

GENERAL DESCRIPTION

The SGM2200H series is a set of low power high voltage regulators implemented in CMOS technology. These devices allow input voltages as high as 36V. The SGM2200H series is available in several fixed and adjustable output voltages. CMOS technology ensures low dropout voltage and low quiescent current.

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

The SGM2200H series is available in Green SOT-89-3, SOT-23, TSOT-23-5 and SC70-5 packages. It operates over an ambient temperature range of -40°C to $+85^{\circ}\text{C}$.

FEATURES

- **Low Power Consumption**
- **Low Dropout Voltage**
- **High Input Voltage (up to 36V)**
- **Output Voltage Tolerance: $\pm 2.5\%$**
- **Fixed Output Voltage Versions: 0.8V to 5.0V with 0.1V per Step**
- **Adjustable Output Voltages: 0.8V to 5.0V**
- **-40°C to $+85^{\circ}\text{C}$ Operating Temperature Range**
- **Available in Green SOT-89-3, SOT-23, TSOT-23-5 and SC70-5 Packages**

APPLICATIONS

Battery-Powered Equipment
Communication Equipment
Audio/Video Equipment

TYPICAL APPLICATION

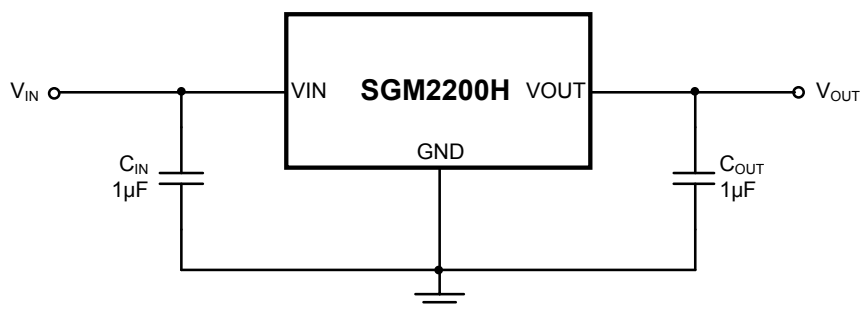


Figure 1. Fixed Voltage Typical Application Circuit

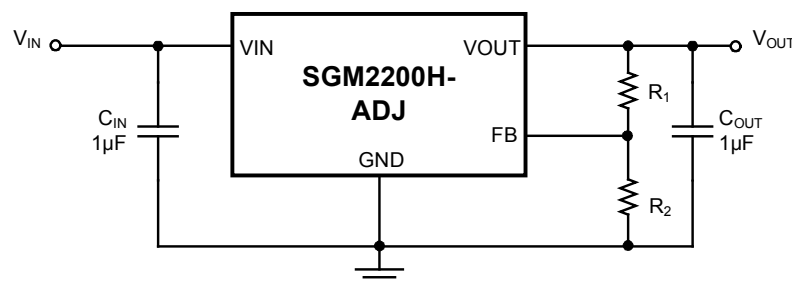


Figure 2. Adjustable Voltage Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	V _{OUT} (V)	PACKAGE DESCRIPTION	ORDERING NUMBER	MARKING INFORMATION	PACKING OPTION
SGM2200H-1.5	1.5	SOT-89-3	SGM2200H-1.5YK3G/TR	G21XX	Tape and Reel, 1000
SGM2200H-1.8	1.8	SOT-89-3	SGM2200H-1.8YK3G/TR	G22XX	Tape and Reel, 1000
SGM2200H-2.5	2.5	SOT-89-3	SGM2200H-2.5YK3G/TR	SY2XX	Tape and Reel, 1000
SGM2200H-2.8	2.8	SOT-89-3	SGM2200H-2.8YK3G/TR	G23XX	Tape and Reel, 1000
SGM2200H-3.0	3.0	SOT-89-3	SGM2200H-3.0YK3G/TR	SY3XX	Tape and Reel, 1000
SGM2200H-3.3	3.3	SOT-89-3	SGM2200H-3.3YK3G/TR	SY5XX	Tape and Reel, 1000
SGM2200H-3.6	3.6	SOT-89-3	SGM2200H-3.6YK3G/TR	G1FXX	Tape and Reel, 1000
SGM2200H-4.4	4.4	SOT-89-3	SGM2200H-4.4YK3G/TR	SY8XX	Tape and Reel, 1000
SGM2200H-5.0	5.0	SOT-89-3	SGM2200H-5.0YK3G/TR	G20XX	Tape and Reel, 1000
SGM2200H-1.5	1.5	SOT-23	SGM2200H-1.5YN3LG/TR	G24XX	Tape and Reel, 3000
SGM2200H-1.8	1.8	SOT-23	SGM2200H-1.8YN3LG/TR	SY1XX	Tape and Reel, 3000
SGM2200H-2.5	2.5	SOT-23	SGM2200H-2.5YN3LG/TR	G25XX	Tape and Reel, 3000
SGM2200H-2.8	2.8	SOT-23	SGM2200H-2.8YN3LG/TR	G26XX	Tape and Reel, 3000
SGM2200H-3.0	3.0	SOT-23	SGM2200H-3.0YN3LG/TR	SY4XX	Tape and Reel, 3000
SGM2200H-3.3	3.3	SOT-23	SGM2200H-3.3YN3LG/TR	G27XX	Tape and Reel, 3000
SGM2200H-3.6	3.6	SOT-23	SGM2200H-3.6YN3LG/TR	SY7XX	Tape and Reel, 3000
SGM2200H-4.4	4.4	SOT-23	SGM2200H-4.4YN3LG/TR	G28XX	Tape and Reel, 3000
SGM2200H-5.0	5.0	SOT-23	SGM2200H-5.0YN3LG/TR	G29XX	Tape and Reel, 3000

PACKAGE/ORDERING INFORMATION (continued)

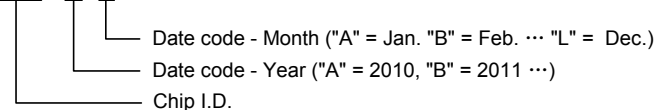
MODEL	V _{OUT} (V)	PACKAGE DESCRIPTION	ORDERING NUMBER	MARKING INFORMATION	PACKING OPTION
SGM2200H-1.5	1.5	TSOT-23-5	SGM2200H-1.5YTN5G/TR	G2AXX	Tape and Reel, 3000
SGM2200H-1.8	1.8	TSOT-23-5	SGM2200H-1.8YTN5G/TR	G2BXX	Tape and Reel, 3000
SGM2200H-2.5	2.5	TSOT-23-5	SGM2200H-2.5YTN5G/TR	G2CXX	Tape and Reel, 3000
SGM2200H-2.8	2.8	TSOT-23-5	SGM2200H-2.8YTN5G/TR	G2DXX	Tape and Reel, 3000
SGM2200H-3.0	3.0	TSOT-23-5	SGM2200H-3.0YTN5G/TR	G2EXX	Tape and Reel, 3000
SGM2200H-3.3	3.3	TSOT-23-5	SGM2200H-3.3YTN5G/TR	G2FXX	Tape and Reel, 3000
SGM2200H-3.6	3.6	TSOT-23-5	SGM2200H-3.6YTN5G/TR	G30XX	Tape and Reel, 3000
SGM2200H-4.4	4.4	TSOT-23-5	SGM2200H-4.4YTN5G/TR	G31XX	Tape and Reel, 3000
SGM2200H-5.0	5.0	TSOT-23-5	SGM2200H-5.0YTN5G/TR	G32XX	Tape and Reel, 3000
SGM2200H-ADJ	Adjustable	TSOT-23-5	SGM2200H-ADJYTN5G/TR	G33XX	Tape and Reel, 3000
SGM2200H-1.5	1.5	SC70-5	SGM2200H-1.5YC5G/TR	G34XX	Tape and Reel, 3000
SGM2200H-1.8	1.8	SC70-5	SGM2200H-1.8YC5G/TR	G35XX	Tape and Reel, 3000
SGM2200H-2.5	2.5	SC70-5	SGM2200H-2.5YC5G/TR	G36XX	Tape and Reel, 3000
SGM2200H-2.8	2.8	SC70-5	SGM2200H-2.8YC5G/TR	G37XX	Tape and Reel, 3000
SGM2200H-3.0	3.0	SC70-5	SGM2200H-3.0YC5G/TR	G38XX	Tape and Reel, 3000
SGM2200H-3.3	3.3	SC70-5	SGM2200H-3.3YC5G/TR	SY6XX	Tape and Reel, 3000
SGM2200H-3.6	3.6	SC70-5	SGM2200H-3.6YC5G/TR	G39XX	Tape and Reel, 3000
SGM2200H-4.4	4.4	SC70-5	SGM2200H-4.4YC5G/TR	G3AXX	Tape and Reel, 3000
SGM2200H-5.0	5.0	SC70-5	SGM2200H-5.0YC5G/TR	G3BXX	Tape and Reel, 3000
SGM2200H-ADJ	Adjustable	SC70-5	SGM2200H-ADJYC5G/TR	G3CXX	Tape and Reel, 3000

NOTE: The devices are available in fixed output voltages from 0.8V to 5.0V with 0.1V per step.

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.

MARKING INFORMATION

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For example: G3CGA (2016, January)

ABSOLUTE MAXIMUM RATINGS

VIN to GND	-0.3V to 44V
VOU to GND	-0.3V to Min(VIN + 0.3V, 6V)
FB to GND	-0.3V to Min(VIN + 0.3V, 6V)
Power Dissipation, PD @ TA = +25°C	
SOT-89-3	0.691W
TSOT-23-5	0.429W
SC70-5	0.349W
SOT-23	0.345W
Package Thermal Resistance	
SOT-89-3, θJA	152°C/W
TSOT-23-5, θJA	245°C/W
SC70-5, θJA	301°C/W
SOT-23, θJA	304°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
Fixed Voltage Version:	
HBM	4000V
MM	200V
CDM	1000V
Adjustable Voltage Version:	
HBM	3000V
MM	150V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	2.7V to 36V
Operating Temperature Range	-40°C to +85°C

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.

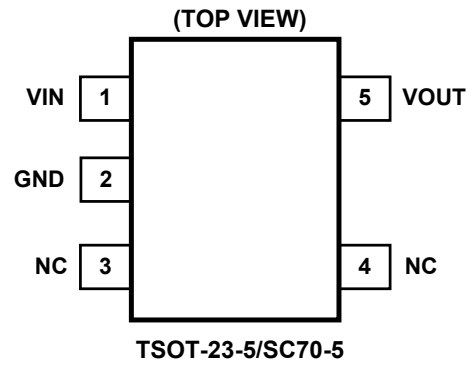
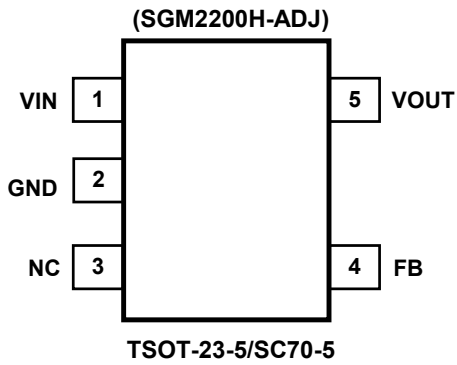
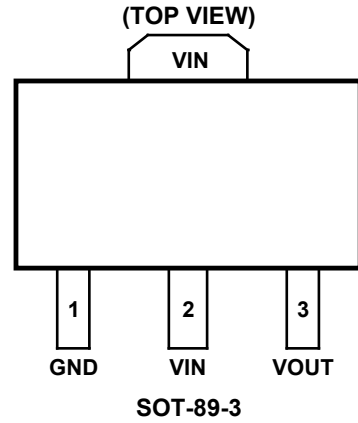
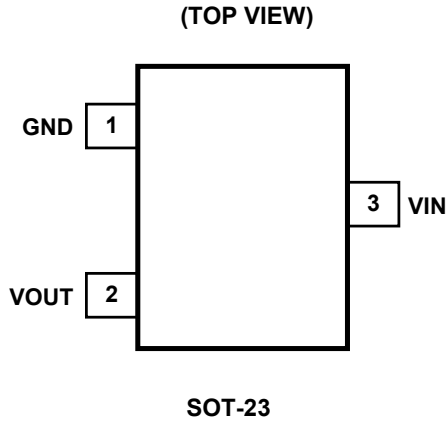
ESD SENSITIVITY CAUTION

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 CONFIGURATIONS



PIN DESCRIPTION

PIN			NAME	FUNCTION
TSOT-23-5/ SC70-5	SOT-23	SOT-89-3		
1	3	2	VIN	Regulator Input. Up to 36V operation voltage. At least 1μF supply bypass capacitor is recommended.
2	1	1	GND	Ground.
3	-	-	NC	No Internal Connection.
4	-	-	FB	Feedback Pin (adjustable voltage version only). This is used to set the output voltage of the device.
			NC	No Internal Connection (fixed voltage version only).
5	2	3	VOUT	Regulator Output. Recommended output capacitor range: 1μF to 10μF.

ELECTRICAL CHARACTERISTICS

(V_{IN} = 15V, C_{IN} = C_{OUT} = 1μF, Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

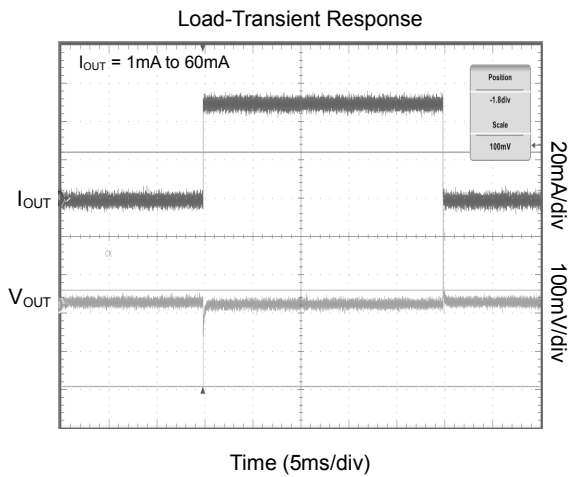
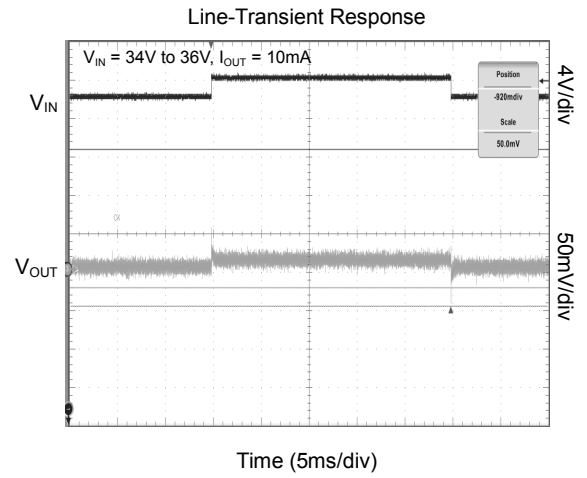
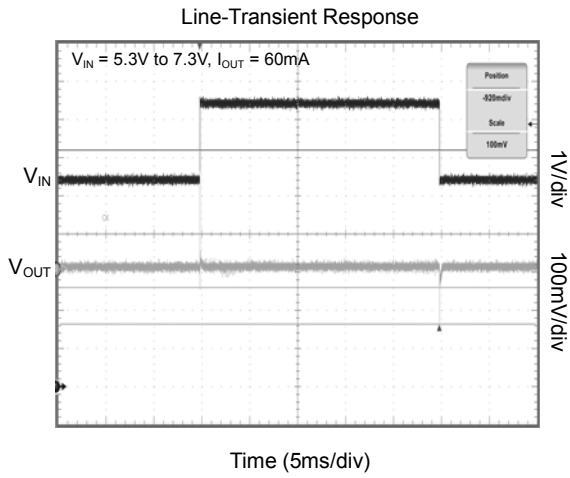
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V _{IN}	V _{OUT} < 3.3V	Full	2.7		28	V
		V _{OUT} ≥ 3.3V	Full	2.7		36	
Output Voltage Accuracy		I _{OUT} = 1mA	+25°C	-2.5		2.5	%
Feedback Voltage	V _{FB}	SGM2200H-ADJ, V _{FB} = V _{OUT} , I _{OUT} = 1mA	+25°C		0.8		V
FB Input Current	I _{FB}	SGM2200H-ADJ, V _{FB} = 0.9V	Full	-15		15	nA
Ground Pin Current		No Load	+25°C		2.2	2.8	μA
			Full			3.2	
Maximum Output Current ⁽¹⁾		V _{IN} = V _{OUT} + 2V or 4V, whichever is greater	+25°C	60			mA
Dropout Voltage ⁽²⁾	V _{DROP}	I _{OUT} = 60mA, V _{OUT} ≥ 2.5V	+25°C		1600	2100	mV
			Full			2650	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	V _{IN} = V _{OUT} + 2V or 4V to 28V, I _{OUT} = 1mA, V _{OUT} < 3.3V	+25°C		0.005	0.025	%V
		V _{IN} = V _{OUT} + 2V to 36V, I _{OUT} = 1mA, V _{OUT} ≥ 3.3V	+25°C		0.005	0.025	
Load Regulation	ΔV_{OUT}	V _{IN} = V _{OUT} + 2V or 4V, I _{OUT} = 1mA to 60mA	+25°C		15	35	mV
Output Voltage Temperature Coefficient ⁽³⁾	$\frac{\Delta V_{OUT}}{\Delta T_A \times V_{OUT}}$	V _{IN} = V _{OUT} + 2V or 4V, I _{OUT} = 1mA	Full		65		ppm/°C

NOTES:

- Maximum output current is affected by the PCB layout, size of metal trace, the thermal conduction path between metal layers, ambient temperature and the other environment factors of system. Attention should be paid to the dropout voltage when V_{IN} < V_{OUT} + V_{DROP}.
- The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} is 95% of the value of V_{OUT} for V_{IN} = V_{OUT} + 2V.
- Output voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.

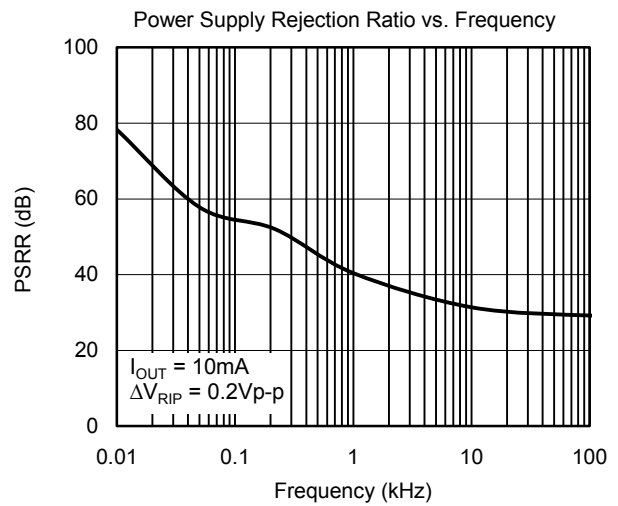
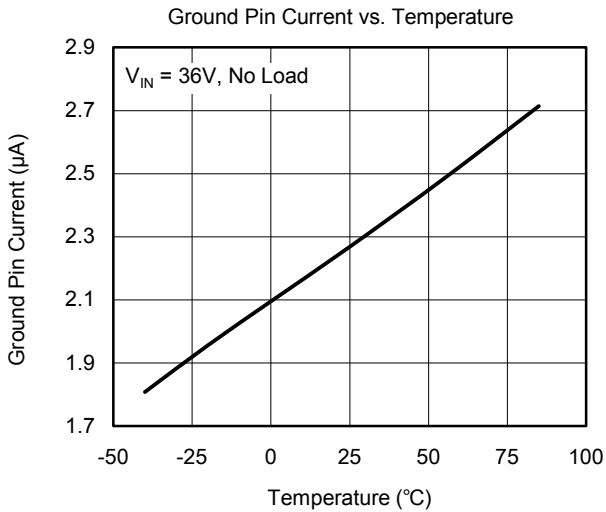
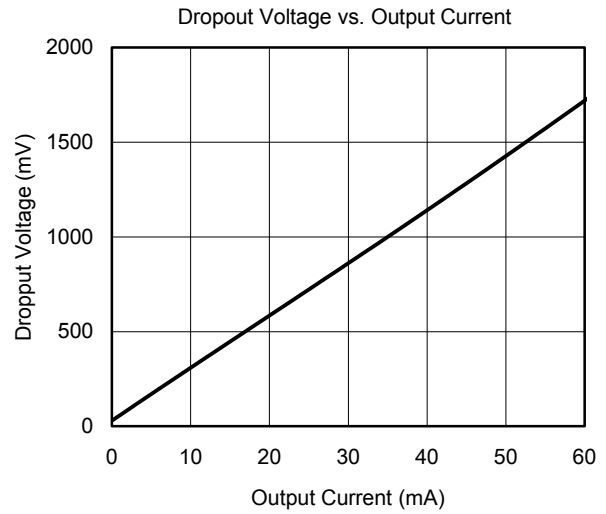
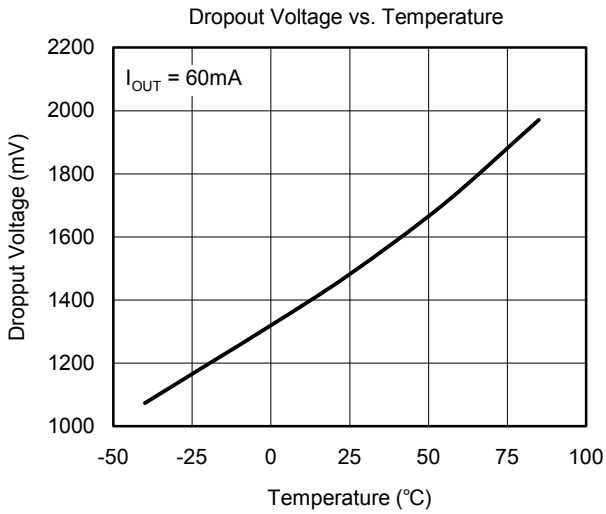
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = 5.3V$, $V_{OUT} = 3.3V$, $C_{IN} = C_{OUT} = 1\mu F$, $T_A = +25^\circ C$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$V_{IN} = 5.3V$, $V_{OUT} = 3.3V$, $C_{IN} = C_{OUT} = 1\mu F$, $T_A = +25^\circ C$, unless otherwise noted.



DETAILED DESCRIPTION

The SGM2200H series is a linear regulator designed primarily for high input voltage applications. The SGM2200H series is available in several fixed output voltages and adjustable from 0.8V to 5.0V with a simple resistor divider. The maximum output current is dependent on the package’s maximum power dissipation for a given temperature.

The SGM2200H series is available in adjustable and several fixed output voltages. CMOS technology ensures low dropout voltage and low quiescent current.

The SGM2200H uses external feedback, allowing the user to set the output voltage with an external resistor divider. The typical FB pin voltage is 0.8V.

APPLICATION INFORMATION

Setting the Output Voltage

Set the output voltage of the SGM2200H by using a resistor divider as shown:

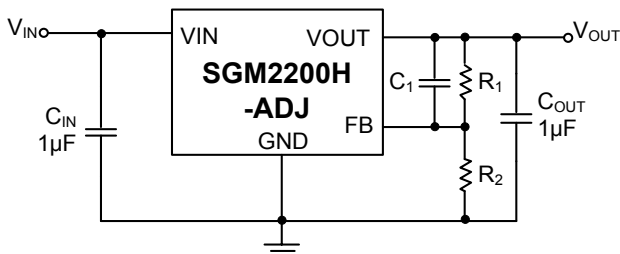


Figure 3. SGM2200H-ADJ with External Resistor Divider

Choose $R_2 = 2M\Omega$ to maintain a $0.4\mu A$ minimum load. Calculate the value for R_1 using the following equation:

$$R_1 = R_2 \times \left(\frac{V_{OUT}}{0.8V} - 1 \right)$$

Input Capacitor and Output Capacitor

For proper operation, place a ceramic capacitor (C_{IN}) between $1\mu F$ and $10\mu F$ between the input pin and ground. Larger values in this range will help improve line transient response.

For stable operation, use a ceramic capacitor (C_{OUT}) between $1\mu F$ and $10\mu F$. Larger values in this range will help improve load transient response and reduce noise. Output capacitors of other dielectric types may be used, but are not recommended as their capacitance can deviate greatly from their rated value over temperature.

Thermal Considerations

When the junction temperature is too high, the thermal protection circuitry sends a signal to the control logic that will shutdown the IC. The IC will restart when the temperature has sufficiently cooled down.

The maximum power dissipation is dependent on the thermal resistance of the case and the circuit board, the temperature difference between the die junction and the ambient air, and the rate of air flow.

Output Noise

The SGM2200H will exhibit noise on the output during normal operation. This noise is negligible for most applications. However, in applications that include analog-to-digital converters (ADCs) of more than 12 bits, one needs to consider the ADC’s power supply rejection specifications. The feed forward capacitor C_1 across R_1 will significantly reduce the output noise.

REVISION HISTORY

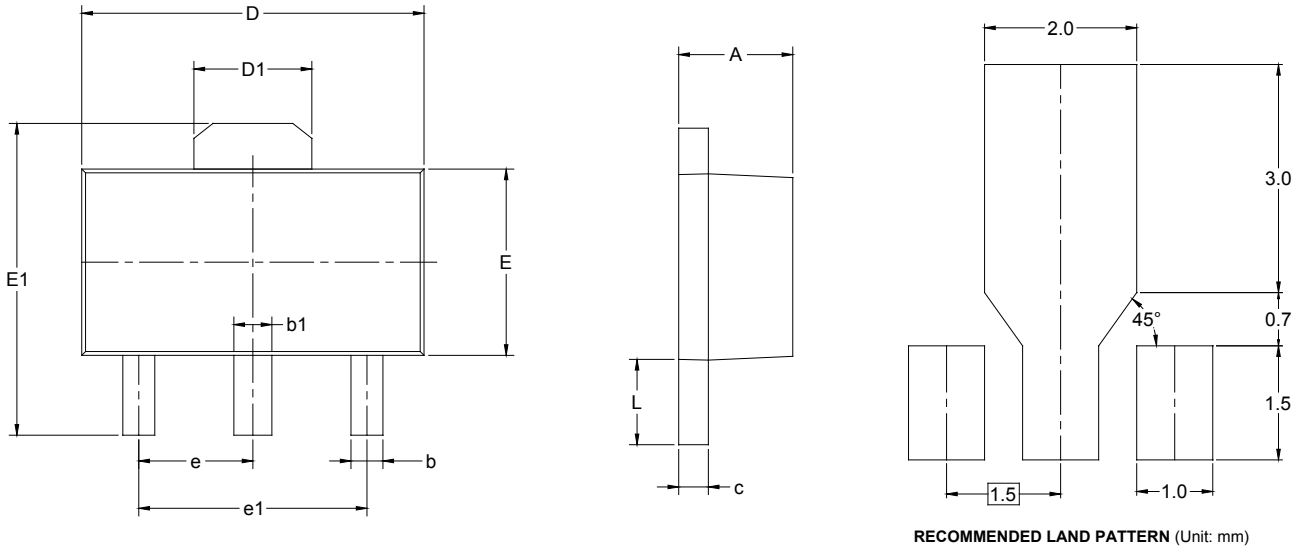
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (APRIL 2017) to REV.A

Changed from product preview to production data.....	All
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PACKAGE OUTLINE DIMENSIONS

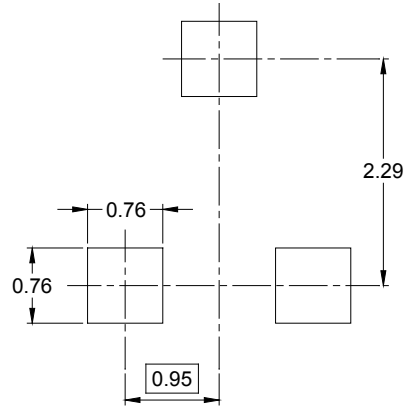
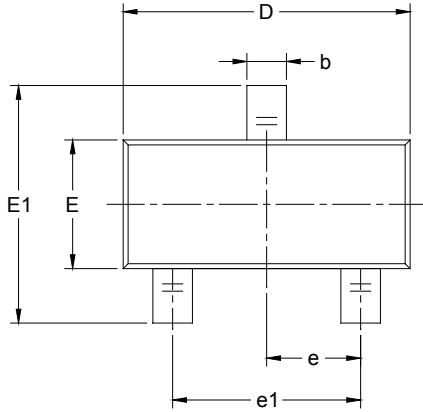
SOT-89-3



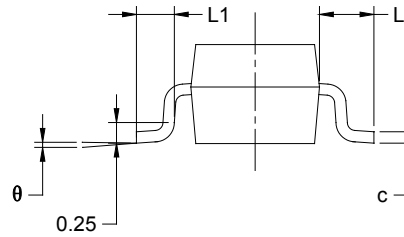
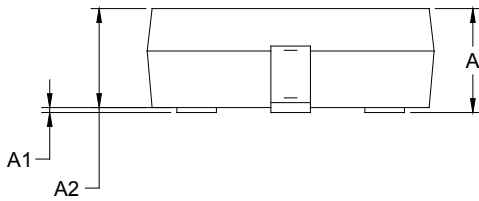
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060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

PACKAGE OUTLINE DIMENSIONS

SOT-23



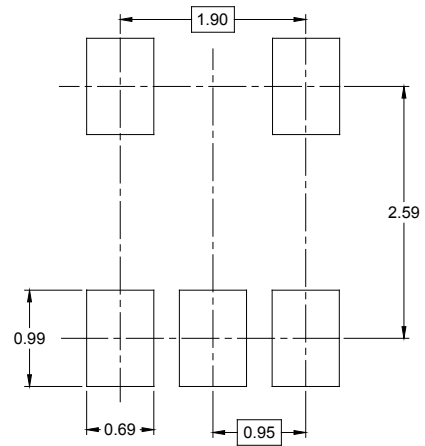
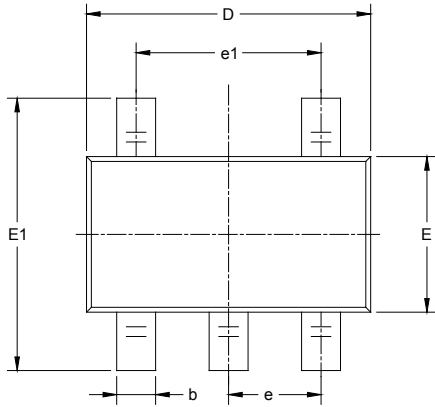
RECOMMENDED LAND PATTERN (Unit: mm)



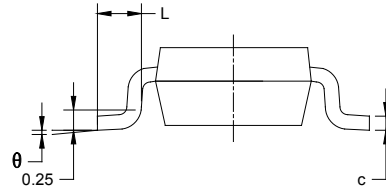
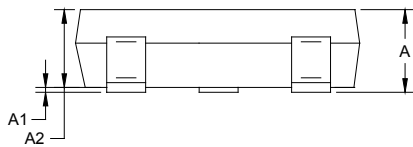
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

TSOT-23-5



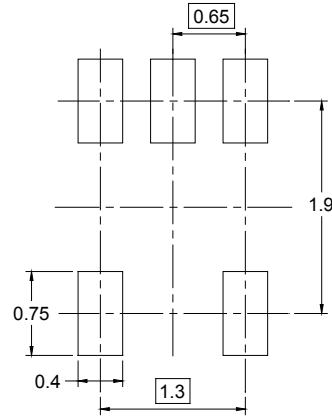
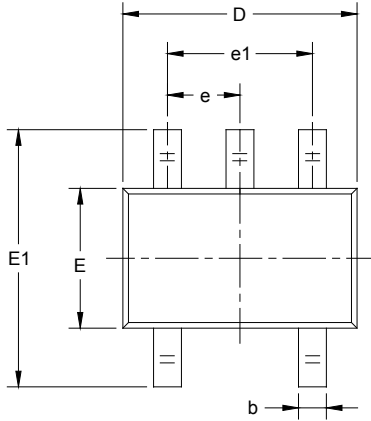
RECOMMENDED LAND PATTERN (Unit: mm)



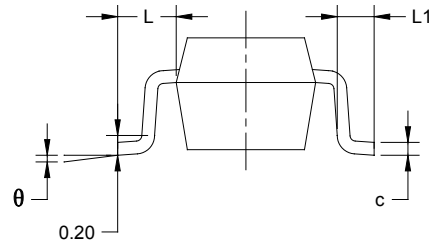
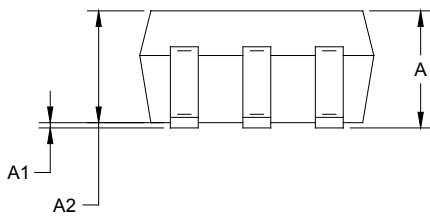
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b	0.350	0.500	0.014	0.020
c	0.080	0.200	0.003	0.008
D	2.820	3.020	0.111	0.119
E	1.600	1.700	0.063	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 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)

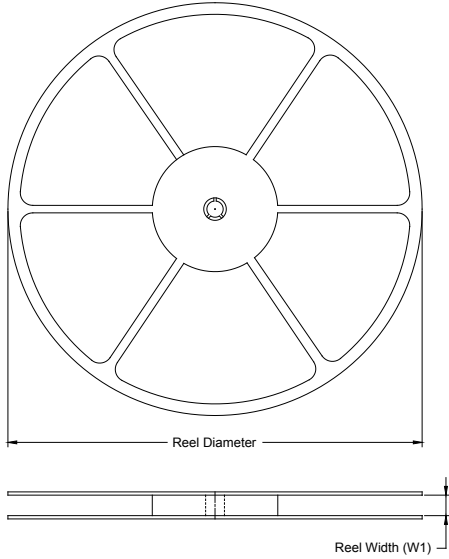


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 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°

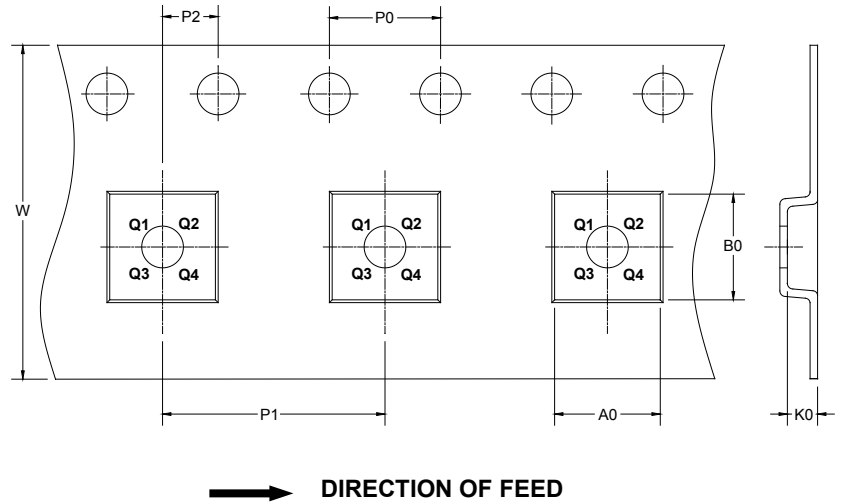
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

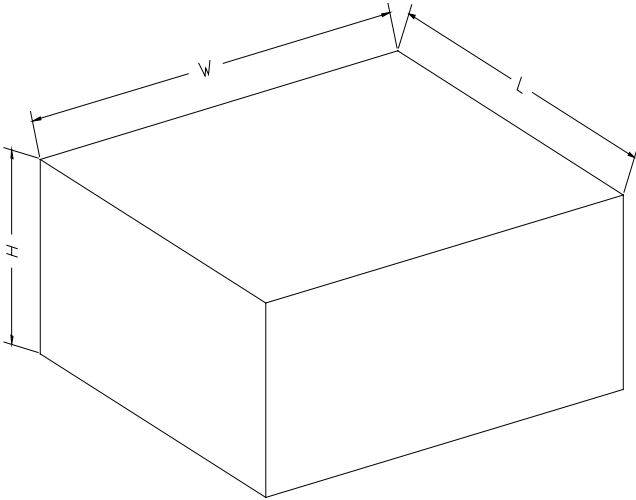
KEY PARAMETER LIST OF TAPE AND REEL

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-89-3	7"	13.2	4.85	4.45	1.85	4.0	8.0	2.0	12.0	Q3
SOT-23	7"	9.5	3.15	2.77	1.22	4.0	4.0	2.0	8.0	Q3
TSOT-23-5	7"	9.5	3.17	3.10	1.10	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

D00001

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

DD0002