

**1.0A LOW DROPOUT LINEAR REGULATOR**

NEW PRODUCT

**Description**

The AZ1117E is a low dropout three-terminal regulator with 1.0A output current ability, and the dropout voltage is specified at typical 1.1V at 1.0A current load, decreasing at lower load currents.

The AZ1117E has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown protection solutions. Its circuit includes a trimmed band gap 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.

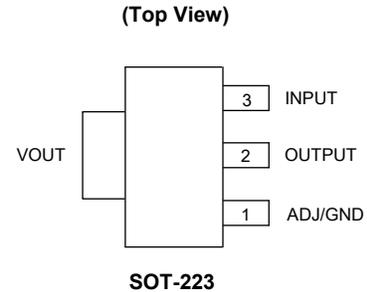
The AZ1117E is available in 1.2V, 1.5V, 1.8V, 2.5V, 3.3V and 5.0V fixed output voltage versions and ADJ output voltage version. The fixed versions integrate the adjust resistors.

The AZ1117E is available in the industry-standard SOT-223 package.

**Applications**

- TVs and LCD Monitors
- PC Peripherals: Notebooks, Motherboards
- STB

**Pin Assignments**

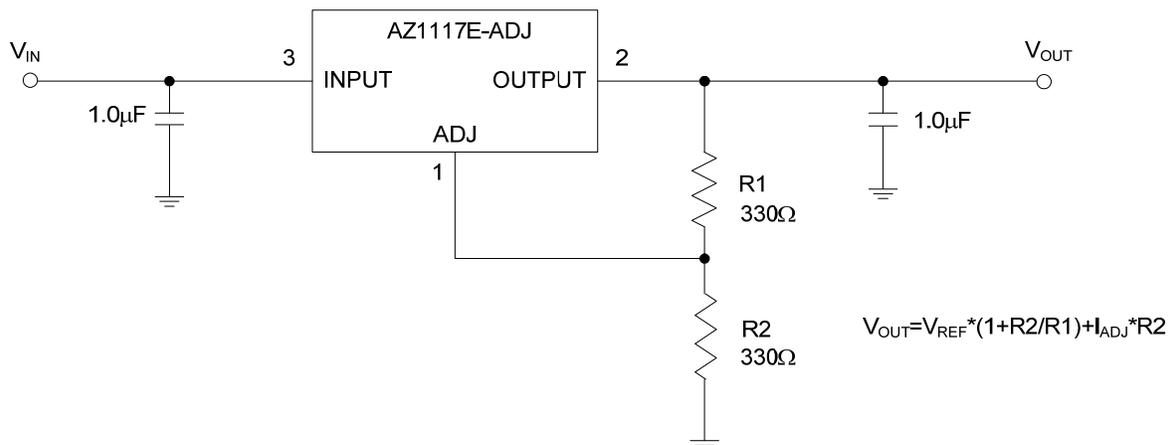


**Features**

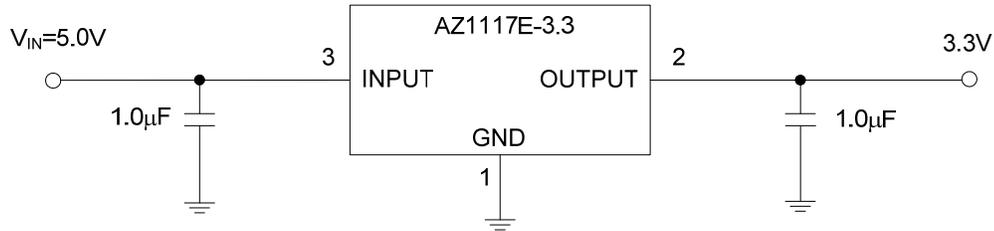
- Provide ADJ Version ( $V_{REF} = 1.25V$ ) and Fixed Voltage 1.2V, 1.5V, 1.8V, 2.5V, 3.3V and 5.0V with Accuracy ±1% (Except 1.2V)
- Current Limit: 1.3A (Typ.)
- Dropout Voltage: 1.1V (Typ.) @  $I_{OUT} = 1A$
- Regulator Stable with Low ESR MLCC
- Excellent Line Regulation: 0.001%/V (Typ.) @  $I_{OUT} = 30mA$
- Excellent Load Regulation: 0.2%/A @  $I_{OUT} = 1A$
- Quiescent Current: 3.5mA
- Low Output Noise
- PSRR: 70dB
- OTSD Protection
- 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)**

- 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](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)



**Typical Applications Circuit** (Cont. Note 4)



Note 4: The AZ1117E is compatible with Low ESR ceramic capacitor. A minimum of 1.0µF input and output capacitors are required. The ESR of the output capacitors must be less than 1.5Ω. Close to the OUTPUT pin, it is not recommended to use a capacitor smaller than 0.68µF in parallel with output capacitor. When the output capacitor parallels 0.1µF capacitor, the 0.1µF capacitor must be away from the OUTPUT pin, the distance is no less than 5mm.

**Pin Descriptions**

Pin Number	Pin Name	Function
1	ADJ/GND	Adjustable pin or ground pin
2	OUTPUT	Regulator output pin
3	INPUT	Supply voltage pin

**Absolute Maximum Ratings** (Note 5)

Symbol	Parameter	Rating	Unit
$V_{IN}$	Power Supply Voltage	16	V
$T_J$	Operating Junction Temperature Range	+150	°C
$T_{STG}$	Storage Temperature Range	-65 to +150	°C
$T_{LEAD}$	Lead Temperature (Soldering, 10sec)	+260	°C
$\theta_{JA}$	Thermal Resistance (Junction to Ambient) (Note 6)	65	°C/W
-	ESD (Machine Model)	200	V
-	ESD (Human Body Model)	2000	V

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 200mm<sup>2</sup> (16mm\*12.5mm) 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
$V_{IN}$	Supply Voltage	-	13	V
$T_J$	Operating Junction Temperature Range	-40	+125	°C

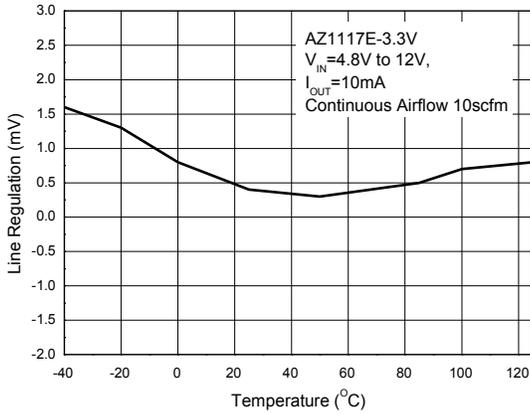
NEW PRODUCT

**Electrical Characteristics** (@ $V_{IN} = V_{OUT} + 1.5V$ ,  $C_{IN} = 1.0\mu F$  (Ceramic),  $C_{OUT} = 1.0\mu F$  (Ceramic), Typical  $T_A = +25^\circ C$ , **Bold** typeface applies over  $-40^\circ C \leq T_J \leq +125^\circ C$  ranges, unless otherwise specified.)

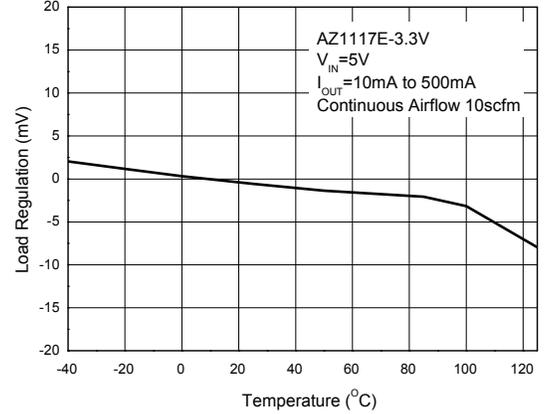
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{REF}$	Reference Voltage	$V_{OUT} + 1.5V \leq V_{IN} \leq 12V$ , $I_{OUT} = 10mA$	1.238	1.250	1.262	V	
			<b>98%*<math>V_{OUT}</math></b>	$V_{OUT}$	<b>102%*<math>V_{OUT}</math></b>	V	
$V_{OUT}$	Output Voltage (Fixed Versions)	For 1.2V, $V_{OUT} + 1.5V \leq V_{IN} \leq 12V$ , $I_{OUT} = 10mA$	98%* $V_{OUT}$	$V_{OUT}$	102%* $V_{OUT}$	V	
			<b>96%*<math>V_{OUT}</math></b>	<b><math>V_{OUT}</math></b>	<b>104%*<math>V_{OUT}</math></b>	V	
		For 1.5V to 5V, $V_{OUT} + 1.5V \leq V_{IN} \leq 12V$ , $I_{OUT} = 10mA$	99%* $V_{OUT}$	$V_{OUT}$	101%* $V_{OUT}$	V	
			<b>98%*<math>V_{OUT}</math></b>	$V_{OUT}$	<b>102%*<math>V_{OUT}</math></b>	V	
$V_{DROP}$	Dropout Voltage	$I_{OUT} = 1A$	–	1.1	1.3	V	
$I_{OUT(MAX)}$	Maximum Output Current	$1.5V \leq V_{IN} - V_{OUT}$	1	1.3	–	A	
$V_{RLOAD}$	Load Regulation	$V_{IN} = V_{OUT} + 1.5V$ $1mA \leq I_{OUT} \leq 1A$	–	0.2	0.6	%/A	
$V_{RLINE}$	Line Regulation	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$ , $I_{OUT} = 30mA$	–	0.001	$\pm 0.04$	%/V	
$I_Q$	Quiescent Current	For Fixed Voltage Version, $I_{OUT} = 0$	–	3.5	6	mA	
–	Minimum Load Current	For ADJ Version, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$	–	2	5	mA	
$I_{ADJ}$	Adjustable Pin Current	–	–	45	90	$\mu A$	
–	Adjustable Pin Current Change	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$	–	0.2	5	$\mu A$	
PSRR	Power Supply Rejection Ratio	Ripple 1.0 Vp-p $V_{IN} = V_{OUT} + 2V$ , $I_{OUT} = 100mA$	f = 120Hz	–	70	–	dB
			f = 1kHz	–	70	–	
$\frac{\Delta V_{OUT}}{V_{OUT}} / \Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 30mA$	–	$\pm 30$	–	ppm/ $^\circ C$	
$V_{NOISE}$	RMS Output Noise	$10Hz \leq f \leq 100kHz$ , No Load	–	0.003	–	%	
$T_{OTSD}$	Thermal Shutdown Temperature	–	–	+170	–	$^\circ C$	
$T_{HYOTSD}$	Thermal Shutdown Hysteresis	–	–	+20	–	$^\circ C$	
$\theta_{JC}$	Thermal Resistance (Junction to Case)	SOT-223	–	40	–	$^\circ C/W$	

**Performance Characteristics**

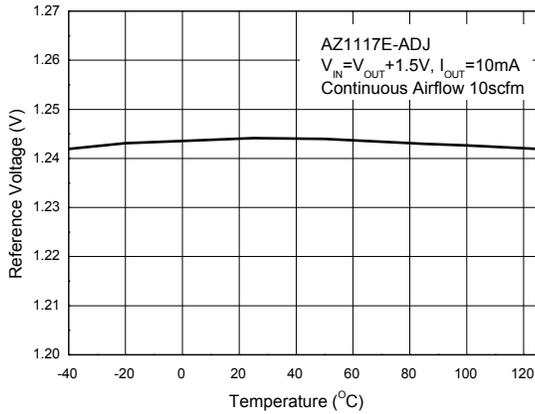
**Line Regulation vs. Temperature**



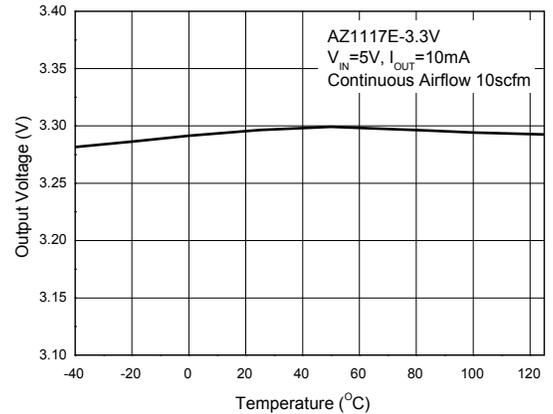
**Load Regulation vs. Temperature**



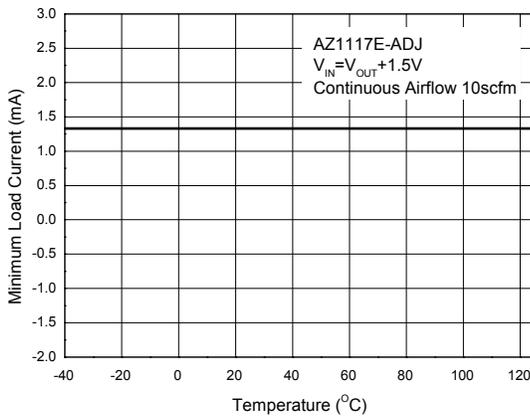
**Reference Voltage vs. Temperature**



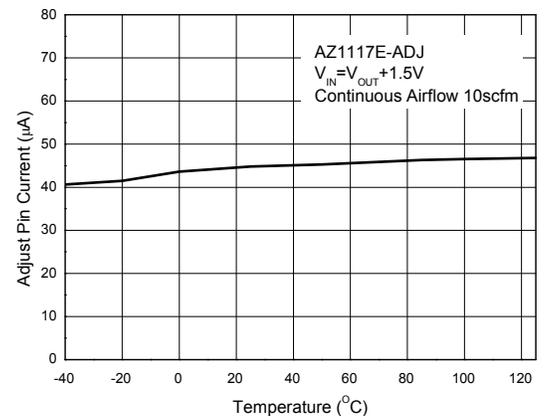
**Output Voltage vs. Temperature**



**Minimum Load Current vs. Temperature**

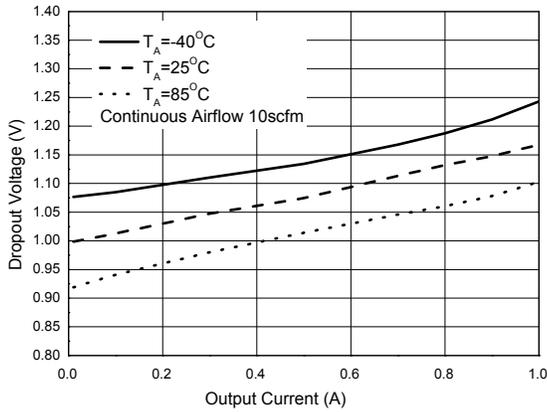


**Adjust Pin Current vs. Temperature**

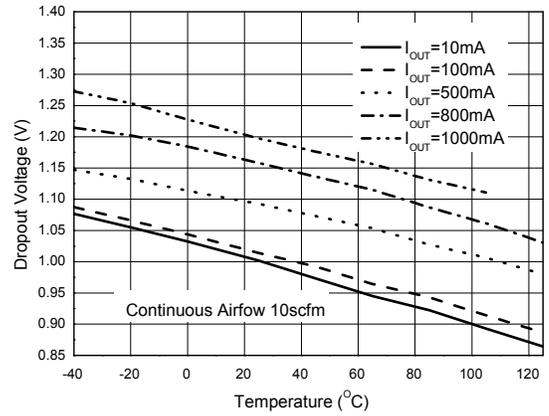


**Performance Characteristics (Cont.)**

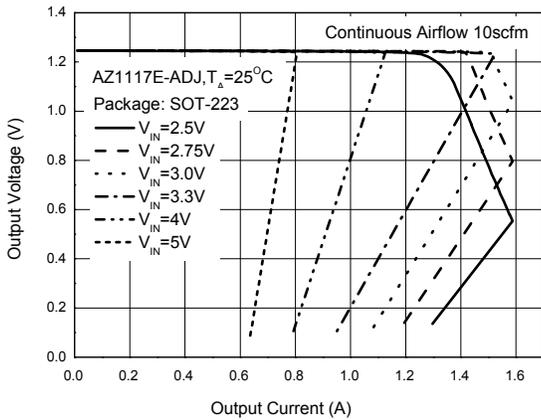
**Dropout Voltage vs. Output Current**



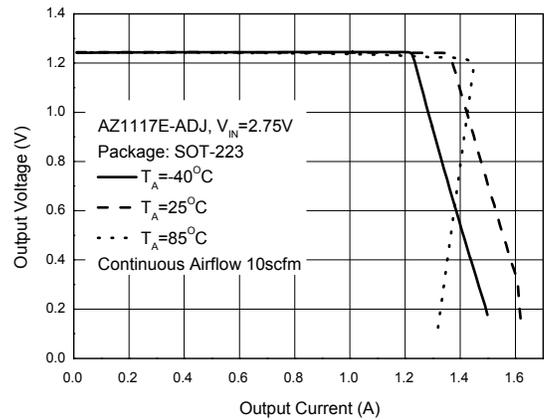
**Dropout Voltage vs. Temperature**



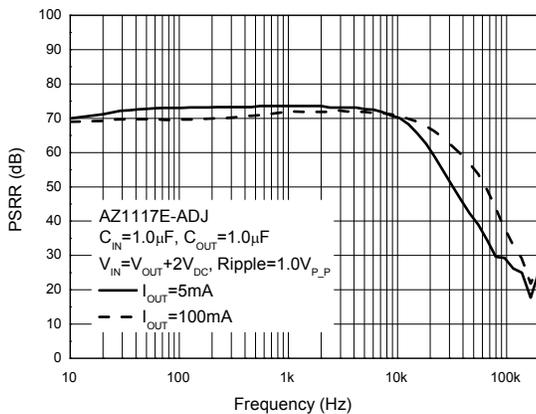
**Output Voltage vs. Output Current**



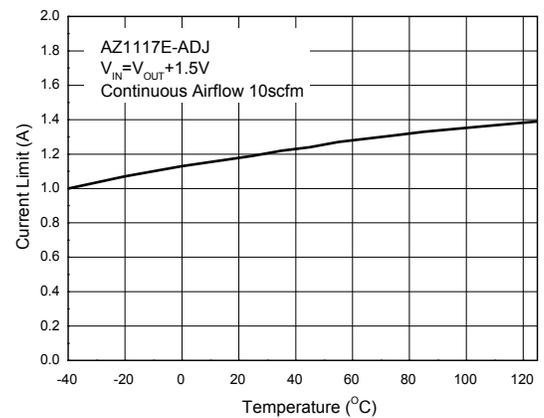
**Output Voltage vs. Output Current**



**PSRR vs. Frequency**



**Current Limit vs. Temperature**

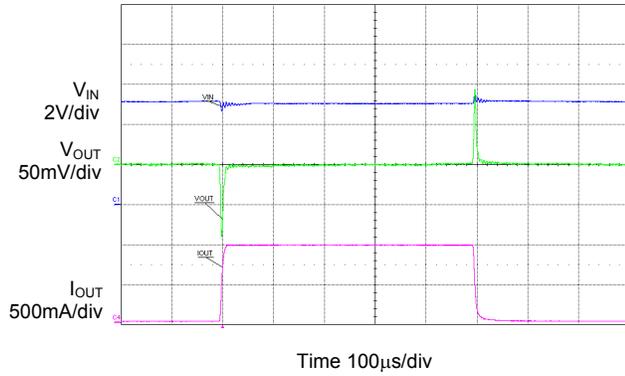


**Performance Characteristics (Cont.)**

**Load Transient Response**

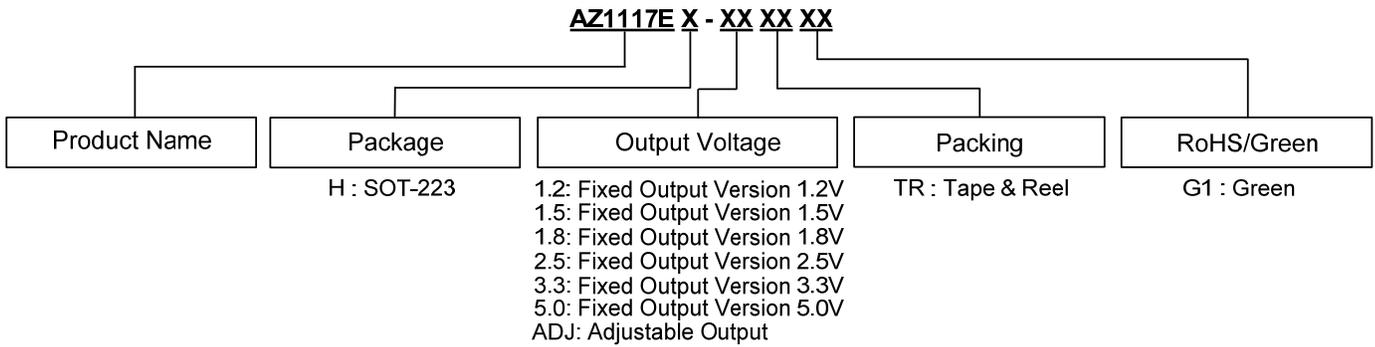
(AZ1117E-ADJ,  $V_{IN}=5V$ ,  $V_{OUT}=3.3V$ ,

$C_{IN}=1.0\mu F$ ,  $C_{OUT}=1.0\mu F$ )



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**Ordering Information**

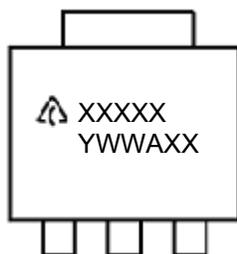


Package	Temperature Range	Part Number	Marking ID	Packing
SOT-223	-40 to +125°C	AZ1117EH-1.2TRG1	GH23F	4000/Tape & Reel
		AZ1117EH-1.5TRG1	GH27F	4000/Tape & Reel
		AZ1117EH-1.8TRG1	GH18G	4000/Tape & Reel
		AZ1117EH-2.5TRG1	GH23G	4000/Tape & Reel
		AZ1117EH-3.3TRG1	GH27G	4000/Tape & Reel
		AZ1117EH-5.0TRG1	GH18H	4000/Tape & Reel
		AZ1117EH-ADJTRG1	GH23H	4000/Tape & Reel

**Marking Information**

SOT-223 Series

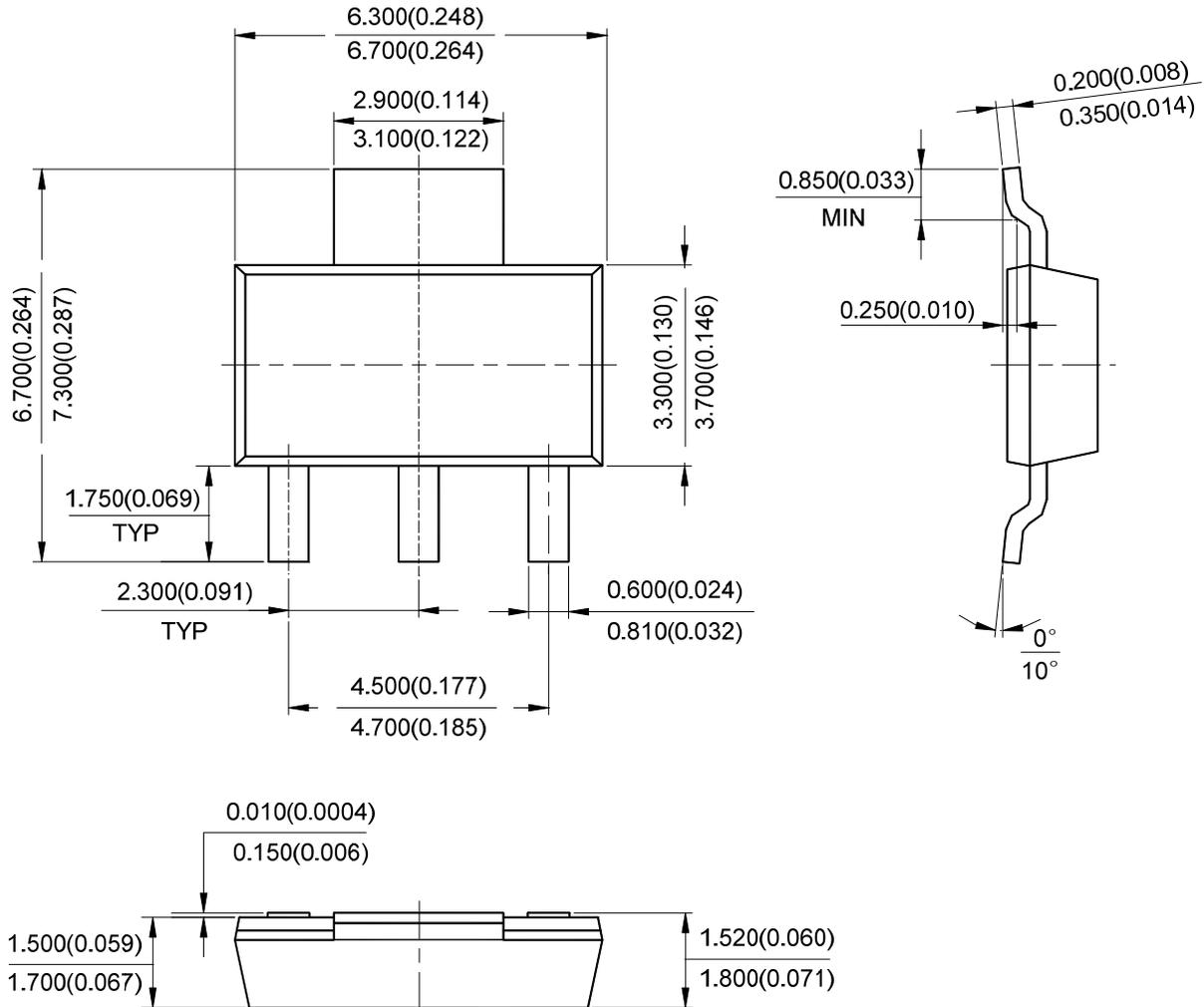
(Top View)



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: 7<sup>th</sup> and 8<sup>th</sup> Digits of Batch Number

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

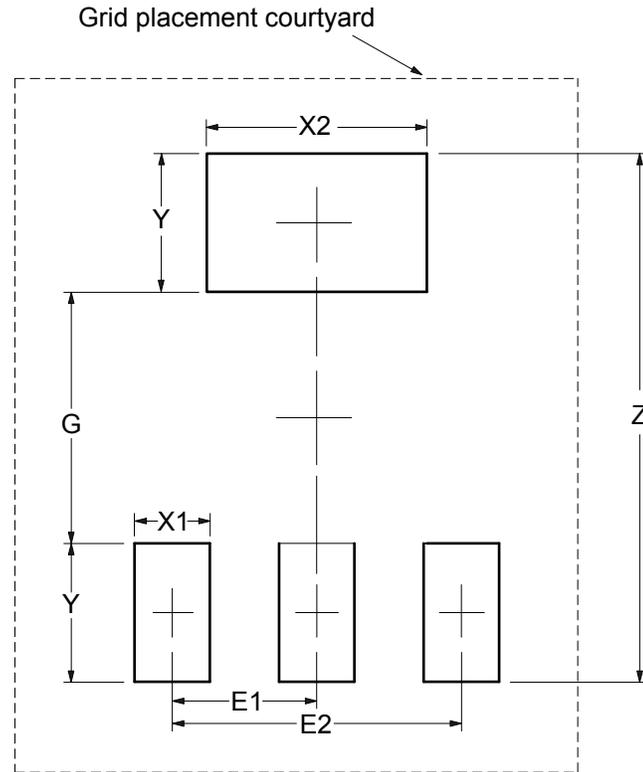
(1) Package Type: SOT-223



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**Suggested Pad Layout**

(1) Package Type: SOT-223



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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[AZ1117EH-2.5TRG1](#) [AZ1117EH-3.3TRG1](#)