

3-TERMINAL 1A ADJUSTABLE VOLTAGE REGULATOR

Description

The AZ317 is an adjustable three-terminal positive voltage regulator with a very low dropout of 1.2V at 1A output current. Using 2 external resistors, the AZ317 can provide an adjustable output voltage down to 1.25V.

The AZ317 includes a circuit of trimmed bandgap reference to assure output voltage accuracy to be within 1%. It also provides current limiting and thermal shutdown. The current limit is trimmed to ensure specified output current and controlled short-circuit current. The On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The AZ317 is available in the standard SOT223, TO220-3, TO252-2 (1) and TO252-2 (3) power packages.

Features

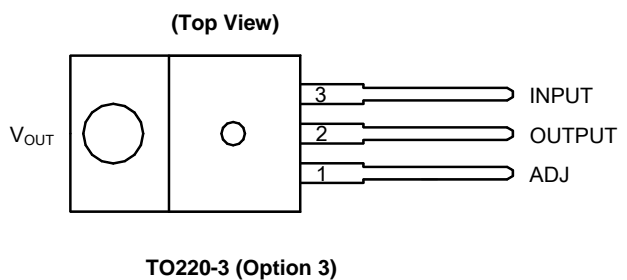
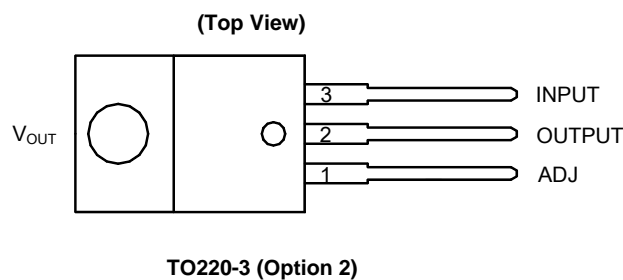
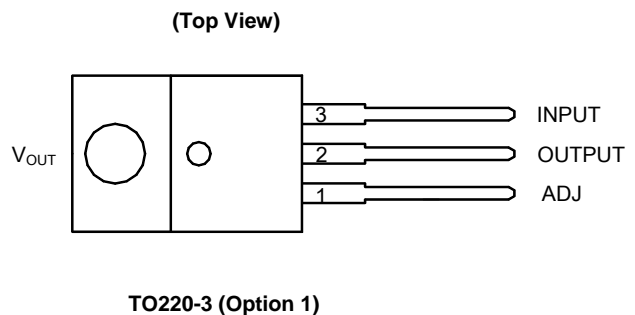
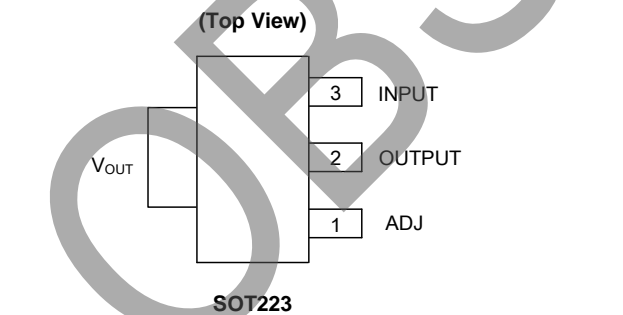
- Typical 1% Output Voltage Tolerance
- Typical 0.01%/V Line Regulation
- Typical 0.2% Load Regulation
- Very Low Dropout Voltage: 1.2V at 1A Output Current
- Trimmed Current Limit
- On-chip Thermal Protection
- Operation Junction Temperature: 0 to +125°C
- Lead-Free Packages: SOT223, TO220-3, TO252-2 (1) and TO252-2 (3)
 - **Totally Lead-Free; RoHS Compliant (Notes 1 & 2)**
- Lead-Free Packages, Available in "Green" Molding Compound: SOT223
 - **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
 - **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

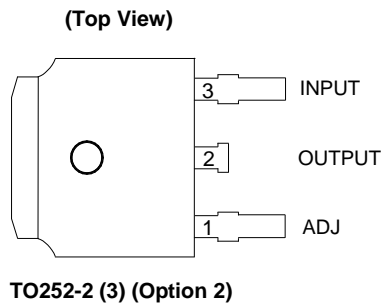
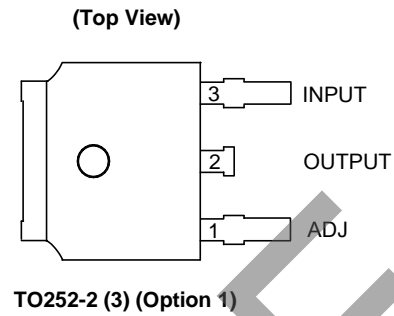
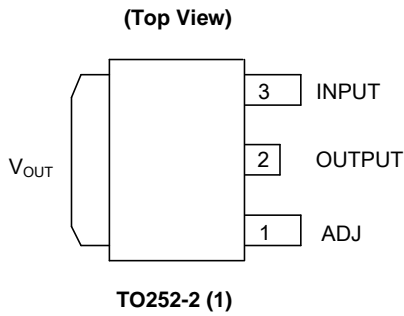
- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD Player
- Network Interface Card/Switch
- Telecom Equipment
- Printer and other Peripheral Equipment

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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.

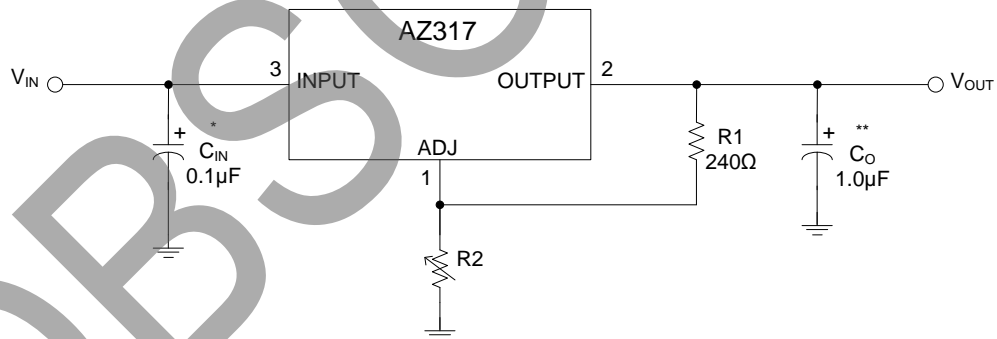
Pin Assignments



Pin Assignments (Cont.)



Typical Applications Circuit



* = C_{IN} is required if the regulator is located near power supply filter.

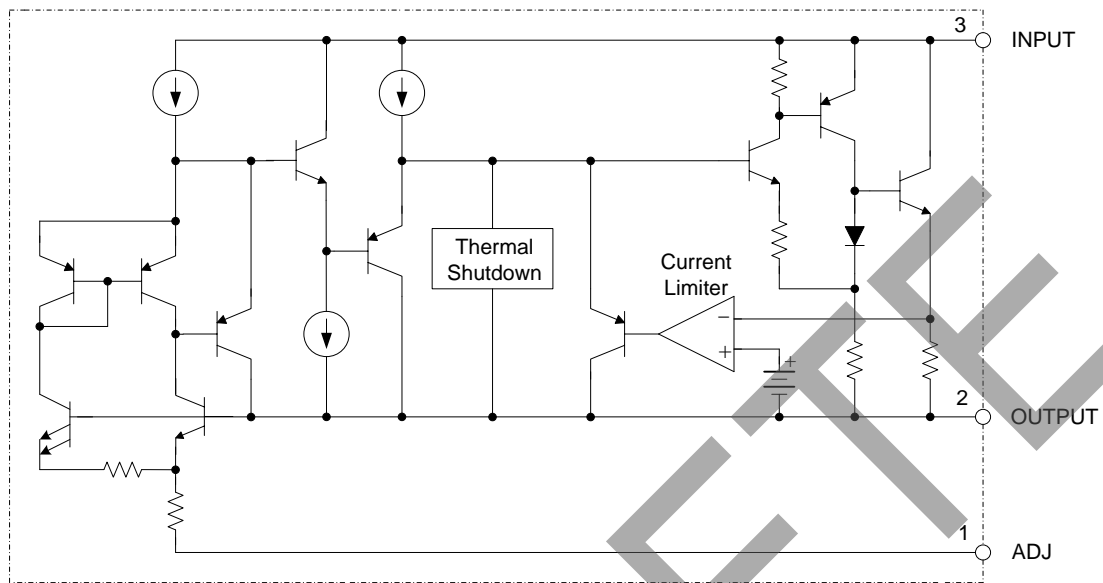
**= C_O is needed for stability and it improves transient response.

$$V_{OUT} = V_{REF} \times (1 + R_2/R_1) + I_{ADJ} \times R_2$$

Since I_{ADJ} is controlled to less than 100µA, the error associated with this term is negligible in most applications.

OBSOLETE - PART DISCONTINUED

Functional Block Diagram



Absolute Maximum Ratings (Note 4)

| Symbol | Parameter | Value | Unit |
|------------|-------------------------------------|-------------|------|
| V_{IN} | Input Voltage | 20 | V |
| T_J | Maximum Junction Temperature | +150 | °C |
| T_S | Storage Temperature | -65 to +150 | °C |
| T_{LEAD} | Lead Temperature (Soldering, 10sec) | +300 | °C |
| ESD | ESD (Human Body Model) | 4000 | V |

Note 4: 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.

Recommended Operating Conditions

| Symbol | Parameter | Min | Max | Unit |
|----------|--------------------------------------|-------------|------|------|
| V_{IN} | Input Voltage | $V_{OUT}+2$ | 15 | V |
| T_J | Operating Junction Temperature Range | 0 | +125 | °C |

Electrical Characteristics (Typicals and limits apply for $T_J = +25^\circ\text{C}$, $P \leq$ Maximum Power Dissipation unless otherwise specified. Note 5)

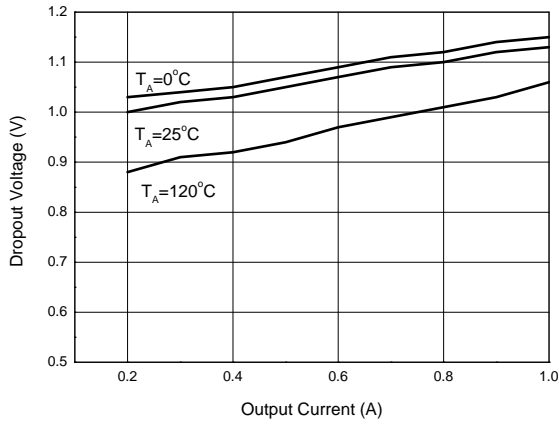
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|--|---|------|-------|------|--------------------|
| V_{REF} | Reference Voltage | $10\text{mA} \leq I_{OUT} \leq 1\text{A}$, $3\text{V} \leq (V_{IN}-V_{OUT}) \leq 10\text{V}$ | 1.20 | 1.25 | 1.30 | V |
| S_V | Line Regulation | $I_{OUT} \leq 20\text{mA}$, $3\text{V} \leq V_{IN}-V_{OUT} \leq 10\text{V}$ | — | 0.01 | 0.04 | %/V |
| S_i | Load Regulation | $V_{IN}-V_{OUT} = 2\text{V}$, $10\text{mA} \leq I_{OUT} \leq 1\text{A}$ | — | 0.2 | 0.4 | % |
| — | Thermal Regulation | 20ms Pulse | — | 0.04 | 0.07 | %/W |
| ΔV | Dropout Voltage | $I_{OUT} = 1\text{A}$ | — | 1.2 | 1.3 | V |
| I_{LIMIT} | Current Limit | $(V_{IN}-V_{OUT}) = 2\text{V}$ | 1.2 | 1.5 | 1.8 | A |
| — | Adjust Pin Current | — | — | 50 | 100 | μA |
| — | Adjust Pin Current Change | $1.4\text{V} \leq (V_{IN}-V_{OUT}) \leq 10\text{V}$, $10\text{mA} \leq I_{OUT} \leq 1\text{A}$ | — | 0.2 | 5 | μA |
| — | Minimum Load Current | $3\text{V} \leq (V_{IN}-V_{OUT}) \leq 15\text{V}$ | — | 3.5 | 10 | mA |
| — | Ripple Rejection | $f = 120\text{Hz}$, $C_{OUT} = 1\mu\text{F}$ Tantalum, $(V_{IN}-V_{OUT}) = 3\text{V}$, $I_{OUT} = 1\text{A}$ | 60 | 75 | — | dB |
| — | Temperature Stability | — | — | 1 | — | % |
| — | Long-Term Stability | $T_A = +125^\circ\text{C}$, 1000hrs | — | 0.3 | — | % |
| — | RMS Output Noise (% of V_{OUT}) | $T_A = +25^\circ\text{C}$, $10\text{Hz} \leq f \leq 10\text{kHz}$ | — | 0.003 | — | % |
| — | Thermal Resistance (Junction to Case) | SOT223 | — | 15 | — | $^\circ\text{C/W}$ |
| | | TO252-2 (1)/TO252-2 (3) | — | 10 | — | |
| | | TO220-3 | — | 4.5 | — | |
| — | Thermal Shutdown | Junction Temperature | — | +150 | — | $^\circ\text{C}$ |
| — | Thermal Shutdown Hysteresis | — | — | +25 | — | $^\circ\text{C}$ |

Note 5: Maximum Power Dissipation is Package Type and Case Temperature dependent. Please see Figure Maximum Power Dissipation.

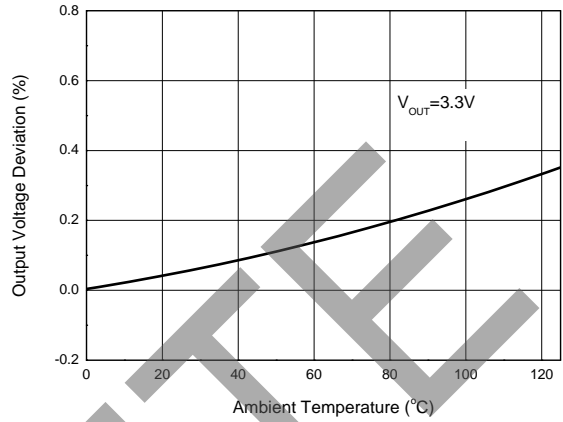
OBSOLETE - PART DISCONTINUED

Performance Characteristics

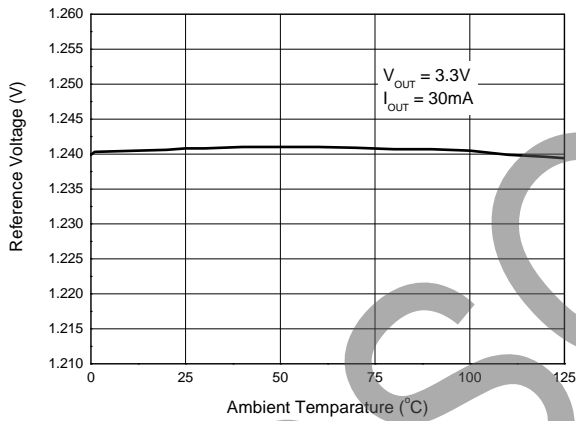
Dropout Voltage vs. Output Current



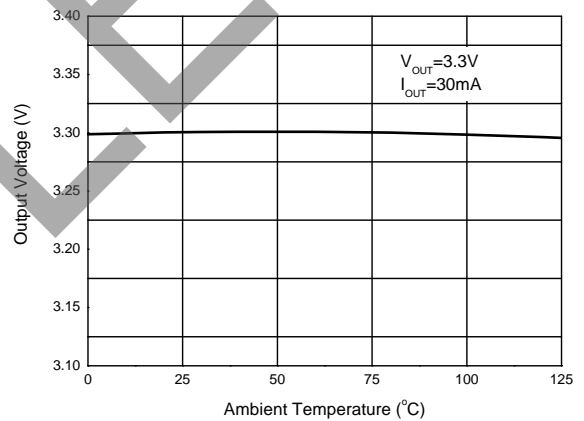
Load Regulation vs. Temperature



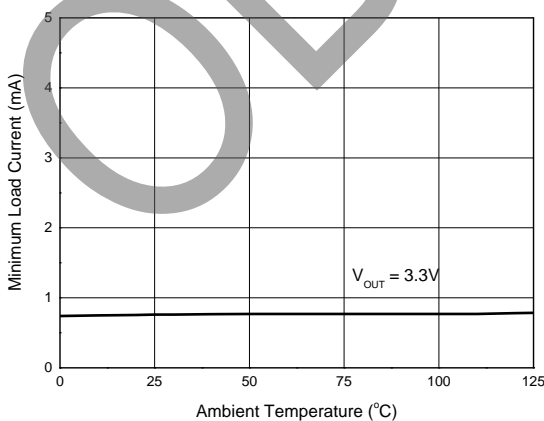
Reference Voltage vs. Temperature



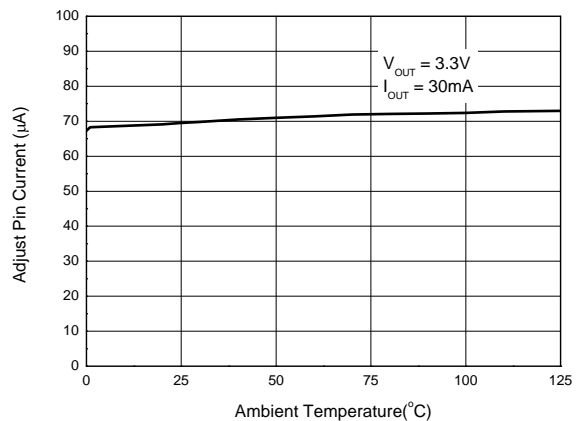
Output Voltage vs. Temperature



Minimum Load Current vs. Temperature



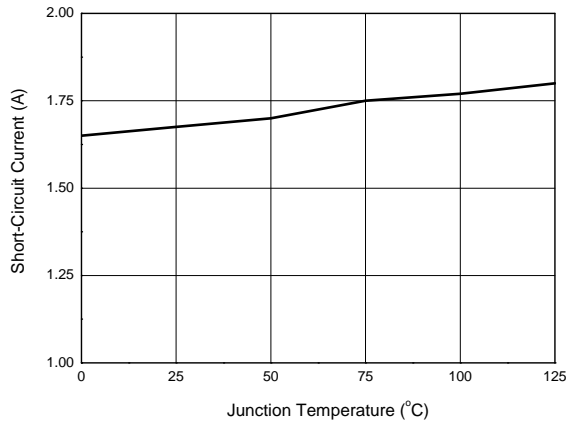
Adjust Pin Current vs. Temperature



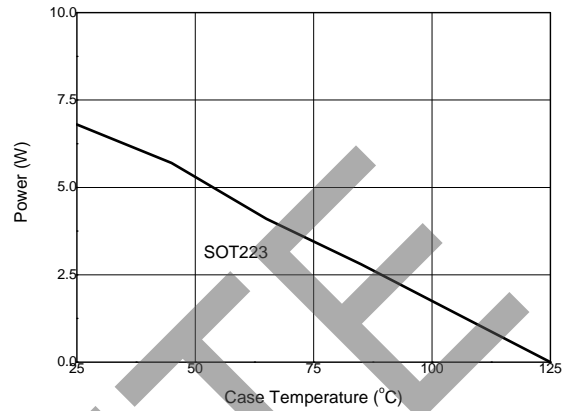
OBSOLETE - PART DISCONTINUED

Performance Characteristics (Cont.)

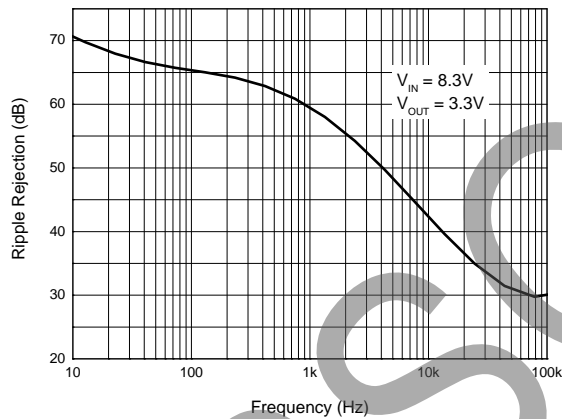
Short-Circuit Current vs. Temperature



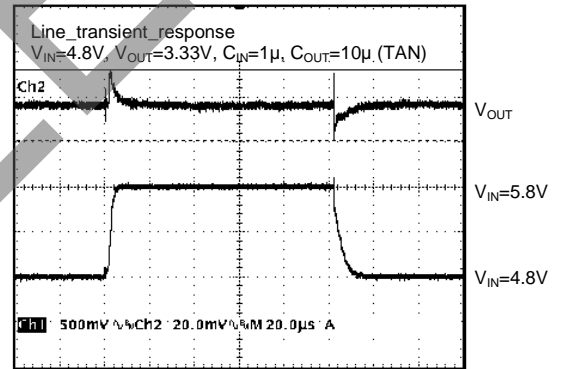
Maximum Power Dissipation



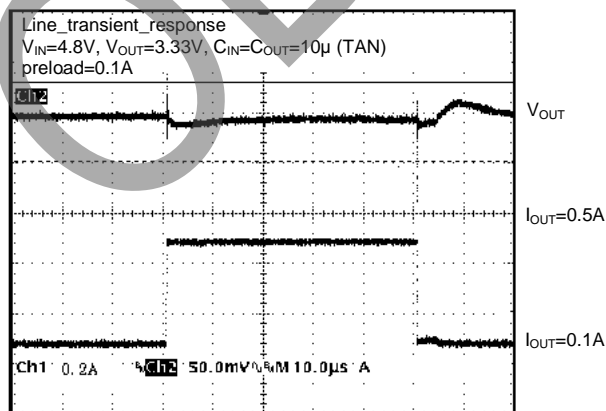
Ripple Rejection vs. Frequency



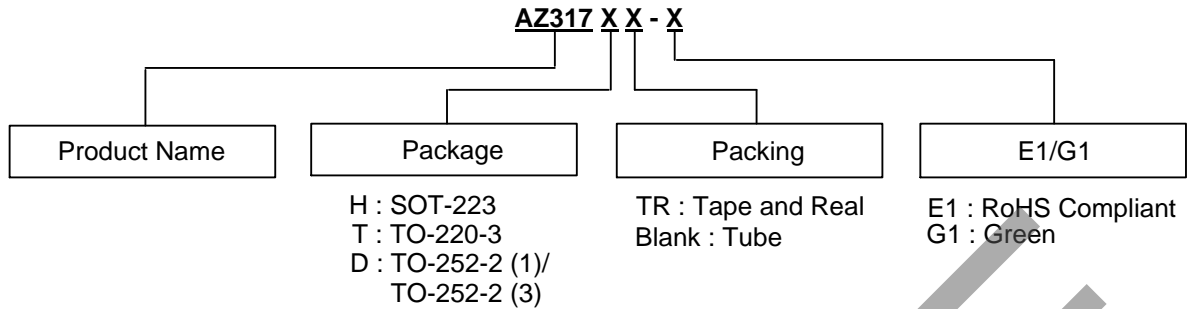
Line Transient Response



Load Transient Response



Ordering Information



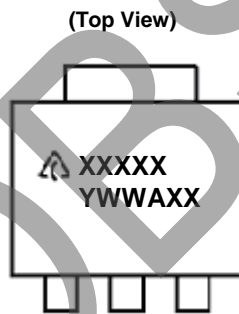
| Part Number | Package (Note 7) | Temperature Range | RoHS Compliant / Green | Marking ID | Packing | Quantity | Status (Note 6) |
|-------------|------------------|-------------------|------------------------|------------|-------------|----------|-----------------|
| AZ317HTR-E1 | SOT223 | 0 to +125°C | RoHS Compliant | EH31A | Tape & Reel | 1000 | In Production |
| AZ317HTR-G1 | SOT223 | 0 to +125°C | Green | GH31A | Tape & Reel | 1000 | In Production |
| AZ317T-E1 | TO220-3 | 0 to +125°C | RoHS Compliant | AZ317T-E1 | Tube | 1000 | In Production |
| AZ317DTR-E1 | TO252-2 (1)/(3) | 0 to +125°C | RoHS Compliant | AZ317D-E1 | Tape & Reel | 2500 | In Production |



Notes: 6. All variants in TO-263-3 package are End of Life without any replacement.
AZ317DTR-G1 and AZ317T-G1 are End of Life without any replacement.
7. For packaging details, go to our website at: <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

(1) SOT223



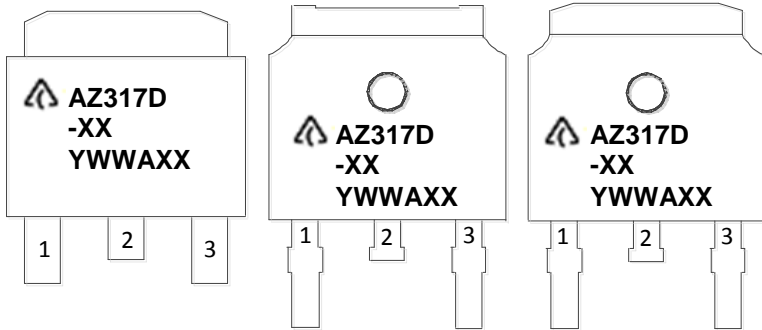
First Line: Logo and Marking ID (See Ordering Information)
Second Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

OBSOLETE - PART DISCONTINUED

Marking Information (Cont.)

(2) TO252-2 (1)/3

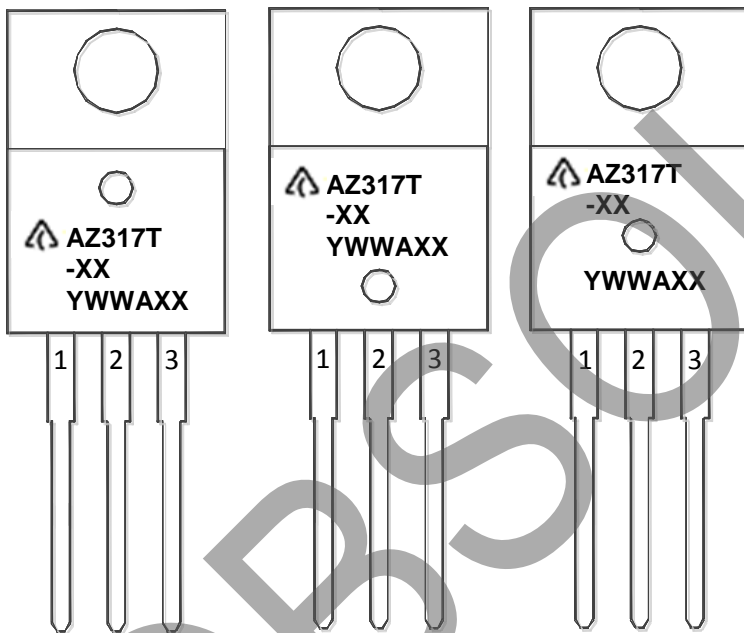
(Top View)



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

(3) TO220-3

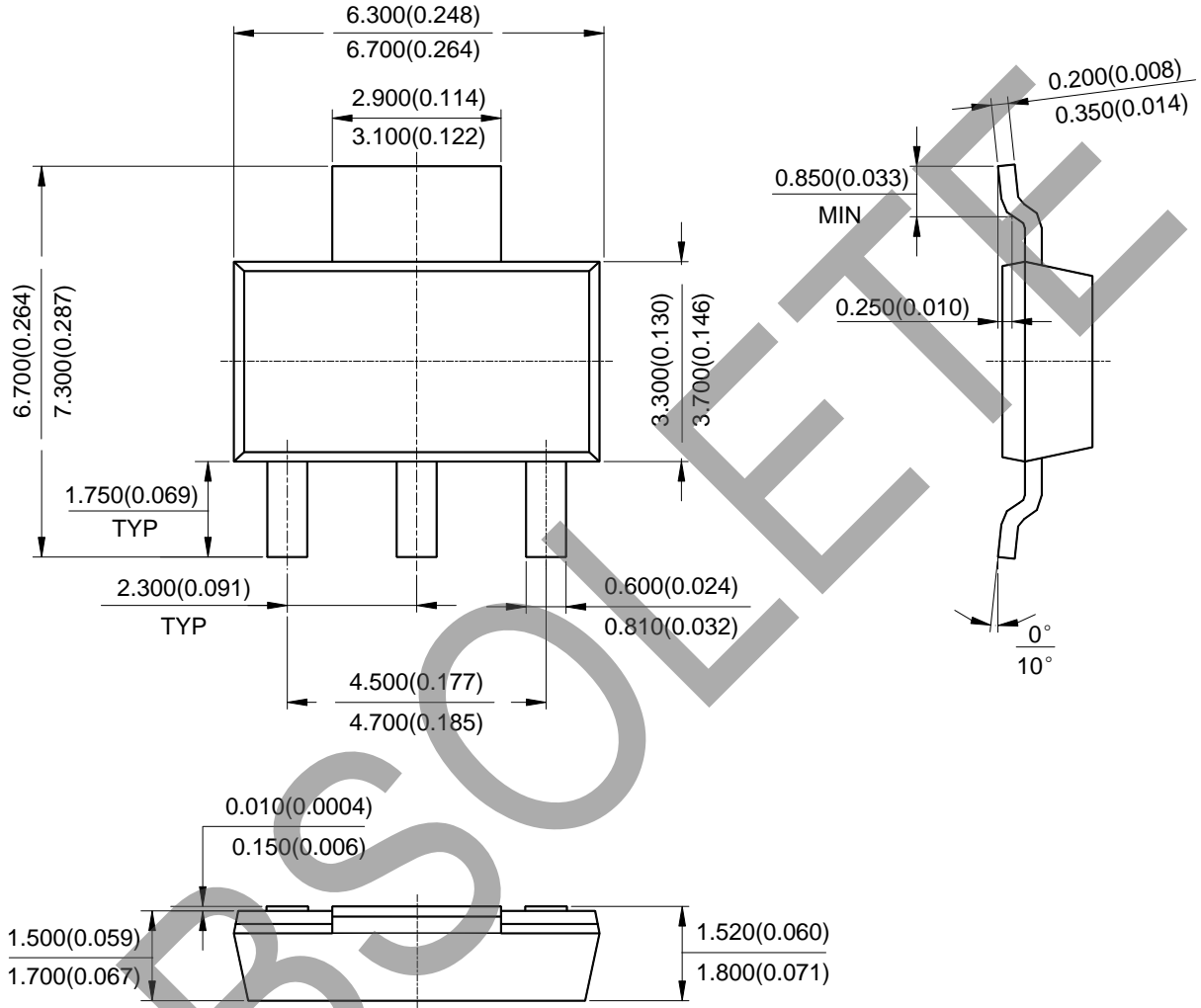
(Top View)



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

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

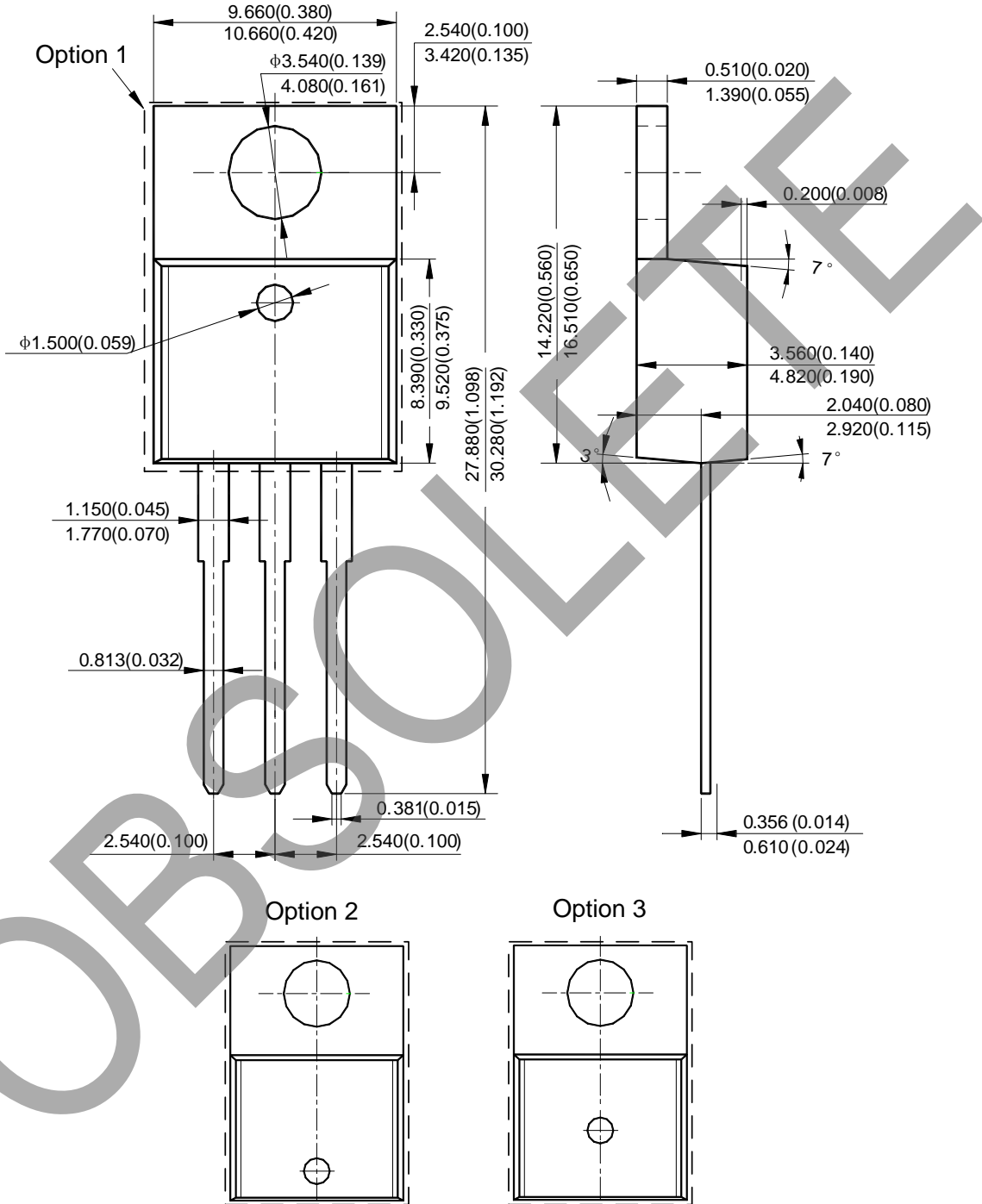
(1) Package Type: SOT223



OBSOLETE - PART DISCONTINUED

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

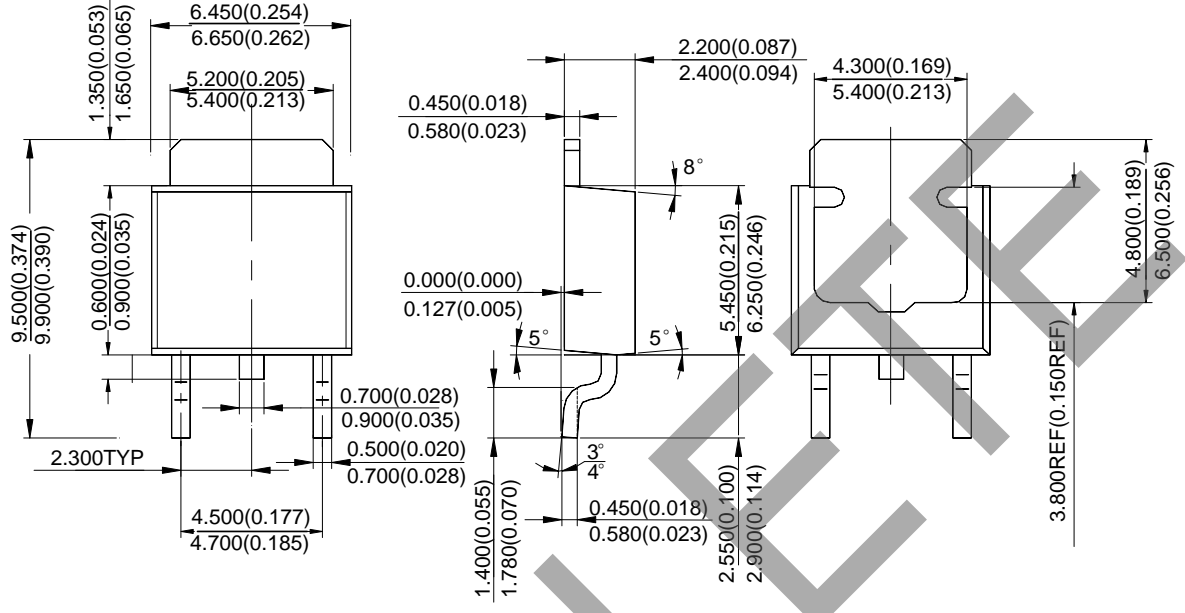
(2) Package Type: TO220-3



OBSOLETE - PART DISCONTINUED

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

(3) Package Type: TO252-2 (1)

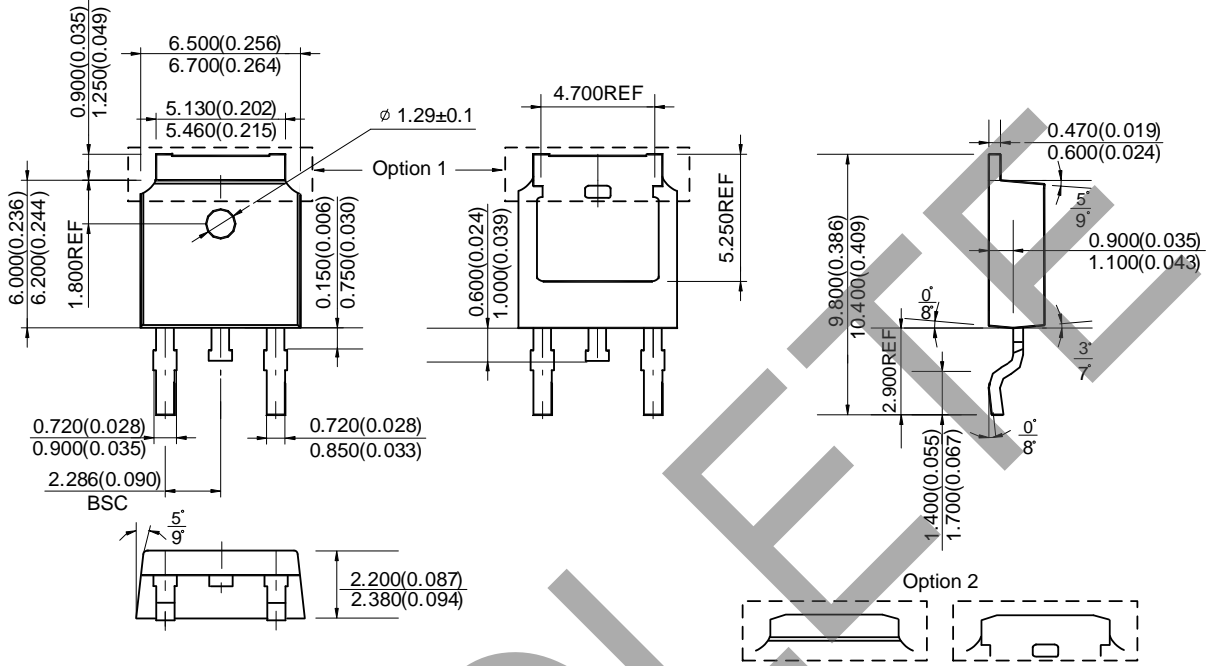


OBSOLETE - PART DISCONTINUED

OBSOLETE

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

(4) Package Type: TO252-2 (3)

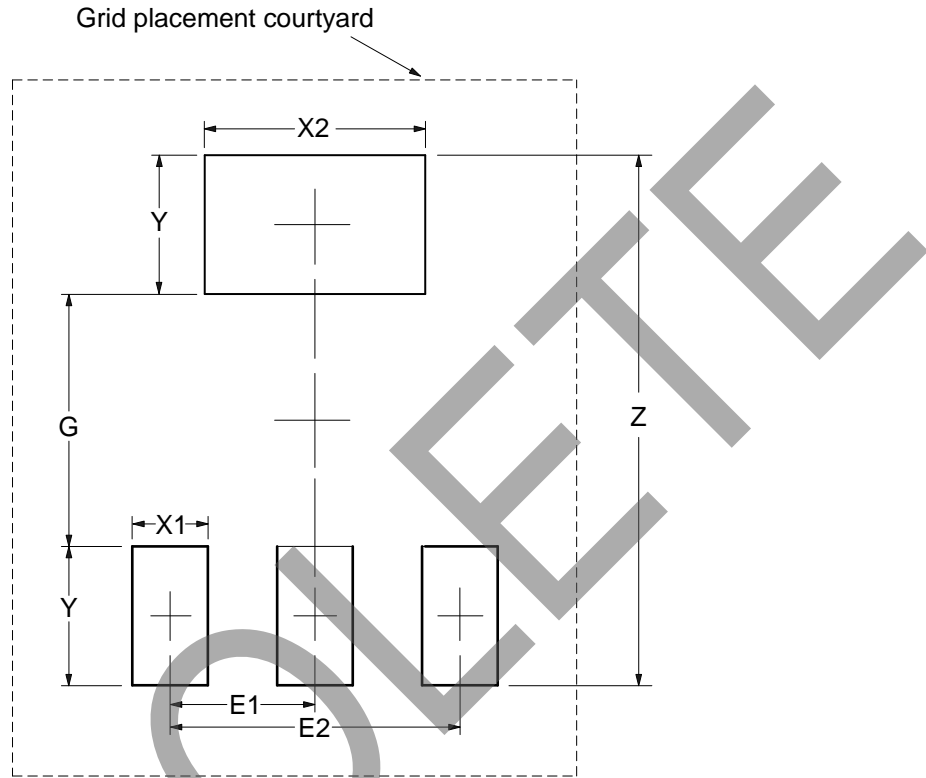


OBSOLETE - PART DISCONTINUED

OBSOLETE

Suggested Pad Layout

(1) Package Type: SOT223



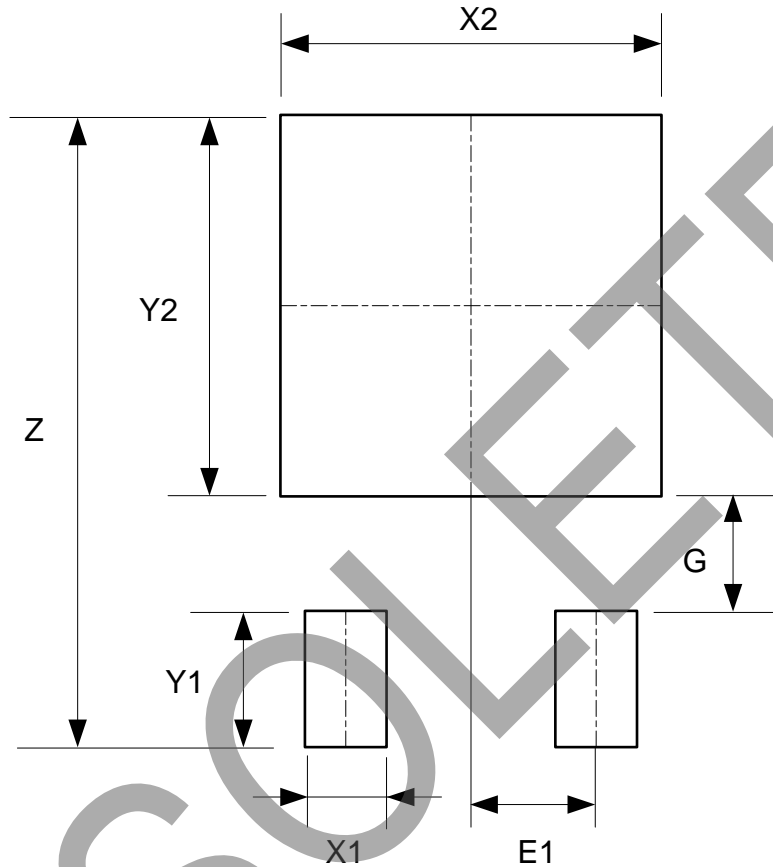
| Dimensions | Z (mm)/(inch) | G (mm)/(inch) | X1 (mm)/(inch) | X2 (mm)/(inch) | Y (mm)/(inch) | E1 (mm)/(inch) | E2 (mm)/(inch) |
|------------|------------------|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Value | 8.400/0.331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

OBSOLETE - PART DISCONTINUED

OBSOLETE

Suggested Pad Layout (Cont.)

(2) Package Type: TO252-2 (1)

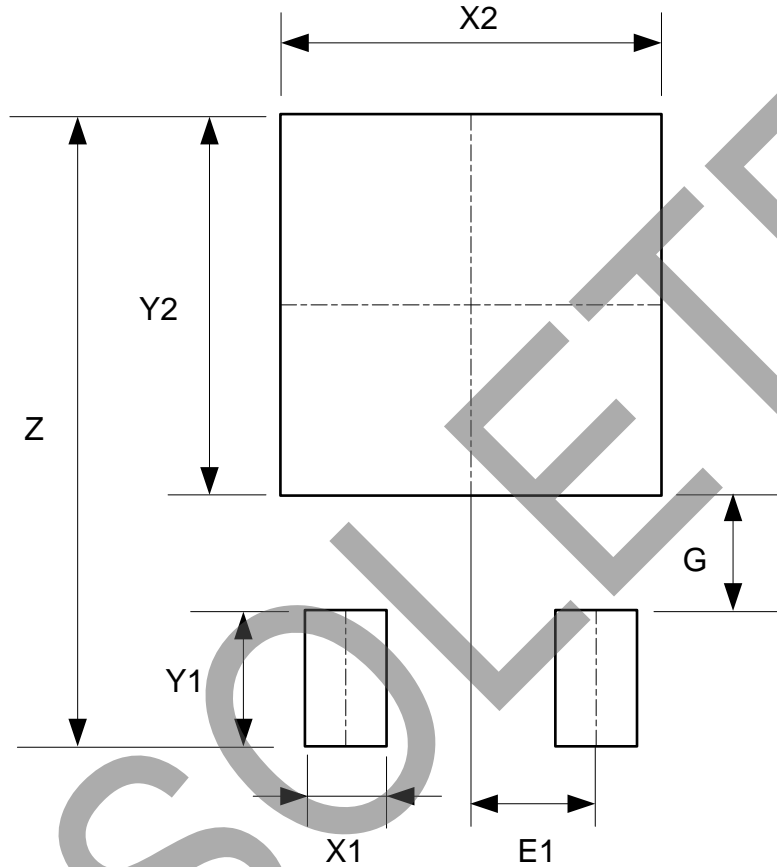


| Dimensions | Z (mm)/(inch) | X1 (mm)/(inch) | X2=Y2 (mm)/(inch) | Y1 (mm)/(inch) | G (mm)/(inch) | E1 (mm)/(inch) |
|------------|------------------|-------------------|----------------------|-------------------|------------------|-------------------|
| Value | 11.600/0.457 | 1.500/0.059 | 7.000/0.276 | 2.500/0.098 | 2.100/0.083 | 2.300/0.091 |

OBSOLETE - PART DISCONTINUED

Suggested Pad Layout (Cont.)

(3) Package Type: TO252-2 (3)



| Dimensions | Z (mm)/(inch) | X1 (mm)/(inch) | X2=Y2 (mm)/(inch) | Y1 (mm)/(inch) | G (mm)/(inch) | E1 (mm)/(inch) |
|------------|------------------|-------------------|----------------------|-------------------|------------------|-------------------|
| Value | 11.600/0.457 | 1.500/0.059 | 7.000/0.276 | 2.500/0.098 | 2.100/0.083 | 2.300/0.091 |

OBSOLETE - PART DISCONTINUED

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