SGM2019

Low Power, Low Dropout, 250mA, RF - Linear Regulators

GENERAL DESCRIPTION

The SGM2019 series low-power, low-noise, low-dropout, CMOS linear voltage regulators operate from a 2.5V to 5.5V input and deliver up to 250mA. 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 SGM2019 series also offer ultra low dropout voltage (225mV at 250mA output) to prolong battery life in portable electronics. Systems requiring a quiet voltage source, such as RF applications, will benefit from the SGM2019 series' ultra low output noise ($30\mu V_{RMS}$) 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 0.8V to 5.0V. Other features include a 10nA logic-controlled shutdown mode, foldback current limit and thermal shut-down protection.

The SGM2019 has lead (Pb) free SC70-4(R), SC70-5 and SOT23-5 packages. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Low Output Noise**
- **Low Dropout Voltage**
- **High PSRR**
- **Thermal-Overload Protection**
- **Output Current Limit**
- **High PSRR (65dB at 1kHz)**
- **10nA Logic-Controlled Shutdown**
- **Available in Multiple Output Voltage Versions**
  Fixed Outputs of 0.9V, 1.2V, 1.3V, 1.5V, 1.8V, 2.5V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.1V, 3.2V, 3.3V, 3.6V, 4.2V, 5.0V
  Adjustable Output from 0.8V to 5.0V
- **-40℃ to +85℃ Operating Temperature Range**
- **Pb-Free SC70-4(R), SC70-5 and SOT23-5 Packages**

APPLICATIONS

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

ORDERING INFORMATION

MODEL	V_{OUT}(V)	PIN-PACKAGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM2019-0.9	0.9V	SC70-4(R)	SGM2019-0.9YC4/TR	YJ09	Tape and Reel, 3000
SGM2019-0.9	0.9V	SC70-5	SGM2019-0.9YC5/TR	YJ09	Tape and Reel, 3000
SGM2019-0.9	0.9V	SOT23-5	SGM2019-0.9YN5/TR	YJ09	Tape and Reel, 3000
SGM2019-1.2	1.2V	SC70-4(R)	SGM2019-1.2YC4/TR	YJ12	Tape and Reel, 3000
SGM2019-1.2	1.2V	SC70-5	SGM2019-1.2YC5/TR	YJ12	Tape and Reel, 3000
SGM2019-1.2	1.2V	SOT23-5	SGM2019-1.2YN5/TR	YJ12	Tape and Reel, 3000
SGM2019-1.3	1.3V	SC70-4(R)	SGM2019-1.3YC4/TR	YJ13	Tape and Reel, 3000
SGM2019-1.3	1.3V	SC70-5	SGM2019-1.3YC5/TR	YJ13	Tape and Reel, 3000
SGM2019-1.3	1.3V	SOT23-5	SGM2019-1.3YN5/TR	YJ13	Tape and Reel, 3000
SGM2019-1.5	1.5V	SC70-4(R)	SGM2019-1.5YC4/TR	YJ15	Tape and Reel, 3000
SGM2019-1.5	1.5V	SC70-5	SGM2019-1.5YC5/TR	YJ15	Tape and Reel, 3000
SGM2019-1.5	1.5V	SOT23-5	SGM2019-1.5YN5/TR	YJ15	Tape and Reel, 3000
SGM2019-1.8	1.8V	SC70-4(R)	SGM2019-1.8YC4/TR	YJ18	Tape and Reel, 3000
SGM2019-1.8	1.8V	SC70-5	SGM2019-1.8YC5/TR	YJ18	Tape and Reel, 3000
SGM2019-1.8	1.8V	SOT23-5	SGM2019-1.8YN5/TR	YJ18	Tape and Reel, 3000
SGM2019-2.5	2.5V	SC70-4(R)	SGM2019-2.5YC4/TR	YJ25	Tape and Reel, 3000
SGM2019-2.5	2.5V	SC70-5	SGM2019-2.5YC5/TR	YJ25	Tape and Reel, 3000
SGM2019-2.5	2.5V	SOT23-5	SGM2019-2.5YN5/TR	YJ25	Tape and Reel, 3000
SGM2019-2.7	2.7V	SC70-4(R)	SGM2019-2.7YC4/TR	YJ27	Tape and Reel, 3000
SGM2019-2.7	2.7V	SC70-5	SGM2019-2.7YC5/TR	YJ27	Tape and Reel, 3000
SGM2019-2.7	2.7V	SOT23-5	SGM2019-2.7YN5/TR	YJ27	Tape and Reel, 3000
SGM2019-2.8	2.8V	SC70-4(R)	SGM2019-2.8YC4/TR	YJ28	Tape and Reel, 3000
SGM2019-2.8	2.8V	SC70-5	SGM2019-2.8YC5/TR	YJ28	Tape and Reel, 3000
SGM2019-2.8	2.8V	SOT23-5	SGM2019-2.8YN5/TR	YJ28	Tape and Reel, 3000
SGM2019-2.85	2.85V	SC70-4(R)	SGM2019-2.85YC4/TR	YJ2J	Tape and Reel, 3000
SGM2019-2.85	2.85V	SC70-5	SGM2019-2.85YC5/TR	YJ2J	Tape and Reel, 3000
SGM2019-2.85	2.85V	SOT23-5	SGM2019-2.85YN5/TR	YJ2J	Tape and Reel, 3000
SGM2019-2.9	2.9V	SC70-4(R)	SGM2019-2.9YC4/TR	YJ29	Tape and Reel, 3000
SGM2019-2.9	2.9V	SC70-5	SGM2019-2.9YC5/TR	YJ29	Tape and Reel, 3000
SGM2019-2.9	2.9V	SOT23-5	SGM2019-2.9YN5/TR	YJ29	Tape and Reel, 3000
SGM2019-3.0	3.0V	SC70-4(R)	SGM2019-3.0YC4/TR	YJ30	Tape and Reel, 3000
SGM2019-3.0	3.0V	SC70-5	SGM2019-3.0YC5/TR	YJ30	Tape and Reel, 3000
SGM2019-3.0	3.0V	SOT23-5	SGM2019-3.0YN5/TR	YJ30	Tape and Reel, 3000
SGM2019-3.1	3.1V	SC70-4(R)	SGM2019-3.1YC4/TR	YJ31	Tape and Reel, 3000
SGM2019-3.1	3.1V	SC70-5	SGM2019-3.1YC5/TR	YJ31	Tape and Reel, 3000
SGM2019-3.1	3.1V	SOT23-5	SGM2019-3.1YN5/TR	YJ31	Tape and Reel, 3000
SGM2019-3.2	3.2V	SC70-4(R)	SGM2019-3.2YC4/TR	YJ32	Tape and Reel, 3000
SGM2019-3.2	3.2V	SC70-5	SGM2019-3.2YC5/TR	YJ32	Tape and Reel, 3000
SGM2019-3.2	3.2V	SOT23-5	SGM2019-3.2YN5/TR	YJ32	Tape and Reel, 3000
SGM2019-3.3	3.3V	SC70-4(R)	SGM2019-3.3YC4/TR	YJ33	Tape and Reel, 3000
SGM2019-3.3	3.3V	SC70-5	SGM2019-3.3YC5/TR	YJ33	Tape and Reel, 3000
SGM2019-3.3	3.3V	SOT23-5	SGM2019-3.3YN5/TR	YJ33	Tape and Reel, 3000
SGM2019-3.6	3.6V	SC70-4(R)	SGM2019-3.6YC4/TR	YJ36	Tape and Reel, 3000
SGM2019-3.6	3.6V	SC70-5	SGM2019-3.6YC5/TR	YJ36	Tape and Reel, 3000
SGM2019-3.6	3.6V	SOT23-5	SGM2019-3.6YN5/TR	YJ36	Tape and Reel, 3000
SGM2019-4.2	4.2V	SC70-4(R)	SGM2019-4.2YC4/TR	YJ42	Tape and Reel, 3000
SGM2019-4.2	4.2V	SC70-5	SGM2019-4.2YC5/TR	YJ42	Tape and Reel, 3000
SGM2019-4.2	4.2V	SOT23-5	SGM2019-4.2YN5/TR	YJ42	Tape and Reel, 3000
SGM2019-5.0	5.0V	SC70-4(R)	SGM2019-5.0YC4/TR	YJ50	Tape and Reel, 3000
SGM2019-5.0	5.0V	SC70-5	SGM2019-5.0YC5/TR	YJ50	Tape and Reel, 3000
SGM2019-5.0	5.0V	SOT23-5	SGM2019-5.0YN5/TR	YJ50	Tape and Reel, 3000
SGM2019A	adjustable	SC70-5	SGM2019-YC5/TR	YJAA	Tape and Reel, 3000
SGM2019A	adjustable	SOT23-5	SGM2019-YN5/TR	YJAA	Tape and Reel, 3000

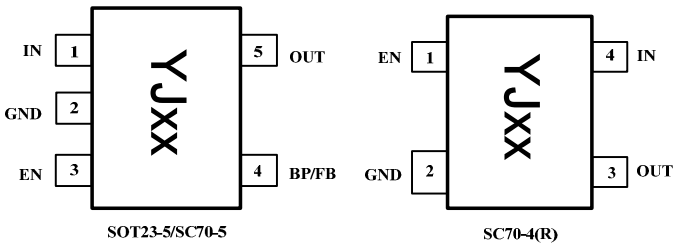
Notes: SC70-4(R) package is same as SOT-343R and SC-82 package; SC70-5 package is same as SOT-353 package.

ABSOLUTE MAXIMUM RATINGS

IN to GND..... - 0.3V to +6V
Output Short-Circuit Duration .....Infinite
EN to GND..... -0.3V to +6V
OUT, BP/FB to GND..... - 0.3V to (V_{IN} + 0.3V)
Operating Temperature Range..... - 40℃ to +85℃
Junction Temperature..... +150℃
Storage Temperature.....-65℃ to +150℃
Lead Temperature (soldering, 10s).....260℃
ESD Susceptibility
HBM..... 4000V
MM..... 400V

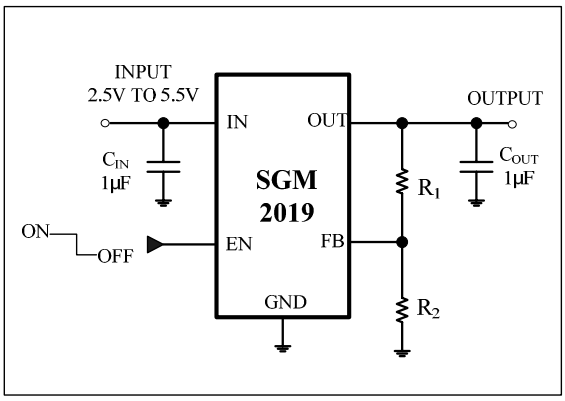
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

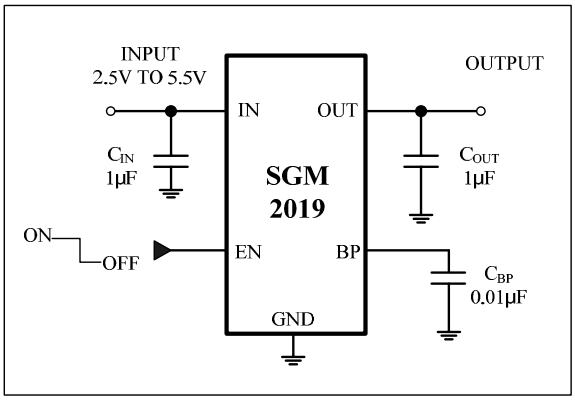
PIN CONFIGURATIONS (TOP VIEW)



Note1: The location of pin 1 on the YJxx is determined by orienting the package marking as shown.
Note2: "xx" is the output voltage code. (For Example: when the output voltage is 1.2V, it is expressed as 12.)
Note3: When the output voltage is 2.85V, it is expressed as YJ2J.

TYPICAL OPERATION CIRCUIT





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

PIN DESCRIPTION

PIN		NAME	FUNCTION
SC70-5/ SOT23-5	SC70-4(R)		
1	4	IN	Regulator Input. Supply voltage can range from 2.5V to 5.5V. Bypass with a 1μF capacitor to GND.
2	2	GND	Ground.
3	1	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.
4	—	FB	Adjustable voltage version only—this is used to set the output voltage of the device.
5	3	OUT	Regulator Output.

ELECTRICAL CHARACTERISTICS

(V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V [1], Full = -40°C to +85°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}				2.5		5.5	V
Output Voltage Accuracy [1]							2.4	%
Maximum Output Current					250			mA
Current Limit	I_{LIM}				260	500		mA
Ground Pin Current	I_Q	No load, EN = 2V				120		μA
Dropout Voltage [2]		I_{OUT} = 1mA				0.9		mV
		I_{OUT} = 250mA				225		
Line Regulation [1]	ΔV_{LNR}	V_{IN} = 2.5V or (V_{OUT} + 0.5V) to 5.5V, I_{OUT} = 1mA				0.02		%/V
Load Regulation	ΔV_{LDR}	I_{OUT} =0.1mA to 250mA, C_{OUT} = 1μF				0.001		%/mA
Output Voltage Noise	e_n	f = 10Hz to 100kHz, C_{BP} = 0.01μF, C_{OUT} = 10μF		+25℃		30		μV_{RMS}
Power Supply Rejection Rate	PSRR	C_{BP} = 0.1μF, I_{LOAD} = 50mA, C_{OUT} = 1μF	f = 217Hz	+25℃		72		dB
			f = 1kHz	+25℃		65		dB
SHUTDOWN								
EN Input Threshold	V_{IH}	V_{IN} = 2.5V to 5.5V		Full	2.0			V
	V_{IL}			Full			0.3	
EN Input Bias Current	$I_{B(SHDN)}$	EN = 0V and EN = 5.5V		+25℃		0.01	1	μA
				Full		0.01		
Shutdown Supply Current	$I_{Q(SHDN)}$	EN = 0.4V		+25℃		0.01	1	μA
				Full		0.01		
Shutdown Exit Delay [3]				+25℃		30		μs
THERMAL PROTECTION								
Thermal Shutdown Temperature	T_{SHDN}					150		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}					15		℃

Note 1: V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V, whichever is greater.

Note 2: 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.)

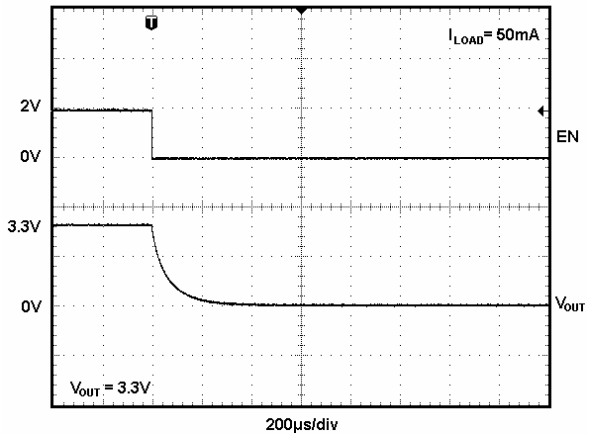
Note 3: Time needed for V_{OUT} to reach 95% of final value.

Specifications subject to changes without notice.

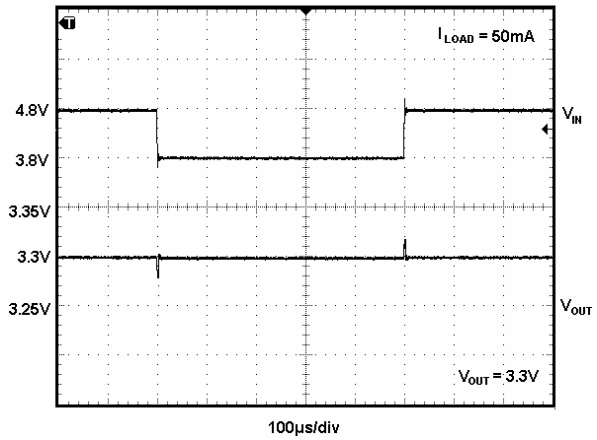
TYPICAL OPERATING CHARACTERISTICS

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.

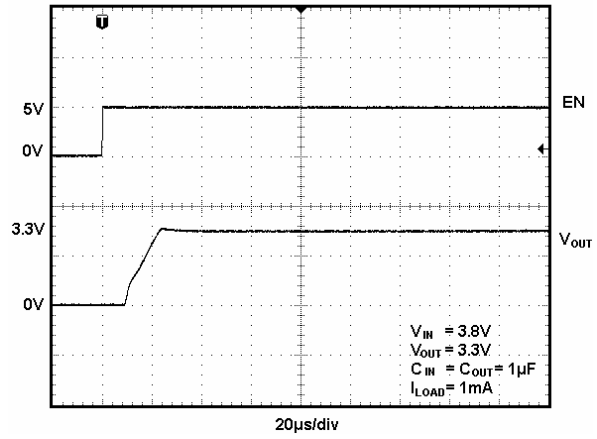
Entering Shutdown



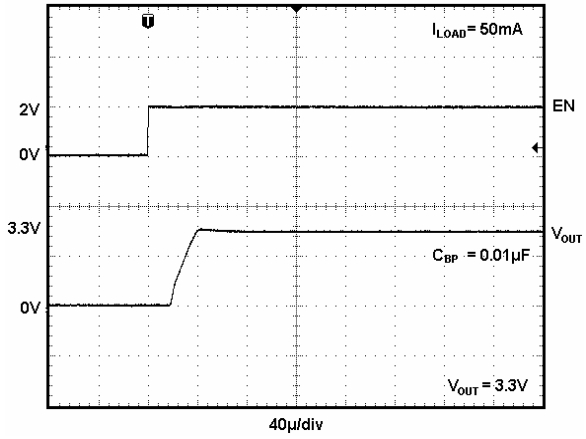
Line-Transcient Response



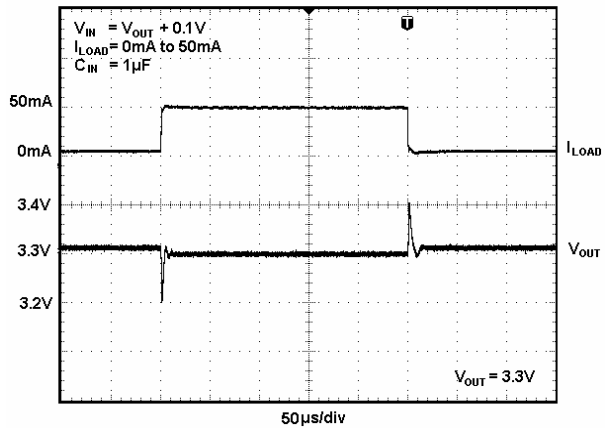
Start Up



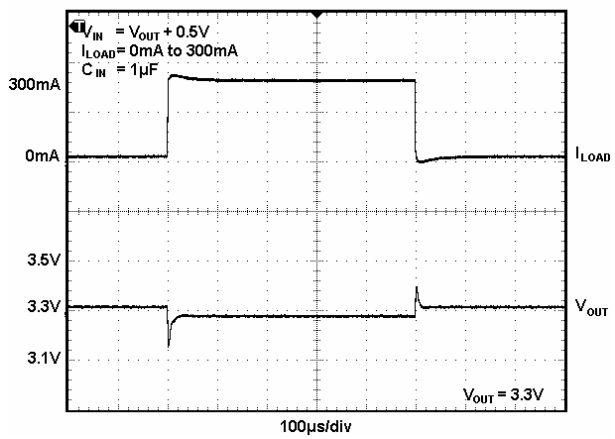
Shutdown Exit Delay



Load-Transient Response Near Dropout



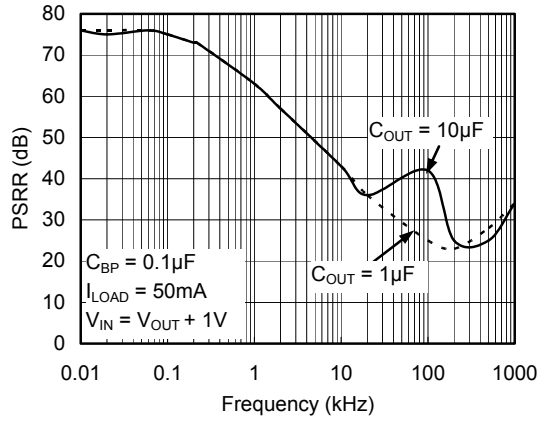
Load-Transient Response



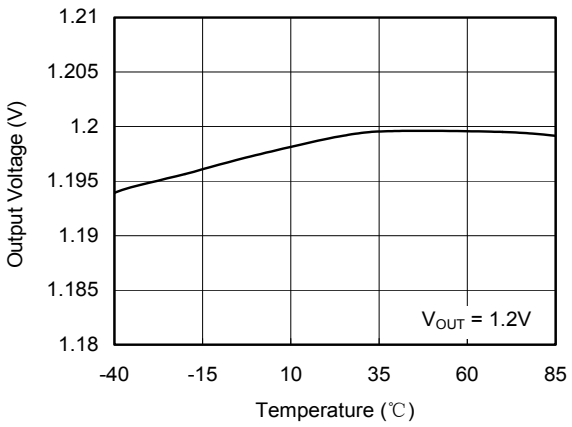
TYPICAL OPERATING CHARACTERISTICS

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.

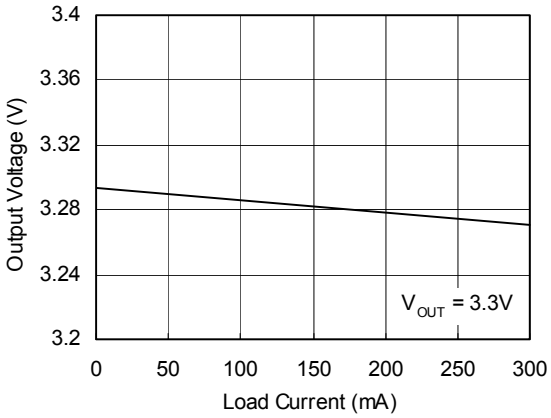
Power-Supply Rejection Ratio vs. Frequency



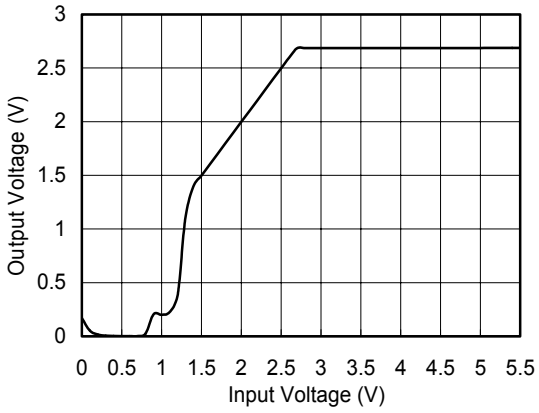
Output Voltage vs. Temperature



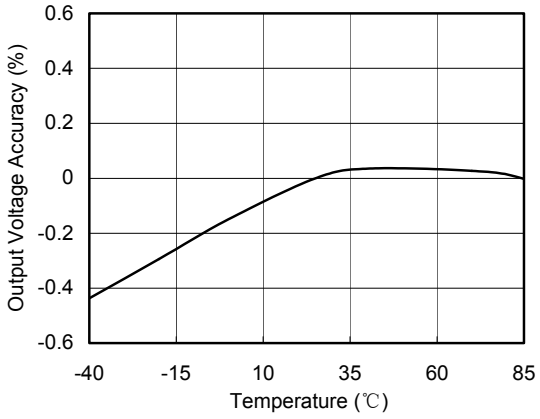
Output Voltage vs. Load Current



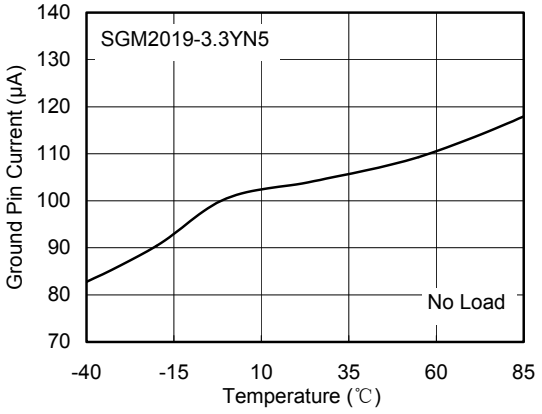
Output Voltage vs. Input Voltage



Output Voltage Accuracy vs. Temperature



Ground Pin Current vs. Temperature



TYPICAL OPERATING CHARACTERISTICS

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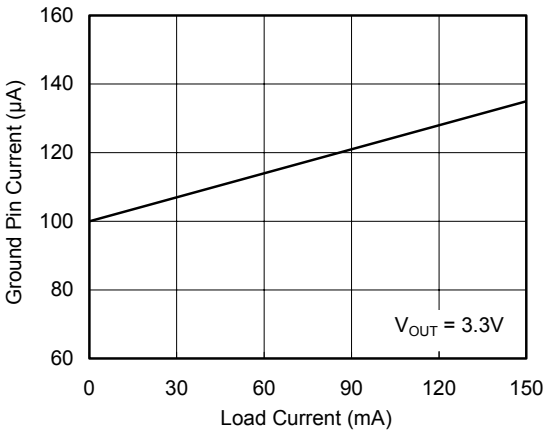
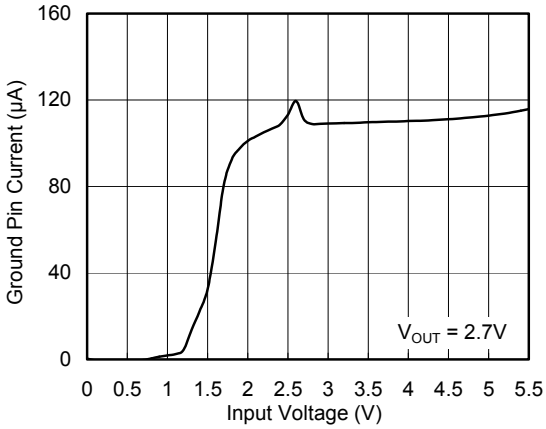
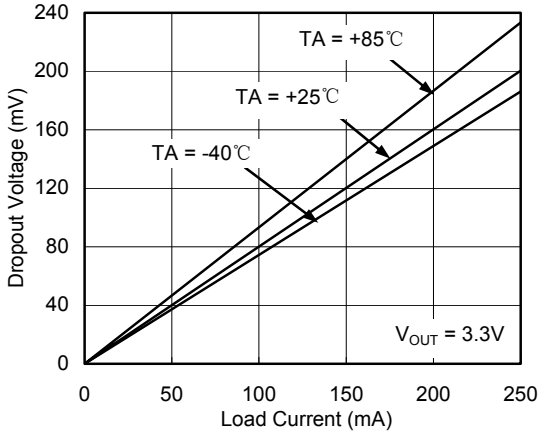
Ground Pin Current vs. Load Current



Ground Pin Current vs. Input Voltage

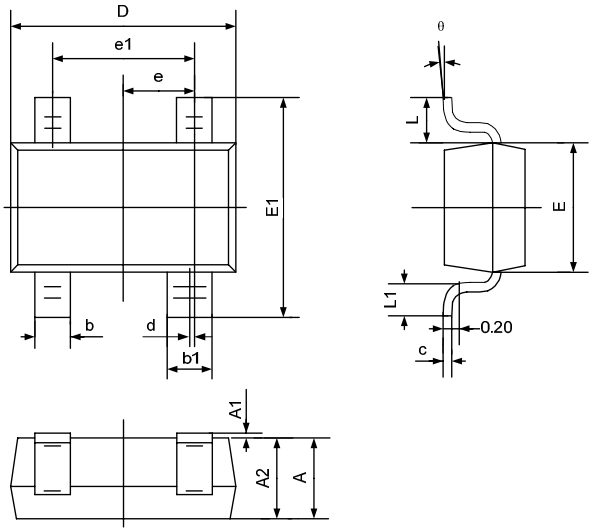


Dropout Voltage vs. Load Current



PACKAGE OUTLINE DIMENSIONS

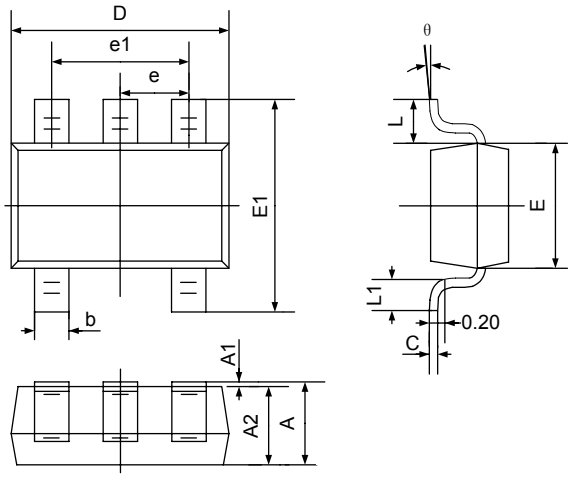
SC70-4(R) / SOT-343R



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	0.250	0.400	0.010	0.016
b1	0.350	0.500	0.014	0.020
c	0.080	0.150	0.003	0.006
d	0.050TYP		0.002TYP	
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	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

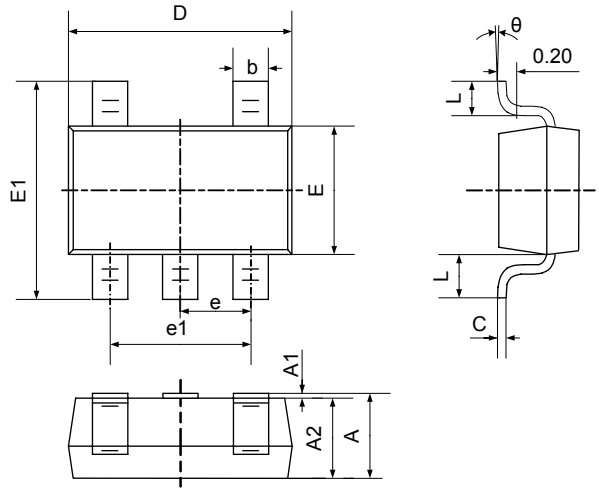
SC70-5 / SOT-353



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	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOT23-5



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	0.400	0.012	0.016
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	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°