. Output Voltage vs. Input Voltage**



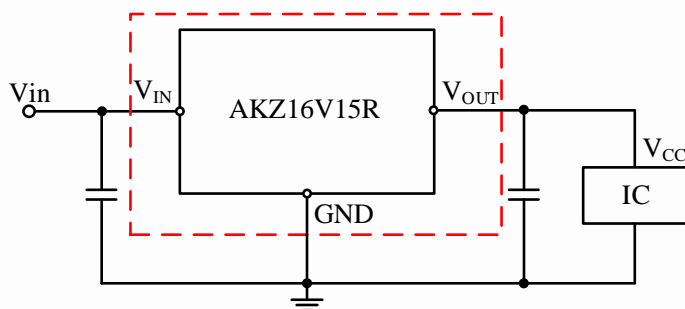
**Figure 4. Output Voltage vs. Load Current**



### Typical Application Circuits

The AKZ16V15R series is an industry-first integrated voltage regulator developed by ARK using MOSovp™ technology. It is ideal for applications such as wide-range input voltage power supply, circuit overvoltage protection, and circuit overcurrent protection.

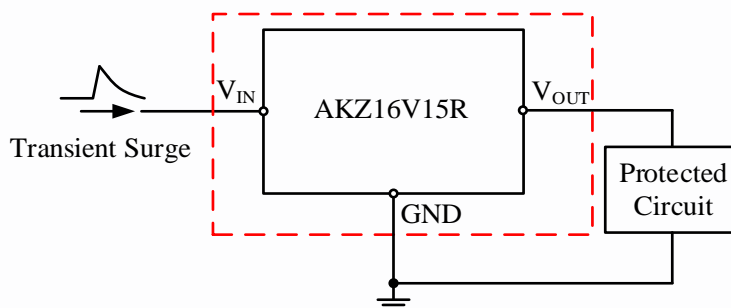
The typical circuit for the AKZ16V15R series of products for regulated power supply is as follows:



**Figure 1. Supplies power to the load circuit**

As shown in Figure 1, AKZ16V15R can be used as a voltage regulator to provide a stable voltage to the load or IC, allowing input voltage up to 190V with low output ripple, with extremely high stability and reliability. The AKZ16V15R series also features automatic temperature compensation, and its output voltage has excellent temperature characteristics. This series of products has very low static current and very fast response speed, which can effectively suppress circuit surges.

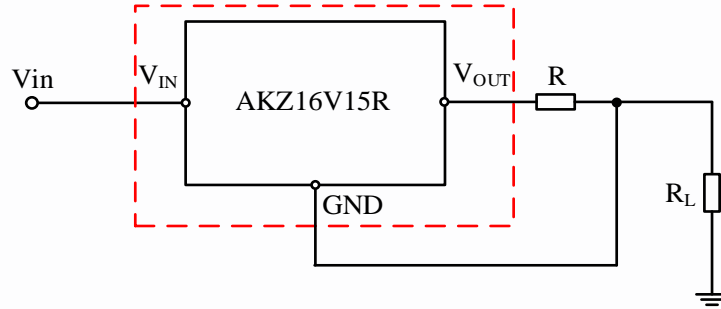
The typical circuit for the AKZ16V15R series of products for overvoltage protection is as follows:



**Figure 2. Overvoltage protection for the load circuit**

As shown in Figure 2, the AKZ16V15R can be used as an overvoltage protector to provide overvoltage protection for the load circuit. The product has a very fast response speed and can effectively suppress circuit surges. When the circuit is not triggered clamping protection,  $V_{OUT}=V_{IN}$ . AKZ16V15R presents a low resistance characteristic and does not affect the circuit signal. When there is a surge signal in the input circuit, the AKZ16V15R responds quickly and immediately changes to a high resistance state, clamping the output voltage to provide overvoltage protection for the load circuit.

The typical circuit for the AKZ16V15R series of products for overcurrent protection is as follows:



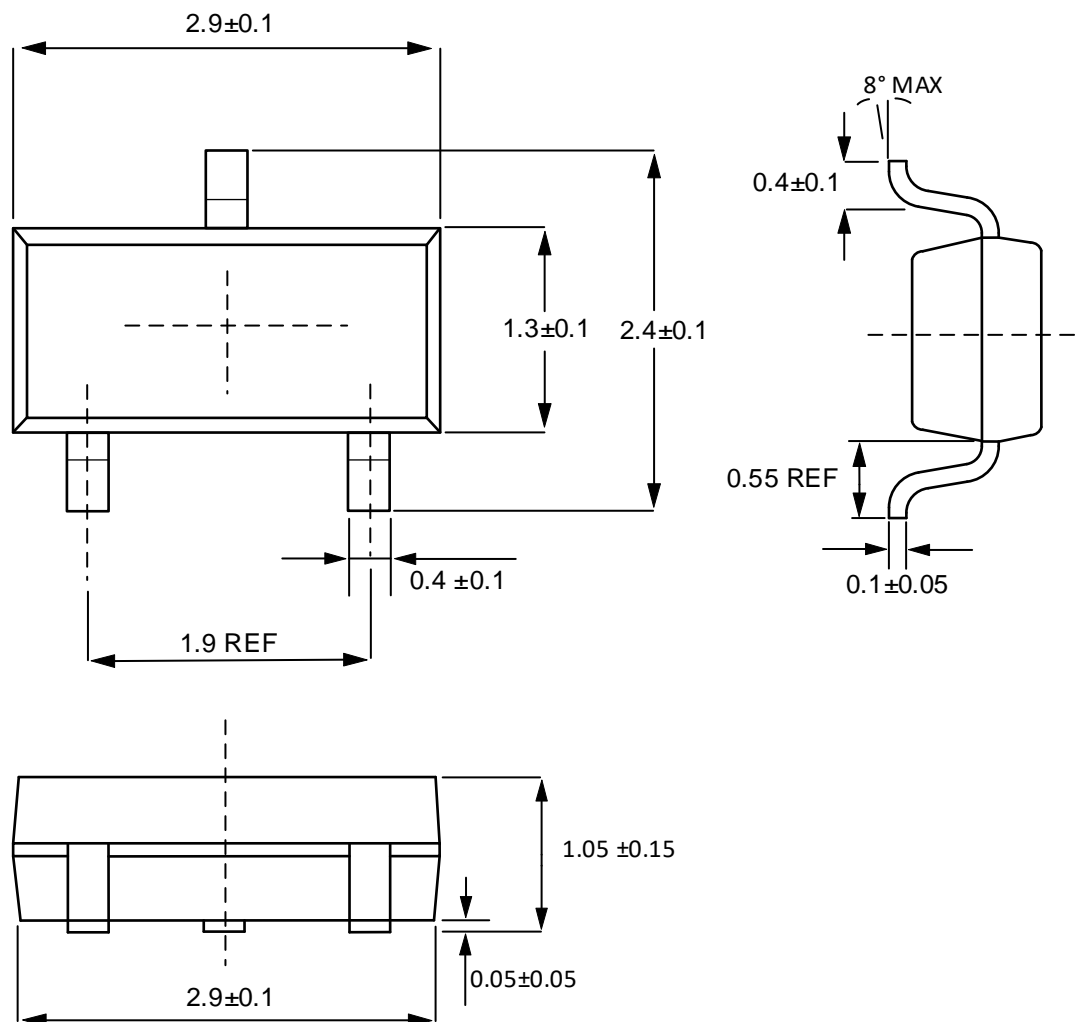
**Figure 3. Overcurrent protection for the load circuit**

As shown in Figure 3, AKZ16V15R can be used with a current limiting resistor to form a simple constant current source/overcurrent protector to provide constant current power supply or overcurrent protection for load circuits. The maximum voltage across the resistor R1 in the circuit is  $V_{MAX} = V_{OUT(MAX)}$ , so the maximum current flowing through R1 is  $I_{MAX} = V_{OUT(MAX)} / R_1$ , which means the current flowing through the circuit will be limited to a certain range, thus providing overcurrent protection for the load circuit.

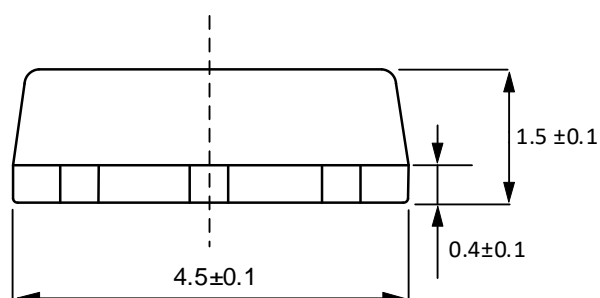
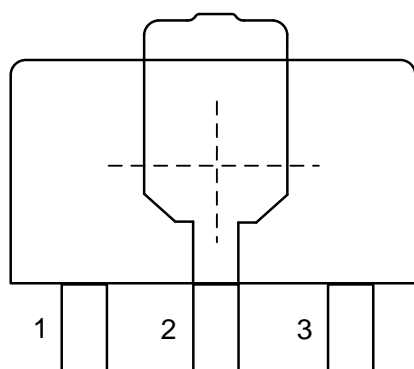
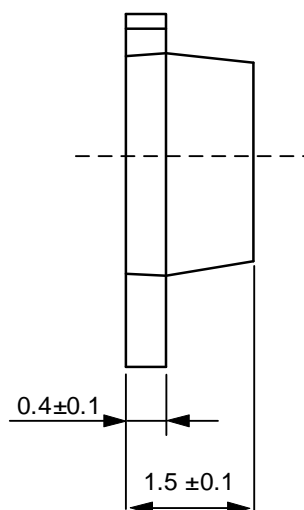
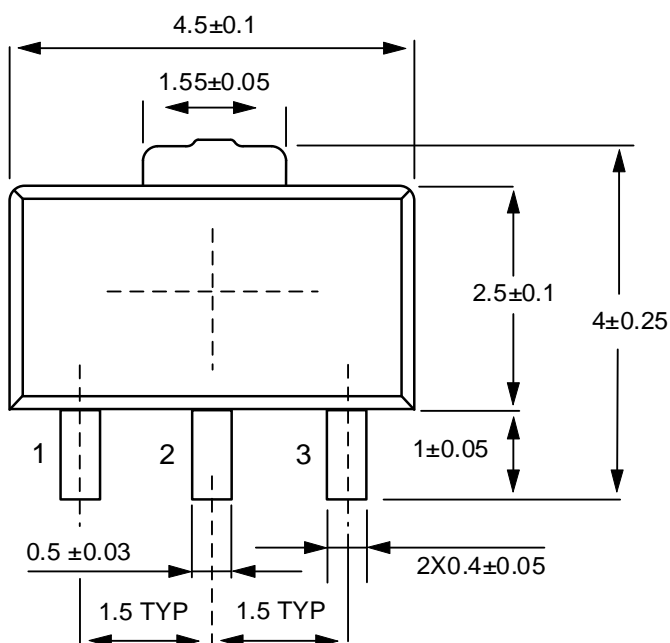
This circuit can also be used as a constant current source to power a load in applications with a wide range of voltage inputs, with a constant current of  $I = V_{OUT(MAX)} / R_1$ .

## Package Dimensions

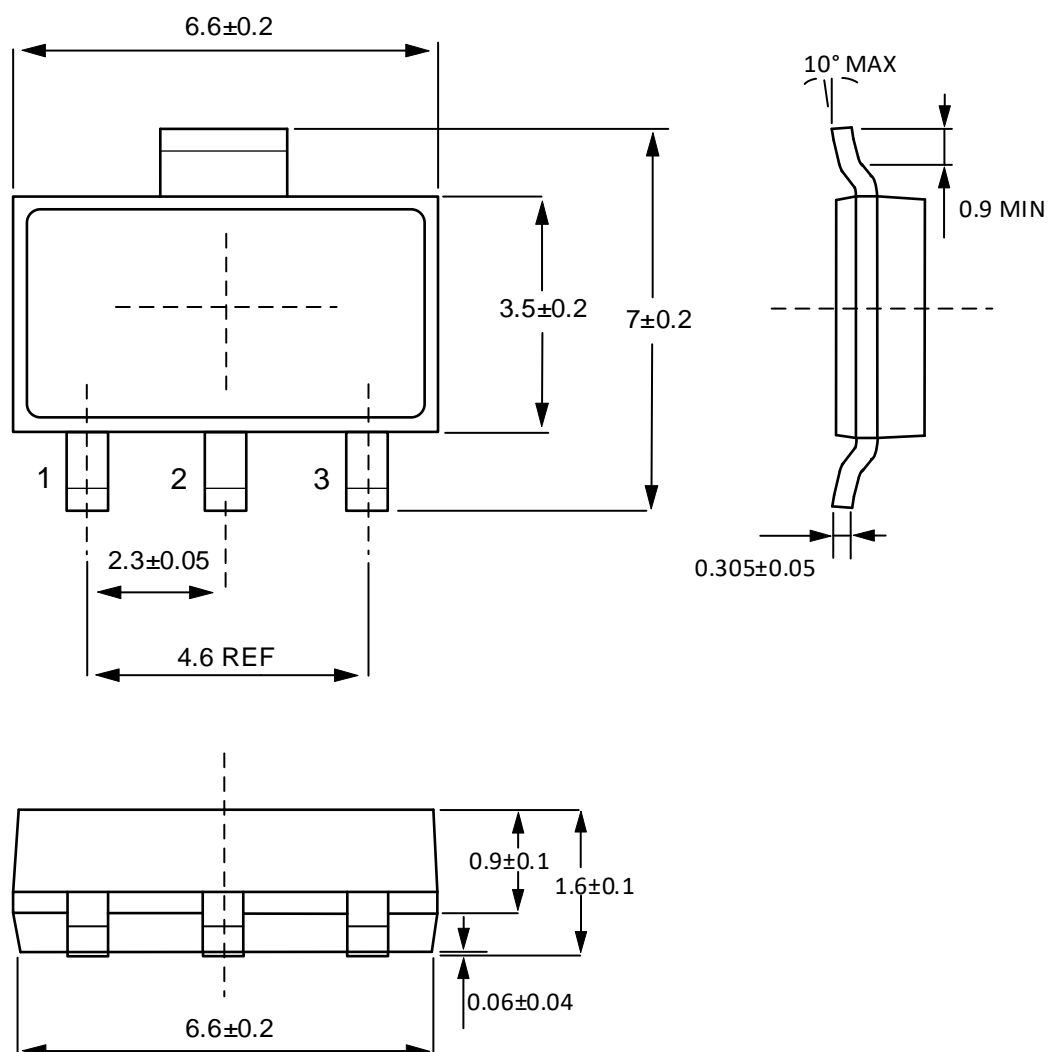
### SOT-23



**SOT-89**



**SOT-223**







**Published by**

**ARK Microelectronics Co., Ltd.**

**ADD: D26, UESTC National Science Park No. 1 Shuangxing Avenue, Chengdu, Sichuan.**

**All Rights Reserved.**

## **Disclaimers**

---

ARK Microelectronics Co., Ltd. reserves the right to make change without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to ARK Microelectronics Co., Ltd's terms and conditions supplied at the time of order acknowledgement.

ARK Microelectronics Co., Ltd. warrants performance of its hardware products to the specifications at the time of sale. Testing, reliability and quality control are used to the extent ARK Microelectronics Co., Ltd deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessary performed.

ARK Microelectronics Co., Ltd. does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using ARK Microelectronics Co., Ltd's components. To minimize risk, customers must provide adequate design and operating safeguards.

ARK Microelectronics Co., Ltd. does not warrant or convey any license either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in ARK Microelectronics Co., Ltd's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice. ARK Microelectronics Co., Ltd is not responsible or liable for such altered documentation.

Resale of ARK Microelectronics Co., Ltd's products with statements different from or beyond the parameters stated by ARK Microelectronics Co., Ltd. for the product or service voids all express or implied warranties for the associated ARK Microelectronics Co., Ltd's product or service and is unfair and deceptive business practice. ARK Microelectronics Co., Ltd is not responsible or liable for any such statements.

---

## **Life Support Policy:**

ARK Microelectronics Co., Ltd's products are not authorized for use as critical components in life devices or systems without the expressed written approval of ARK Microelectronics Co., Ltd.

As used herein:

1. Life support devices or systems are devices or systems which:
    - a. are intended for surgical implant into the human body,
    - b. support or sustain life,
    - c. whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
  2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.
-