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: ±2.5%**
- **Operating Temperature Range: -40°C to +85°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**

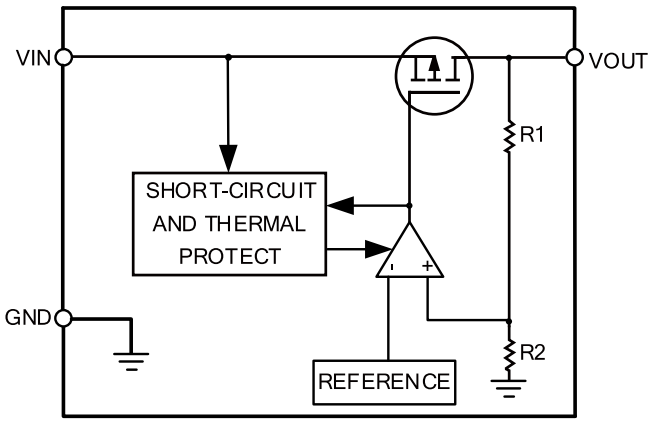
DESCRIPTION

The RS3005 series is a set of low power high voltage regulators implemented in CMOS technology. It can operate from 2.5V to 36V. which can provide 150mA output current. The device allows input voltage as high as 36V.

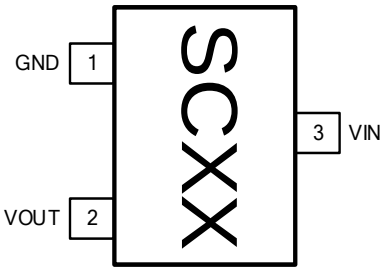
The RS3005 series is available in several fixed output voltages. CMOS technology ensures low dropout voltage and low quiescent current.

The RS3005 is available in Green SOT23-3 and SOT89-3L packages. It operates over an ambient temperature range of -40°C to +85°C.

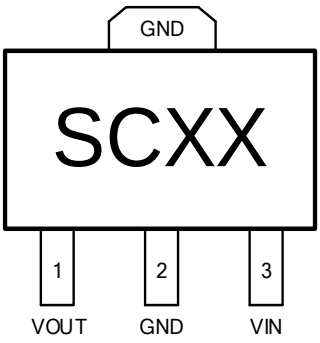
Function Block Diagram



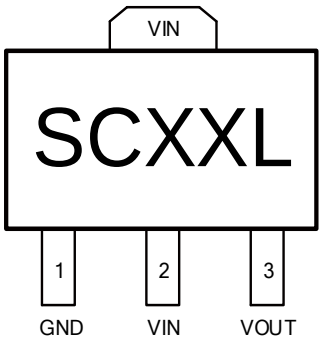
PIN CONFIGURATIONS



SOT23-3



SOT89-3L



SOT89-3L(L-Type)

NOTE: XX indicate Output Voltage

For example: SC33 (V_{OUT}=3.3V)

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 (1)

VIN to GND.....-0.3 to 40V
VOUT to GND..... -0.3V to Min (V_{IN} + 0.3V,7V)
Power Dissipation, P_D @ T_A = 25°C
SOT23-3 .....0.31W
SOT89-3L 1.3W
SOT89-3L(L-Type) 0.6W
Junction Temperature.....+150°C
Operating Temperature Range .....-40°C to +85°C
Package Thermal Resistance @ T_A = 25°C
SOT23-3.....320°C/W
SOT89-3L.....75°C/W
SOT89-3L(L-Type) .....165°C/W
Storage Temperature Range.....-65°C to +150°C
Lead Temperature (Soldering, 10s) .....260°C
ESD Susceptibility
HBM 1000V
MM 100V

(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.

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.

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	V_{OUT}(V)	PACKAGE LEAD	PACKAGE MARKING	PACKAGE OPTION
RS3005-3.3	RS3005-3.3YF3	3.3	SOT23-3	SC33 XXXX	Tape and Reel,3000
	RS3005-3.3YE3	3.3	SOT89-3L	SC33 XXXX	Tape and Reel,1000
	RS3005-3.3YE3L	3.3	SOT89-3L (L-Type)	SC33L XXXX	Tape and Reel,1000
RS3005-5.0	RS3005-5.0YF3	5.0	SOT23-3	SC50 XXXX	Tape and Reel,3000
	RS3005-5.0YE3	5.0	SOT89-3L	SC50 XXXX	Tape and Reel,1000
	RS3005-5.0YE3L	5.0	SOT89-3L (L-Type)	SC50L XXXX	Tape and Reel,1000

NOTE: XXXX = Date Code and Vendor Code.

ELECTRICAL CHARACTERISTICS

(V_{IN} = V_{OUT} + 2V, C_{IN} = C_{OUT} = 1μF, Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}	V_{OUT} = 3.3V		+25°C	2.5(1)		36	V
Output Voltage Accuracy		I_{OUT} = 1mA		+25°C	-2.5	0	2.5	%
Ground Pin Current		No load	V_{IN} = V_{OUT} + 2V	+25°C		11	18	μ A
			V_{IN} = 36V			16	25	
		I_{OUT} = 50mA				11		
Maximum Output Current (2)				+25°C	150			mA
Dropout Voltage (3)	V_{DROP}	I_{OUT} = 150mA		+25°C		1300	1800	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	V_{IN} = V_{OUT} + 2V to 36V, I_{OUT} = 1mA		+25°C		0.005	0.012	%/V
Load Regulation	ΔV_{OUT}	V_{IN} =V_{OUT}+2V, I_{OUT} = 1mA to150mA		+25°C		10	25	mV
Power Supply Rejection Ratio	PSRR	V_{OUT} = 3.3V, I_{OUT} = 10mA	f = 217Hz	+25°C		65		dB
			f = 1KHz			63		
Output Voltage Temperature Coefficient (4)	$\frac{\Delta V_{OUT}}{\Delta T_A \times V_{OUT}}$	I_{OUT} = 1mA		FULL		70		ppm/°C
THERMAL PROTECTION								
Thermal Shutdown Temperature	T_{SHDN}					120		°C

NOTES:

1. V_{IN} = $V_{OUT\ (NOMINAL)}$ or 2.5V, whichever is greater.

2. 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. Attention should be paid to the dropout voltage when V_{IN} < V_{OUT} + V_{DROP}.

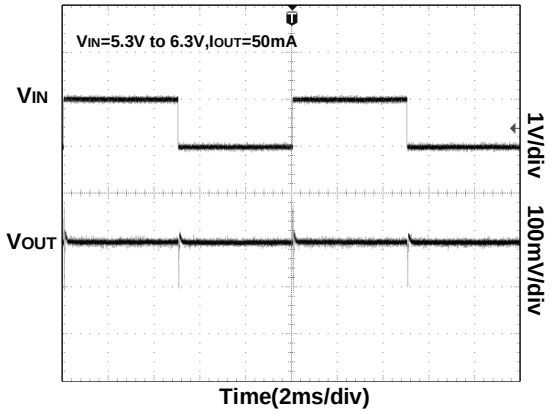
3. The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} is 100mV below the value of V_{OUT} for V_{IN} = $V_{OUT\ (NOMINAL)}$ + 2V.

4. Output voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.

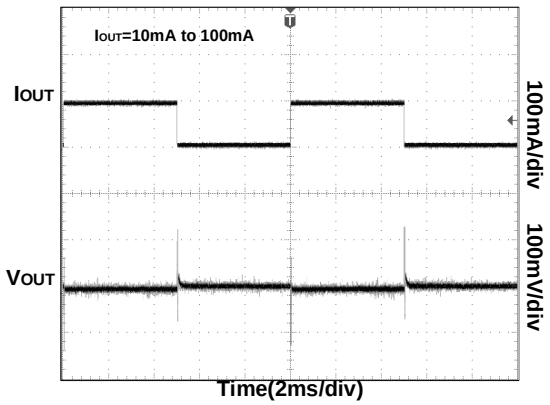
TYPICAL CHARACTERISTICS

V_{IN} = 5.3V, V_{OUT} = 3.3V, C_{IN} = C_{OUT} = 1μF, T_A = 25°C unless otherwise noted.

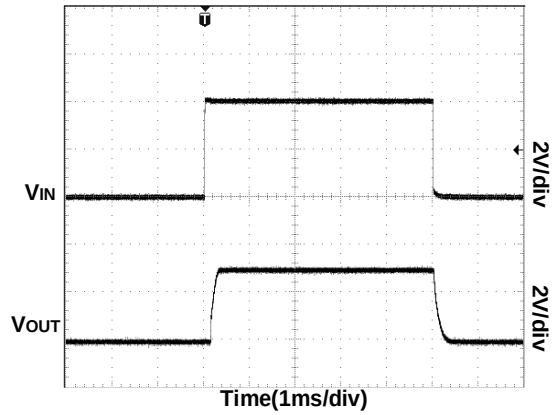
Line-Transient Response



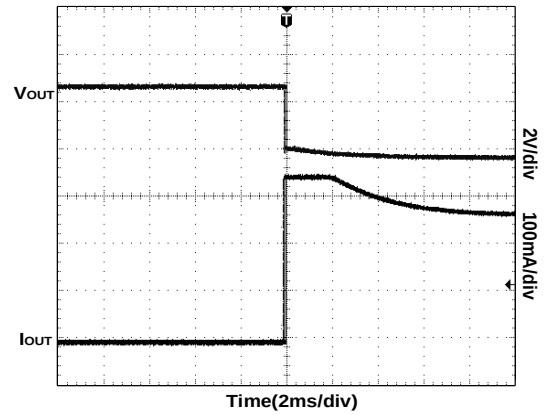
Load-Transient Response



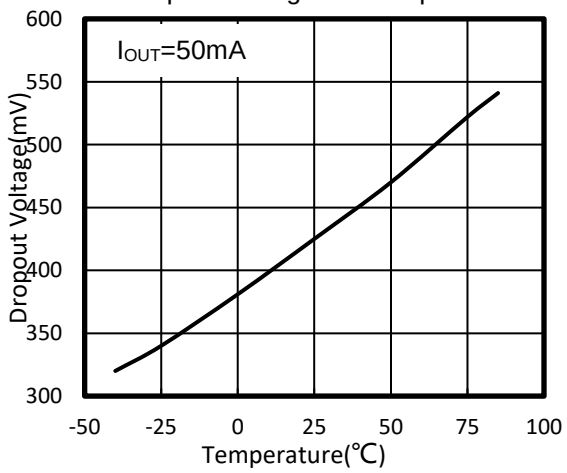
Power-Up/Power-Down Output Waveform



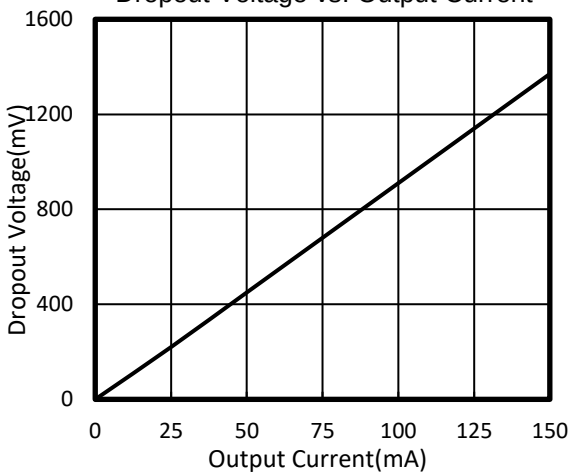
Output Short Waveform



Dropout Voltage vs. Temperature



Dropout Voltage vs. Output Current



APPLICATION NOTES

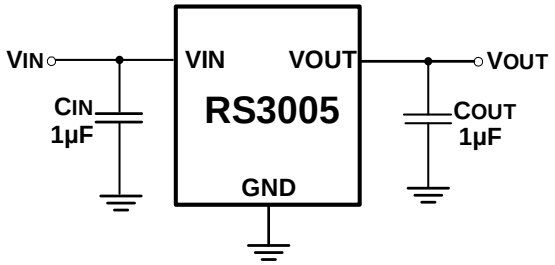
Input Capacitor and Output Capacitor

For proper operation, using a ceramic capacitor (C_{IN}) between 1μF and 10μF 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 1μF and 10μF. 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.

Thermal Considerations

When the junction temperature is too high, the thermal protection circuitry sends a signal to the control logic that will shut down the IC. The IC will restart when the temperature has sufficiently cooled down.

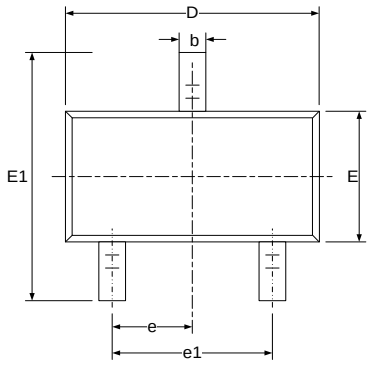
The maximum power dissipation is dependent on the thermal resistance of the case and the circuit board, the temperature difference between the die junction and the ambient air, and the rate of air flow. The GND pin must be connected to the ground plane for proper dissipation.

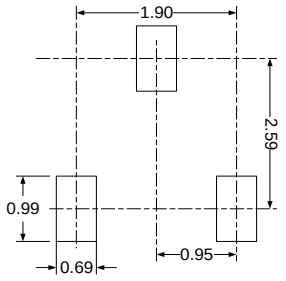


Typical Application Circuit

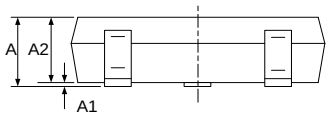
PACKAGE OUTLINE DIMENSIONS

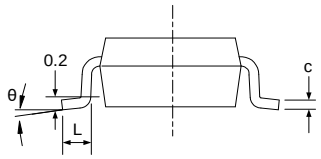
SOT23-3





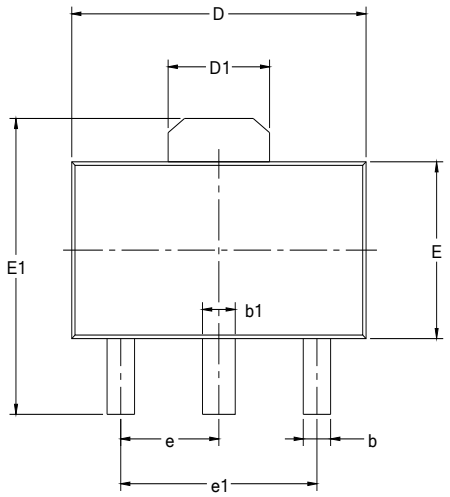
RECOMMENDED LAND PATTERN (Unit: mm)

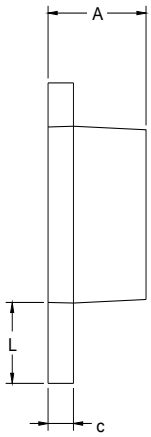


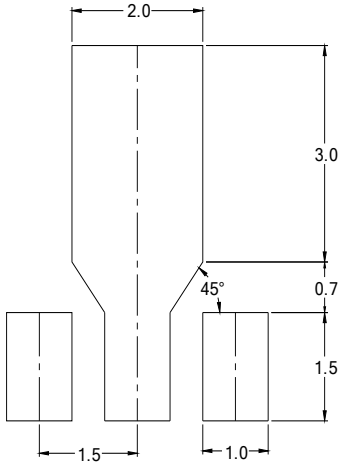


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

SOT89-3L







RECOMMENDED LAND PATTERN (Unit: mm)

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

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