Description

The AZ1084C is a series of low-dropout positive-voltage regulators with a maximum dropout of 1.5V at 5A of load current.

The series features on-chip thermal limiting, which provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures. It also includes a trimmed bandgap reference and a current-limiting circuit.

The AZ1084C is available in 1.5V, 1.8V, 2.5V, 3.3V and 5.0V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set the output voltage with two external resistors.

The AZ1084C series is available in the standard packages of TO252-2 (3), TO252-2 (4), TO252-2 (5) and TO252 (Type CJ).

Features

- Low Dropout Voltage: 1.35V typical at 5A
- Current Limiting and Thermal Protection
- Output Current: 5A
- Current Limit: 6.5A
- Operating Junction Temperature Range: 0°C to +125°C
- Compatible with Low ESR Ceramic Capacitor
- Line Regulation (Adj Version): 0.015% (typ)
- Load Regulation (Adj Version): 0.1% (typ)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

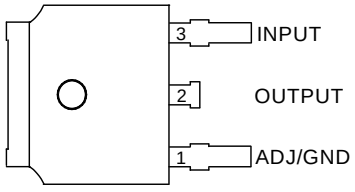
Applications

- High-efficiency linear regulators
- Battery chargers
- Post-regulation for switching supplies
- Microprocessor supplies
- Desktop PCs, RISC and embedded processors' supplies

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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.

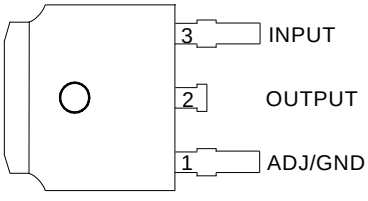
Pin Assignments

(Top View)



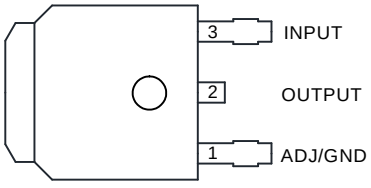
TO252-2 (3) Option 1

(Top View)



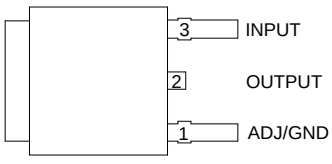
TO252-2 (3) Option 2 / TO252 (Type CJ)

(Top View)



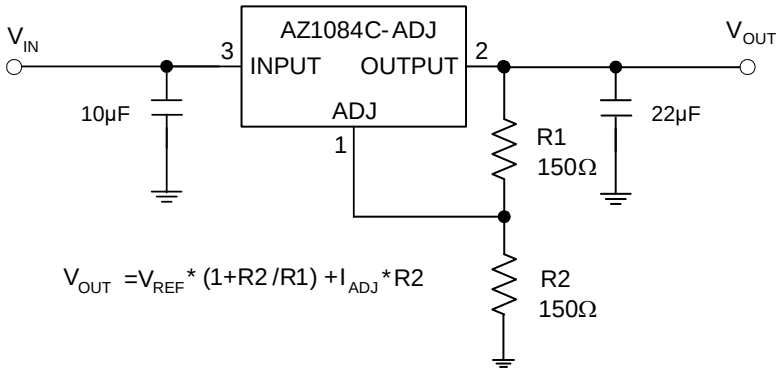
TO252-2 (4)

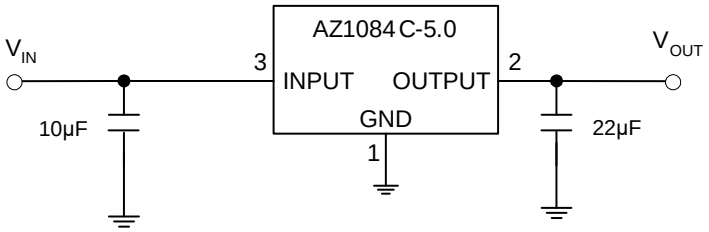
(Top View)



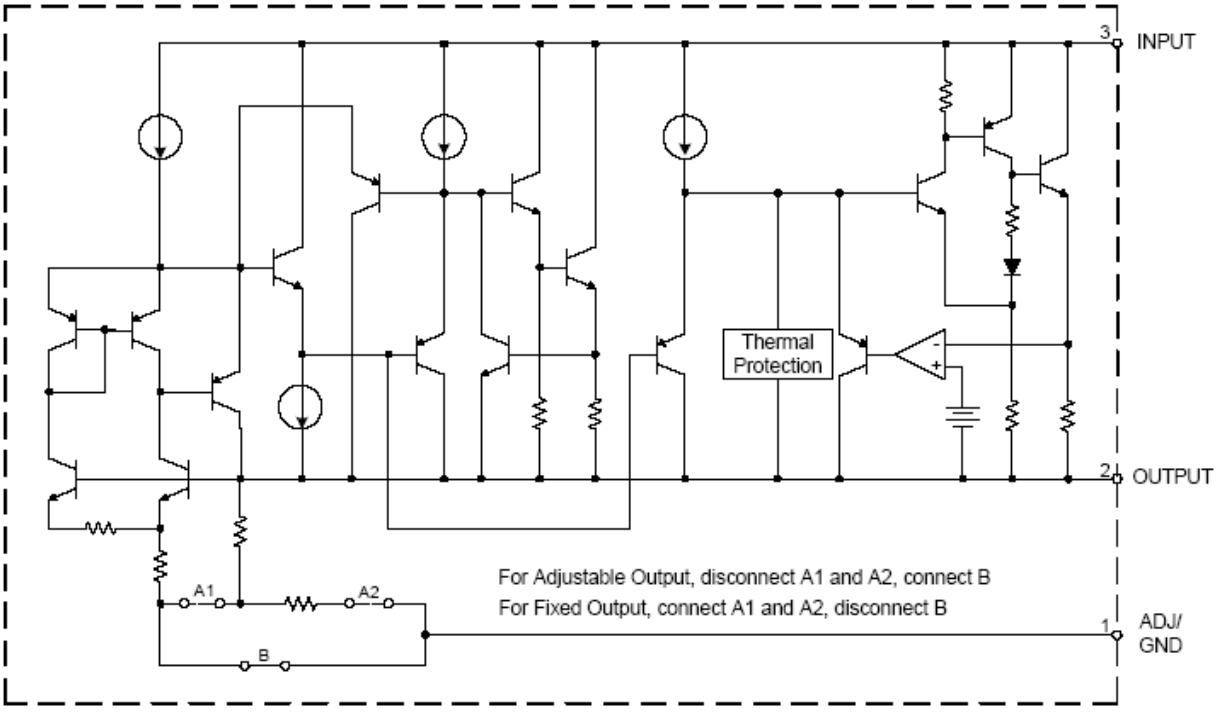
TO252-2 (5)

Typical Applications Circuit





Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	13.2	V
T_J	Operating Junction Temperature	+150	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec.)	+260	°C
θ_{JA}	Thermal Resistance (Note 5)	100	°C/W
ESD	ESD (Human Body Model)	2000	V
ESD	ESD (Machine Model)	400	V

Notes:
4. Stresses greater than those listed under *"Absolute Maximum Ratings"* can 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 can 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	°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.)

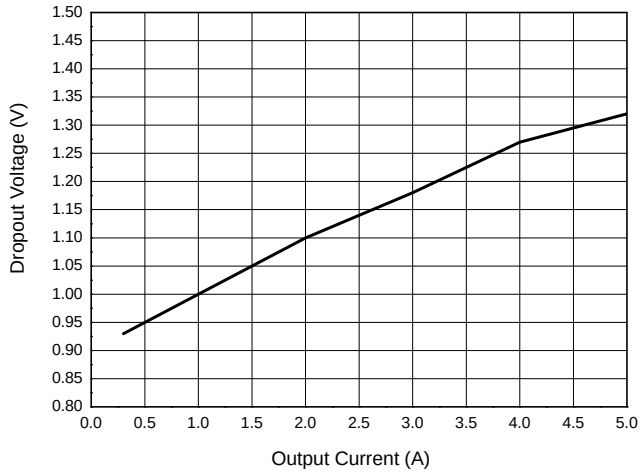
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	AZ1084C-ADJ, I_{OUT} = 10mA, V_{IN}-V_{OUT} = 3V, 10mA ≤ I_{OUT} ≤ 5A, 1.5V ≤ V_{IN}-V_{OUT} ≤ 5V	1.238 1.225	1.250 1.250	1.262 1.270	V
V_{OUT}	Output Voltage	AZ1084C-1.5, I_{OUT} = 0mA, V_{IN} = 4.5V, 10mA ≤ I_{OUT} ≤ 5A, 3.0V ≤ V_{IN} ≤ 6V	1.485 1.47	1.5 1.5	1.515 1.53	V
		AZ1084C-1.8, I_{OUT} = 0mA, V_{IN} = 4.8V, 10mA ≤ I_{OUT} ≤ 5A, 3.3V ≤ V_{IN} ≤ 6V	1.782 1.764	1.8 1.8	1.818 1.836	V
		AZ1084C-2.5, I_{OUT} = 0mA, V_{IN} = 5.5V 10mA ≤ I_{OUT} ≤ 5A, 4.0V ≤ V_{IN} ≤ 7V	2.475 2.45	2.5 2.5	2.525 2.55	V
		AZ1084C-3.3, I_{OUT} = 0mA, V_{IN} = 6.3V, 10mA ≤ I_{OUT} ≤ 5A, 4.8V ≤ V_{IN} ≤ 8V	3.267 3.234	3.3 3.3	3.333 3.366	V
		AZ1084C-5.0, I_{OUT} = 0mA, V_{IN} = 8V, 10mA ≤ I_{OUT} ≤ 5A, 6.5V ≤ V_{IN} ≤ 10V	4.95 4.9	5 5	5.05 5.1	V
ΔV_{OUT}	Line Regulation	AZ1084C-ADJ, I_{OUT} = 10mA, 2.85V ≤ V_{IN} ≤ 10V	—	0.015 0.035	0.2 0.2	%
		AZ1084C-1.5, I_{OUT} = 10mA, 3.0V ≤ V_{IN} ≤ 10V	—	0.5 1	6 6	mV
		AZ1084C-1.8, I_{OUT} = 10mA, 3.3V ≤ V_{IN} ≤ 10V	—	0.5 1	6 6	mV
		AZ1084C-2.5, I_{OUT} = 10mA, 4.0V ≤ V_{IN} ≤ 10V	—	0.5 1	6 6	mV
		AZ1084C-3.3, I_{OUT} = 10mA, 4.8V ≤ V_{IN} ≤ 10V	—	0.5 1	6 6	mV
		AZ1084C-5.0, I_{OUT} = 10mA, 6.5V ≤ V_{IN} ≤ 10V	—	0.5 1	10 10	mV
ΔV_{OUT}	Load Regulation	AZ1084C-ADJ, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	0.1 0.2	0.3 0.4	%
		AZ1084C-1.5, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	3 7	15 20	mV
		AZ1084C-1.8, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	3 7	15 20	mV
		AZ1084C-2.5, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	3 7	15 20	mV
		AZ1084C-3.3, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	3 7	15 20	mV
		AZ1084C-5.0, 0mA ≤ I_{OUT} ≤ 5A, V_{IN}-V_{OUT} = 3V	—	5 10	20 35	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 4.5A, ΔV_{REF}, ΔV_{OUT} = 1%	—	1.35	1.5	V
θ_{JC}	Thermal Resistance (Junction to Case)	—	—	7.36	—	°C/W

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.)

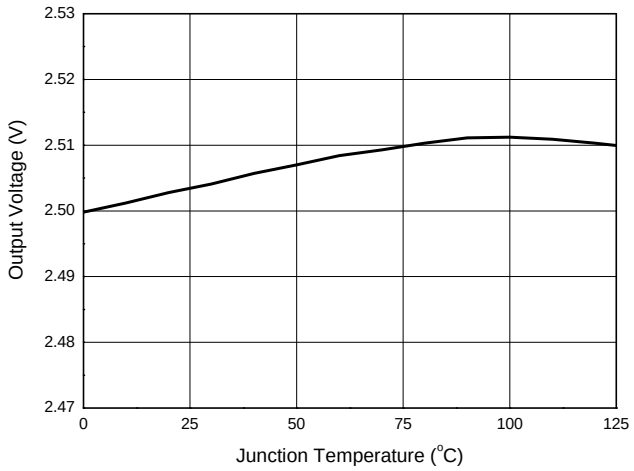
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 3V	5.5	6.5	—	A
$I_{LOAD\ (MIN)}$	Minimum Load Current	V_{IN} = 10V (AZ1084C-ADJ)	—	3	10	mA
I_Q	Quiescent Current	V_{IN} = 10V (AZ1084C)	—	5	10	mA
PSRR	Ripple Rejection	f_{RIPPLE} = 120Hz, C_{OUT} = 25µF Tantalum, I_{OUT} = 5A, 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} ≤ 5A, 1.5V ≤ (V_{IN}-V_{OUT}) ≤ 4.5V	—	0.2	5	µA
—	Temperature Stability	I_{OUT} = 10mA, V_{IN}-V_{OUT} = 1.5V	—	0.5	—	%
—	Long Term Stability	T_A = +125°C, 1000Hrs	—	0.5	—	%
—	RMS Noise (% of V_{OUT})	10Hz ≤ f ≤ 10kHz	—	0.003	—	%

Performance Characteristics

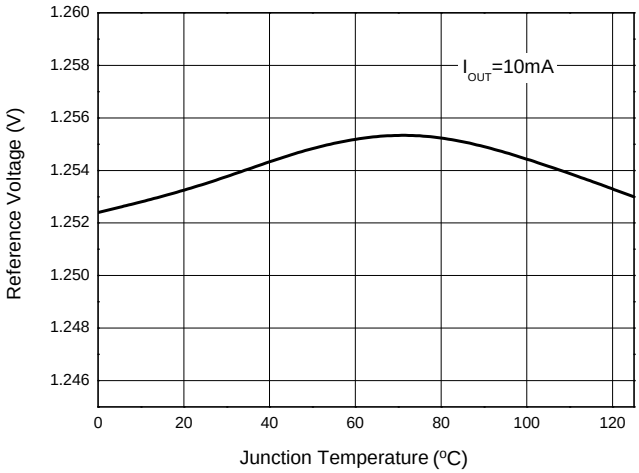
Dropout Voltage vs. Output Current



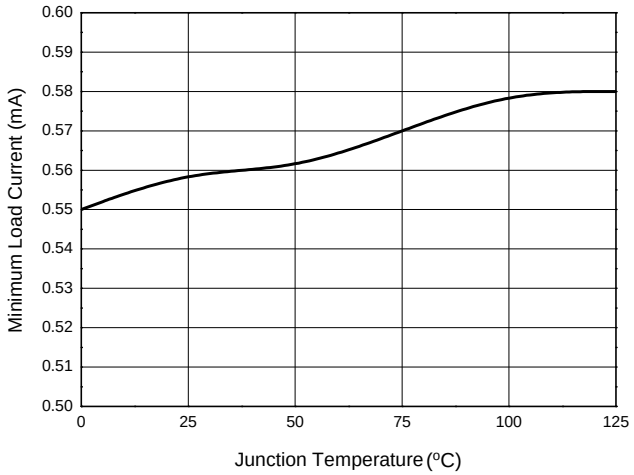
Output Voltage vs. Junction Temperature



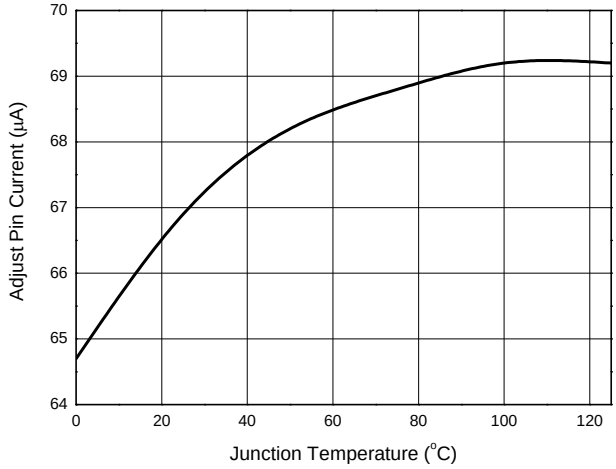
Reference Voltage vs. Junction Temperature



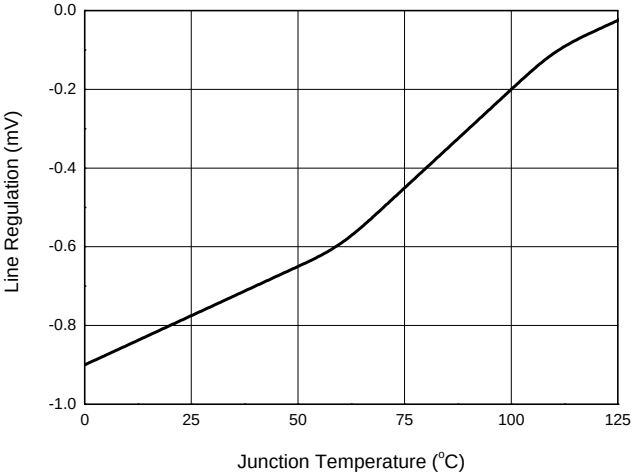
Minimum Load Current vs. Junction Temperature



Adjust Pin Current vs. Junction Temperature

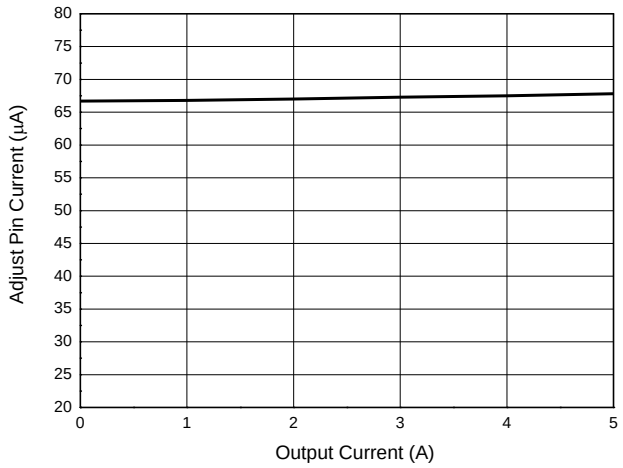


Line Regulation vs. Junction Temperature

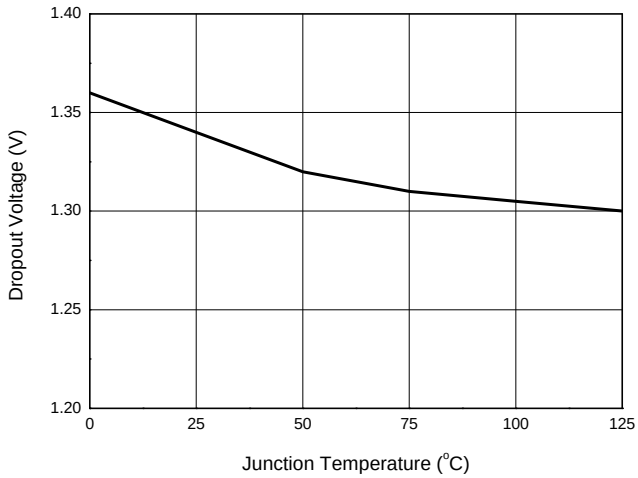


Performance Characteristics (continued)

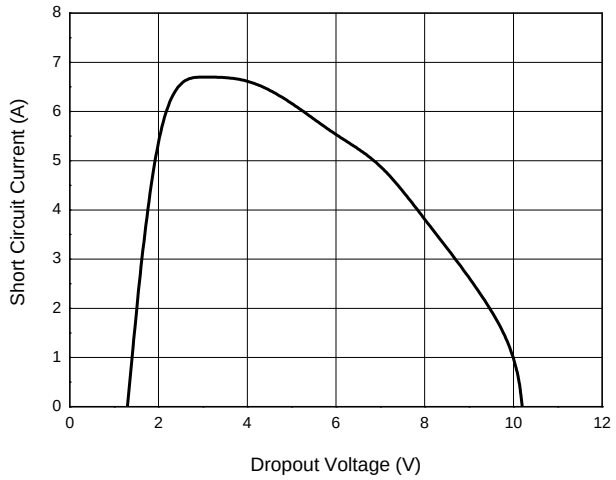
Adjust Pin Current vs. Output Current



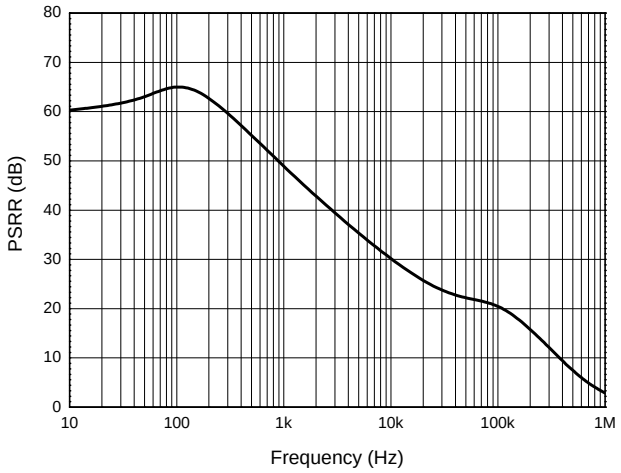
Dropout Voltage vs. Junction Temperature



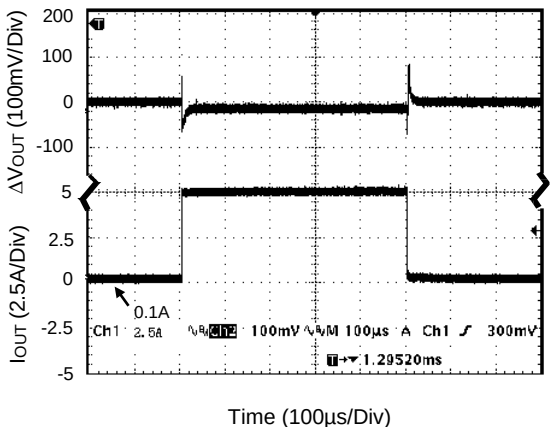
Short Circuit Current vs. Dropout Voltage



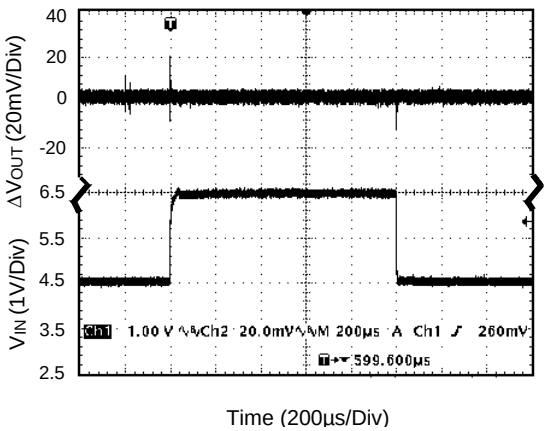
PSRR vs. Frequency



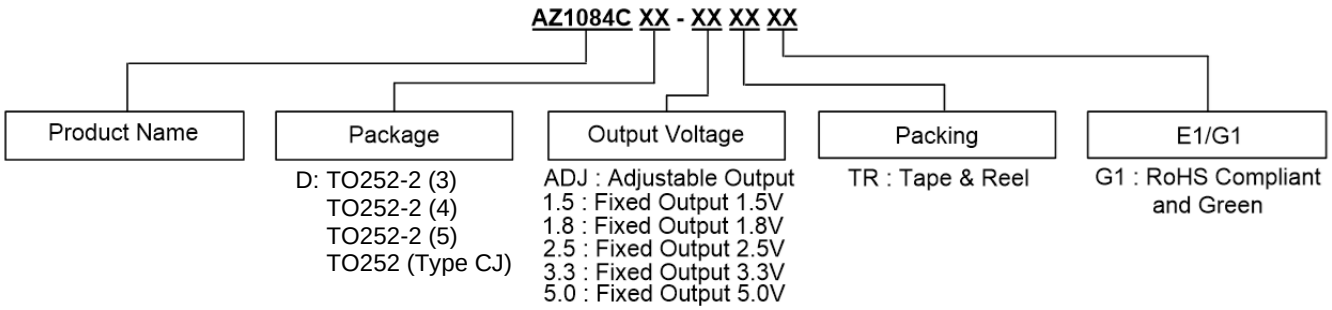
Load Transient Response
(Conditions: V_{IN} = 5.5V, V_{OUT} = 2.5V, I_{OUT} = 10mA to 5A, C_{IN} = 10μF, C_{OUT} = 10μF)



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



Ordering Information

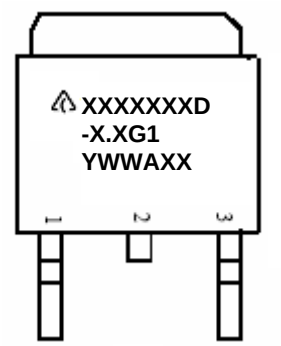


Part Number	Package	Temperature Range	Marking ID	Packing	
RoHS Compliant and Green			RoHS Compliant and Green	Qty.	Carrier
AZ1084CD-ADJTRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-ADJG1	2500	Tape & Reel
AZ1084CD-1.5TRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-1.5G1	2500	Tape & Reel
AZ1084CD-1.8TRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-1.8G1	2500	Tape & Reel
AZ1084CD-2.5TRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-2.5G1	2500	Tape & Reel
AZ1084CD-3.3TRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-3.3G1	2500	Tape & Reel
AZ1084CD-5.0TRG1	TO252-2 (3)/(4)/(5) TO252 (Type CJ)	0°C to +125°C	AZ1084CD-5.0G1	2500	Tape & Reel

Marking Information

(1) TO252-2 (3)/TO252-2 (4)/TO252-2 (5)/TO252 (Type CJ)

(Top View)

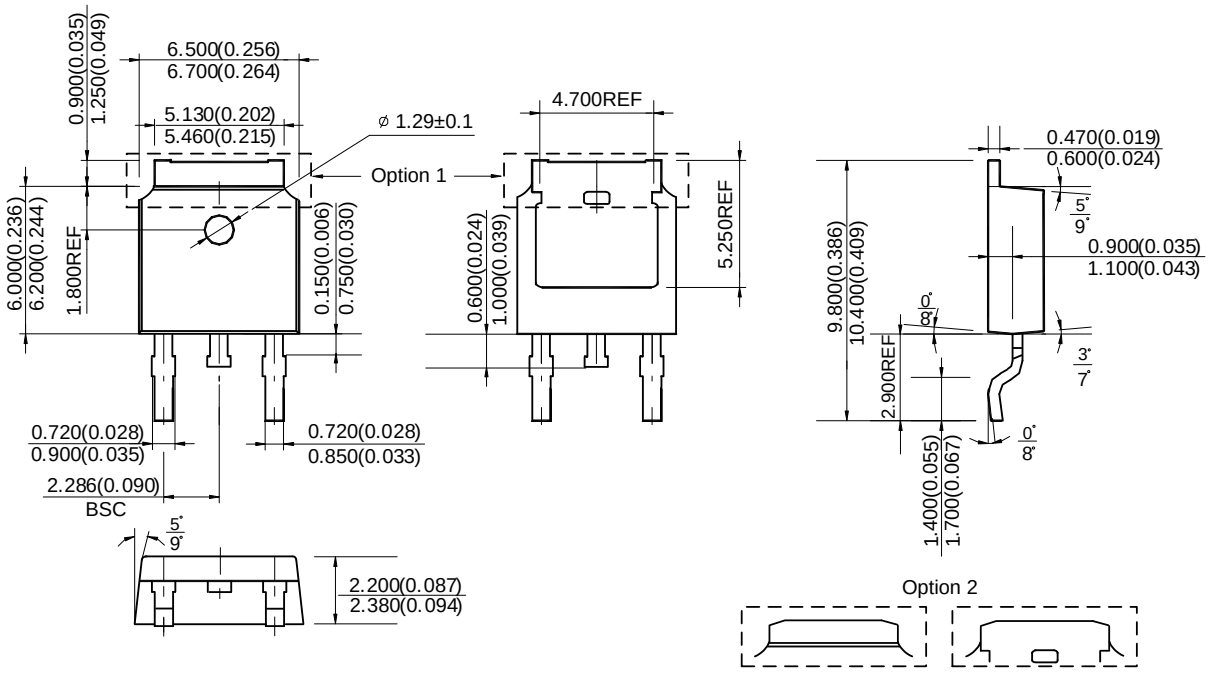


First and Second Lines: Logo and Marking ID
(See Ordering Information)
Third Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

Package Outline Dimensions (All dimensions in mm)

Please see http://www.diodes.com/package-outlines.html for the latest version.

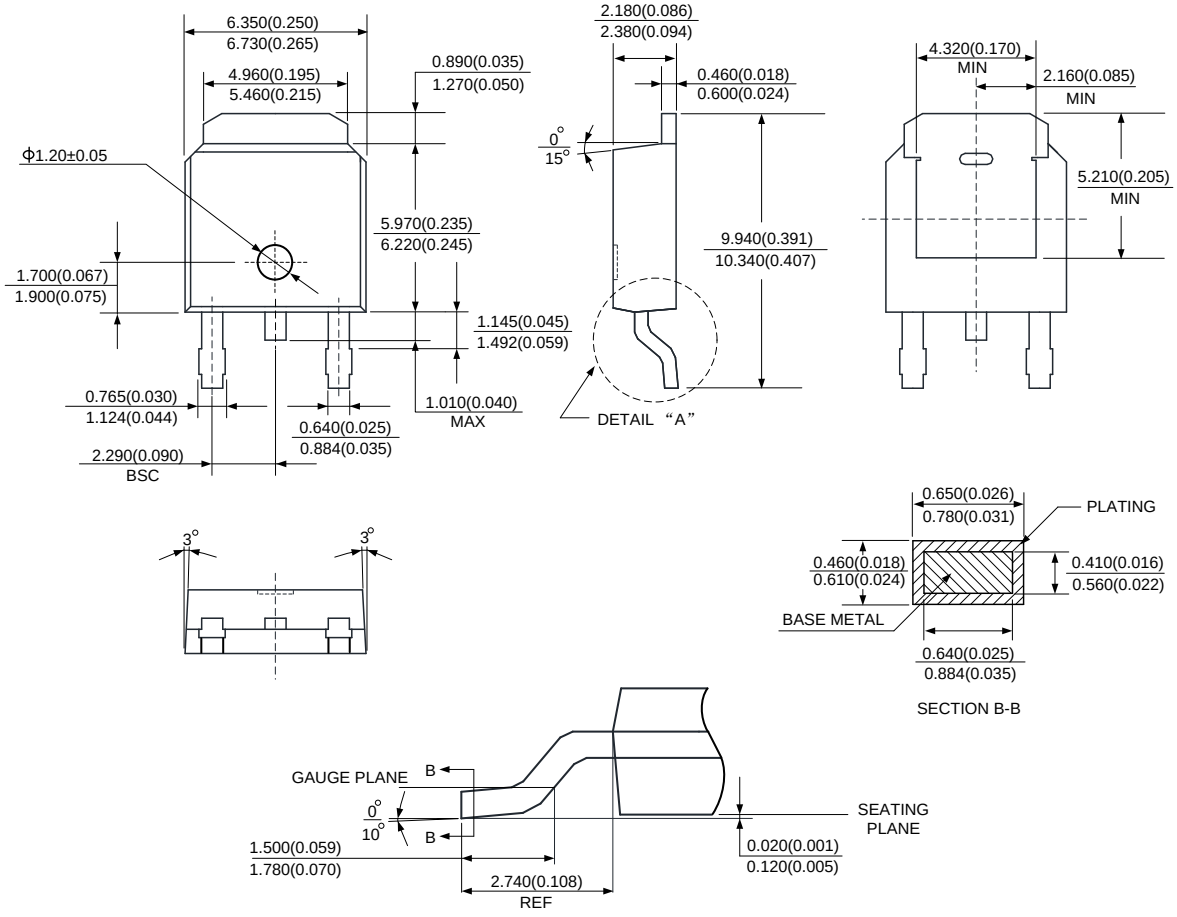
(1) Package Type: TO252-2 (3)



Package Outline Dimensions (All dimensions in mm) (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

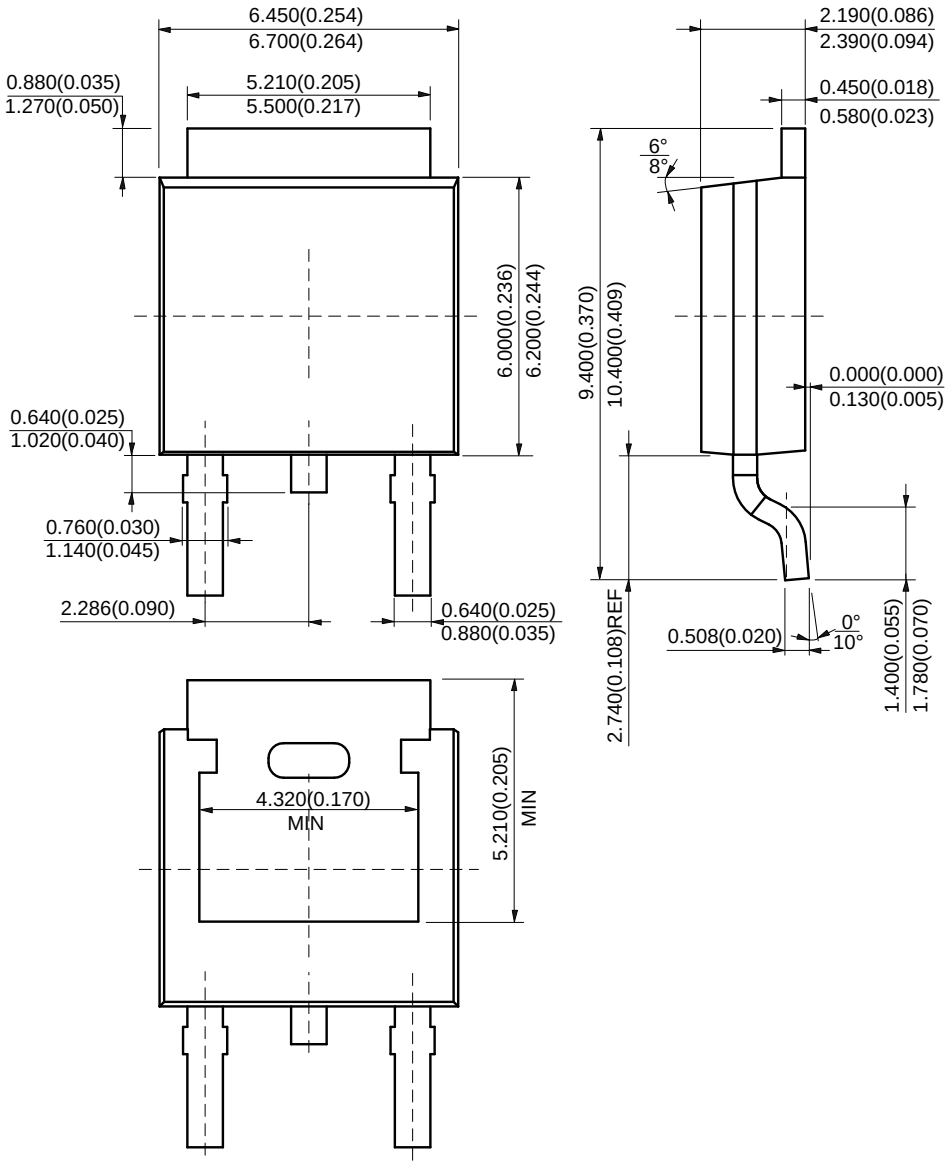
(2) Package Type: TO252-2 (4)



Package Outline Dimensions (All dimensions in mm) (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

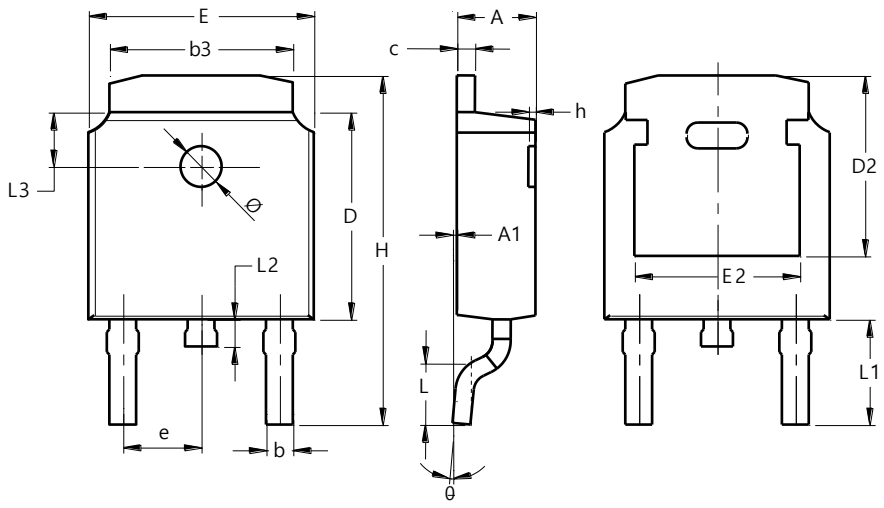
(3) Package Type: TO252-2 (5)



Package Outline Dimensions (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(4) Package Type: TO252 (Type CJ)

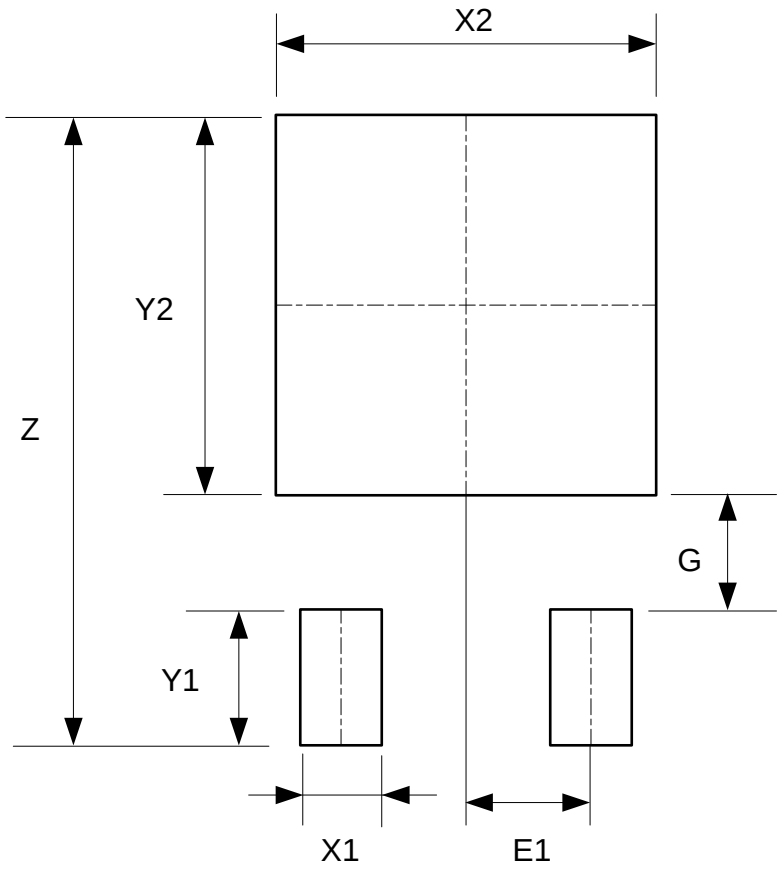


TO252 (Type CJ)			
Dim	**Min**	**Max**	**Typ**
A	2.200	2.400	--
A1	0.000	0.127	--
b	0.635	0.770	--
b3	5.100	5.460	--
c	0.460	0.580	--
D	6.000	6.200	--
D2	5.250 REF		
E	6.500	6.700	--
E2	4.830 REF		
e	2.186	2.386	--
h	0.000	0.300	--
H	9.712	10.312	--
L	1.400	1.700	--
L1	2.900 REF		
L2	0.600	1.000	--
L3	1.600 REF		
Ø	1.100	1.300	--
θ	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

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

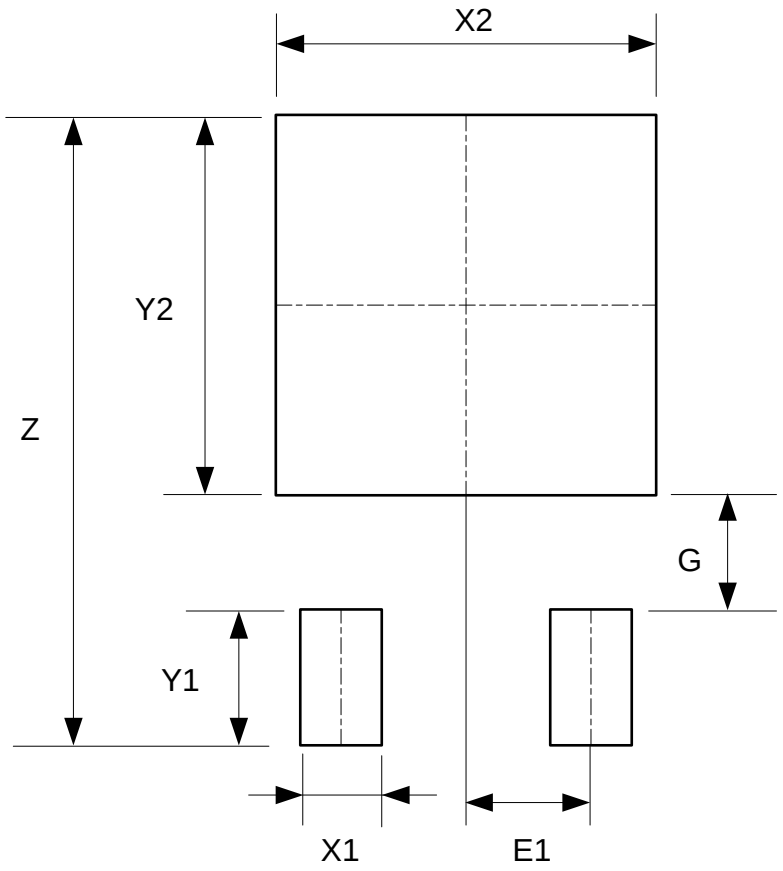


Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

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

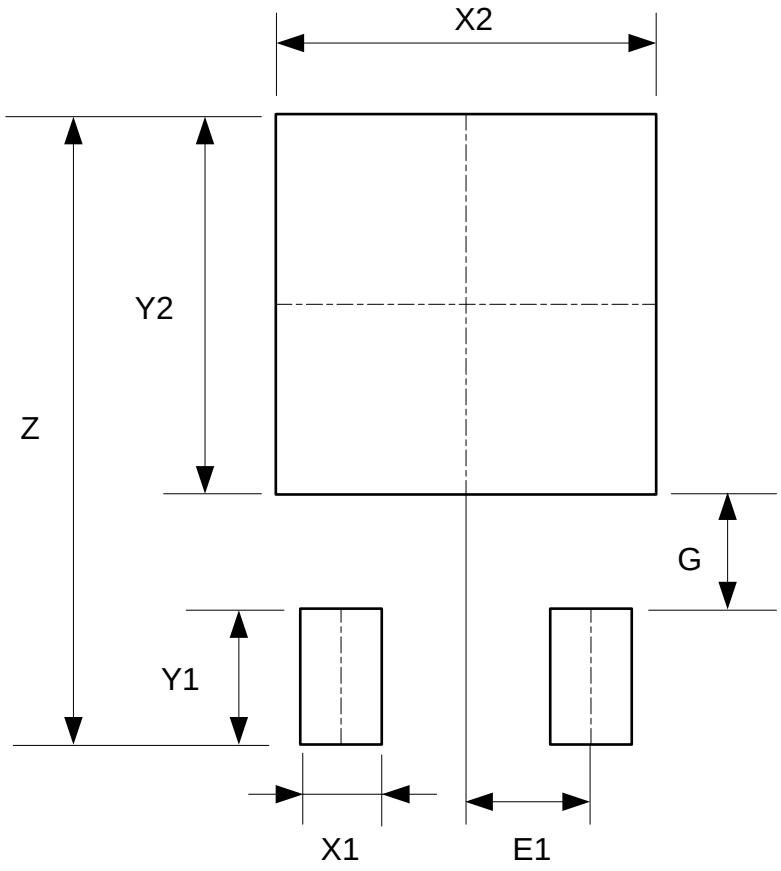


Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

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

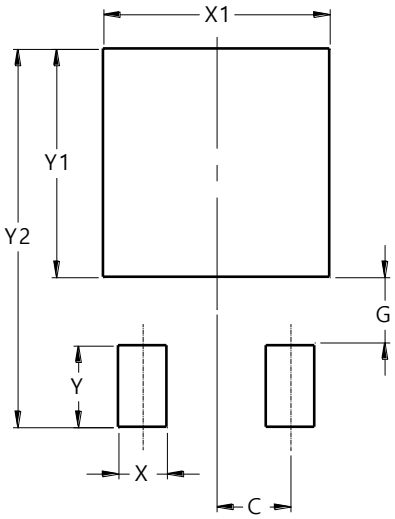


Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2=Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(4) Package Type: TO252 (Type CJ)



Dimensions	Value (in mm)
C	2.300
G	2.100
X	1.500
X1	7.000
Y	2.500
Y1	7.000
Y2	11.600

Mechanical Data

- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.312 grams (Approximate)

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