



ACE515C

300mA High PSRR, Fast Response Linear Regulator

Description

ACE515C series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

ACE515C can provide output value in the range of 1.0V~4.5V every 0.1V step. It also can be customized on command.

ACE515C includes high accuracy voltage reference, error amplifier, and current limit circuit and output driver module with discharge capability.

ACE515C has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

Features

- Low Power Consumption: 35uA (Typ.)
- Low output noise (47uVRMS)
- Standby Mode: 0.1uA
- Low dropout Voltage: 300mV @300mA (Typ.)
- High Ripple Rejection: 70dB @1KHz (Typ.)
- Low Temperature Coefficient: $\pm 100\text{ppm}/^\circ\text{C}$
- Excellent Line regulation: 0.05%/V
- Build-in chip enable and discharge circuit
- Output Voltage Range: 1.0V~4.5V (customized on command every 0.1V step)
- Highly Accurate: $\pm 2\%$
- Output Current Limit

Application

- Power source for cellular phones and various kind of PCSs
- Battery Powered equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Reference Voltage Source
- Regulation after Switching Power



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Absolute Maximum Ratings

| Parameter | | Value |
|--|----------|--------------|
| Max Input Voltage | | 8V |
| Operating Junction Temperature(Tj) | | 125°C |
| Output Current | | 300mA |
| Ambient Temperature(Ta) | | -40°C –85°C |
| Package Thermal Resistance (θ_{jA}) | SOT-23-5 | 220°C / W |
| | SOT-23-3 | 220°C / W |
| Power Dissipation | SC70-5 | 250mW |
| | SOT-23-5 | 250mW |
| | SOT-23-3 | 250mW |
| | DFN1x1-4 | 600mW |
| Storage Temperature(Ts) | | -40°C -150°C |
| Lead Temperature & Time | | 260°C,10S |

Note:

1. Heat Sink Area of PCB for DFN1x1-4 is recommended at least 2.5mmx4mm.
2. Package Thermal Resistance value can be affected by PCB design, outside radiator, ambient airflow, operating power, it just shows for reference.
3. Exceed these limits to damage to the device.
4. Exposure to absolute maximum rating conditions may affect device reliability.

Recommended Work Conditions

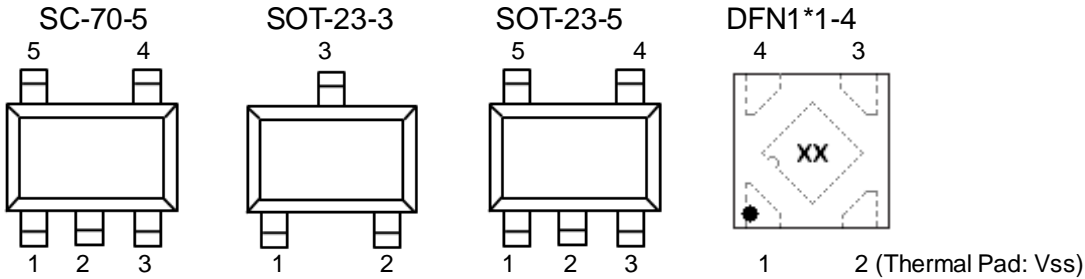
| Item | Min | Max. | Unit |
|---------------------|-----|------|------|
| Input Voltage Range | 2 | 6 | V |
| Ambient Temperature | -40 | 85 | °C |



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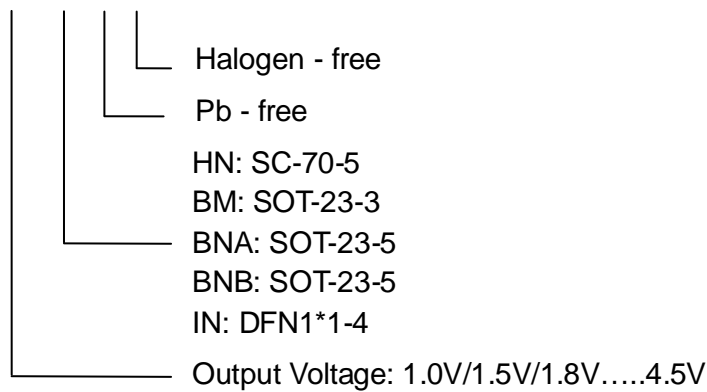
Packaging Type



| SC-70-5 | SOT-23-3 | SOT-23-5 | | DFN1*1-4 | Description | Function |
|---------|----------|----------|---|----------|------------------|-----------------|
| | | A | B | | | |
| 5 | 2 | 5 | 1 | 1 | V _{out} | Output pin |
| 1 | 3 | 1 | 3 | 4 | V _{in} | Input pin |
| 2 | 1 | 2 | 2 | 2 | V _{SS} | Ground pin |
| 3 | | 3 | 4 | 3 | CE | Chip Enable pin |
| 4 | | 4 | 5 | | NC | No Connection |

Ordering information

ACE515C XX XX + H





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Electrical Characteristics

ACE515C for arbitrary output voltage (Test Conditions: $C_{in}=1\mu F$, $C_{out}=1\mu F$, $T_A=25^\circ C$, unless otherwise specified.)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|--|--|--|----------------------------|-----------|--------------------------|--------------------|
| Input Voltage | V_{IN} | | 2 | | 6 | V |
| Output Voltage | $V_{OUT}>1.5V$ | $V_{IN}=\text{Set } V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 30mA$ | V_{OUT} $\times 0.98$ | V_{OUT} | $V_{OUT} \times$ 1.02 | V |
| | $V_{OUT} \leq 1.5V$ | | $V_{OUT} -$ 0.03 | | $V_{OUT} +$ 0.03 | |
| Maximum Output Current | $I_{OUT}(\text{Max.})$ | $V_{IN} - V_{OUT}=1V$ | 300 | | | mA |
| Dropout Voltage, $V_{OUT} \geq 2.8V$ | V_{drop}^1 | $I_{OUT}=100mA$ | | 100 | 150 | mV |
| | | $I_{OUT}=300mA$ | | 300 | 400 | |
| Line Regulation | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$ | $I_{OUT}=40mA$ $2.8V \leq V_{IN} \leq 6V$ | | 0.05 | 0.2 | %/V |
| Load Regulation | ΔV_{OUT} | $V_{IN}=\text{Set } V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 300mA$ | | 50 | 80 | mV |
| Supply Current | I_{SS} | $V_{IN}=\text{Set } V_{OUT}+1V$ | | 35 | 80 | μA |
| Supply Current (Standby) | $I_{standby}$ | $V_{IN}=\text{Set } V_{OUT}+1V$ $V_{ce}=V_{SS}$ | | 0.1 | 1.0 | μA |
| Output Voltage Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T \cdot V_{OUT}}$ | $I_{OUT}=30mA$ | | ± 100 | | ppm/ $^\circ C$ |
| Ripple Rejection | PSRR | $F=1KHz$, Ripple=0.5Vp-p $V_{IN}=\text{Set } V_{OUT}+1V$ | | 70 | | dB |
| Short Current Limit | I_{lim} | | 300 | | | mA |
| CE Pull down Resistance | R_{pd} | | | 500 | | $K\Omega$ |
| Discharge Resistor | $R_{discharge}$ | $CE=0$, $V_{out}=3.0V$ | | 1.5K | | ohm |
| CE Input Voltage "H" | V_{ceh} | | 1.5 | | V_{in} | V |
| CE Input Voltage "L" | V_{cel} | | 0 | | 0.25 | V |
| Output Noise | e_n | $BW=10Hz \sim 100kHz$ | | 47 | | μV_{rms} |

Note:

$V_{drop} = V_{in1} - (V_{out2} \times 0.98)$ V_{out2} is the output voltage when $V_{in} = V_{out1} + 1.0V$ and $I_{out} = 300mA$.

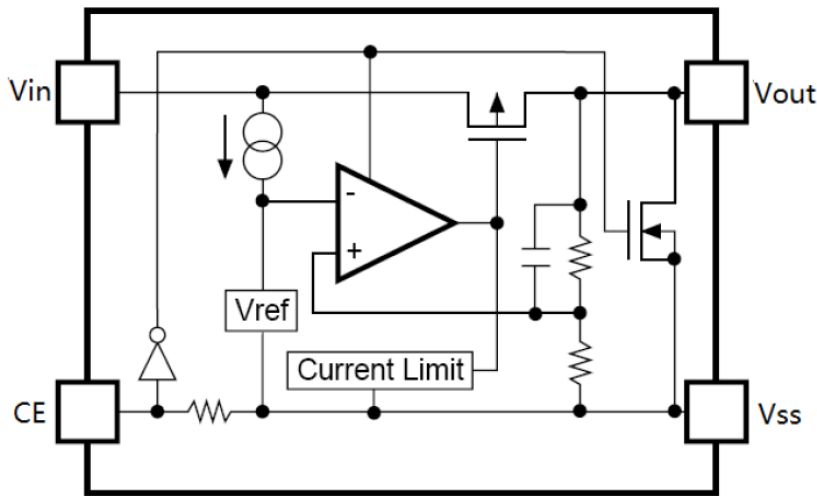
V_{in1} is the input voltage at which the output voltage becomes 98% of V_{out1} after gradually decreasing the input voltage.



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Block Diagram



Explanation :

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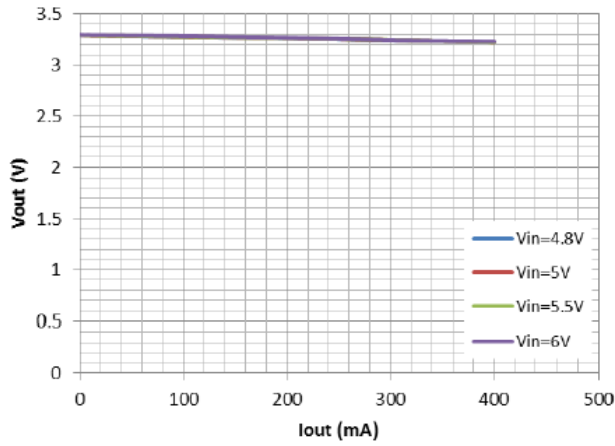
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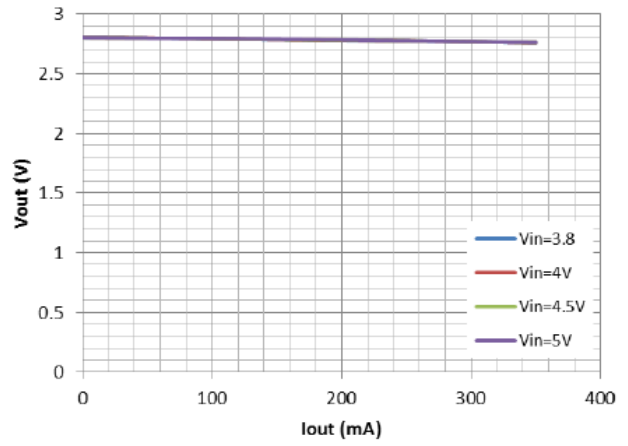


Typical Performance Characteristics (T=25°C)

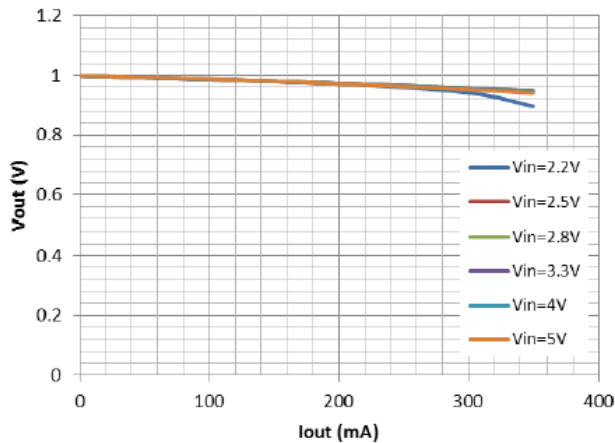
Load Regulation
(Vout=3.3V)



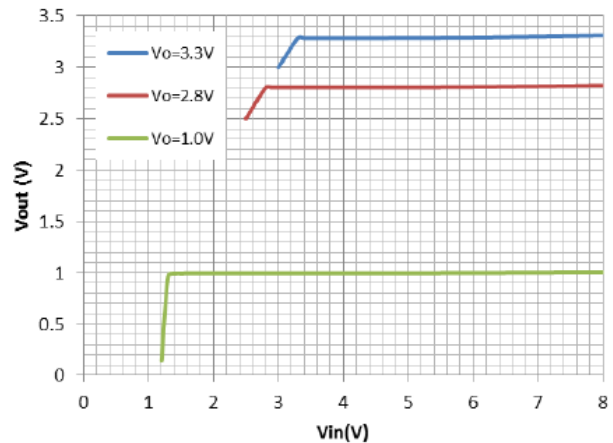
Load Regulation
(Vout=2.8V)



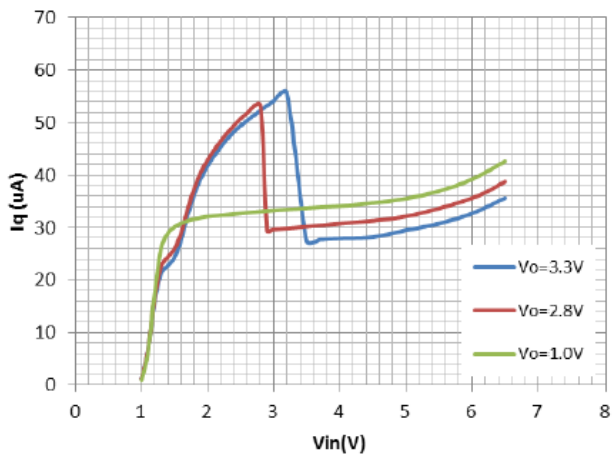
Load Regulation
(Vout=1.0V)



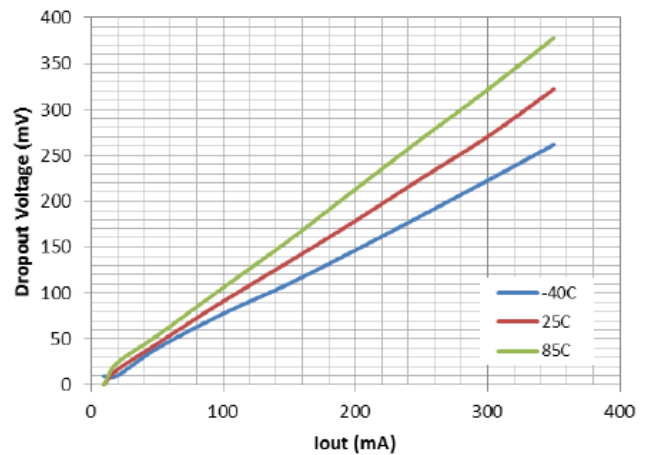
Line Regulation
(Iout=0mA)



Quiescent Current
(Iout=0mA and CE=high)



Dropout Voltage
(Vout=3.3V)

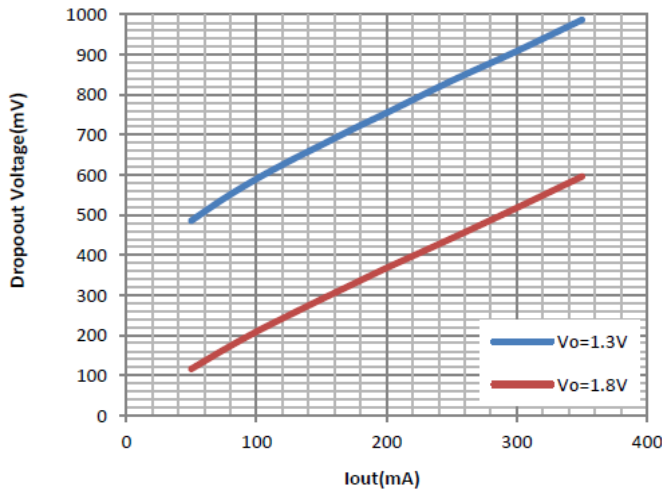




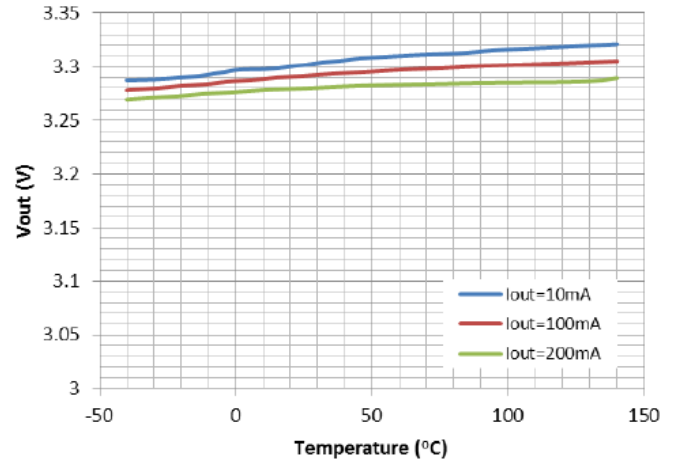
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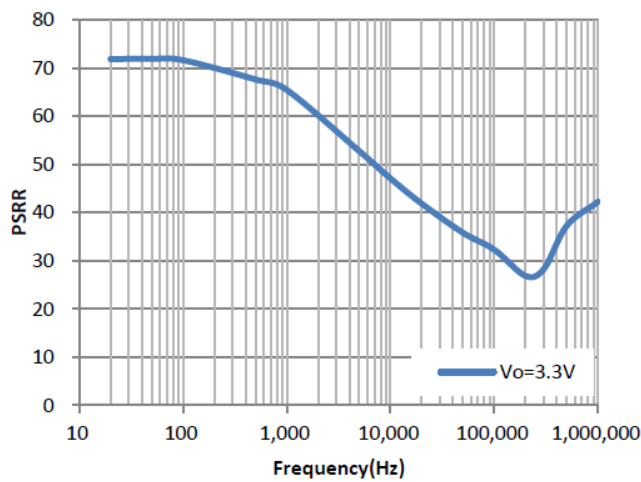
Dropout Voltage



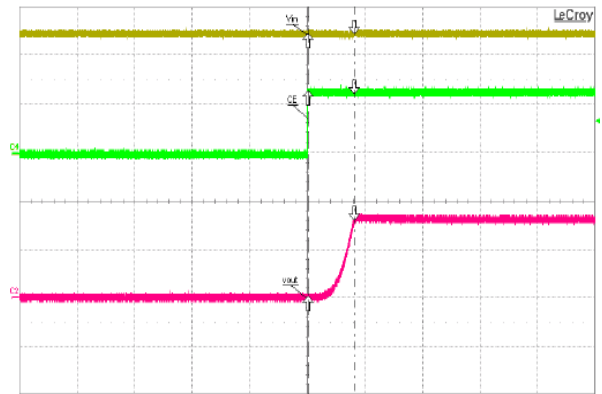
Vout Temperature Coefficient (Vout=3.3V)



PSRR

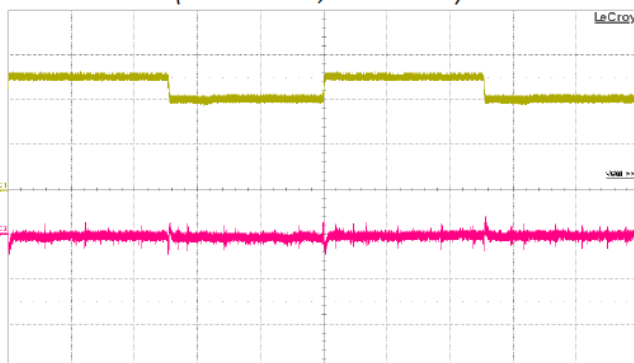


CE Chip Enable Response



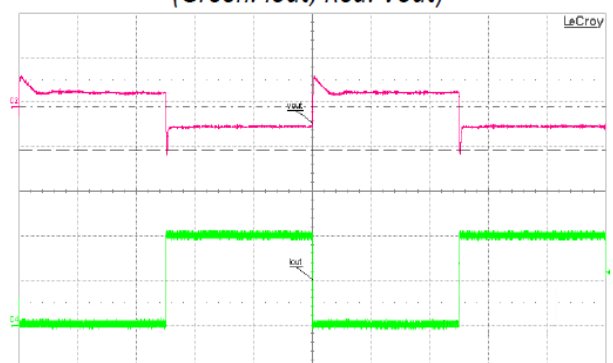
Line Transient Response

$V_{out} = 3.3V$, $I_{out} = 20mA$
(brown: V_{in} ; Red: V_{out})



Load Transient Response

$V_{in} = 5V$, $V_{out} = 3.3V$, $I_{out} = 1-100mA$
(Green: I_{out} ; Red: V_{out})



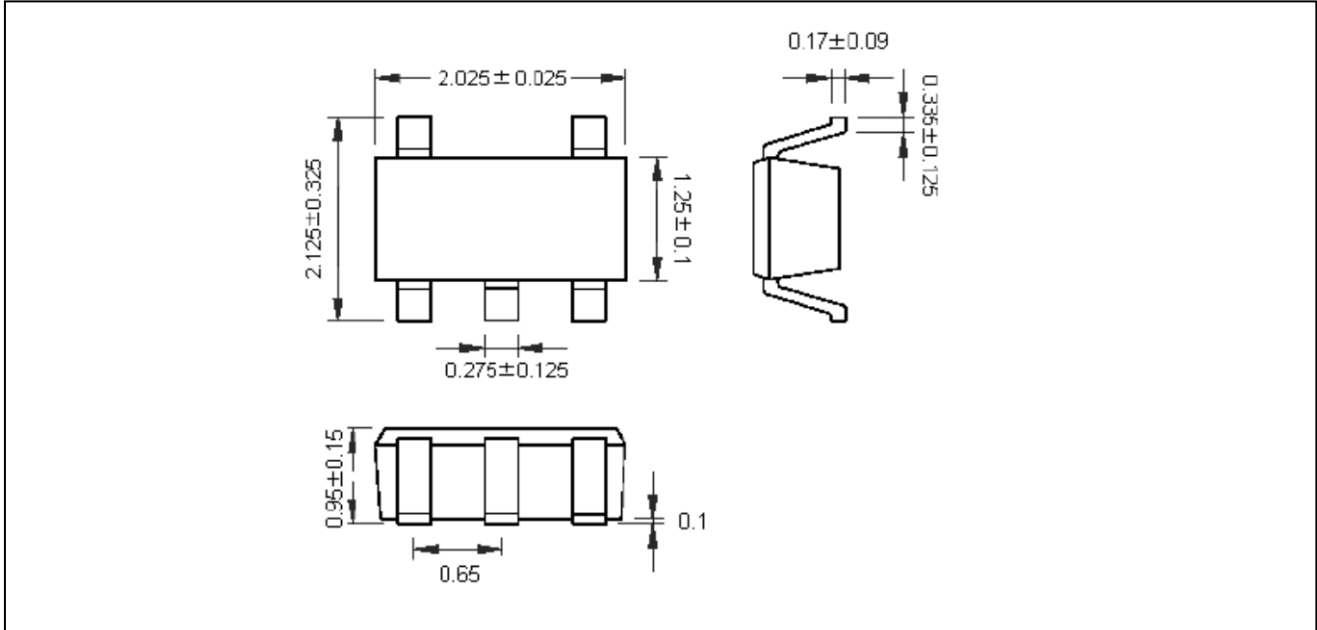


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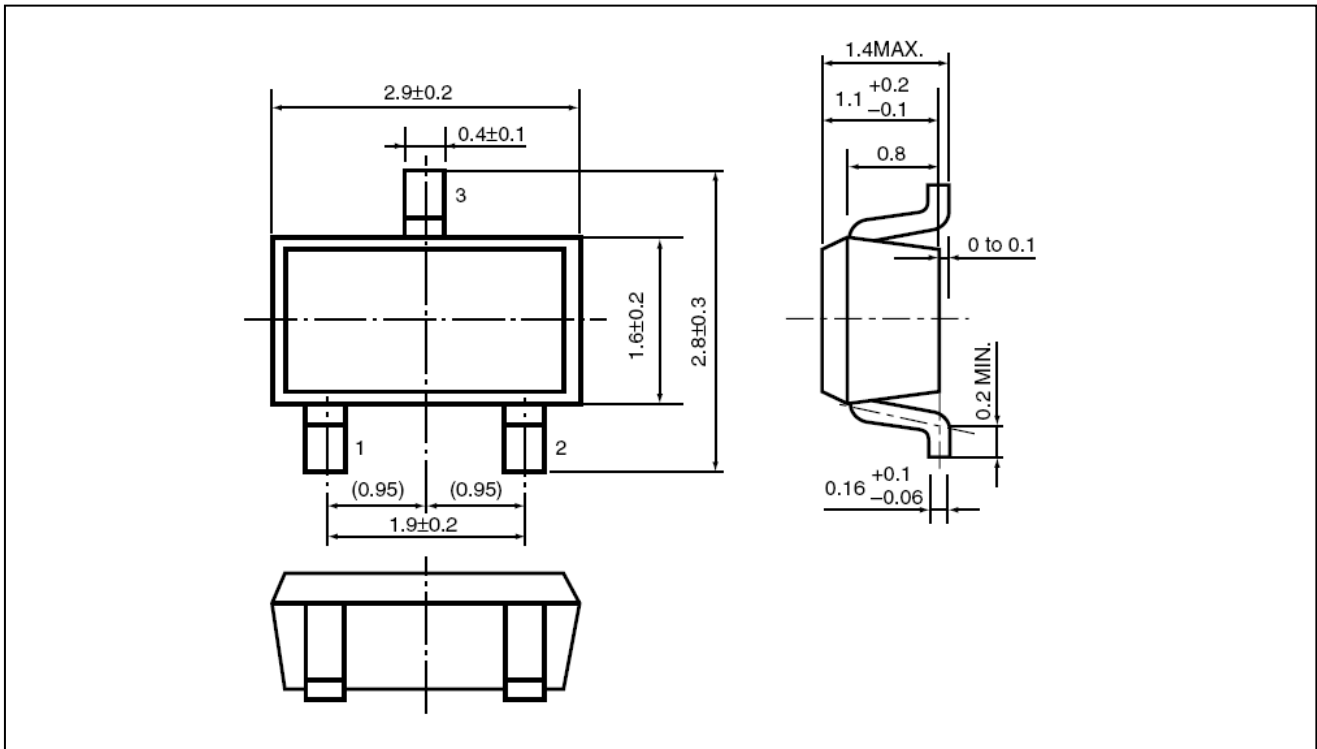
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Packing Information

SC-70-5



SOT-23-3





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Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a 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.

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