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.

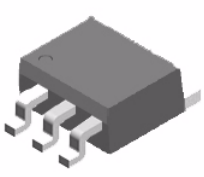
The AZ1085 series is available in standard packages of TO-263-2L, TO-263-3L, TO-220 and TO-252.

Features

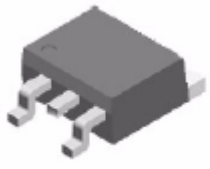
- Low Dropout Voltage: Typical 1.3V at 3A
- Current Limiting and Thermal Protection
- Output Current: 3A
- Current Limit: 4.5A
- Operating Junction Temperature: 0 to 125^{o}C
- Line Regulation: 0.015% (Typical)
- Load Regulation: 0.1% (Typical)

Applications

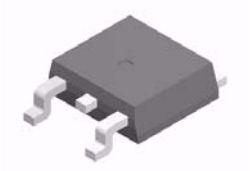
- High Efficiency Linear Regulators
- Battery Charger
- Post Regulation for Switching Supplies
- Microprocessor Supply
- Mother Board Power Supplies
- DVD - Video Player
- Telecom Equipment
- Set Top boxes and Web Boxes Modules' Supply



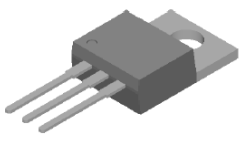
TO-263-3L



TO-263-2L



TO-252

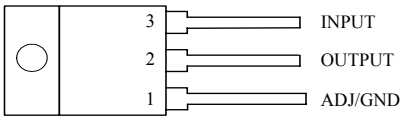


TO-220

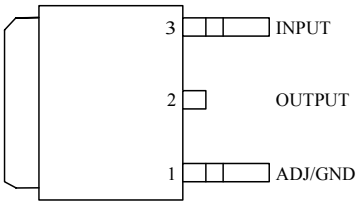
Figure 1. Package Types of AZ1085

Pin Configuration

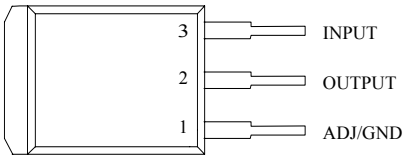
T Package
(TO-220)



D Package
(TO-252)



S Package
(TO-263-3L)



S Package
(TO-263-2L)

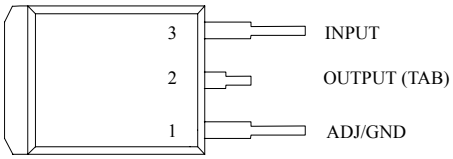


Figure 2. Pin Configuration of AZ1085 (Top View)

Functional Block Diagram

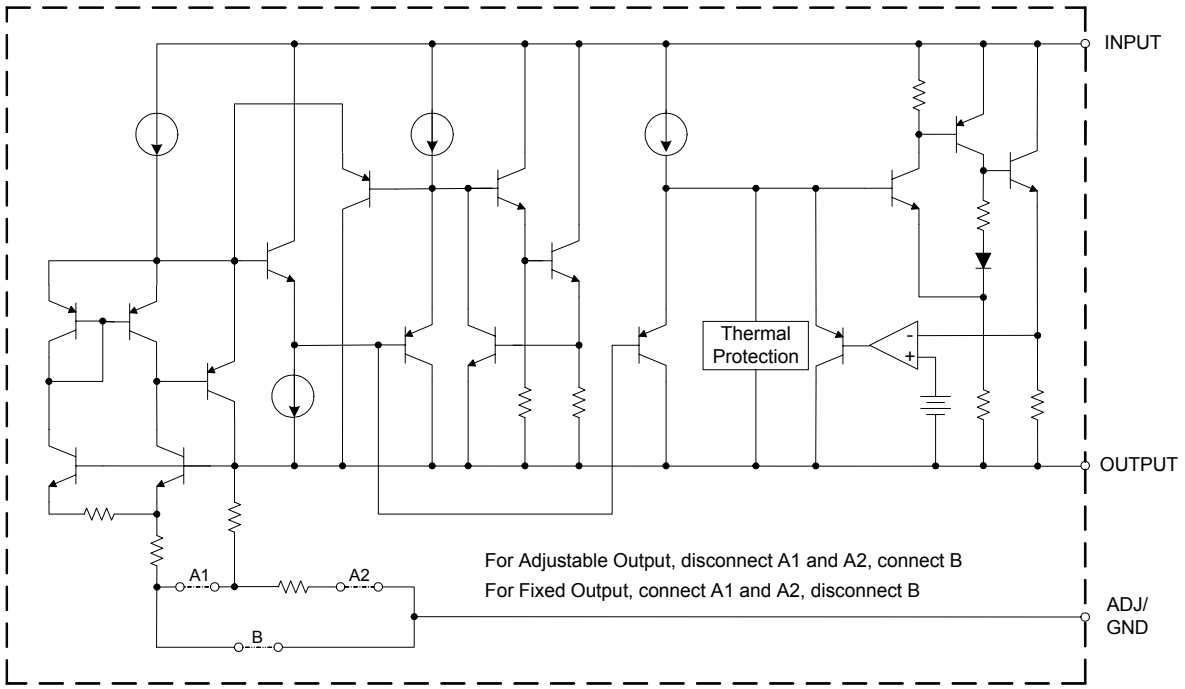
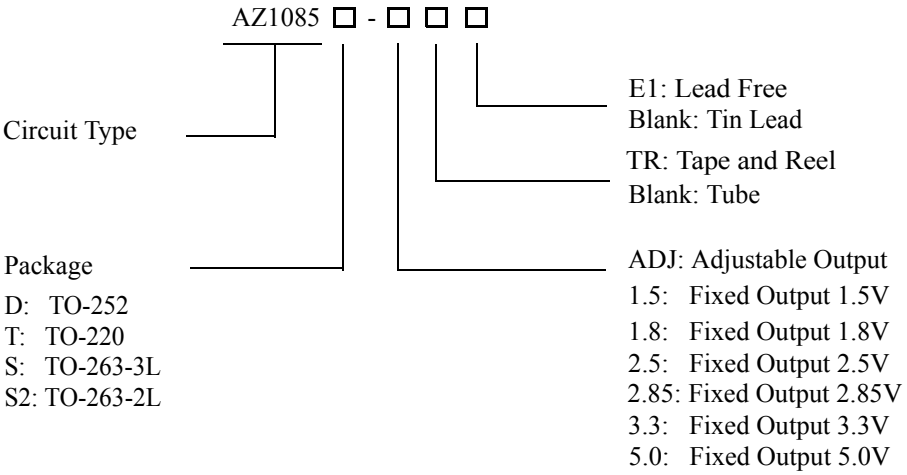


Figure 3. Functional Block Diagram of AZ1085

Ordering Information



Package	Tempera-ture 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

Ordering Information (Continued)

Package	Tempera-ture 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

The listed part numbers are used during the transition to lead-free products. After the transition completed, lead-free products will be considered as the "standard" and we will resume the original part numbers.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Min	Max	Unit
Operating Junction Temperature	T_J		150	°C
Storage Temperature	T_S	-65	150	°C
Lead Temperature (Soldering, 10 sec.)	T_{LEAD}		300	°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_{IN}		12	V
Operating Junction Temperature Range	T_J	0	125	°C

Electrical Characteristics

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

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

Electrical Characteristics (Continued)

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
		AZ1085-5.0, I_{OUT} = 10mA, 6.6V ≤ V_{IN} ≤ 10V		0.5 **1**	10 **10**	mV
Load Regulation	ΔV_{OUT}	AZ1085-ADJ, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		0.1 **0.2**	0.3 **0.4**	%
		AZ1085-1.5, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		3 **7**	15 **20**	mV
		AZ1085-1.8, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		3 **7**	15 **20**	mV
		AZ1085-2.5, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		3 **7**	15 **20**	mV
		AZ1085-2.85, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		3 **7**	15 **20**	mV
		AZ1085-3.3, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		3 **7**	15 **20**	mV
		AZ1085-5.0, 0mA ≤ I_{OUT} ≤ 3A, V_{IN} - V_{OUT} = 3V		5 **10**	20 **35**	mV
Dropout Voltage		I_O = 3A, ΔV_{REF}, ΔV_{OUT} = 1%		1.3	1.5	V
Current Limit	I_{LIMIT}	V_{IN} - V_{OUT} = 3V,	3.2	4.5		A
Minimum Load Current		V_{IN} = 10V (AZ1085-ADJ)		**3**	**10**	mA
Quiescent Current		V_{IN} = 10V (AZ1085)		**5**	**10**	mA
Ripple Rejection		f_{RIPPLE} = 120Hz, C_{OUT} = 25μF Tantalum, I_{OUT} = 3A, V_{IN} - V_{OUT} = 3V	**60**	**72**		dB
Adjust Pin Current		V_{IN} = 4.25V, I_{OUT} = 10mA		55	**120**	μA
Adjust Pin Current Change		10mA ≤ I_{OUT} ≤ 3A, 1.5V ≤ V_{IN} -V_{OUT} ≤ 6V		**0.2**	**5**	μA
Long Term Stability		T_A = 125°C, 1000Hrs		0.5		%
Temperature Stability		I_{OUT} = 10mA, V_{IN} - V_{OUT} = 1.5V		**0.5**		%
RMS Noise (% of V_{OUT})		T_A = 25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
Thermal Resistance Junction-to-Case	θ_{JC}	TO-263 TO-220		3 3		°C / W

Typical Performance Characteristics

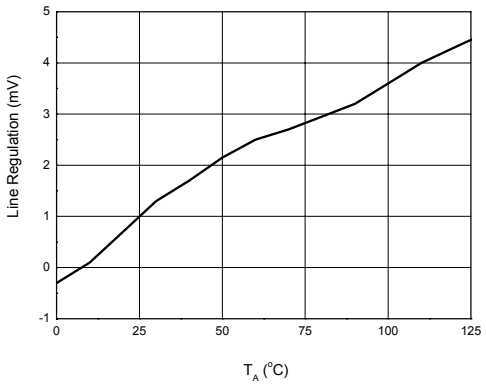


Figure 4. Line Regulation vs. Temperature

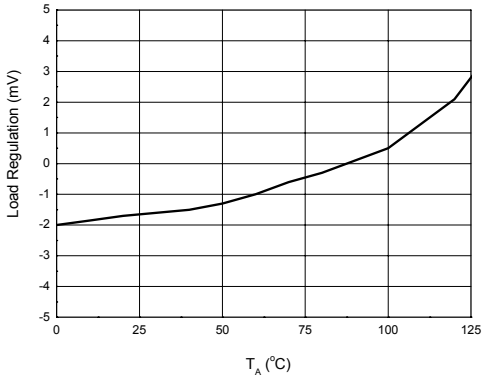


Figure 5. Load Regulation vs. Temperature

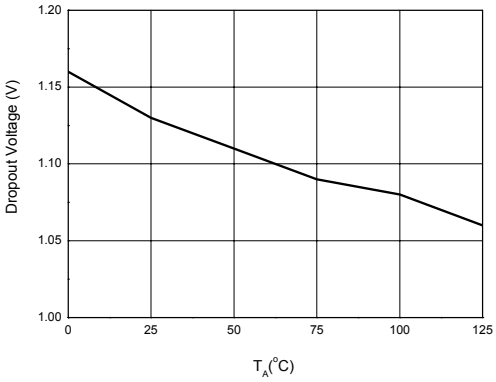


Figure 6. Dropout Voltage vs. Temperature

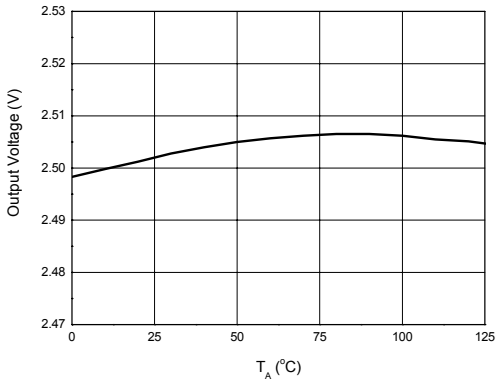


Figure 7. Output Voltage vs. Temperature

Typical Performance Characteristics (Continued)

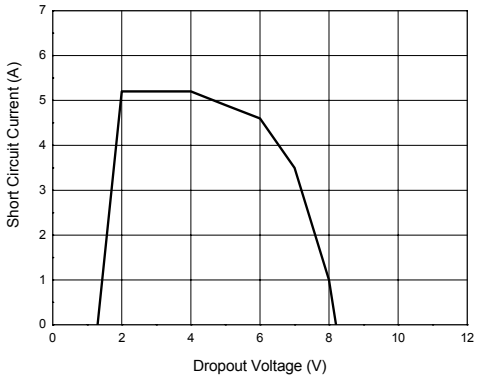


Figure 8. Short Circuit Current vs. Dropout Voltage

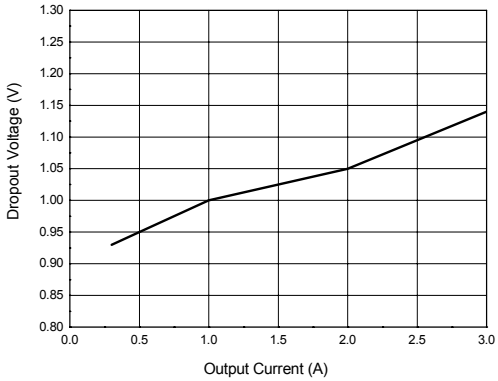


Figure 9. Dropout Voltage vs. Output Current

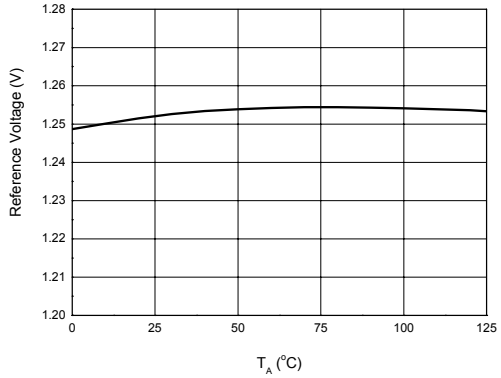


Figure10. Reference Voltage vs. Temperature

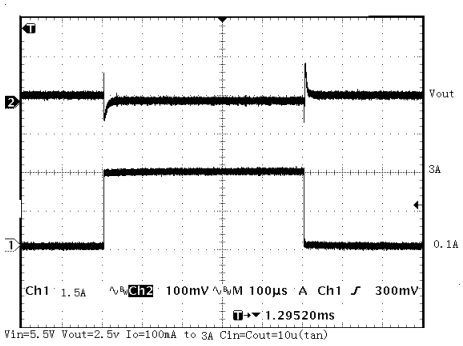


Figure 11. Load Transient Response

Typical Performance Characteristics (Continued)

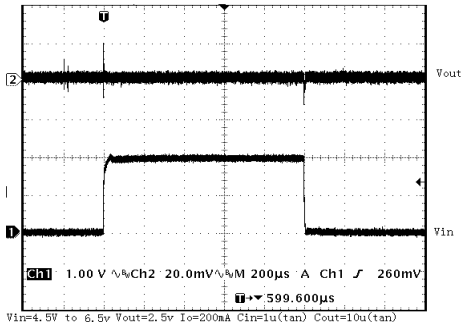


Figure 12. Line Transient Response

Typical Applications

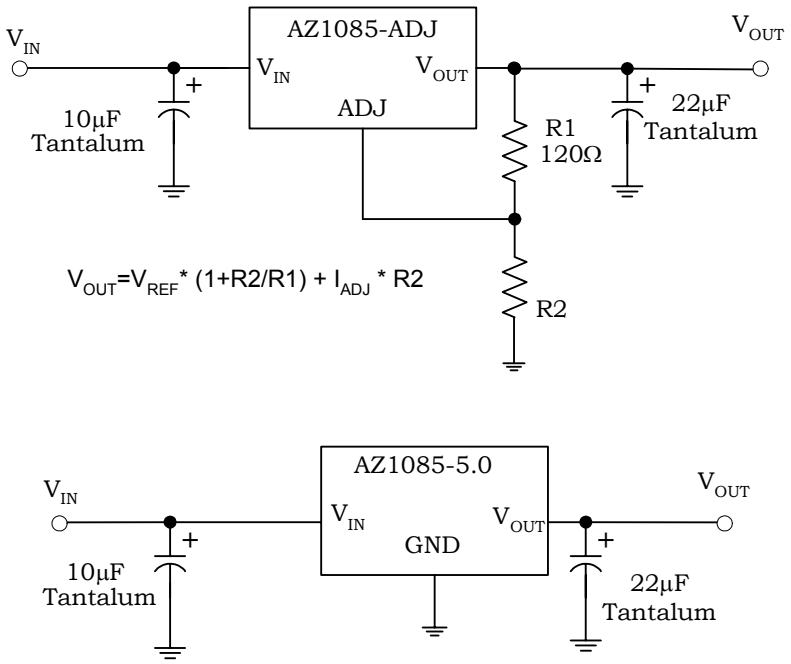
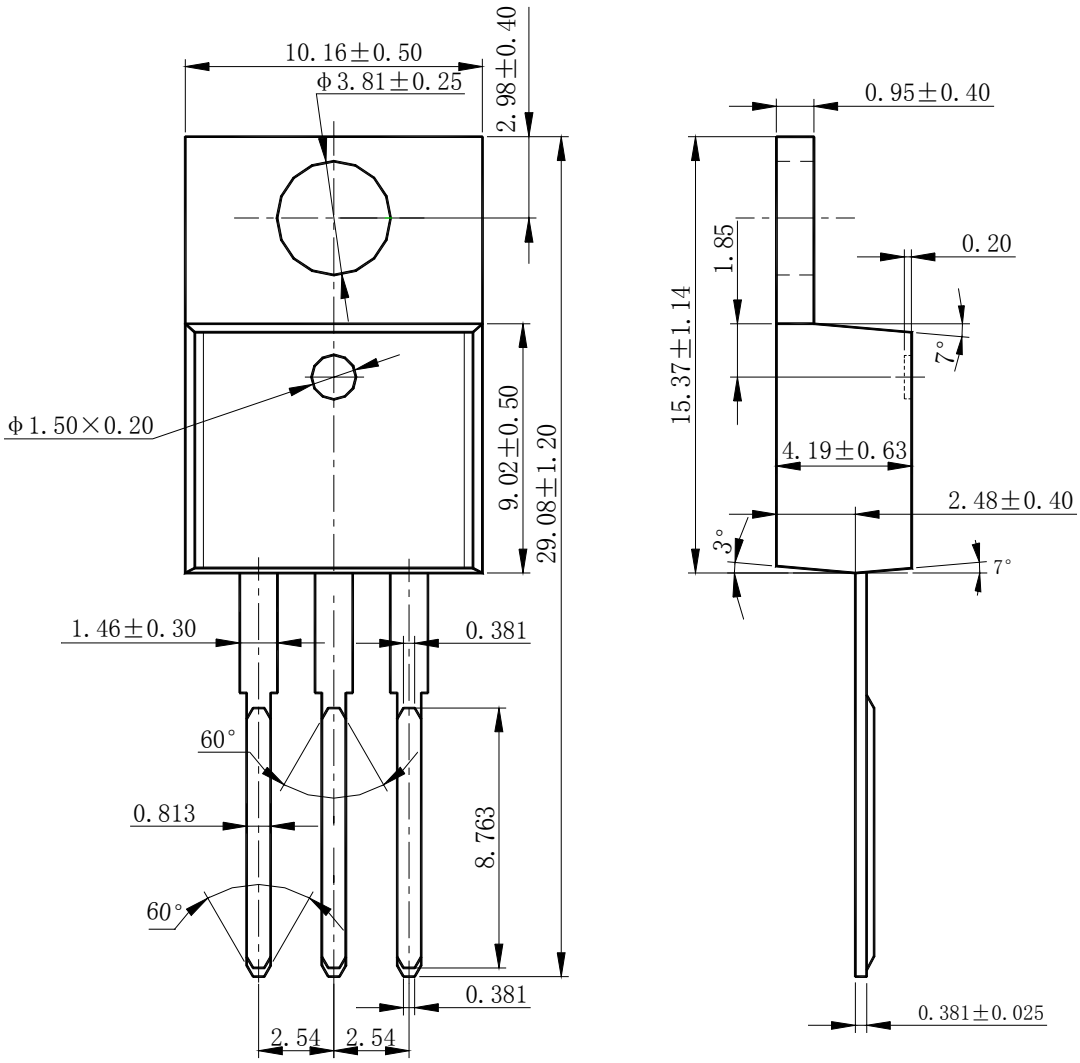


Figure 13. Typical Applications of AZ1085

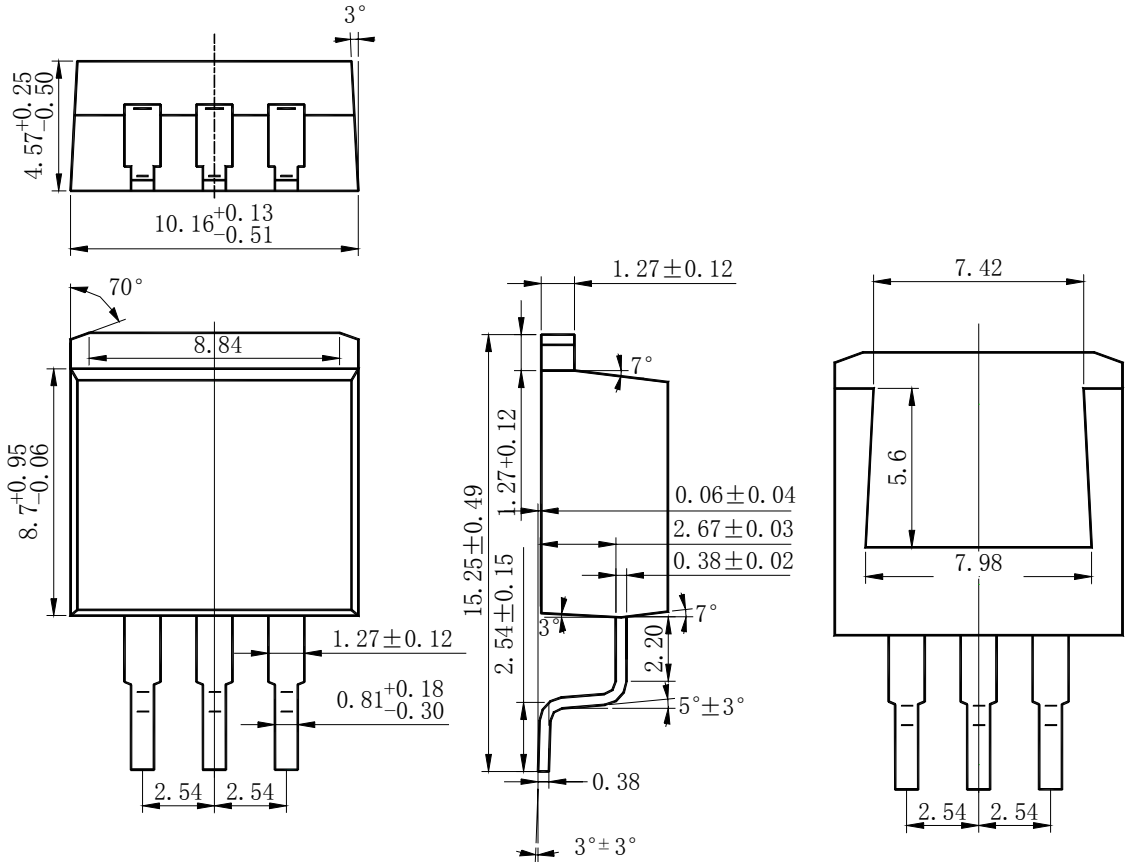
Mechanical Dimensions

TO-220 **Unit: mm**



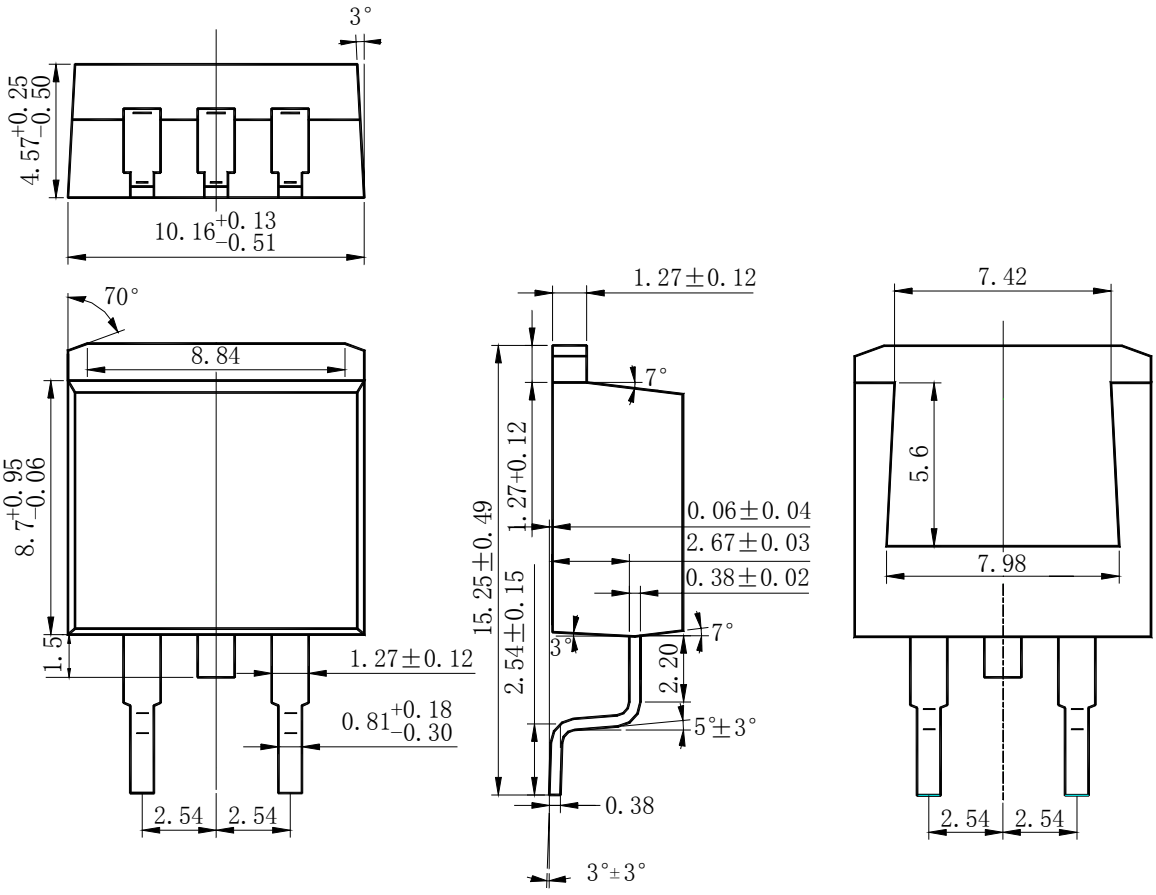
Mechanical Dimensions (Continued)

TO-263-3L **Unit: mm**



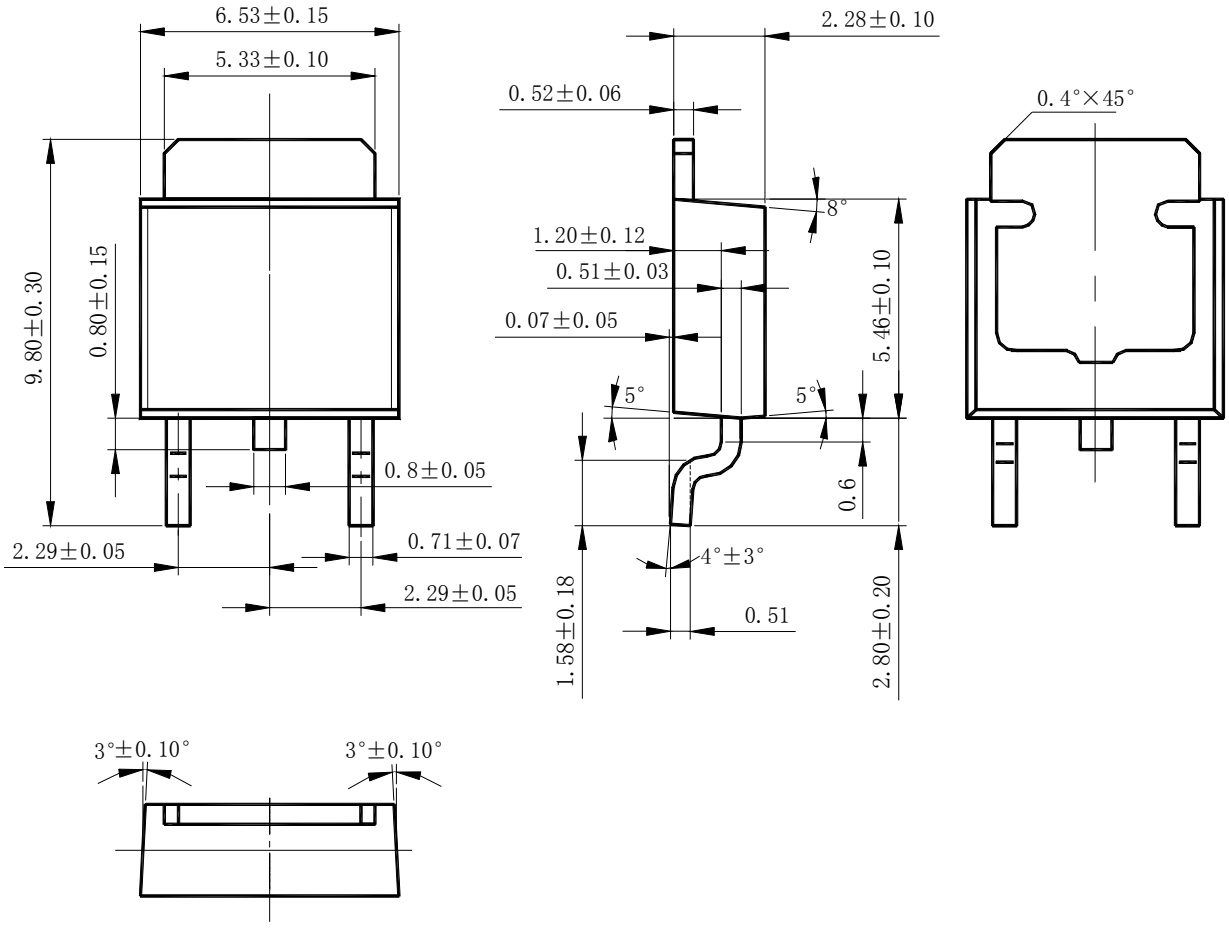
Mechanical Dimensions (Continued)

TO-263-2L **Unit: mm**



Mechanical Dimensions (Continued)

TO-252 **Unit: mm**



BCD Semiconductor Manufacturing Limited

http://www.bcdsemi.com

BCD Semiconductor Corporation

3170 De La Cruz Blvd, Suite # 105 Santa Clara, CA 95054-2411, U.S.A Tel : +1-408-988 6388, Fax : +1-408-988 6386

Shanghai SIM-BCD Semiconductor manufacturing Co., Ltd.

800 Yi Shan Road, Shanghai 200233, PRC Tel: +86-21-6485-1491, Fax: +86-21-5450-0008

Advanced Analog circuits (Shanghai) Corporation

8F, B Zone, 900 Yi Shan Road, Shanghai 200233, PRC Tel: +86-21-6495 9539, Fax: +86-21-6485 9673

BCD Semiconductor (Taiwan) company Limited

Room 2210, 22nd Fl, 333, Keelung Road, Sec. 1, TaiPei (110), Taiwan Tel: +886-2-2758 6828, Fax: +886-2-2758 6892