

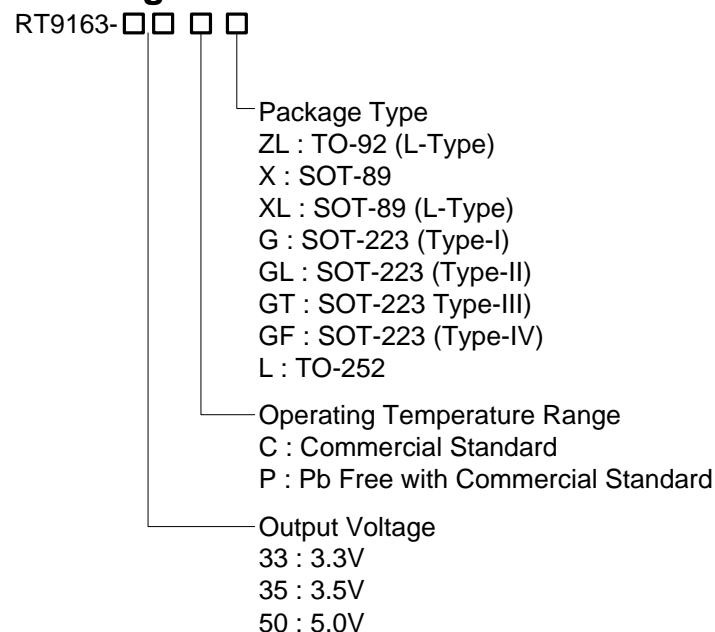
500mA Low Dropout Positive Voltage Regulator

General Description

The RT9163 is a positive low dropout regulator designed for applications requiring low dropout performance at full rated current. The device is available in fixed output voltage of 3.3V, 3.5V, and 5.0V. The RT9163 provides excellent regulation over line, load, and temperature variations.

The other features include low dropout performance at a maximum of 1.4V at 500mA, fast transient response, internal current limiting, and thermal shutdown protection of the output devices. The RT9163 is a three-terminal regulator available in surface mount SOT-89, SOT-223, and TO-252 packages.

Ordering Information



Note :

RichTek Pb-free products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.
- 100%matte tin (Sn) plating.

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.

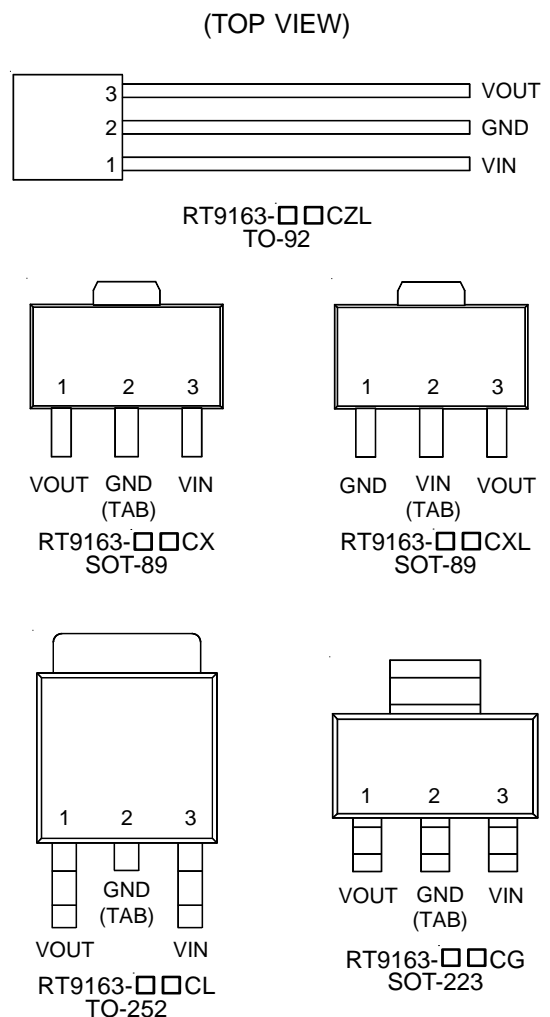
Features

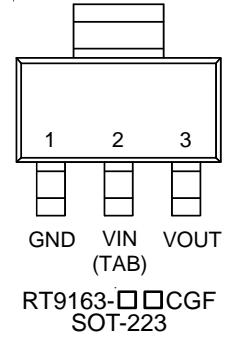
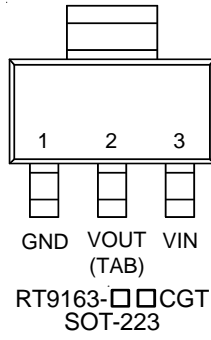
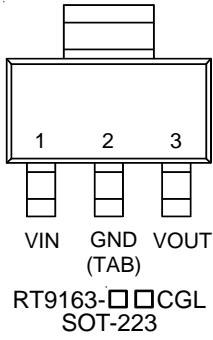
- Low Dropout, Maximum 1.4V at 500mA
- Fast Transient Response
- $\pm 2\%$ Total Output Regulation
- 0.4% Line Regulation
- 0.4% Load Regulation
- TO-92, SOT-89, SOT-223, and TO-252 Packages
- RoHS Compliant and 100% Lead (Pb)-Free

Applications

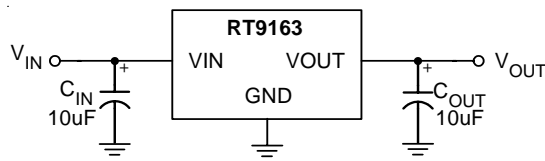
- 5V to 3.3V Linear Regulator
- Low Voltage Microcontroller, DSP,.... etc. Power Supply
- Linear Regulator for LAN Card and CD-ROM

Pin Configurations

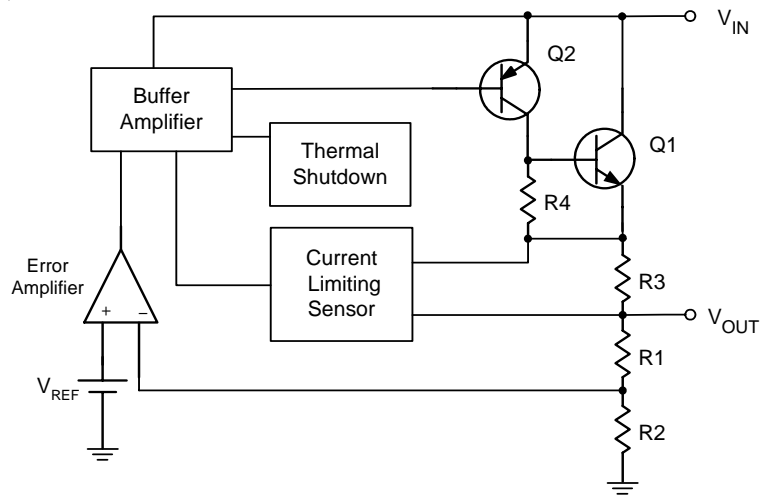




Typical Application Circuit



Function Block Diagram



Functional Pin Description

| Pin Name | Pin Function |
|----------|----------------|
| VOUT | Output Voltage |
| GND | Ground |
| VIN | Power Input |

Absolute Maximum Ratings

- Input Voltage ----- 15V
- Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$
 - TO-92 ----- 0.625W
 - SOT-89 ----- 0.571W
 - SOT-223 ----- 0.740W
 - TO-252 ----- 1.471W
- Package Thermal Resistance (Note 4)
 - TO-92, θ_{JA} ----- 160°C/W
 - SOT-89, θ_{JC} ----- 48°C/W
 - SOT-89, θ_{JA} ----- 175°C/W
 - SOT-223, θ_{JC} ----- 19°C/W
 - SOT-223, θ_{JA} ----- 135°C/W
 - TO-252, θ_{JC} ----- 7.5°C/W
 - TO-252, θ_{JA} ----- 68°C/W
- Operating Junction Temperature Range ----- -40°C to 125°C
- Storage Temperature Range ----- -65°C to 150°C

Electrical Characteristics

($V_{IN} = 5V$, $T_A = 25^\circ\text{C}$, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units | |
|-----------------------------|-------------------|-----------------------------|---------------|-------|-------|---------------------|------------------------|
| Output Voltage (Note 1) | RT9163-33 | V_{OUT} | 3.235 | 3.300 | 3.365 | V | |
| | RT9163-35 | | 3.430 | 3.500 | 3.570 | | |
| | RT9163-50 | | $V_{IN} = 7V$ | 4.900 | 5.000 | | 5.100 |
| Line Regulation (Note 1) | RT9163-33 | ΔV_{LINE} | -- | 0.1 | 0.4 | % | |
| | RT9163-35 | | | | | | $V_{IN} = 5V \sim 15V$ |
| | RT9163-50 | | | | | | $V_{IN} = 7V \sim 15V$ |
| Load Regulation (Note 1) | ΔV_{LOAD} | $I_L = 0 \sim 500\text{mA}$ | -- | 0.2 | 0.4 | % | |
| Dropout Voltage (Note 2) | V_{DROP} | $\Delta V_{OUT} = 1\%$ | -- | 1.3 | 1.4 | V | |
| Current Limit | I_{LIM} | Load = 1Ω | 550 | -- | -- | mA | |
| Quiescent Current | I_Q | | -- | 4.5 | 8 | mA | |
| Temperature Coefficient | T_C | | -- | 0.005 | -- | $\%/^\circ\text{C}$ | |
| Temperature Stability | T_S | | -- | 0.5 | -- | % | |
| RMS Output Noise (Note 3) | | | -- | 0.003 | -- | $\%/V_{OUT}$ | |

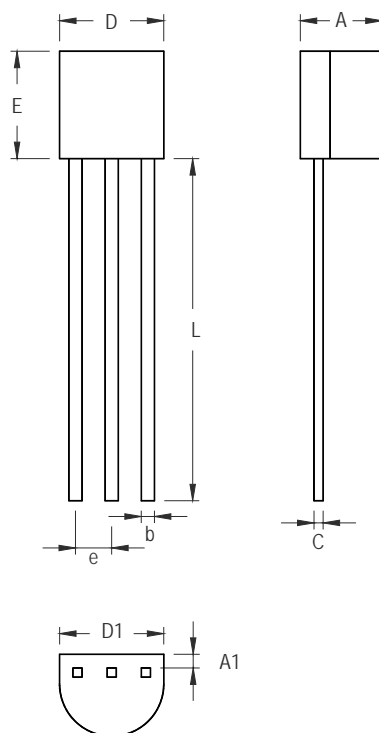
Note 1. Low duty cycle pulse tested with Kelvin connections.

Note 2. The dropout voltage is defined as $V_{IN} - V_{OUT}$, which is measured when V_{OUT} is $V_{OUT(NORMAL)} - 100\text{mV}$.

Note 3. Bandwidth of 10 Hz to 10 kHz.

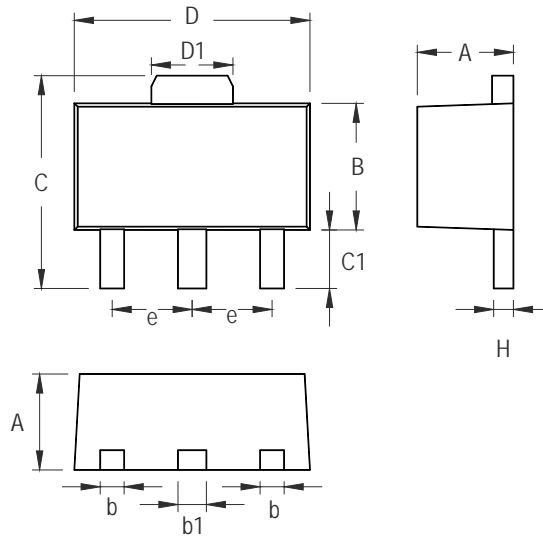
Note 4. θ_{JA} is measured in the natural convection at $T_A = 25^\circ\text{C}$ on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard. The case point of θ_{JC} is on the center of the exposed pad.

Outline Dimension



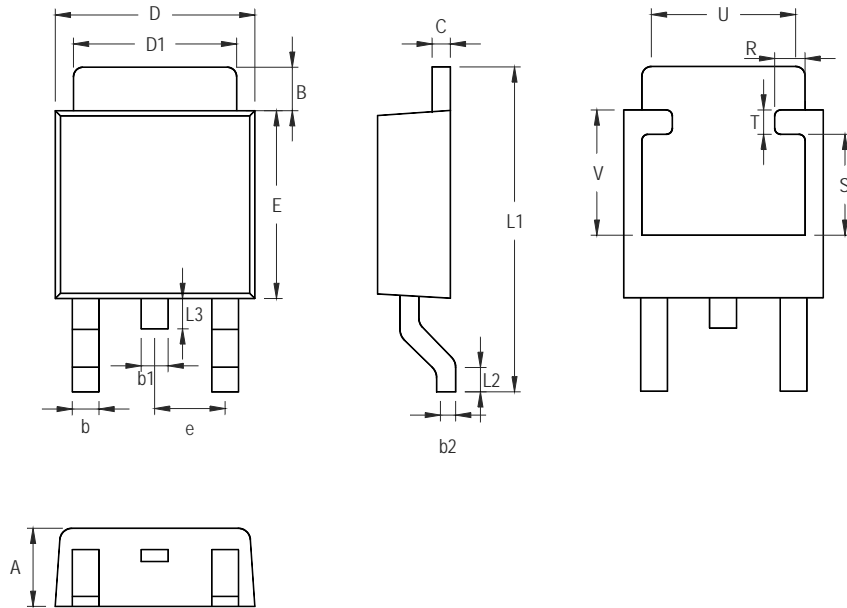
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 3.175 | 4.191 | 0.125 | 0.165 |
| A1 | 1.143 | 1.372 | 0.045 | 0.054 |
| b | 0.406 | 0.533 | 0.016 | 0.021 |
| C | 0.406 | 0.533 | 0.016 | 0.021 |
| D | 4.445 | 5.207 | 0.175 | 0.205 |
| D1 | 3.429 | 5.029 | 0.135 | 0.198 |
| 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 Plastic Package



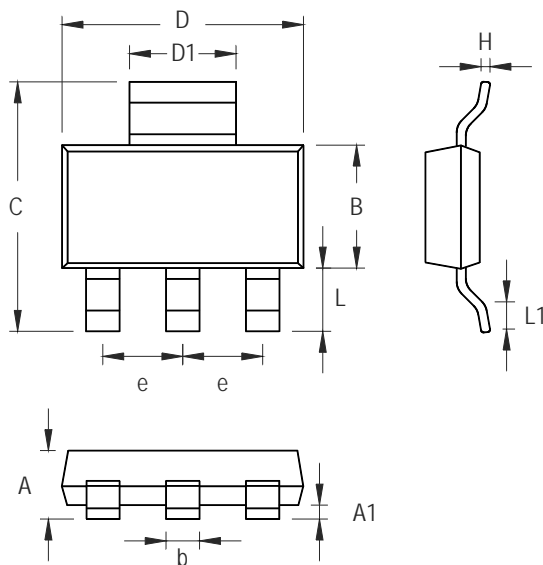
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.397 | 1.600 | 0.055 | 0.063 |
| b | 0.356 | 0.483 | 0.014 | 0.019 |
| B | 2.388 | 2.591 | 0.094 | 0.102 |
| b1 | 0.406 | 0.533 | 0.016 | 0.021 |
| C | 3.937 | 4.242 | 0.155 | 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 | 0.356 | 0.432 | 0.014 | 0.017 |

3-Lead SOT-89 Surface Mount Package



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 2.184 | 2.388 | 0.086 | 0.094 |
| B | 0.889 | 2.032 | 0.035 | 0.080 |
| b | 0.508 | 0.889 | 0.020 | 0.035 |
| b1 | 1.016 Ref. | | 0.040 Ref. | |
| b2 | 0.457 | 0.584 | 0.018 | 0.023 |
| C | 0.457 | 0.584 | 0.018 | 0.023 |
| D | 6.350 | 6.731 | 0.250 | 0.265 |
| D1 | 5.207 | 5.461 | 0.205 | 0.215 |
| E | 5.334 | 6.223 | 0.210 | 0.245 |
| e | 2.108 | 2.438 | 0.083 | 0.096 |
| L1 | 9.398 | 10.414 | 0.370 | 0.410 |
| L2 | 0.508 Ref. | | 0.020 Ref. | |
| L3 | 0.635 | 1.016 | 0.025 | 0.040 |
| U | 3.810 Ref. | | 0.150 Ref. | |
| V | 3.048 Ref. | | 0.120 Ref. | |
| R | 0.200 | 0.850 | 0.008 | 0.033 |
| S | 2.500 | 3.400 | 0.098 | 0.134 |
| T | 0.500 | 0.850 | 0.020 | 0.033 |

3-Lead TO-252 Surface Mount Package



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|--------|
| | Min | Max | Min | Max |
| A | 1.450 | 1.803 | 0.057 | 0.071 |
| A1 | 0.020 | 0.100 | 0.0008 | 0.0047 |
| b | 0.610 | 0.787 | 0.024 | 0.031 |
| B | 3.302 | 3.708 | 0.130 | 0.146 |
| C | 6.706 | 7.290 | 0.264 | 0.287 |
| D | 6.299 | 6.706 | 0.248 | 0.264 |
| D1 | 2.896 | 3.150 | 0.114 | 0.124 |
| e | 2.261 | 2.362 | 0.089 | 0.093 |
| H | 0.229 | 0.330 | 0.009 | 0.013 |
| L | 1.550 | 1.950 | 0.061 | 0.077 |
| L1 | 0.800 | 1.100 | 0.009 | 0.013 |

3-Lead SOT-223 Surface Mount Package

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