Not Recommend for New Design
Recommend SGM2021

SG2011
300mA, Low Power, Low Dropout, Linear Regulators

GENERAL DESCRIPTION

The SG2011 low-power, low-dropout, CMOS linear voltage regulators operate from a 2.5V to 5.5V input and deliver up to 300mA. They are perfect choice for low voltage, low power applications. An ultra low ground current (110μA at 300mA output) makes them attractive for battery operated power systems. The SG2011 series also offer ultra low dropout voltage (210mV at 300mA output) to prolong battery life in portable electronics.

The output voltage is preset to voltages in the range of 1.5V to 5.0V. Other features include foldback current limit and thermal shut-down protection.

SG2011 comes in Green SOT-23-3 and SOT-89-3 packages.

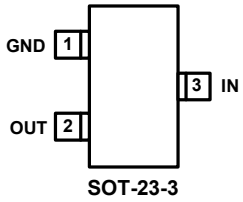
APPLICATIONS

Cellular Telephones
Digital Cameras
MP3、MP4
USB 2.0
Modems
PC Cameras
Hand-Held Instruments
Electronic Dictionaries
Portable/Battery-Powered Equipment

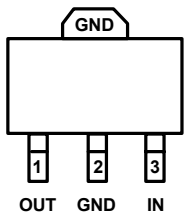
FEATURES

- **Ultra-Low Dropout Voltage:**
  210mV at 300mA Output
- **Low 80μA No-Load Supply Current**
- **Low 110μA Operating Supply Current**
  at 300mA Output
- **Thermal-Overload Protection**
- **Output Current Limit**
- **Preset Output Voltages (±1.8% Accuracy)**
- **Output Voltage:**
  Available in Fixed Outputs of 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V and 3.6V

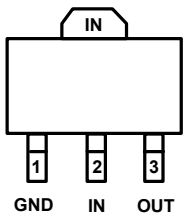
PIN CONFIGURATIONS (TOP VIEW)



SOT-23-3

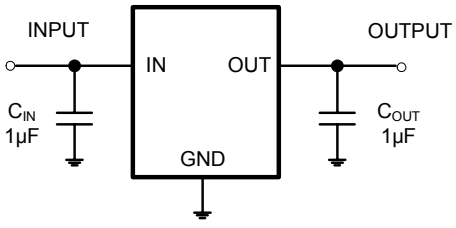


SOT-89-3



SOT-89-3(L-Type)

TYPICAL OPERATION CIRCUIT



PIN DESCRIPTION

NAME	FUNCTION
IN	Regulator Input. Supply voltage can range from 2.5V to 5.5V.
GND	Ground.
OUT	Regulator Output.

PACKAGE/ORDERING INFORMATION

MODEL	V_{OUT} (V)	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SG2011-1.5	1.5V	SOT-23-3	-40℃ to +125℃	SG2011-1.5XN3/TR	XB15	Tape and Reel, 3000
		SOT-89-3		SG2011-1.5XK3/TR	SG2011-1.5XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-1.5XK3L/TR	SG2011-1.5XK3L	Tape and Reel, 1000
SG2011-1.8	1.8V	SOT-23-3	-40℃ to +125℃	SG2011-1.8XN3/TR	XB18	Tape and Reel, 3000
		SOT-89-3		SG2011-1.8XK3/TR	SG2011-1.8XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-1.8XK3L/TR	SG2011-1.8XK3L	Tape and Reel, 1000
SG2011-2.5	2.5V	SOT-23-3	-40℃ to +125℃	SG2011-2.5XN3/TR	XB25	Tape and Reel, 3000
		SOT-89-3		SG2011-2.5XK3/TR	SG2011-2.5XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-2.5XK3L/TR	SG2011-2.5XK3L	Tape and Reel, 1000
SG2011-2.8	2.8V	SOT-23-3	-40℃ to +125℃	SG2011-2.8XN3/TR	XB28	Tape and Reel, 3000
		SOT-89-3		SG2011-2.8XK3/TR	SG2011-2.8XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-2.8XK3L/TR	SG2011-2.8XK3L	Tape and Reel, 1000
SG2011-3.0	3.0V	SOT-23-3	-40℃ to +125℃	SG2011-3.0XN3/TR	XB30	Tape and Reel, 3000
		SOT-89-3		SG2011-3.0XK3/TR	SG2011-3.0XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-3.0XK3L/TR	SG2011-3.0XK3L	Tape and Reel, 1000
SG2011-3.3	3.3V	SOT-23-3	-40℃ to +125℃	SG2011-3.3XN3/TR	XB33	Tape and Reel, 3000
		SOT-89-3		SG2011-3.3XK3/TR	SG2011-3.3XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-3.3XK3L/TR	SG2011-3.3XK3L	Tape and Reel, 1000
SG2011-3.6	3.6V	SOT-23-3	-40℃ to +125℃	SG2011-3.6XN3/TR	XB36	Tape and Reel, 3000
		SOT-89-3		SG2011-3.6XK3/TR	SG2011-3.6XK3	Tape and Reel, 1000
		SOT-89-3(L-Type)		SG2011-3.6XK3L/TR	SG2011-3.6XK3L	Tape and Reel, 1000

ABSOLUTE MAXIMUM RATINGS

IN to GND.....-0.3V to 6V
Output Short-Circuit Duration.....Infinite
OUT to GND.....-0.3V to (V_{IN} + 0.3V)
Power Dissipation, P_D @ T_A = 25℃
SOT-23-3 .....0.4W
SOT-89-3 .....0.571W
Package Thermal Resistance
SOT-23-3, θ_{JA}..... 250℃/W
SOT-89-3, θ_{JA}.....175℃/W
Operating Temperature Range.....-40℃ to +125℃
Junction Temperature.....150℃
Storage Temperature.....-65℃ to +150℃
Lead Temperature (soldering, 10s).....260℃
ESD Susceptibility
HBM.....7000V
MM.....400V

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD if you don’t pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. 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.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the last datasheet.

ELECTRICAL CHARACTERISTICS

(V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), T_A = -40℃ to +125℃. Typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}			2.5		5.5	V
Output Voltage Accuracy		I_{OUT} = 0.1mA, T_A = +25℃		-1.8		1.8	%
		I_{OUT} = 0.1mA to 300mA, T_A = 0℃ to +70℃				2.5	
		I_{OUT} = 0.1mA to 300mA, T_A = -40℃ to +125℃				2.9	
Output Current				300			mA
Current Limit	I_{LIM}			310	750		mA
Ground Pin Current	I_Q	No Load			80	140	μA
		I_{OUT} = 300mA			110		
Dropout Voltage (1)		I_{OUT} = 1mA			0.8		mV
		I_{OUT} = 300mA			210	340	
Line Regulation	ΔV_{LNR}	V_{IN} = 2.5V or (V_{OUT} + 0.1V) to 5.5V, I_{OUT} = 1mA			0.004	0.15	%/ V
Load Regulation	ΔV_{LDR}	I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF			0.0005	0.002	%/mA
Output Voltage Noise	e_n	f = 10Hz to 100kHz, C_{OUT} = 10μF			120		μV_{RMS}
Power Supply Rejection Rate	PSRR	I_{Load} = 50mA, C_{OUT} = 1μF	f = 100Hz		74		dB
			f = 1kHz		54		dB
THERMAL PROTECTION							
Thermal Shutdown Temperature	T_{SHDN}				160		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}				15		℃

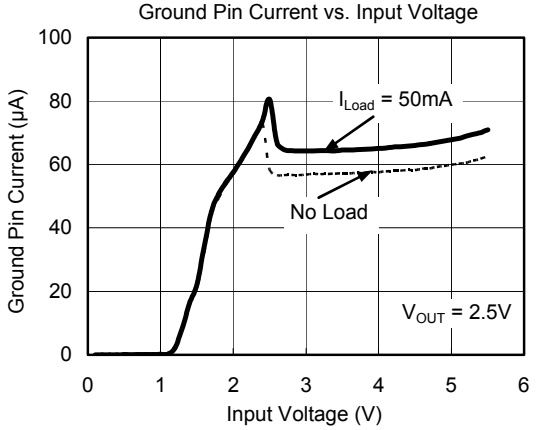
NOTE:

1. 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} + 0.5V. (Only applicable for V_{OUT} = +2.5V to +5.0V)

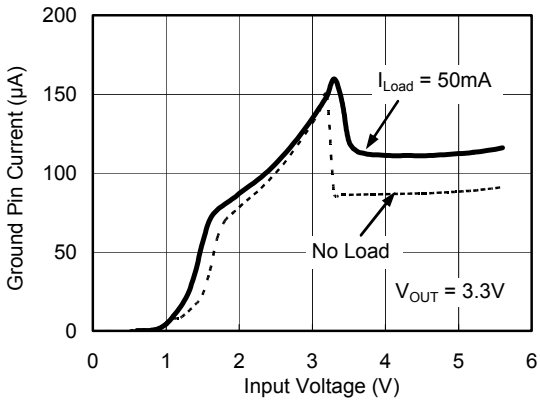
TYPICAL OPERATING CHARACTERISTICS

V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.

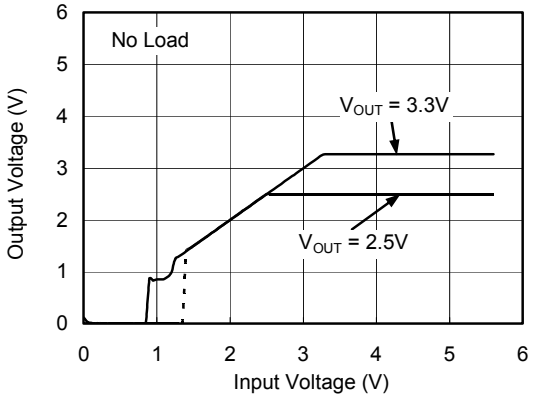
Ground Pin Current vs. Input Voltage



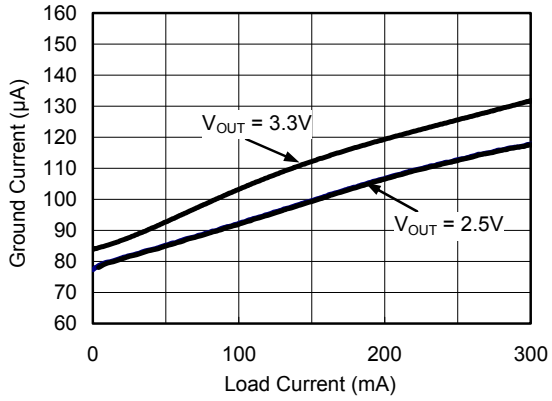
Ground Pin Current vs. Input Voltage



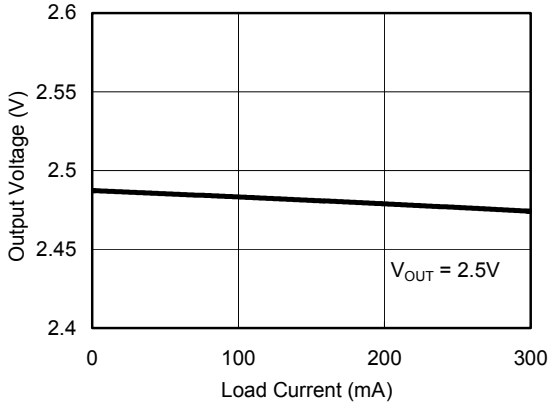
Output Voltage vs. Input Voltage



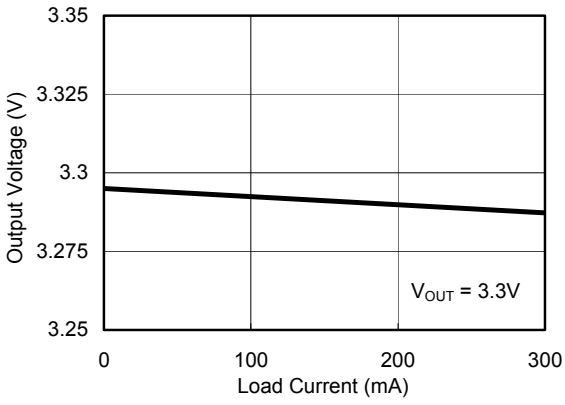
Ground Pin Current vs. Load Current



Output Voltage vs. Load Current



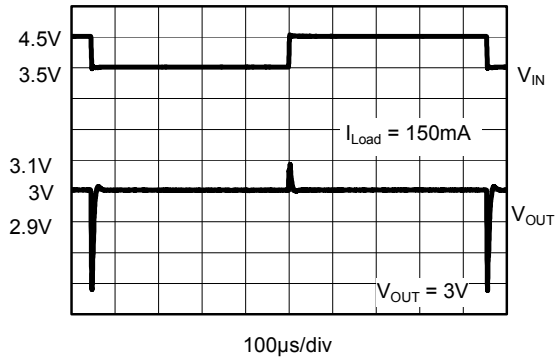
Output Vlotage vs. Load Current



TYPICAL OPERATING CHARACTERISTICS

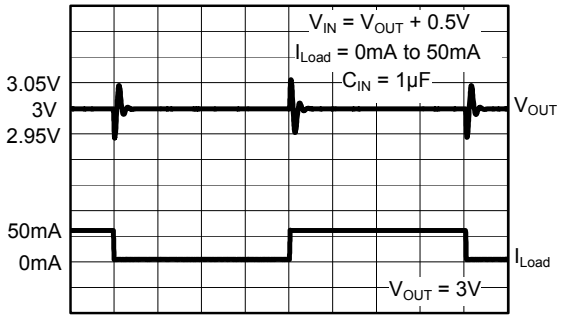
V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.

Line-Transient Response



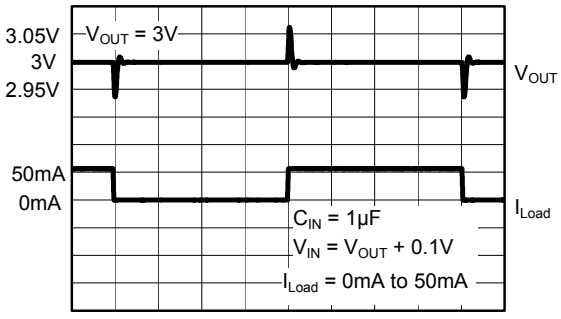
100μs/div

Load-Transient Response



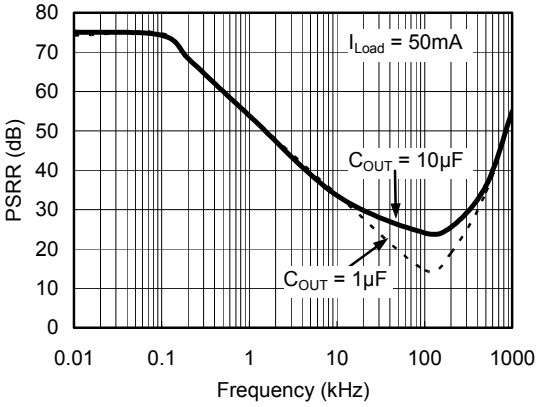
40μs/div

Load-Transient Response Near Dropout

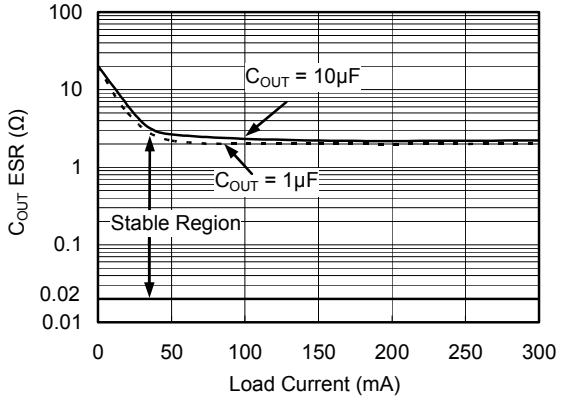


40μs/div

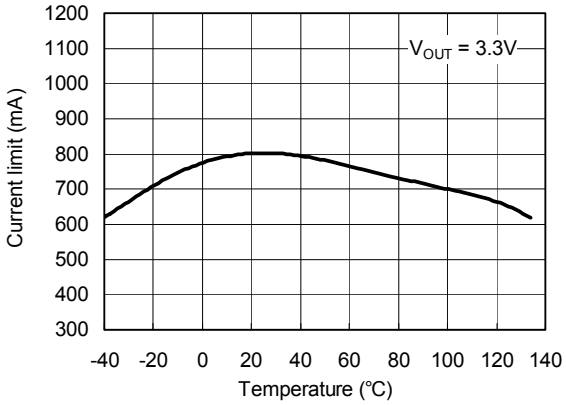
Power-Supply Rejection Ratio vs. Frequency



Region of Stable C_{OUT} ESR vs. Load Current



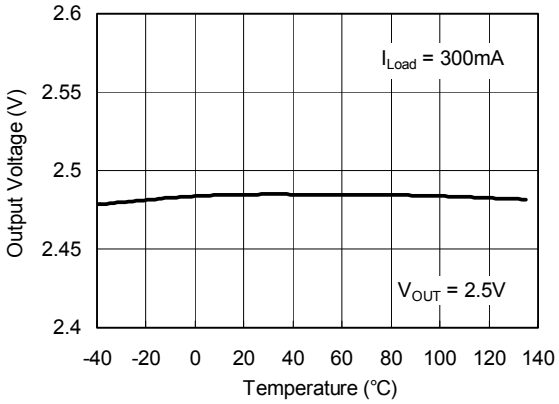
Current limit vs. Temperature



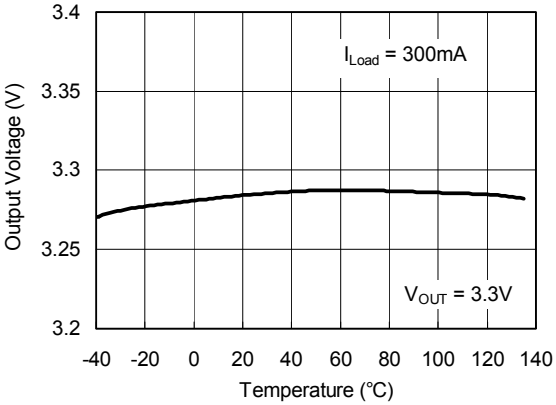
TYPICAL OPERATING CHARACTERISTICS

V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.

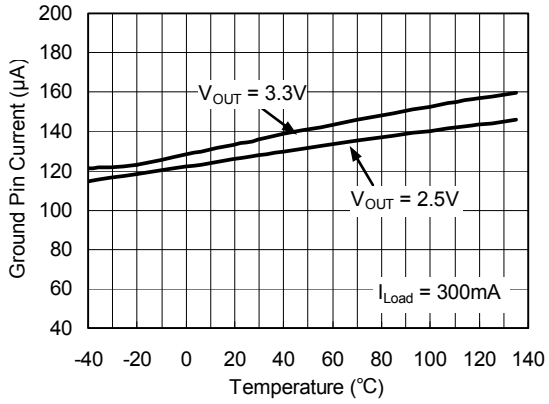
Output Voltage vs. Temperature



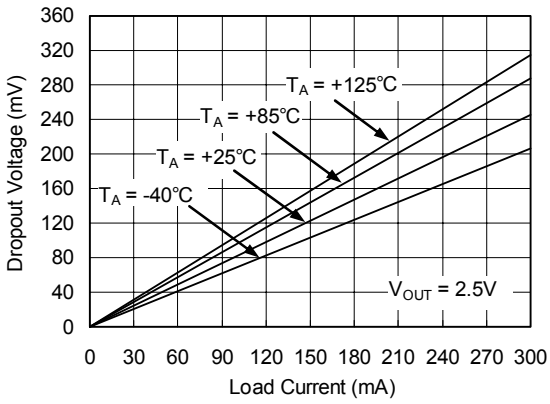
Output Voltage vs. Temperature



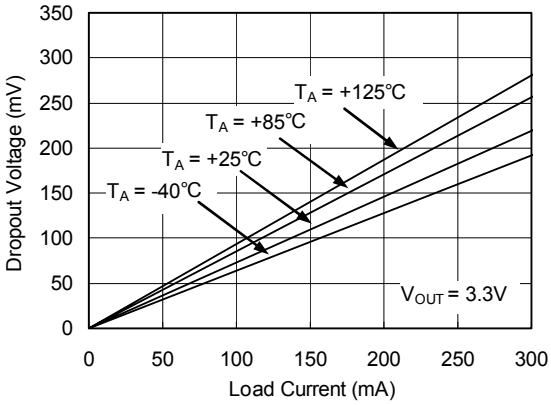
Ground Pin Current vs. Temperature



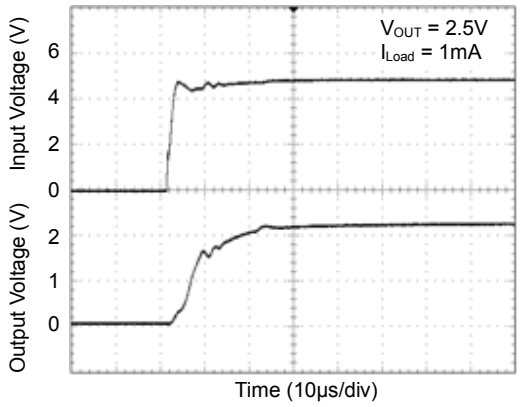
Dropout Voltage vs. Load Current



Dropout Voltage vs. Load Current

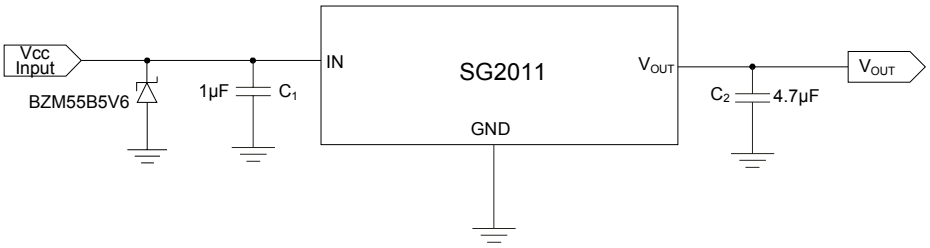


Start Up



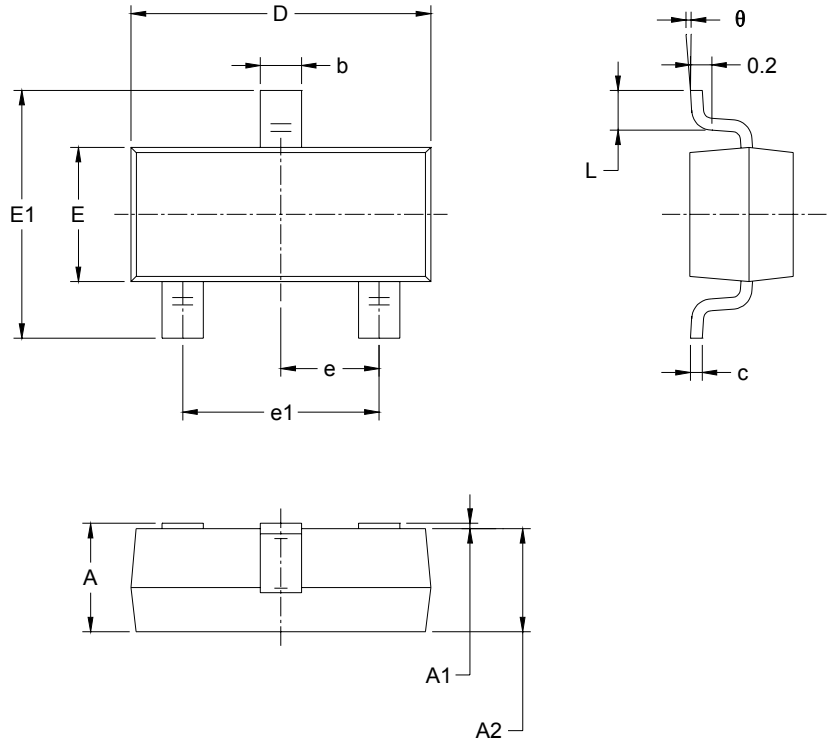
APPLICATION NOTES

When LDO is used in handheld products, attention must be paid to voltage spikes which could damage SG2011. In such applications, voltage spikes will be generated at charger interface and V_{BUS} pin of USB interface when charger adapters and USB equipments are hot-plugged. Besides this, handheld products will be tested on the production line without battery. Test engineer will apply power from the connector pin which connects with positive pole of the battery. When external power supply is turned on suddenly, the voltage spikes will be generated at the battery connector. The voltage spikes will be very high, and it always exceeds the absolute maximum input voltage (6.0V) of LDO. In order to get robust design, design engineer needs to clear up this voltage spike. Zener diode is a cheap and effective solution to eliminate such voltage spike. For example, BZM55B5V6 is a 5.6V small package Zener diode which can be used to remove voltage spikes in cell phone designs. The schematic is shown below.



PACKAGE OUTLINE DIMENSIONS

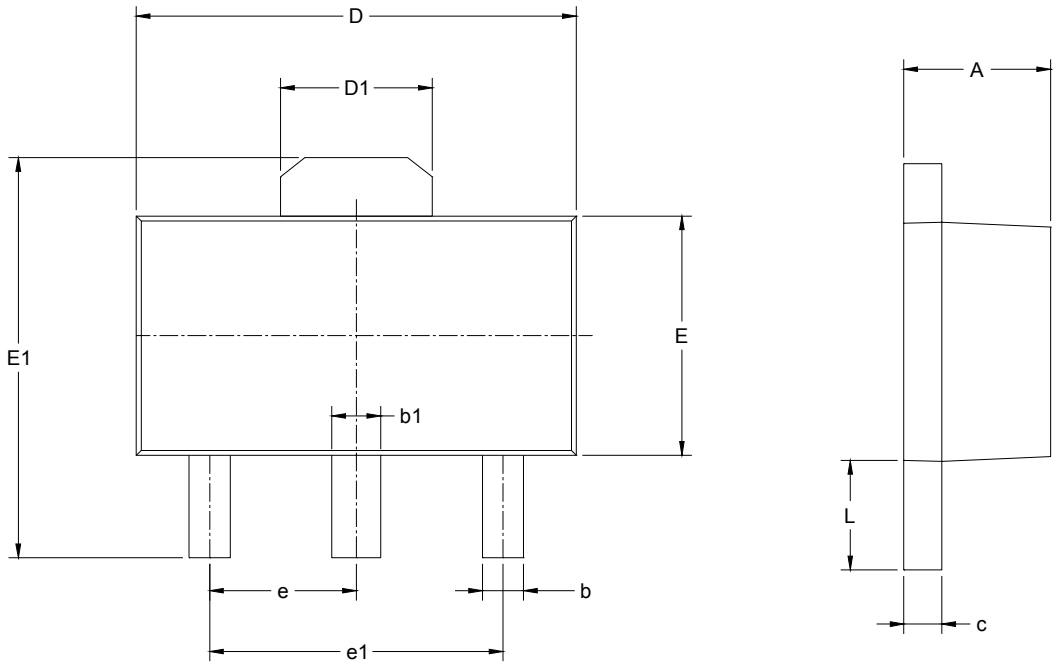
SOT-23-3



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	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOT-89-3



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 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047