

# 150mA, Low Power Consumption, High Voltage CMOS LDO Regulator

## FEATURES

- Low Power Consumption
- 150mA Nominal Output Current
- Low Dropout Voltage
- Low Temperature Coefficient
- High Input Voltage (up to 36V)
- Output Voltage Accuracy:  $\pm 3\%$
- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- *Micro* SIZE PACKAGES: SOT23-3, SOT89-3L and SOT89-3L(L-Type)

## APPLICATIONS

- Audio/Video Equipment
- Communication Equipment
- Battery-Powered Equipment
- Laptop, Palmtops, Notebook Computers

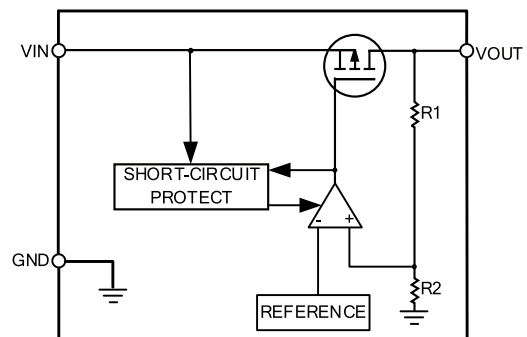
## DESCRIPTION

The RS3003 series is a set of low power high voltage regulators implemented in CMOS technology. It can operate from 6.3V to 36V, which can provide 150mA output current. The device allows input voltage as high as 36V.

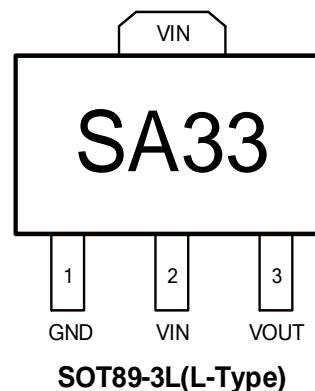
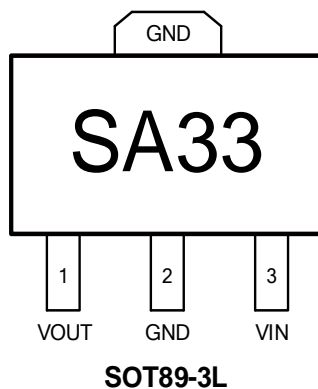
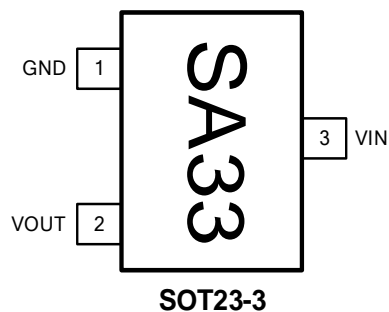
The RS3003 series is available in several fixed output voltages. CMOS technology ensures low dropout voltage and low quiescent current.

The RS3003 is available in Green SOT23-3 and SOT89-3L packages. It operates over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

## Function Block Diagram



## PIN CONFIGURATIONS



## PIN DESCRIPTION

NAME	PIN			FUNCTION
	SOT23-3	SOT89-3L	SOT89-3L (L-Type)	
GND	1	2	1	Ground.
VIN	3	3	2	Regulator Input. Up to 36V input voltage. At least 1μF supply bypass capacitor is recommended.
VOUT	2	1	3	Regulator Output. Recommended output capacitor range: 1μF to 10μF.

**ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>**

VIN to GND.....	-0.3 to 40V
VOUT to GND.....	-0.3V to Min (VIN + 0.3V,7V)
Power Dissipation, PD @ TA = 25°C	
SOT-23 .....	0.28W
SOT-89-3 .....	0.5W
Junction Temperature.....	+150°C
Operating Temperature Range .....	-40°C to +85°C
Package Thermal Resistance @ TA = 25°C	
SOT-23.....	360°C/W
SOT-89-3.....	200°C/W
Storage Temperature.....	-65°C to +150°C
Lead Temperature (Soldering, 10s) .....	260°C
ESD Susceptibility	
HBM .....	1000V
MM .....	100V


**ESD SENSITIVITY CAUTION**

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

**PACKAGE/ORDERING INFORMATION**

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING	PACKAGE OPTION
RS3003	RS3003-3.3YF3	-40°C ~+85°C	SOT23-3	SA33	Tape and Reel,3000
	RS3003-3.3YE3	-40°C ~+85°C	SOT89-3L	SA33	Tape and Reel,1000
	RS3003-3.3YE3L	-40°C ~+85°C	SOT89-3L (L-Type)	SA33	Tape and Reel,1000

NOTE: X = Date Code

**ELECTRICAL CHARACTERISTICS**
 $V_{IN} = 15V$ ,  $C_{IN} = C_{OUT} = 1\mu F$ , Typical values are at  $T_A = +25^\circ C$ . (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Voltage	$V_{IN}$	$V_{OUT} = 3.3V$	+25°C	6.3		36	V
Output Voltage Accuracy		$I_{OUT} = 1mA$	+25°C	-3	0	3	%
Ground Pin Current		No load	+25°C		12		$\mu A$
		$I_{OUT} = 50mA$			12		
Maximum Output Current <sup>(1)</sup>		$V_{IN} = V_{OUT} + 3V$ or $4V$ , whichever is greater	+25°C	150			mA
Dropout Voltage <sup>(2)</sup>	$V_{DROP}$	$I_{OUT} = 150mA$ , $V_{OUT} \geq 3.3V$	+25°C		1300		mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$V_{IN} = V_{OUT} + 3V$ or $4V$ to $36V$ , $I_{OUT} = 1mA$	$V_{OUT} = 3.3V$	+25°C		0.005	%/V
Load Regulation	$\Delta V_{OUT}$	$V_{IN} = V_{OUT} + 3V$ or $4V$ to $36V$ , $I_{OUT} = 1mA$ to $150mA$	$V_{OUT} = 3.3V$	+25°C		10	mV
Power Supply Rejection Ratio	PSRR	$V_{OUT} = 3.3V$ , $I_{OUT} = 10mA$	$f = 217Hz$	+25°C		65	dB
			$f = 1KHz$			63	
Output Voltage Noise	$e_n$	$f = 10Hz$ to $100kHz$ , $V_{OUT} = 3.3V$ , $I_{OUT} = 10mA$	+25°C		220		$\mu V_{RMS}$

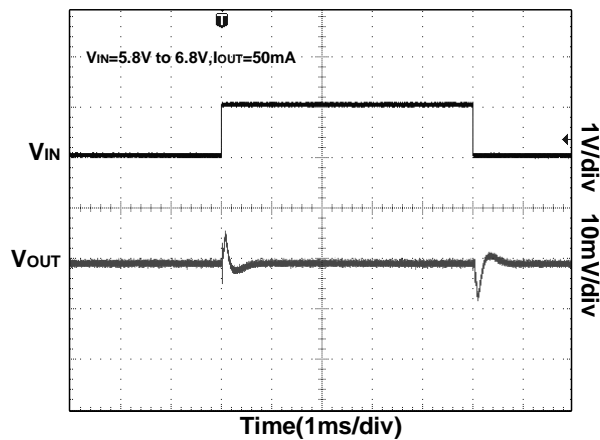
**NOTES:**

- Maximum output current is affected by the PCB layout, size of metal trace, the thermal conduction path between metal layers, ambient temperature and the other environment factors of system.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT (NOMINAL)} + 3V$  or  $4V$ , whichever is greater.

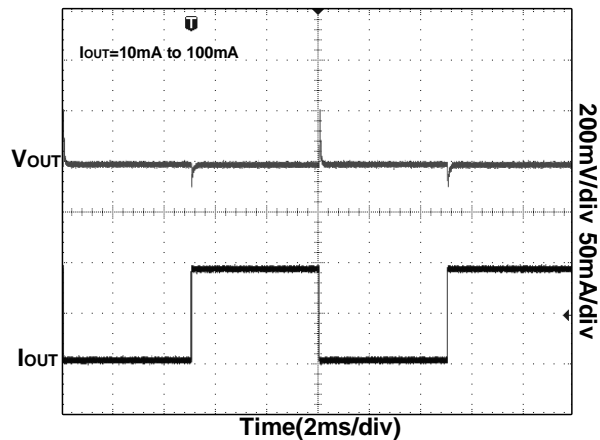
### TYPICAL CHARACTERISTICS

$V_{IN} = V_{OUT (NOMINAL)} + 2.5V$  or  $4V$ , whichever is greater,  $V_{OUT} = 3.3V$ ,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $T_A = 25^\circ C$  unless otherwise noted.

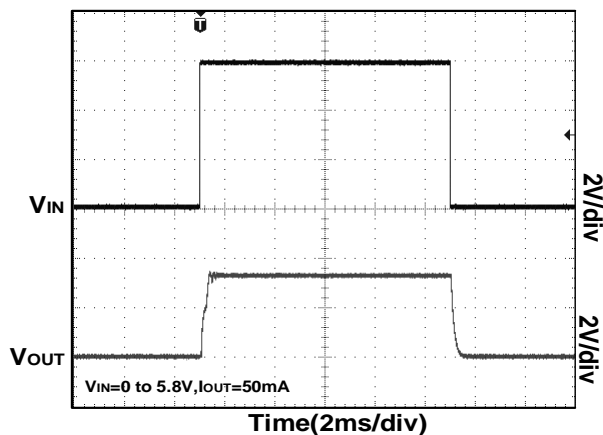
Line-Transient Response



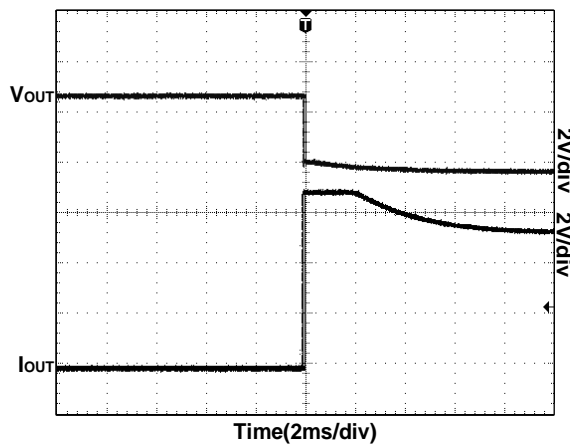
Load-Transient Response



Power-Up/Power-Down Output Waveform



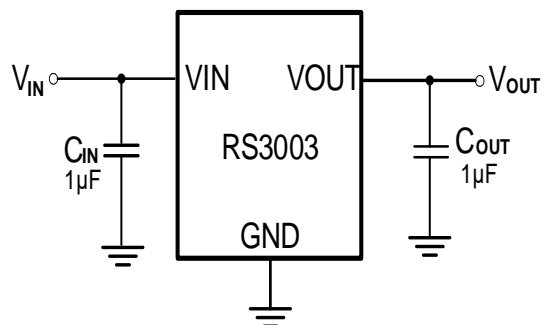
Output Short Waveform



## APPLICATION NOTES

### Input Capacitor and Output Capacitor

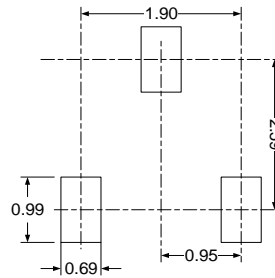
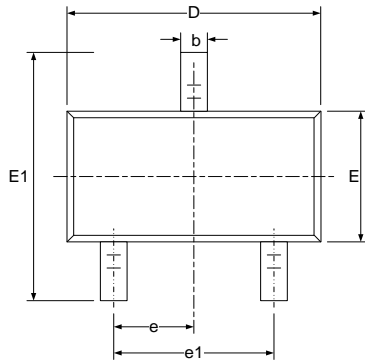
For proper operation, using a ceramic capacitor ( $C_{IN}$ ) between  $1\mu\text{F}$  and  $10\mu\text{F}$  between the input pin and ground. The input capacitor must be located a distance of not more than 0.5 inch from the input pin of the IC and returned to a clean analog ground. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response. The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application. For stable operation, use a ceramic capacitor ( $C_{OUT}$ ) between  $1\mu\text{F}$  and  $10\mu\text{F}$ . Larger values in this range will help improve load transient response and reduce noise. Output capacitors of other dielectric types may be used, but are not recommended as their capacitance can deviate greatly from their rated value over temperature.



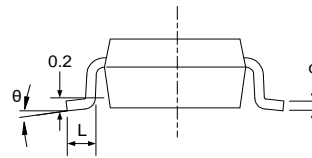
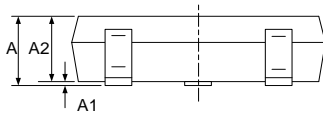
Typical Application Circuit

# PACKAGE OUTLINE DIMENSIONS

## SOT23-3

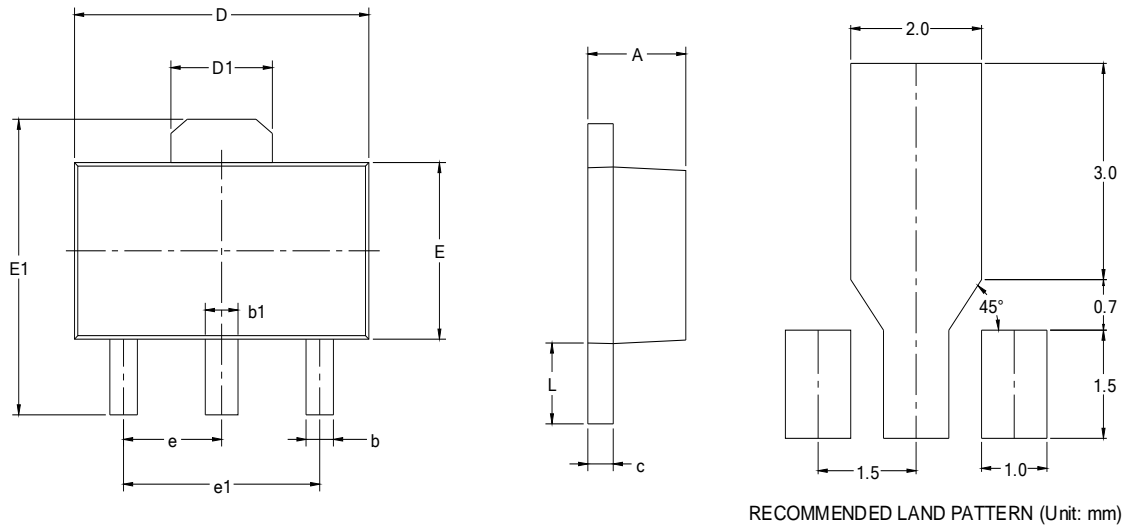


**RECOMMENDED LAND PATTERN (Unit: mm)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

# SOT-89-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 BSC		0.060 BSC	
e1	3.000 BSC		0.118 BSC	
L	0.900	1.200	0.035	0.047