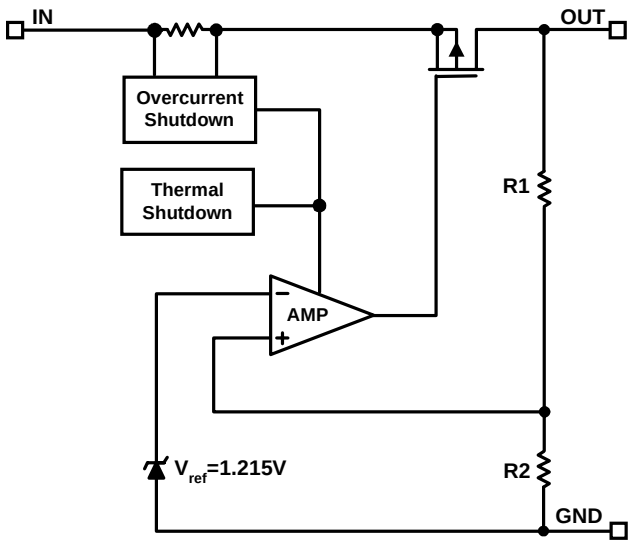
## ■ General Description

The AME8805/8810 family of positive, linear regulators feature low quiescent current (30μA typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-89 and SOT-223 packages are attractive for "Pocket" and "Hand Held" applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

The AME8805/8810 is stable with an output capacitance of 2.2μF or greater.

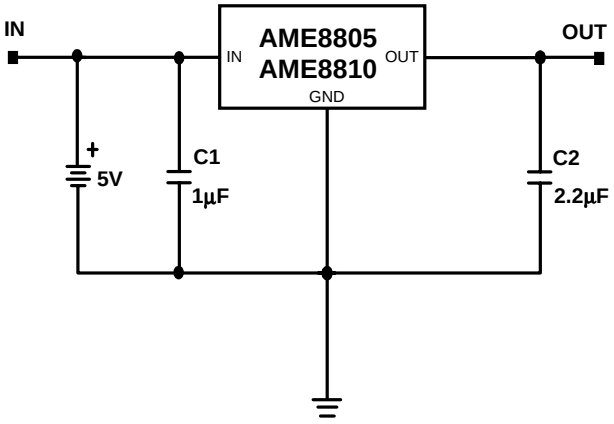
## ■ Functional Block Diagram




## ■ Features

- Very Low Dropout Voltage
- Guaranteed 600mA Output
- Accurate to within 1.5%
- 30μA Quiescent Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Space-Saving SOT-89, SOT-223
- Factory Pre-set Output Voltages
- Low Temperature Coefficient

## ■ Typical Application

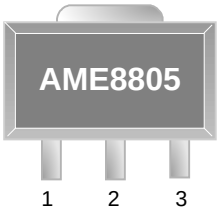



## ■ Applications

- Instrumentation
- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets
- Electronic Scales

## ■ Pin Configuration

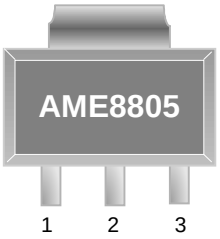
**SOT-89**
**Top View**




**AME8805**

1. GND
2. $V_{IN}$
3. $V_{OUT}$

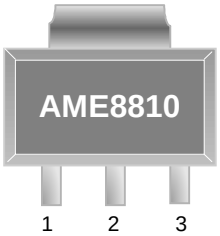
**SOT-223**
**Top View**




**AME8805**

1. $V_{IN}$
2. GND
3. $V_{OUT}$

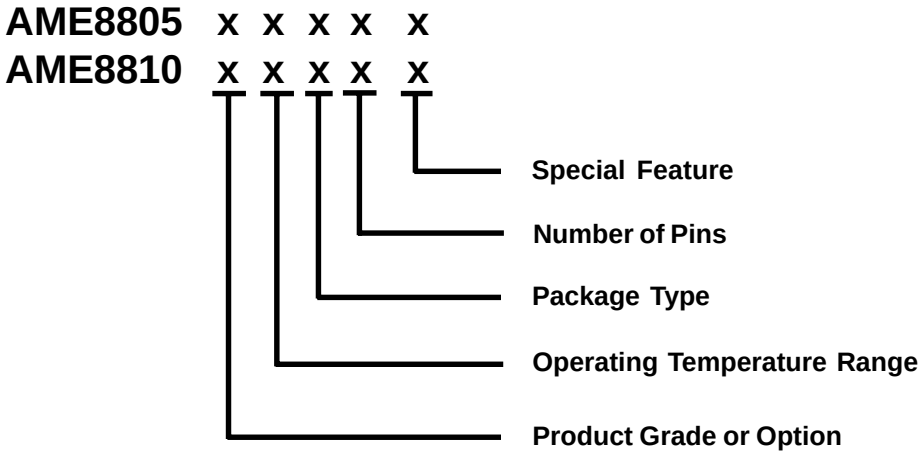
**SOT-223**
**Top View**




**AME8810**

1. GND
2. $V_{OUT}$
3. $V_{IN}$

## ■ Ordering Information




| Product Grade or Option | Operating Temperature Range | Package Type | Number of Pins | Special Feature |
|---|---|---|---|---|
| A: 3.3V<br>B: 3.0V<br>C: 2.8V<br>D: 2.5V<br>E: 3.8V<br>F: 3.6V<br>G: 3.5V<br>H: 2.7V<br>I: 3.4V<br>J: 2.85V<br>K: 3.7V<br>L: 1.5V<br>M: 1.8V<br>N: 2.9V<br>O: 3.1V<br>Y: 1.9V<br>1: 1.3V<br>2: 2.0V | E: -40$^{O}$C to 85$^{O}$C | F: SOT-89<br>G: SOT-223 | T: 3 | Z: Lead Free |

## ■ Ordering Information

| Part Number | Marking | Output Voltage | Package | Operating Temp. Range |
|---|---|---|---|---|
| AME8805AEFT | A8805<br>AEFww | 3.3V | SOT-89 | - 40°C to + 85°C |
| AME8805AEFTZ | A8805<br>AEFww | 3.3V | SOT-89 | - 40°C to + 85°C |
| AME8805BEFT | A8805<br>BEFww | 3.0V | SOT-89 | - 40°C to + 85°C |
| AME8805CEFT | A8805<br>CEFww | 2.8V | SOT-89 | - 40°C to + 85°C |
| AME8805DEFT | A8805<br>DEFww | 2.5V | SOT-89 | - 40°C to + 85°C |
| AME8805DEFTZ | A8805<br>DEFww | 2.5V | SOT-89 | - 40°C to + 85°C |
| AME8805EEFT | A8805<br>EEFww | 3.8V | SOT-89 | - 40°C to + 85°C |
| AME8805FEFT | A8805<br>FEFww | 3.6V | SOT-89 | - 40°C to + 85°C |
| AME8805GEFT | A8805<br>GEFww | 3.5V | SOT-89 | - 40°C to + 85°C |
| AME8805HEFT | A8805<br>HEFww | 2.7V | SOT-89 | - 40°C to + 85°C |
| AME8805IEFT | A8805<br>IEFww | 3.4V | SOT-89 | - 40°C to + 85°C |
| AME8805JEFT | A8805<br>JEFww | 2.85V | SOT-89 | - 40°C to + 85°C |
| AME8805KEFT | A8805<br>KEFww | 3.7V | SOT-89 | - 40°C to + 85°C |
| AME8805LEFT | A8805<br>LEFww | 1.5V | SOT-89 | - 40°C to + 85°C |
| AME8805MEFT | A8805<br>MEFww | 1.8V | SOT-89 | - 40°C to + 85°C |
| AME8805MEFTZ | A8805<br>MEFww | 1.8V | SOT-89 | - 40°C to + 85°C |
| AME8805NEFT | A8805<br>NEFww | 2.9V | SOT-89 | - 40°C to + 85°C |
| AME8805OEFT | A8805<br>OEFww | 3.1V | SOT-89 | - 40°C to + 85°C |
| AME8805YEFT | A8805<br>YEFww | 1.9V | SOT-89 | - 40°C to + 85°C |
| AME88052EFT | A8805<br>2EFww | 2.0V | SOT-89 | - 40°C to + 85°C |
| AME8805AEGT | ADByww | 3.3V | SOT-223 | - 40°C to + 85°C |
| AME8805AEGTZ | ADByww | 3.3V | SOT-223 | - 40°C to + 85°C |
| AME8805BEGT | ADCyww | 3.0V | SOT-223 | - 40°C to + 85°C |
| AME8805CEGT | ADDyww | 2.8V | SOT-223 | - 40°C to + 85°C |

## ■ Ordering Information (contd.)

| Part Number | Marking | Output Voltage | Package | Operating Temp. Range |
|---|---|---|---|---|
| AME8805DEGT | ADEyww | 2.5V | SOT-223 | - 40°C to + 85°C |
| AME8805DEGTZ | ADEyww | 2.5V | SOT-223 | - 40°C to + 85°C |
| AME8805EEGT | ADFyww | 3.8V | SOT-223 | - 40°C to + 85°C |
| AME8805FEGT | ADGyww | 3.6V | SOT-223 | - 40°C to + 85°C |
| AME8805GEGT | ADHyww | 3.5V | SOT-223 | - 40°C to + 85°C |
| AME8805HEGT | AEJyww | 2.7V | SOT-223 | - 40°C to + 85°C |
| AME8805IEGT | AERyww | 3.4V | SOT-223 | - 40°C to + 85°C |
| AME8805JEGT | AGTyww | 2.85V | SOT-223 | - 40°C to + 85°C |
| AME8805KEGT | AHVyww | 3.7V | SOT-223 | - 40°C to + 85°C |
| AME8805MEGT | AJJyww | 1.8V | SOT-223 | - 40°C to + 85°C |
| AME8805NEGT | AKSyww | 2.9V | SOT-223 | - 40°C to + 85°C |
| AME8805OEGT | AKTyww | 3.1V | SOT-223 | - 40°C to + 85°C |
| AME88051EGT | AWLww | 1.3V | SOT-223 | - 40°C to + 85°C |
| AME8810AEGT | ADlyww | 3.3V | SOT-223 | - 40°C to + 85°C |
| AME8810AEGTZ | ADlyww | 3.3V | SOT-223 | - 40°C to + 85°C |
| AME8810BEGT | ADJyww | 3.0V | SOT-223 | - 40°C to + 85°C |
| AME8810BEGTZ | ADJyww | 3.0V | SOT-223 | - 40°C to + 85°C |
| AME8810CEGT | ADKyww | 2.8V | SOT-223 | - 40°C to + 85°C |
| AME8810DEGT | ADLyww | 2.5V | SOT-223 | - 40°C to + 85°C |
| AME8810EEGT | ADMyww | 3.8V | SOT-223 | - 40°C to + 85°C |
| AME8810FEGT | ADNyww | 3.6V | SOT-223 | - 40°C to + 85°C |
| AME8810GEGT | ADOyww | 3.5V | SOT-223 | - 40°C to + 85°C |
| AME8810HEGT | AEKyww | 2.7V | SOT-223 | - 40°C to + 85°C |
| AME8810IEGT | AESyww | 3.4V | SOT-223 | - 40°C to + 85°C |
| AME8810JEGT | AGVyww | 2.85V | SOT-223 | - 40°C to + 85°C |
| AME8810KEGT | AHXyww | 3.7V | SOT-223 | - 40°C to + 85°C |
| AME8810LEGT | AJFyww | 1.5V | SOT-223 | - 40°C to + 85°C |
| AME8810MEGT | AJGyww | 1.8V | SOT-223 | - 40°C to + 85°C |
| AME8810NEGT | AKWyww | 2.9V | SOT-223 | - 40°C to + 85°C |
| AME8810OEGT | AKXyww | 3.1V | SOT-223 | - 40°C to + 85°C |

Please consult AME sales office or authorized Rep./Distributor for other output voltage and package type availability.

## ■ Absolute Maximum Ratings

| Parameter | Maximum | Unit |
|---|---|---|
| Input Voltage | 8 | V |
| Output Current | 1 | A |
| Input, Output Voltage | GND - 0.3 to $V_{IN}$ + 0.3 | V |
| ESD Classification | B | |

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device

## ■ Recommended Operating Conditions

| Parameter | Rating | Unit |
|---|---|---|
| Supply Voltage | 4.5 to 5.5 | V |
| Ambient Temperature Range | - 40 to + 85 | $^oC$ |
| Junction Temperature | - 40 to + 125 | $^oC$ |

## ■ Thermal Information

| Parameter | | Maximum | Unit |
|---|---|---|---|
| Thermal Resistance ($\theta_{ja}$) | SOT-89 | 180 | $^oC$ / W |
| | SOT-223 | 160 | |
| Thermal Resistance ($\theta_{jc}$) | SOT-89 | 18 | $^oC$ / W |
| | SOT-223 | 15 | |
| Internal Power Dissipation ($P_D$) ($\Delta T = 100^oC$, No Heat Sink) | SOT-89 | 550 | mW |
| | SOT-223 | 625 | |
| Internal Power Dissipation ($P_D$) ($\Delta T = 100^oC$, With Heat Sink) | SOT-89 | 2750* | mW |
| | SOT-223 | 3300* | |
| Maximum Junction Temperature | | 150 | $^oC$ |
| Maximum Lead Temperature (10 Sec) | | 300 | $^oC$ |

* Using twice the θjc for this calculation.

## ■ Electrical Specifications

TA = 25°C unless otherwise noted

| Parameter | Symbol | Test Condition | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | | Note 1 | | 7 | V |
| Output Voltage Accuracy | $V_O$ | $I_O$=1mA | | -1.5 | | 1.5 | % |
| Dropout Voltage | $V_{DROPOUT}$ | $I_O$=600mA<br>$V_O$=$V_{O(NOM)}$-2.0% | 1.3V<=$V_{O(NOM)}$<=1.4V | | See chart | 1900 | mV |
| | | | 1.4V<$V_{O(NOM)}$<=2.0V | | | 1400 | |
| | | | 2.0V<$V_{O(NOM)}$<=2.8V | | | 800 | |
| | | | 2.8V<$V_{O(NOM)}$ | | | 600 | |
| Output Current | $I_O$ | $V_O$>1.2V | | 600 | | | mA |
| Current Limit | $I_{LIM}$ | $V_O$>1.2V | | 600 | 800 | | mA |
| Short Circuit Current | $I_{SC}$ | $V_O$<0.8V | | | 300 | 600 | mA |
| Quiescent Current | $I_Q$ | $I_O$=0mA | | | 30 | 50 | µA |
| Ground Pin Current | $I_{GND}$ | $I_O$=1mA to 600mA | | | 35 | | µA |
| Line Regulation | $REG_{LINE}$ | $I_O$=1mA<br>$V_{IN}$=$V_O$+1 to $V_O$+2 | 1.3V <= $V_O$ <= 1.4V | -0.2 | | 0.2 | % |
| | | | 1.4V < $V_O$ <= 2.0V | -0.15 | | 0.15 | |
| | | | 2.0V < $V_O$ < 4.0V | -0.1 | 0.02 | 0.1 | |
| | | | $V_O$ >= 4.0V | -0.4 | 0.2 | 0.4 | |
| Load Regulation | $REG_{LOAD}$ | $I_O$=1mA to 600mA | | | 0.2 | 1 | % |
| Over Temperature Shutdown | OTS | | | | 150 | | °C |
| Over Temperature Hysterisis | OTH | | | | 30 | | °C |
| $V_O$ Temperature Coefficient | TC | | | | 30 | | ppm/°C |
| Power Supply Rejection | PSRR | $I_O$=100mA<br>$C_O$=2.2µF | f=1kHz | | 50 | | dB |
| | | | f=10kHz | | 20 | | |
| | | | f=100kHz | | 15 | | |
| Output Voltage Noise | eN | f=10Hz to 100kHz<br>$I_O$=10mA,$C_{BYP}$=0µF | Co=2.2µF | | 30 | | µVrms |

Note1: $V_{IN(MIN)}$=$V_{OUT}$+$V_{DROPOUT}$

Note2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.

## ■ Detailed Description

The AME8805/8810 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150$^{o}$C, or the current exceeds 600mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120$^{o}$C.

The AME8805/8810 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The AME8805/8810 also incorporates current foldback to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8 volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

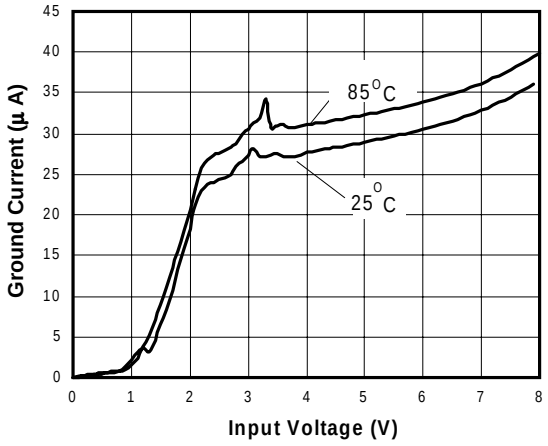
## ■ External Capacitors

The AME8805/8810 is stable with an output capacitor to ground of 2.2µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1µF ceramic capacitor with a 10µF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

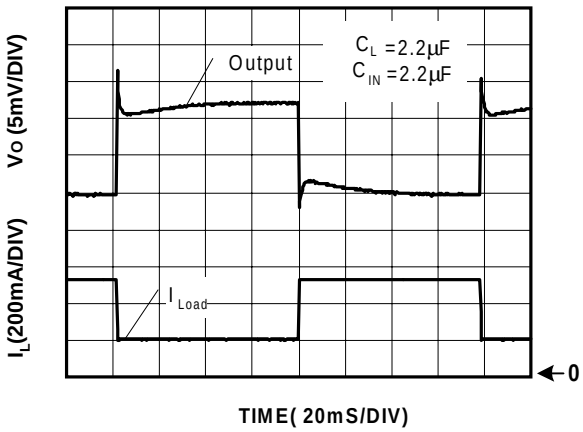
A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1µF to have a beneficial effect.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

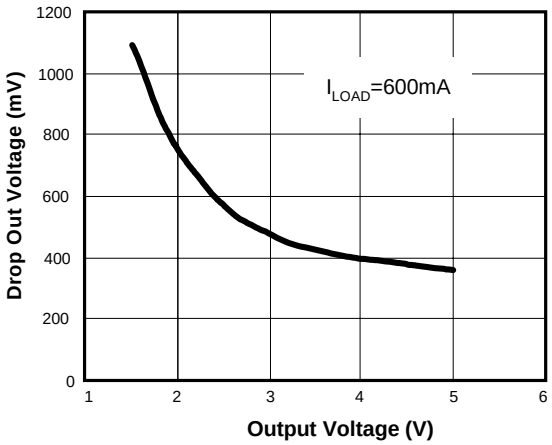
### Ground Current vs. Input Voltage



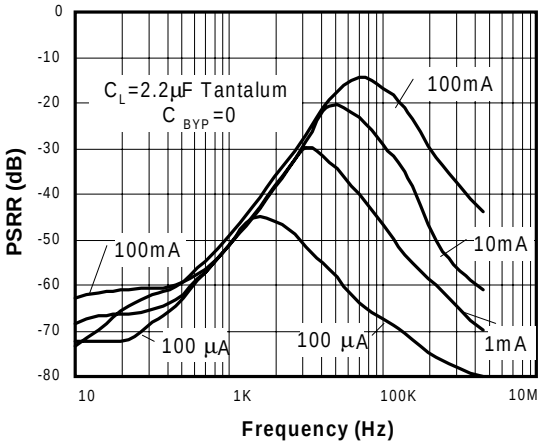

### Load Step (1mA-600mA)



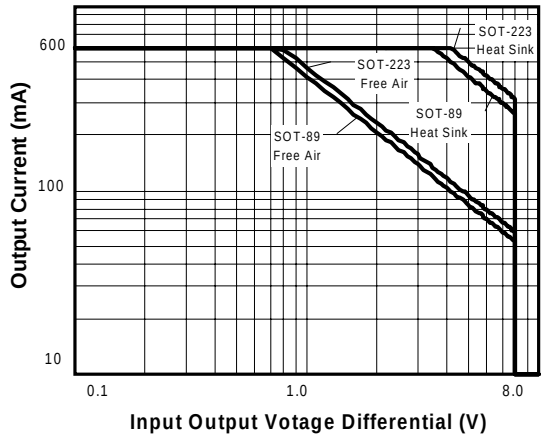

### Drop Out Voltage vs. Output Voltage



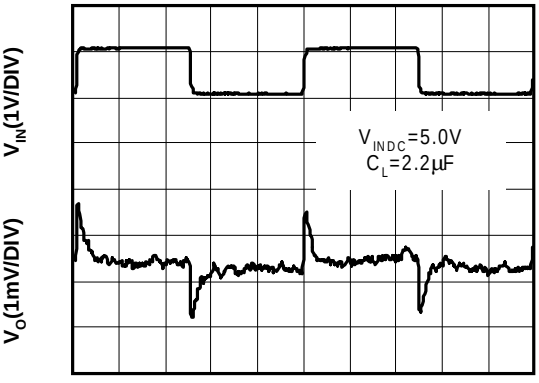

### Power Supply Rejection Ratio



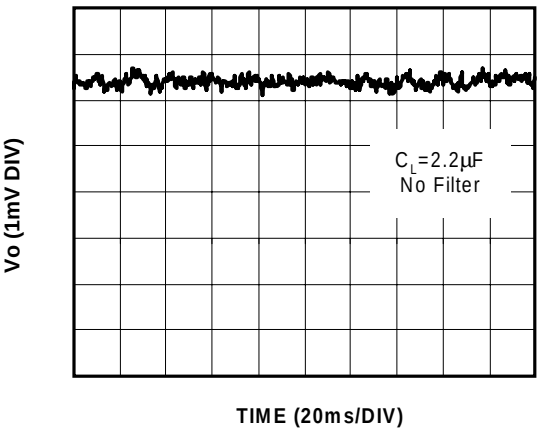

### Safe Operating Area



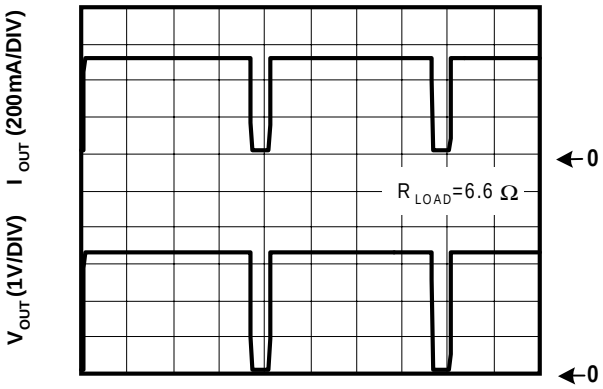

### Line Transient Response



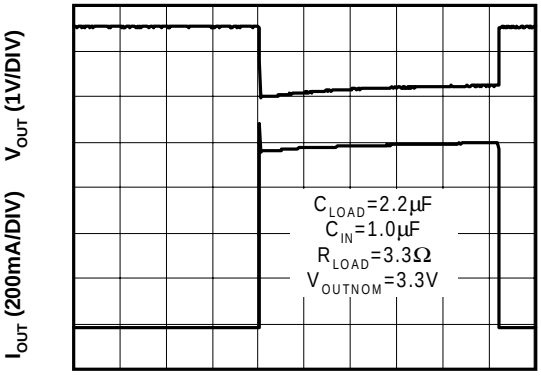
### Noise Measurement



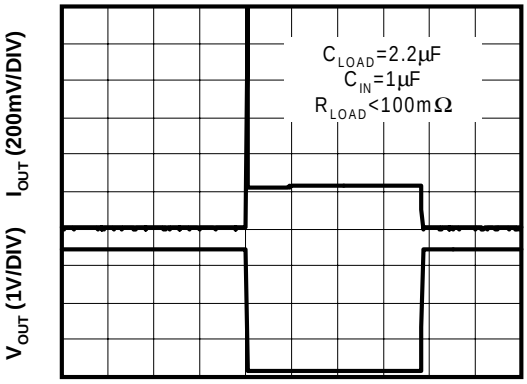

### Overtemperature Shutdown




### Current Limit Response

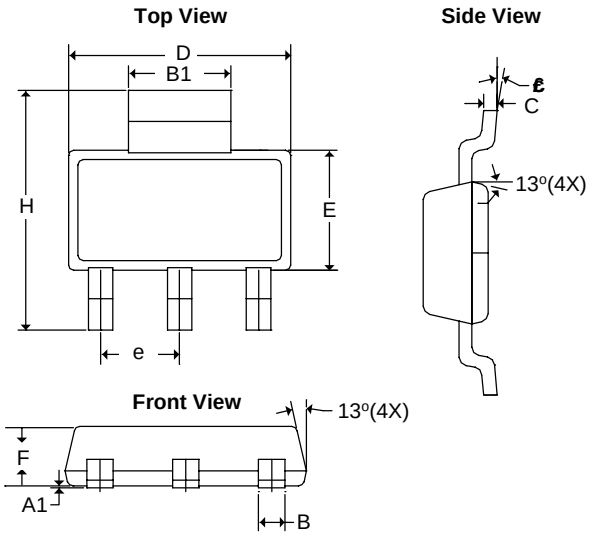



### Short Circuit Response



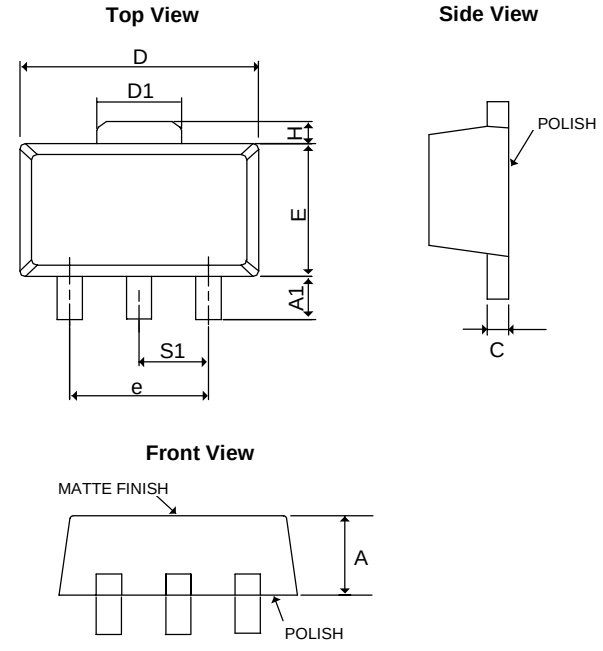
## ■ Package Dimension

### SOT-223




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| $A_1$ | 0.02 | 0.10 | 0.0008 | 0.0039 |
| B | 0.60 | 0.84 | 0.0236 | 0.0330 |
| $B_1$ | 2.90 | 3.15 | 0.1140 | 0.1240 |
| C | 0.24 | 0.38 | 0.0094 | 0.0150 |
| D | 6.30 | 6.71 | 0.2480 | 0.2640 |
| E | 3.30 | 3.71 | 0.1299 | 0.1460 |
| e | 2.30 BSC | | 0.0906 BSC | |
| F | 1.40 | 1.80 | 0.0560 | 0.0702 |
| H | 6.70 | 7.30 | 0.2638 | 0.2874 |
| θ | 0° | 10° | 0° | 10° |

### SOT-89




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 1.39 | 1.60 | 0.05472 | 0.06299 |
| $A_1$ | 0.8REF | | 0.0315REF | |
| C | 0.35 | 0.44 | 0.01378 | 0.01732 |
| D | 4.39 | 4.60 | 0.17283 | 0.1811 |
| $D_1$ | 1.35 | 1.83 | 0.05315 | 0.07205 |
| E | 2.28 | 3.60 | 0.08976 | 0.14173 |
| e | 3.00REF | | 0.1181REF | |
| H | 0.70REF | | 0.0276REF | |
| S1 | 1.50REF | | 0.0590REF | |



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