

GENERAL DESCRIPTION

The SGM2202 is a high voltage, high accuracy and high PSRR linear regulator. It is capable of supplying 150mA output current. The operating input voltage is up to 36V. The output voltage range is from 2.5V to 5.0V in fixed output version. For adjustable output version, the output voltage can be adjusted from 0.8V to 13.2V by using external resistors.

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

The SGM2202 is suitable for application which needs high PSRR and high voltage, such as palmtops high-power boost applications, etc. Fixed or adjustable output voltage versions are provided.

The SGM2202 is available in Green SOT-23-5 and SOT-23-6 packages. It operates over an operating temperature range of -40°C to +85°C.

FEATURES

- **High Input Voltage: Up to 36V**
- **Fixed Output Voltages: 2.5V, 2.8V, 3.0V, 3.3V, 5.0V**
- **Adjustable Output Voltages: 0.8V to 13.2V**
- **150mA Guaranteed Output Current**
- **Output Voltage Accuracy: ±2.5% at +25°C**
- **High PSRR: 40dB (TYP) at 1kHz**
- **Low Dropout Voltage**
- **Low Power Consumption: 4.2µA (TYP)**
- **Shutdown Supply Current: 1.5µA (TYP)**
- **Low Temperature Coefficient**
- **Thermal Shutdown Protection**
- **Output Current Limit**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green SOT-23-5 and SOT-23-6 Packages**

APPLICATIONS

- Palmtops
- High-Power Boost Applications
- Power Source for Battery-Powered Equipment
- Home Electric/Electronic Appliances

TYPICAL APPLICATION

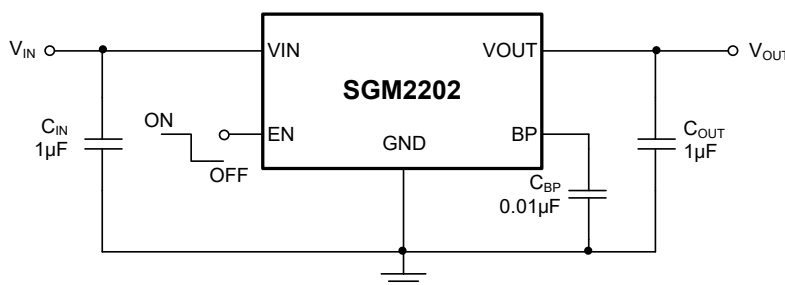


Figure 1. Fixed Voltage Typical Application Circuit

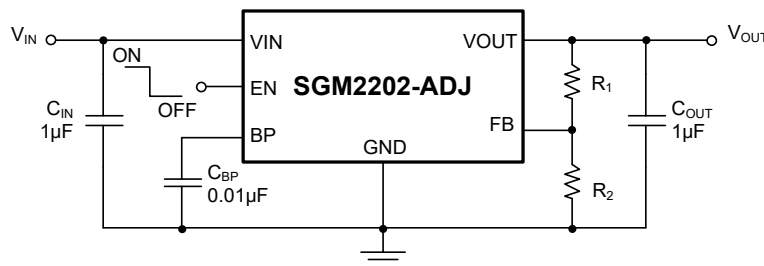


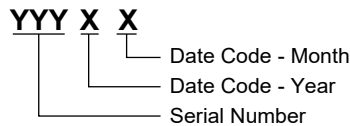
Figure 2. Adjustable Voltage Typical Application Circuit

PACKAGE/ORDERING INFORMATION

| MODEL | V _{OUT} (V) | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|-------------|----------------------|---------------------|-----------------------------|---------------------|-----------------|---------------------|
| SGM2202-2.5 | 2.5 | SOT-23-5 | -40°C to +85°C | SGM2202-2.5YN5G/TR | G1DXX | Tape and Reel, 3000 |
| SGM2202-2.8 | 2.8 | SOT-23-5 | -40°C to +85°C | SGM2202-2.8YN5G/TR | SX5XX | Tape and Reel, 3000 |
| SGM2202-3.0 | 3.0 | SOT-23-5 | -40°C to +85°C | SGM2202-3.0YN5G/TR | SX6XX | Tape and Reel, 3000 |
| | | SOT-23-5 (L-Type) | -40°C to +85°C | SGM2202-3.0YN5LG/TR | G12XX | Tape and Reel, 3000 |
| SGM2202-3.3 | 3.3 | SOT-23-5 | -40°C to +85°C | SGM2202-3.3YN5G/TR | SX8XX | Tape and Reel, 3000 |
| SGM2202-5.0 | 5.0 | SOT-23-5 | -40°C to +85°C | SGM2202-5.0YN5G/TR | G3DXX | Tape and Reel, 3000 |
| SGM2202-ADJ | Adjustable | SOT-23-6 | -40°C to +85°C | SGM2202-ADJYN6G/TR | SVFXX | Tape and Reel, 3000 |

MARKING INFORMATION

NOTE: XX = Date Code.



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

- VIN, EN to GND -0.3V to 44V
- VOU_T to GND -0.3V to Min(V_{IN} + 0.3V, 15V)
- BP, FB to GND -0.3V to Min(V_{IN} + 0.3V, 6V)
- Power Dissipation, P_D @ T_A = +25°C
- SOT-23-5, SOT-23-5 (L-Type)..... 0.517W
- SOT-23-6 0.558W
- Package Thermal Resistance
- SOT-23-5, SOT-23-5 (L-Type), θ_{JA} 242°C/W
- SOT-23-6, θ_{JA} 224°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..... 150V
- CDM 1000V

RECOMMENDED OPERATING CONDITIONS

- Input Voltage Range2.7V to 36V
- Operating Temperature Range -40°C to +85°C

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.

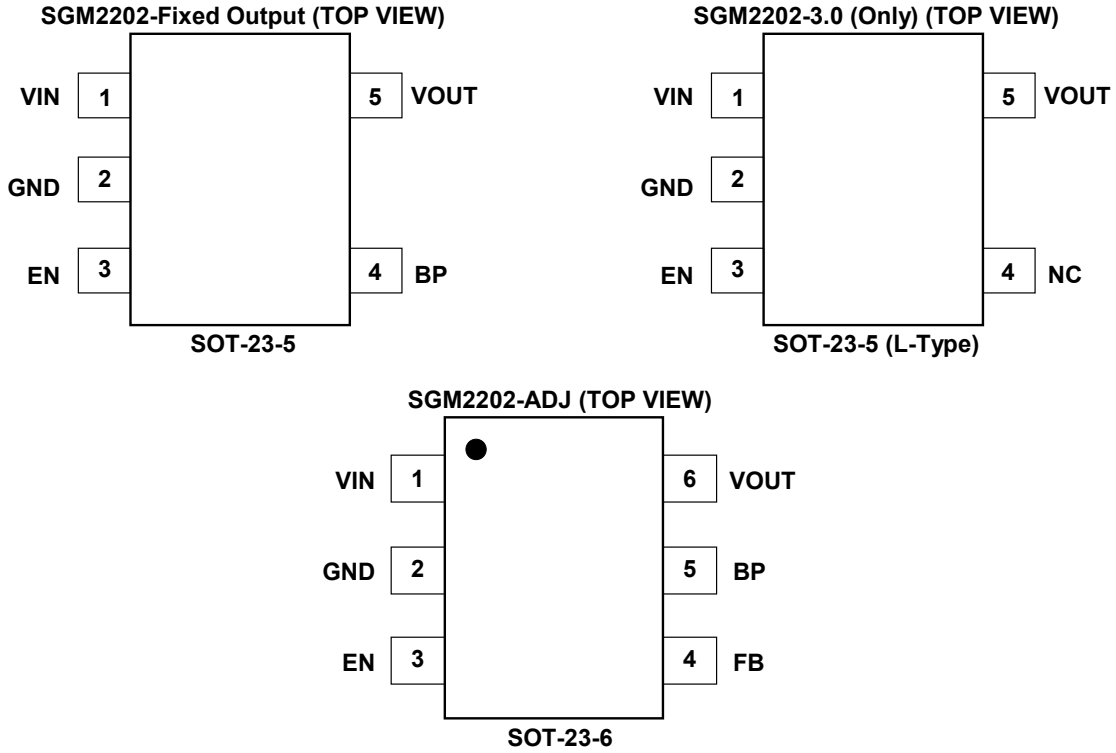
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

| PIN | | | NAME | FUNCTION |
|----------|-------------------|----------|------|---|
| SOT-23-5 | SOT-23-5 (L-Type) | SOT-23-6 | | |
| 1 | 1 | 1 | VIN | Regulator Input Pin. Up to 36V input voltage. It is recommended to use a 1μF or larger ceramic capacitor from VIN pin to ground. |
| 2 | 2 | 2 | GND | Ground. |
| 3 | 3 | 3 | EN | Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator. This pin must be connected to VIN pin if enable functionality is not used. |
| - | - | 4 | FB | Feedback Voltage Input Pin. Connect this pin to the external resistor divider to adjust the output voltage. |
| 4 | - | 5 | BP | Reference-Noise Bypass Pin. Bypass with an external capacitor C _{BP} can reduce output noise to very low level. The capacitor is recommended to be placed very close to the pin for high PSRR. |
| - | 4 | - | NC | Not Connected. |
| 5 | 5 | 6 | VOUT | Regulator Output Pin. It is recommended to use an output capacitor with effective capacitance in the range of 1μF to 10μF. The capacitor should be located very close to this pin. |

ELECTRICAL CHARACTERISTICS

($V_{IN} = 15V$, $V_{EN} = 2V$, $C_{IN} = C_{OUT} = 1\mu F$, $C_{BP} = 0.01\mu F$, Full = $-40^{\circ}C$ to $+85^{\circ}C$, typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

| PARAMETER | SYMBOL | CONDITIONS | TEMP | MIN | TYP | MAX | UNITS |
|---|---|---|----------------|----------------|-------|------|------------------|
| Input Voltage | V_{IN} | $V_{OUT} < 3.3V$ | Full | 2.7 | | 32 | V |
| | | $V_{OUT} \geq 3.3V$ | Full | 2.7 | | 36 | |
| Output Voltage Accuracy | | $I_{OUT} = 1mA$ | $+25^{\circ}C$ | -2.5 | | 2.5 | % |
| Feedback Voltage | V_{FB} | SGM2202-ADJ, $V_{FB} = V_{OUT}$, $I_{OUT} = 1mA$ | $+25^{\circ}C$ | | 0.8 | | V |
| FB Input Current | I_{FB} | SGM2202-ADJ, $V_{FB} = 0.9V$ | Full | -15 | | 15 | nA |
| Ground Pin Current | | No load | $+25^{\circ}C$ | | 4.2 | 5.4 | μA |
| | | | Full | | | 6.5 | |
| | | $I_{OUT} = 50mA$ | $+25^{\circ}C$ | | 4.2 | | |
| Maximum Output Current ⁽¹⁾ | | $V_{IN} = V_{OUT} + 2V$ or $4V$, whichever is greater | $+25^{\circ}C$ | 150 | | | mA |
| Dropout Voltage ⁽²⁾ | V_{DROP} | $I_{OUT} = 150mA$, $V_{OUT} \geq 2.5V$ | $+25^{\circ}C$ | | 1300 | 1840 | mV |
| | | | Full | | | 2380 | |
| Line Regulation | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $V_{IN} = V_{OUT} + 2V$ or $4V$ to $32V$, $I_{OUT} = 1mA$, $V_{OUT} < 3.3V$ | $+25^{\circ}C$ | | 0.005 | 0.01 | %V |
| | | $V_{IN} = V_{OUT} + 2V$ to $36V$, $I_{OUT} = 1mA$, $V_{OUT} \geq 3.3V$ | $+25^{\circ}C$ | | 0.005 | 0.01 | |
| Load Regulation | ΔV_{OUT} | $V_{IN} = V_{OUT} + 2V$ or $4V$, $I_{OUT} = 1mA$ to $150mA$ | $+25^{\circ}C$ | | 10 | 24 | mV |
| Power Supply Rejection Ratio | PSRR | $V_{OUT} = 3.3V$, $I_{OUT} = 10mA$ | $f = 217Hz$ | $+25^{\circ}C$ | | 55 | dB |
| | | | $f = 1kHz$ | $+25^{\circ}C$ | | 40 | |
| 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 | | 35 | | ppm/ $^{\circ}C$ |
| Shutdown | | | | | | | |
| EN Input Threshold | V_{IH} | $V_{IN} = 2.7V$ to $36V$ | Full | 1.2 | | | V |
| | V_{IL} | | Full | | | 0.4 | |
| EN Input Bias Current | I_{BH} | $V_{EN} = V_{IN}$ | Full | | 0.02 | 1 | μA |
| | I_{BL} | $V_{EN} = 0V$ | Full | -1 | | 1 | |
| Shutdown Supply Current | $I_{Q(SHDN)}$ | $V_{EN} = 0V$ | $+25^{\circ}C$ | | 1.5 | 2 | μA |
| Start-Up Time ⁽⁴⁾ | t_{STR} | No load | $+25^{\circ}C$ | | 5 | | ms |
| R_{ON} of Discharge MOSFET | | $V_{IN} = 2.7V$, $V_{EN} = 0V$, $I_{OUT} = -1mA$ | $+25^{\circ}C$ | | 75 | | Ω |
| Thermal Protection | | | | | | | |
| Thermal Shutdown Temperature | T_{SHDN} | | | | 150 | | $^{\circ}C$ |
| Thermal Shutdown Hysteresis | ΔT_{SHDN} | | | | 20 | | $^{\circ}C$ |

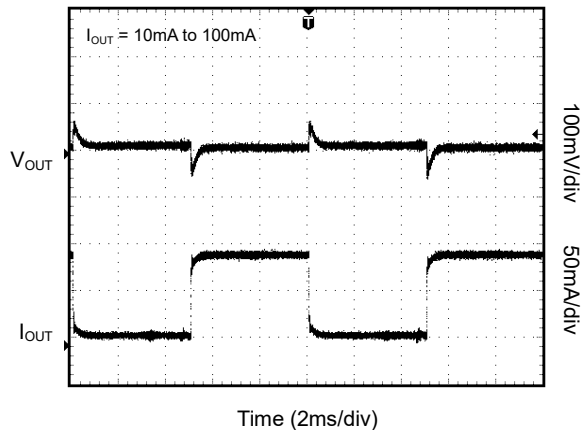
NOTES:

- 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.
- Time needed for V_{OUT} to reach 90% of final value.

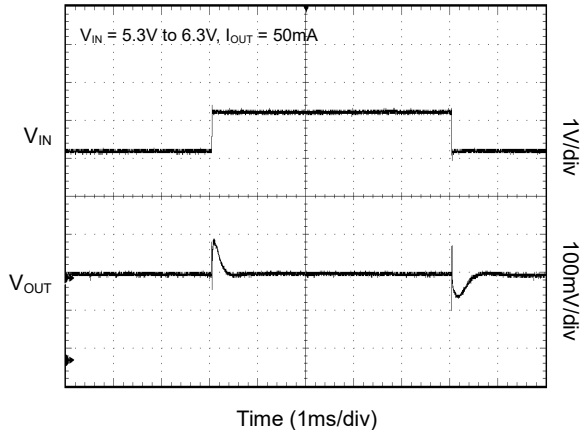
TYPICAL PERFORMANCE CHARACTERISTICS

$T_A = +25^\circ\text{C}$, $V_{IN} = 5.3\text{V}$, $V_{EN} = 2\text{V}$, $V_{OUT} = 3.3\text{V}$, $C_{IN} = C_{OUT} = 1\mu\text{F}$, $C_{BP} = 0.01\mu\text{F}$, unless otherwise noted.

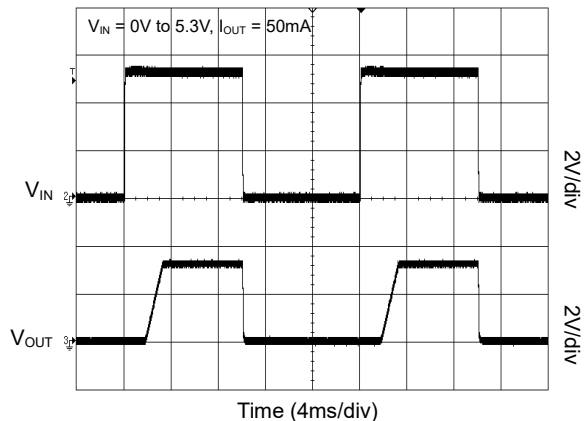
Load-Transient Response



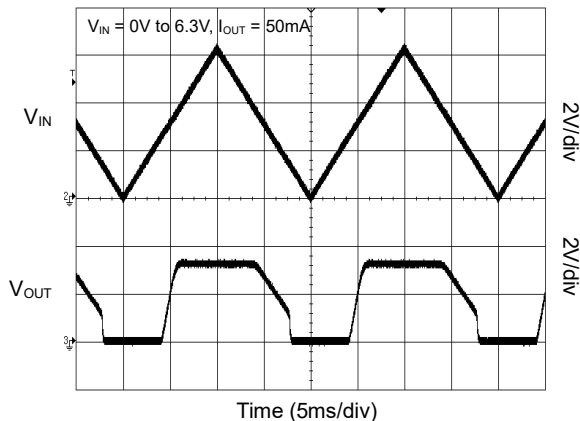
Line-Transient Response



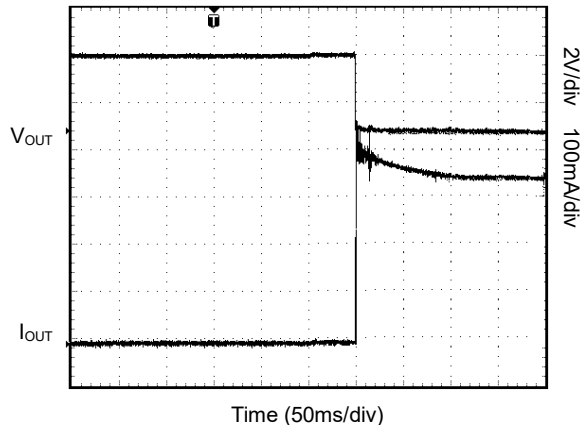
Power-Up/Power-Down Output Waveform



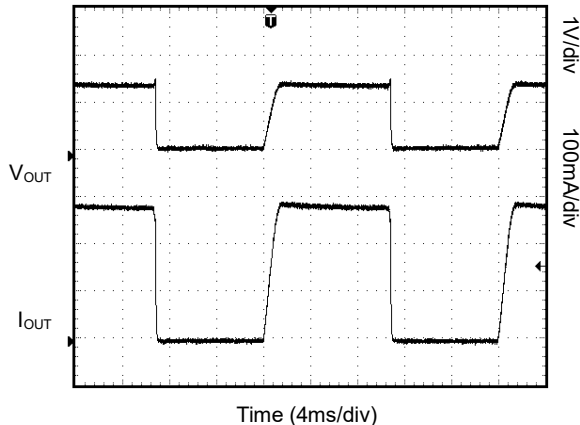
Power Ramp-Up/Ramp-Down Output Waveform



Output Short Waveform

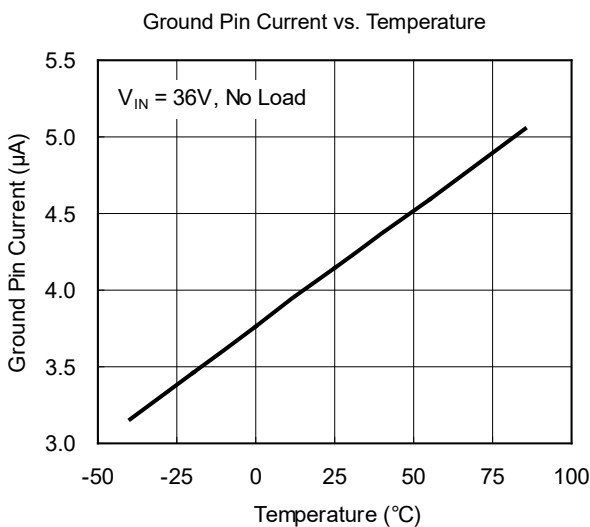
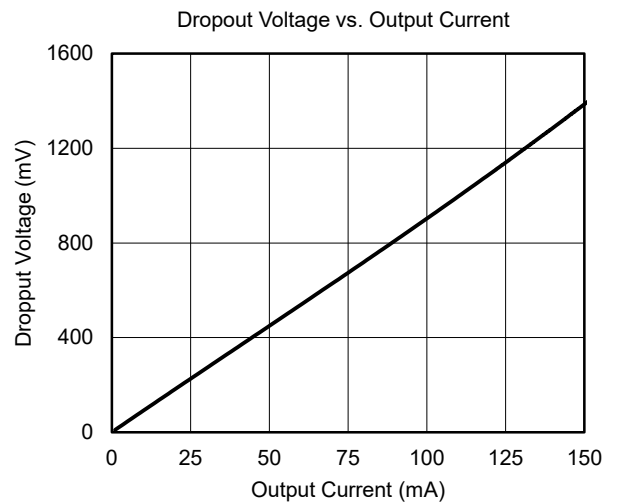
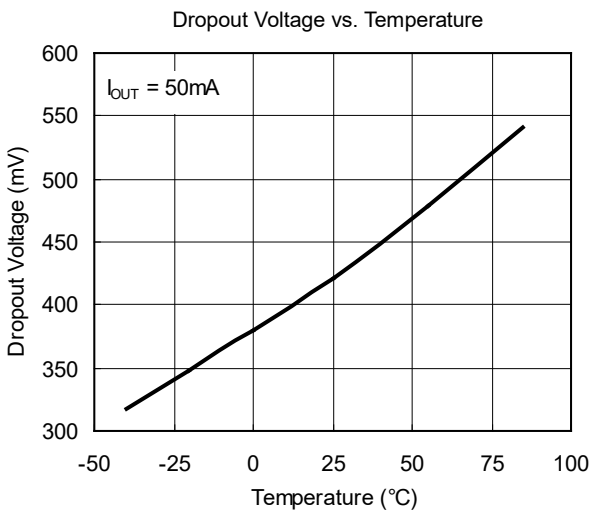
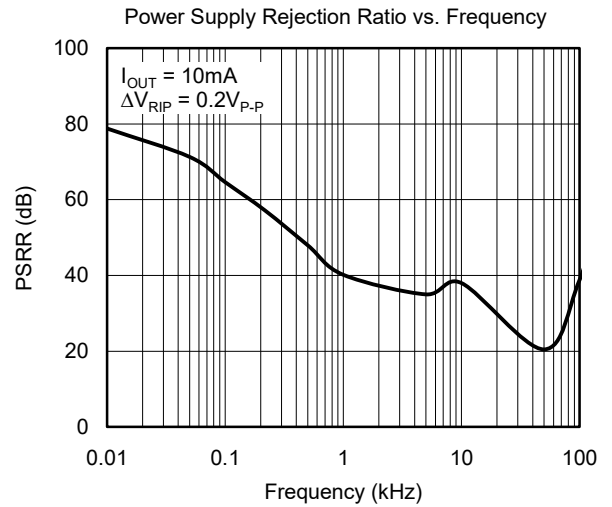
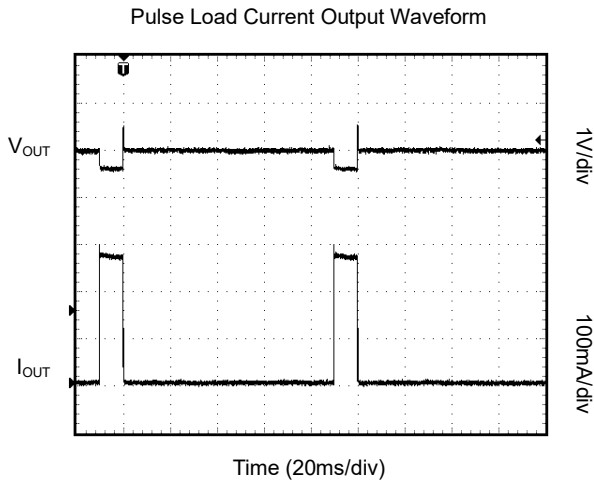


Thermal Protection Waveform



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_{IN} = 5.3\text{V}$, $V_{EN} = 2\text{V}$, $V_{OUT} = 3.3\text{V}$, $C_{IN} = C_{OUT} = 1\mu\text{F}$, $C_{BP} = 0.01\mu\text{F}$, unless otherwise noted.



REVISION HISTORY

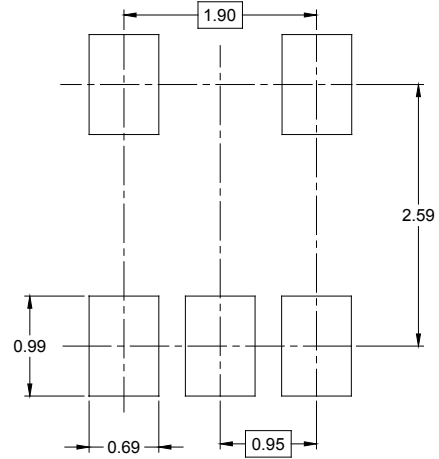
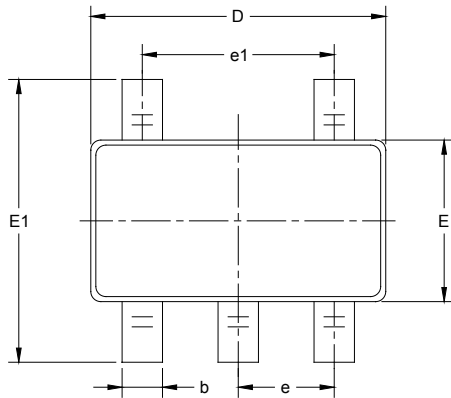
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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| Updated Package/Ordering Information section..... | 2 |

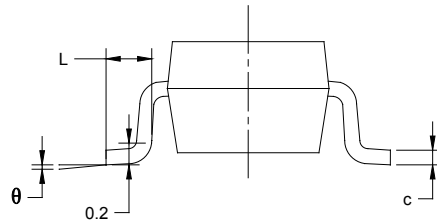
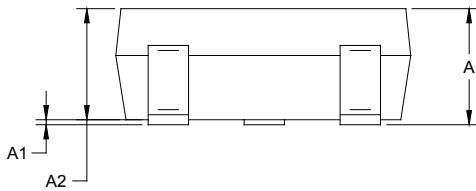
| Changes from Original (APRIL 2017) to REV.A | Page |
|--|-------------|
| Changed from product preview to production data..... | All |

PACKAGE OUTLINE DIMENSIONS

SOT-23-5



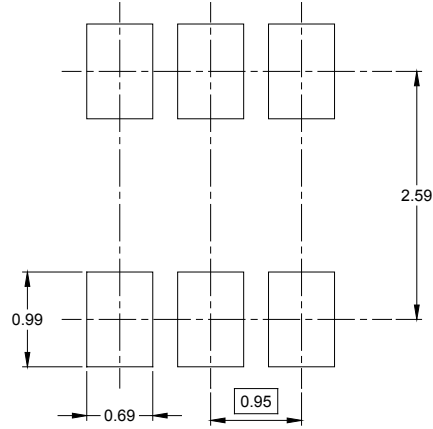
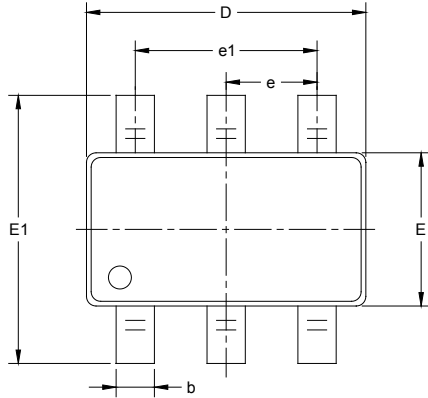
RECOMMENDED LAND PATTERN (Unit: mm)



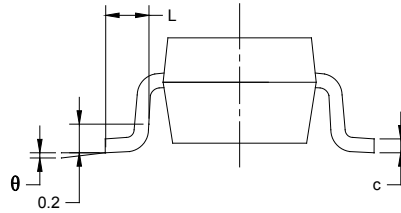
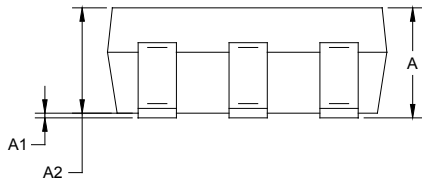
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 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

SOT-23-6



RECOMMENDED LAND PATTERN (Unit: mm)

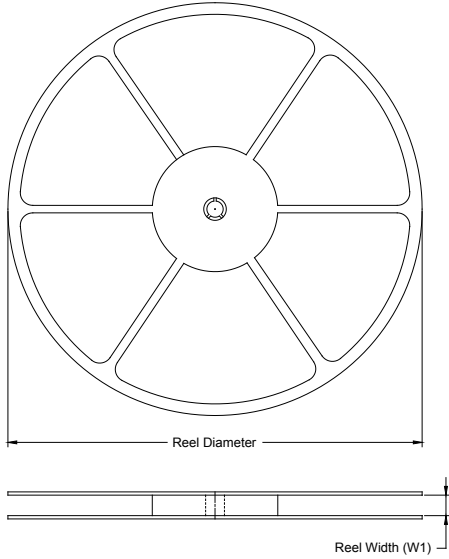


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 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 |
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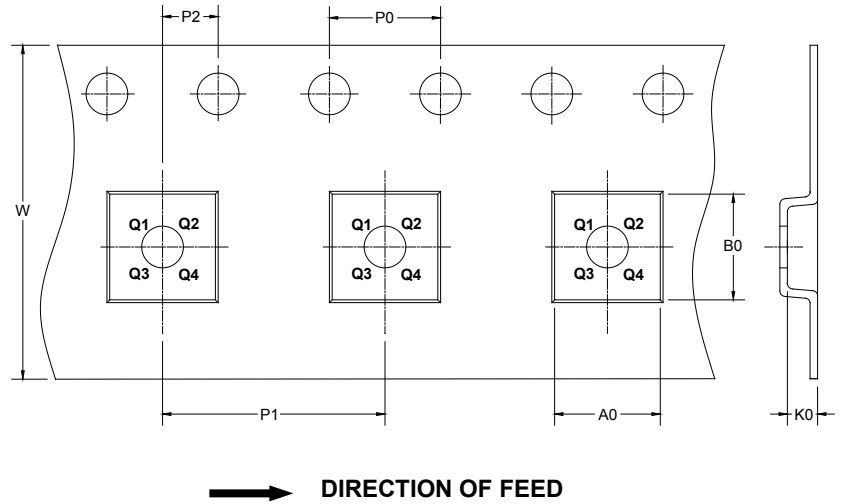
PACKAGE INFORMATION

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 |
| SOT-23-6 | 7" | 9.5 | 3.17 | 3.23 | 1.37 | 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

单击下面可查看定价，库存，交付和生命周期等信息

[>>SGMICRO\(圣邦微电子\)](#)