AZ1085C

3A LOW DROPOUT LINEAR REGULATOR

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 TO263, TO263-2, TO252-2 (3), TO252-2 (4) and TO252-2 (5).

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)
- Lead-Free Packages: TO263, TO263-2
  - **Totally Lead-Free; RoHS Compliant (Notes 1 & 2)**
- Lead-Free Packages, Available in “Green” Molding Compound: TO263, TO263-2, TO252-2 (3), TO252-2 (4), TO252-2 (5)
  - **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
  - **Halogen and Antimony Free. “Green” Device (Note 3)**

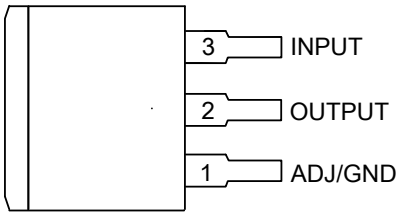
Applications

- 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

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 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.

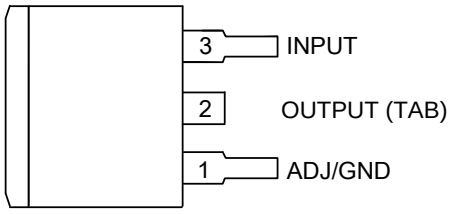
Pin Assignments

(Top View)



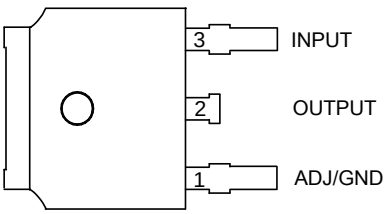
TO263

(Top View)



TO263-2

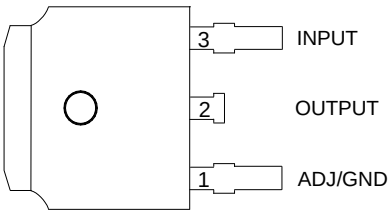
(Top View)



TO252-2 (3) Option 1

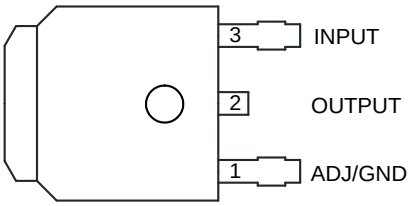
Pin Assignments (Cont.)

(Top View)



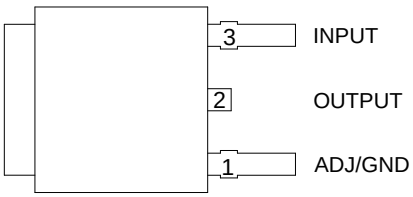
TO252-2 (3) Option 2

(Top View)



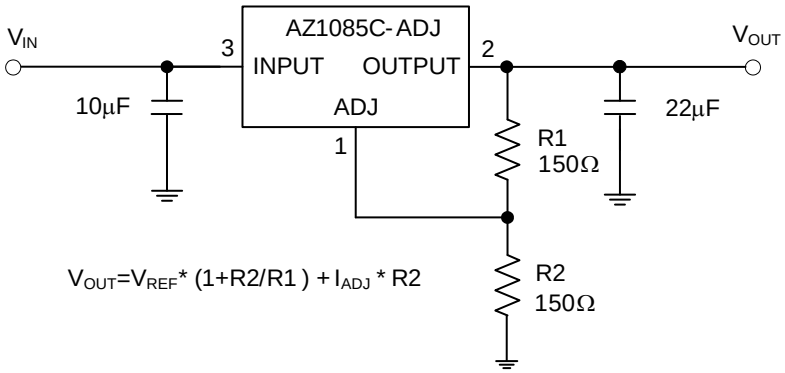
TO252-2 (4)

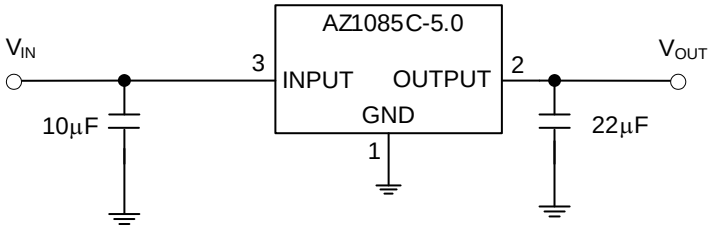
(Top View)



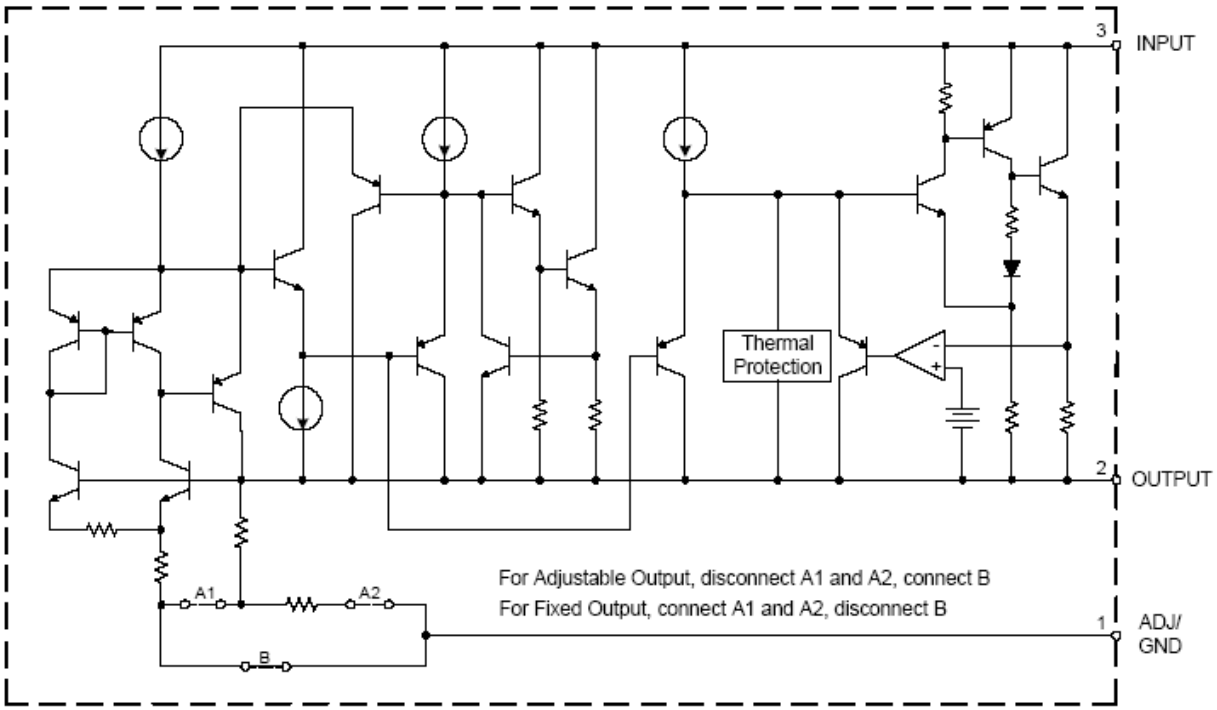
TO252-2 (5)

Typical Applications Circuit





Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating		Unit
T_J	Operating Junction Temperature	+150		ºC
T_{STG}	Storage Temperature Range	-65 to +150		ºC
T_{LEAD}	Lead Temperature (Soldering, 10sec.)	+260		ºC
θ_{JA}	Thermal Resistance (Note 5)	TO263	75	ºC/W
		TO263-2	75	
		TO252-2 (3)/TO252-2 (4)/ TO252-2 (5)	100	
ESD	ESD (Human Body Model)	2000		V

Notes: 4. 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.

5. 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

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	–	12	V
T_J	Operating Junction Temperature Range	0	+125	ºC

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.)

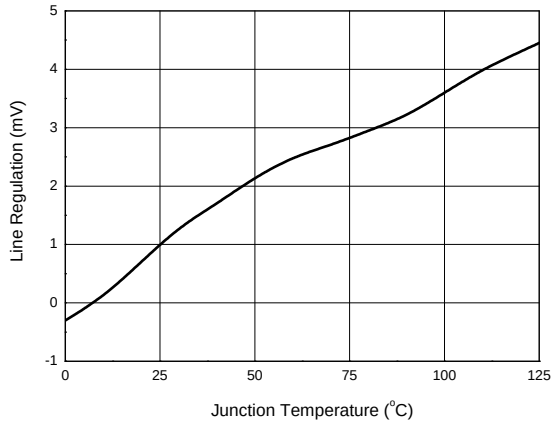
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	AZ1085C-ADJ, I_{OUT} = 10mA, V_{IN}-V_{OUT} = 3V, T_J = +25°C, 10mA ≤ I_{OUT} ≤ 3A, 1.5V ≤ V_{IN}-V_{OUT} ≤ 5V	1.238 **1.225**	1.250 **1.250**	1.262 **1.275**	V
V_{OUT}	Output Voltage	AZ1085C-1.5, I_{OUT} = 0mA, V_{IN} = 4.5V, T_J = +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
ΔV_{OUT}	Line Regulation	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 (Cont. 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.)

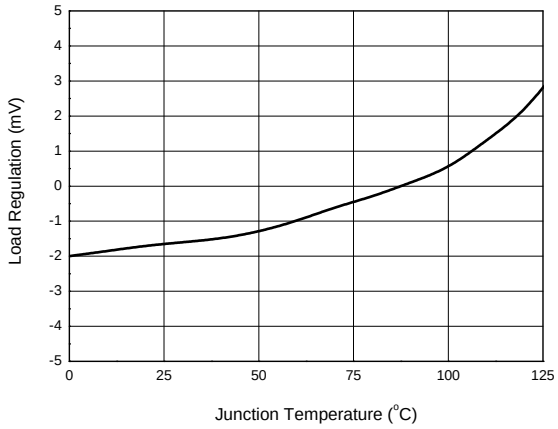
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔV_{OUT}	Load Regulation	AZ1085C-ADJ, 0mA ≤ I_{OUT} ≤ 3A, V_{IN}-V_{OUT} = 3V	–	0.1 **0.2**	0.3 **0.4**	%
		AZ1085C-1.5, 0mA ≤ I_{OUT} ≤ 3A, V_{IN}-V_{OUT} = 3V	–	3 **7**	15 **20**	mV
		AZ1085C-1.8, 0mA ≤ I_{OUT} ≤ 3A, V_{IN}-V_{OUT} = 3V	–	3 **7**	15 **20**	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
V_{DROP}	Dropout Voltage	I_{OUT} = 3A, ΔV_{REF}, ΔV_{OUT} = 1%	–	**1.3**	**1.5**	V
θ_{JC}	Thermal Resistance (Junction to Case)	TO263	–	6.34	–	°C/W
		TO263-2	–	6.34	–	
		TO252-2 (3)/TO252-2 (4)/TO252-2 (5)	–	7.36	–	
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 3V	3.2	4.5	–	A
I_{LOAD} (MIN)	Minimum Load Current	V_{IN} = 10V (AZ1085C-ADJ)	–	**3**	**10**	mA
I_Q	Quiescent Current	V_{IN} = 10V (AZ1085C)	–	**5**	**10**	mA
PSRR	Ripple Rejection	f_{RIPPLE} = 120Hz, C_{OUT} = 25µF, I_{OUT} = 3A, V_{IN}-V_{OUT} = 3V	**60**	**72**	–	dB
I_{ADJ}	Adjust Pin Current	V_{IN} = 4.25V, I_{OUT} = 10mA	–	55	**120**	µA
ΔI_{ADJ}	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	–	%

Performance Characteristics

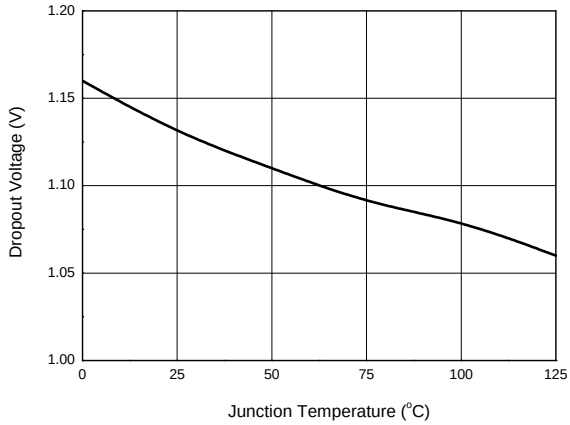
Line Regulation vs. Junction Temperature



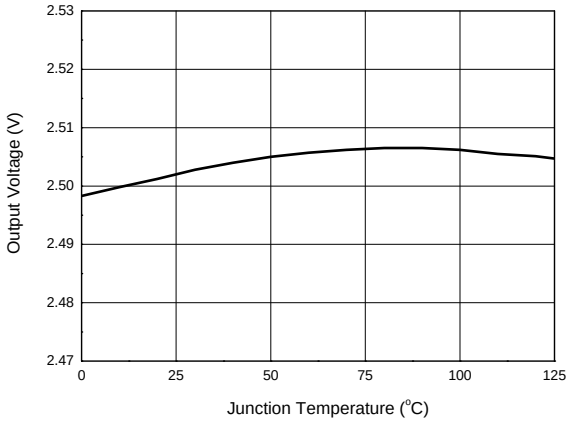
Load Regulation vs. Junction Temperature



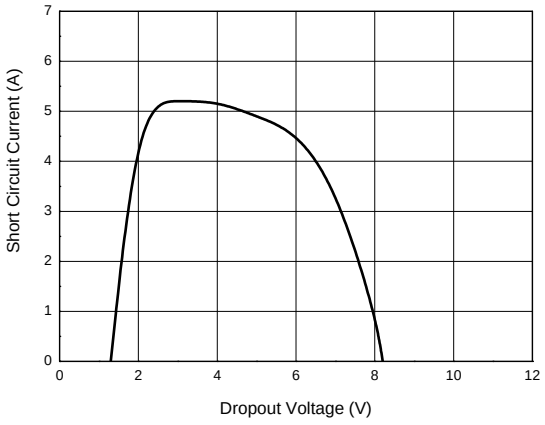
Dropout Voltage vs. Junction Temperature



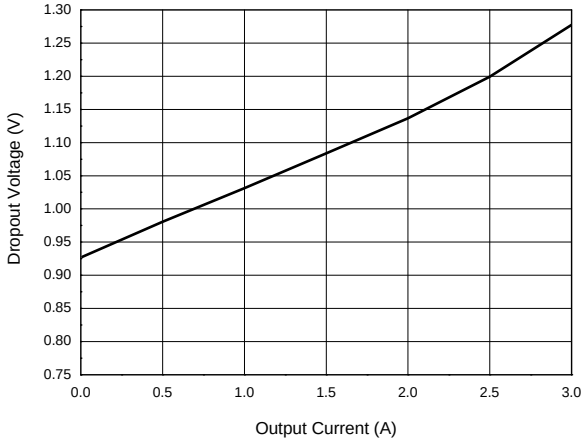
Output Voltage vs. Junction Temperature



Short Circuit Current vs. Dropout Voltage

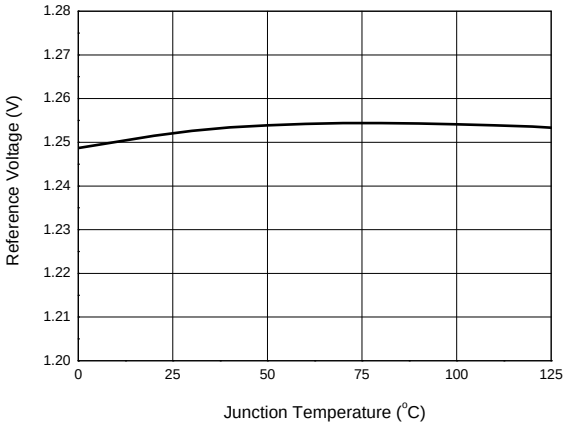


Dropout Voltage vs. Output Current

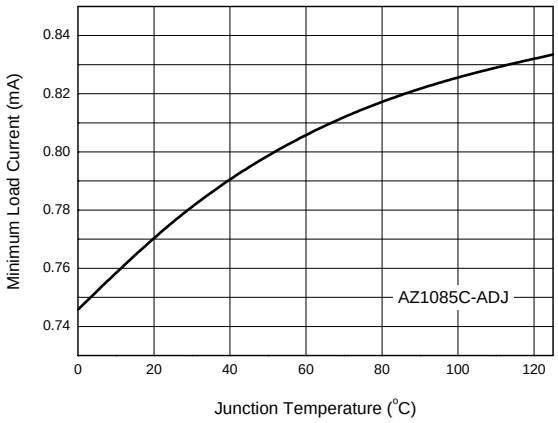


Performance Characteristics (Cont.)

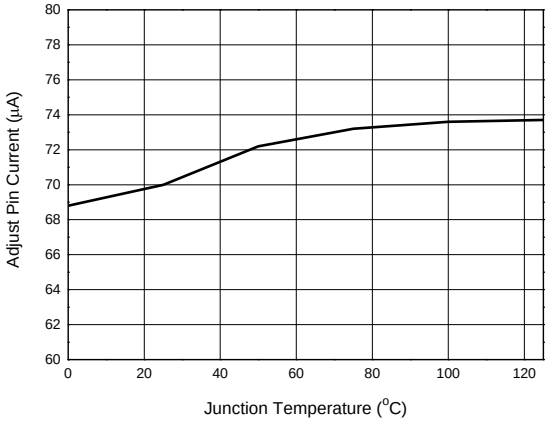
Reference Voltage vs. Junction Temperature



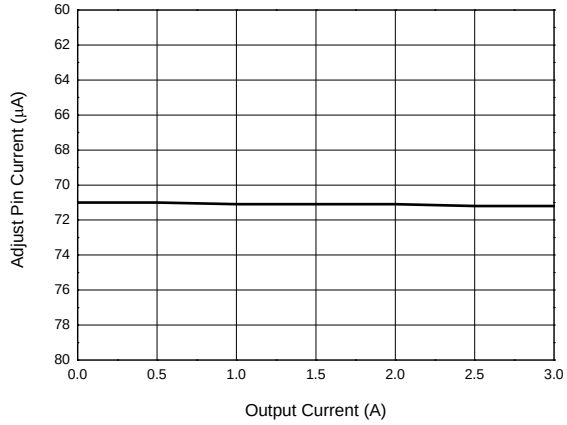
Minimum Load Current vs. Junction Temperature



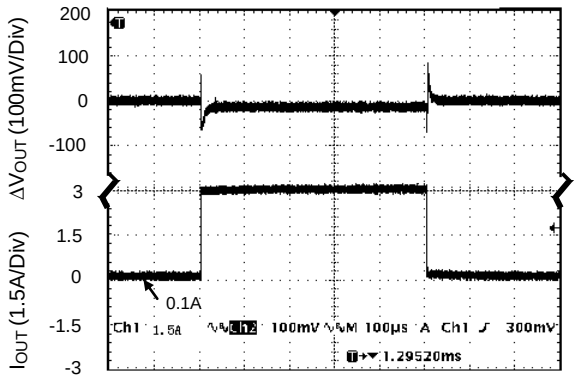
Adjust Pin Current vs. Junction Temperature



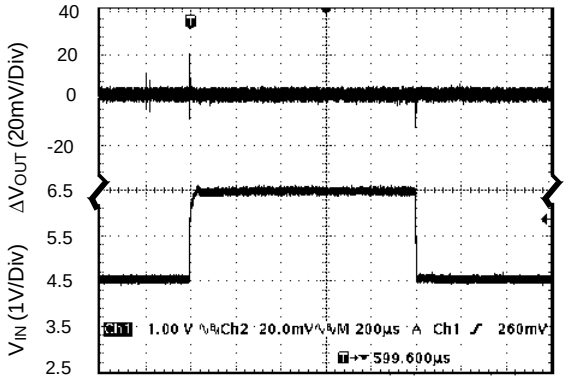
Adjust Pin Current vs. Output Current



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

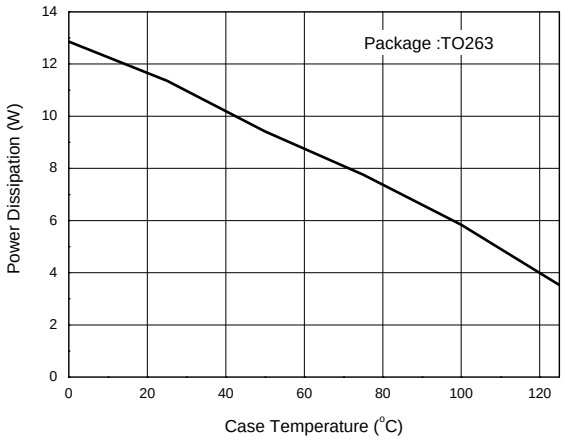


Line Transient Response
(Conditions: V_{IN} = 4.5V to 6.5V, V_{OUT} = 2.5V, I_{OUT} = 200mA, C_{IN} = 1µF, C_{OUT} = 10µF)

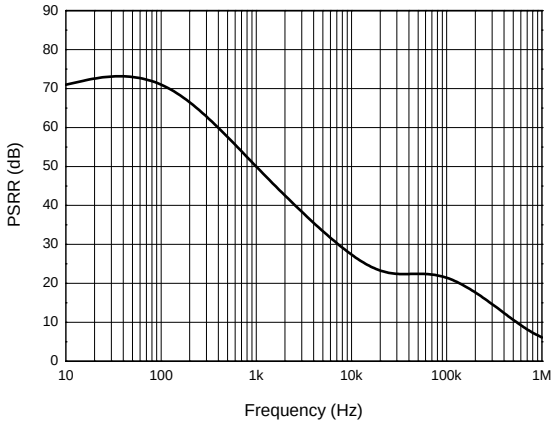


Performance Characteristics (Cont.)

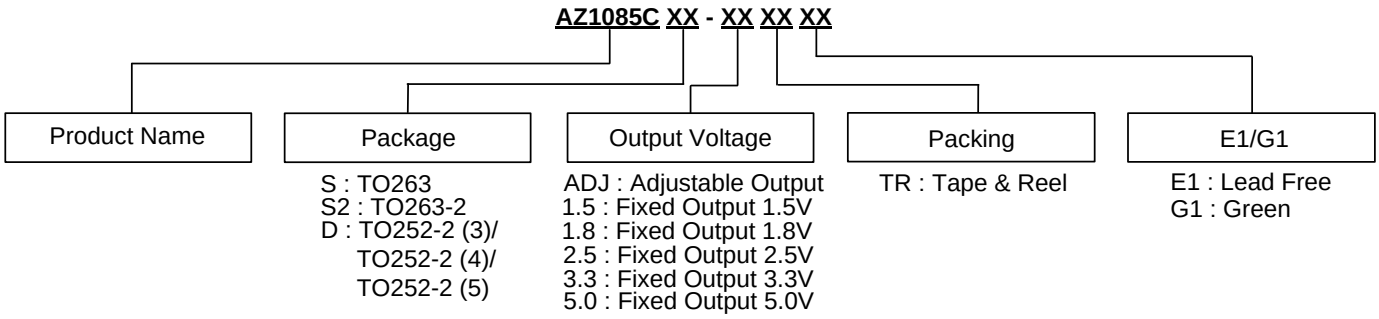
Power Dissipation vs. Case Temperature



PSRR vs. Frequency



Ordering Information



Diodes IC'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.

Package	Temperature Range	Part Number		Marking ID		Packing
		Lead Free	Green	Lead Free	Green	
TO263	0 to +125°C	AZ1085CS-ADJTRE1	AZ1085CS-ADJTRG1	AZ1085CS-ADJE1	AZ1085CS-ADJG1	800/Tape & Reel
TO263	0 to +125°C	AZ1085CS-1.5TRE1	AZ1085CS-1.5TRG1	AZ1085CS-1.5E1	AZ1085CS-1.5G1	800/Tape & Reel
TO263	0 to +125°C	AZ1085CS-1.8TRE1	AZ1085CS-1.8TRG1	AZ1085CS-1.8E1	AZ1085CS-1.8G1	800/Tape & Reel
TO263	0 to +125°C	AZ1085CS-2.5TRE1	AZ1085CS-2.5TRG1	AZ1085CS-2.5E1	AZ1085CS-2.5G1	800/Tape & Reel
TO263	0 to +125°C	AZ1085CS-3.3TRE1	AZ1085CS-3.3TRG1	AZ1085CS-3.3E1	AZ1085CS-3.3G1	800/Tape & Reel
TO263	0 to +125°C	AZ1085CS-5.0TRE1	AZ1085CS-5.0TRG1	AZ1085CS-5.0E1	AZ1085CS-5.0G1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-ADJTRE1	AZ1085CS2-ADJTRG1	AZ1085CS2-ADJE1	AZ1085CS2-ADJG1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-1.5TRE1	AZ1085CS2-1.5TRG1	AZ1085CS2-1.5E1	AZ1085CS2-1.5G1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-1.8TRE1	AZ1085CS2-1.8TRG1	AZ1085CS2-1.8E1	AZ1085CS2-1.8G1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-2.5TRE1	AZ1085CS2-2.5TRG1	AZ1085CS2-2.5E1	AZ1085CS2-2.5G1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-3.3TRE1	AZ1085CS2-3.3TRG1	AZ1085CS2-3.3E1	AZ1085CS2-3.3G1	800/Tape & Reel
TO263-2	0 to +125°C	AZ1085CS2-5.0TRE1	AZ1085CS2-5.0TRG1	AZ1085CS2-5.0E1	AZ1085CS2-5.0G1	800/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-ADJTRG1	–	AZ1085CD-ADJG1	2500/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-1.5TRG1	–	AZ1085CD-1.5G1	2500/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-1.8TRG1	–	AZ1085CD-1.8G1	2500/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-2.5TRG1	–	AZ1085CD-2.5G1	2500/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-3.3TRG1	–	AZ1085CD-3.3G1	2500/Tape & Reel
TO252-2 (3)/(4)/(5)	0 to +125°C	–	AZ1085CD-5.0TRG1	–	AZ1085CD-5.0G1	2500/Tape & Reel

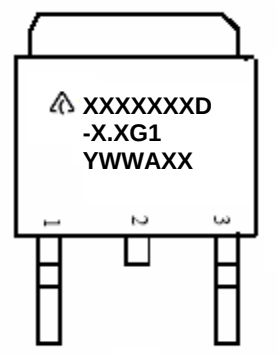
Lead-Free

Lead-free Green

Marking Information

(1) TO252-2 Series

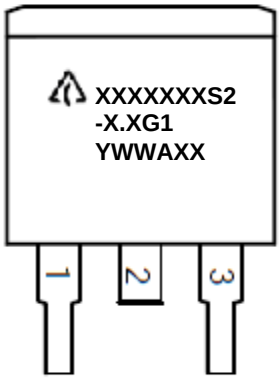
(Top View)



First and Second Lines: Logo and Marking ID
(See Ordering Information)
Third Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

(2) TO263-2 Series

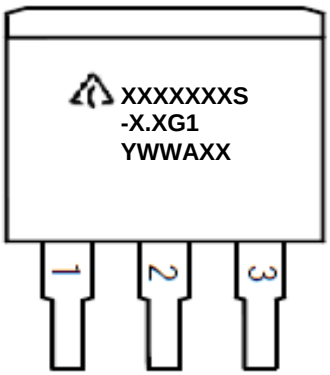
(Top View)



First and Second Lines: Logo and Marking ID
(See Ordering Information)
Third Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

(3) TO263 Series

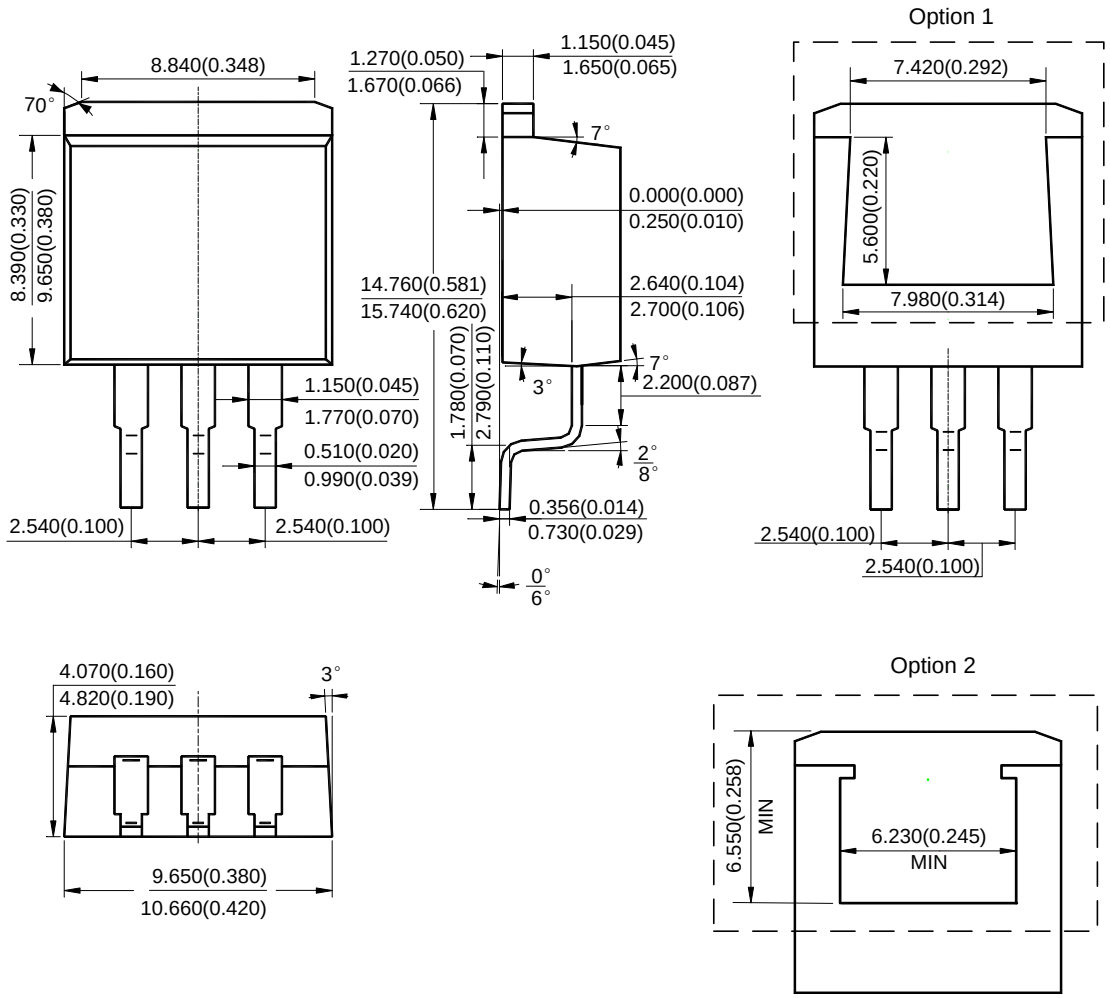
(Top View)



First and Second Lines: Logo and Marking ID
(See Ordering Information)
Third Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

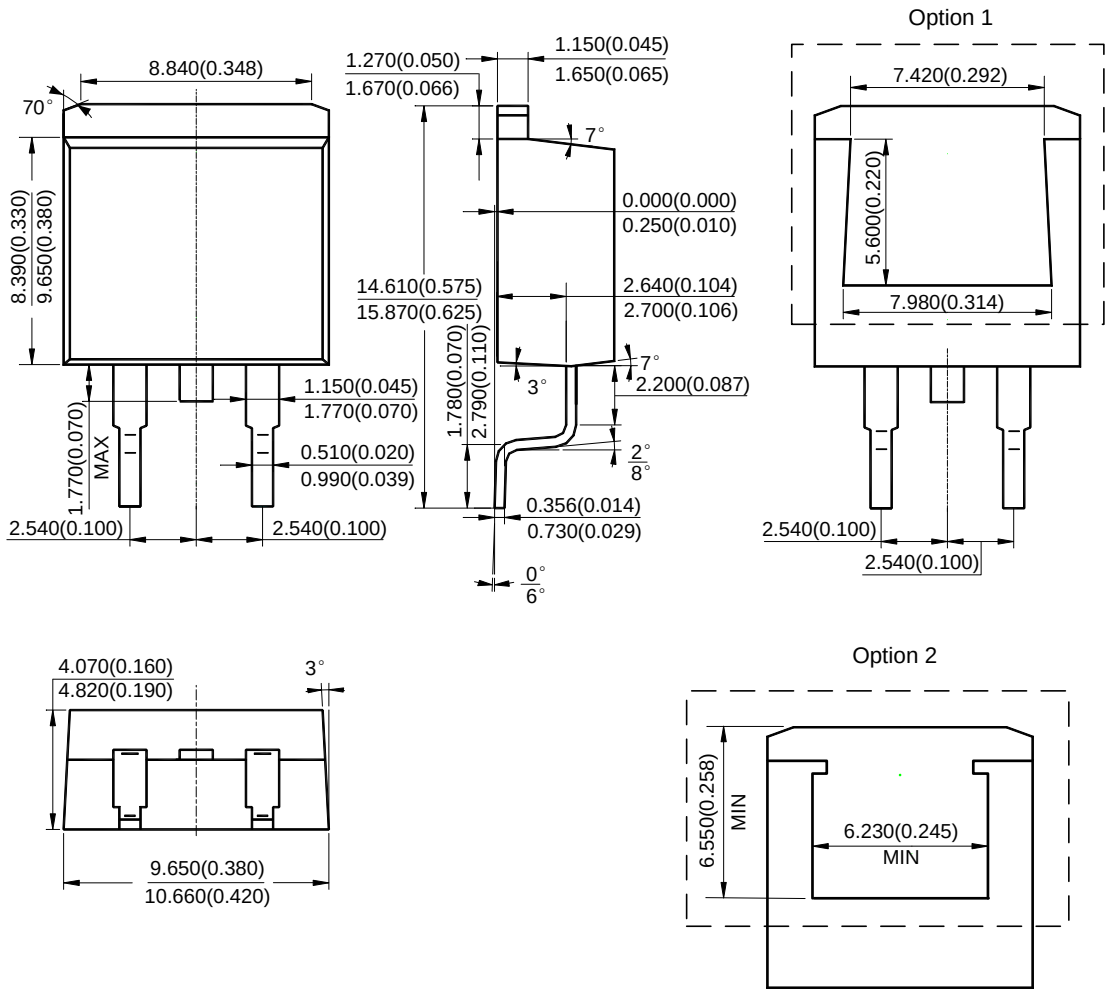
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: TO263



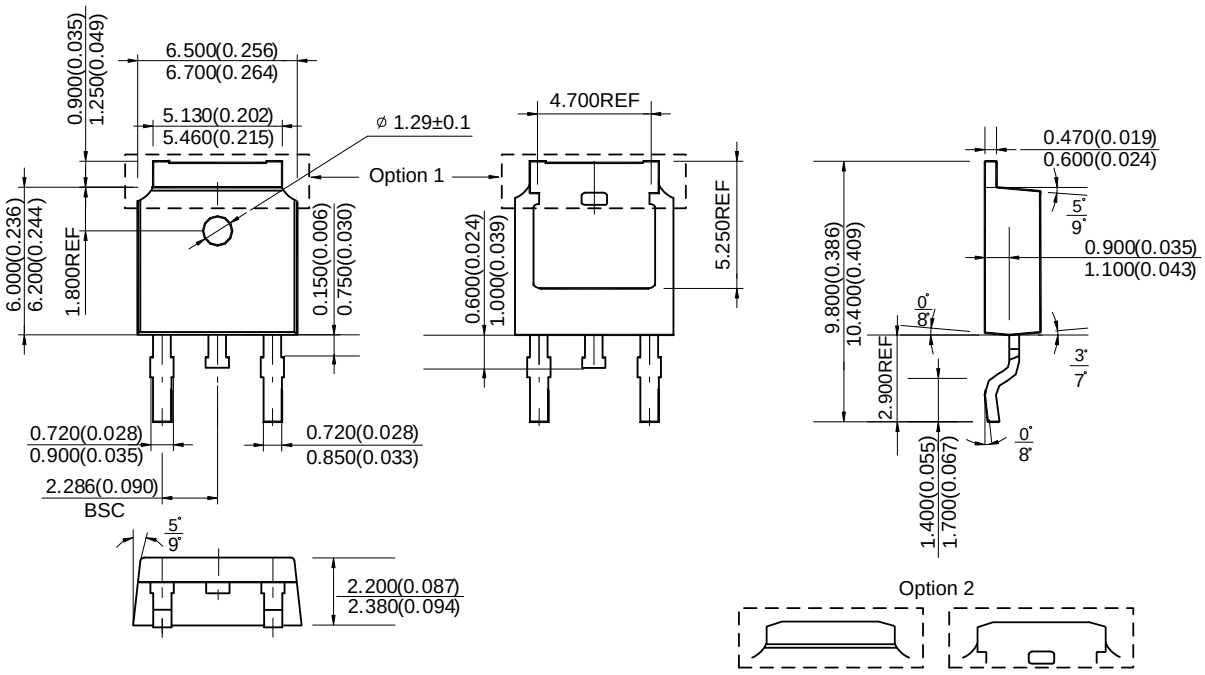
Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(2) Package Type: TO263-2



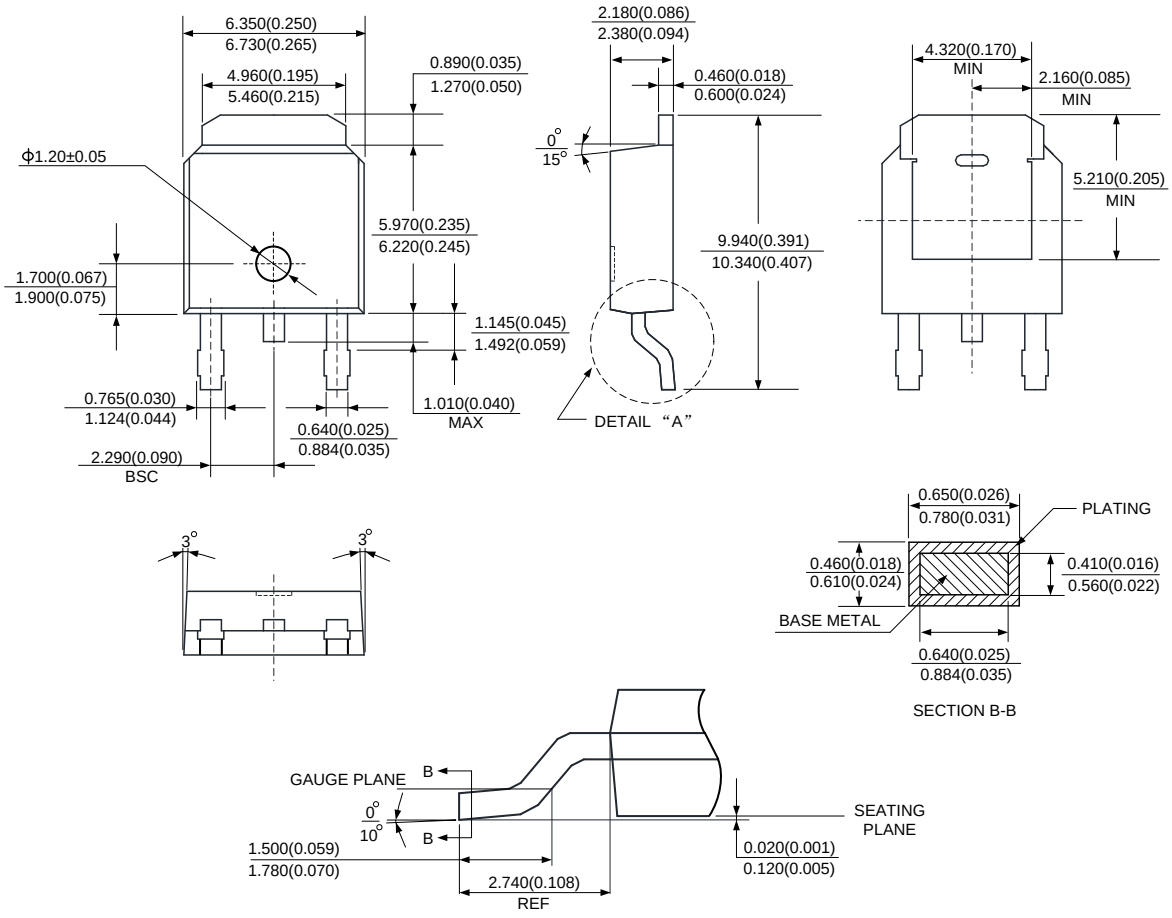
Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(3) Package Type: TO252-2 (3)



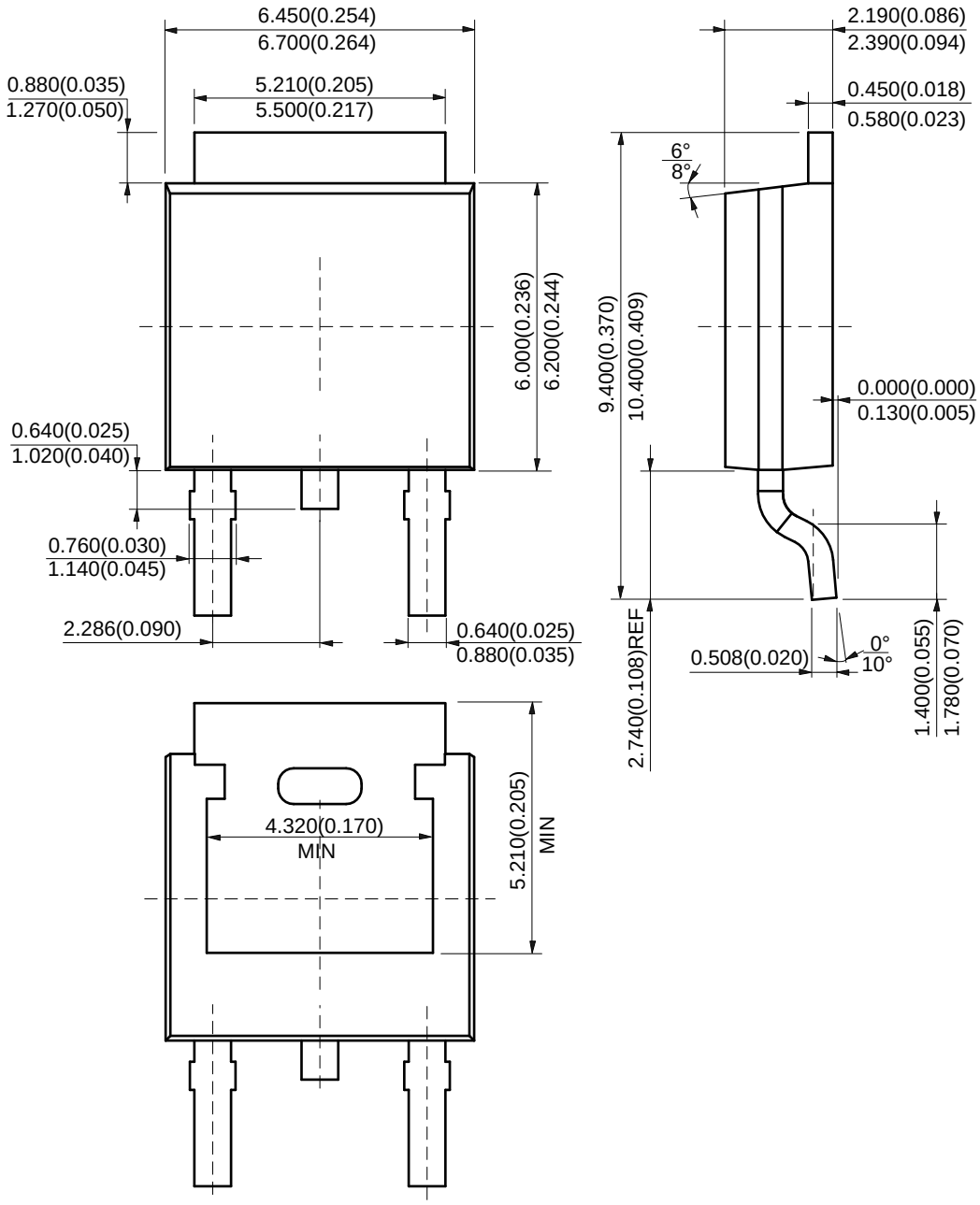
Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(4) Package Type: TO252-2 (4)



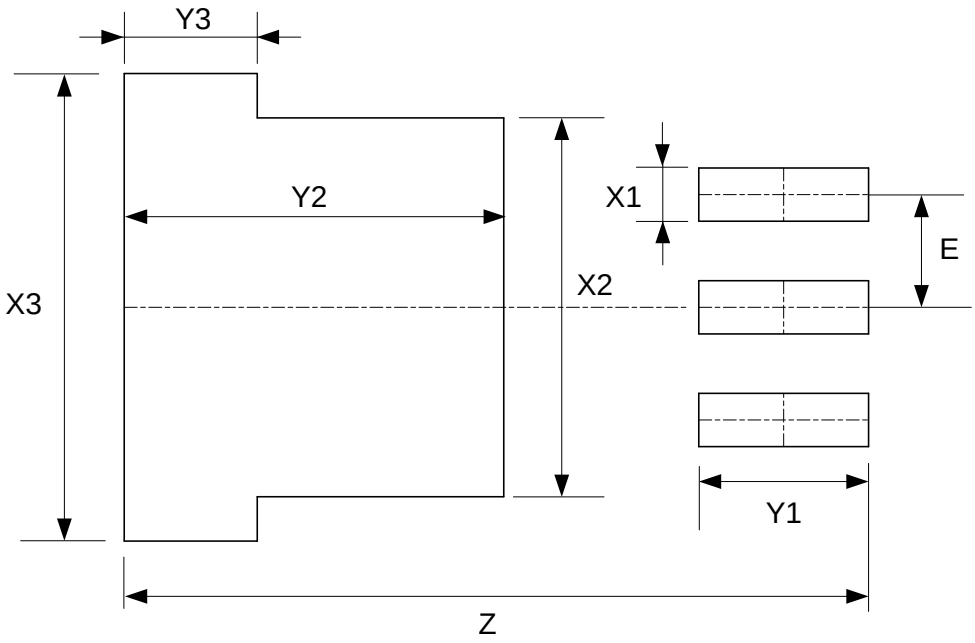
Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(5) Package Type: TO252-2 (5)



Suggested Pad Layout

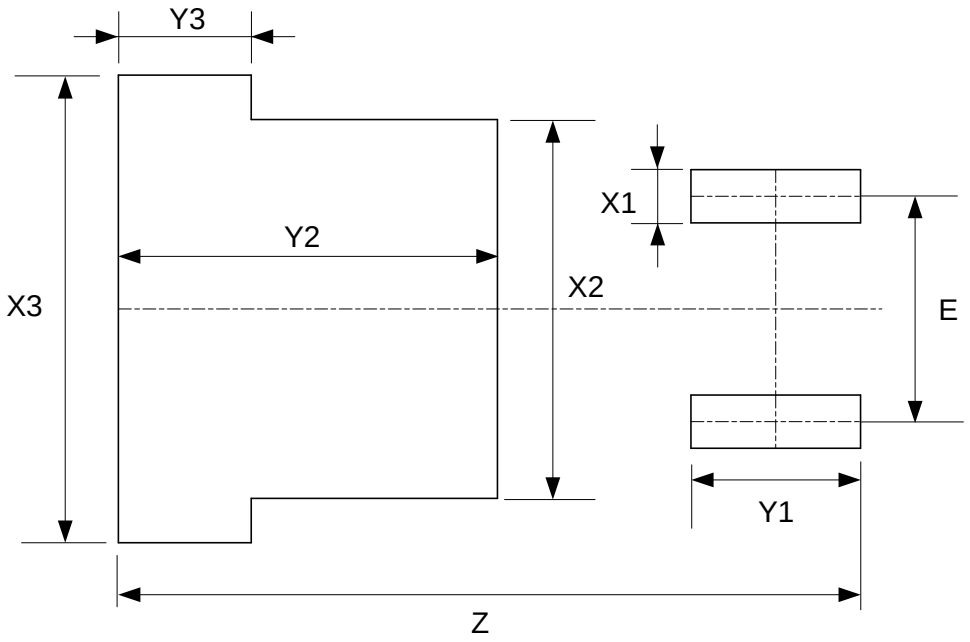
(1) Package Type: TO263



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	X3 (mm)/(inch)
Value	16.760/0.660	1.200/0.047	8.540/0.336	10.540/0.415
Dimensions	Y1 (mm)/(inch)	Y2 (mm)/(inch)	Y3 (mm)/(inch)	E (mm)/(inch)
Value	3.830/0.151	8.560/0.337	3.000/0.118	2.540/0.100

Suggested Pad Layout (Cont.)

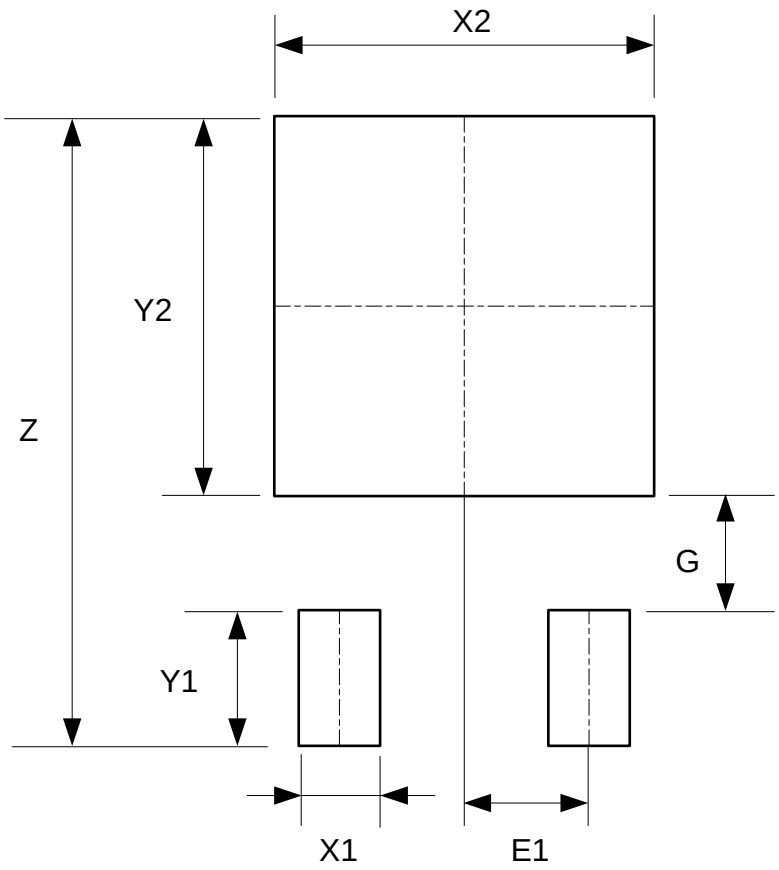
(2) Package Type: TO263-2



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	X3 (mm)/(inch)
Value	16.760/0.660	1.200/0.047	8.540/0.336	10.540/0.415
Dimensions	Y1 (mm)/(inch)	Y2 (mm)/(inch)	Y3 (mm)/(inch)	E (mm)/(inch)
Value	3.830/0.151	8.560/0.337	3.000/0.118	5.080/0.200

Suggested Pad Layout (Cont.)

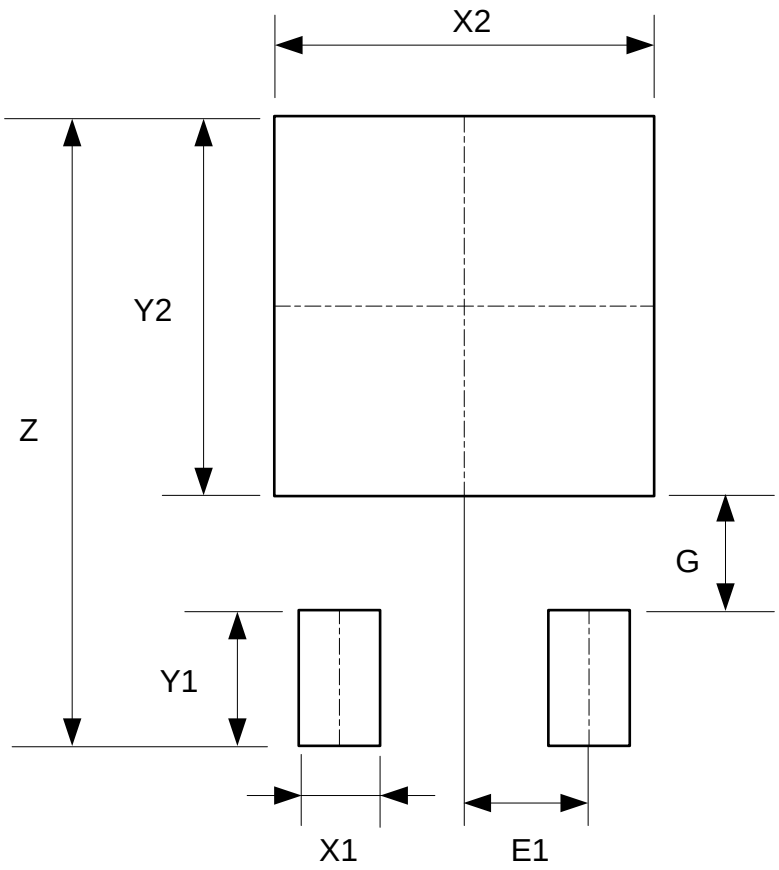
(3) Package Type: TO252-2 (3)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (Cont.)

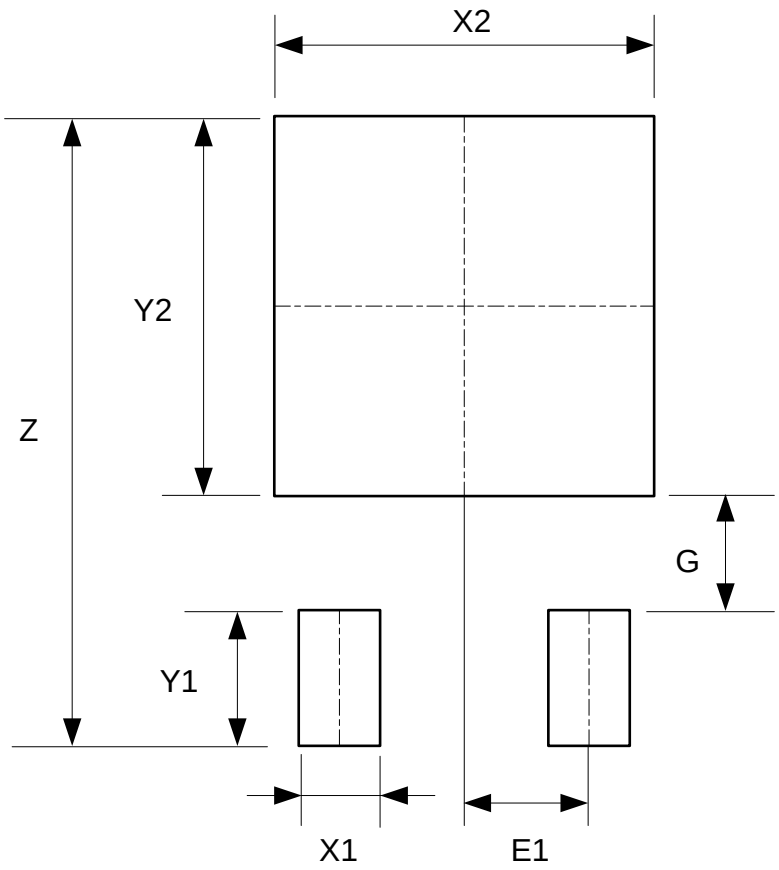
(4) Package Type: TO252-2 (4)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (Cont.)

(5) Package Type: TO252-2 (5)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

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