SGM2013
300mA, Low Power, Low Dropout, 3-Terminal, Linear Regulator

GENERAL DESCRIPTION

The SGM2013 is a 3-terminal, low noise and low dropout linear regulator. It is capable of supplying 300mA output current with typical dropout voltage of only 270mV. The operating input voltage range is from 2.5V to 5.5V and output voltage range is from 1.2V to 3.3V.

Other features include output current limit and thermal shutdown protection.

The SGM2013 is suitable for application which needs low noise, low dropout voltage and low power supply, such as power supply of cellular telephone, etc.

The SGM2013 is available in a Green SOT-89-3 package. It operates over an operating temperature range of -40℃ to +125℃.

FEATURES

- **Operating Input Voltage Range: 2.5V to 5.5V**
- **Fixed Output Voltages:**
  1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V and 3.3V
- **Maximum Output Current: 300mA**
- **Output Voltage Accuracy: ±2.5% at +25℃**
- **Low Output Noise: 140μV_{RMS} (TYP)**
- **Low Dropout Voltage: 270mV (TYP) at 300mA**
- **High PSRR: 72dB (TYP) at 1kHz**
- **Thermal Shutdown Protection**
- **Output Current Limit**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SOT-89-3 Package**

APPLICATIONS

Modems
MP3 Players
Cellular Telephones
PCMCIA Cards
Palmtop Computers
Portable Electronics

TYPICAL APPLICATION

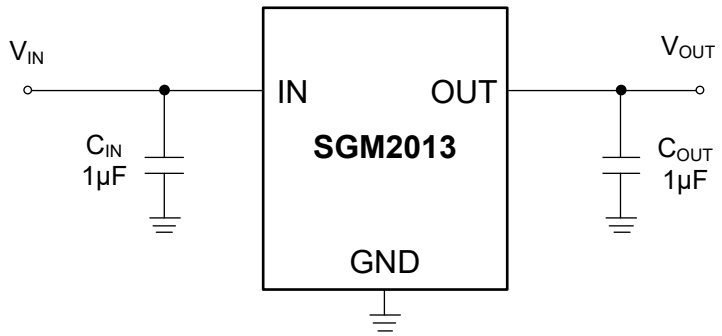


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	V_{OUT} (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2013-1.2	1.2V	SOT-89-3	-40℃ to +125℃	SGM2013-1.2XK3/TR	SGM2013-1.2XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-1.2XK3L/TR	SGM2013-1.2XK3L	Tape and Reel, 1000
SGM2013-1.5	1.5V	SOT-89-3	-40℃ to +125℃	SGM2013-1.5XK3/TR	SGM2013-1.5XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-1.5XK3L/TR	SGM2013-1.5XK3L	Tape and Reel, 1000
SGM2013-1.8	1.8V	SOT-89-3	-40℃ to +125℃	SGM2013-1.8XK3/TR	SGM2013-1.8XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-1.8XK3L/TR	SGM2013-1.8XK3L	Tape and Reel, 1000
SGM2013-2.5	2.5V	SOT-89-3	-40℃ to +125℃	SGM2013-2.5XK3/TR	SGM2013-2.5XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-2.5XK3L/TR	SGM2013-2.5XK3L	Tape and Reel, 1000
SGM2013-2.8	2.8V	SOT-89-3	-40℃ to +125℃	SGM2013-2.8XK3/TR	SGM2013-2.8XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-2.8XK3L/TR	SGM2013-2.8XK3L	Tape and Reel, 1000
SGM2013-3.0	3.0V	SOT-89-3	-40℃ to +125℃	SGM2013-3.0XK3/TR	SGM2013-3.0XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-3.0XK3L/TR	SGM2013-3.0XK3L	Tape and Reel, 1000
SGM2013-3.3	3.3V	SOT-89-3	-40℃ to +125℃	SGM2013-3.3XK3/TR	SGM2013-3.3XK3	Tape and Reel, 1000
		SOT-89-3 (L-Type)	-40℃ to +125℃	SGM2013-3.3XK3L/TR	SGM2013-3.3XK3L	Tape and Reel, 1000

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

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-89-3 ..... 0.571W
Package Thermal Resistance
SOT-89-3, θ_{JA} ..... 175℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
MM 400V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +125℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

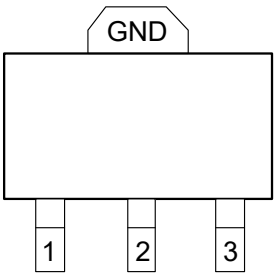
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

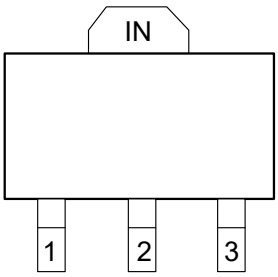
PIN CONFIGURATIONS

(TOP VIEW)



SOT-89-3

(TOP VIEW)



SOT-89-3 (L-Type)

PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT-89-3	SOT-89-3 (L-Type)		
1	3	OUT	Regulator Output Pin. It is recommended to use an output capacitor with effective capacitance of 1μF. The capacitor should be located very close to this pin.
2	1	GND	Ground.
3	2	IN	Input Voltage Supply Pin. It is recommended to use a 1μF or larger ceramic capacitor from IN pin to ground.

ELECTRICAL CHARACTERISTICS

(V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V, whichever is greater, 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		-2.5		2.5	%
Maximum Output Current				300			mA
Current Limit	I_{LIM}			310	500		mA
Ground Pin Current	I_Q	No load, EN = 2V			100	200	μA
Dropout Voltage (1)		I_{OUT} = 1mA			0.9		mV
		I_{OUT} = 300mA			270	400	
Line Regulation	ΔV_{LNR}	V_{IN} = 2.5V or (V_{OUT} + 0.5V) to 5.5V, I_{OUT} = 1mA			0.02	0.05	%/V
Load Regulation	ΔV_{LDR}	I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} > 2V			0.002	0.005	%/mA
		I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} ≤ 2V			0.004	0.008	
Output Voltage Noise	e_n	f = 10Hz to 100kHz, C_{OUT} = 10μF			140		μV_{RMS}
Power Supply Rejection Ratio	PSRR	I_{OUT} = 50mA, C_{OUT} = 1μF, V_{IN} = V_{OUT} + 1V	f = 217Hz		72		dB
			f = 1kHz		72		dB
THERMAL PROTECTION							
Thermal Shutdown Temperature	T_{SHDN}				150		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}				15		℃

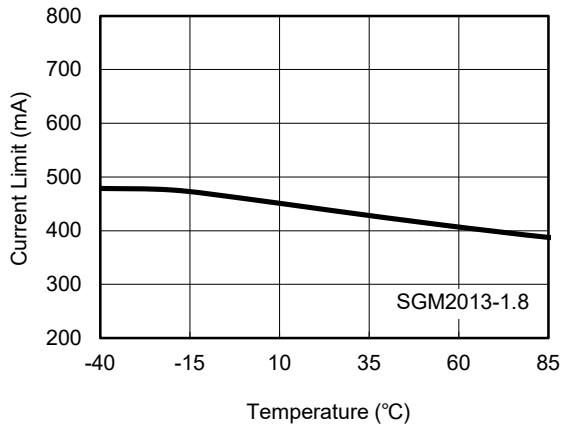
NOTE:

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).

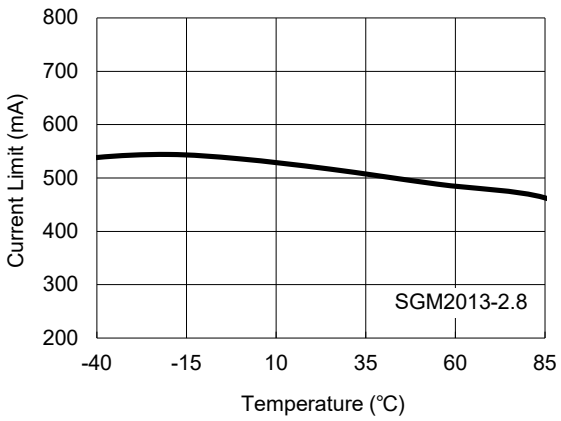
TYPICAL PERFORMANCE CHARACTERISTICS

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.

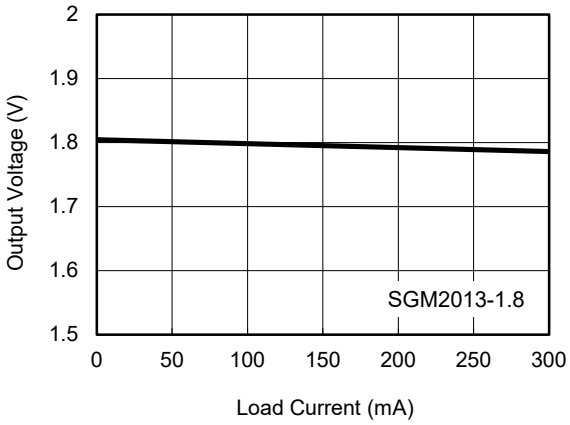
Current Limit vs. Temperature



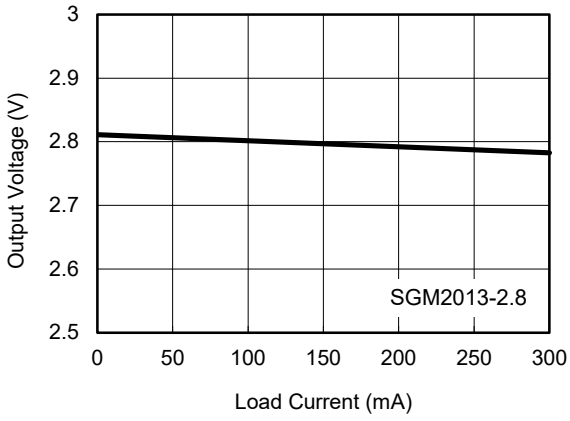
Current Limit vs. Temperature



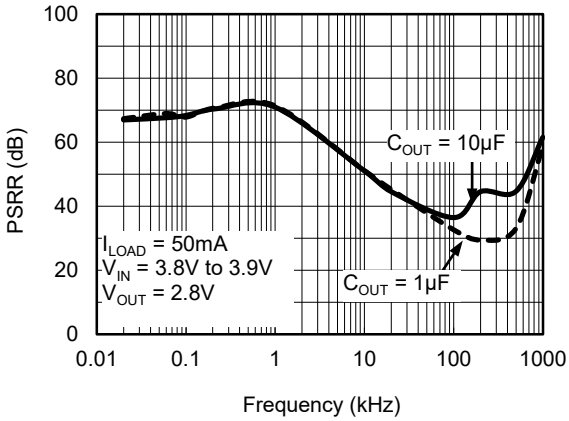
Output Voltage vs. Load Current



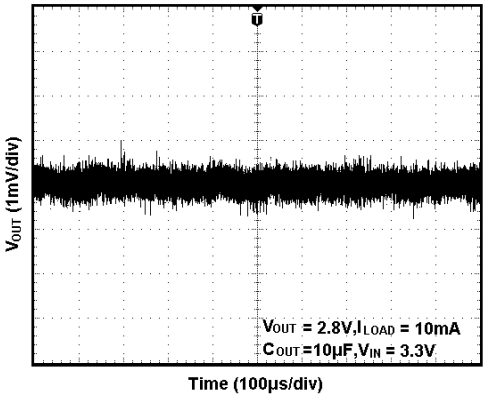
Output Voltage vs. Load Current



Power Supply Rejection Ratio vs. Frequency



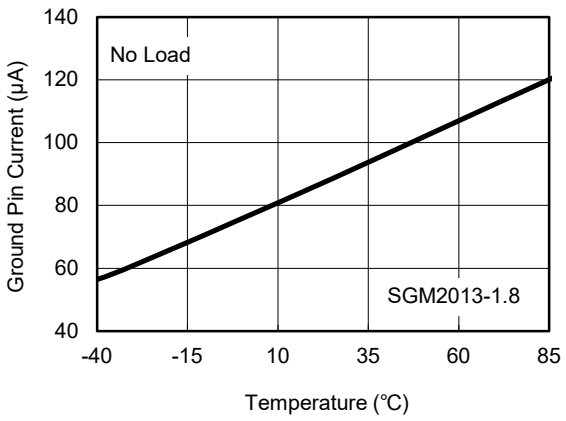
Output Noise 10Hz to 100kHz



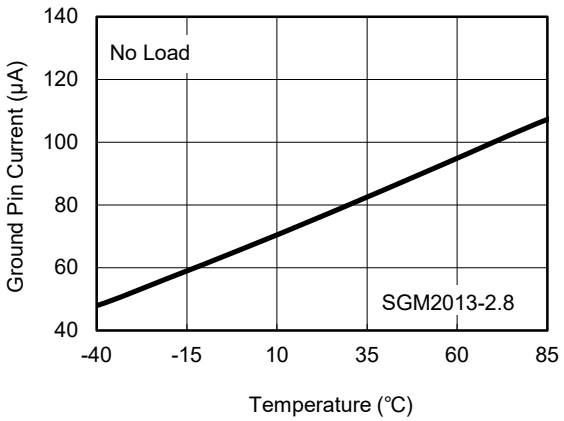
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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.

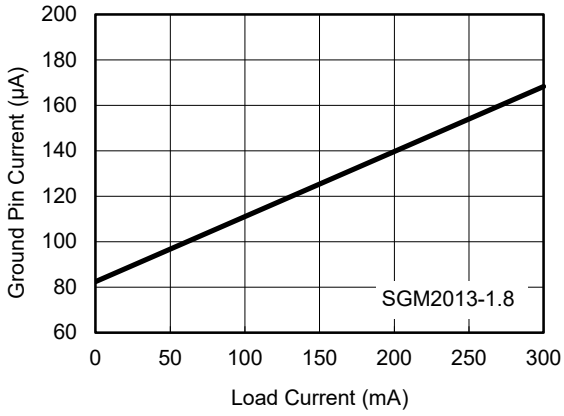
Ground Pin Current vs. Temperature



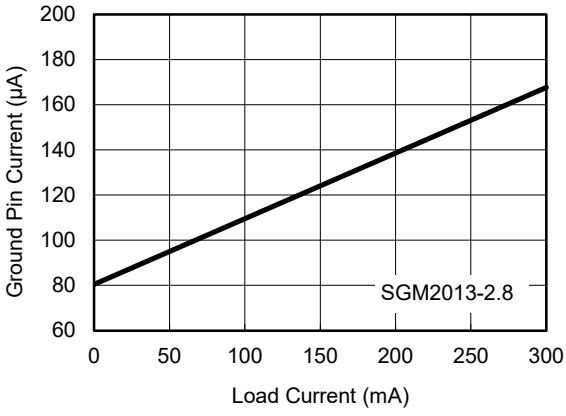
Ground Pin Current vs. Temperature



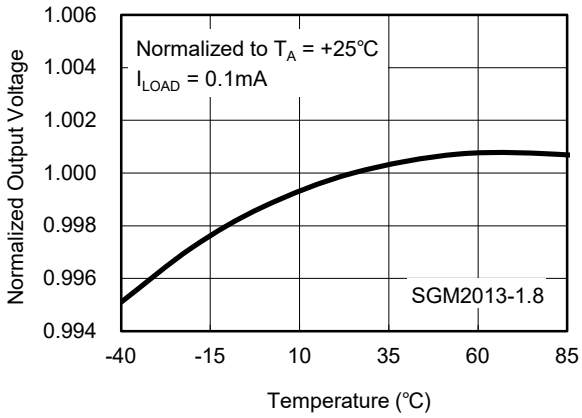
Ground Pin Current vs. Load Current



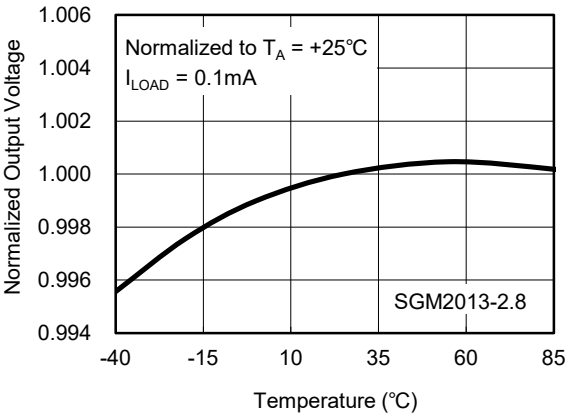
Ground Pin Current vs. Load Current



Normalized Output Voltage vs. Temperature



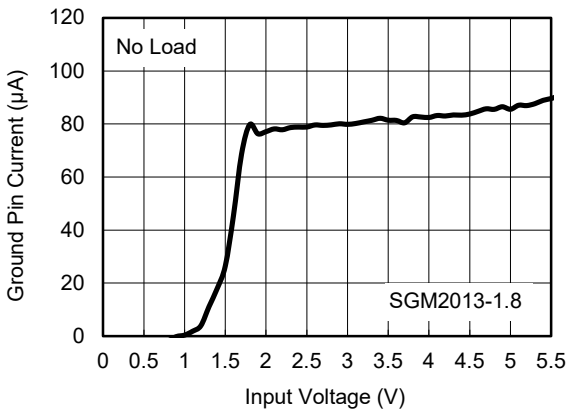
Normalized Output Voltage vs. Temperature



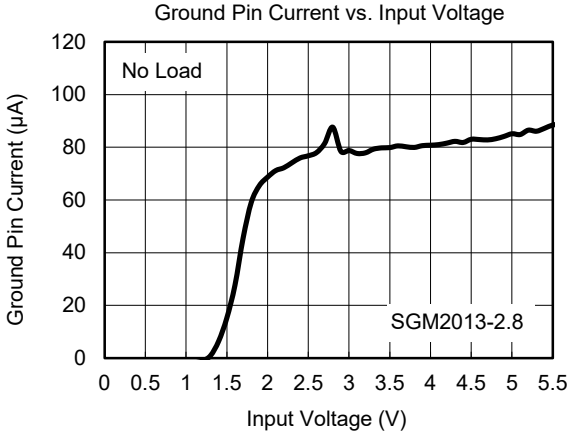
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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.

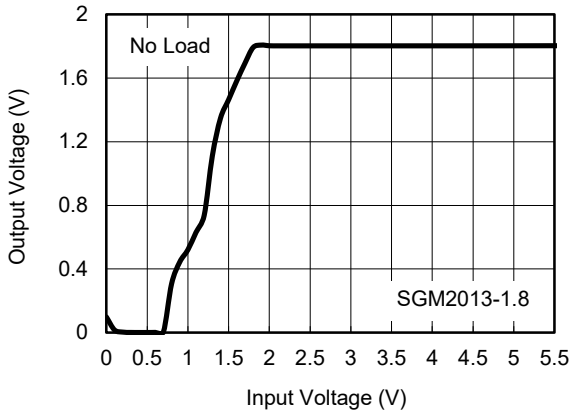
Ground Pin Current vs. Input Voltage



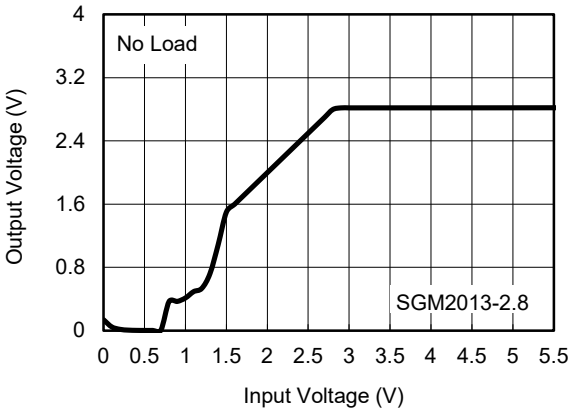
Ground Pin Current vs. Input Voltage



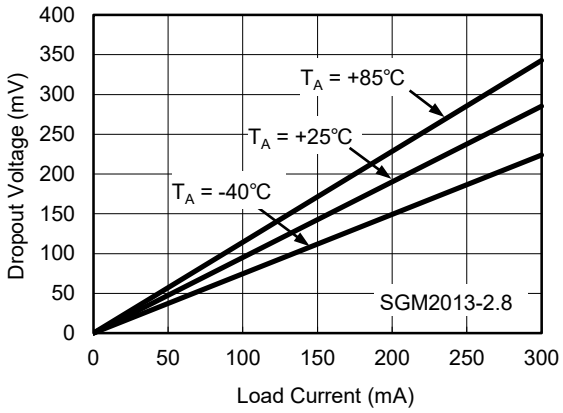
Output Voltage vs. Input Voltage



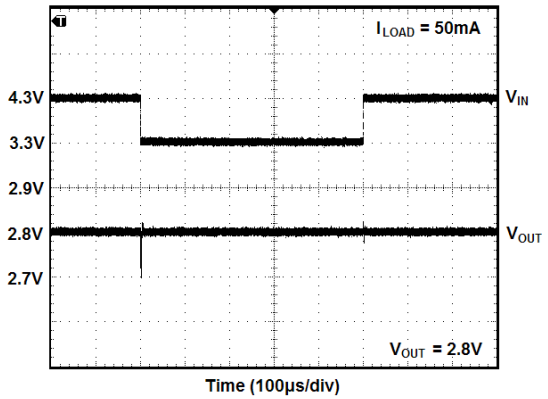
Output Voltage vs. Input Voltage



Dropout Voltage vs. Load Current



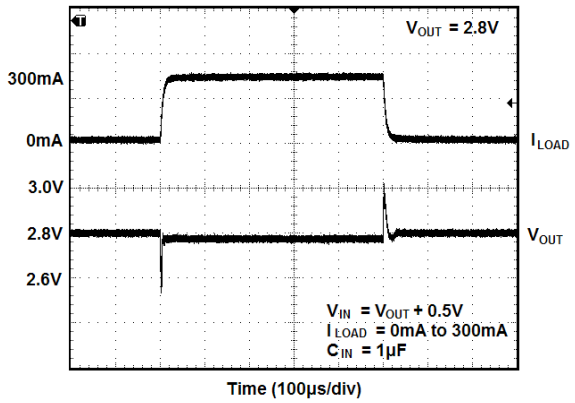
Line-Transient Response



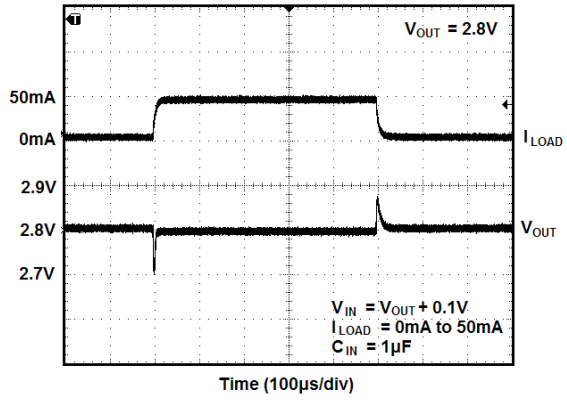
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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.

Load-Transient Response



Load-Transient Response Near Dropout



REVISION HISTORY

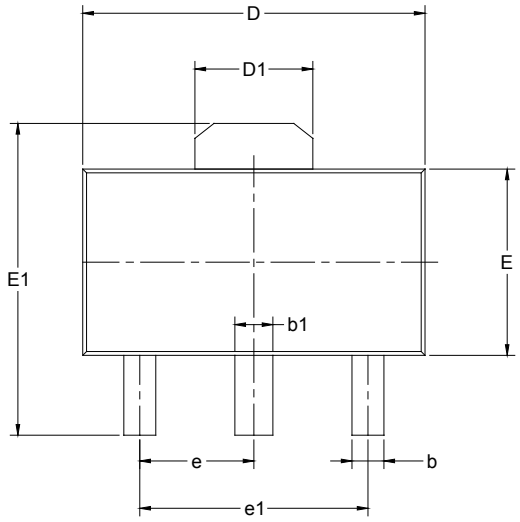
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

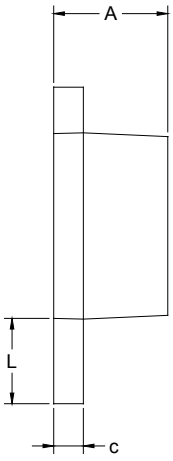
APRIL 2016 – REV.C.4 to REV.D

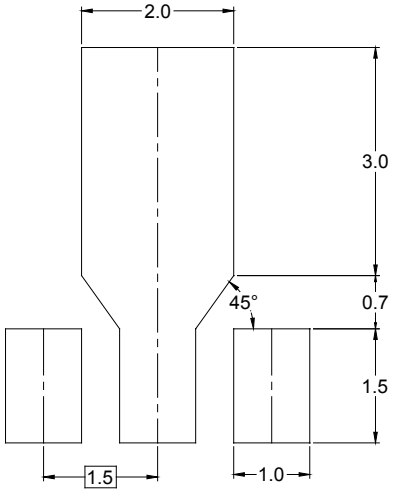
Changed the Normalized Output Voltage vs. Temperature curves 7

PACKAGE OUTLINE DIMENSIONS

SOT-89-3





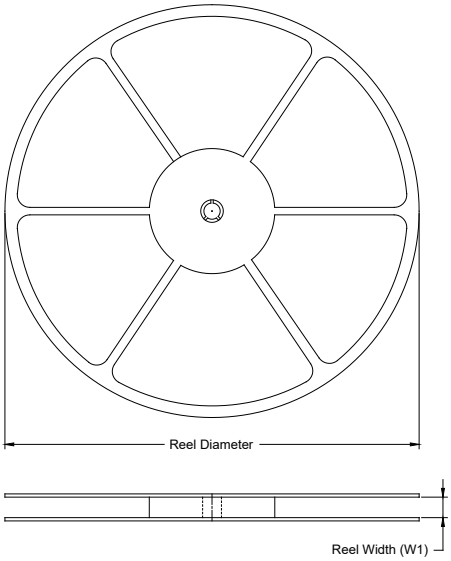


RECOMMENDED LAND PATTERN (Unit: mm)

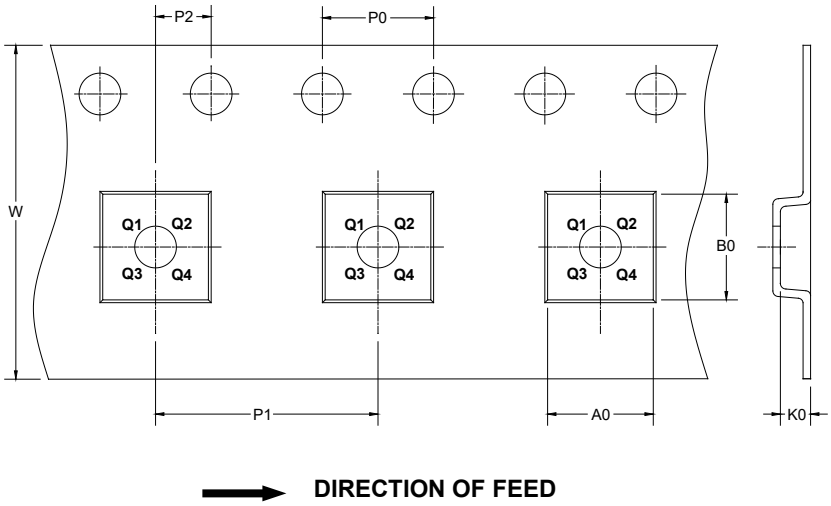
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060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

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



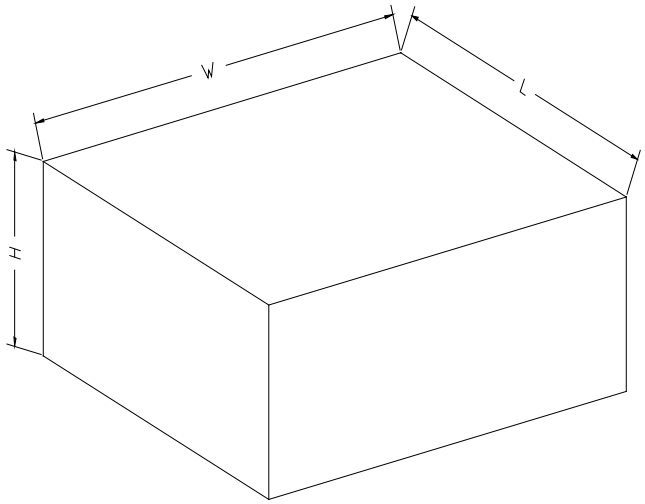
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-89-3	7″	13.2	4.85	4.45	1.85	4.0	8.0	2.0	12.0	Q3

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002