3A LOW DROPOUT LINEAR REGULATOR AZ1085C

General Description

The AZ1085C 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 AZ1085C is available in 1.5V, 1.8V, 2.5V, 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 AZ1085C series is available in standard packages of TO-263-3, TO-263-2, TO-252-2 (3) and TO-252-2 (4).

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
- Compatible with Low ESR Ceramic Capacitor
- Line Regulation: 0.015% (Typ)
- Load Regulation: 0.1% (Typ)

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

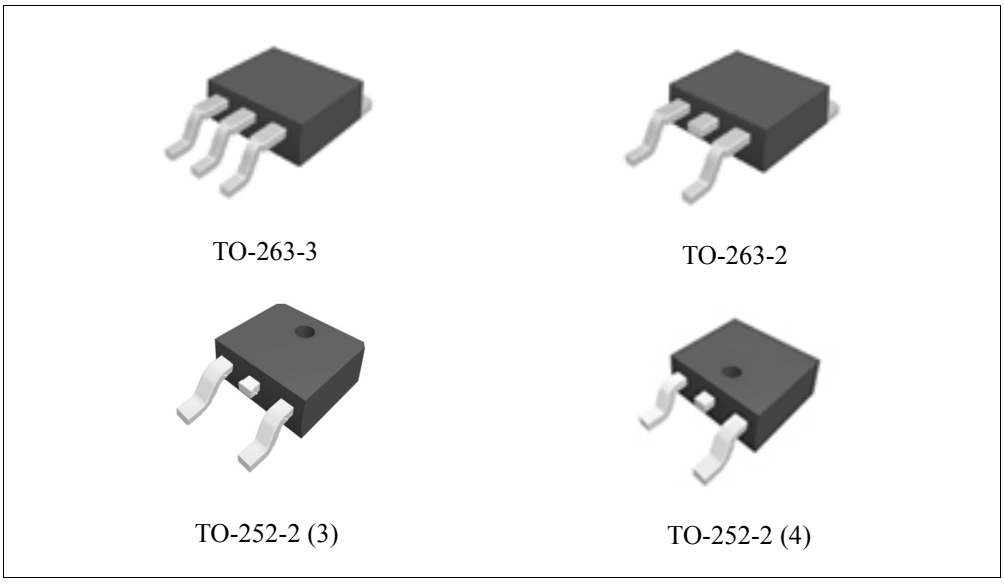
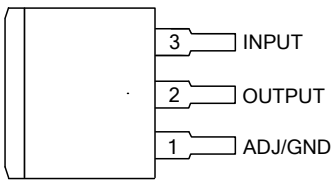


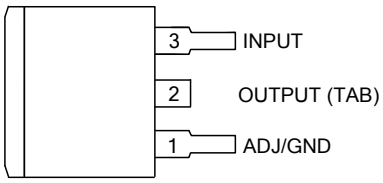
Figure 1. Package Types of AZ1085C

Pin Configuration

S Package
(TO-263-3)

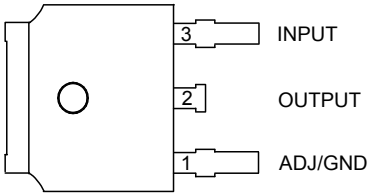


S2 Package
(TO-263-2)



D Package

(TO-252-2 (3))



(TO-252-2 (4))

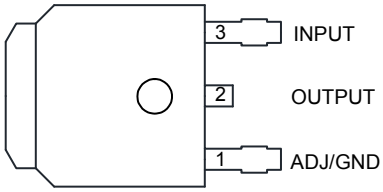


Figure 2. Pin Configuration of AZ1085C (Top View)

Functional Block Diagram

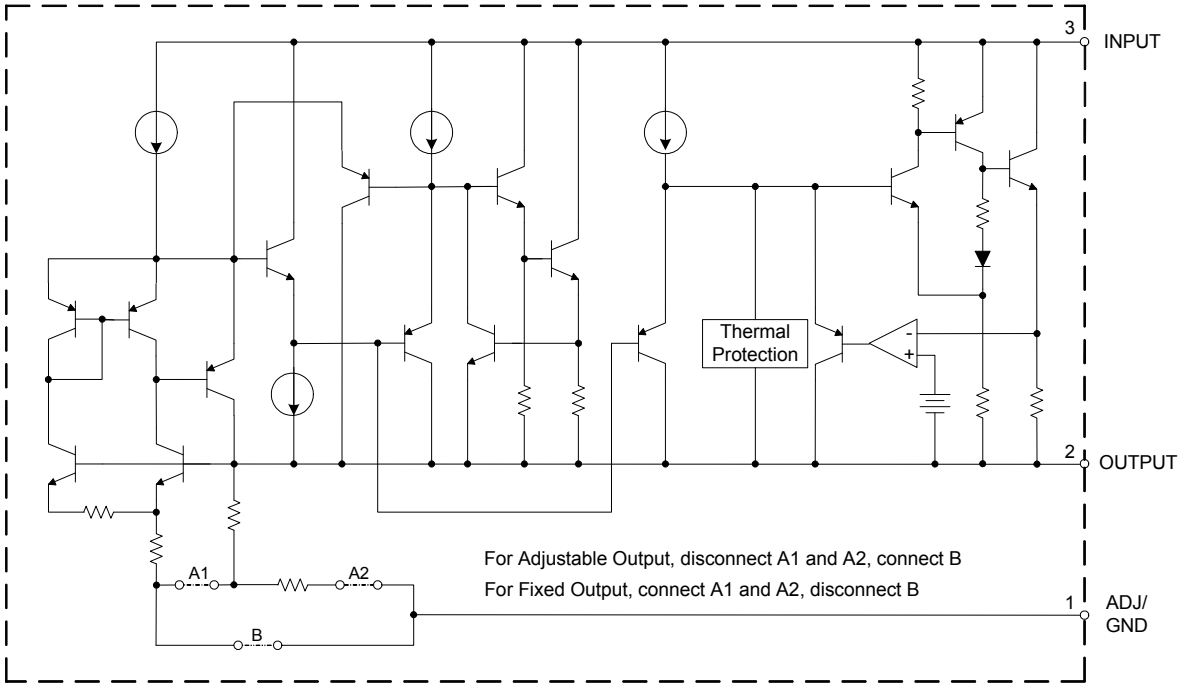
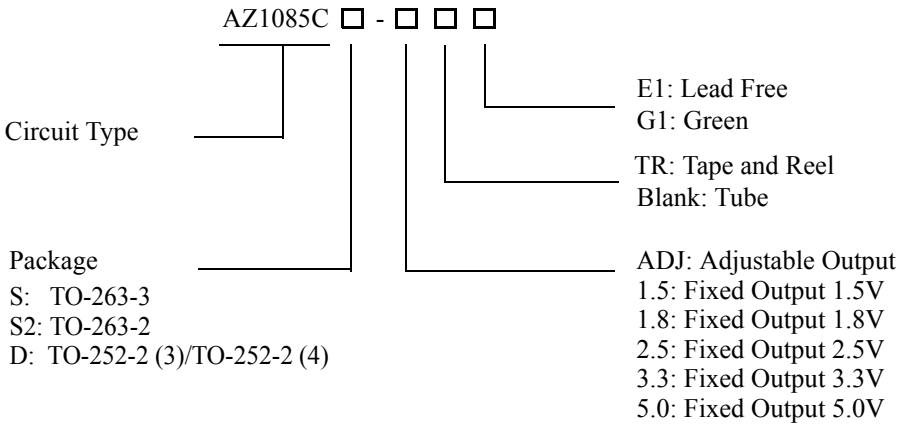


Figure 3. Functional Block Diagram of AZ1085C

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TO-263-3	0 to 125°C	AZ1085CS-ADJE1	AZ1085CS-ADJG1	AZ1085CS-ADJE1	AZ1085CS-ADJG1	Tube
		AZ1085CS-ADJTRE1	AZ1085CS-ADJTRG1	AZ1085CS-ADJE1	AZ1085CS-ADJG1	Tape & Reel
		AZ1085CS-1.5E1	AZ1085CS-1.5G1	AZ1085CS-1.5E1	AZ1085CS-1.5G1	Tube
		AZ1085CS-1.5TRE1	AZ1085CS-1.5TRG1	AZ1085CS-1.5E1	AZ1085CS-1.5G1	Tape & Reel
		AZ1085CS-1.8E1	AZ1085CS-1.8G1	AZ1085CS-1.8E1	AZ1085CS-1.8G1	Tube
		AZ1085CS-1.8TRE1	AZ1085CS-1.8TRG1	AZ1085CS-1.8E1	AZ1085CS-1.8G1	Tape & Reel
		AZ1085CS-2.5E1	AZ1085CS-2.5G1	AZ1085CS-2.5E1	AZ1085CS-2.5G1	Tube
		AZ1085CS-2.5TRE1	AZ1085CS-2.5TRG1	AZ1085CS-2.5E1	AZ1085CS-2.5G1	Tape & Reel
		AZ1085CS-3.3E1	AZ1085CS-3.3G1	AZ1085CS-3.3E1	AZ1085CS-3.3G1	Tube
		AZ1085CS-3.3TRE1	AZ1085CS-3.3TRG1	AZ1085CS-3.3E1	AZ1085CS-3.3G1	Tape & Reel
		AZ1085CS-5.0E1	AZ1085CS-5.0G1	AZ1085CS-5.0E1	AZ1085CS-5.0G1	Tube
		AZ1085CS-5.0TRE1	AZ1085CS-5.0TRG1	AZ1085CS-5.0E1	AZ1085CS-5.0G1	Tape & Reel
TO-263-2	0 to 125°C	AZ1085CS2-ADJE1	AZ1085CS2-ADJG1	AZ1085CS2-ADJE1	AZ1085CS2-ADJG1	Tube
		AZ1085CS2-ADJTRE1	AZ1085CS2-ADJTRG1	AZ1085CS2-ADJE1	AZ1085CS2-ADJG1	Tape & Reel
		AZ1085CS2-1.5E1	AZ1085CS2-1.5G1	AZ1085CS2-1.5E1	AZ1085CS2-1.5G1	Tube
		AZ1085CS2-1.5TRE1	AZ1085CS2-1.5TRG1	AZ1085CS2-1.5E1	AZ1085CS2-1.5G1	Tape & Reel
		AZ1085CS2-1.8E1	AZ1085CS2-1.8G1	AZ1085CS2-1.8E1	AZ1085CS2-1.8G1	Tube
		AZ1085CS2-1.8TRE1	AZ1085CS2-1.8TRG1	AZ1085CS2-1.8E1	AZ1085CS2-1.8G1	Tape & Reel
		AZ1085CS2-2.5E1	AZ1085CS2-2.5G1	AZ1085CS2-2.5E1	AZ1085CS2-2.5G1	Tube
		AZ1085CS2-2.5TRE1	AZ1085CS2-2.5TRG1	AZ1085CS2-2.5E1	AZ1085CS2-2.5G1	Tape & Reel
		AZ1085CS2-3.3E1	AZ1085CS2-3.3G1	AZ1085CS2-3.3E1	AZ1085CS2-3.3G1	Tube
		AZ1085CS2-3.3TRE1	AZ1085CS2-3.3TRG1	AZ1085CS2-3.3E1	AZ1085CS2-3.3G1	Tape & Reel
		AZ1085CS2-5.0E1	AZ1085CS2-5.0G1	AZ1085CS2-5.0E1	AZ1085CS2-5.0G1	Tube
		AZ1085CS2-5.0TRE1	AZ1085CS2-5.0TRG1	AZ1085CS2-5.0E1	AZ1085CS2-5.0G1	Tape & Reel

Ordering Information (Continued)

Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-252-2(3)/TO-252-2(4)	0 to 125°C	AZ1085CD-ADJTRG1	AZ1085CD-ADJG1	Tape & Reel
		AZ1085CD-1.5TRG1	AZ1085CD-1.5G1	Tape & Reel
		AZ1085CD-1.8TRG1	AZ1085CD-1.8G1	Tape & Reel
		AZ1085CD-2.5TRG1	AZ1085CD-2.5G1	Tape & Reel
		AZ1085CD-3.3TRG1	AZ1085CD-3.3G1	Tape & Reel
		AZ1085CD-5.0TRG1	AZ1085CD-5.0G1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value		Unit
Operating Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-65 to 150		°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260		°C
Thermal Resistance(Note 2)	θ_{JA}	TO-263-3	75	°C/W
		TO-263-2	75	
		TO-252-2 (3)/TO-252-2 (4)	100	
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, $T_{J(max)}$, 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: $P_{D(max)}=(T_{J(max)}-T_A)/\theta_{JA}$. 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	°C

Electrical Characteristics

Typicals and limits appearing in normal type apply for T_J=25°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}	AZ1085C-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}	AZ1085C-1.5, I_{OUT}=0mA, V_{IN}=4.5V, T_J=25°C, 10mA≤ I_{OUT}≤ 3A, 3.0V≤V_{IN}≤ 6V	1.485 **1.47**	1.5 **1.5**	1.515 **1.53**	V
		AZ1085C-1.8, I_{OUT}=0mA, V_{IN}=4.8V, T_J=25°C, 10mA≤ I_{OUT}≤3A, 3.3V≤V_{IN}≤7V	1.782 **1.764**	1.8 **1.8**	1.818 **1.836**	V
		AZ1085C-2.5, I_{OUT}=0mA, V_{IN}=5.5V, T_J=25°C, 10mA≤I_{OUT}≤3A, 4.0V≤V_{IN}≤7V	2.475 **2.45**	2.5 **2.5**	2.525 **2.55**	V
		AZ1085C-3.3, I_{OUT}=0mA, V_{IN}=6.3V, T_J=25°C, 10mA≤ I_{OUT}≤3A, 4.8V≤V_{IN}≤ 8V	3.267 **3.234**	3.3 **3.3**	3.333 **3.366**	V
		AZ1085C-5.0, I_{OUT}=0mA, V_{IN}=8V, T_J=25°C, 10mA≤ I_{OUT}≤ 3A, 6.5V≤V_{IN}≤10V	4.95 **4.9**	5 **5**	5.05 **5.1**	V
Line Regulation	ΔV_{OUT}	AZ1085C-ADJ, I_{OUT}=10mA, 2.85V≤V_{IN}≤10V		0.015 **0.035**	0.2 **0.2**	%
		AZ1085C-1.5, I_{OUT}=10mA, 3.0V≤V_{IN}≤10V		0.5 **1**	6 **6**	mV
		AZ1085C-1.8, I_{OUT}=10mA, 3.3V≤V_{IN}≤10V		0.5 **1**	6 **6**	mV
		AZ1085C-2.5, I_{OUT}=10mA, 4.0V≤ V_{IN}≤10V		0.5 **1**	6 **6**	mV
		AZ1085C-3.3, I_{OUT}=10mA, 4.8V≤ V_{IN}≤10V		0.5 **1**	6 **6**	mV
		AZ1085C-5.0, I_{OUT}=10mA, 6.5V≤V_{IN}≤10V		0.5 **1**	10 **10**	mV

Electrical Characteristics (Continued)

Typicals and limits appearing in normal type apply for T_J=25°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
Load Regulation	ΔV_{OUT}	AZ1085C-ADJ, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		0.1 **0.2**	0.3 **0.4**	%
		AZ1085C-1.5, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 **7**	15 **20**	mV
		AZ1085C-1.8, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 **7**	15 **20**	mV
		AZ1085C-2.5, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 **7**	15 **20**	mV
		AZ1085C-3.3, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 **7**	15 **20**	mV
		AZ1085C-5.0, 0mA≤ I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		5 **10**	20 **35**	mV
Dropout Voltage	V_{DROP}	I_{OUT}=3A, ΔV_{REF}, ΔV_{OUT}=1%		**1.3**	**1.5**	V
Thermal Resistance (Junction to Case)	θ_{JC}	TO-263-3		6.34		°C/W
		TO-263-2		6.34		
		TO-252-2 (3)/TO-252-2 (4)		7.36		
Current Limit	I_{LIMIT}	V_{IN}-V_{OUT}=3V	3.2	4.5		A
Minimum Load Current	I_{LOAD} (MIN)	V_{IN}=10V (AZ1085C-ADJ)		**3**	**10**	mA
Quiescent Current	I_Q	V_{IN}=10V (AZ1085C)		**5**	**10**	mA
Ripple Rejection	PSRR	f_{RIPPLE}=120Hz, C_{OUT}=25μF, I_{OUT}=3A, V_{IN}-V_{OUT} = 3V	**60**	**72**		dB
Adjust Pin Current	I_{ADJ}	V_{IN} = 4.25V, I_{OUT} = 10mA		55	**120**	μA
Adjust Pin Current Change	ΔI_{ADJ}	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		%

Typical Performance Characteristics

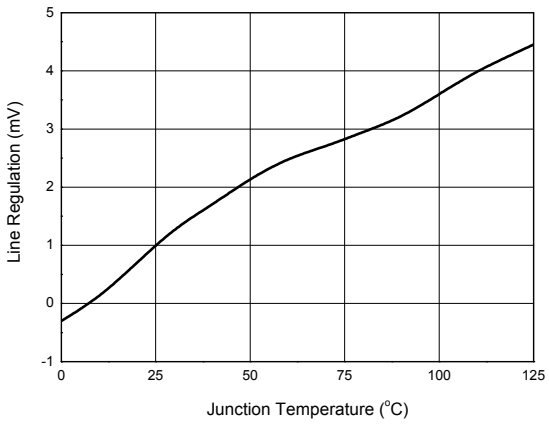


Figure 4. Line Regulation vs. Junction Temperature

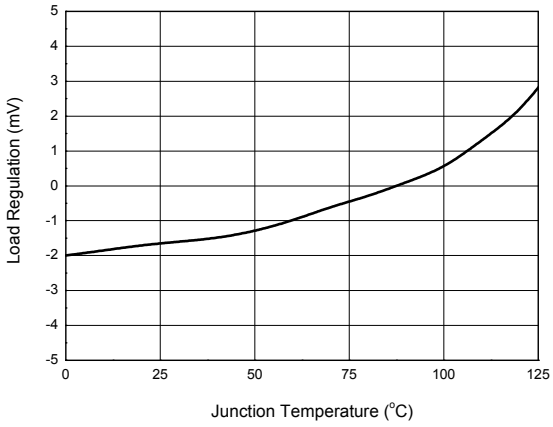


Figure 5. Load Regulation vs. Junction Temperature

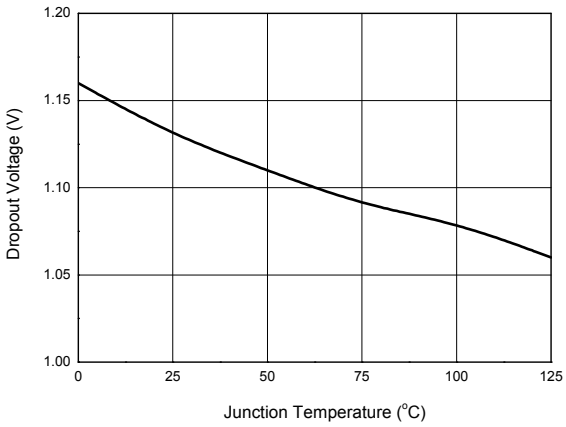


Figure 6. Dropout Voltage vs. Junction Temperature

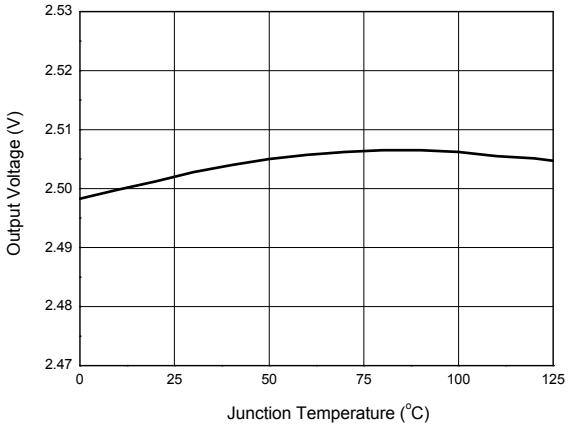


Figure 7. Output Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

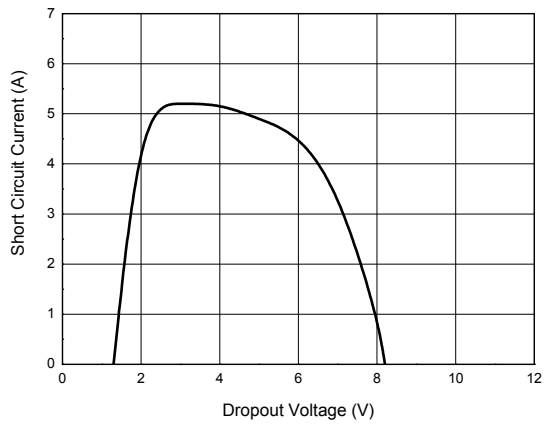


Figure 8. Short Circuit Current vs. Dropout Voltage

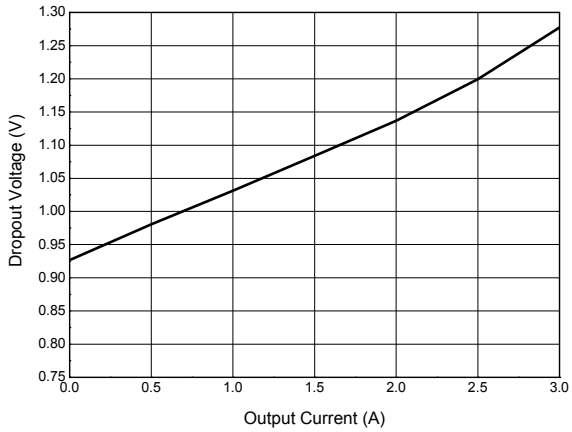


Figure 9. Dropout Voltage vs. Output Current

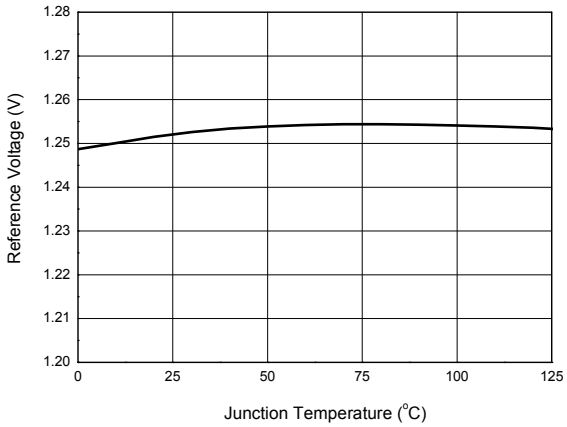


Figure10. Reference Voltage vs. Junction Temperature

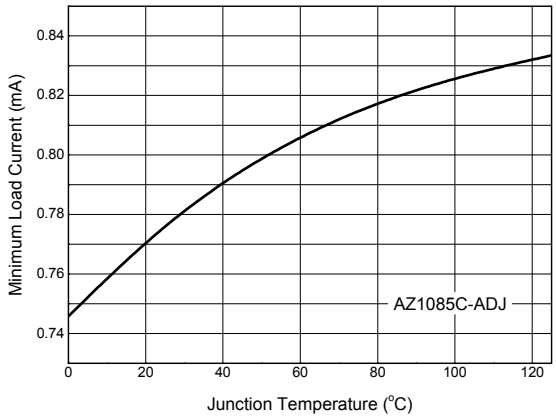


Figure11. Minimum Load Current vs. Junction Temperature

Typical Performance Characteristics (Continued)

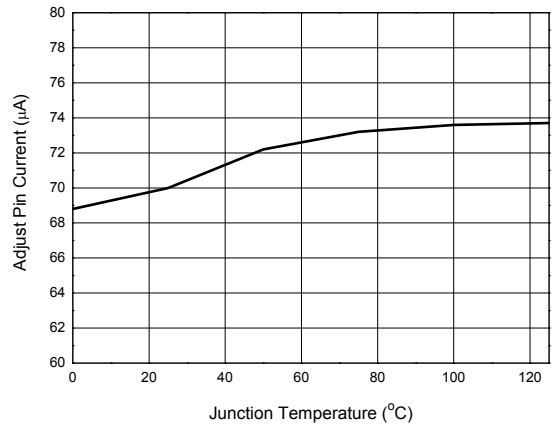


Figure12. Adjust Pin Current vs. Junction Temperature

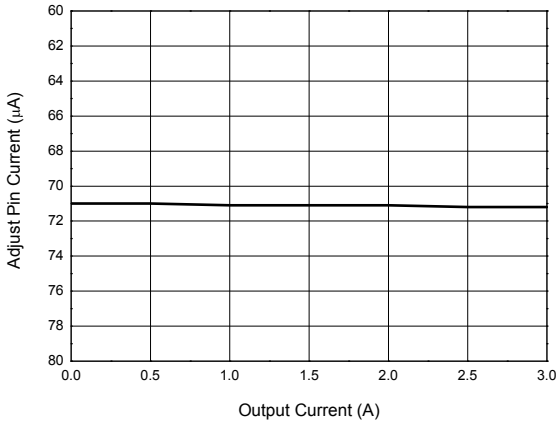


Figure13. Adjust Pin Current vs. Output Current

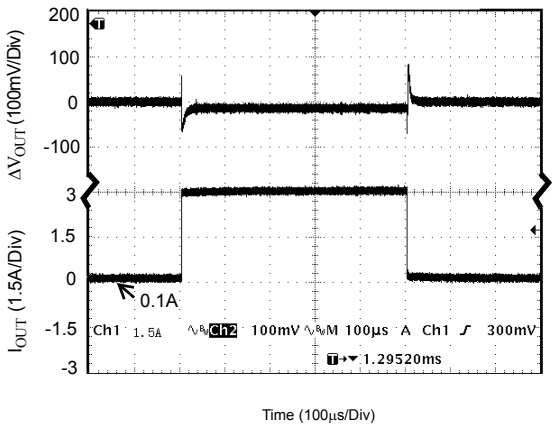


Figure 14. Load Transient Response
(Conditions: V_{IN}=5.5V, V_{OUT}=2.5V, I_{OUT}=100mA to 3A, C_{IN}=C_{OUT}=10μF)

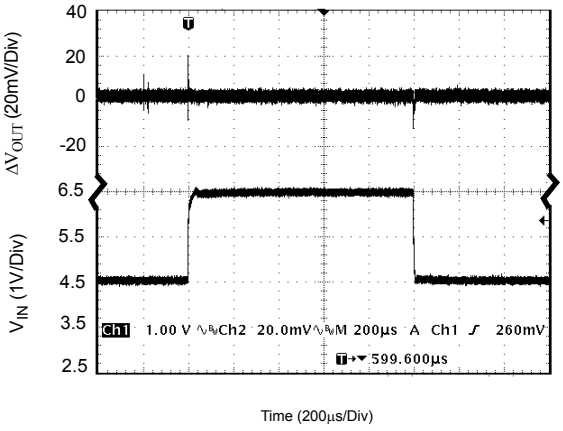


Figure 15. Line Transient Response
(Conditions: V_{IN}=4.5V to 6.5V, V_{OUT}=2.5V, I_{OUT}=200mA, C_{IN}=1μF, C_{OUT}=10μF)

Typical Performance Characteristics (Continued)

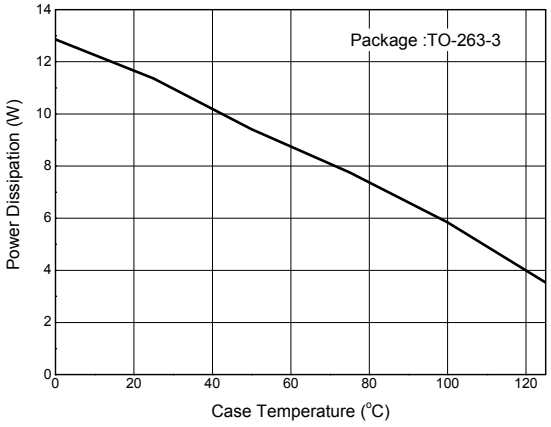


Figure16. Power Dissipation vs. Case Temperature

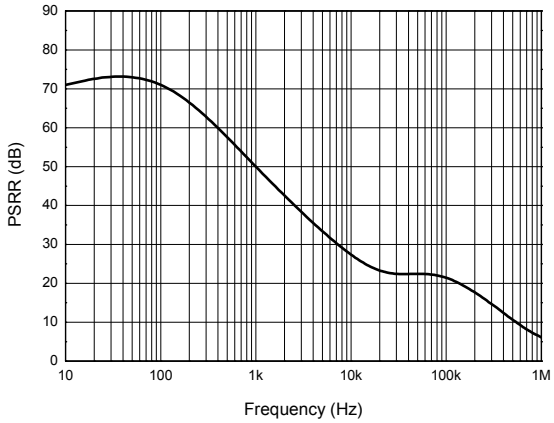


Figure17. PSRR vs. Frequency

Typical Application

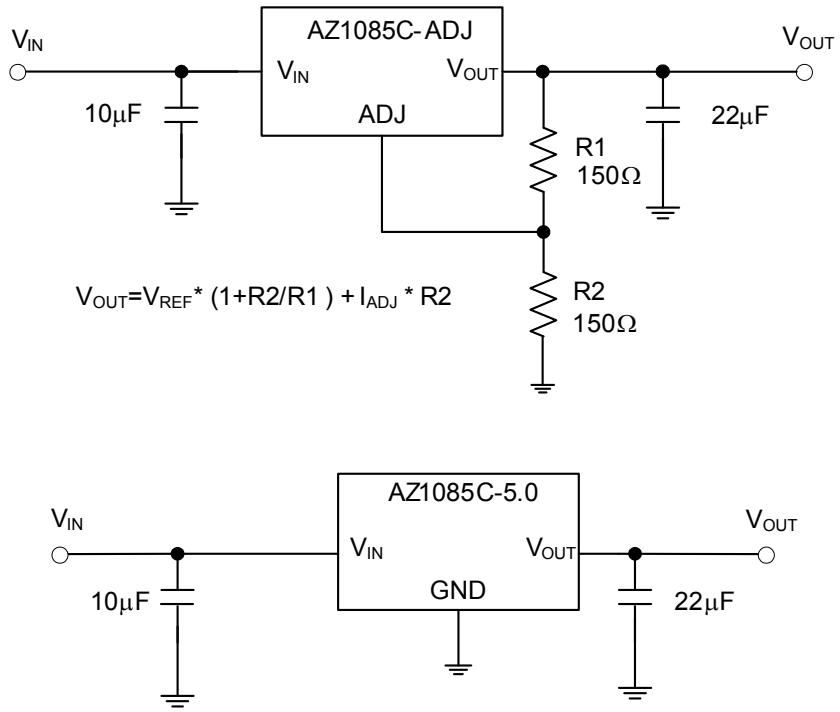
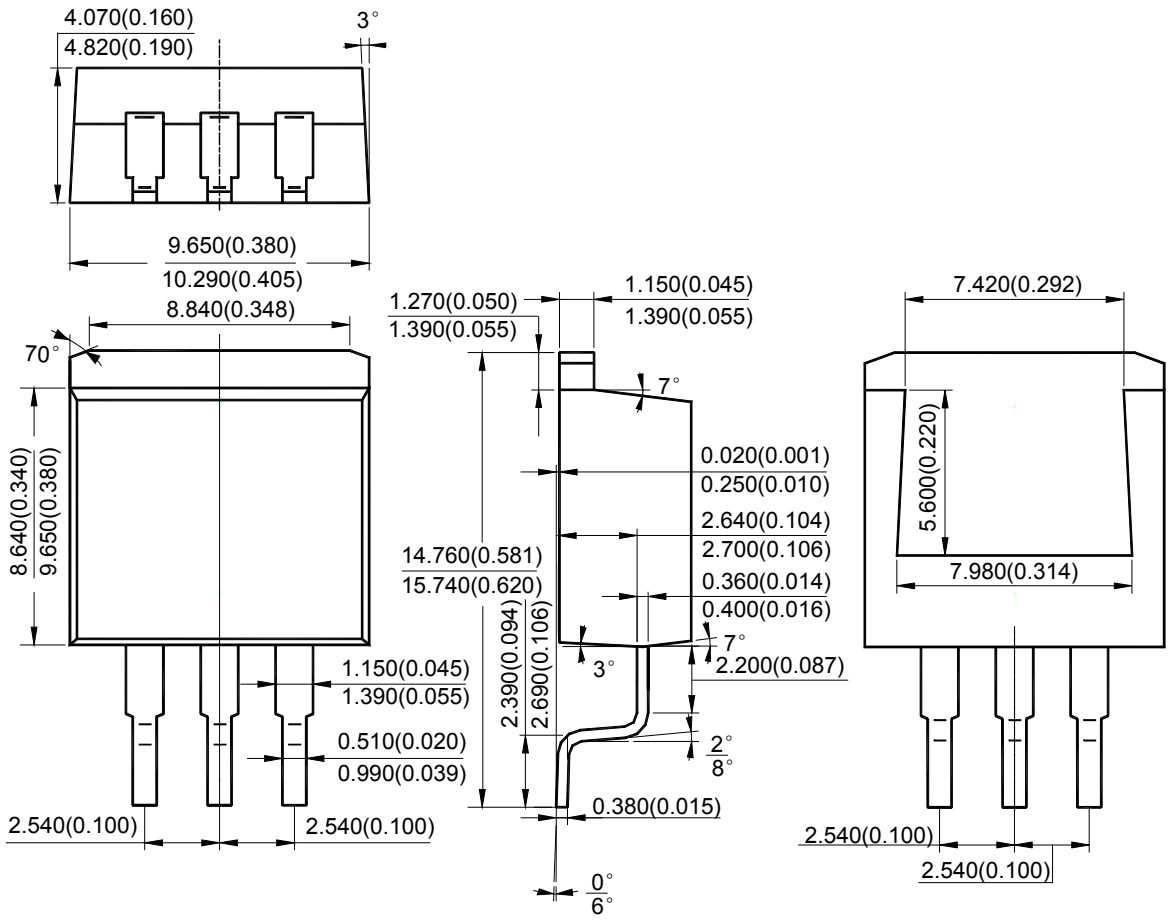


Figure 18. Typical Applications of AZ1085C

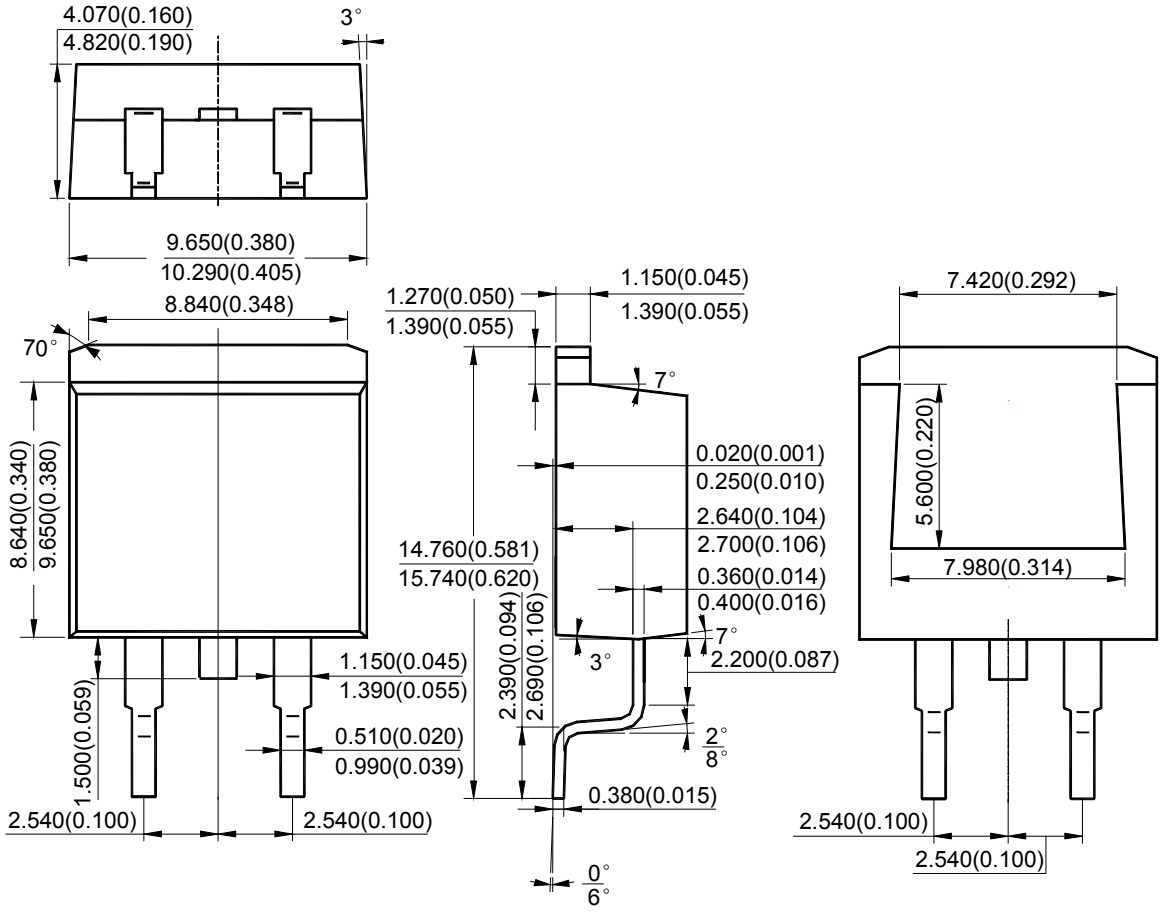
Mechanical Dimensions

TO-263-3 **Unit: mm(inch)**



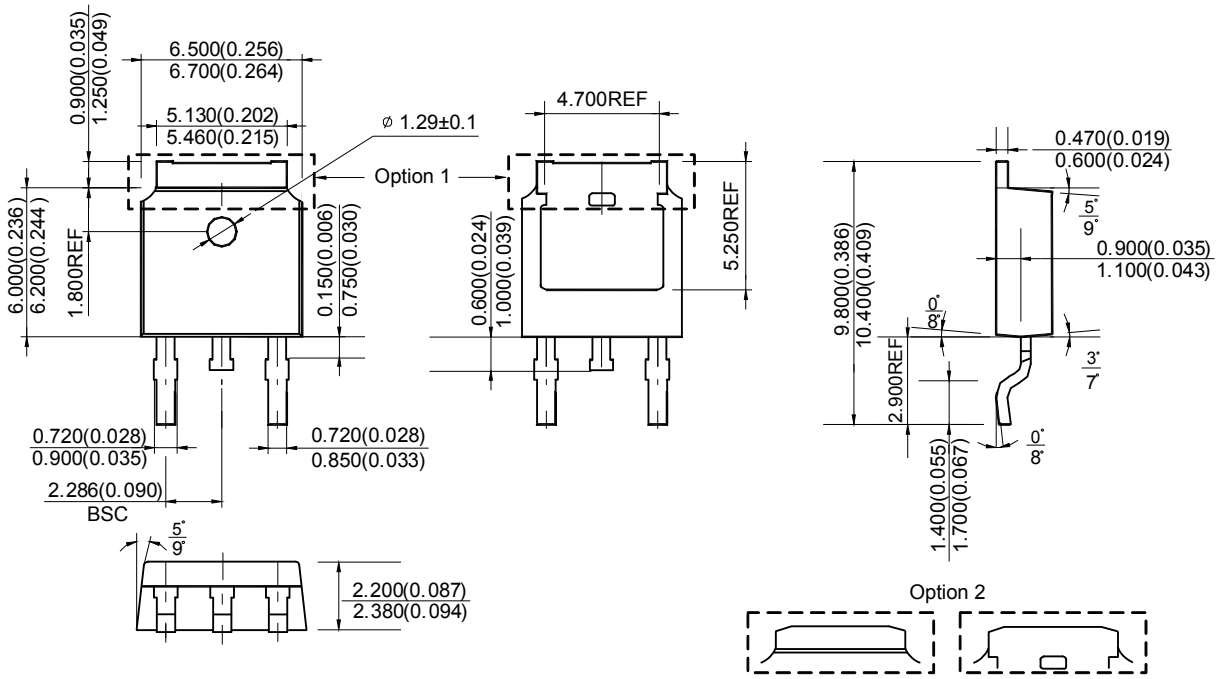
Mechanical Dimensions (Continued)

TO-263-2 **Unit: mm(inch)**



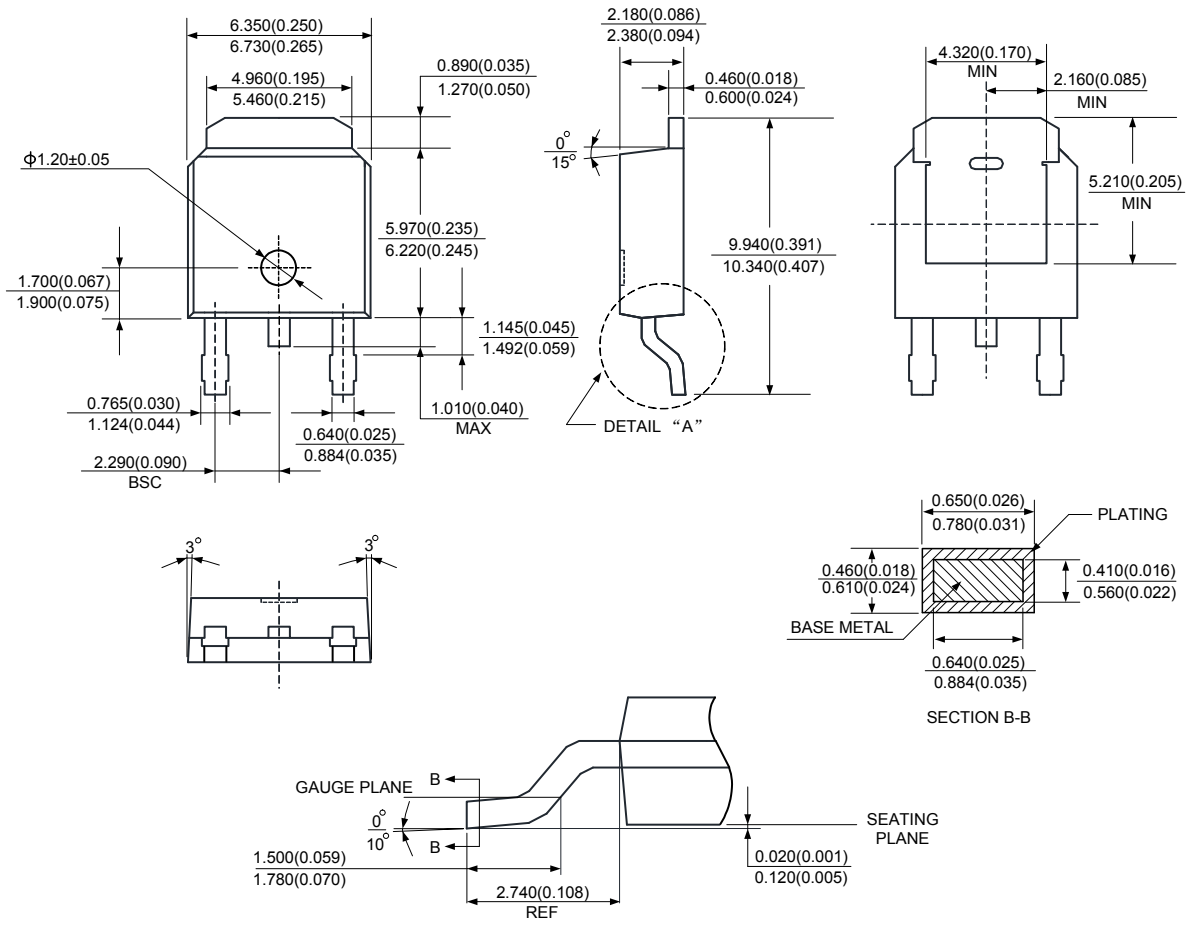
Mechanical Dimensions (Continued)

TO-252-2 (3) **Unit: mm(inch)**



Mechanical Dimensions (Continued)

TO-252-2 (4) **Unit: mm(inch)**



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