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## Description

The AZ2117 is a low dropout three-terminal regulator.

The AZ2117 has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within ±1%. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

The AZ2117 is available in ADJ output voltage version. It is available in an adjustable version which can set the output voltage with two external resistors.

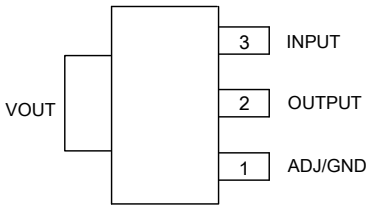
The AZ2117 is available in the industry-standard SOT223 Series power packages.

## Features

- Current Limit: 1.35A (Typ)
- Output Noise from 10Hz to 10kHz: 0.003% of $V_{OUT}$
- PSRR at $I_{OUT}$ = 300mA and f = 120Hz: 60dB
- Output Voltage Accuracy: ±1%
- On-chip Thermal Shutdown
- Maximum Quiescent Current: $I_{QMAX}$ = 1mA
- Compatible with Low ESR Ceramic Capacitor
- Operation Junction Temperature: -40°C to +125°C
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Pin Assignments

**(Top View)**



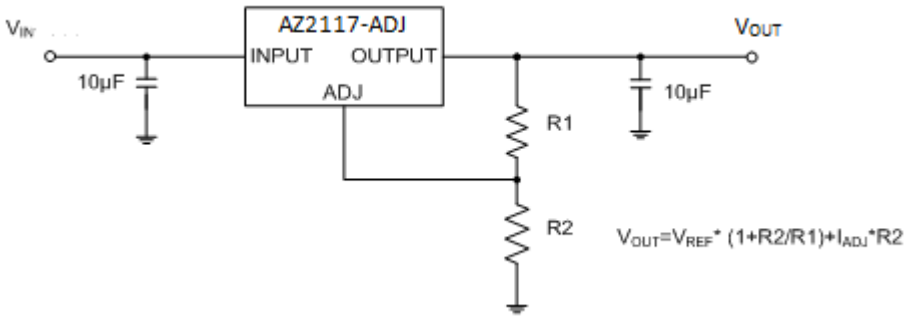

**SOT223**

## Applications

- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Typical Applications Circuit (Note 4)




Note 4: The AZ2117 is compatible with low ESR ceramic capacitor.
The ESR of the output capacitors must be less than 20Ω.
A minimum of 1µF output capacitor is required.

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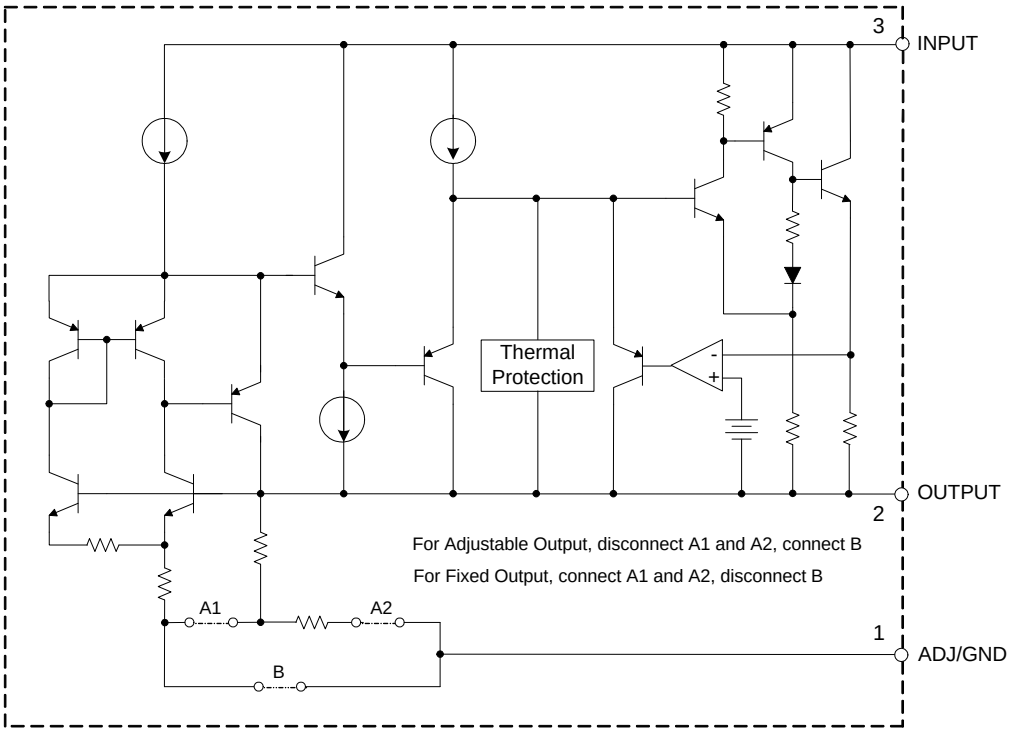
## Functional Block Diagram




## Absolute Maximum Ratings (Note 5)

| Symbol | Parameter | Rating | | Unit |
|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | 18 | | V |
| $T_J$ | Operating Junction Temperature Range | +150 | | °C |
| $T_{STG}$ | Storage Temperature Range | -65 to +150 | | °C |
| $\theta_{JA}$ | Thermal Resistance (Without Heatsink) | SOT223 | 125 | °C/W |
| $\theta_{JA}$ | Thermal Resistance (With Heatsink) (Note 6) | SOT223 | 100 | °C/W |
| $T_{LEAD}$ | Lead Temperature (Soldering, 10sec) | +260 | | °C |

Notes: 5. Stresses greater than 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 under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

6. Chip is soldered to 100mm$^2$(10mm*10mm) copper (top side solder mask) on 2oz.2 layers FR-4 PCB with 8*0.5mm vias.

## Recommended Operating Conditions

| Symbol | Parameter | Min | Max | Unit |
|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | — | 15 | V |
| $T_J$ | Operating Junction Temperature Range | -40 | +125 | °C |

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## Electrical Characteristics

(Operating Conditions: $V_{IN} \leq 10V$, $I_{OUT}$ = 10mA, $T_J$ = +25°C, unless otherwise specified. (P ≤ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, -40°C to +125°C.)

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{REF}$ | Reference Voltage | $V_{OUT}$+1.75V ≤ $V_{IN}$ ≤ 12V, $I_{OUT}$ = 10mA | | 1.238 | 1.250 | 1.262 | V |
| | | | | **98%*$V_{OUT}$** | $V_{OUT}$ | **102%*$V_{OUT}$** | V |
| $V_{DROP}$ | Dropout Voltage | $I_{OUT}$ = 1A | | — | 1.3 | 1.5 | V |
| $I_{LIMIT}$ (Note 7) | Maximum Output Current | 1.75V ≤ $V_{IN}$-$V_{OUT}$ | | 1.25 | 1.35 | 1.5 | A |
| $V_{RLOAD}$ | Load Regulation | $V_{IN}$ = $V_{OUT}$+1.75V<br>1mA ≤ $I_{OUT}$ ≤ 1A | | — | 0.2 | 0.6 | %/A |
| $V_{RLINE}$ | Line Regulation | 1.75V ≤ $V_{IN}$-$V_{OUT}$ ≤ 10V,<br>$I_{OUT}$ = 30mA | | — | 0.001 | 0.04 | %/V |
| $I_Q$ | Quiescent Current | $I_{OUT}$ = 0 | | — | 0.35 | 1 | mA |
| — | Minimum Load Current | For ADJ Version,<br>1.75V ≤ $V_{IN}$-$V_{OUT}$ ≤ 10V | | — | 0.3 | 1 | mA |
| $I_{ADJ}$ | Adjustable Pin Current | — | | — | 7 | 10 | µA |
| — | Adjustable Pin Current Change | 1.75V ≤ $V_{IN}$-$V_{OUT}$ ≤ 10V | | — | 0.3 | 2 | µA |
| PSRR | Power Supply Rejection Ratio | Ripple 1.0 Vp-p<br>$V_{IN}$ = $V_{OUT}$+2V,<br>$I_{OUT}$ = 100mA | f = 120Hz | — | 60 | — | dB |
| | | | f = 1kHz | — | 60 | — | |
| $\frac{\Delta V_{OUT} / V_{OUT}}{\Delta T}$ | Output Voltage Temperature Coefficient | $I_{OUT}$ = 30mA | | — | ±100 | — | ppm/°C |
| $V_{NOISE}$ | RMS Output Noise | 10Hz ≤ f ≤ 100kHz, No Load | | — | 0.003 | — | % |
| $T_{OTSD}$ | Thermal Shutdown Temperature | — | | — | +170 | — | °C |
| $T_{HYOTSD}$ | Thermal Shutdown Hysteresis | — | | — | +20 | — | °C |
| $\theta_{JC}$ | Thermal Resistance (Junction to Case) | SOT223 | | — | 40 | — | °C/W |

Note 7: Make the $V_{OUT}$ down to about 98% of the test values, $I_{OUT}$ value is set to $I_{LIMIT}$ at this time.

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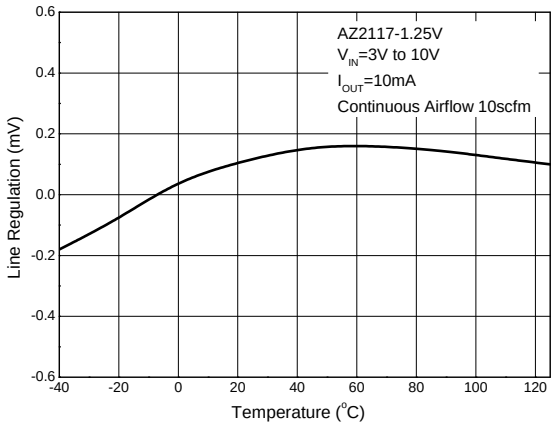
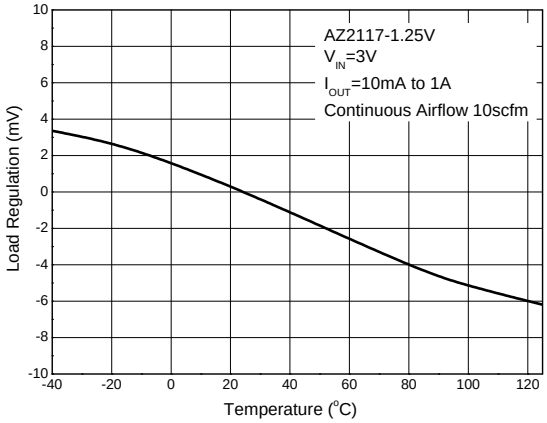
## Performance Characteristics

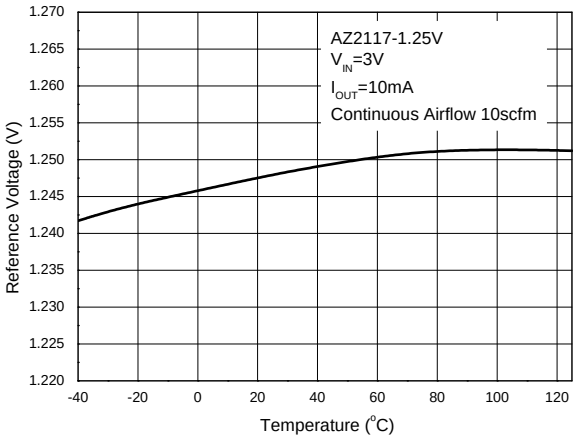
### Line Regulation vs. Temperature



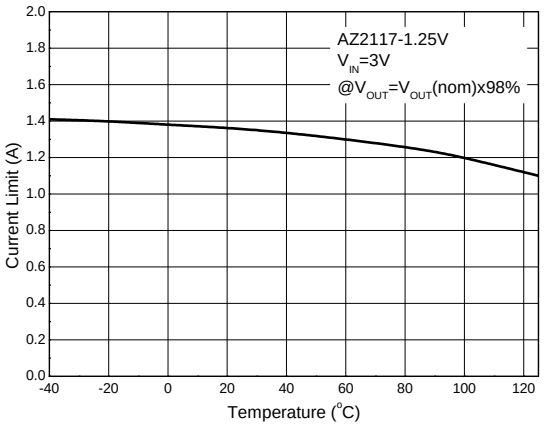

### Load Regulation vs. Temperature



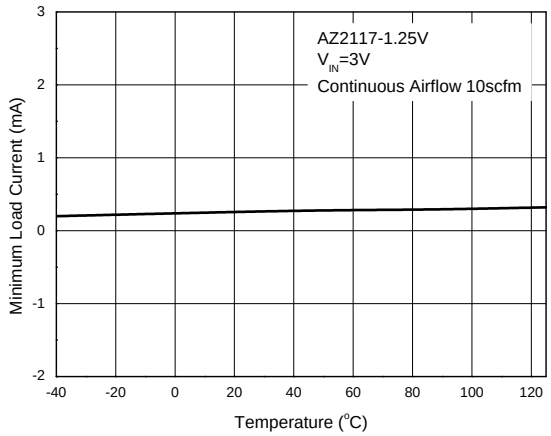

### Reference Voltage vs. Temperature



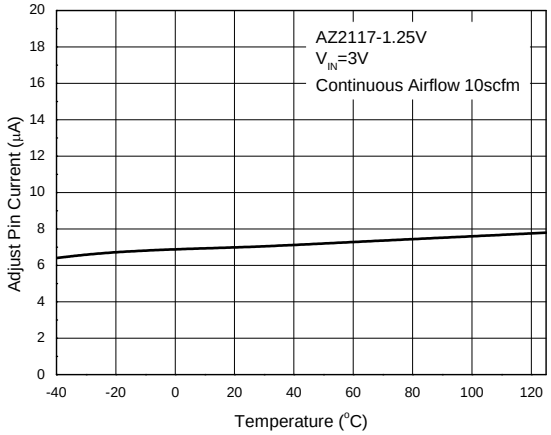

### Current Limit vs. Temperature




### Minimum Load Current vs. Temperature




### Adjust Pin Current vs. Temperature



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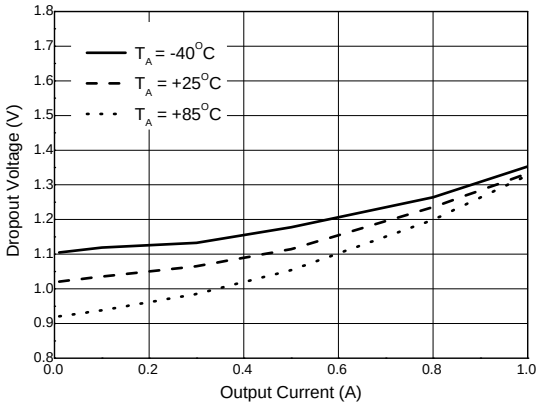
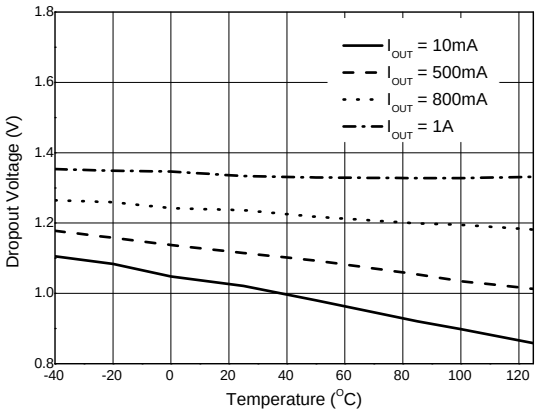
## Performance Characteristics (Cont.)

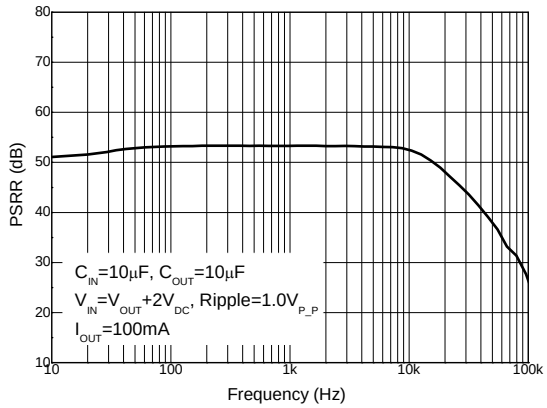
### Dropout Voltage vs. Output Current



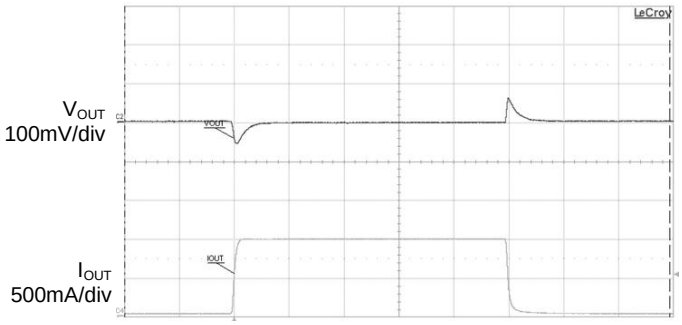

### Dropout Voltage vs. Temperature



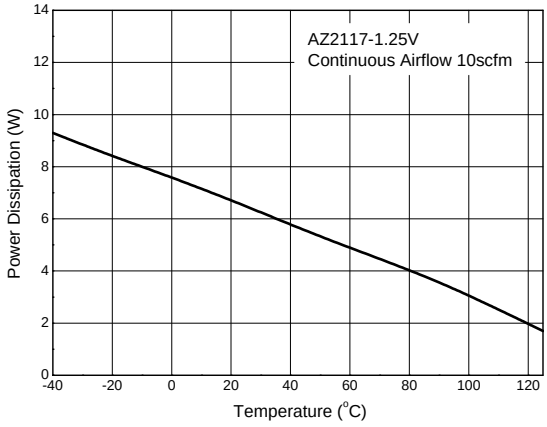

### PSRR vs. Frequency




### Load Transient Response




### Power Dissipation vs. Temperature



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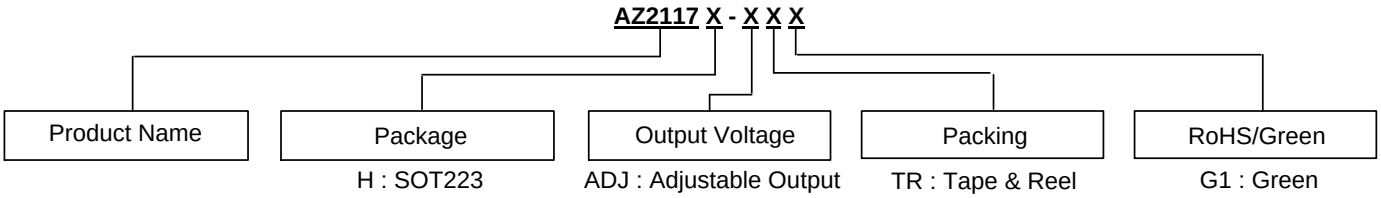
## Ordering Information

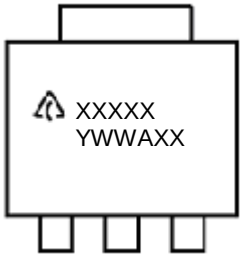



| Package | Temperature Range | Part Number | Marking ID | Packing |
|---|---|---|---|---|
| SOT223 | -40°C to +125°C | AZ2117H-ADJTRG1 | GH15P | 4000/Tape & Reel |

## Marking Information

**(1) SOT223**

**(Top View)**




First Line: Logo and Marking ID
(See Ordering Information)
Second Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

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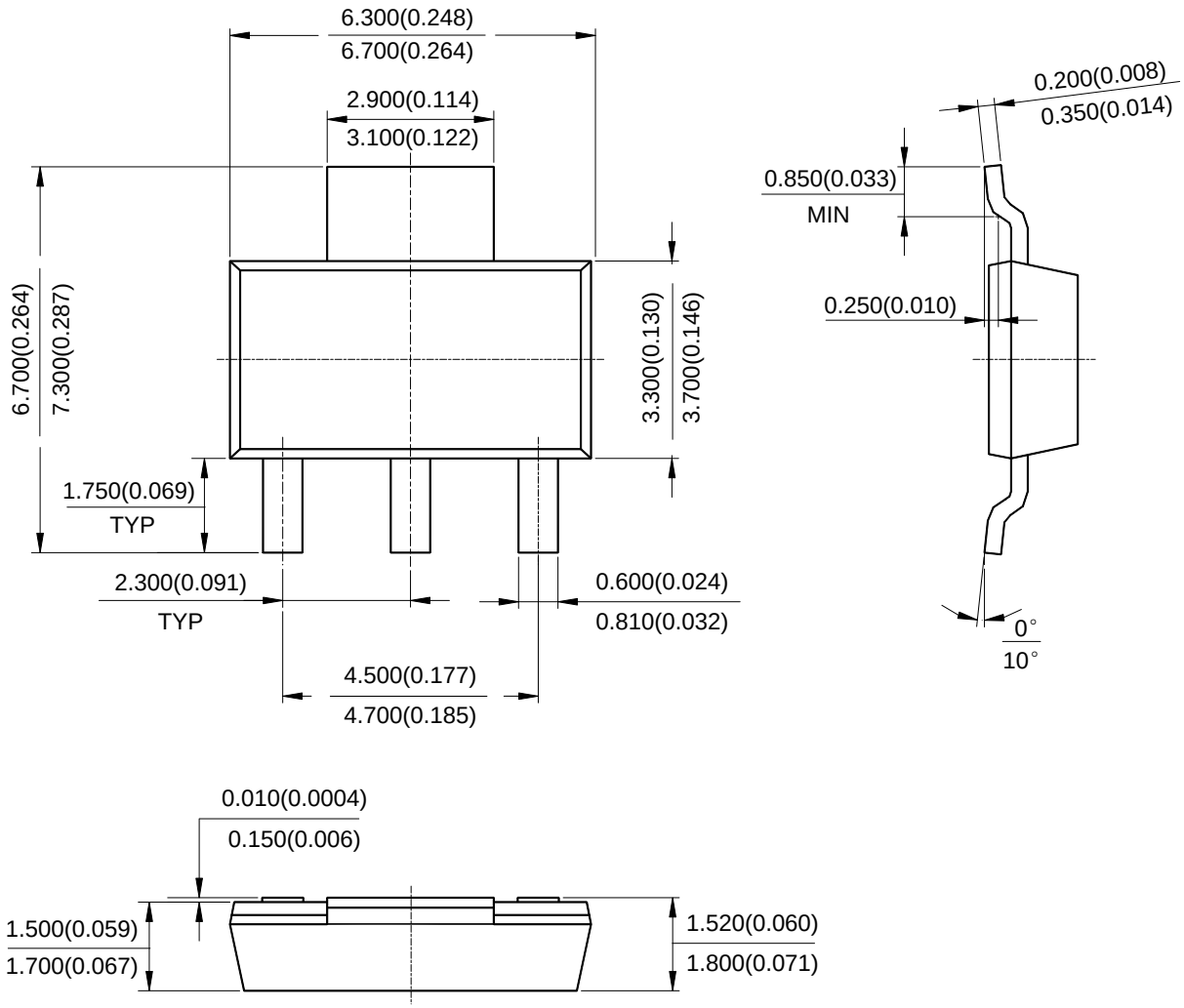
## Package Outline Dimensions (All dimensions in mm (inch).)

**(1) Package Type: SOT223**



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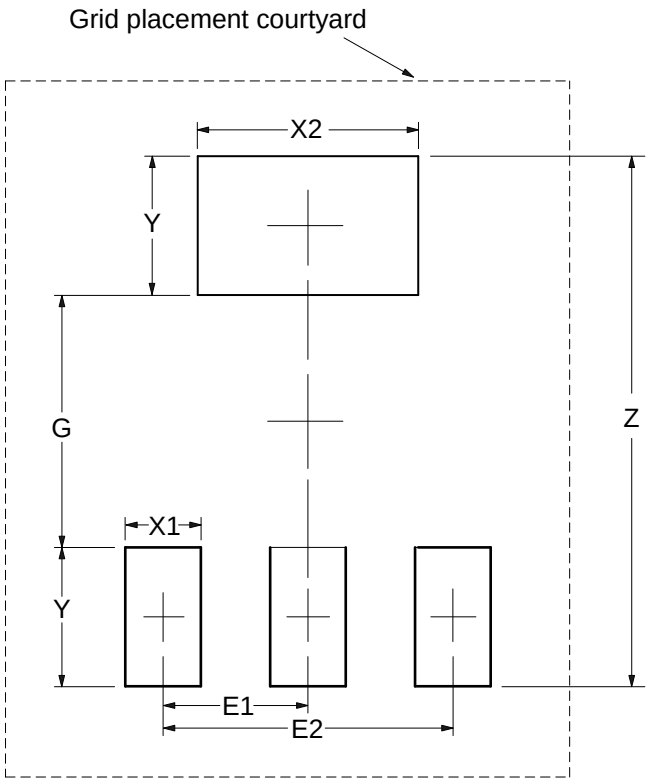
## Suggested Pad Layout

**(1) Package Type: SOT223**




| Dimensions | Z (mm)/(inch) | G (mm)/(inch) | X1 (mm)/(inch) | X2 (mm)/(inch) | Y (mm)/(inch) | E1 (mm)/(inch) | E2 (mm)/(inch) |
|---|---|---|---|---|---|---|---|
| Value | 8.400/0.331 | 4.000/0.157 | 1.200/0.047 | 3.500/0.138 | 2.200/0.087 | 2.300/0.091 | 4.600/0.181 |

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