

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****General Description**

The AZ1085 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 3A of load current.

The series features on-chip thermal shutdown. It also includes a bandgap reference and a current limiting circuit.

The AZ1085 is available in 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V and adjustable versions. The fixed versions integrate the adjust resistors. The adjustable version can set the output voltage with two external resistors.

The AZ1085 series is available in standard packages of TO-263-2L, TO-263-3L, TO-220 and TO-252.

**Features**

- Low Dropout Voltage: Typical 1.3V at 3A
- Current Limiting and Thermal Protection
- Output Current: 3A
- Current Limit: 4.5A
- Operating Junction Temperature: 0 to 125°C
- Line Regulation: 0.015% (Typical)
- Load Regulation: 0.1% (Typical)

**Applications**

- High Efficiency Linear Regulators
- Battery Charger
- Post Regulation for Switching Supplies
- Microprocessor Supply
- Mother Board Power Supplies
- DVD - Video Player
- Telecom Equipment
- Set Top boxes and Web Boxes Modules' Supply

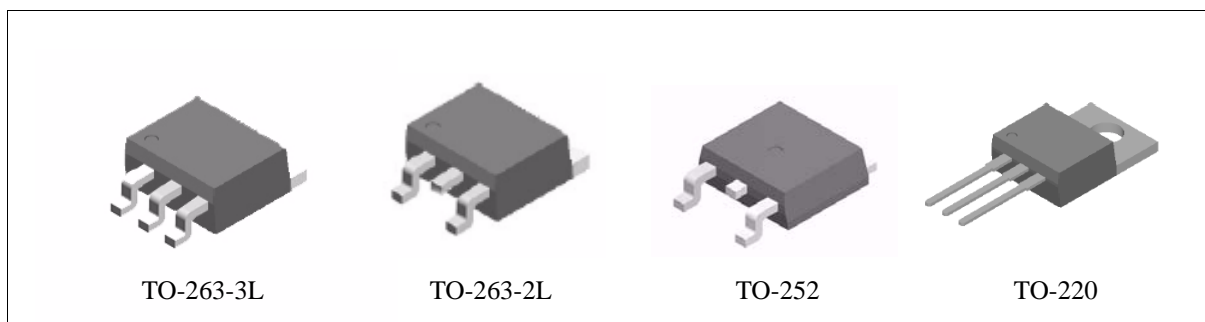


Figure 1. Package Types of AZ1085

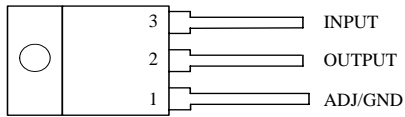


# 3A LOW DROPOUT LINEAR REGULATOR

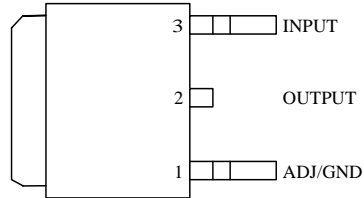
# AZ1085

## Pin Configuration

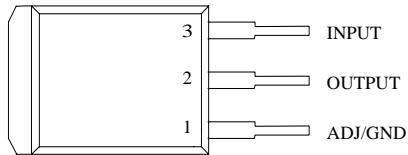
T Package  
(TO-220)



D Package  
(TO-252)



S Package  
(TO-263-3L)



S Package  
(TO-263-2L)

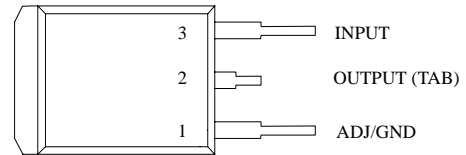


Figure 2. Pin Configuration of AZ1085 (Top View)

## Functional Block Diagram

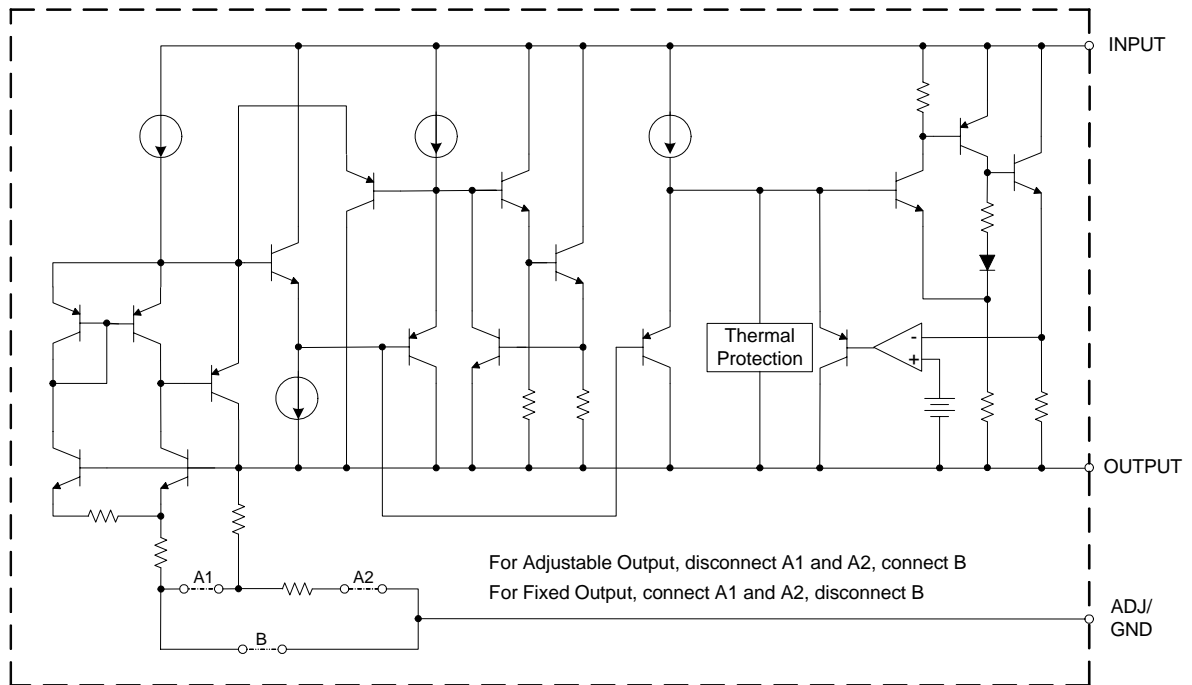


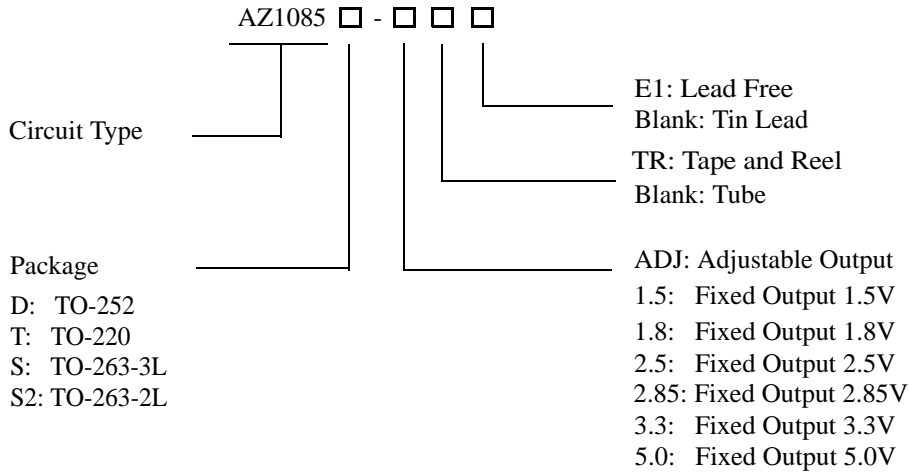
Figure 3. Functional Block Diagram of AZ1085



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Ordering Information**



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-252	0 to 125°C	AZ1085D-ADJ	AZ1085D-ADJE1	AZ1085D-ADJ	AZ1085D-ADJE1	Tube
		AZ1085D-ADJTR	AZ1085D-ADJTRE1	AZ1085D-ADJ	AZ1085D-ADJE1	Tape & Reel
		AZ1085D-1.5	AZ1085D-1.5E1	AZ1085D-1.5	AZ1085D-1.5E1	Tube
		AZ1085D-1.5TR	AZ1085D-1.5TRE1	AZ1085D-1.5	AZ1085D-1.5E1	Tape & Reel
		AZ1085D-1.8	AZ1085D-1.8E1	AZ1085D-1.8	AZ1085D-1.8E1	Tube
		AZ1085D-1.8TR	AZ1085D-1.8TRE1	AZ1085D-1.8	AZ1085D-1.8E1	Tape & Reel
		AZ1085D-2.5	AZ1085D-2.5E1	AZ1085D-2.5	AZ1085D-2.5E1	Tube
		AZ1085D-2.5TR	AZ1085D-2.5TRE1	AZ1085D-2.5	AZ1085D-2.5E1	Tape & Reel
		AZ1085D-2.85	AZ1085D-2.85E1	AZ1085D-2.85	AZ1085D-2.85E1	Tube
		AZ1085D-2.85TR	AZ1085D-2.85TRE1	AZ1085D-2.85	AZ1085D-2.85E1	Tape & Reel
		AZ1085D-3.3	AZ1085D-3.3E1	AZ1085D-3.3	AZ1085D-3.3E1	Tube
		AZ1085D-3.3TR	AZ1085D-3.3TRE1	AZ1085D-3.3	AZ1085D-3.3E1	Tape & Reel
		AZ1085D-5.0	AZ1085D-5.0E1	AZ1085D-5.0	AZ1085D-5.0E1	Tube
		AZ1085D-5.0TR	AZ1085D-5.0TRE1	AZ1085D-5.0	AZ1085D-5.0E1	Tape & Reel
TO-220	0 to 125°C	AZ1085T-ADJ	AZ1085T-ADJE1	AZ1085T-ADJ	AZ1085T-ADJE1	Tube
		AZ1085T-1.5	AZ1085T-1.5E1	AZ1085T-1.5	AZ1085T-1.5E1	Tube
		AZ1085T-1.8	AZ1085T-1.8E1	AZ1085T-1.8	AZ1085T-1.8E1	Tube
		AZ1085T-2.5	AZ1085T-2.5E1	AZ1085T-2.5	AZ1085T-2.5E1	Tube
		AZ1085T-2.85	AZ1085T-2.85E1	AZ1085T-2.85	AZ1085T-2.85E1	Tube
		AZ1085T-3.3	AZ1085T-3.3E1	AZ1085T-3.3	AZ1085T-3.3E1	Tube
		AZ1085T-5.0	AZ1085T-5.0E1	AZ1085T-5.0	AZ1085T-5.0E1	Tube



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Ordering Information (Continued)**

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-263-3L	0 to 125°C	AZ1085S-ADJ	AZ1085S-ADJE1	AZ1085S-ADJ	AZ1085S-ADJE1	Tube
		AZ1085S-ADJTR	AZ1085S-ADJTRE1	AZ1085S-ADJ	AZ1085S-ADJE1	Tape & Reel
		AZ1085S-1.5	AZ1085S-1.5E1	AZ1085S-1.5	AZ1085S-1.5E1	Tube
		AZ1085S-1.5TR	AZ1085S-1.5TRE1	AZ1085S-1.5	AZ1085S-1.5E1	Tape & Reel
		AZ1085S-1.8	AZ1085S-1.8E1	AZ1085S-1.8	AZ1085S-1.8E1	Tube
		AZ1085S-1.8TR	AZ1085S-1.8TRE1	AZ1085S-1.8	AZ1085S-1.8E1	Tape & Reel
		AZ1085S-2.5	AZ1085S-2.5E1	AZ1085S-2.5	AZ1085S-2.5E1	Tube
		AZ1085S-2.5TR	AZ1085S-2.5TRE1	AZ1085S-2.5	AZ1085S-2.5E1	Tape & Reel
		AZ1085S-2.85	AZ1085S-2.85E1	AZ1085S-2.85	AZ1085S-2.85E1	Tube
		AZ1085S-2.85TR	AZ1085S-2.85TRE1	AZ1085S-2.85	AZ1085S-2.85E1	Tape & Reel
		AZ1085S-3.3	AZ1085S-3.3E1	AZ1085S-3.3	AZ1085S-3.3E1	Tube
		AZ1085S-3.3TR	AZ1085S-3.3TRE1	AZ1085S-3.3	AZ1085S-3.3E1	Tape & Reel
		AZ1085S-5.0	AZ1085S-5.0E1	AZ1085S-5.0	AZ1085S-5.0E1	Tube
		AZ1085S-5.0TR	AZ1085S-5.0TRE1	AZ1085S-5.0	AZ1085S-5.0E1	Tape & Reel
TO-263-2L	0 to 125°C	AZ1085S2-ADJ	AZ1085S2-ADJE1	AZ1085S2-ADJ	AZ1085S2-ADJE1	Tube
		AZ1085S2-ADJTR	AZ1085S2-ADJTRE1	AZ1085S2-ADJ	AZ1085S2-ADJE1	Tape & Reel
		AZ1085S2-1.5	AZ1085S2-1.5E1	AZ1085S2-1.5	AZ1085S2-1.5E1	Tube
		AZ1085S2-1.5TR	AZ1085S2-1.5TRE1	AZ1085S2-1.5	AZ1085S2-1.5E1	Tape & Reel
		AZ1085S2-1.8	AZ1085S2-1.8E1	AZ1085S2-1.8	AZ1085S2-1.8E1	Tube
		AZ1085S2-1.8TR	AZ1085S2-1.8TRE1	AZ1085S2-1.8	AZ1085S2-1.8E1	Tape & Reel
		AZ1085S2-2.5	AZ1085S2-2.5E1	AZ1085S2-2.5	AZ1085S2-2.5E1	Tube
		AZ1085S2-2.5TR	AZ1085S2-2.5TRE1	AZ1085S2-2.5	AZ1085S2-2.5E1	Tape & Reel
		AZ1085S2-2.85	AZ1085S2-2.85E1	AZ1085S2-2.85	AZ1085S2-2.85E1	Tube
		AZ1085S2-2.85TR	AZ1085S2-2.85TRE1	AZ1085S2-2.85	AZ1085S2-2.85E1	Tape & Reel
		AZ1085S2-3.3	AZ1085S2-3.3E1	AZ1085S2-3.3	AZ1085S2-3.3E1	Tube
		AZ1085S2-3.3TR	AZ1085S2-3.3TRE1	AZ1085S2-3.3	AZ1085S2-3.3E1	Tape & Reel
		AZ1085S2-5.0	AZ1085S2-5.0E1	AZ1085S2-5.0	AZ1085S2-5.0E1	Tube
		AZ1085S2-5.0TR	AZ1085S2-5.0TRE1	AZ1085S2-5.0	AZ1085S2-5.0E1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Min	Max	Unit
Operating Junction Temperature	$T_J$		150	$^{\circ}\text{C}$
Storage Temperature	$T_S$	-65	150	$^{\circ}\text{C}$
Lead Temperature (Soldering, 10 sec.)	$T_{\text{LEAD}}$		300	$^{\circ}\text{C}$
ESD (Human Body Model)	ESD		2000	V

Note 1: 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**

Parameter	Symbol	Min	Max	Unit
Input Voltage	$V_{\text{IN}}$		12	V
Operating Junction Temperature Range	$T_J$	0	125	$^{\circ}\text{C}$



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Electrical Characteristics**

Typicals and limits appearing in normal type apply for  $T_J = 25^\circ\text{C}$ . Limits appearing in **Boldface** type apply over the entire operating junction temperature range 0 to  $125^\circ\text{C}$ .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	$V_{REF}$	AZ1085-ADJ, $I_{OUT}=10\text{mA}$ , $V_{IN} - V_{OUT} = 3\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $1.5\text{V} \leq V_{IN} - V_{OUT} \leq 5\text{V}$	1.238 <b>1.225</b>	1.250 <b>1.250</b>	1.262 <b>1.275</b>	V
Output Voltage	$V_{OUT}$	AZ1085-1.5, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 4.5\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $3.1\text{V} \leq V_{IN} \leq 6\text{V}$	1.485 <b>1.47</b>	1.5 <b>1.5</b>	1.515 <b>1.53</b>	V
		AZ1085-1.8, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 4.8\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $3.4\text{V} \leq V_{IN} \leq 7\text{V}$	1.782 <b>1.764</b>	1.8 <b>1.8</b>	1.818 <b>1.836</b>	V
		AZ1085-2.5, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 5.5\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $4.1\text{V} \leq V_{IN} \leq 7\text{V}$	2.475 <b>2.45</b>	2.5 <b>2.5</b>	2.525 <b>2.55</b>	V
		AZ1085-2.85, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 6\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $4.5\text{V} \leq V_{IN} \leq 8\text{V}$	2.821 <b>2.793</b>	2.85 <b>2.85</b>	2.879 <b>2.907</b>	V
		AZ1085-3.3, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 6.3\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $4.9\text{V} \leq V_{IN} \leq 8\text{V}$	3.267 <b>3.234</b>	3.3 <b>3.3</b>	3.333 <b>3.366</b>	V
		AZ1085-5.0, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 8\text{V}$ , $T_J = 25^\circ\text{C}$ , $10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $6.6\text{V} \leq V_{IN} \leq 10\text{V}$	4.95 <b>4.9</b>	5 <b>5</b>	5.05 <b>5.1</b>	V
Line Regulation	$\Delta V_{OUT}$	AZ1085-ADJ, $I_{OUT} = 10\text{mA}$ , $2.85\text{V} \leq V_{IN} \leq 10\text{V}$		0.015 <b>0.035</b>	0.2 <b>0.2</b>	%
		AZ1085-1.5, $I_{OUT} = 10\text{mA}$ , $3.1\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	6 <b>6</b>	mV
		AZ1085-1.8, $I_{OUT} = 10\text{mA}$ , $3.4\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	6 <b>6</b>	mV
		AZ1085-2.5, $I_{OUT} = 10\text{mA}$ , $4.1\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	6 <b>6</b>	mV
		AZ1085-2.85, $I_{OUT} = 10\text{mA}$ , $4.5\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	6 <b>6</b>	mV
		AZ1085-3.3, $I_{OUT} = 10\text{mA}$ , $4.9\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	6 <b>6</b>	mV



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Electrical Characteristics (Continued)**

Typicals and limits appearing in normal type apply for  $T_J = 25^\circ\text{C}$ . Limits appearing in **Boldface** type apply over the entire operating junction temperature range 0 to  $125^\circ\text{C}$ .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
		AZ1085-5.0, $I_{OUT} = 10\text{mA}$ , $6.6\text{V} \leq V_{IN} \leq 10\text{V}$		0.5 <b>1</b>	10 <b>10</b>	mV
Load Regulation	$\Delta V_{OUT}$	AZ1085-ADJ, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		0.1 <b>0.2</b>	0.3 <b>0.4</b>	%
		AZ1085-1.5, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		3 <b>7</b>	15 <b>20</b>	mV
		AZ1085-1.8, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		3 <b>7</b>	15 <b>20</b>	mV
		AZ1085-2.5, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		3 <b>7</b>	15 <b>20</b>	mV
		AZ1085-2.85, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		3 <b>7</b>	15 <b>20</b>	mV
		AZ1085-3.3, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		3 <b>7</b>	15 <b>20</b>	mV
		AZ1085-5.0, $0\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$		5 <b>10</b>	20 <b>35</b>	mV
Dropout Voltage		$I_O = 3\text{A}$ , $\Delta V_{REF}$ , $\Delta V_{OUT} = 1\%$		1.3	1.5	V
Current Limit	$I_{LIMIT}$	$V_{IN} - V_{OUT} = 3\text{V}$ ,	3.2	4.5		A
Minimum Load Current		$V_{IN} = 10\text{V}$ (AZ1085-ADJ)		<b>3</b>	<b>10</b>	mA
Quiescent Current		$V_{IN} = 10\text{V}$ (AZ1085)		<b>5</b>	<b>10</b>	mA
Ripple Rejection		$f_{RIPPLE} = 120\text{Hz}$ , $C_{OUT} = 25\mu\text{F}$ Tantalum, $I_{OUT} = 3\text{A}$ , $V_{IN} - V_{OUT} = 3\text{V}$	<b>60</b>	<b>72</b>		dB
Adjust Pin Current		$V_{IN} = 4.25\text{V}$ , $I_{OUT} = 10\text{mA}$		55	<b>120</b>	$\mu\text{A}$
Adjust Pin Current Change		$10\text{mA} \leq I_{OUT} \leq 3\text{A}$ , $1.5\text{V} \leq V_{IN} - V_{OUT} \leq 6\text{V}$		<b>0.2</b>	<b>5</b>	$\mu\text{A}$
Long Term Stability		$T_A = 125^\circ\text{C}$ , 1000Hrs		0.5		%
Temperature Stability		$I_{OUT} = 10\text{mA}$ , $V_{IN} - V_{OUT} = 1.5\text{V}$		<b>0.5</b>		%
RMS 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	$\theta_{JC}$	TO-263 TO-220		3 3		$^\circ\text{C} / \text{W}$



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Typical Performance Characteristics**

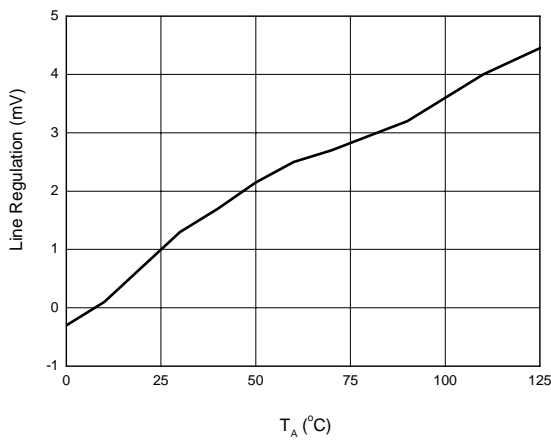


Figure 4. Line Regulation vs. Temperature

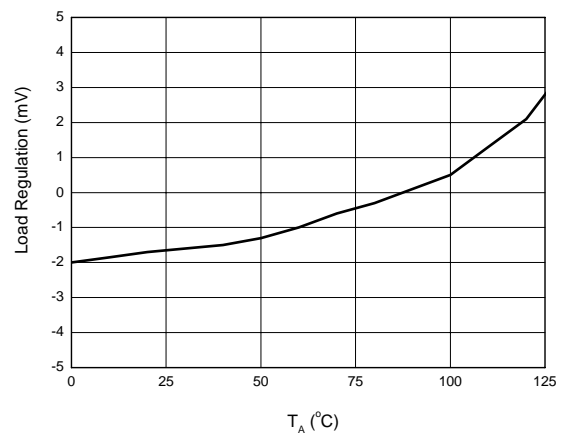


Figure 5. Load Regulation vs. Temperature

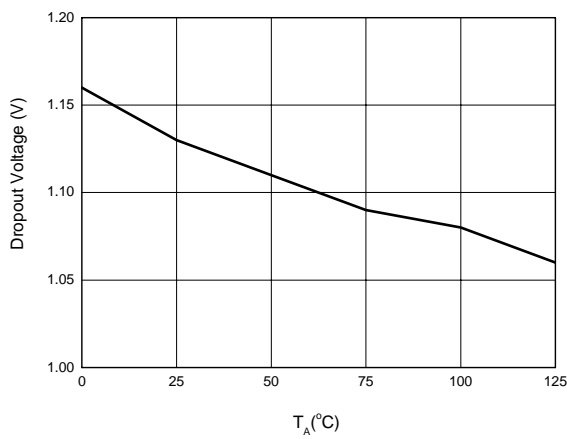


Figure 6. Dropout Voltage vs. Temperature

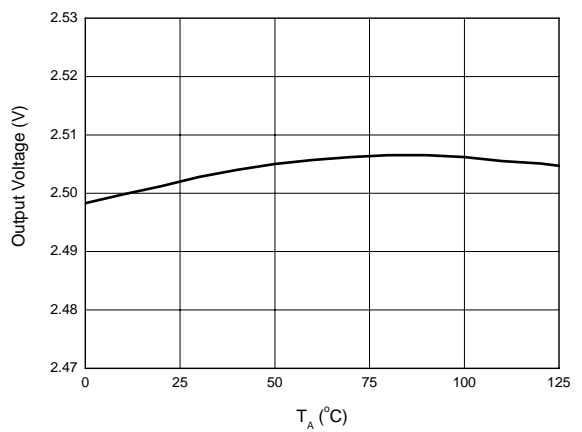


Figure 7. Output Voltage vs. Temperature





**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Typical Performance Characteristics (Continued)**

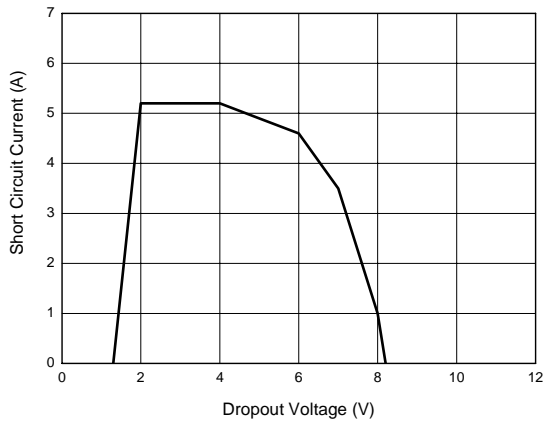


Figure 8. Short Circuit Current vs. Dropout Voltage

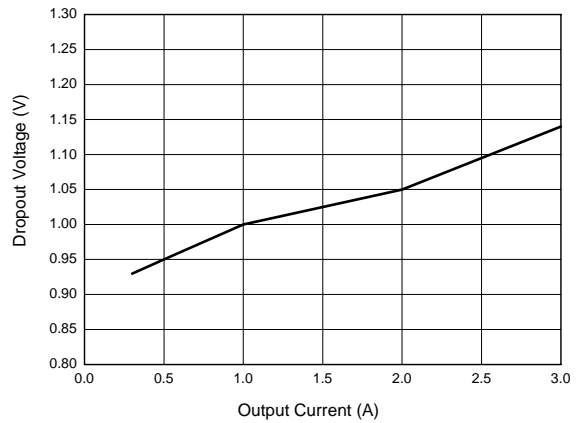


Figure 9. Dropout Voltage vs. Output Current

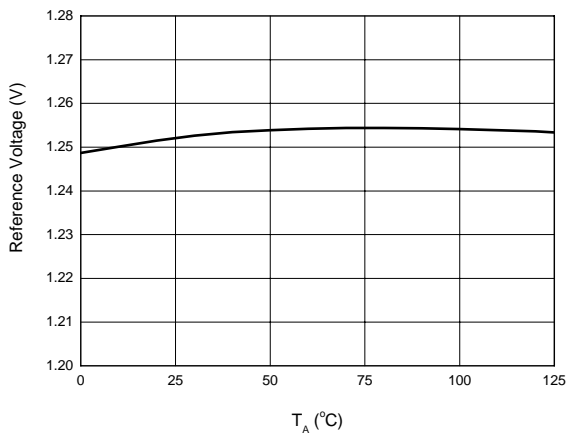


Figure 10. Reference Voltage vs. Temperature

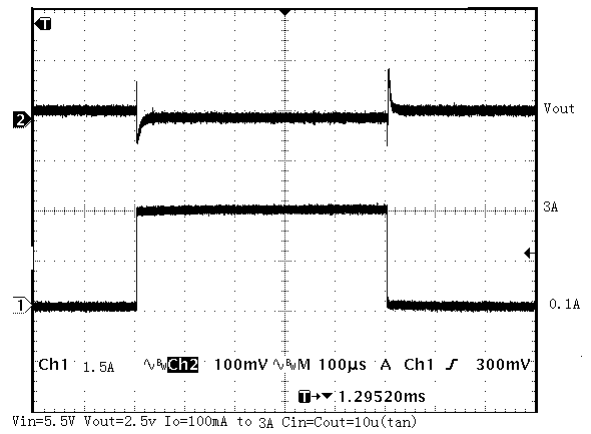


Figure 11. Load Transient Response



**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Typical Performance Characteristics (Continued)**

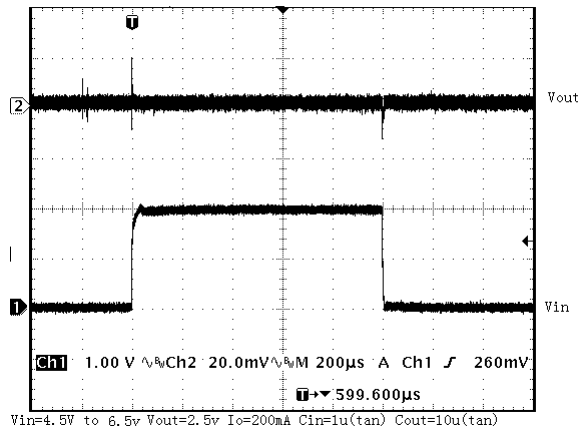


Figure 12. Line Transient Response



**3A LOW DROPOUT LINEAR REGULATOR**

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**Typical Application**

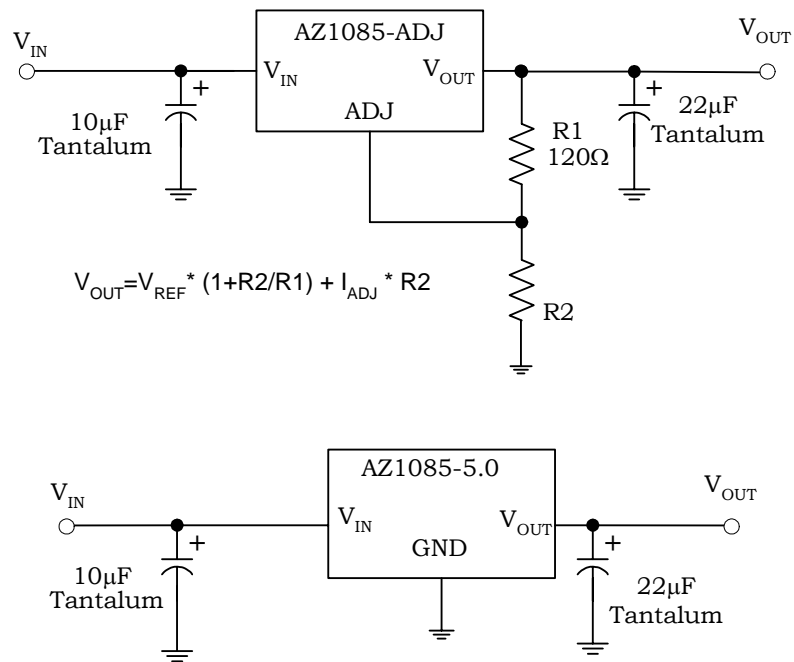


Figure 13. Typical Applications of AZ1085



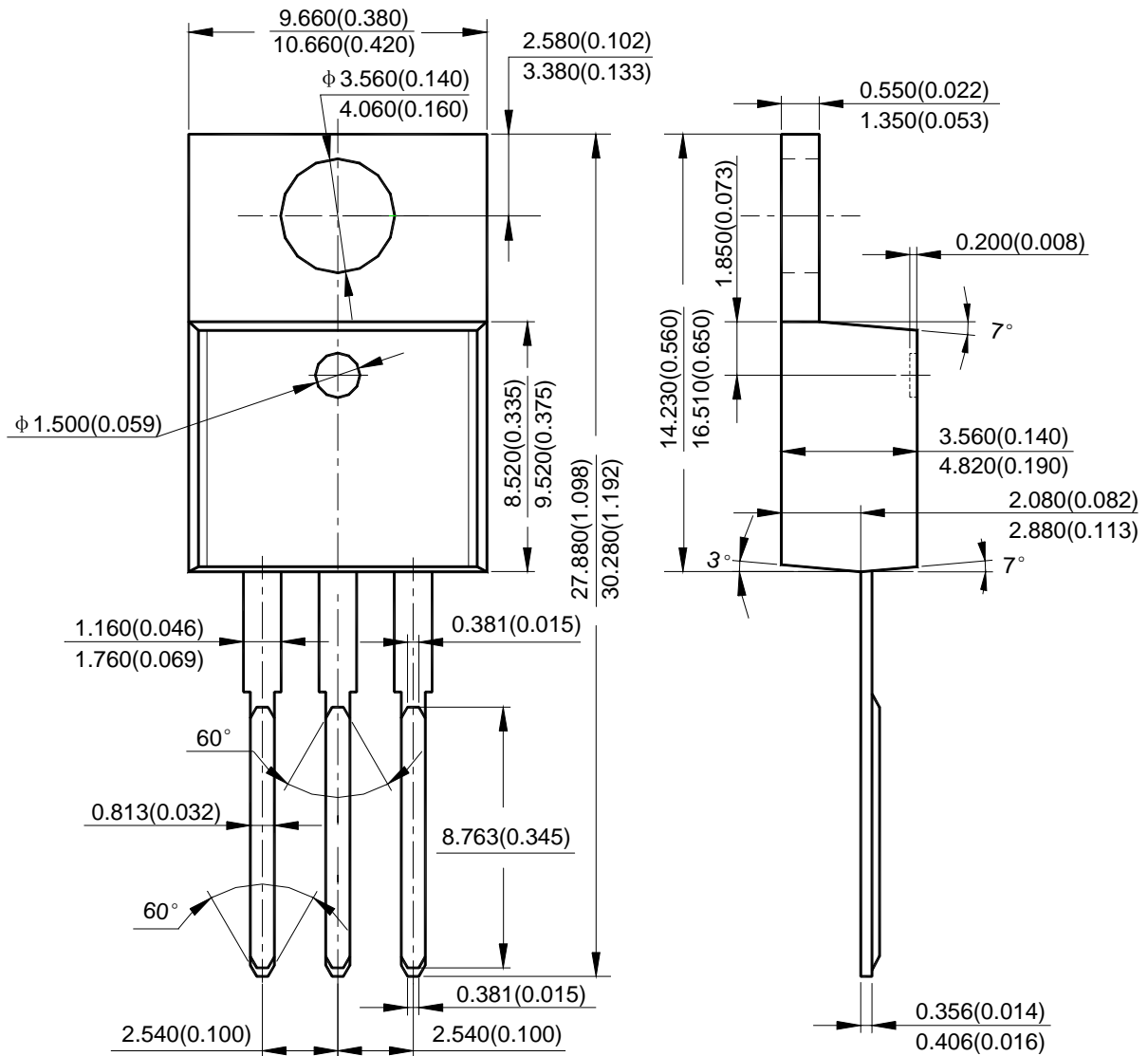
**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Mechanical Dimensions**

**TO-220**

**Unit: mm(inch)**





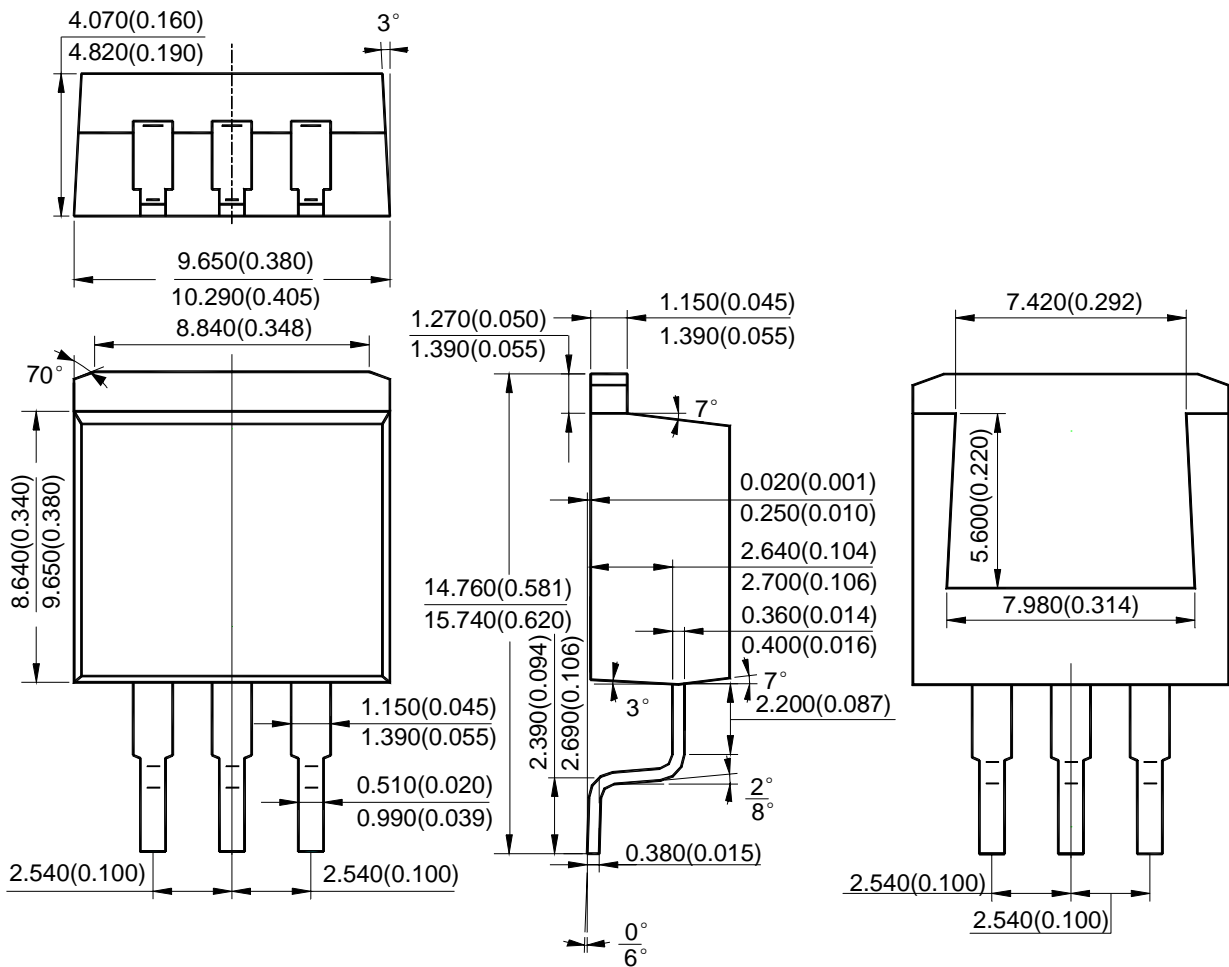
**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Mechanical Dimensions (Continued)**

**TO-263-3L**

**Unit: mm(inch)**





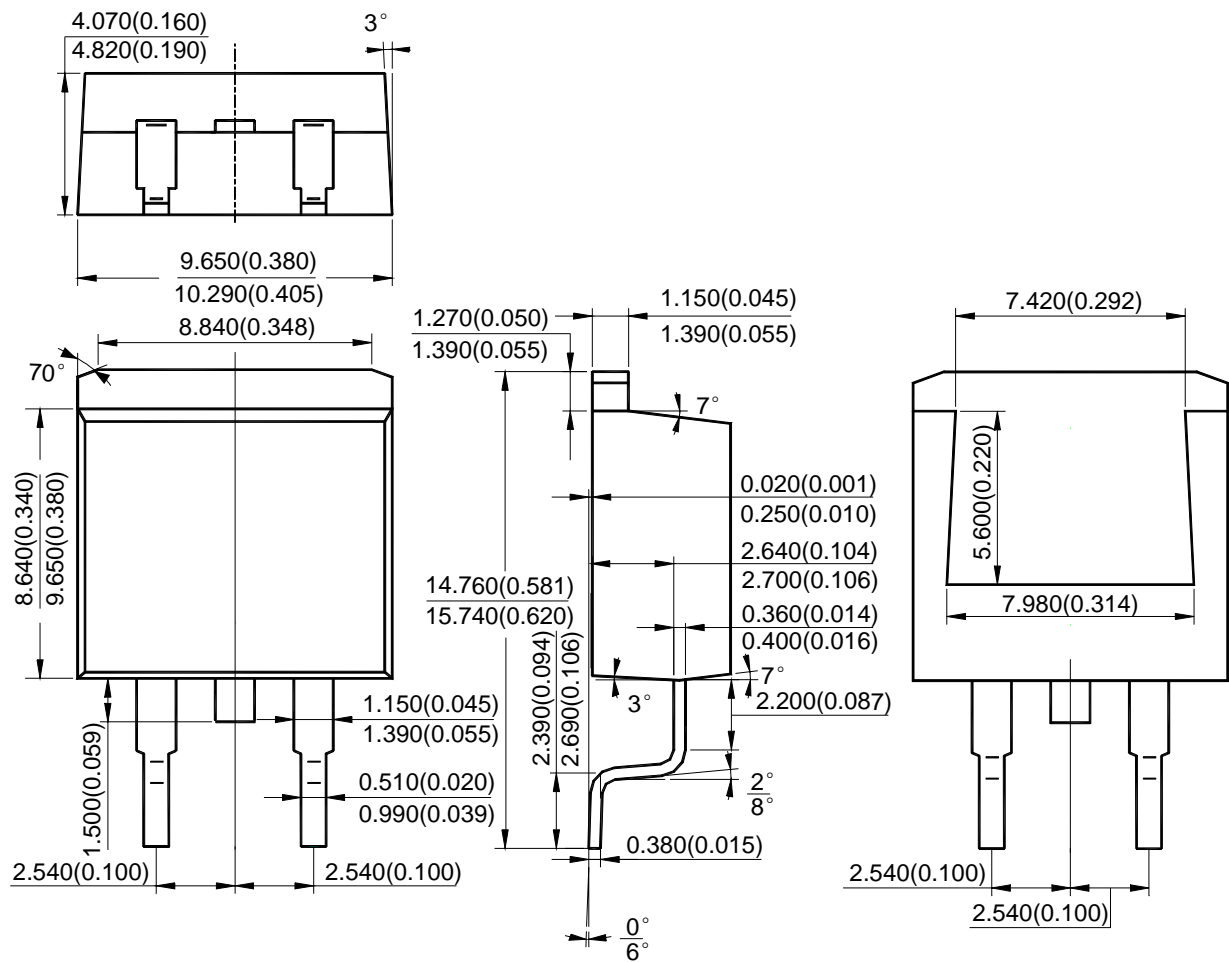
**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Mechanical Dimensions (Continued)**

**TO-263-2L**

**Unit: mm(inch)**





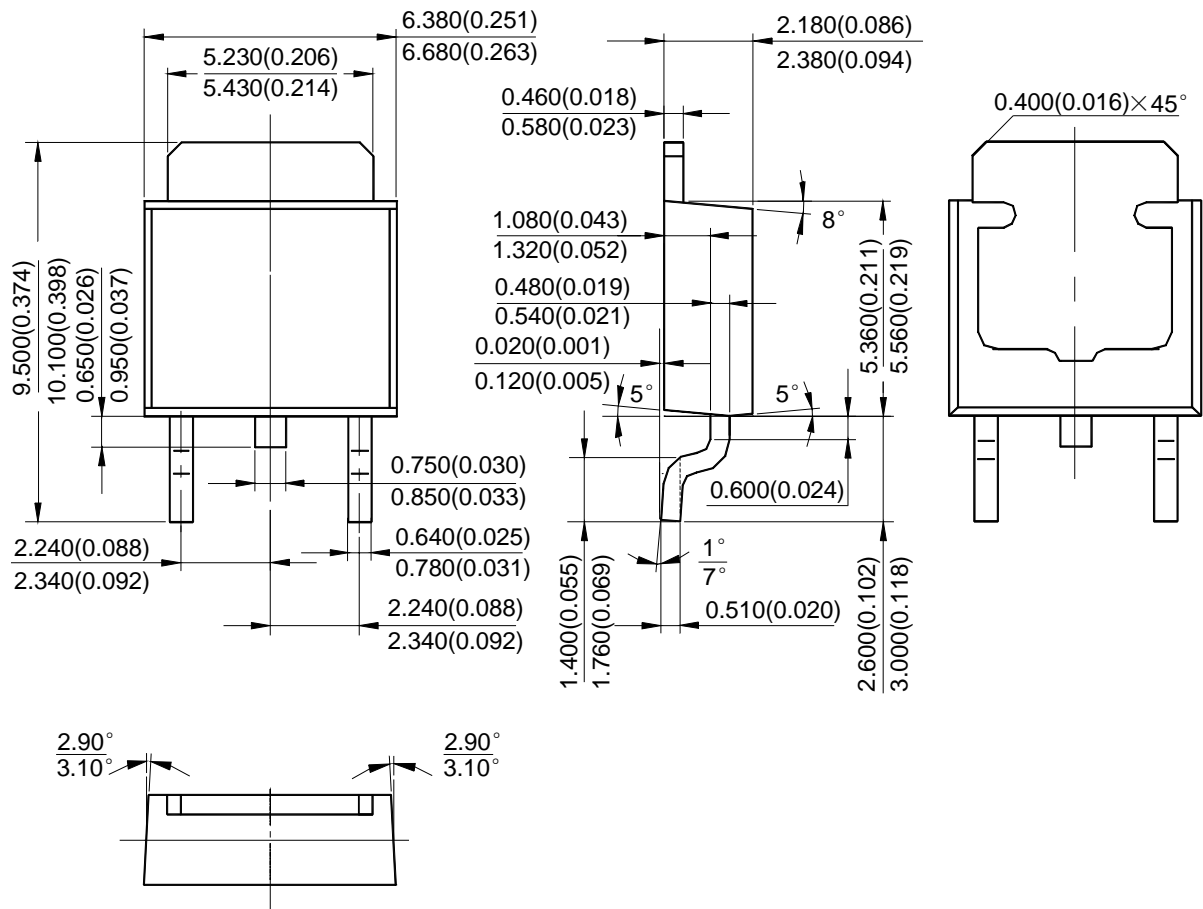
**3A LOW DROPOUT LINEAR REGULATOR**

**AZ1085**

**Mechanical Dimensions (Continued)**

**TO-252**

**Unit: mm(inch)**





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