

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-263-2, TO-263-3, TO-220-3 and TO-252-2 (1).

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

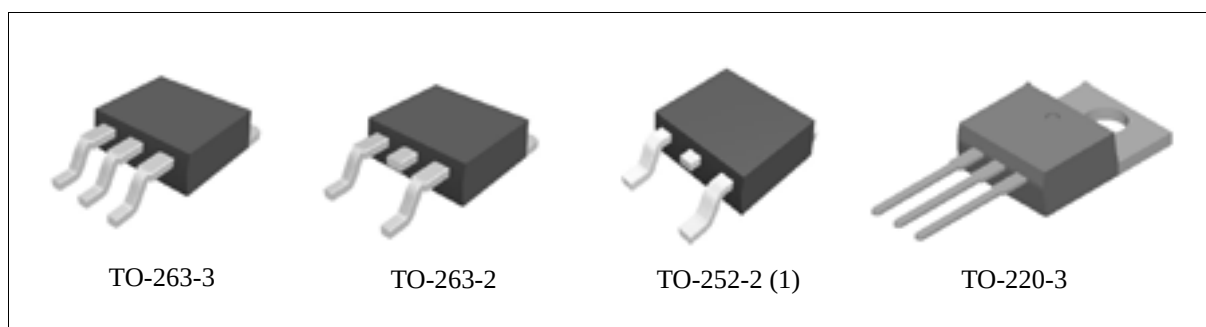


Figure 1. Package Types of AZ1085

3A LOW DROPOUT LINEAR REGULATOR

AZ1085

Pin Configuration

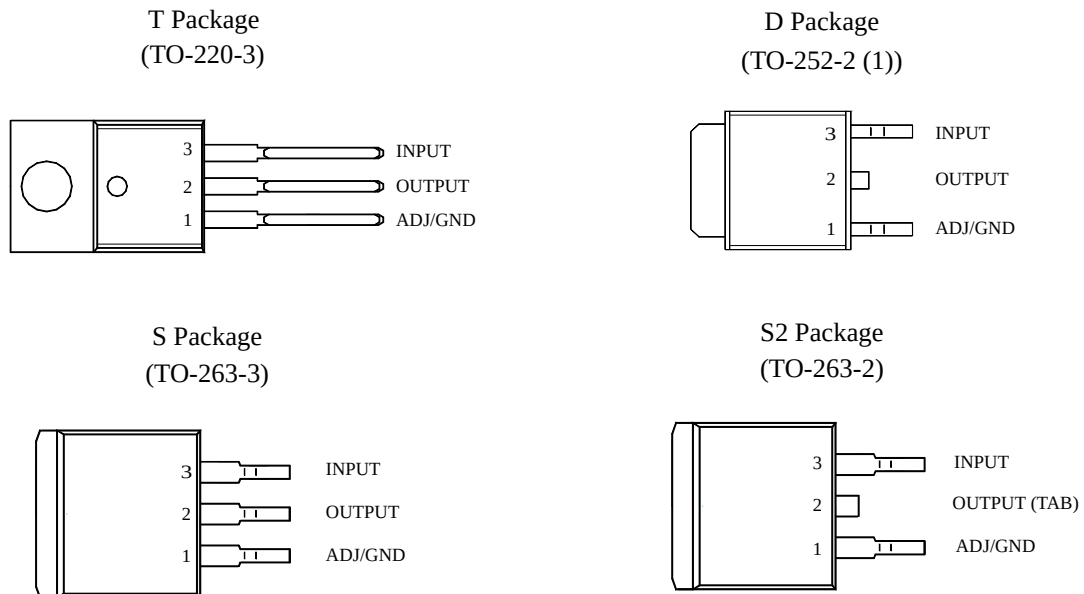


Figure 2. Pin Configuration of AZ1085 (Top View)

Functional Block Diagram

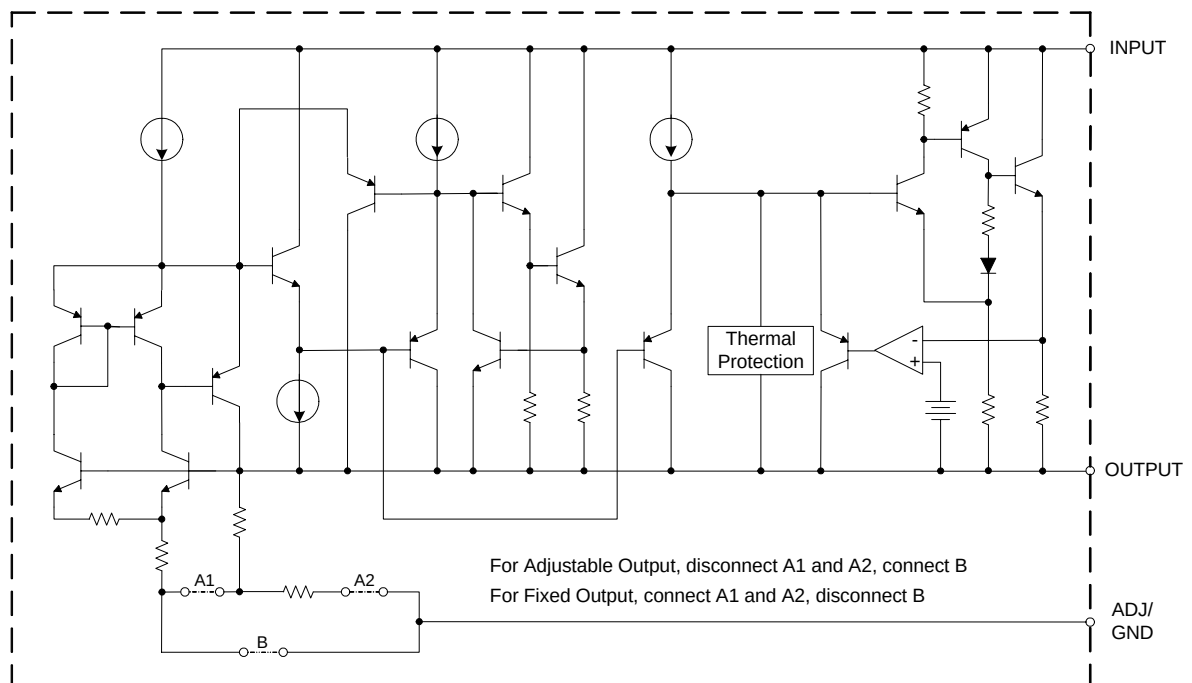


Figure 3. Functional Block Diagram of AZ1085

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-252-2 (1)	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-220-3	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-263-3	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-263-2	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	Value		Unit
Operating Junction Temperature	T_J	150		$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 to 150		$^{\circ}\text{C}$
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260		$^{\circ}\text{C}$
Thermal Resistance (Note 2)	θ_{JA}	TO-220-3	60	$^{\circ}\text{C/W}$
		TO-252-2 (1)	100	
		TO-263-3	60	
		TO-263-2	60	
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.

Note 2: Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(\text{max})}$, the junction-to-ambient thermal resistance, θ_{JA} , and the ambient temperature, T_A . The maximum allowable power dissipation at any ambient temperature is calculated using: $P_{D(\text{max})} = (T_{J(\text{max})} - T_A) / \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{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°C .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}	AZ1085-ADJ, $I_{\text{OUT}}=10\text{mA}$, $V_{\text{IN}}-V_{\text{OUT}}=3\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $1.5\text{V} \leq V_{\text{IN}}-V_{\text{OUT}} \leq 5\text{V}$	1.238 1.225	1.250 1.250	1.262 1.275	V
Output Voltage	V_{OUT}	AZ1085-1.5, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=4.5\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $3.0\text{V} \leq V_{\text{IN}} \leq 6\text{V}$	1.485 1.47	1.5 1.5	1.515 1.53	V
		AZ1085-1.8, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=4.8\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $3.3\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	1.782 1.764	1.8 1.8	1.818 1.836	V
		AZ1085-2.5, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=5.5\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $4.0\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	2.475 2.45	2.5 2.5	2.525 2.55	V
		AZ1085-2.85, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=6\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $4.4\text{V} \leq V_{\text{IN}} \leq 8\text{V}$	2.821 2.793	2.85 2.85	2.879 2.907	V
		AZ1085-3.3, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=6.3\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $4.8\text{V} \leq V_{\text{IN}} \leq 8\text{V}$	3.267 3.234	3.3 3.3	3.333 3.366	V
		AZ1085-5.0, $I_{\text{OUT}}=0\text{mA}$, $V_{\text{IN}}=8\text{V}$, $T_J=25^\circ\text{C}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $6.5\text{V} \leq V_{\text{IN}} \leq 10\text{V}$	4.95 4.9	5 5	5.05 5.1	V
Line Regulation	ΔV_{OUT}	AZ1085-ADJ, $I_{\text{OUT}}=10\text{mA}$, $2.85\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.015 0.035	0.2 0.2	%
		AZ1085-1.5, $I_{\text{OUT}}=10\text{mA}$, $3.0\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	6 6	mV
		AZ1085-1.8, $I_{\text{OUT}}=10\text{mA}$, $3.3\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	6 6	mV
		AZ1085-2.5, $I_{\text{OUT}}=10\text{mA}$, $4.0\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	6 6	mV
		AZ1085-2.85, $I_{\text{OUT}}=10\text{mA}$, $4.4\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	6 6	mV
		AZ1085-3.3, $I_{\text{OUT}}=10\text{mA}$, $4.8\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	6 6	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°C .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Line Regulation	ΔV_{OUT}	AZ1085-5.0, $I_{\text{OUT}}=10\text{mA}$, $6.5\text{V} \leq V_{\text{IN}} \leq 10\text{V}$		0.5 1	10 10	mV
Load Regulation	ΔV_{OUT}	AZ1085-ADJ, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		0.1 0.2	0.3 0.4	%
		AZ1085-1.5, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		3 7	15 20	mV
		AZ1085-1.8, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		3 7	15 20	mV
		AZ1085-2.5, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		3 7	15 20	mV
		AZ1085-2.85, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		3 7	15 20	mV
		AZ1085-3.3, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		3 7	15 20	mV
		AZ1085-5.0, $0\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$		5 10	20 35	mV
Dropout Voltage	V_{DROP}	$I_{\text{OUT}}=3\text{A}$, ΔV_{REF} , $\Delta V_{\text{OUT}}=1\%$		1.3	1.5	V
Current Limit	I_{LIMIT}	$V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$	3.2	4.5		A
Minimum Load Current	I_{LOAD} (MIN)	$V_{\text{IN}}=10\text{V}$ (AZ1085-ADJ)		3	10	mA
Quiescent Current	I_{Q}	$V_{\text{IN}}=10\text{V}$ (AZ1085)		5	10	mA
Ripple Rejection	PSRR	$f_{\text{RIPPLE}}=120\text{Hz}$, $C_{\text{OUT}}=25\mu\text{F}$, $I_{\text{OUT}}=3\text{A}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$	60	72		dB
Adjust Pin Current	I_{ADJ}	$V_{\text{IN}} = 4.25\text{V}$, $I_{\text{OUT}} = 10\text{mA}$		55	120	μA
Adjust Pin Current Change	ΔI_{ADJ}	$10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $1.5\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 6\text{V}$		0.2	5	μA
Long Term Stability		$T_A = 125^{\circ}\text{C}$, 1000Hrs		0.5		%
Temperature Stability		$I_{\text{OUT}}=10\text{mA}$, $V_{\text{IN}} - V_{\text{OUT}}=1.5\text{V}$		0.5		%
RMS Noise (% of V_{OUT})		$T_A=25^{\circ}\text{C}$, $10\text{Hz} \leq f \leq 10\text{kHz}$		0.003		%

3A LOW DROPOUT LINEAR REGULATOR

AZ1085

Typical Performance Characteristics

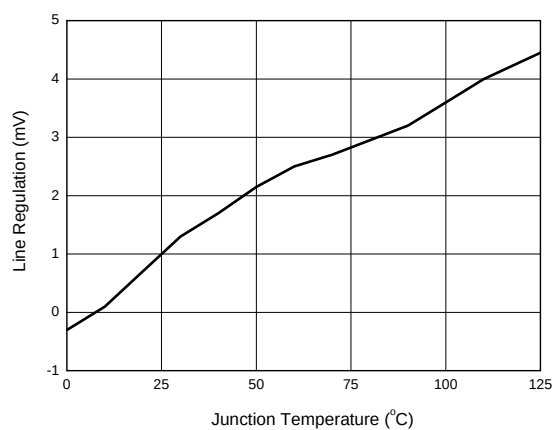


Figure 4. Line Regulation vs. Junction Temperature

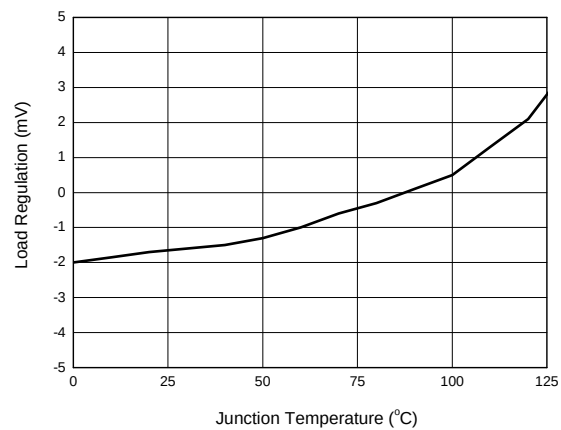


Figure 5. Load Regulation vs. Junction Temperature

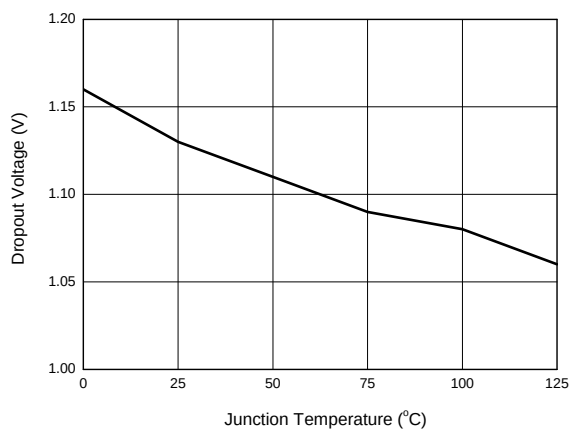


Figure 6. Dropout Voltage vs. Junction Temperature

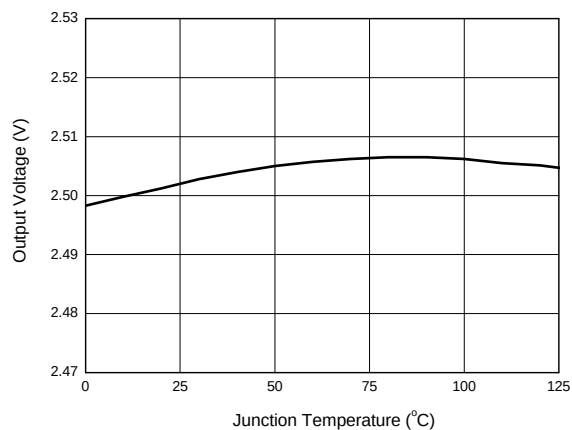


Figure 7. Output Voltage vs. Junction Temperature

3A LOW DROPOUT LINEAR REGULATOR

AZ1085

Typical Performance Characteristics (Continued)

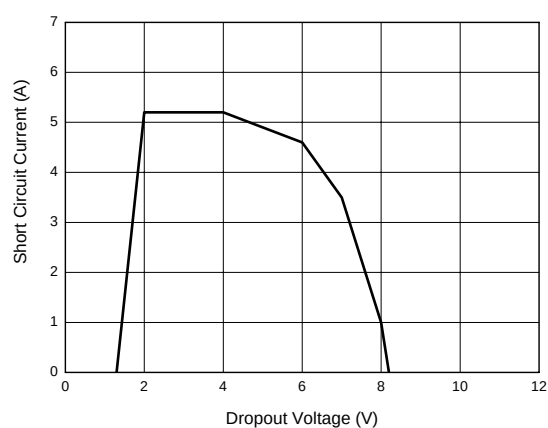


Figure 8. Short Circuit Current vs. Dropout Voltage

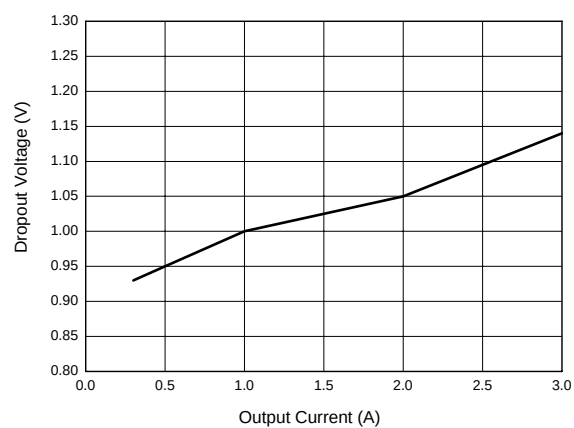


Figure 9. Dropout Voltage vs. Output Current

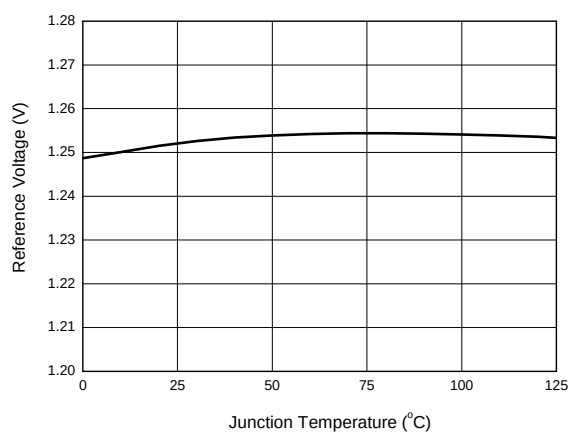


Figure10. Reference Voltage vs. Junction Temperature

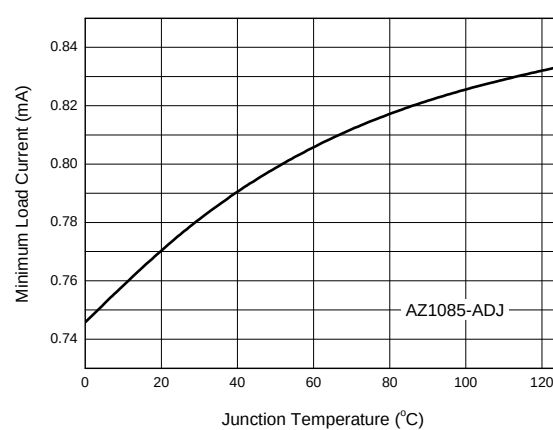


Figure11. Minimum Load Current vs. Junction Temperature

3A LOW DROPOUT LINEAR REGULATOR

AZ1085

Typical Performance Characteristics (Continued)

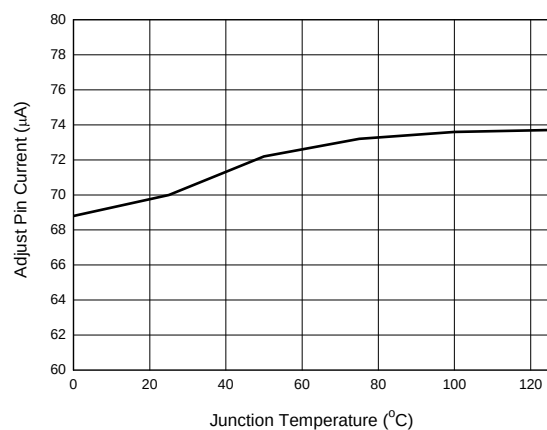


Figure12. Adjust Pin Current vs. Junction Temperature

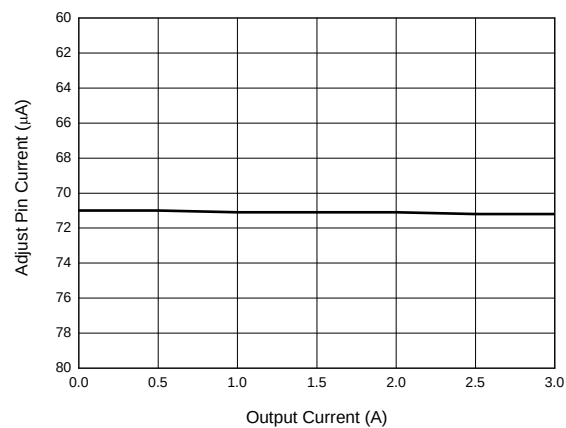


Figure13. Adjust Pin Current vs. Output Current

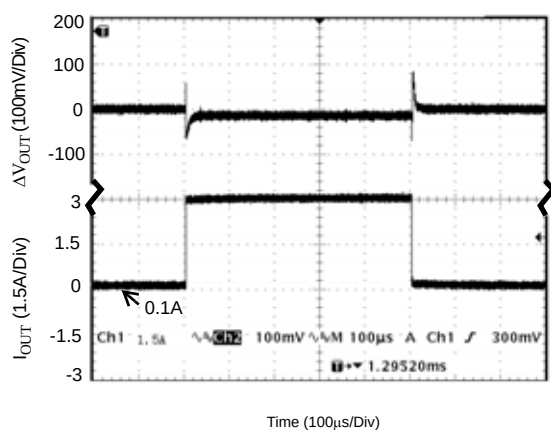


Figure 14. Load Transient Response
(Conditions: $V_{IN}=5.5V$, $V_{OUT}=2.5V$, $I_{OUT}=100mA$ to $3A$,
 $C_{IN}=C_{OUT}=10\mu F$)

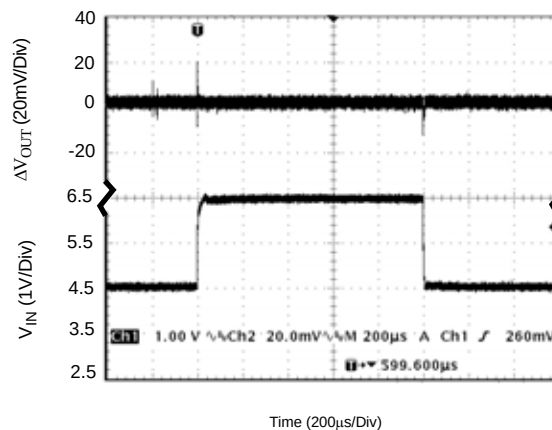


Figure 15. Line Transient Response
(Conditions: $V_{IN}=4.5V$ to $6.5V$, $V_{OUT}=2.5V$,
 $I_{OUT}=200mA$, $C_{IN}=1\mu F$, $C_{OUT}=10\mu F$)

3A LOW DROPOUT LINEAR REGULATOR

AZ1085

Typical Performance Characteristics (Continued)

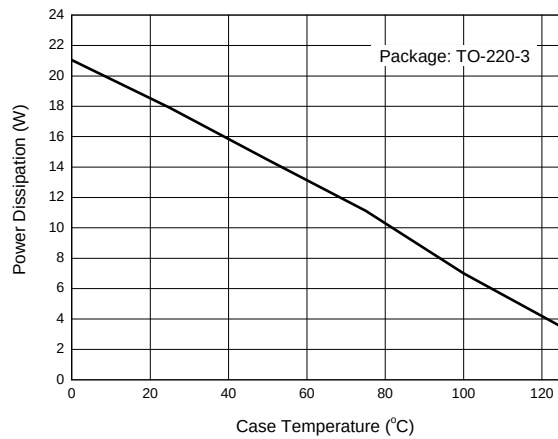


Figure16. Power Dissipation vs. Case Temperature

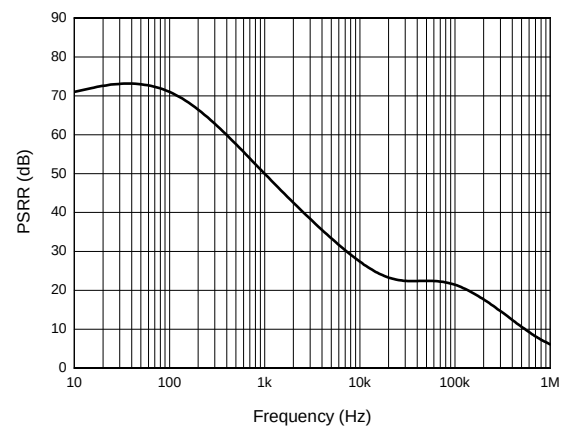


Figure17. PSRR vs. Frequency

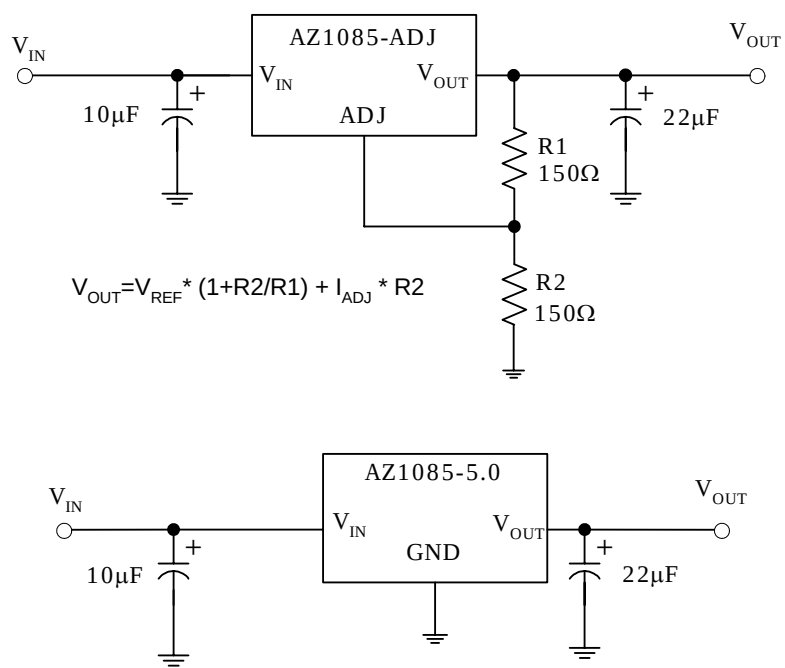
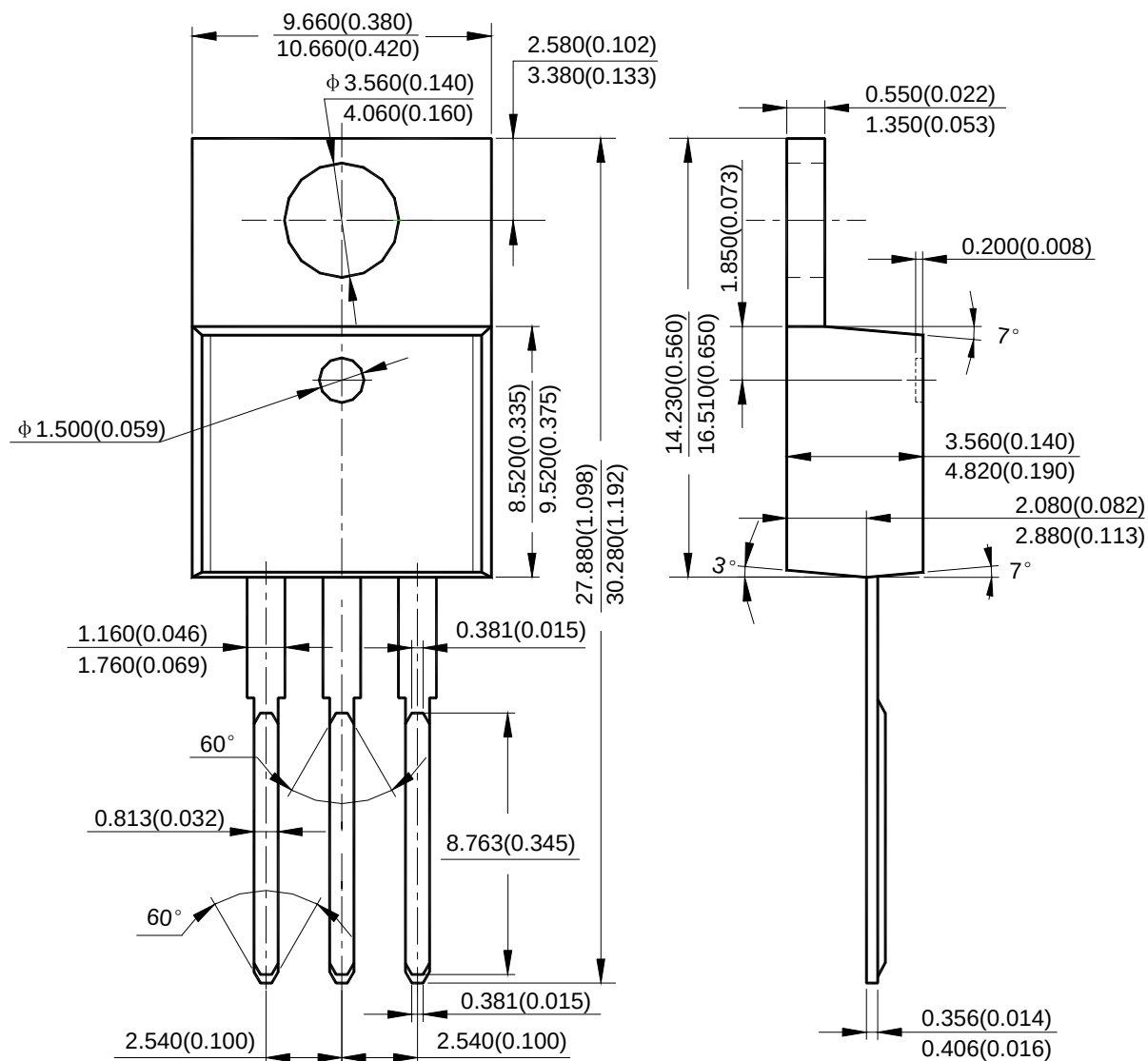
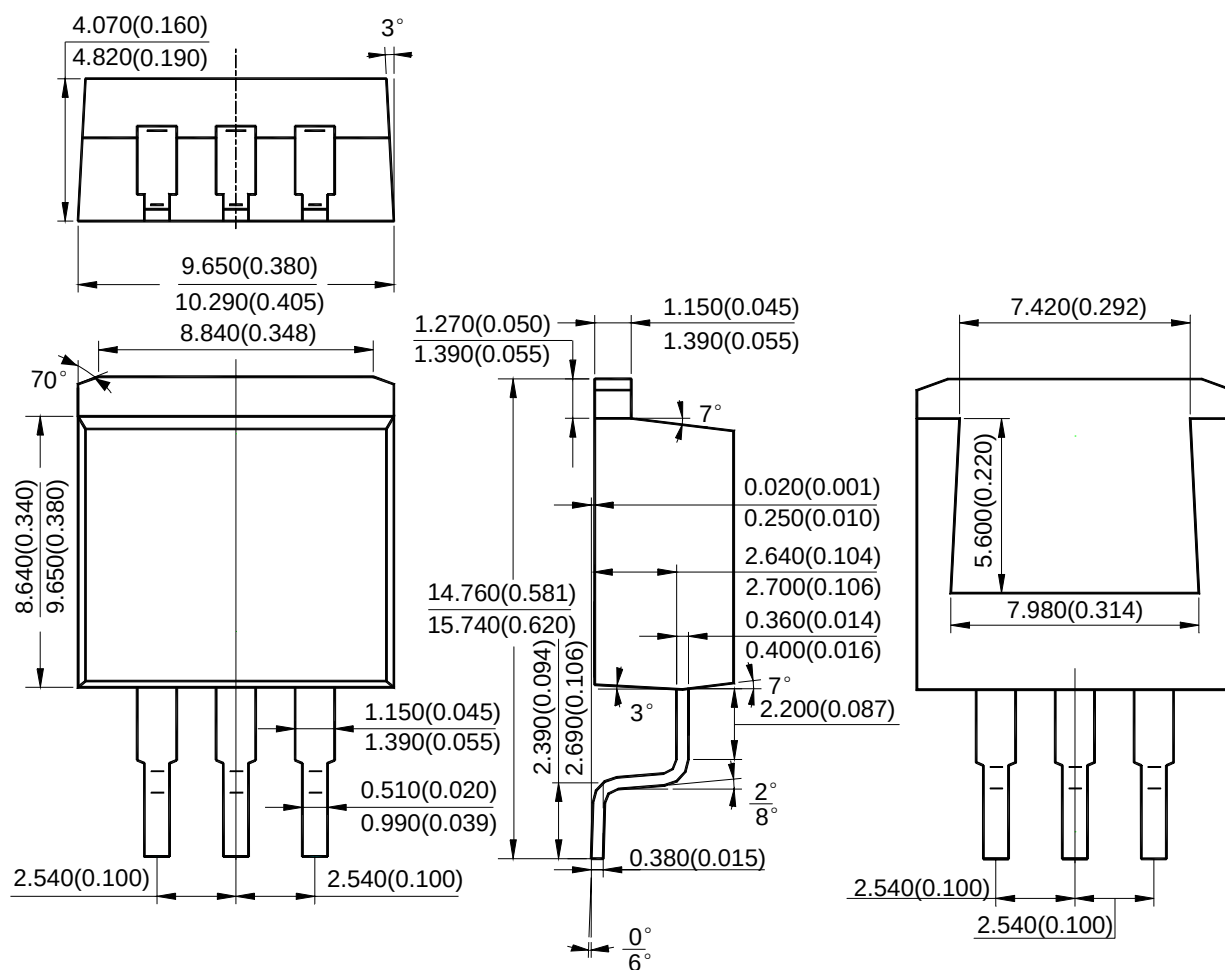
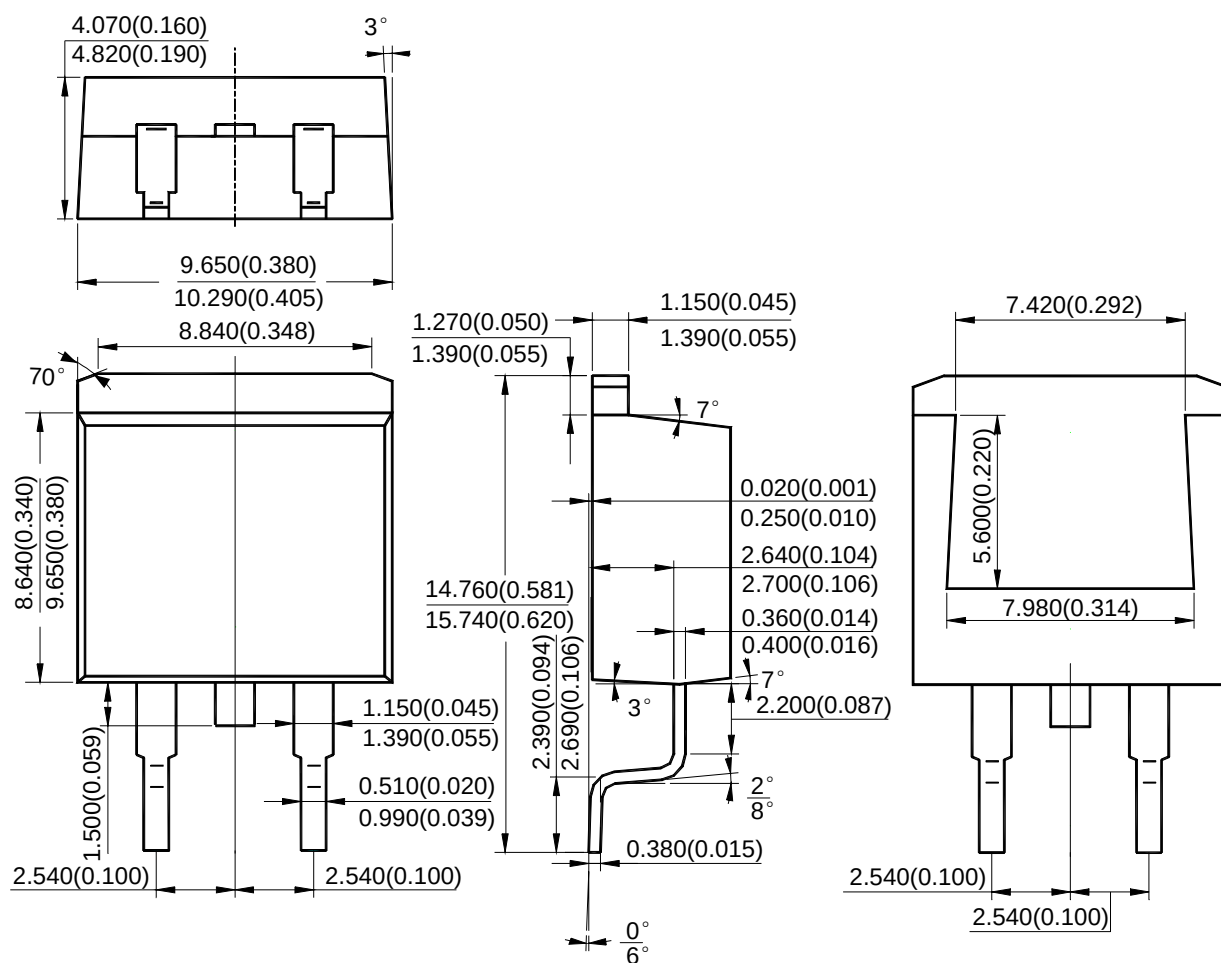
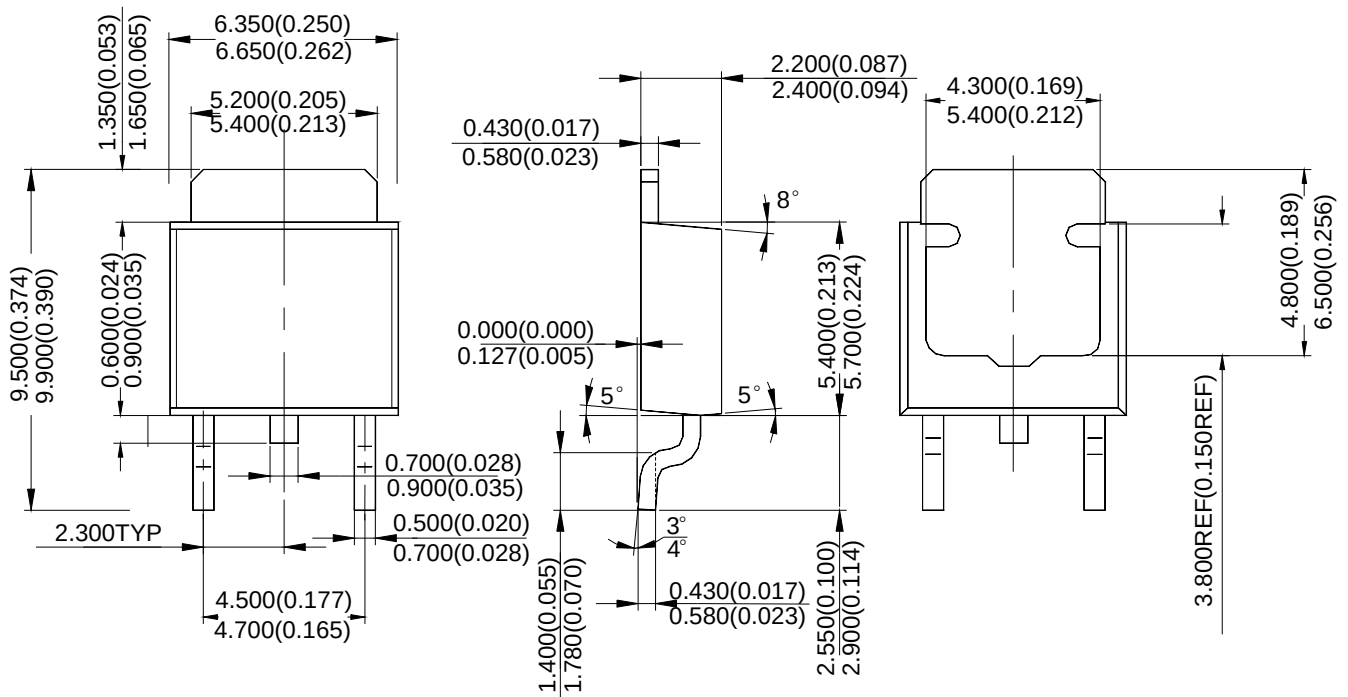
**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Typical Application**

Figure 18. Typical Applications of AZ1085

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Mechanical Dimensions****TO-220-3****Unit: mm(inch)**

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Mechanical Dimensions (Continued)****TO-263-3****Unit: mm(inch)**

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Mechanical Dimensions (Continued)****TO-263-2****Unit: mm(inch)**

**3A LOW DROPOUT LINEAR REGULATOR****AZ1085****Mechanical Dimensions (Continued)****TO-252-2 (1)****Unit: mm(inch)**



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MAIN SITE

BCD Semiconductor Manufacturing Limited

- Wafer Fab

Shanghai SIM-BCD Semiconductor Manufacturing Limited

800, Yi Shan Road, Shanghai 200233, China

Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

BCD Semiconductor Manufacturing Limited

- IC Design Group

Advanced Analog Circuits (Shanghai) Corporation

8F, Zone B, 900, Yi Shan Road, Shanghai 200233, China

Tel: +86-21-6495 9539, Fax: +86-21-6485 9673

REGIONAL SALES OFFICE

Shenzhen Office

Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd. Shenzhen Office

Advanced Analog Circuits (Shanghai) Corporation Shenzhen Office

Room E, 5F, Noble Center, No.1006, 3rd Fuzhong Road, Futian District, Shenzhen 518026, China

Tel: +86-755-8826 7951

Fax: +86-755-8826 7865

Taiwan Office

BCD Semiconductor (Taiwan) Company Limited

4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei,

Taiwan

Tel: +886-2-2656 2808

Fax: +886-2-2656 2806

USA Office

BCD Semiconductor Corporation

30920 Huntwood Ave. Hayward,

CA 94544, U.S.A

Tel : +1-510-324-2988

Fax: +1-510-324-2788