

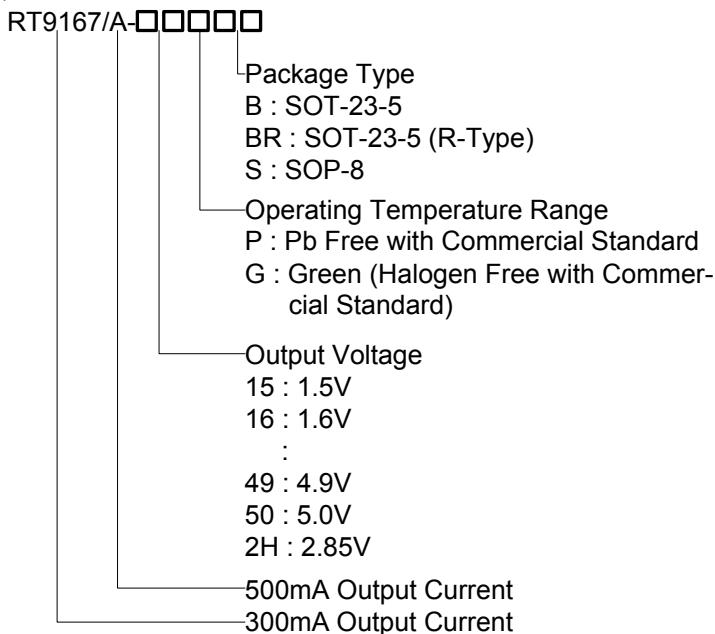
# RT9167/A

## General Description

The RT9167/A is a 300mA/500mA low dropout and low noise micropower regulator suitable for portable applications. The output voltages range from 1.5V to 5.0V in 100mV increments and 2% accuracy. The RT9167/A is designed for use with very low ESR capacitors. The output remains stable even with 1µF ceramic output capacitor.

The RT9167/A uses an internal PMOS as the pass device, which does not cause extra GND current in heavy load and dropout conditions. The shutdown mode of nearly zero operation current makes the IC suitable for battery-powered devices. Other features include a reference bypass pin to improve low noise performance, current limiting, and over temperature protection.

## Ordering Information



## Features

- Stable with Low-ESR Output Capacitor
- Low Dropout Voltage (350mV @ 300mA)
- Low Operation Current –80µA Typical
- Shutdown Function
- Low Noise Output
- Low Temperature Coefficient
- Current and Thermal Limiting
- Custom Voltage Available
- SOT-23-5 and SOP-8 Packages
- RoHS Compliant and 100% Lead (Pb)-Free

## Applications

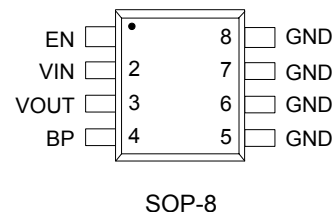
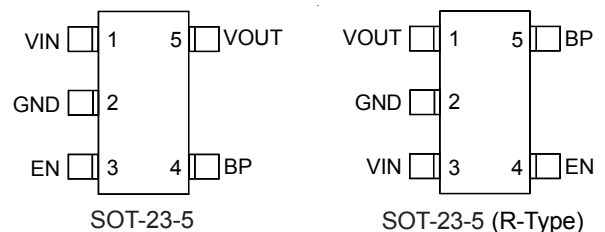
- Cellular Telephones
- Laptop, Notebook, and Palmtop Computers
- Battery-powered Equipment
- Hand-held Equipment

## 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.

## Pin Configurations

(TOP VIEW)

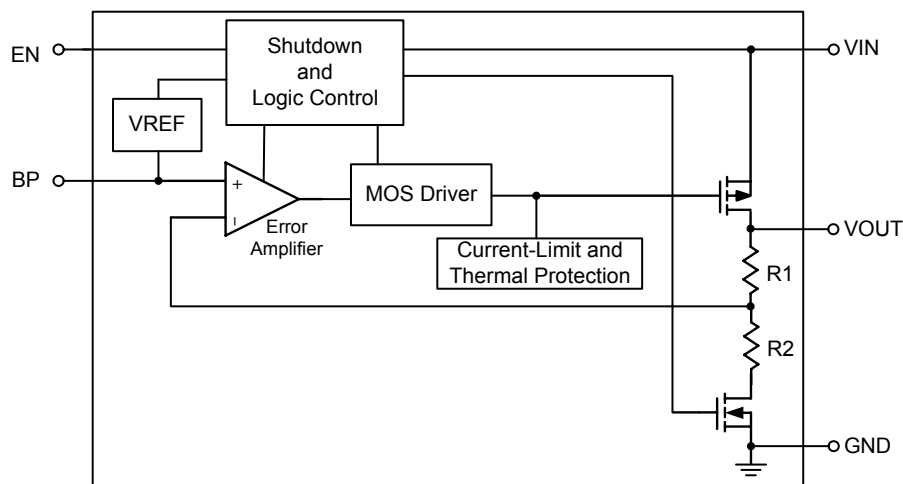


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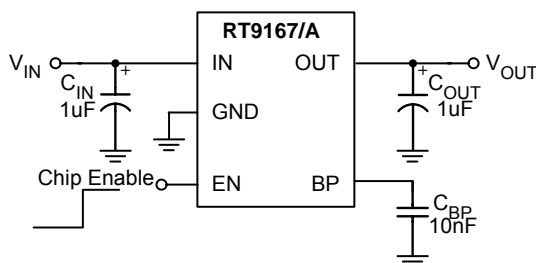
## Functional Pin Description

Pin Name	Pin Function
VIN	Power Input Voltage
GND	Ground
EN	Chip Enable (Active High)
BP	Reference Noise Bypass
VOUT	Output Voltage

## Function Block Diagram



## Typical Application Circuit



# RT9167/A

## Absolute Maximum Ratings

- Input Voltage ----- 8V
- Power Dissipation,  $P_D$  @  $T_A = 25^\circ\text{C}$ 
  - SOT-23-5 ----- 0.4W
  - SOP-8 ----- 0.625W
- Package Thermal Resistance (Note1)
  - SOT-23-5,  $\theta_{JA}$  -----  $250^\circ\text{C/W}$
  - SOT-23-5,  $\theta_{JC}$  -----  $130^\circ\text{C/W}$
  - SOP-8,  $\theta_{JA}$  -----  $160^\circ\text{C/W}$
  - SOP-8,  $\theta_{JC}$  -----  $60^\circ\text{C/W}$
- Operating Junction Temperature Range -----  $-40^\circ\text{C}$  to  $125^\circ\text{C}$
- Storage Temperature Range -----  $-65^\circ\text{C}$  to  $150^\circ\text{C}$
- Lead Temperature (Soldering, 10 sec.) -----  $260^\circ\text{C}$

## Electrical Characteristics

( $V_{IN} = 5.0\text{V}$ ,  $C_{IN} = 1\mu\text{F}$ ,  $C_{OUT} = 1\mu\text{F}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
Input Voltage Range	$V_{IN}$		2.9	--	7	V	
		$I_L = 50\text{mA}$	2.7	--	7		
Output Voltage Accuracy	$\Delta V_{OUT}$	$I_L = 1\text{mA}$	-2	--	+2	%	
Maximum Output Current	RT9167	$I_{MAX}$	300	--	--	mA	
	RT9167A		500	--	--		
Current Limit	RT9167	$I_{LIM}$	400	--	--	mA	
	RT9167A		500	700	--		
Quiescent Current	RT9167/A	$I_G$	No Load	--	80	150	$\mu\text{A}$
	RT9167/A		$I_{OUT} = 300\text{mA}$	--	90	150	
	RT9167A		$I_{OUT} = 500\text{mA}$	--	90	150	
Dropout Voltage <sup>(2)</sup> ( $V_{OUT(Normal)} = 3.0\text{V}$ Version)	RT9167/A	$V_{DROP}$	$I_{OUT} = 1\text{mA}$	--	1.1	5	mV
	RT9167/A		$I_{OUT} = 50\text{mA}$	--	55	100	
	RT9167/A		$I_{OUT} = 300\text{mA}$	--	350	450	
	RT9167A		$I_{OUT} = 500\text{mA}$	--	600	750	
Line Regulation	$\Delta V_{LINE}$	$V_{IN} = (V_{OUT} + 0.15)$ to $7\text{V}$ , $I_{OUT} = 1\text{mA}$	--	--	6	mV/V	
Load Regulation	RT9167/A	$\Delta V_{LOAD}$	$I_{OUT} = 0\text{mA}$ to $300\text{mA}$	--	--	30	mV
	RT9167A		$I_{OUT} = 0\text{mA}$ to $500\text{mA}$	--	--	35	
EN Input High Threshold	$V_{IH}$	$V_{IN} = 3\text{V}$ to $5.5\text{V}$	1.6	--	--	V	
EN Input Low Threshold	$V_{IL}$	$V_{IN} = 3\text{V}$ to $5.5\text{V}$	--	--	0.4	V	
EN Bias Current	$I_{SD}$		--	--	100	nA	
Shutdown Supply Current	$I_{GSD}$	$V_{OUT} = 0\text{V}$	--	0.01	1	$\mu\text{A}$	
Thermal Shutdown Temperature	$T_{SD}$		--	155	--	$^\circ\text{C}$	

To be continued

# RT9167/A

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Noise	e <sub>NO</sub>	C <sub>BP</sub> = 10nF, C <sub>OUT</sub> = 10μF	--	350	--	nV√Hz
Ripple Rejection	PSRR	F = 100Hz, C <sub>BP</sub> = 10nF, C <sub>OUT</sub> = 10μF	--	58	--	dB

Note 1.  $\theta_{JA}$  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. Pin 1 of SOP-8 and pin4 of SOT-23-5 packages are the case position for  $\theta_{JA}$  measurement.

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