



**THE DATASHEET OF  
AZ317HTR-E1**



**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.

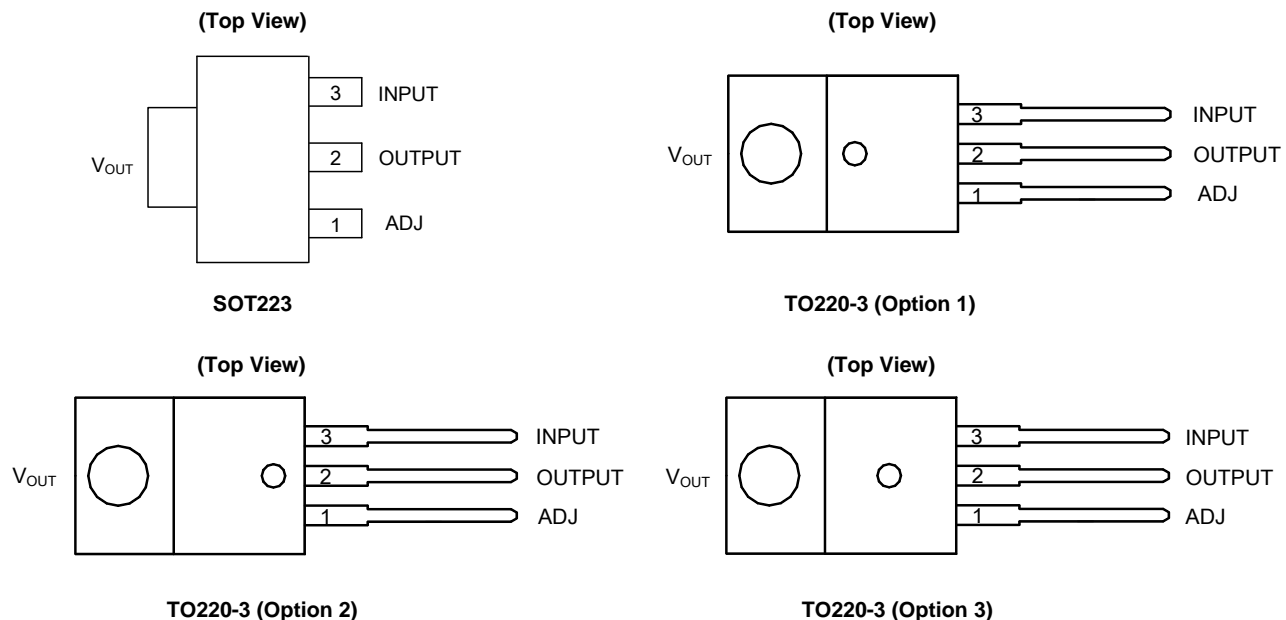
**Features**

- 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)**

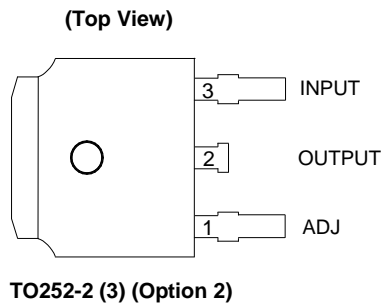
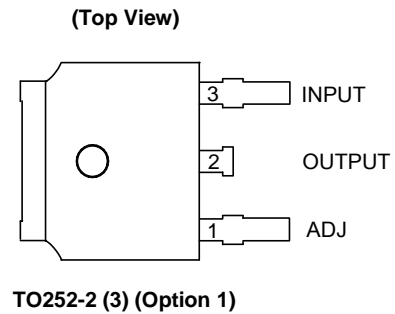
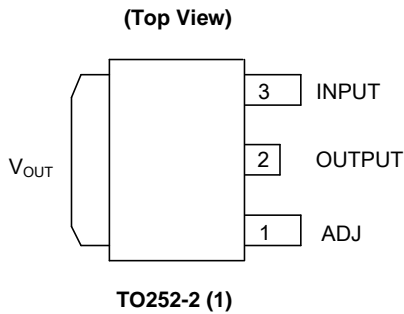
**Applications**

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

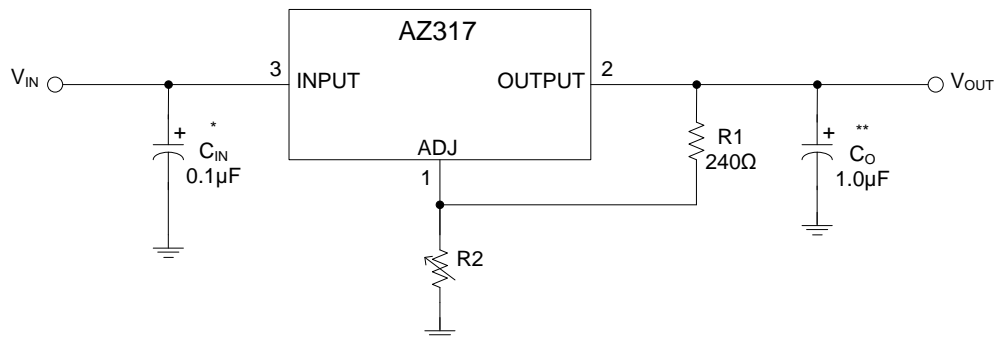
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. 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**



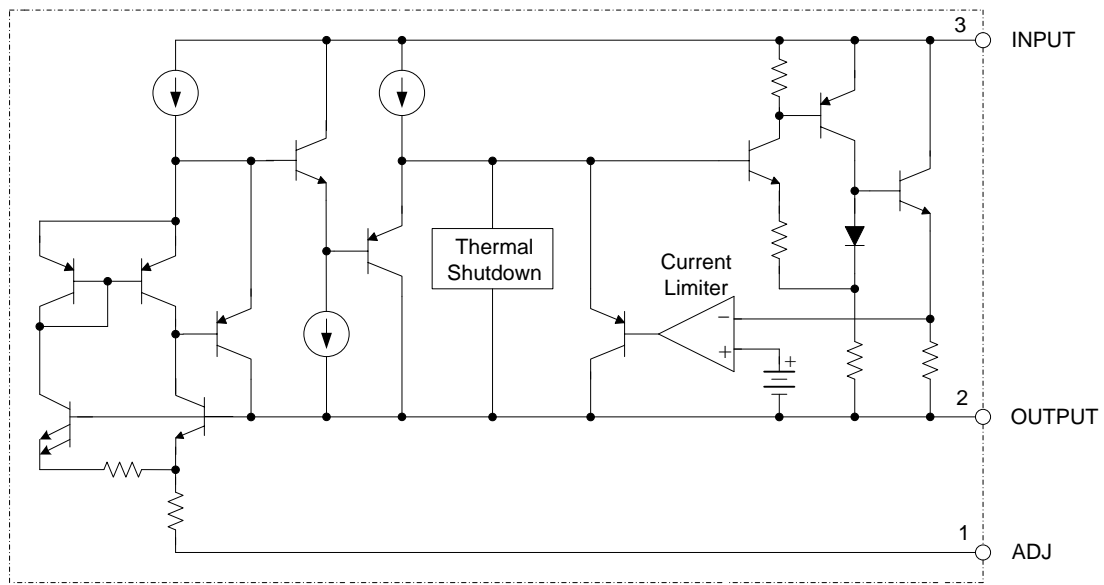
\* =  $C_{IN}$  is required if the regulator is located near power supply filter.

\*\*=  $C_O$  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.

**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

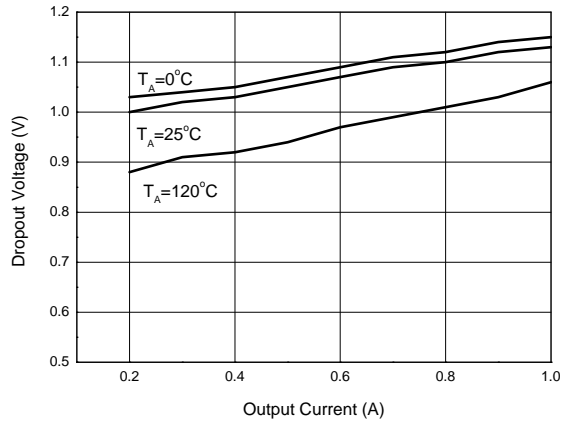
**Electrical Characteristics** (Typicals and limits apply for  $T_J = +25^\circ\text{C}$ ,  $P \leq$  Maximum Power Dissipation unless otherwise specified. Note 5)

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
$\Delta V$	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	$\mu\text{A}$
—	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	$\mu\text{A}$
—	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	—	$^\circ\text{C}$

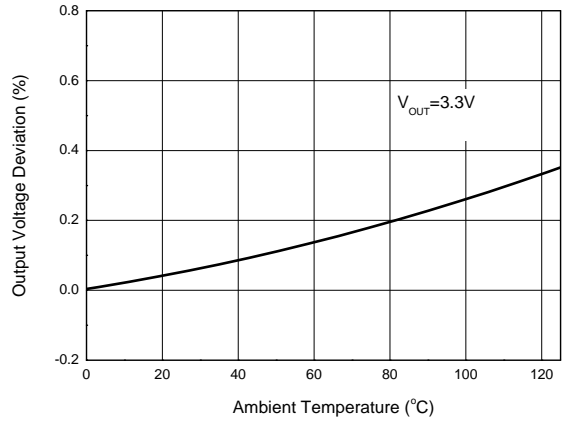
Note 5: Maximum Power Dissipation is Package Type and Case Temperature dependent. Please see Figure Maximum Power Dissipation.

**Performance Characteristics**

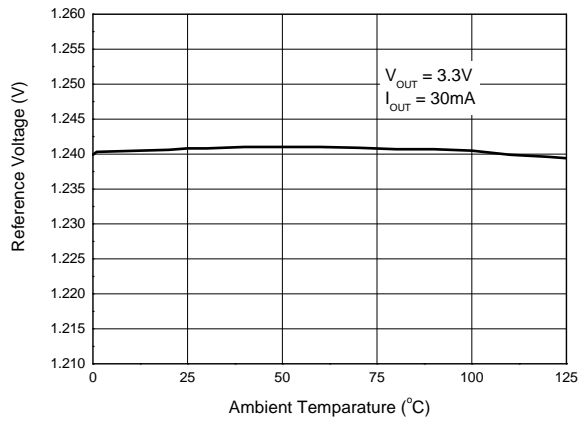
**Dropout Voltage vs. Output Current**



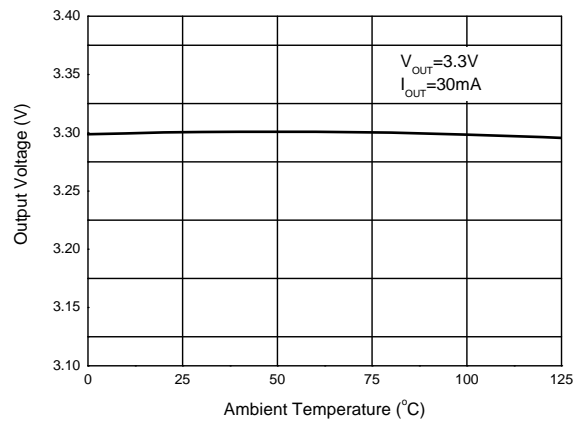
**Load Regulation vs. Temperature**



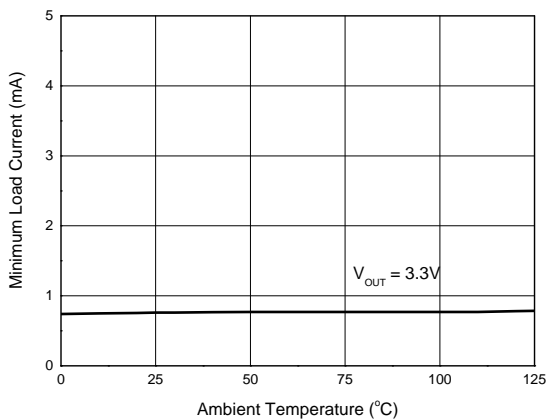
**Reference Voltage vs. Temperature**



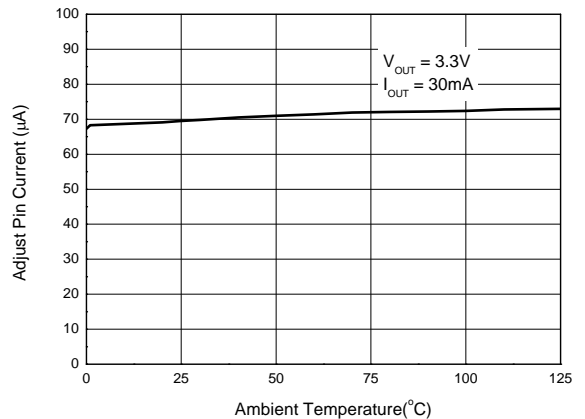
**Output Voltage vs. Temperature**



**Minimum Load Current vs. Temperature**

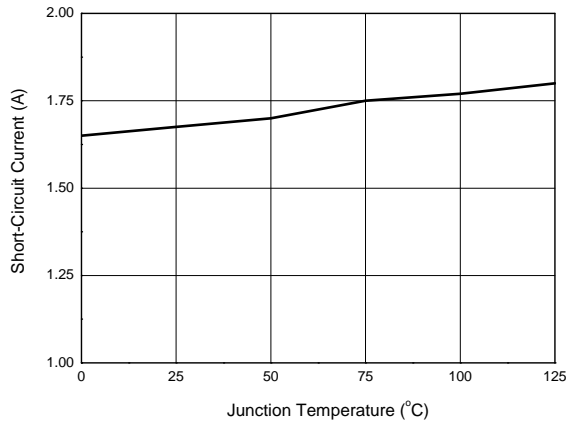


**Adjust Pin Current vs. Temperature**

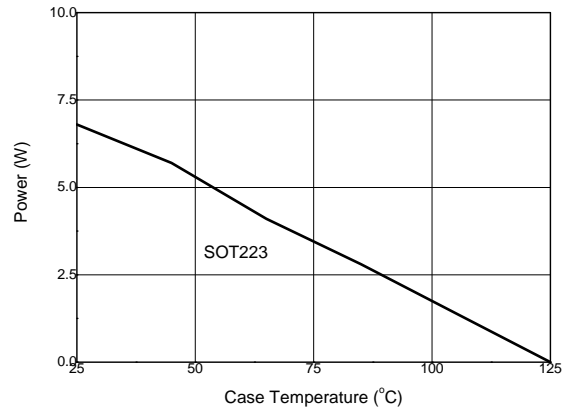


**Performance Characteristics (Cont.)**

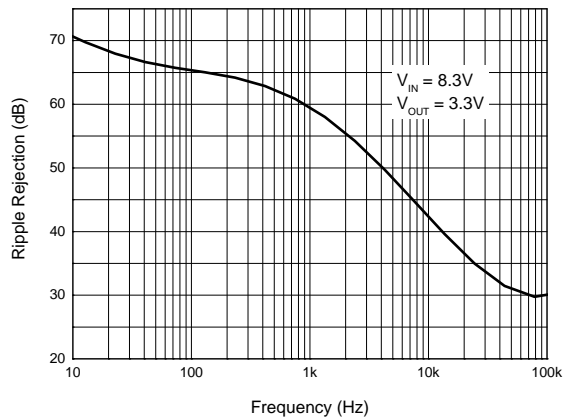
**Short-Circuit Current vs. Temperature**



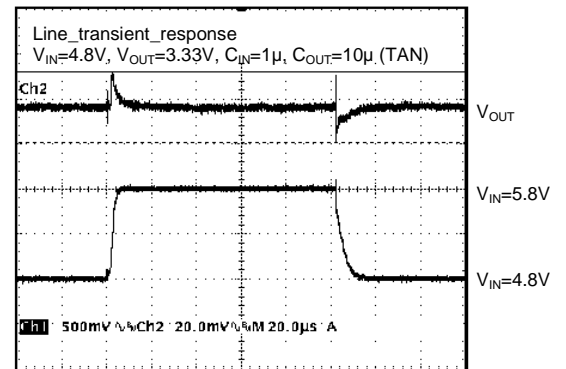
**Maximum Power Dissipation**



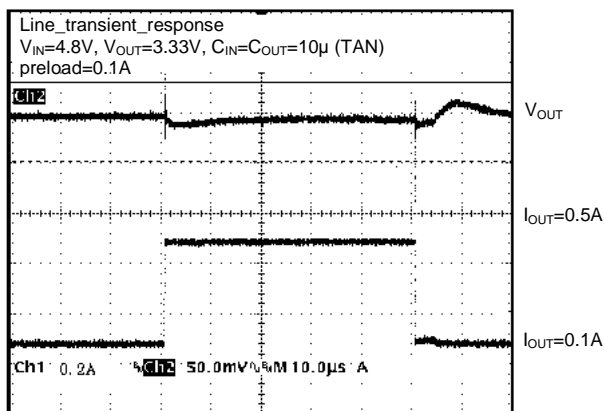
**Ripple Rejection vs. Frequency**



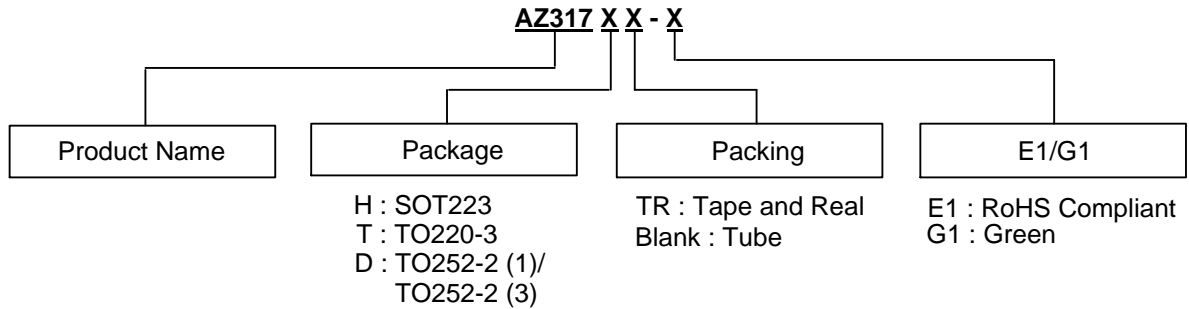
**Line Transient Response**



**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

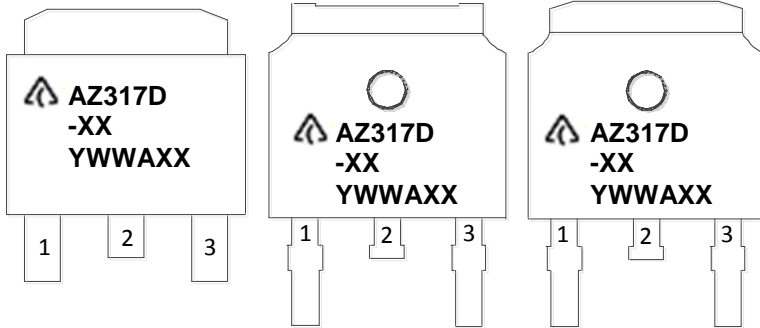


First Line: Logo and Marking ID (See Ordering Information)  
 Second Line: Date Code  
 Y: Year  
 WW: Work Week of Molding  
 A: Assembly House Code  
 XX: 7th and 8th Digits of Batch Number

**Marking Information** (Cont.)

(2) TO252-2 (1)/3

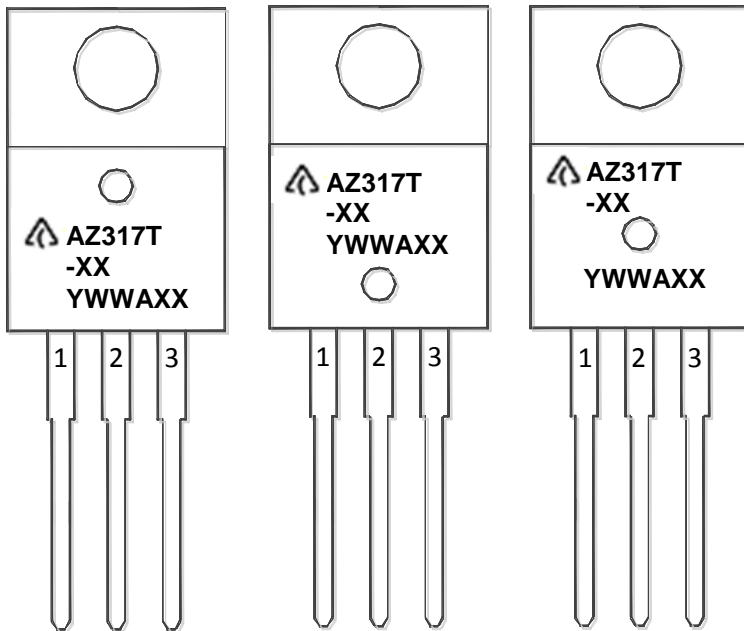
(Top View)



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

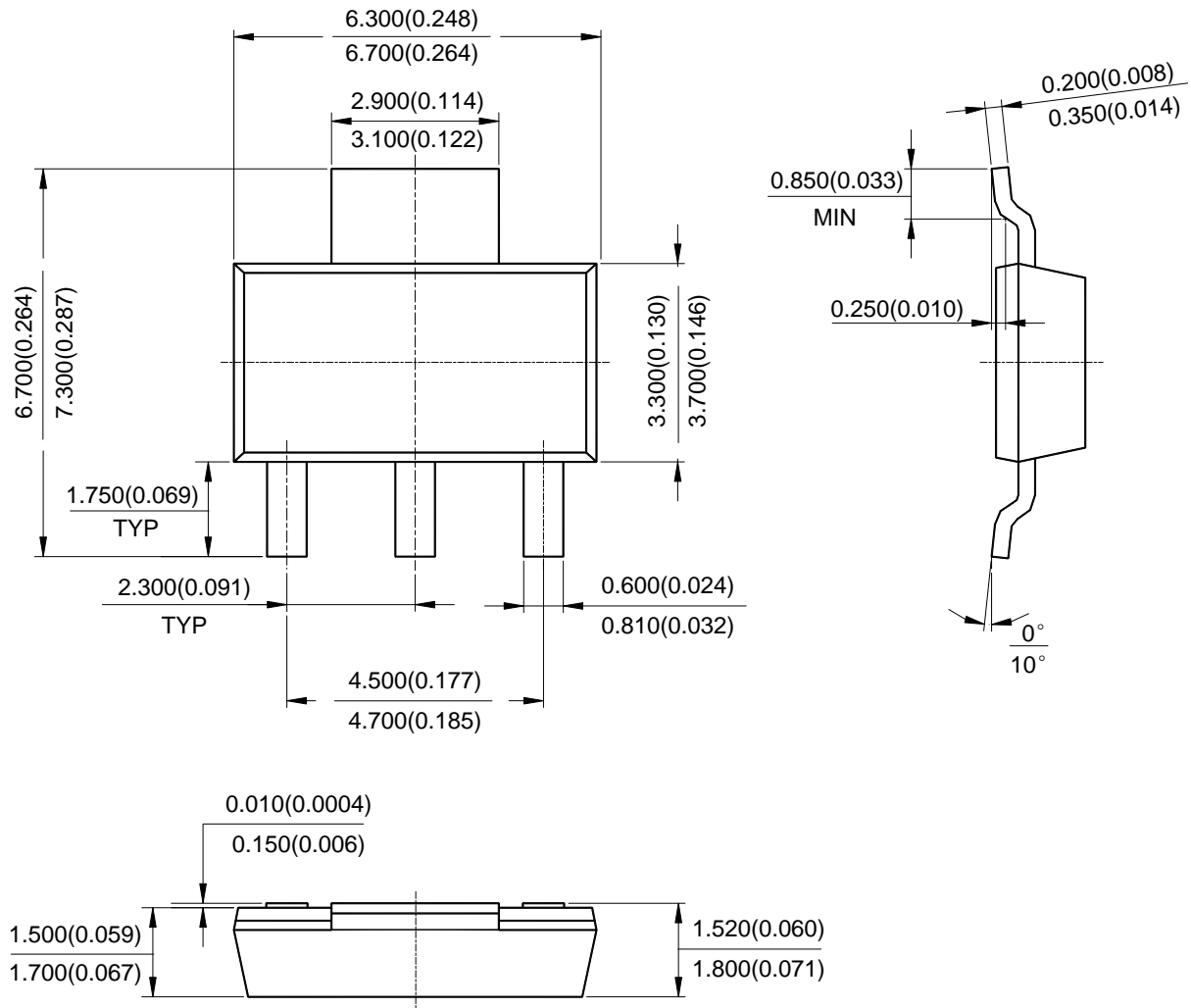
(Top View)



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

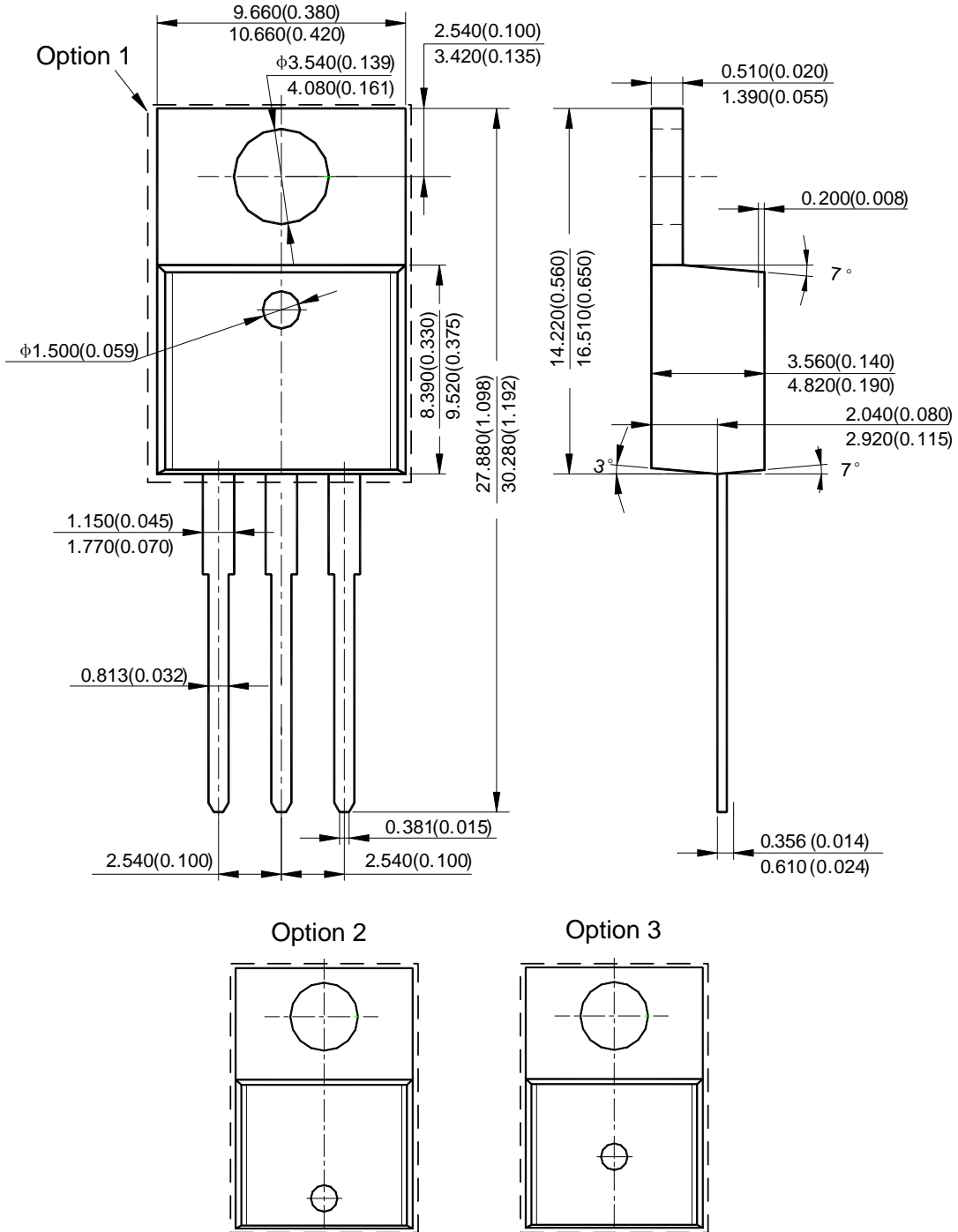
**Package Outline Dimensions** (All dimensions in mm(inch).)

(1) Package Type: SOT223



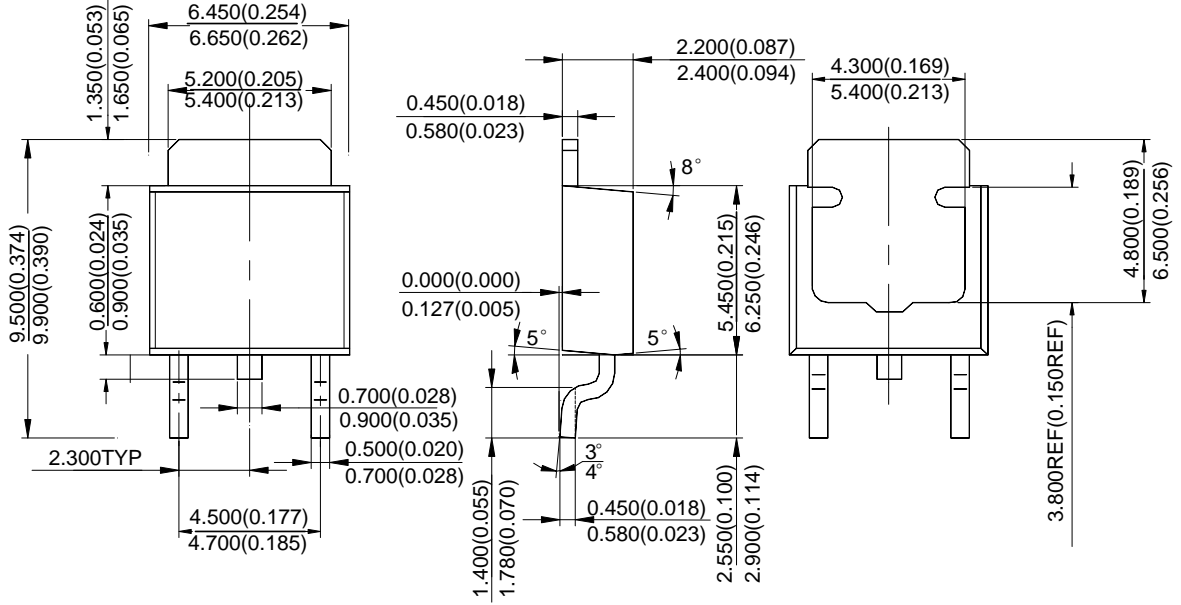
**Package Outline Dimensions** (Cont. All dimensions in mm(inch).)

(2) Package Type: TO220-3



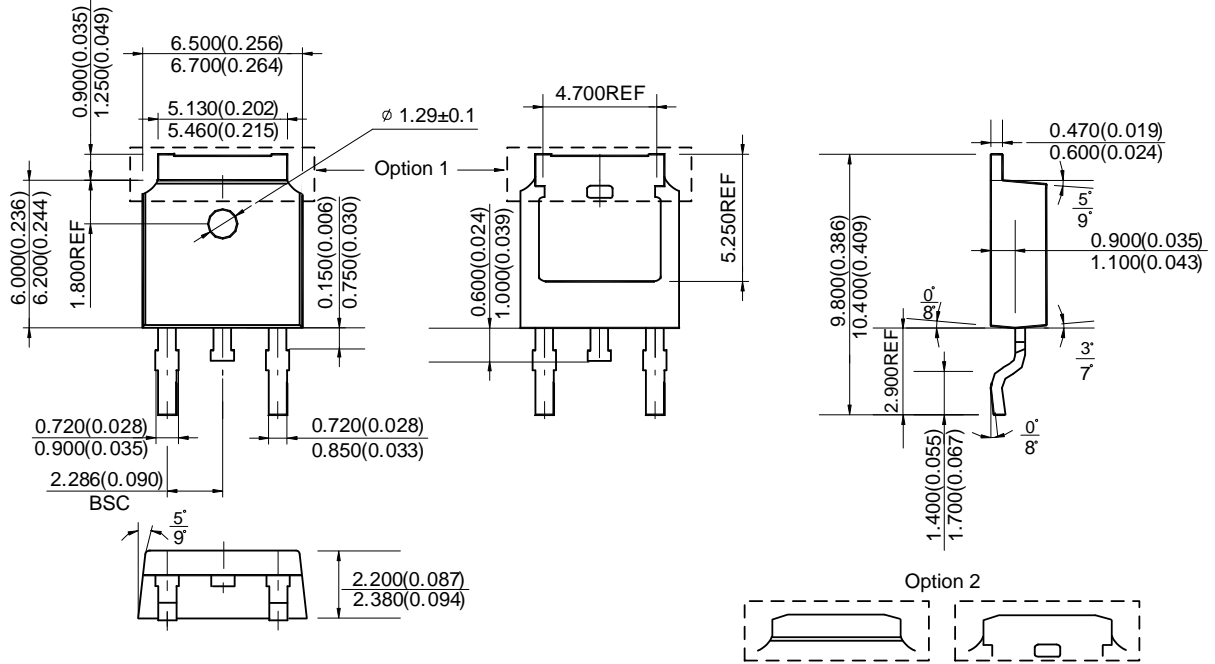
**Package Outline Dimensions** (Cont. All dimensions in mm(inch).)

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



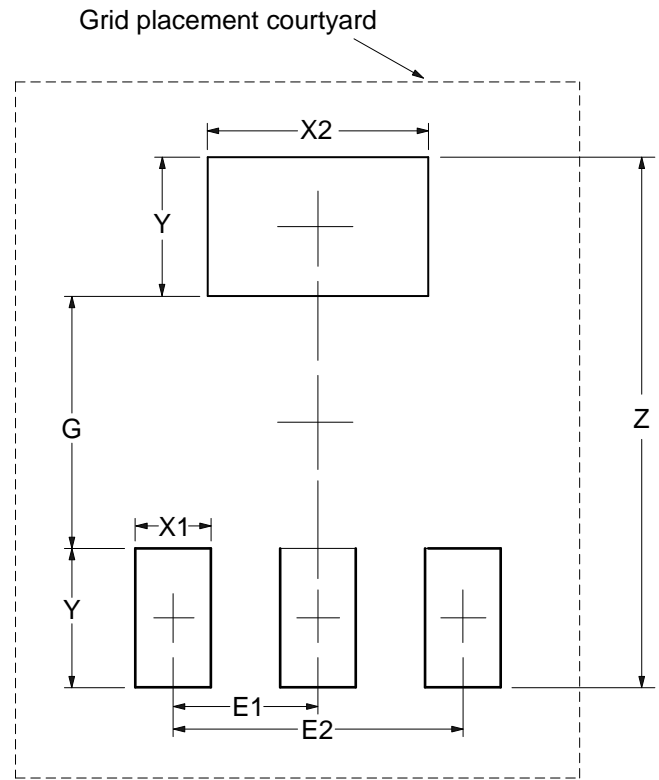
**Package Outline Dimensions** (Cont. All dimensions in mm(inch).)

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



**Suggested Pad Layout**

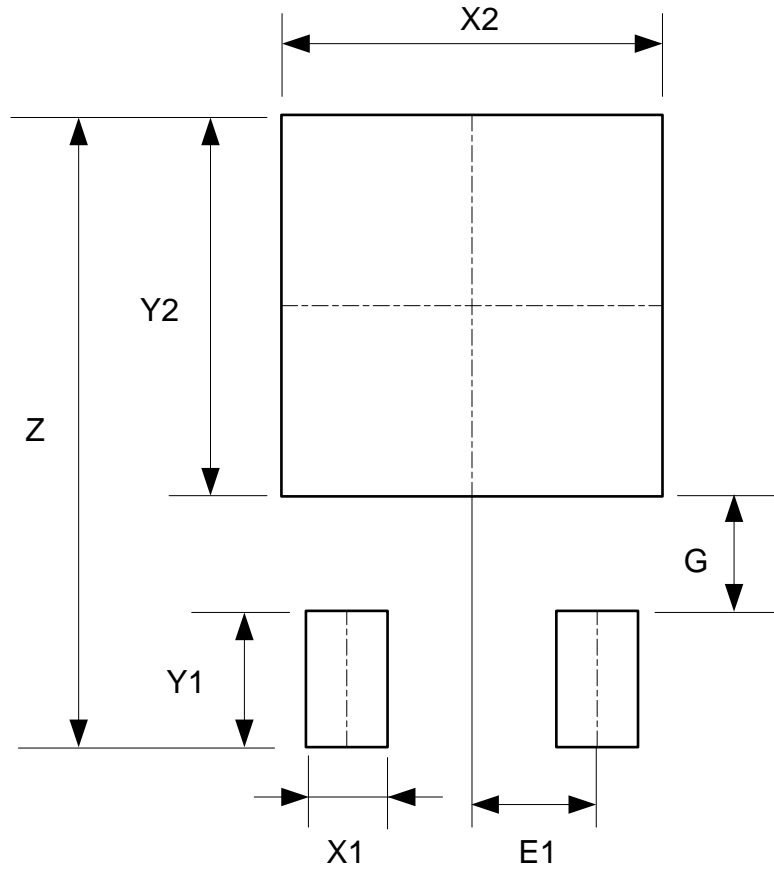
(1) Package Type: SOT223



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

**Suggested Pad Layout** (Cont.)

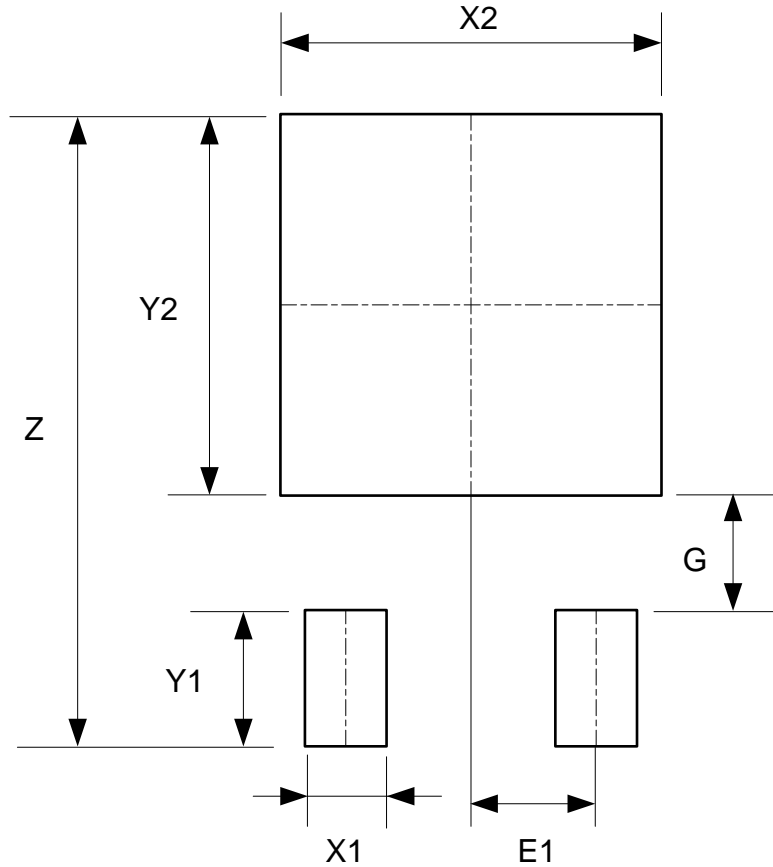
(2) Package Type: TO252-2 (1)



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

**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

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