# SGM2203
# 150mA, High Voltage Regulators

## GENERAL DESCRIPTION

The SGM2203 series is a set of low power high voltage regulators implemented in CMOS technology which can provide 150mA output current. The device allows input voltage as high as 36V. The SGM2203 series is available in several fixed output voltages. CMOS technology ensures low dropout voltage and low quiescent current.

Although designed primarily as fixed voltage regulators, the device can be used with external components to obtain variable output voltages.

The SGM2203 series is available in Green SOT-23 and SOT-89-3 packages. It operates over an ambient temperature range of -40℃ to +85℃.

## FEATURES

- **Low Power Consumption**
- **150mA Nominal Output Current**
- **Low Dropout Voltage**
- **Low Temperature Coefficient**
- **High Input Voltage (up to 36V)**
- **Output Voltage Accuracy: 3%**
- **Fixed Output Voltage Versions:**
  **0.8V to 4.7V with 0.1V per Step**
  **5V to 12V with 0.25V per Step**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green SOT-23 and SOT-89-3 Packages**

## APPLICATIONS

Battery-Powered Equipment
Communication Equipment
Audio/Video Equipment

## TYPICAL APPLICATION

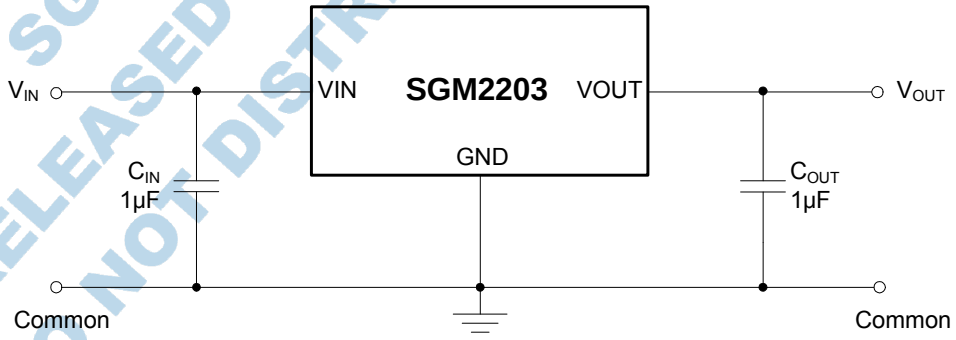



**Figure 1. Typical Application Circuit**

## PACKAGE/ORDERING INFORMATION

| MODEL | $V_{OUT}$ (V) | PACKAGE DESCRIPTION | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|---|---|---|---|---|---|
| SGM2203-0.9 | 0.9 | SOT-23 | SGM2203-0.9YN3LG/TR | SW0XX | Tape and Reel, 3000 |
| SGM2203-1.0 | 1.0 | SOT-23 | SGM2203-1.0YN3LG/TR | SW1XX | Tape and Reel, 3000 |
| SGM2203-1.1 | 1.1 | SOT-23 | SGM2203-1.1YN3LG/TR | SW2XX | Tape and Reel, 3000 |
| SGM2203-1.2 | 1.2 | SOT-23 | SGM2203-1.2YN3LG/TR | SW3XX | Tape and Reel, 3000 |
| SGM2203-1.5 | 1.5 | SOT-23 | SGM2203-1.5YN3LG/TR | SW4XX | Tape and Reel, 3000 |
| SGM2203-1.8 | 1.8 | SOT-23 | SGM2203-1.8YN3LG/TR | SW5XX | Tape and Reel, 3000 |
| SGM2203-2.5 | 2.5 | SOT-23 | SGM2203-2.5YN3LG/TR | SW6XX | Tape and Reel, 3000 |
| SGM2203-2.8 | 2.8 | SOT-23 | SGM2203-2.8YN3LG/TR | SW7XX | Tape and Reel, 3000 |
| SGM2203-3.0 | 3.0 | SOT-23 | SGM2203-3.0YN3LG/TR | SW8XX | Tape and Reel, 3000 |
| SGM2203-3.3 | 3.3 | SOT-23 | SGM2203-3.3YN3LG/TR | SW9XX | Tape and Reel, 3000 |
| SGM2203-3.6 | 3.6 | SOT-23 | SGM2203-3.6YN3LG/TR | SWAXX | Tape and Reel, 3000 |
| SGM2203-5.0 | 5.0 | SOT-23 | SGM2203-5.0YN3LG/TR | SWBXX | Tape and Reel, 3000 |
| SGM2203-2.5 | 2.5 | SOT-89-3 | SGM2203-2.5YK3G/TR | SWCXX | Tape and Reel, 1000 |
| SGM2203-3.3 | 3.3 | SOT-89-3 | SGM2203-3.3YK3G/TR | SWDXX | Tape and Reel, 1000 |
| SGM2203-3.6 | 3.6 | SOT-89-3 | SGM2203-3.6YK3G/TR | SWFXX | Tape and Reel, 1000 |
| SGM2203-5.0 | 5.0 | SOT-89-3 | SGM2203-5.0YK3G/TR | SWEXX | Tape and Reel, 1000 |
| SGM2203-8.0 | 8.0 | SOT-89-3 | SGM2203-8.0YK3G/TR | G74XX | Tape and Reel, 1000 |
| SGM2203-12 | 12 | SOT-89-3 | SGM2203-12YK3G/TR | G3FXX | Tape and Reel, 1000 |
| SGM2203-3.0 | 3.0 | SOT-89-3 (L-Type) | SGM2203-3.0YK3LG/TR | SX0XX | Tape and Reel, 1000 |
| SGM2203-3.3 | 3.3 | SOT-89-3 (L-Type) | SGM2203-3.3YK3LG/TR | G75XX | Tape and Reel, 1000 |
| SGM2203-5.0 | 5.0 | SOT-89-3 (L-Type) | SGM2203-5.0YK3LG/TR | SX1XX | Tape and Reel, 1000 |
| SGM2203-8.0 | 8.0 | SOT-89-3 (L-Type) | SGM2203-8.0YK3LG/TR | SX2XX | Tape and Reel, 1000 |
| SGM2203-9.0 | 9.0 | SOT-89-3 (L-Type) | SGM2203-9.0YK3LG/TR | SX3XX | Tape and Reel, 1000 |
| SGM2203-12 | 12 | SOT-89-3 (L-Type) | SGM2203-12YK3LG/TR | G40XX | Tape and Reel, 1000 |

NOTES:

1. The devices are available in fixed output voltages from 0.8V to 4.7V with 0.1V per step, and from 5V to 12V with 0.25V per step.

2. 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

YYY X X

- Date code - Month ("A" = Jan. "B" = Feb. ··· "L" = Dec.)
- Date code - Year ("A" = 2010, "B" = 2011 ···)
- Chip I.D.

For example: SW0FA (2015, January)

## ABSOLUTE MAXIMUM RATINGS

VIN to GND ..... -0.3V to 44V
VOUT to GND ..... -0.3V to Min($V_{IN}$ + 0.3V, 15V)
Power Dissipation, $P_D$ @ $T_A$ = 25℃
SOT-89-3 ..... 0.625W
SOT-23 ..... 0.347W
Package Thermal Resistance
SOT-89-3, $\theta_{JA}$ ..... 200℃/W
SOT-23, $\theta_{JA}$ ..... 360℃/W
Junction Temperature ..... 150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... 260℃

## RECOMMENDED OPERATING CONDITIONS

Input Voltage Range ..... 2.7V to 36V
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.

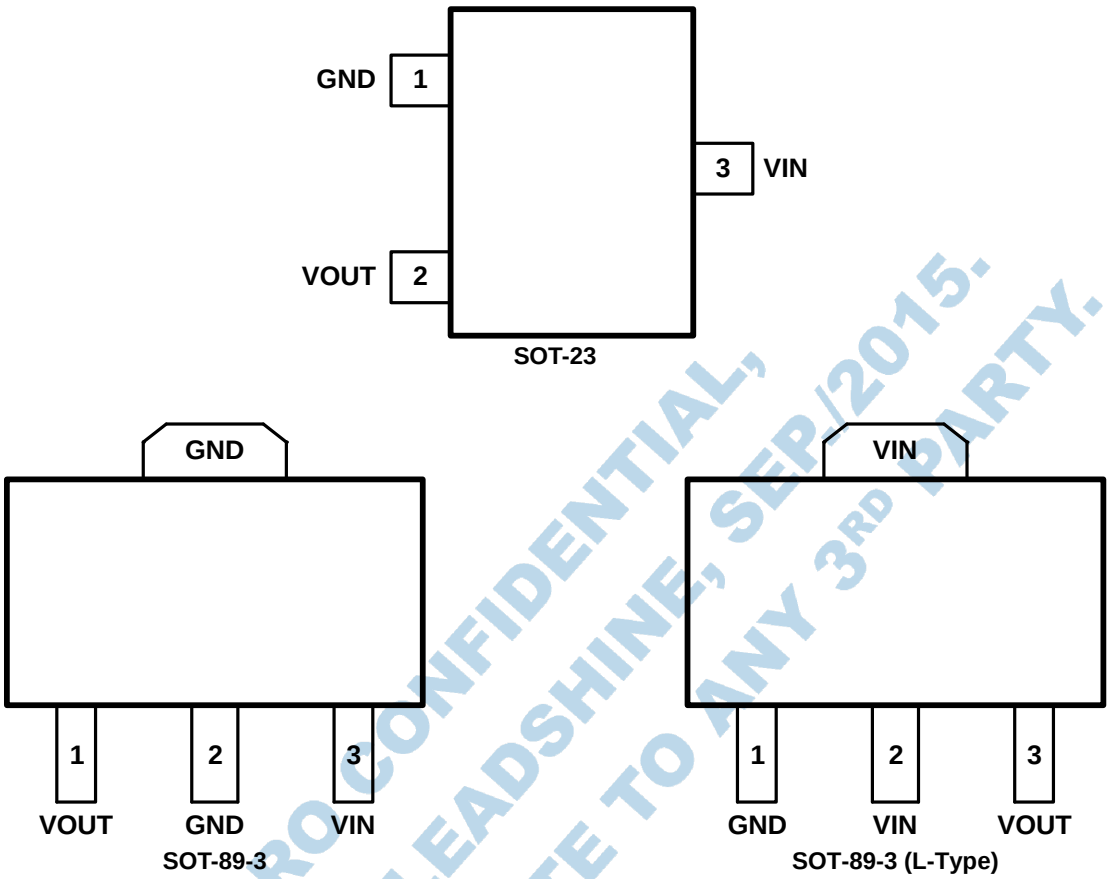
## ESD SENSITIVITY CAUTION

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 CONFIGURATIONS (TOP VIEW)






## PIN DESCRIPTION

| PIN | | | NAME | FUNCTION |
|---|---|---|---|---|
| SOT-23 | SOT-89-3 | SOT-89-3 (L-Type) | | |
| 1 | 2 | 1 | GND | Ground. |
| 2 | 1 | 3 | VOUT | Regulator Output. Recommended output capacitor range: 1μF to 10μF. |
| 3 | 3 | 2 | VIN | Regulator Input. Up to 36V input voltage. At least 1μF supply bypass capacitor is recommended. |

## ELECTRICAL CHARACTERISTICS

($V_{IN}$ = 15V, $C_{IN}$ = $C_{OUT}$ = 1μF, $T_A$ = 25℃, unless otherwise noted.)

| PARAMETER | SYMBOL | CONDITIONS | | TEMP | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | $V_{OUT}$ = 0.8V to 3.2V | | +25℃ | 2.7 | | 32 | V |
| | | $V_{OUT}$ = 3.3V to 12V | | | 2.7 | | 36 | |
| Output Voltage Accuracy | | $I_{OUT}$ = 1mA | | +25℃ | | 3 | | % |
| Ground Pin Current | | No load | | +25℃ | | 4.5 | | μA |
| | | $I_{OUT}$ = 50mA | | | | 4.5 | | |
| Maximum Output Current (1) | | $V_{IN}$ = $V_{OUT}$ + 2V or 4V, whichever is greater | | +25℃ | 150 | | | mA |
| Dropout Voltage (2) | $V_{DROP}$ | $I_{OUT}$ = 150mA, $V_{OUT}$ ≥ 3.3V | | +25℃ | | 1300 | | mV |
| Line Regulation | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $V_{IN}$ = $V_{OUT}$ + 2V or 4V to 32V, $I_{OUT}$ = 1mA | $V_{OUT}$ = 0.8V to 5V | +25℃ | | 0.005 | | %/V |
| | | | $V_{OUT}$ = 6V to 12V | | | 0.05 | | |
| Load Regulation | $\Delta V_{OUT}$ | $V_{IN}$ = $V_{OUT}$ + 2V or 4V to 32V, $I_{OUT}$ =1mA to 150mA | $V_{OUT}$ = 0.8V to 5V | +25℃ | | 10 | | mV |
| | | | $V_{OUT}$ = 6V to 12V | | | 160 | | |
| Power Supply Rejection Ratio | PSRR | $V_{OUT}$ = 3.3V, $I_{OUT}$ = 10mA | f = 217Hz | +25℃ | | 65 | | dB |
| | | | f = 1kHz | | | 50 | | |
| Output Voltage Noise | $e_n$ | f = 10Hz to 100kHz, $V_{OUT}$ = 3.3V, $I_{OUT}$ = 10mA | | +25℃ | | 220 | | $\mu V_{RMS}$ |
| **THERMAL PROTECTION** | | | | | | | | |
| Thermal Shutdown Temperature | $T_{SHDN}$ | | | | | 150 | | ℃ |
| Thermal Shutdown Hysteresis | $\Delta T_{SHDN}$ | | | | | 20 | | ℃ |

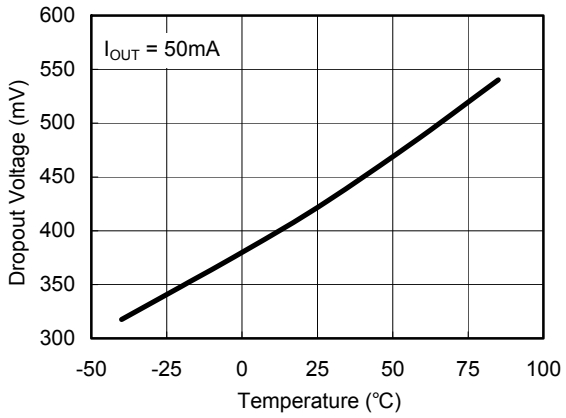
NOTES:

1. 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 $V_{IN}$ < $V_{OUT}$ + $V_{DROP}$.
2. The dropout voltage is defined as $V_{IN}$ - $V_{OUT}$, when $V_{OUT}$ is 100mV below the value of $V_{OUT}$ for $V_{IN}$ = $V_{OUT\,(NOMINAL)}$ + 2V or 4V, whichever is greater.

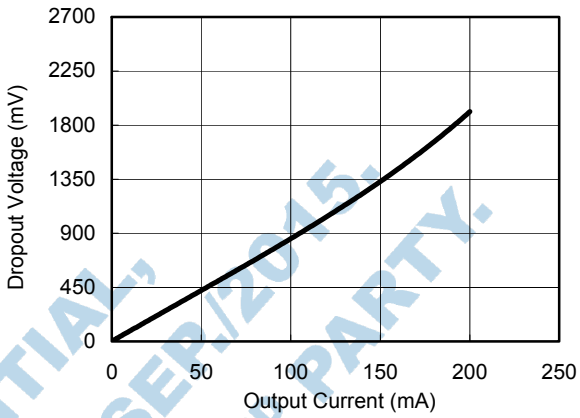
## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}$ = $V_{OUT\ (NOMINAL)}$ + 2V or 4V, whichever is greater, $V_{OUT}$ = 3.3V, $C_{IN}$ = $C_{OUT}$ = 1μF, $T_A$ = 25℃, unless otherwise noted.

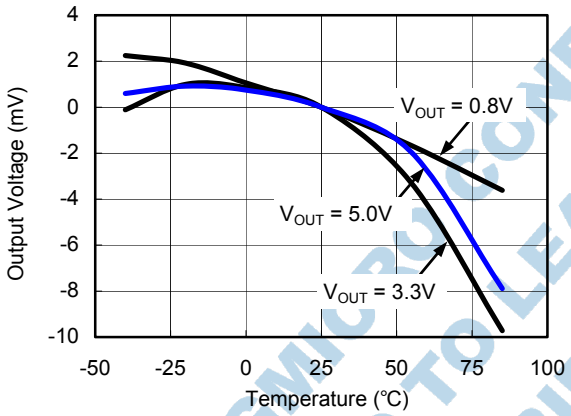
Dropout Voltage vs. Temperature



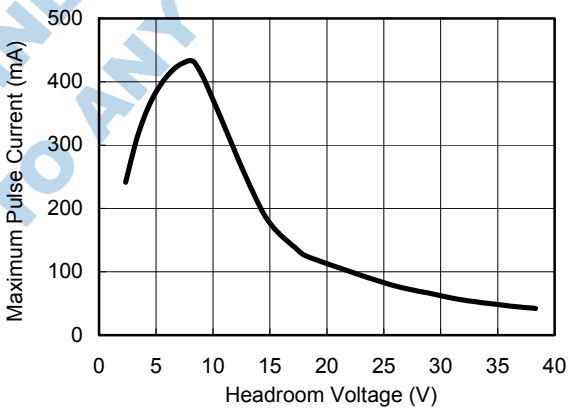

Dropout Voltage vs. Output Current



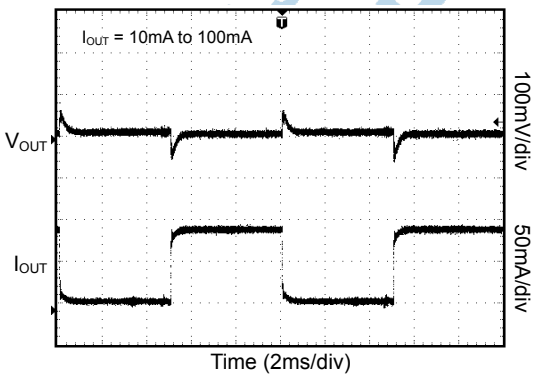

Output Voltage vs. Temperature



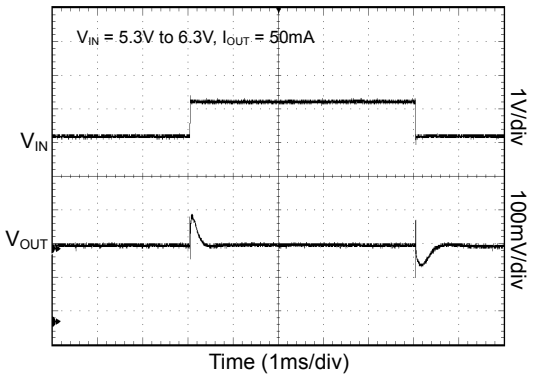

Maximum Pulse Current vs. Headroom Voltage




Load-Transient Response



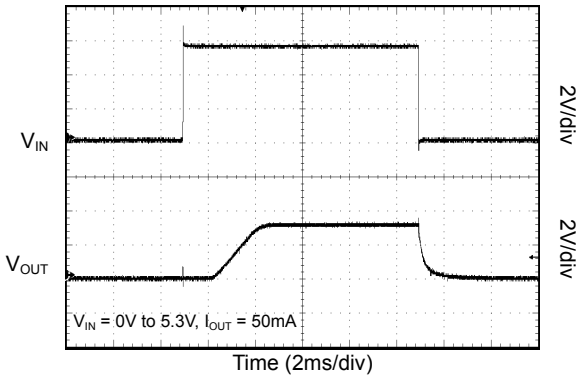

Line-Transient Response



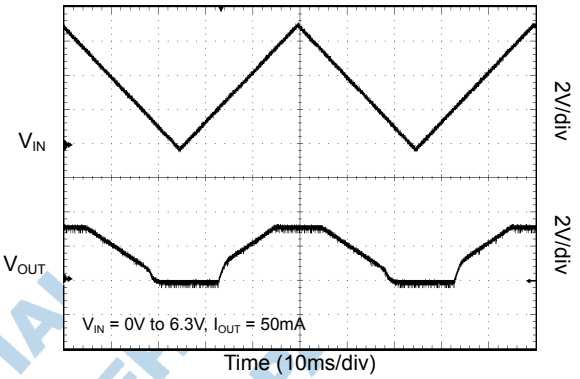
## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}$ = $V_{OUT\ (NOMINAL)}$ + 2V or 4V, whichever is greater, $V_{OUT}$ = 3.3V, $C_{IN}$ = $C_{OUT}$ = 1μF, $T_A$ = 25℃, unless otherwise noted.

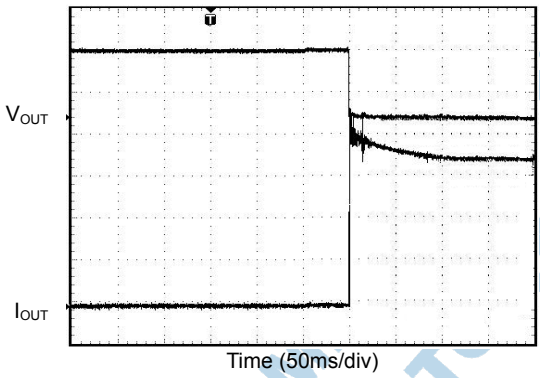
Power-Up/Power-Down Output Waveform



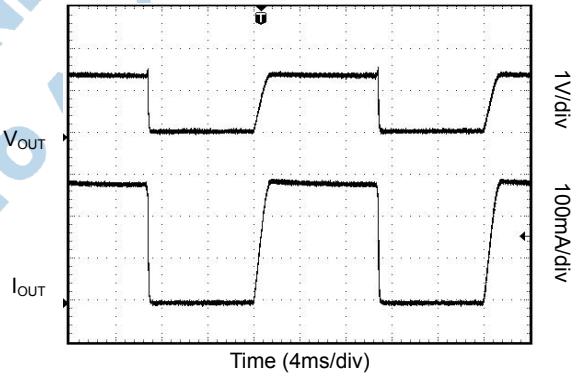

Power Ramp-Up/Ramp-Down Output Waveform



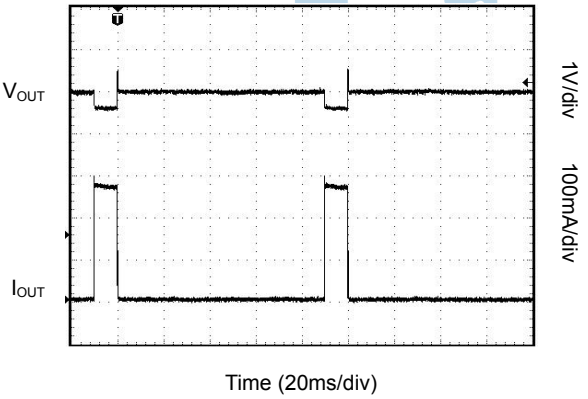

Output Short Waveform



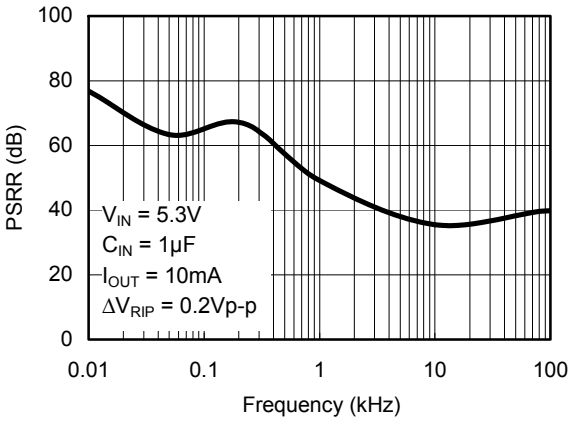

Thermal Protection Waveform




Pulse Load Current Output Waveform




Power Supply Rejection Ratio vs. Frequency



## APPLICATION INFORMATION

### Input Capacitor and Output Capacitor

For proper operation, place a ceramic capacitor ($C_{IN}$) between 1μF and 10μF 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 1μF and 10μF. 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.

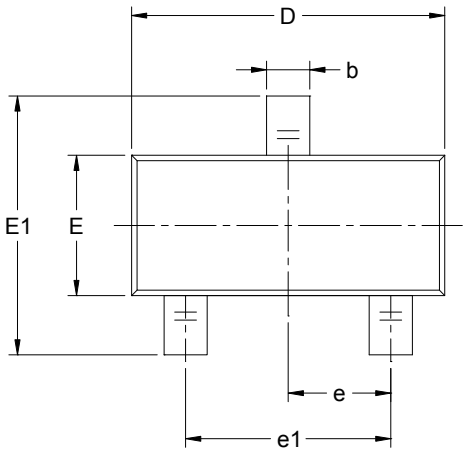
### Thermal Considerations

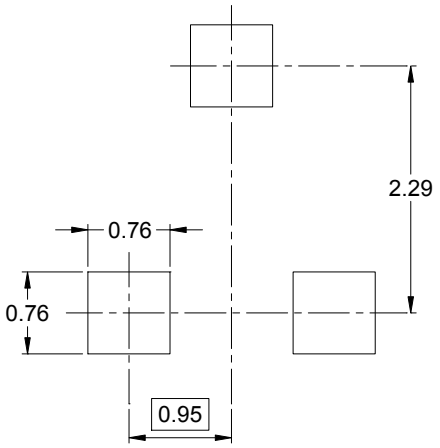
When the junction temperature is too high, the thermal protection circuitry sends a signal to the control logic that will shutdown the IC. The IC will restart when the temperature has sufficiently cooled down.

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. The GND pin must be connected to the ground plane for proper dissipation.

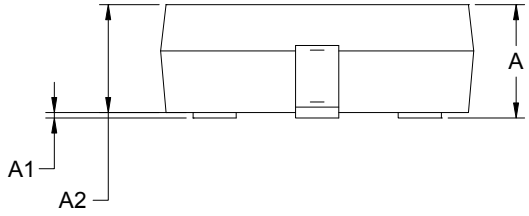
# PACKAGE OUTLINE DIMENSIONS

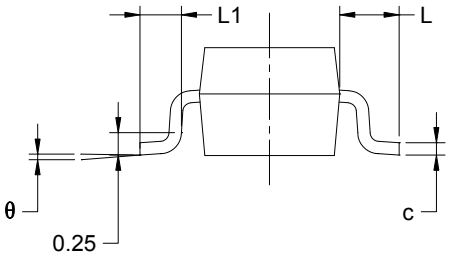
## SOT-23




**RECOMMENDED LAND PATTERN** (Unit: mm)

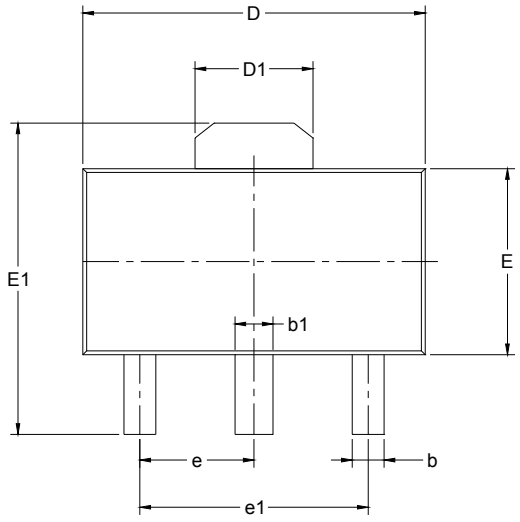


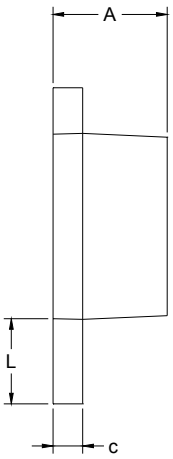



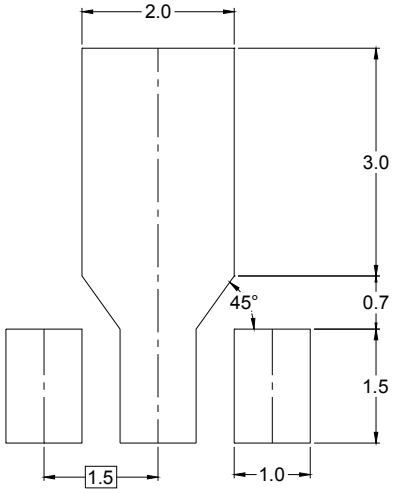

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| 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

## SOT-89-3



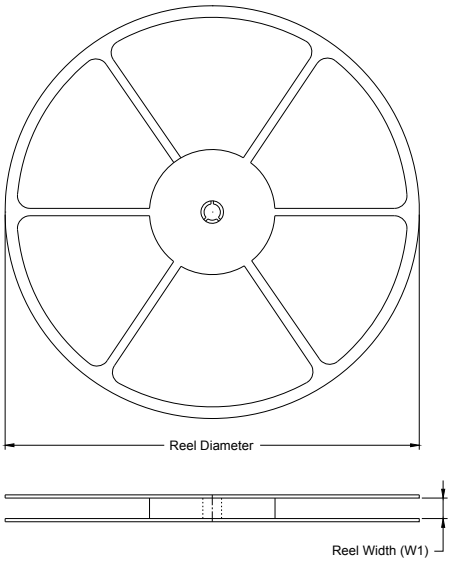




**RECOMMENDED LAND PATTERN** (Unit: mm)

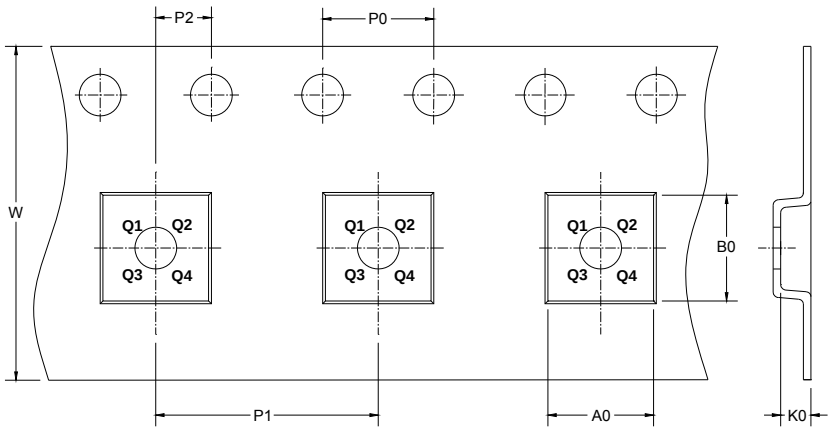
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| 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 |

# TAPE AND REEL INFORMATION

### REEL DIMENSIONS




### TAPE DIMENSIONS




DIRECTION OF FEED

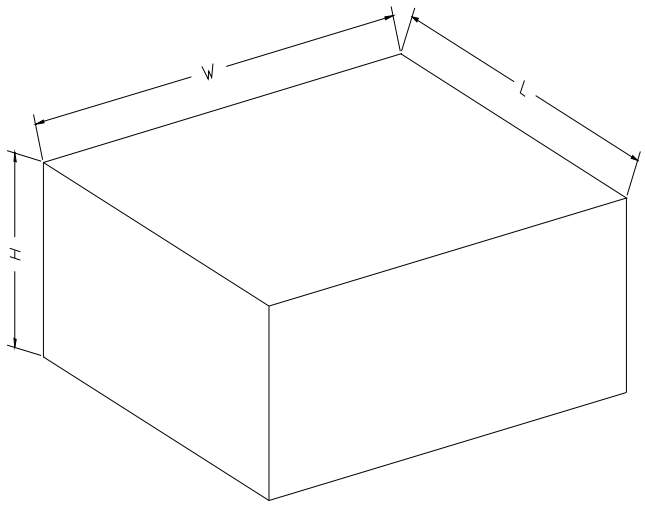
NOTE: The picture is only for reference. Please make the object as the standard.

### 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 | 7″ | 9.5 | 3.15 | 2.77 | 1.22 | 4.0 | 4.0 | 2.0 | 8.0 | Q3 |
| SOT-89-3 | 7″ | 13.2 | 4.85 | 4.45 | 1.85 | 4.0 | 8.0 | 2.0 | 12.0 | 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