

GENERAL DESCRIPTION

The SGM2017 is a low power and low dropout voltage linear regulator. It is capable of supplying 300mA output current with typical dropout voltage of 300mV. The operating input voltage range is from 2.5V to 5.5V and fixed output voltages are 2.8V and 3.3V.

Other features include logic-controlled shutdown mode, short-circuit current limit and thermal shutdown protection.

The SGM2017 is available in a Green SOT-23-5 package. It operates over an operating temperature range of -40°C to +125°C.

FEATURES

- **Operating Input Voltage Range: 2.5V to 5.5V**
- **Fixed Outputs of 2.8V and 3.3V**
- **300mA Output Current**
- **Quiescent Current: 77µA (TYP)**
- **Low Dropout: 300mV (TYP) at 300mA**
- **Low Noise: 30µV_{RMS} (TYP) (10Hz to 100kHz)**
- **High PSRR: 73dB (TYP) at 1kHz**
- **Current Limiting and Thermal Protection**
- **Stable with Small Case Size Ceramic Capacitors**
- **Shutdown Supply Current: 0.01µA (TYP)**
- **-40°C to +125°C Operating Temperature Range**
- **Available in a Green SOT-23-5 Package**

APPLICATIONS

- Modems
- MP3 Players
- Cellular Telephones
- Portable Electronics
- PCMCIA Cards
- Battery-Powered Equipment

TYPICAL APPLICATION

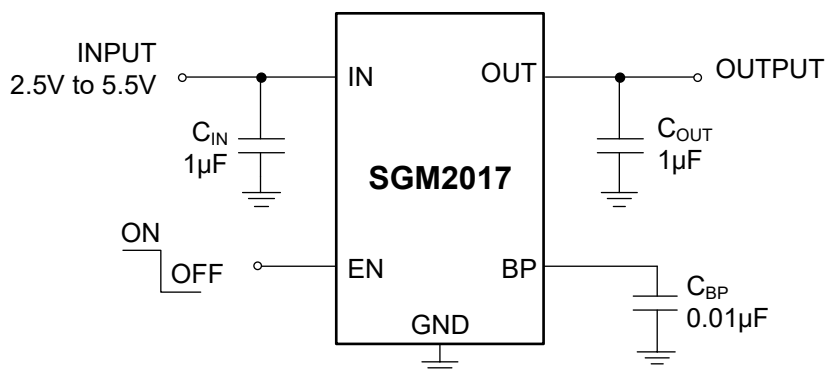


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2017-2.8	SOT-23-5	-40°C to +125°C	SGM2017-2.8XN5/TR	X728	Tape and Reel, 3000
SGM2017-3.3	SOT-23-5	-40°C to +125°C	SGM2017-3.3XN5/TR	X733	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.

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 to GND	-0.3V to ($V_{IN} + 0.3V$)
Power Dissipation, $P_D @ T_A = 25^\circ C$	
SOT-23-5	0.4W
Package Thermal Resistance	
SOT-23-5, θ_{JA}	250°C/W
Junction Temperature.....	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	4000V
MM.....	400V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range	-40°C to +125°C
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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.

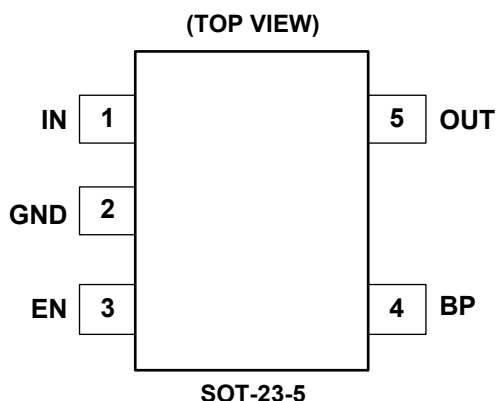
ESD SENSITIVITY CAUTION

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 CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
1	IN	Input Supply Voltage Pin. It is recommended to use a 1 μ F or larger ceramic capacitor from IN pin to ground to get good power supply decoupling. This ceramic capacitor should be placed as close as possible to IN pin.
2	GND	Ground.
3	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.
4	BP	Reference-Noise Bypass Pin. Bypass with an external capacitor C_{BP} can reduce output noise to very low level.
5	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin.

ELECTRICAL CHARACTERISTICS(V_{IN} = V_{OUT (NOMINAL)} + 0.5V, T_A = -40°C to +125°C. Typical values are at T_A = + 25°C, unless otherwise noted.)

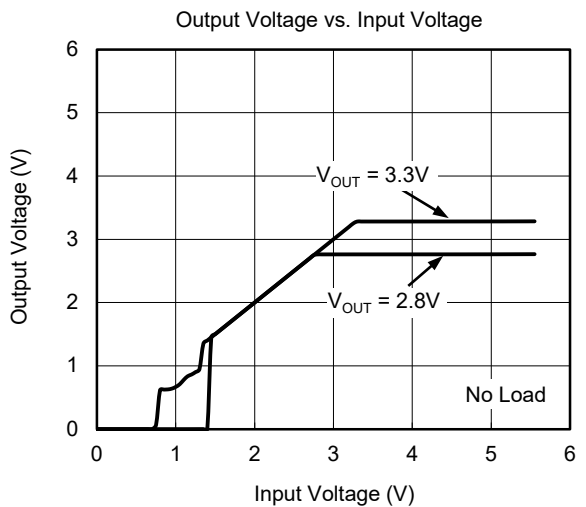
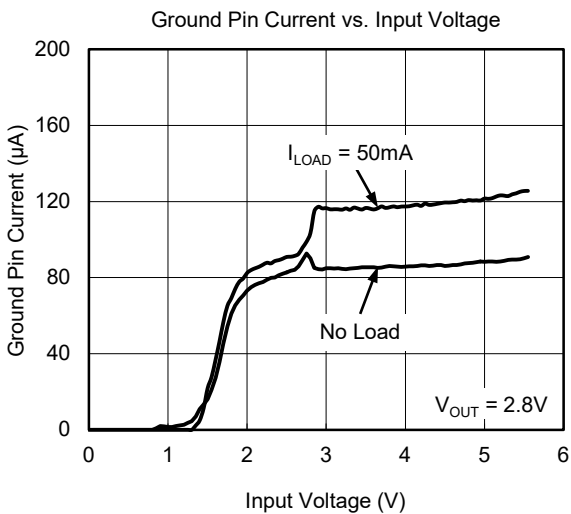
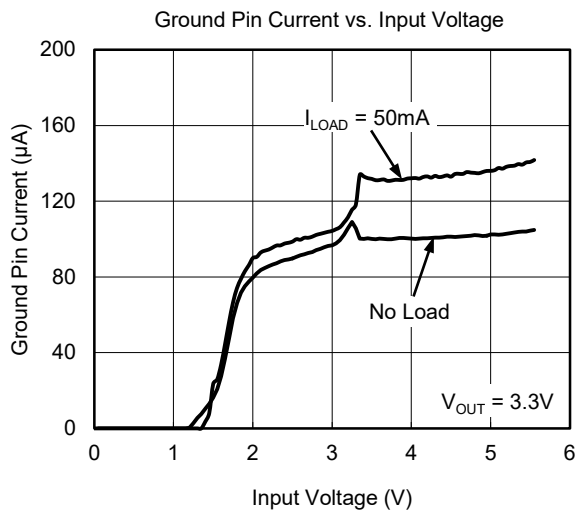
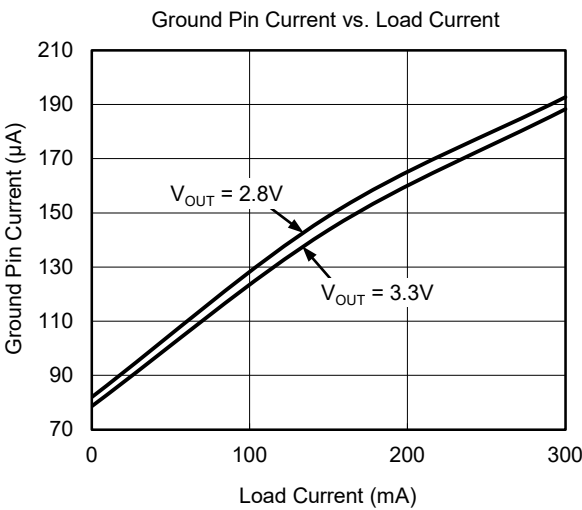
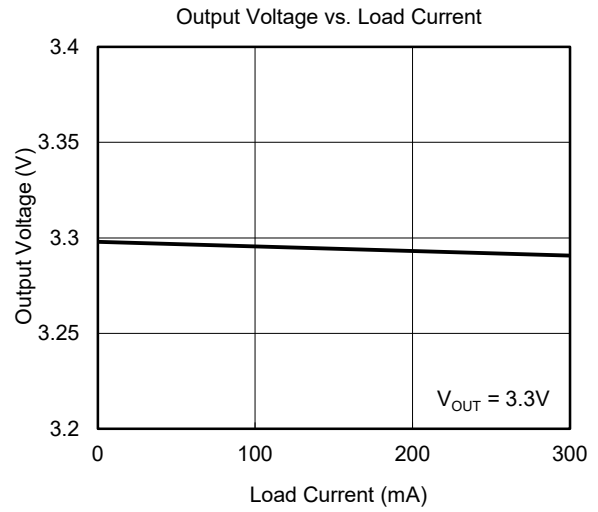
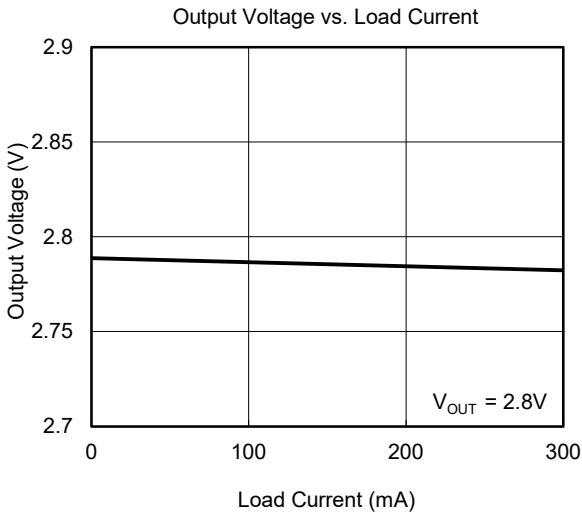
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Input Voltage Range	V _{IN}		2.5		5.5	V	
Output Voltage Accuracy		I _{OUT} = 1mA to 300mA, V _{OUT} + 0.5V ≤ V _{IN} ≤ 5.5V, T _A = +25°C	-3		+3	%	
Maximum Output Current			300			mA	
Output Current Limit	I _{LIM}		310	750		mA	
Ground Pin Current	I _Q	No load, EN = 2V		77	145	μA	
		I _{OUT} = 300mA, EN = 2V		200			
Dropout Voltage ⁽¹⁾		I _{OUT} = 1mA		0.8		mV	
		I _{OUT} = 300mA		300	380		
Line Regulation	ΔV _{LNR}	V _{IN} = (V _{OUT} + 0.5V) to 5.5V, I _{OUT} = 1mA		0.03	0.15	%/V	
Load Regulation	ΔV _{LDR}	I _{OUT} = 0.1mA to 300mA, C _{OUT} = 1μF		0.0008	0.002	%/mA	
Output Voltage Noise	e _n	f = 10Hz to 100kHz, C _{BP} = 0.01μF, C _{OUT} = 10μF		30		μV _{RMS}	
Power Supply Rejection Ratio	PSRR	C _{BP} = 0.1μF, I _{LOAD} = 50mA, C _{OUT} = 1μF	f = 100Hz		78		dB
			f = 1kHz		73		dB
Shutdown							
EN Input Threshold	V _{IH}	V _{IN} = 2.5V to 5.5V	2.0			V	
	V _{IL}				0.4		
EN Input Bias Current	I _{B(SHDN)}	EN = 0V or EN = 5.5V		0.01	1	μA	
Shutdown Supply Current	I _{Q(SHDN)}	EN = 0.4V		0.01	1	μA	
Shutdown Exit Delay ⁽²⁾		C _{BP} = 0.01μF, C _{OUT} = 1μF, No load		30		μs	
Thermal Protection							
Thermal Shutdown Temperature	T _{SHDN}			160		°C	
Thermal Shutdown Hysteresis	ΔT _{SHDN}			15		°C	

NOTES:

- The dropout voltage is defined as the difference between V_{IN} and V_{OUT} when V_{OUT} falls to V_{OUT(NOM)} - 100mV.
- Time needed for V_{OUT} to reach 95% of final value.

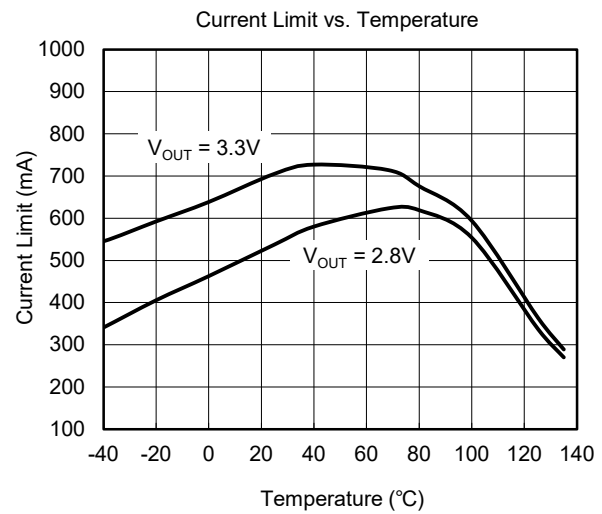
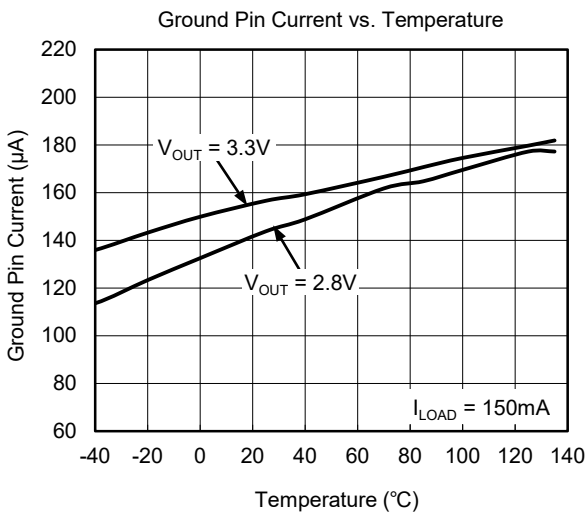
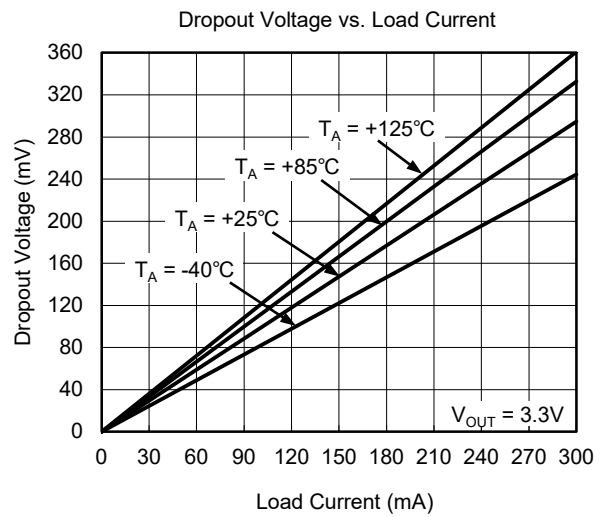
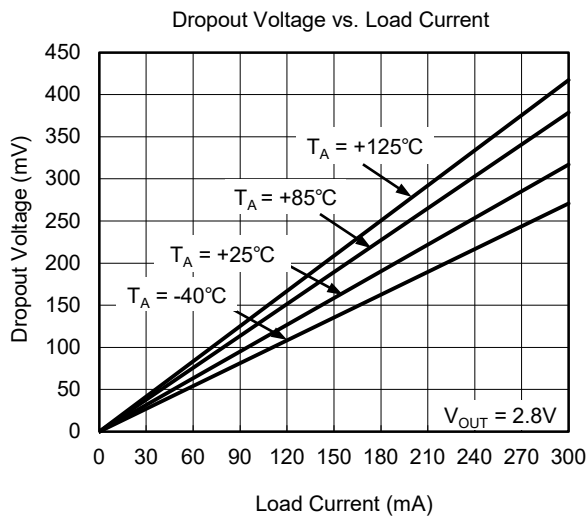
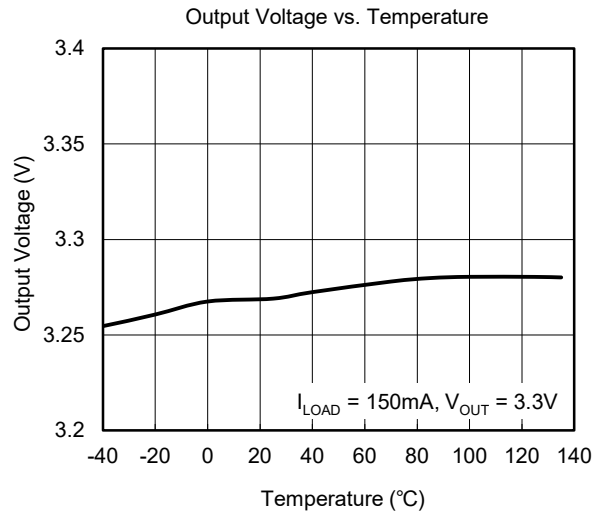
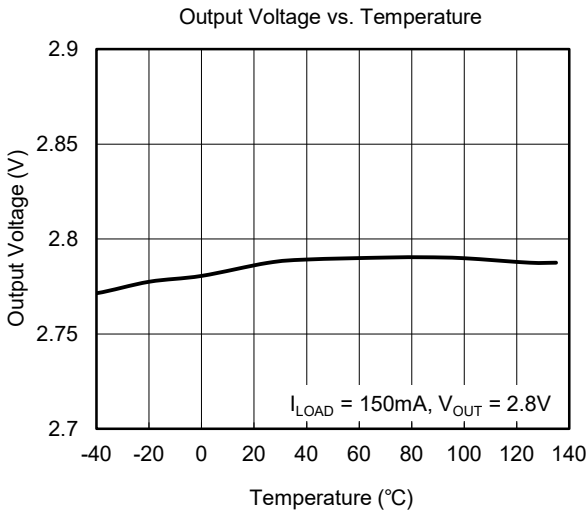
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT(NOMINAL)} + 0.5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $C_{BP} = 0.01\mu F$, $T_A = +25^\circ C$, unless otherwise noted.



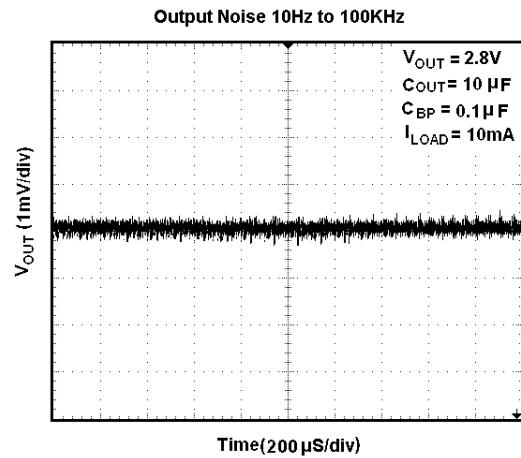
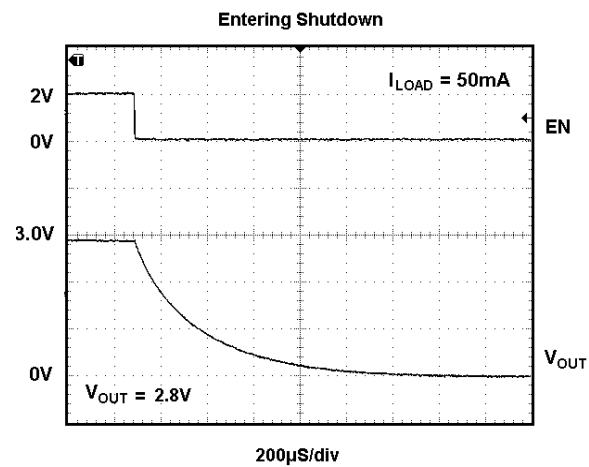
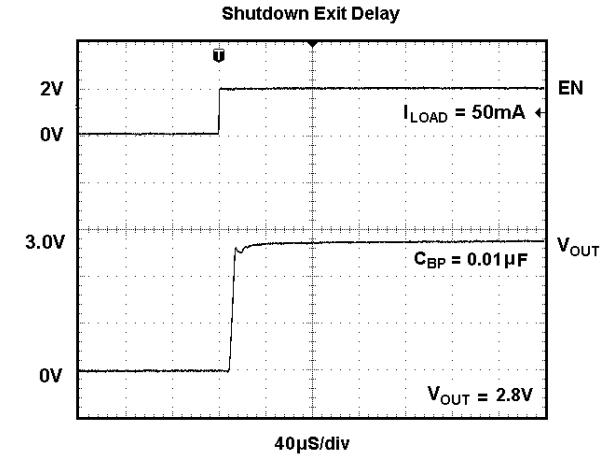
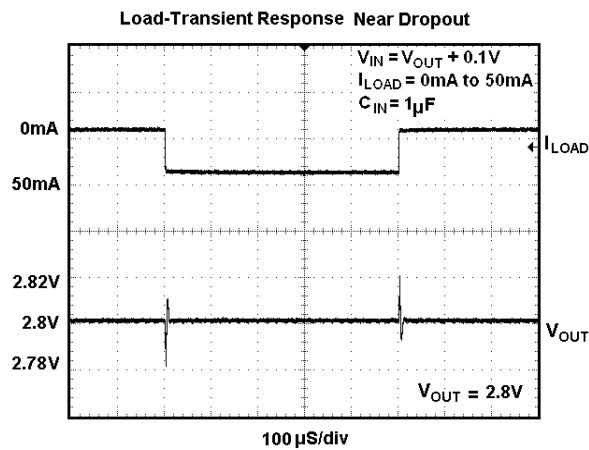
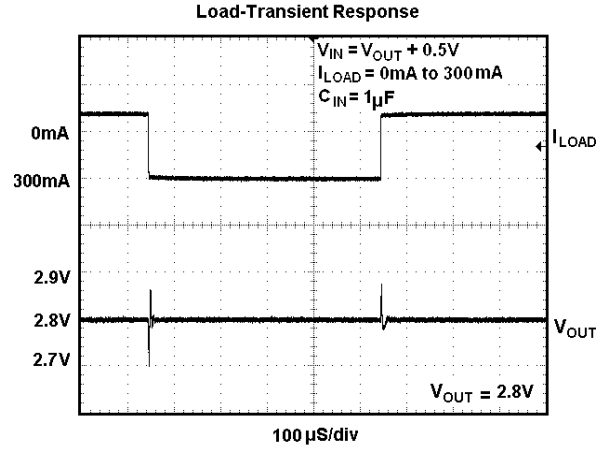
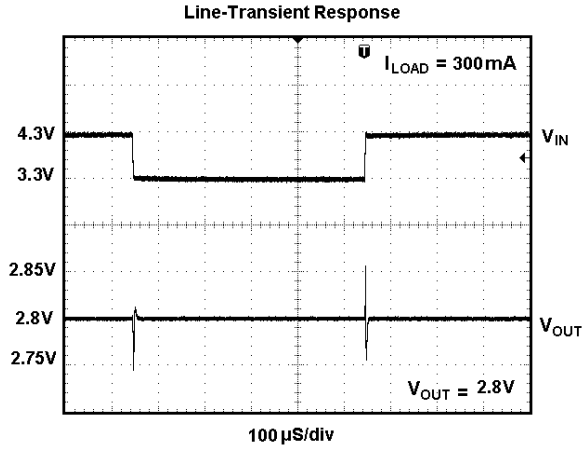
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$V_{IN} = V_{OUT(NOMINAL)} + 0.5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $C_{BP} = 0.01\mu F$, $T_A = +25^\circ C$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$V_{IN} = V_{OUT(NOMINAL)} + 0.5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $C_{BP} = 0.01\mu F$, $T_A = +25^\circ C$, unless otherwise noted.



APPLICATION INFORMATION

The SGM2017 is a low power and low dropout LDO and provides 300mA output current. These features make the device a reliable solution to solve many challenging problems in the generation of clean and accurate power supply. The high performance also makes the SGM2017 useful in a variety of applications. The SGM2017 provides protection functions for output overload, output short-circuit condition and overheating.

The SGM2017 provides an EN pin as an external chip enable control to enable/disable the device. When the regulator is in shutdown state, the shutdown current consumes as low as 0.01µA (TYP).

Input Capacitor Selection (C_{IN})

The input decoupling capacitor is necessary to be connected as close as possible to the IN pin for ensuring the device stability. 1µF or larger X7R or X5R ceramic capacitor is selected to get good dynamic performance.

When V_{IN} is required to provide large current instantaneously, a large effective input capacitor is required. Multiple input capacitors can limit the input tracking inductance. Adding more input capacitors is available to restrict the ringing and to keep it below the device absolute maximum ratings.

Output Capacitor Selection (C_{OUT})

The output decoupling capacitor should be located as close as possible to the OUT pin. 1µF or larger X7R or X5R ceramic capacitor is selected to get good dynamic performance. For ceramic capacitor, temperature, DC bias and package size will change the effective capacitance, so enough margin of C_{OUT} must be considered in design. Additionally, C_{OUT} with larger capacitance and lower ESR will help increase the high frequency PSRR and improve the load transient response.

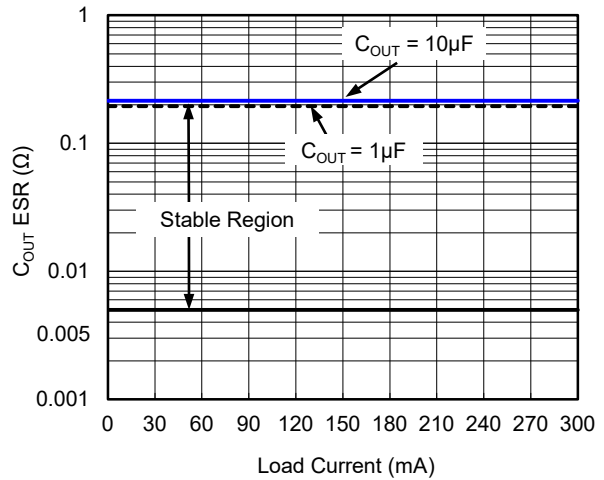


Figure 2. Region of Stable C_{OUT} ESR vs. Load Current

Enable Control

The EN pin of the SGM2017 is used to enable/disable its device.

When the EN pin voltage is lower than 0.4V, the device is in shutdown state. There is no current flowing from IN pin to OUT pin.

When the EN pin voltage is higher than 2.0V, the device is in active state. The output voltage is regulated to expected value.

Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited to 750mA (TYP). When the OUT pin is shorted to ground, the short-circuit protection will limit the output current.

Thermal Shutdown

The SGM2017 can detect the temperature of die. When the die temperature exceeds the threshold value of thermal shutdown, the SGM2017 will be in shutdown state and it will remain in this state until the die temperature decreases to +145°C.

REVISION HISTORY

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

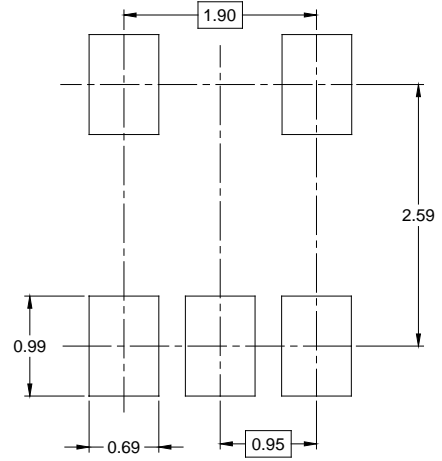
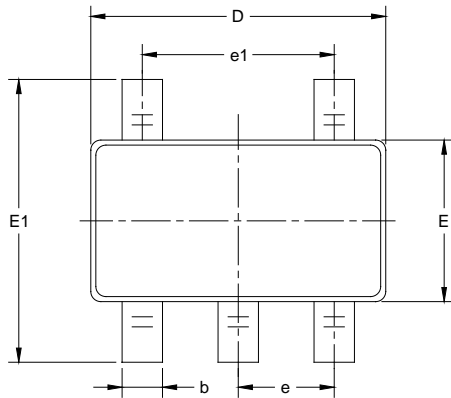
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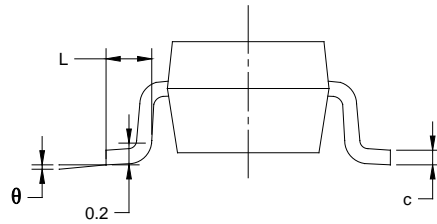
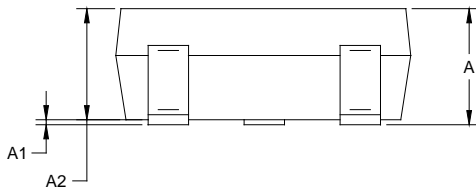
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PACKAGE OUTLINE DIMENSIONS

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 INFORMATION

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

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PACKAGE INFORMATION

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

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