SGM2032
Low Power, Low Dropout, RF Linear Regulators

GENERAL DESCRIPTION

The SGM2032 series low power, low noise, low dropout, CMOS linear voltage regulators operate from a 2.5V to 5.5V input voltage. They are the perfect choice for low voltage, low power applications. A low ground current makes this part attractive for battery operated power systems. The SGM2032 series also offer low dropout voltage to prolong battery life in portable electronics. Systems requiring a quiet voltage source, such as RF applications, will benefit from the SGM2032 series' ultra low output noise and high PSRR. An external noise bypass capacitor connected to the device's BP pin can further reduce the noise level.

The output voltage is preset to voltages in the range of 0.9V to 5.0V. Other features include a 10nA logic-controlled shutdown mode, output current limit and thermal shutdown protection.

The SGM2032 is available in Green SOT-23-5 and SC70-5 packages. It operates over an ambient temperature range of -40℃ to +85℃.

FEATURES

- **Low Output Noise**
- **Low Dropout Voltage**
- **Thermal-Overload Protection**
- **Output Current Limit**
- **High PSRR (75dB at 1kHz)**
- **10nA Logic-Controlled Shutdown**
- **Adjustable Output from 0.8V to 5.0V**
- **Available Fixed Output Voltages: 0.9V, 1.3V, 2.1V, 2.7V, 2.9V, 3.1V, 3.2V, 3.6V, 4.2V and 5.0V**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green SOT-23-5 and SC70-5 Packages**

APPLICATIONS

Cellular Telephones
Cordless Telephones
PCMCIA Cards
Modems
MP3 Player
Hand-Held Instruments
Palmtop Computers
Electronic Planners
Portable/Battery-Powered Equipment

PACKAGE/ORDERING INFORMATION

MODEL	V_{OUT} (V)	PACKAGE DESCRIPTION	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2032-0.9	0.9	SOT-23-5	SGM2032-0.9YN5G/TR	S60XX	Tape and Reel, 3000
SGM2032-0.9	0.9	SC70-5	SGM2032-0.9YC5G/TR	S61XX	Tape and Reel, 3000
SGM2032-1.3	1.3	SC70-5	SGM2032-1.3YC5G/TR	YJ13	Tape and Reel, 3000
SGM2032-1.3	1.3	SOT-23-5	SGM2032-1.3YN5G/TR	YJ13	Tape and Reel, 3000
SGM2032-2.1	2.1	SC70-5	SGM2032-2.1YC5G/TR	YJ21	Tape and Reel, 3000
SGM2032-2.1	2.1	SOT-23-5	SGM2032-2.1YN5G/TR	YJ21	Tape and Reel, 3000
SGM2032-2.7	2.7	SC70-5	SGM2032-2.7YC5G/TR	YJ27	Tape and Reel, 3000
SGM2032-2.7	2.7	SOT-23-5	SGM2032-2.7YN5G/TR	YJ27	Tape and Reel, 3000
SGM2032-2.9	2.9	SC70-5	SGM2032-2.9YC5G/TR	YJ29	Tape and Reel, 3000
SGM2032-2.9	2.9	SOT-23-5	SGM2032-2.9YN5G/TR	YJ29	Tape and Reel, 3000
SGM2032-3.1	3.1	SC70-5	SGM2032-3.1YC5G/TR	YJ31	Tape and Reel, 3000
SGM2032-3.1	3.1	SOT-23-5	SGM2032-3.1YN5G/TR	YJ31	Tape and Reel, 3000
SGM2032-3.2	3.2	SC70-5	SGM2032-3.2YC5G/TR	YJ32	Tape and Reel, 3000
SGM2032-3.2	3.2	SOT-23-5	SGM2032-3.2YN5G/TR	YJ32	Tape and Reel, 3000
SGM2032-3.6	3.6	SC70-5	SGM2032-3.6YC5G/TR	YJ36	Tape and Reel, 3000
SGM2032-3.6	3.6	SOT-23-5	SGM2032-3.6YN5G/TR	YJ36	Tape and Reel, 3000
SGM2032-4.2	4.2	SC70-5	SGM2032-4.2YC5G/TR	YJ42	Tape and Reel, 3000
SGM2032-4.2	4.2	SOT-23-5	SGM2032-4.2YN5G/TR	YJ42	Tape and Reel, 3000
SGM2032-5.0	5.0	SC70-5	SGM2032-5.0YC5G/TR	YJ50	Tape and Reel, 3000
SGM2032-5.0	5.0	SOT-23-5	SGM2032-5.0YN5G/TR	YJ50	Tape and Reel, 3000
SGM2032-ADJ	adjustable	SOT-23-5	SGM2032-ADJYN5G/TR	S5EXX	Tape and Reel, 3000
SGM2032-ADJ	adjustable	SC70-5	SGM2032-ADJYC5G/TR	S5FXX	Tape and Reel, 3000

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.

ORDER NUMBER

SGM2032 - X X X G / TR

Tape and Reel

Green Product

Package Type

C5 SC70-5
N5 SOT-23-5

Operating Temperature Range

Y -40℃ to +85℃

Output Voltages

0.9 0.9V
1.3 1.3V
⋮ ⋮
3.6 3.6V
4.2 4.2V
5.0 5.0V
ADJ adjustable

ABSOLUTE MAXIMUM RATINGS

IN to GND ..... -0.3V to 6V
Output Short-Circuit Duration..... Infinite
EN to GND..... -0.3V to V_{IN}
OUT, BP/FB to GND ..... -0.3V to (V_{IN} + 0.3V)
Power Dissipation, P_D @ T_A = +25℃
SOT-23-5 ..... 0.4W
SC70-5..... 0.3W
Package Thermal Resistance
SOT-23-5, θ_{JA} ..... 260℃/W
SC70-5, θ_{JA}..... 330℃/W
Junction Temperature..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM..... 4000V
MM..... 400V

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range..... 2.5V to 5.5V
Operating Temperature Range..... -40℃ to +85℃

OVERSTRESS CAUTION

Stresses beyond those listed may cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

ESD SENSITIVITY CAUTION

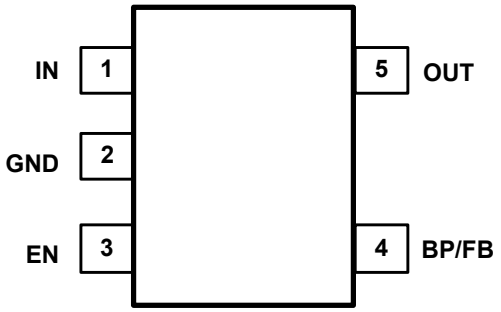
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time.

PIN CONFIGURATION

(TOP VIEW)



SOT-23-5/SC70-5

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	IN	Regulator Input. Supply voltage can range from 2.5V to 5.5V. Bypass with a 1μF capacitor to GND.
2	GND	Ground.
3	EN	Shutdown Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.
4	BP	Reference-Noise Bypass (fixed voltage version only). Bypass with a low-leakage 0.01μF ceramic capacitor for reduced noise at the output.
	FB	Feedback Pin (adjustable voltage version only). This is used to set the output voltage of the device.
5	OUT	Regulator Output.

ELECTRICAL CHARACTERISTICS

(V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V, whichever is greater, Full = -40℃ to +85℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}			+25℃	2.5		5.5	V
Output Voltage Accuracy		I_{OUT} = 0.1mA		+25℃	-2		+2	%
Feedback Voltage	V_{FB}	I_{OUT} = 0.1mA, SGM2032-ADJ		+25℃	0.784	0.8	0.816	V
Maximum Output Current		SOT-23-5		+25℃	300			mA
		V_{OUT} < 1V, SC70-5		+25℃	120			
		1V ≤ V_{OUT} ≤ 2V, SC70-5		+25℃	150			
		V_{OUT} > 2V, SC70-5		+25℃	250			
Current Limit	I_{LIM}			+25℃	310	500		mA
Ground Pin Current	I_Q	No load, EN = 2V		+25℃		120	220	μA
Dropout Voltage (1)		I_{OUT} = 1mA		+25℃		0.9		mV
		I_{OUT} = 300mA		+25℃		270	400	
Line Regulation	ΔV_{LNR}	V_{IN} = 2.5V or (V_{OUT} + 0.5V) to 5.5V, I_{OUT} = 1mA		+25℃		0.02	0.05	%/V
Load Regulation	ΔV_{LDR}	I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} > 2V		+25℃		0.002	0.005	%/mA
		I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} ≤ 2V		+25℃		0.004	0.008	
Output Voltage Noise	e_n	f = 10Hz to 100kHz, C_{BP} = 0.01μF, C_{OUT} = 10μF, Fixed Output of 0.9V		+25℃		30		μV_{RMS}
Power Supply Rejection Ratio	PSRR	C_{BP} = 0.1μF, I_{OUT} = 50mA, C_{OUT} = 1μF, Fixed Output of 0.9V	f = 217Hz	+25℃		80		dB
			f = 1kHz	+25℃		75		
SHUTDOWN (2)								
EN Input Threshold	V_{IH}	V_{IN} = 2.5V to 5.5V, V_{EN} = -0.3V to V_{IN}		Full	1.5			V
	V_{IL}			Full			0.3	
EN Input Bias Current	$I_{B(SHDN)}$	EN = 0V and EN = 5.5V		+25℃		0.01	1	μA
Shutdown Supply Current	$I_{Q(SHDN)}$	EN = 0.3V		+25℃		0.01	1	μA
Shutdown Exit Delay (3)		C_{OUT} = 1μF, No Load		+25℃		30		μs
THERMAL PROTECTION								
Thermal Shutdown Temperature	T_{SHDN}					150		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}					15		℃

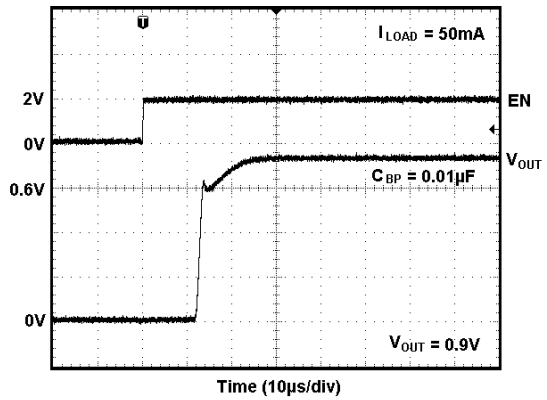
NOTES:

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).
2. V_{EN} = -0.3V to V_{IN}.
3. Time needed for V_{OUT} to reach 90% of final value.

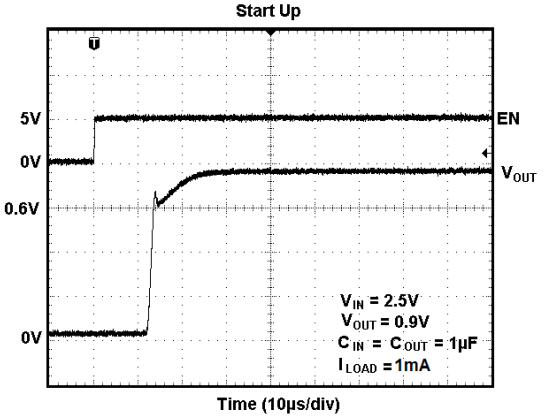
TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, C_{BP} = 0.01μF, T_A = +25℃, unless otherwise noted.

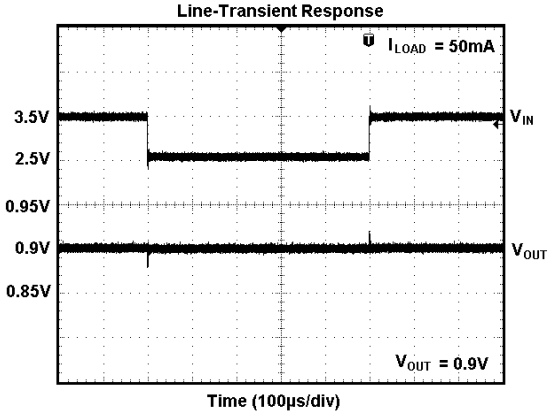
Shutdown Exit Delay



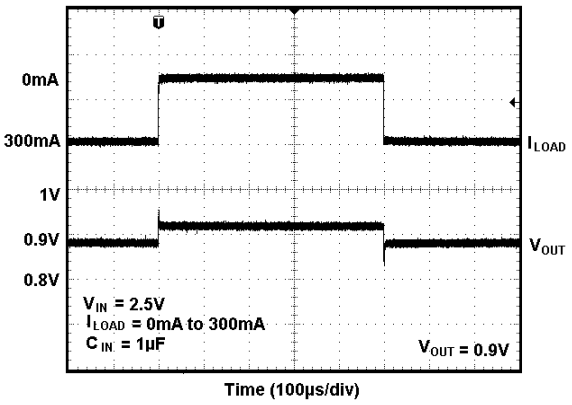
Start Up



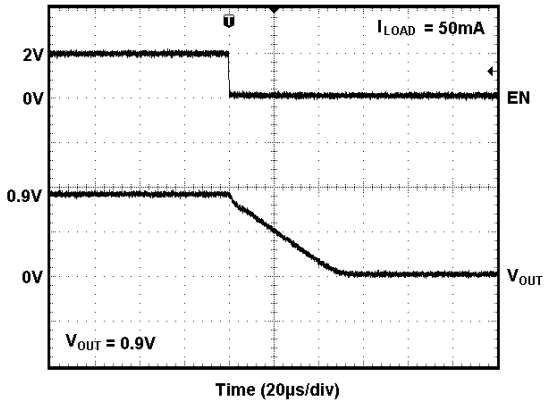
Line-Transient Response



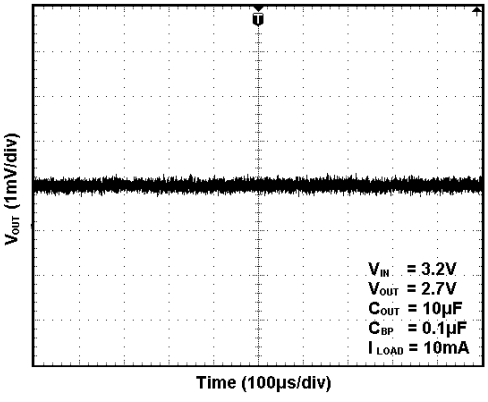
Load-Transient Response



Entering Shutdown



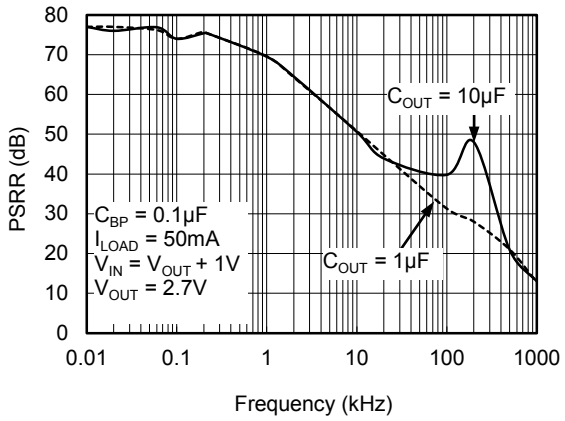
Output Noise 10Hz to 100kHz



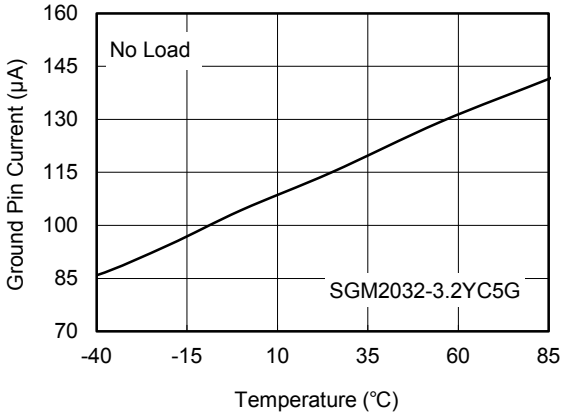
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, C_{BP} = 0.01μF, T_A = +25℃, unless otherwise noted.

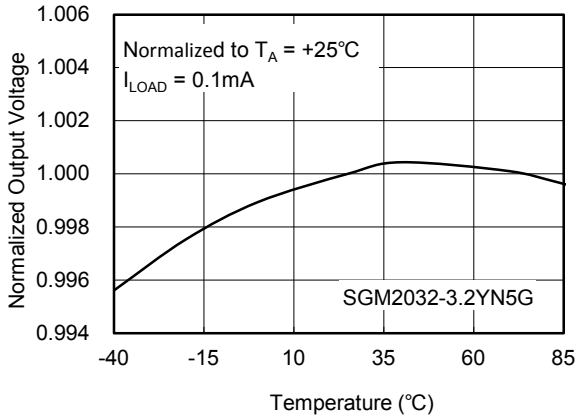
Power Supply Rejection Ratio vs. Frequency



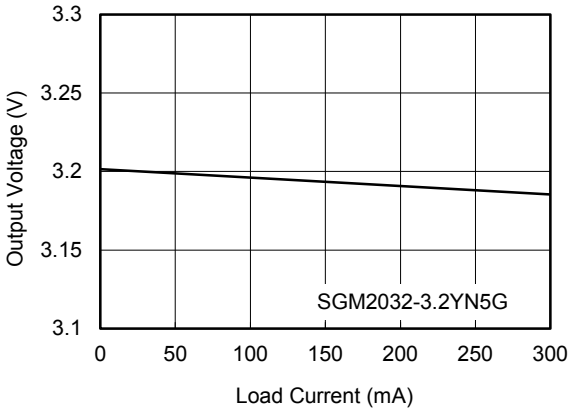
Ground Pin Current vs. Temperature



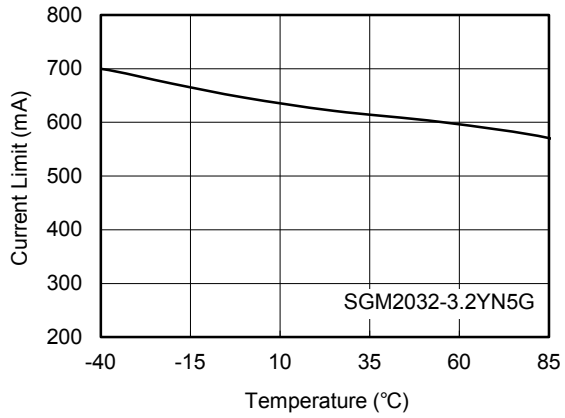
Normalized Output Voltage vs. Temperature



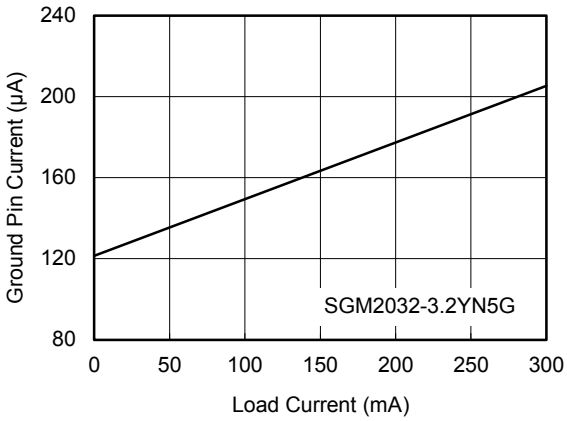
Output Voltage vs. Load Current



Current Limit vs. Temperature



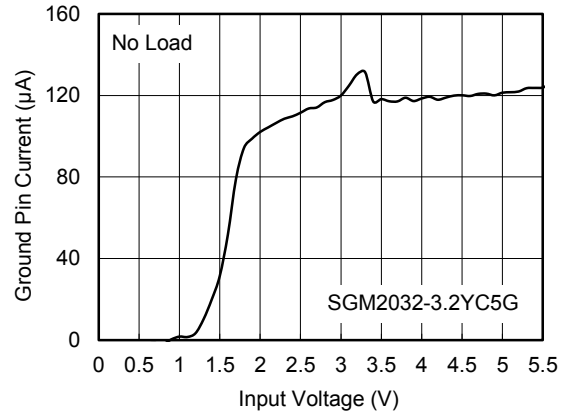
Ground Pin Current vs. Load Current



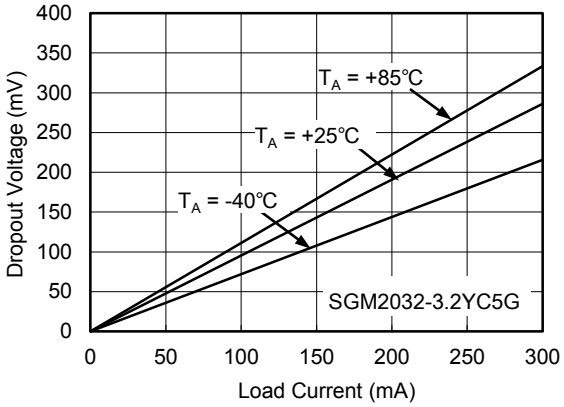
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V (whichever is greater), C_{IN} = 1μF, C_{OUT} = 1μF, C_{BP} = 0.01μF, T_A = +25℃, unless otherwise noted.

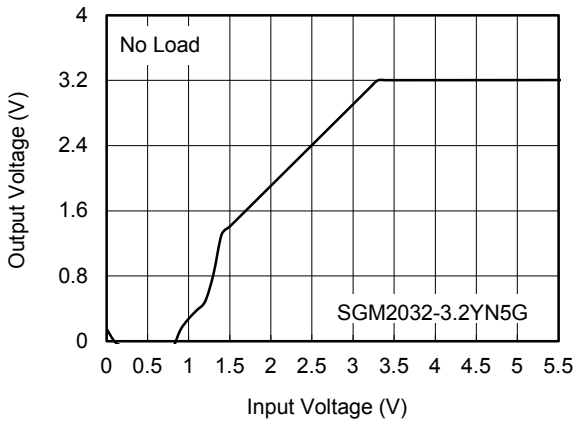
Ground Pin Current vs. Input Voltage



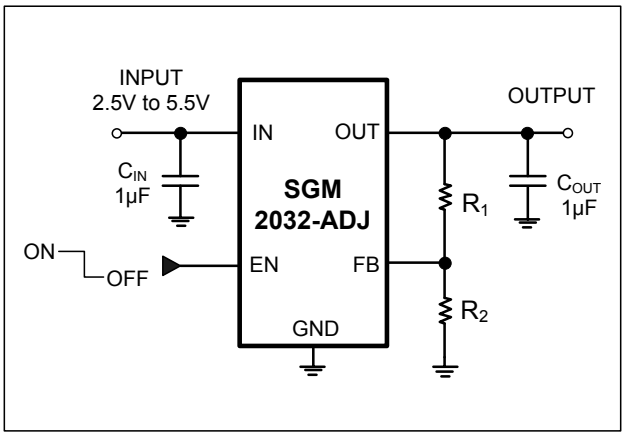
Dropout Voltage vs. Load Current

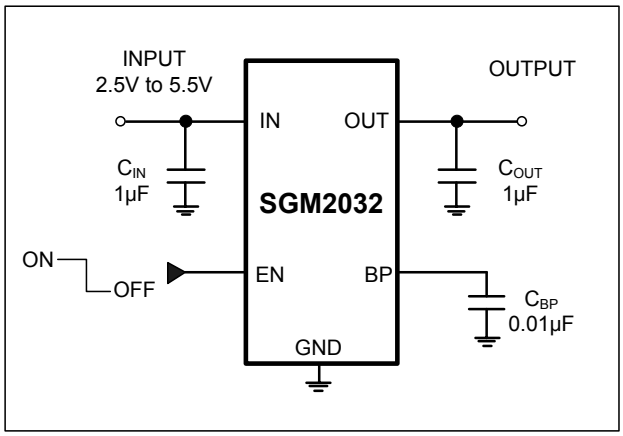


Output Voltage vs. Input Voltage



TYPICAL APPLICATION CIRCUITS





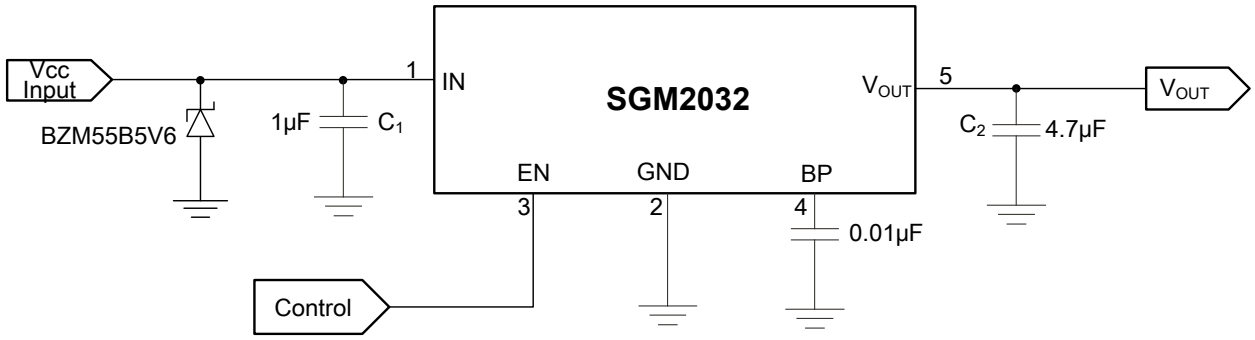
Standard 1% Resistor Values for Common Output Voltages of Adjustable Voltage Version

V_{OUT} (V)	R_1 (kΩ)	R_2 (kΩ)
0.8	0	40.2
1.0	10.5	40.2
1.5	35.7	40.2
1.8	51.1	40.2
2.5	86.6	40.2
2.7	95.3	40.2
2.85	97.6	37.4
2.9	97.6	37.0
3.0	97.6	35.7
3.6	97.6	28.0

NOTE: $V_{OUT} = (R_1 + R_2)/R_2 \times 0.8$

APPLICATION NOTE

When LDO is used in handheld products, attention must be paid to voltage spikes which could damage SGM2032. 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.



REVISION HISTORY

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

JULY 2017 – REV.A.2 to REV.A.3

Added Feedback Voltage 4

MAY 2016 – REV.A.1 to REV.A.2

Updated curve Normalized Output Voltage vs. Temperature 7

JULY 2015 – REV.A to REV.A.1

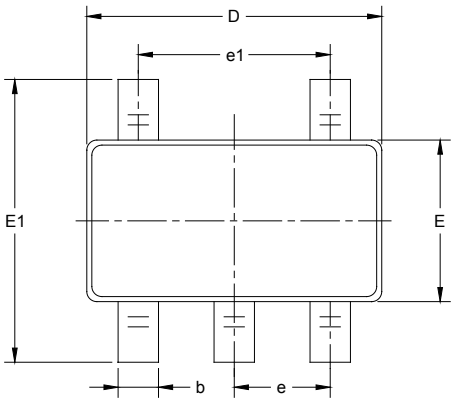
Changed the value of resistance R_1 from No Need to 0 at V_{OUT} = 0.8V 5

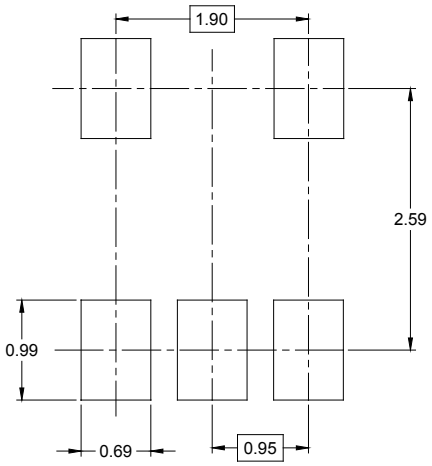
Changes from Original (APRIL 2010) to REV.A

Changed from product preview to production data ..... All

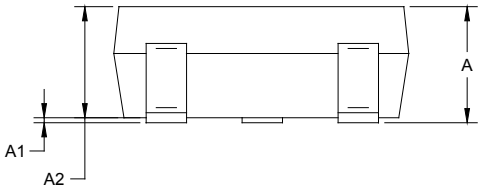
PACKAGE OUTLINE DIMENSIONS

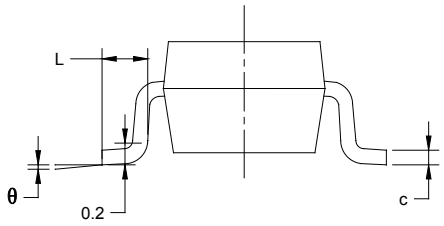
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)

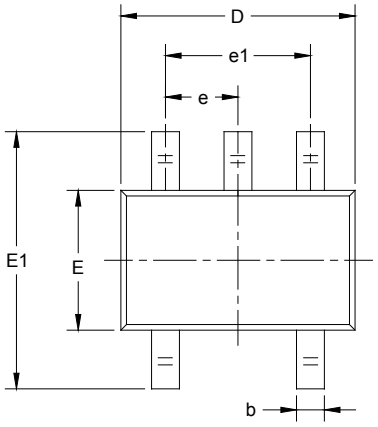


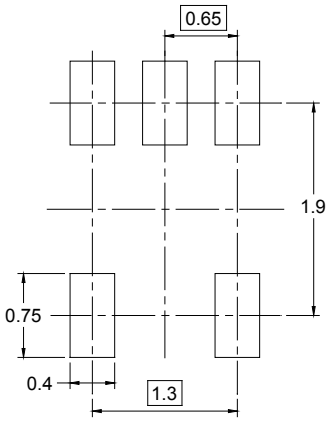


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

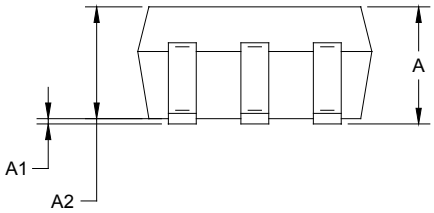
PACKAGE OUTLINE DIMENSIONS

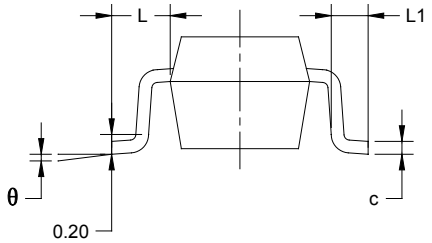
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)

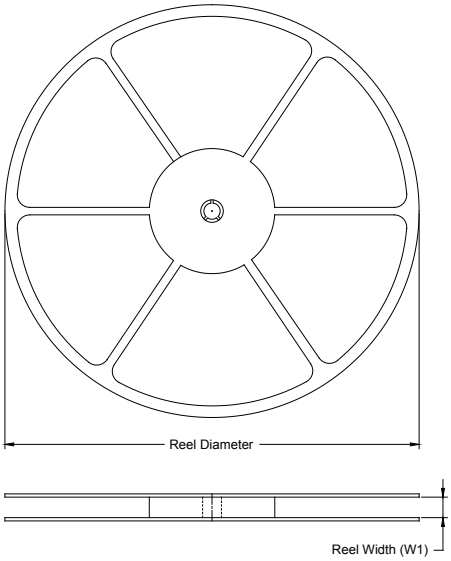




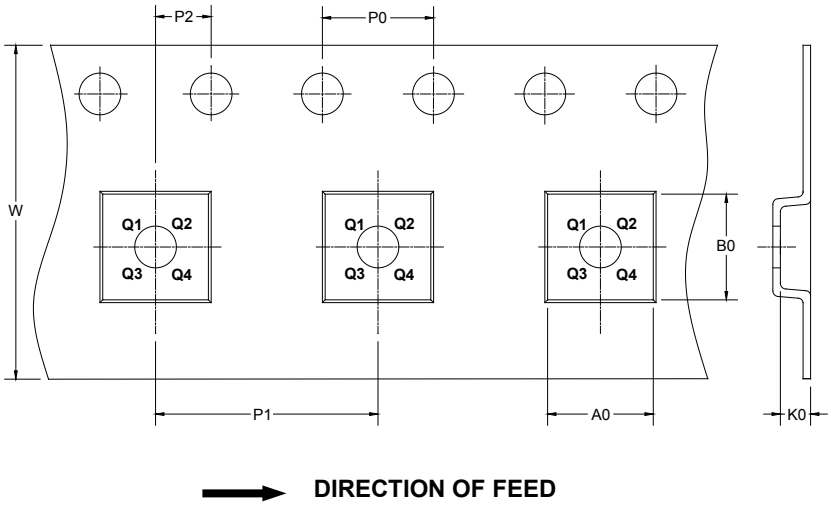
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



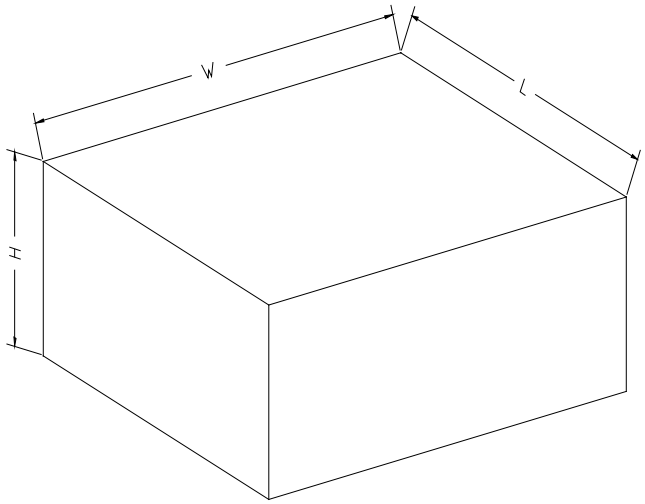
NOTE: The picture is only for reference. Please make the object as the standard.

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-23-5	7″	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SC70-5	7″	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	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