

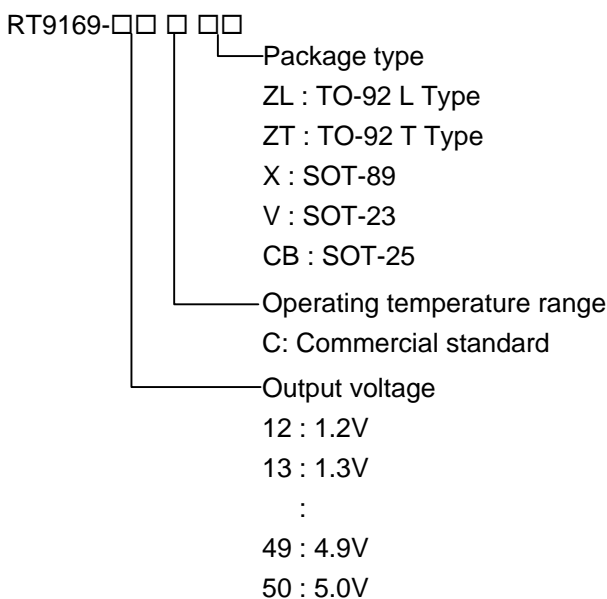
100mA, 4μA Quiescent Current CMOS LDO Regulator

General Description

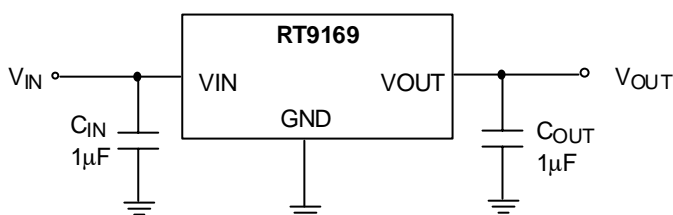
The RT9169 series are 100mA ultra-low quiescent current CMOS low dropout (LDO) regulator designed for battery-powered equipments. The output voltages range from 1.2V to 5V with 0.1V per step.

The other features include 4μA ultra-low quiescent, low dropout voltage, high output accuracy, current limiting protection, and high ripple rejection ratio.

Ordering Information



Typical Application Circuit



Marking Information

For marking information, contact our sales representative directly or through a RichTek distributor located in your area, otherwise visit our website for detail.

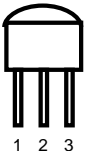
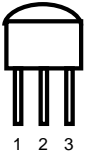
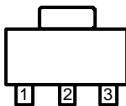
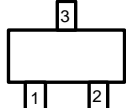
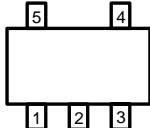
Features

- Ultra-Low Quiescent Current: 4μA
- Low Dropout: 450mV at 100mA
- Wide Operating Voltage Ranges: 2V~6V
- Current Limiting Protection
- Only 1μF Output Capacitor Required for Stability
- High Power Supply Rejection Ratio

Applications

- Battery-Powered Equipment
- Palmtops, Notebook Computers
- Hand-held Instruments
- PCMCIA Cards

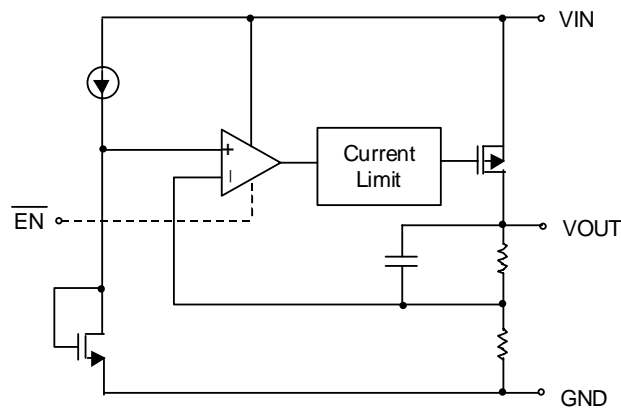
Pin Configurations

| Part Number | Pin Configurations |
|---------------------------------|---|
| RT9169-□□CZL (Plastic TO-92) |  <p>TOP VIEW</p> <ol style="list-style-type: none"> 1. VIN 2. GND 3. VOUT |
| RT9169-□□CZT (Plastic TO-92) |  <p>TOP VIEW</p> <ol style="list-style-type: none"> 1. VOUT 2. VIN 3. GND |
| RT9169-□□CX (Plastic SOT-89) |  <p>TOP VIEW</p> <ol style="list-style-type: none"> 1. GND 2. VIN (TAB) 3. VOUT |
| RT9169-□□CV (Plastic SOT-23) |  <p>TOP VIEW</p> <ol style="list-style-type: none"> 1. VOUT 2. GND 3. VIN |
| RT9169-□□CB (Plastic SOT-25) |  <p>TOP VIEW</p> <ol style="list-style-type: none"> 1. VIN 2. GND 3. EN 4. NC 5. VOUT |

Pin Description

| Pin Name | Pin Function |
|------------------------|---------------------------|
| VIN | Power Input |
| VOUT | Output Voltage |
| GND | Ground |
| $\overline{\text{EN}}$ | Chip Enable Control Input |

Function Block Diagram



Absolute Maximum Ratings

- Input Voltage 7V
- Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$
 - TO-92 0.6W
 - SOT-89 0.5W
 - SOT-23 0.25W
 - SOT-25 0.25W
- Operating Junction Temperature Range -40°C to 125°C
- Storage Range -65°C to 150°C
- Package Thermal Resistance
 - TO-92, θ_{JA} 160°C/W
 - SOT-89, θ_{JC} 100°C/W
 - SOT-89, θ_{JA} 180°C/W
 - SOT-23, θ_{JA} 250°C/W
 - SOT-25, θ_{JA} 250°C/W

Electrical Characteristics

($V_{IN} = 5.5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

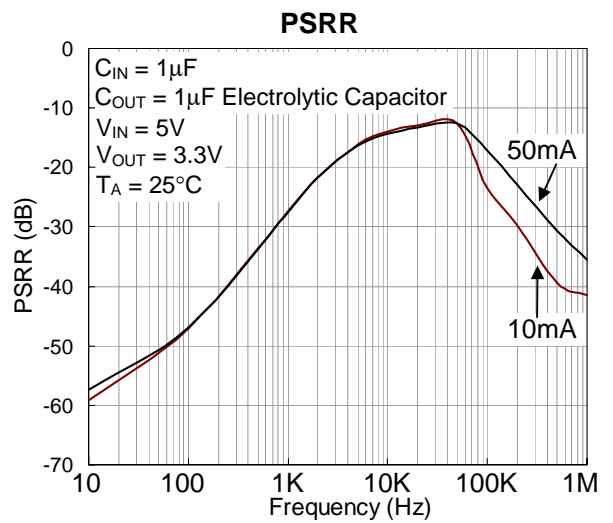
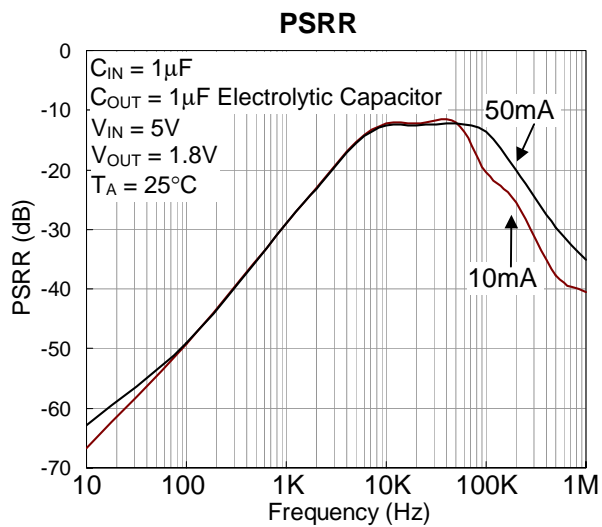
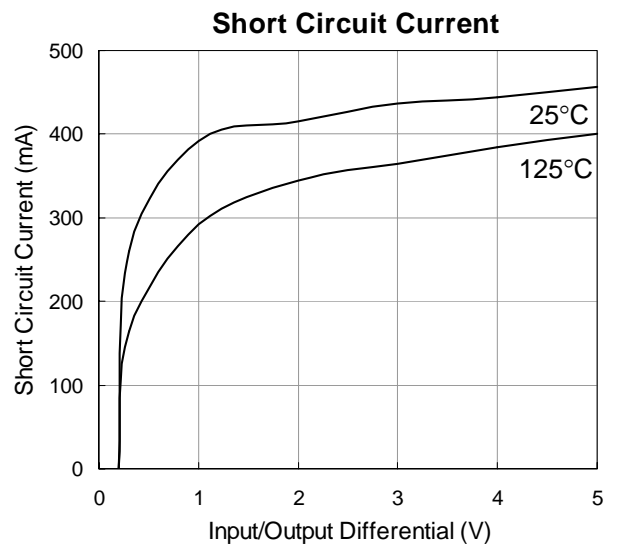
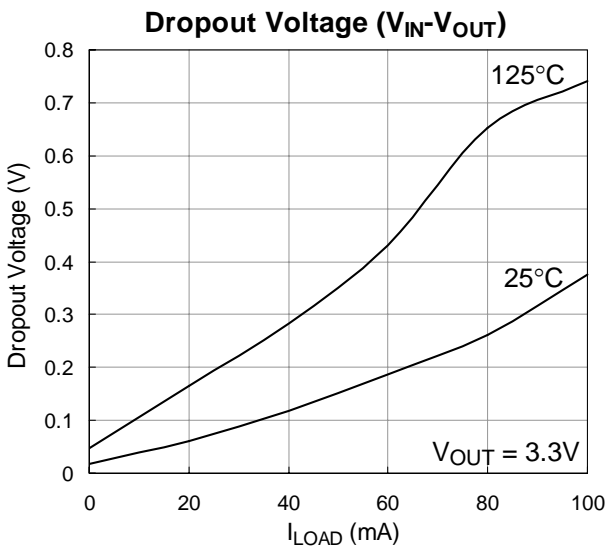
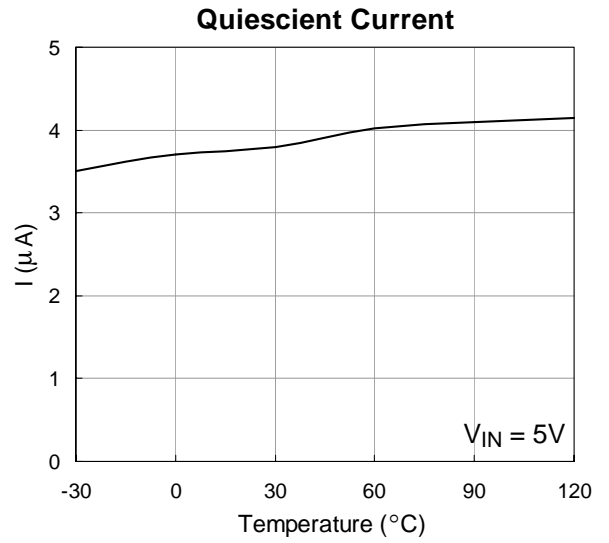
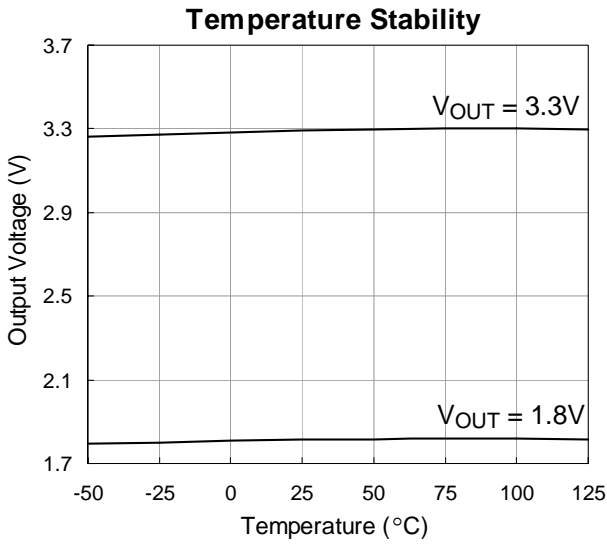
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|-----------------------------|-------------------|---|------|------|------|------------|
| Input Voltage Range | V_{IN} | | 2 | -- | 6 | V |
| Output Voltage Accuracy | ΔV_{OUT} | $I_L = 1mA$ | -2 | -- | +2 | % |
| Maximum Output Current | I_{MAX} | $V_{IN} = V_{OUT} + 0.6V$, $V_{IN} \geq 3.6V$ | 100 | -- | -- | mA |
| Current Limit | I_{LIMIT} | $I_L = 100mA$ | 150 | 250 | -- | mA |
| GND Pin Current | I_G | No Load | -- | 4 | 7 | μA |
| | | $I_{OUT} = 100mA$ | | 4 | 10 | μA |
| Dropout Voltage | V_{DROP} | $I_{OUT} = 1mA$, $V_{IN} \geq 3.6V$ | -- | 4 | 10 | mV |
| | | $I_{OUT} = 50mA$, $V_{IN} \geq 3.6V$ | -- | 200 | 300 | |
| | | $I_{OUT} = 100mA$, $V_{IN} \geq 3.6V$ | -- | 450 | 600 | |
| Line Regulation | ΔV_{LINE} | $V_{IN} = (V_{OUT} + 0.3V)$ to $6V$, $V_{IN} \geq 3.6V$, $I_{OUT} = 1mA$ | -0.2 | -- | +0.2 | %/V |
| Load Regulation | ΔV_{LOAD} | $I_{LOAD} = 0mA$ to $100mA$ | -- | 0.01 | 0.04 | %/mA |
| Output Noise | e_{NO} | BW = 100Hz to 50KHz $C_{OUT} = 10\mu F$ | -- | 250 | -- | μV |
| Ripple Rejection | PSRR | $F = 1KHz$, $C_{OUT} = 1\mu F$ | -- | 30 | -- | dB |
| Standby Current | RT9169-CB | $\overline{EN} = V_{IN}$ | -- | 0.1 | 1 | μA |
| EN Threshold | | | 0.6 | 1 | 2 | V |
| Thermal Shutdown Protection | | | 125 | -- | -- | $^\circ C$ |

Application Information

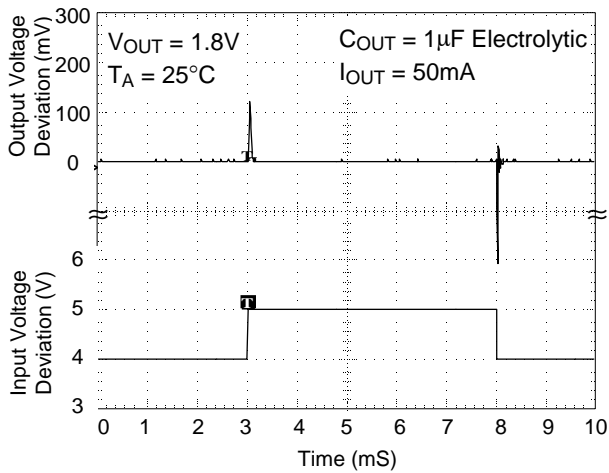
A 1 μF (or larger) capacitor is recommended between V_{OUT} and GND for stability. The part may oscillate without the capacitor. Any type of capacitor can be used, but not Aluminum electrolytes when operating below $-25^\circ C$. The capacitance may be increased without limit.

A 1 μF capacitor (or larger) should be placed between V_{IN} to GND.

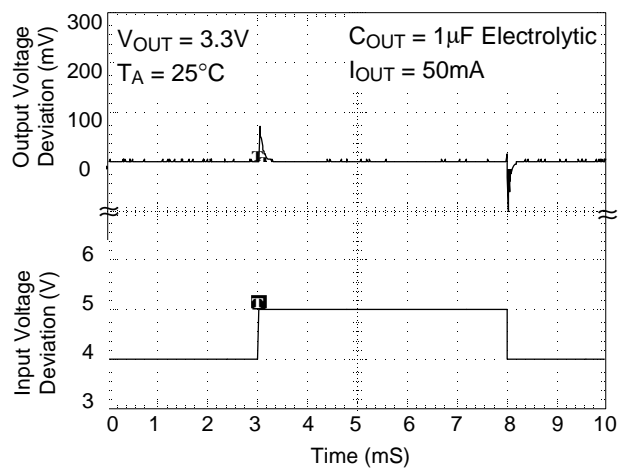
Typical Operating Characteristics



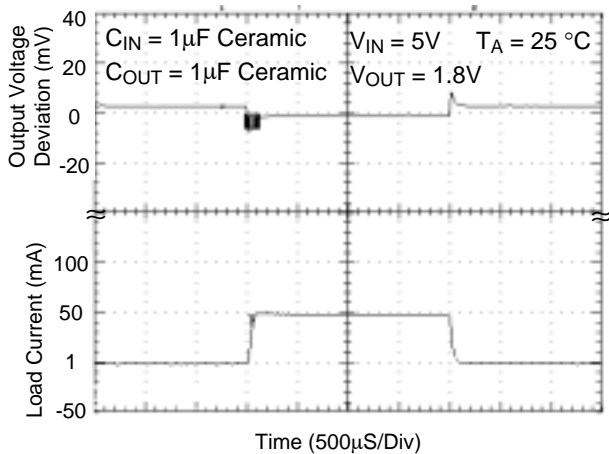
Line Transient Response



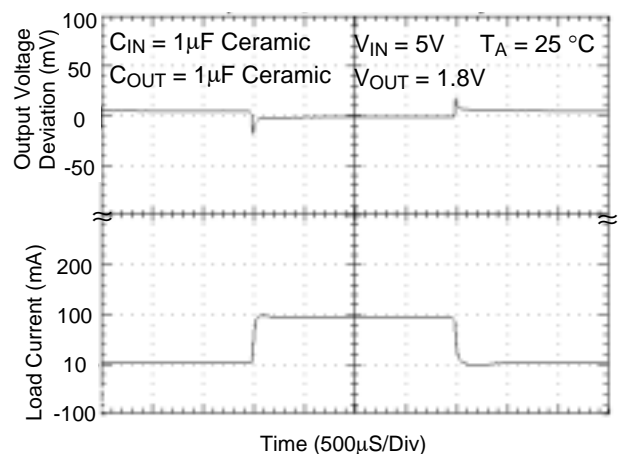
Line Transient Response



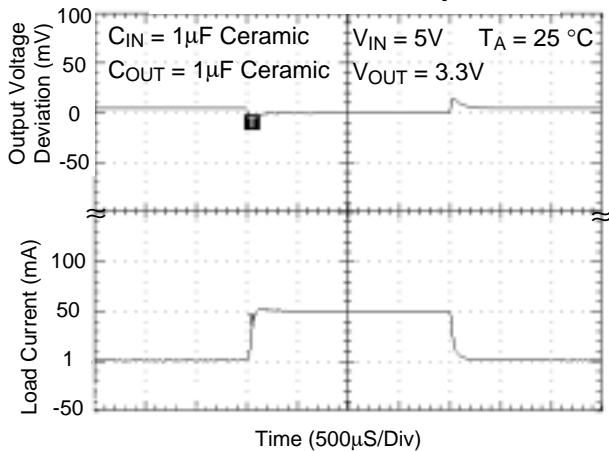
Load Transient Response



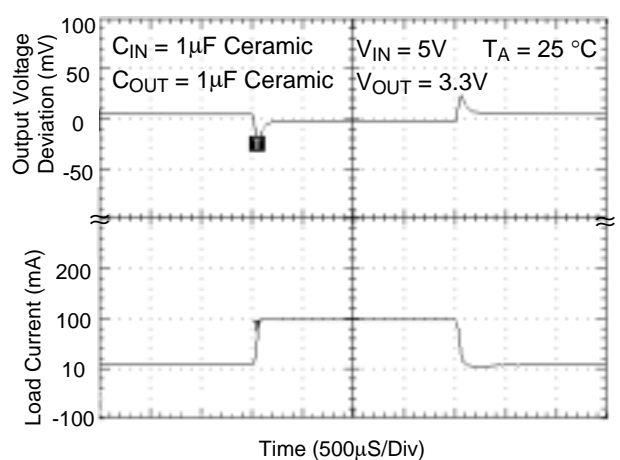
Load Transient Response



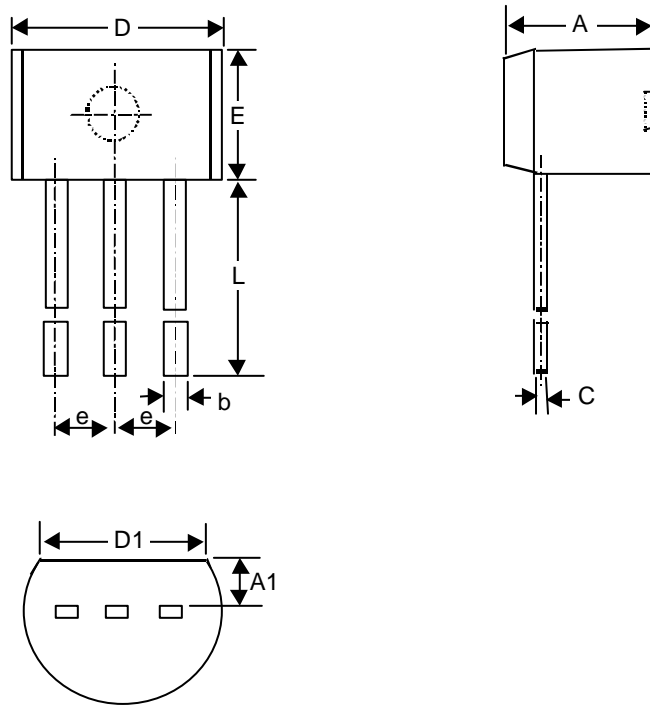
Load Transient Response



Load Transient Response

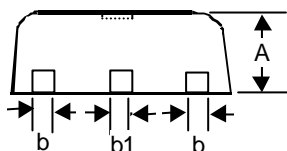
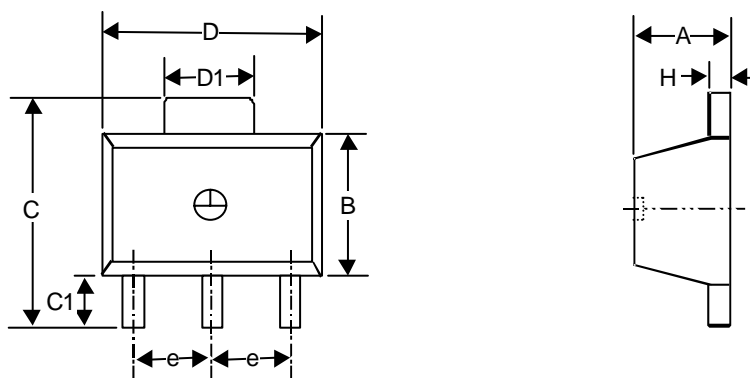


Package Information



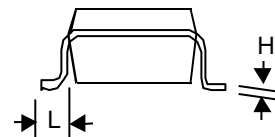
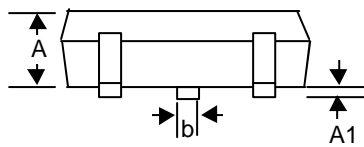
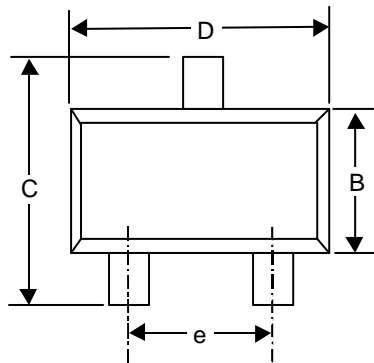
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 3.175 | 4.191 | 0.125 | 0.165 |
| A1 | 1.143 | 1.372 | 0.045 | 0.054 |
| b | 0.406 | 0.533 | 0.016 | 0.021 |
| C | 0.406 | 0.533 | 0.016 | 0.021 |
| D | 4.445 | 5.207 | 0.175 | 0.205 |
| D1 | 3.429 | -- | 0.135 | -- |
| E | 4.318 | 5.334 | 0.170 | 0.210 |
| e | 1.143 | 1.397 | 0.045 | 0.055 |
| L | 12.700 | -- | 0.500 | -- |

3-Lead TO-92 Package



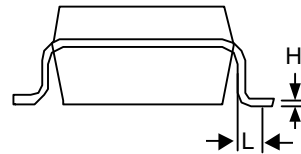
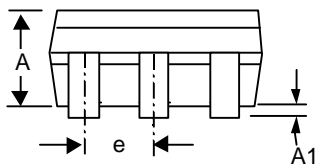
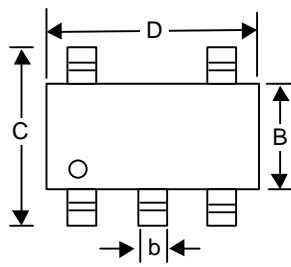
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.397 | 1.600 | 0.055 | 0.063 |
| b | 0.356 | 0.483 | 0.014 | 0.019 |
| B | 2.388 | 2.591 | 0.094 | 0.102 |
| b1 | 0.406 | 0.533 | 0.016 | 0.021 |
| C | -- | 4.242 | -- | 0.167 |
| C1 | 0.787 | 1.194 | 0.031 | 0.047 |
| D | 4.394 | 4.597 | 0.173 | 0.181 |
| D1 | 1.397 | 1.753 | 0.055 | 0.069 |
| e | 1.448 | 1.549 | 0.057 | 0.061 |
| H | 0.355 | 0.432 | 0.014 | 0.017 |

3-Lead SOT-89 Surface Mount



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.889 | 1.295 | 0.035 | 0.051 |
| A1 | -- | 0.152 | -- | 0.006 |
| B | 1.397 | 1.803 | 0.055 | 0.071 |
| b | 0.356 | 0.508 | 0.014 | 0.020 |
| C | 2.591 | 2.997 | 0.102 | 0.118 |
| D | 2.692 | 3.099 | 0.106 | 0.122 |
| e | 1.803 | 2.007 | 0.071 | 0.079 |
| H | 0.102 | 0.254 | 0.004 | 0.010 |
| L | 0.356 | 0.610 | 0.014 | 0.024 |

SOT-23 Plastic Surface Mount



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.889 | 1.295 | 0.035 | 0.051 |
| A1 | 0.000 | 0.152 | 0.000 | 0.006 |
| B | 1.397 | 1.803 | 0.055 | 0.071 |
| b | 0.356 | 0.559 | 0.014 | 0.022 |
| C | 2.591 | 2.997 | 0.102 | 0.118 |
| D | 2.692 | 3.099 | 0.106 | 0.122 |
| e | 0.838 | 1.041 | 0.033 | 0.041 |
| H | 0.102 | 0.254 | 0.004 | 0.010 |
| L | 0.356 | 0.610 | 0.014 | 0.024 |

SOT- 25 Surface Mount Package

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