Description

The AS78XXA series are three-terminal positive voltage regulators designed for a wide variety of applications including local, on-card regulation.

The AS78XXA are complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking is provided, these regulators can deliver output currents of up to 1A.

The AS78XXA are available in TO-220-3, TO-220-3 (2), TO-252-2 (5), TO252 (Type CJ) and TO-263-2 packages.

Applications

- High-efficiency linear regulators
- Post regulation for switching supplies
- Microprocessor power supplies
- Motherboards
- Telecommunication.

Features

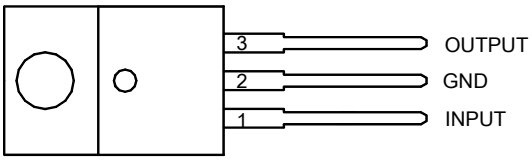
- Output Current up to 1A
- Fixed Output Voltages of 5V, 12V, 15V
- Output Voltage Accuracy of ±4% over the Full Temperature Range
- Internal Short-Circuit Current Limiting
- Internal Thermal Overload Protection
- Output Transistor Safe-Area Protection
- Low Load Regulation
- Stable Performance in High Temperature
- Lead-Free Packages: TO-220-3, TO-220-3 (2)
  - **Totally Lead-Free; RoHS Compliant (Notes 1 & 3)**
- Available in “Green” Packages: TO-220-3, TO-220-3 (2), and TO-263-2
  - **Lead-Free Finish; RoHS Compliant (Notes 2 & 3)**
  - **Halogen and Antimony Free. “Green” Device (Note 4)**
- Lead-Free Packages, Available in “Green” Molding Compound: TO-252-2 (5), TO252 (Type CJ)
  - **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 3)**
  - **Halogen and Antimony Free. “Green” Device (Note 4)**
- **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/**

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. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
3. 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.
4. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

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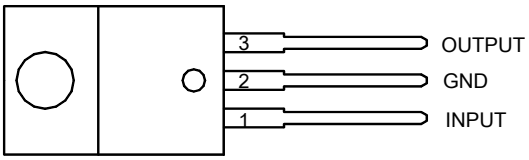
Pin Assignments

(Front View)



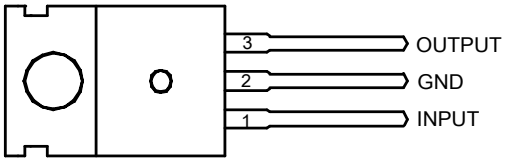
TO-220-3 (Option 1)

(Front View)



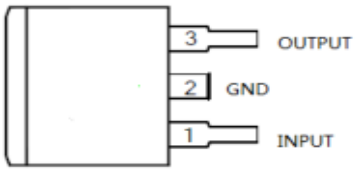
TO-220-3 (Option 2)

(Front View)



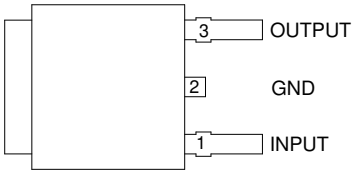
TO-220-3 (2)

(Front View)



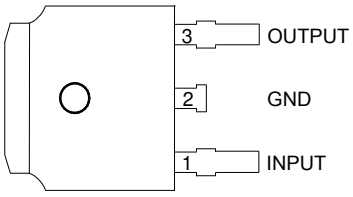
TO-263-2

(Top View)



TO-252-2 (5)

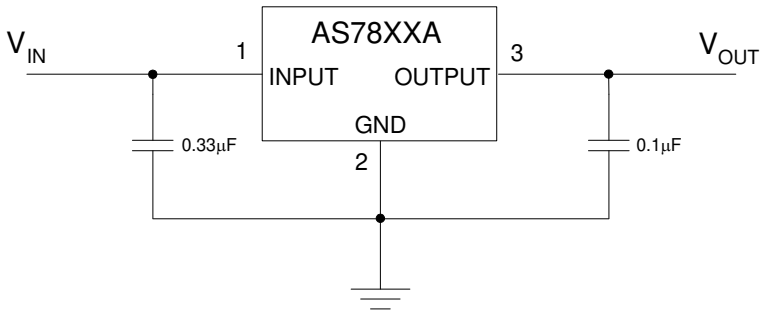
(Top View)



TO252 (Type CJ)

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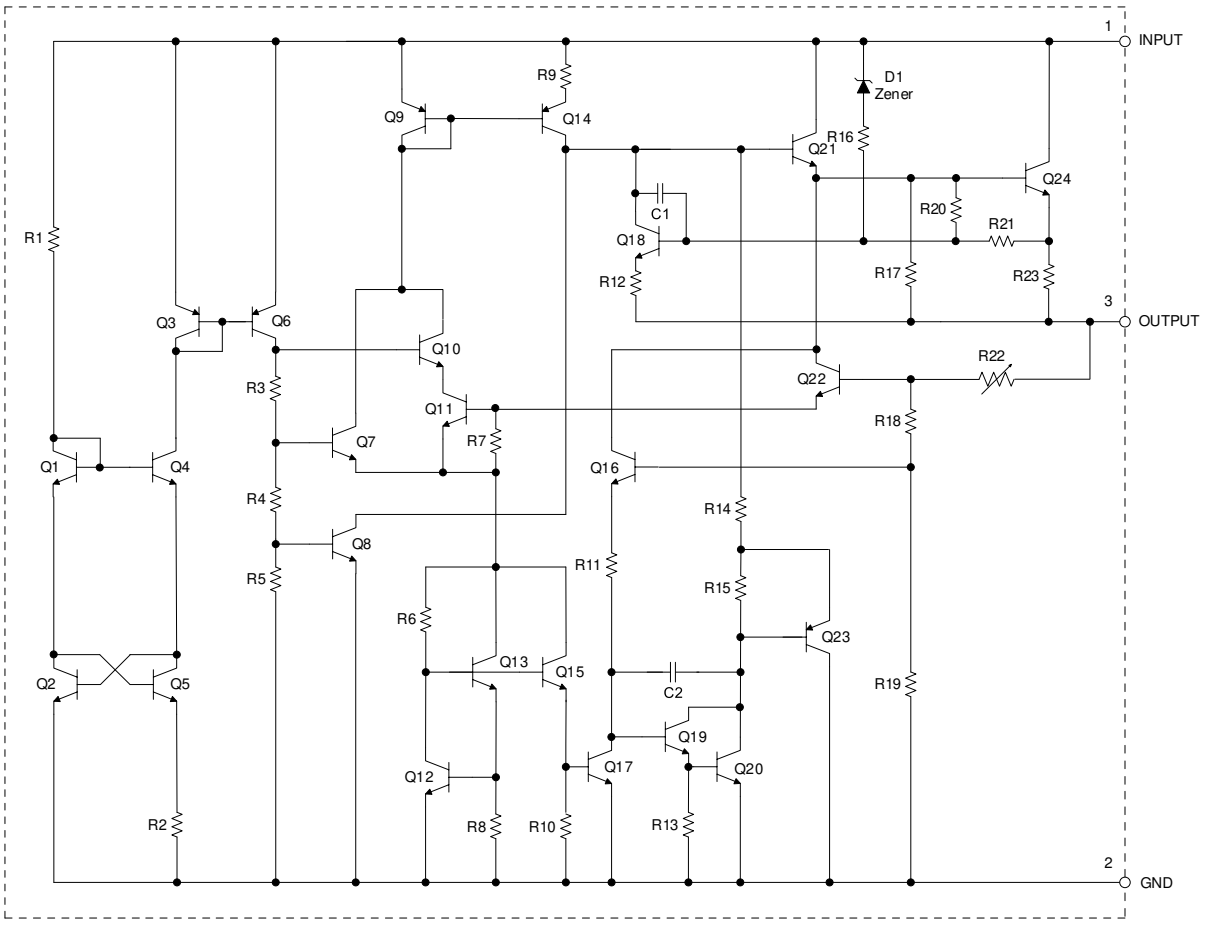
Typical Applications Circuit



Pin Descriptions

Pin Number	Pin Name	Function
1	INPUT	Voltage Input
2	GND	Ground
3	OUTPUT	Voltage Output

Functional Block Diagram



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Absolute Maximum Ratings (Note 5)

Symbol	Parameter		Rating	Unit
V_{IN}	Input Voltage		36	V
T_{LEAD}	Lead Temperature (Soldering, 10sec)		+260	°C
P_D	Power Dissipation		Internally Limited	W
T_J	Operating Junction Temperature		+150	°C
T_{STG}	Storage Temperature Range		-65 to +150	°C
θ_{JA}	Thermal Resistance	TO-220-3 TO-220-3 (2)	60	°C/W
		TO-252-2 (5) TO252 (Type CJ)	100	
		TO-263-2	50	
ESD	ESD (Human Body Model)		6000	V
ESD	ESD (Machine Model)		500	V

Note: 5. 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.

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{IN}	Input Voltage	AS7805A	—	25	V
		AS7812A	—	32	
		AS7815A	—	32	
T_J	Operating Junction Temperature Range		-40	+125	°C

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Electrical Characteristics

AS7805A (@ V_{IN} = 10V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	4.9	5	5.1	V
		I_{OUT} = 5mA to 1A, V_{IN} = 7.5V to 20V $P_D \leq$ 15W	4.8	—	5.2	
V_{RLINE}	Line Regulation	V_{IN} = 7.5V to 20V I_{OUT} = 500mA, T_J = +25°C	—	25	50	mV
V_{RLOAD}	Load Regulation	V_{IN} = 10V, I_{OUT} = 5mA to 1A T_J = +25°C	—	20	50	mV
I_Q	Quiescent Current	V_{IN} = 10V, I_{OUT} = 0	—	3.2	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 8V to 25V, I_{OUT} = 500mA T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 8V to 18V, f = 120Hz I_{OUT} = 500mA	—	70	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	10	—	mΩ
I_{SC}	Short-Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.05	—	A
I_{PK}	Peak Output Current	V_{IN} = 10V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.4	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	
		TO-263-2	—	6	—	

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Electrical Characteristics (continued)

AS7812A (@ V_{IN} = 19V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	11.75	12	12.25	V
		I_{OUT} = 5mA to 1A, V_{IN} = 14.8V to 27V $P_D \leq$ 15W	11.5	—	12.5	
V_{RLINE}	Line Regulation	V_{IN} = 14.8V to 27V I_{OUT} = 500mA, T_J = +25°C	—	25	120	mV
V_{RLOAD}	Load Regulation	V_{IN} = 19V, I_{OUT} = 5mA to 1A T_J = +25°C	—	40	120	mV
I_Q	Quiescent Current	V_{IN} = 19V, I_{OUT} = 0	—	3.4	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 14.8V to 30V, I_{OUT} = 500mA T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 15V to 25V, f = 120Hz I_{OUT} = 500mA	—	60	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	11	—	mΩ
I_{SC}	Short-Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 18V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.96	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	

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Electrical Characteristics (continued)

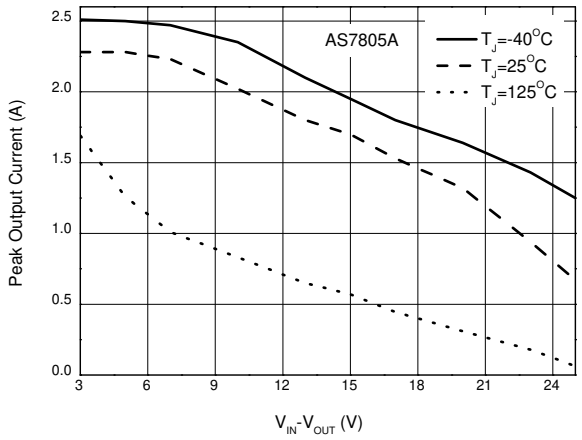
AS7815A (@ V_{IN} = 23V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	14.7	15	15.3	V
		I_{OUT} = 5mA to 1A, V_{IN} = 17.9V to 30V $P_D \leq$ 15W	14.4	—	15.6	
V_{RLINE}	Line Regulation	V_{IN} = 17.9V to 30V I_{OUT} = 500mA, T_J = +25°C	—	35	150	mV
V_{RLOAD}	Load Regulation	V_{IN} = 23V, I_{OUT} = 5mA to 1A T_J = +25°C	—	70	150	mV
I_Q	Quiescent Current	V_{IN} = 23V, I_{OUT} = 0	—	3.4	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 17.9V to 30V, I_{OUT} = 500mA T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 18.5V to 28.5V, f = 120Hz I_{OUT} = 500mA	—	58	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	$\mu V/V_O$
R_O	Output Resistance	f = 1kHz	—	11	—	mΩ
I_{SC}	Short-Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 21V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	1.2	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	

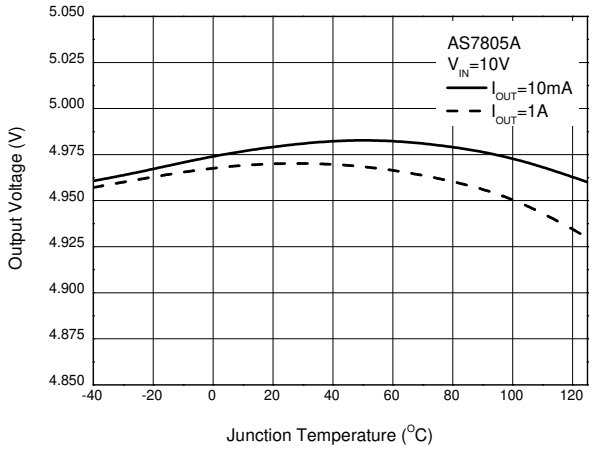
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Performance Characteristics

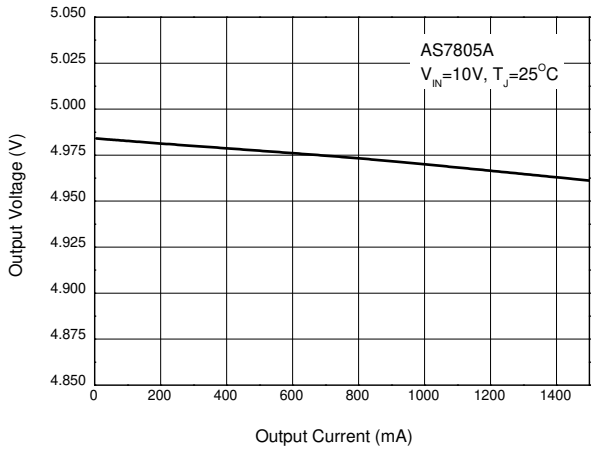
Peak Output Current vs. Input/Output Differential Voltage



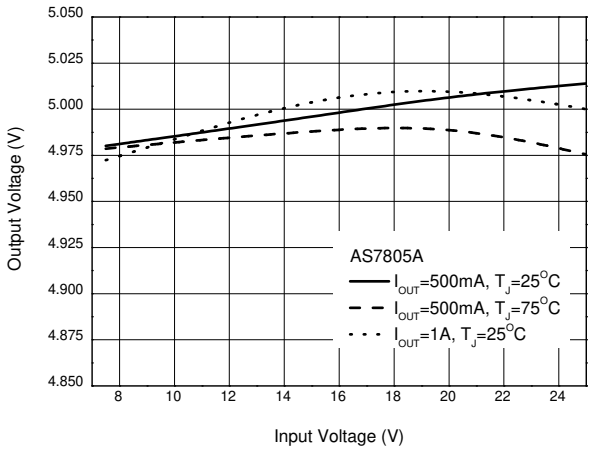
Output Voltage vs. Junction Temperature



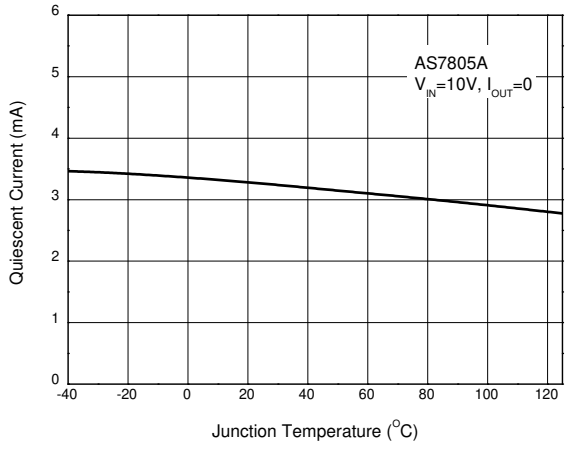
Output Voltage vs. Output Current



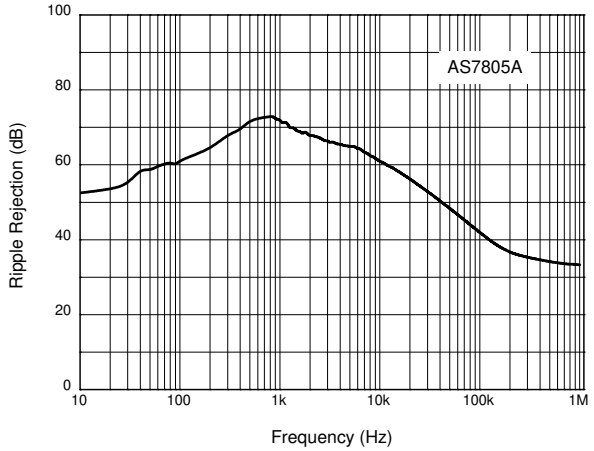
Output Voltage vs. Input Voltage



Quiescent Current vs. Junction Temperature



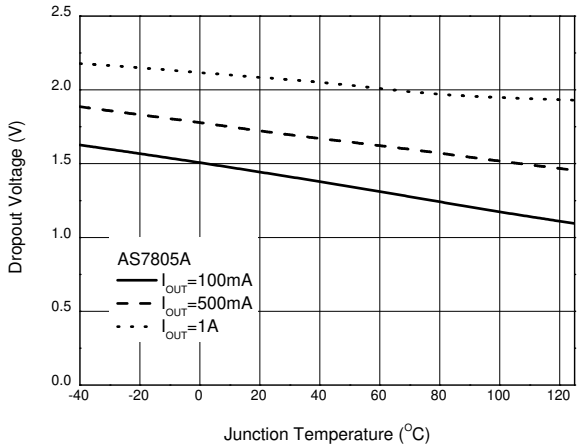
Ripple Rejection vs. Frequency



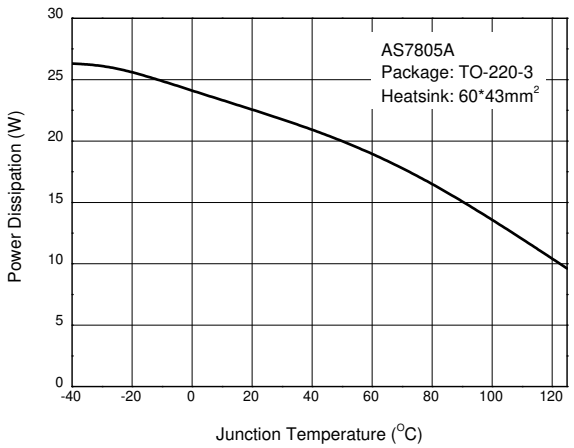
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Performance Characteristics (continued)

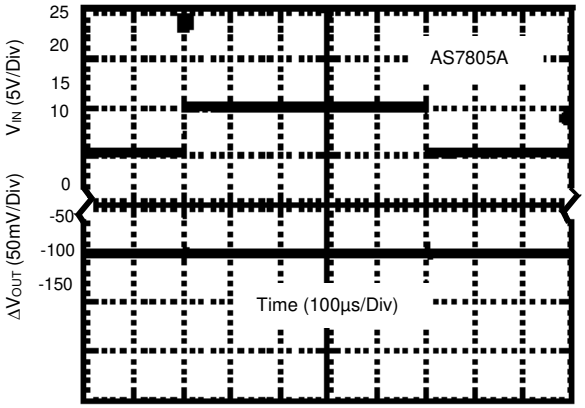
Dropout Voltage vs. Junction Temperature



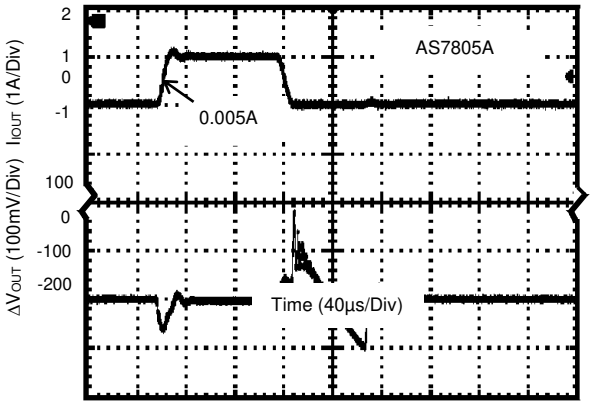
Power Dissipation vs. Junction Temperature



Line Transient
(Conditions: I_{OUT} = 500mA, C_{OUT} = 0.1µF)

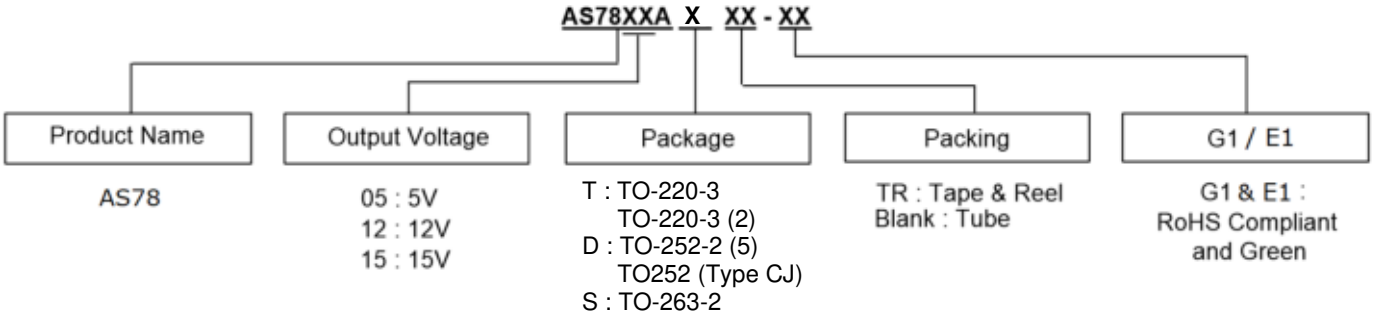


Load Transient
(Conditions: V_{IN} = 10V, C_{IN} = 0.33µF, C_{OUT} = 0.1µF)



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Ordering Information



Orderable Part Number	Package (Note 6)	Output Voltage (V)	RoHS Compliant Lead Free/ Green	Marking ID	Packing	
					Qty.	Carrier
AS7805ADTR-E1	TO-252-2 (5) TO252 (Type CJ)	5	Green	AS7805AD-E1	2500	Tape & Reel
AS7805ADTR-G1		5	Green	AS7805AD-G1	2500	Tape & Reel
AS7805AT-E1	TO-220-3 TO-220-3 (2)	5	Green	AS7805AT-E1	1000	Tube
AS7805ASTR-G1	TO-263-2	5	Green	AS7805AS-G1	800	Tape & Reel

Orderable Part Number	Package (Note 6)	Output Voltage (V)	RoHS Compliant Lead Free/ Green	Marking ID	Packing	
					Qty.	Carrier
AS7812ADTR-G1	TO-252-2 (5) TO252 (Type CJ)	12	Green	AS7812AD-G1	2500	Tape & Reel
AS7812AT-E1	TO-220-3 TO-220-3 (2)	12	Lead Free	AS7812AT-E1	1000	Tube
AS7815ADTR-G1	TO-252-2 (5) TO252 (Type CJ)	15	Green	AS7815AD-G1	2500	Tape & Reel
AS7815AT-E1	TO-220-3 TO-220-3 (2)	15	Lead Free	AS7815AT-E1	1000	Tube

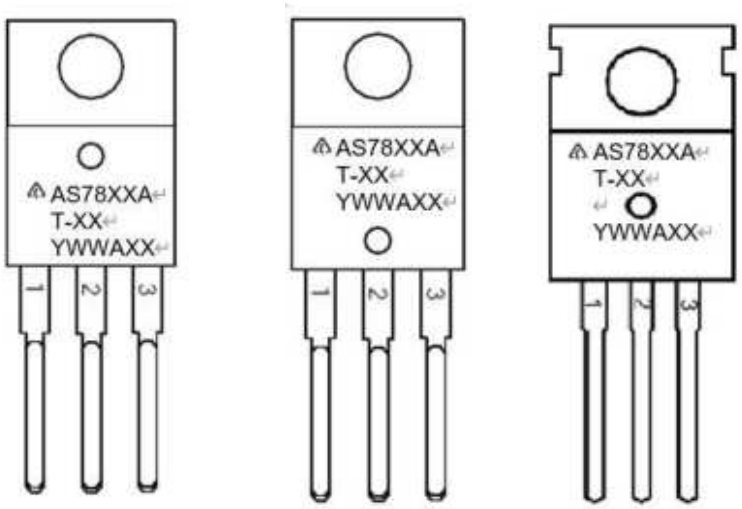
Note: 6. For packaging details, go to our website at: https://www.diodes.com/design/support/packaging/diodes-packaging/.

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Marking Information

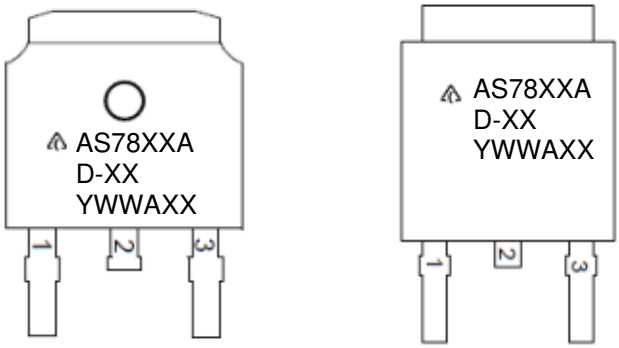
(1) TO-220-3/TO-220-3 (2)

(Front 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: Internal Code

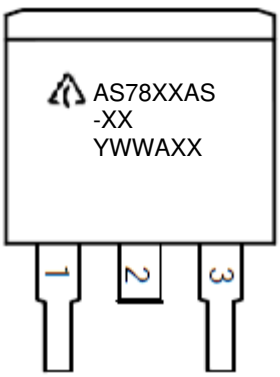
(2) TO252 (Type CJ)/TO-252-2 (5)



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: Internal Code

(3) TO-263-2

(Top View)



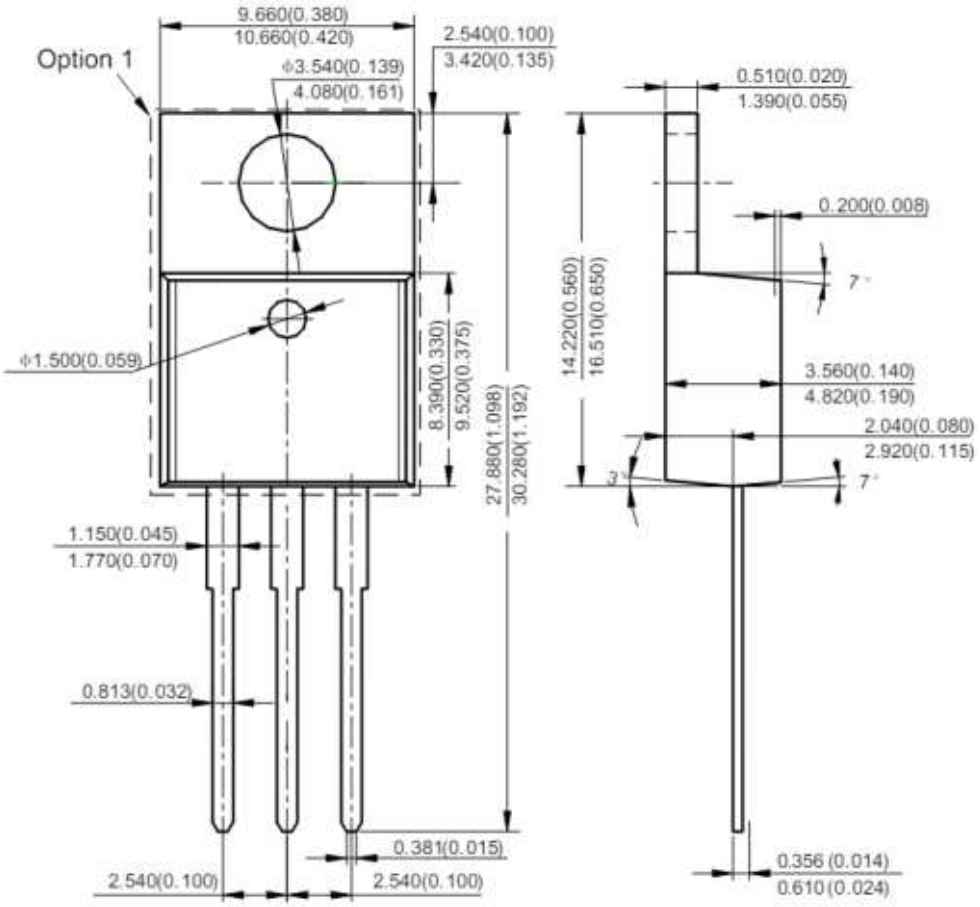
First and Second Lines: Logo and Marking ID
(See *Ordering Information*)
Third line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and8th Digits of Batch No.

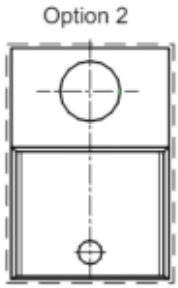
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Package Outline Dimensions (All dimensions in mm(inch).)

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

(1) Package Type: TO-220-3



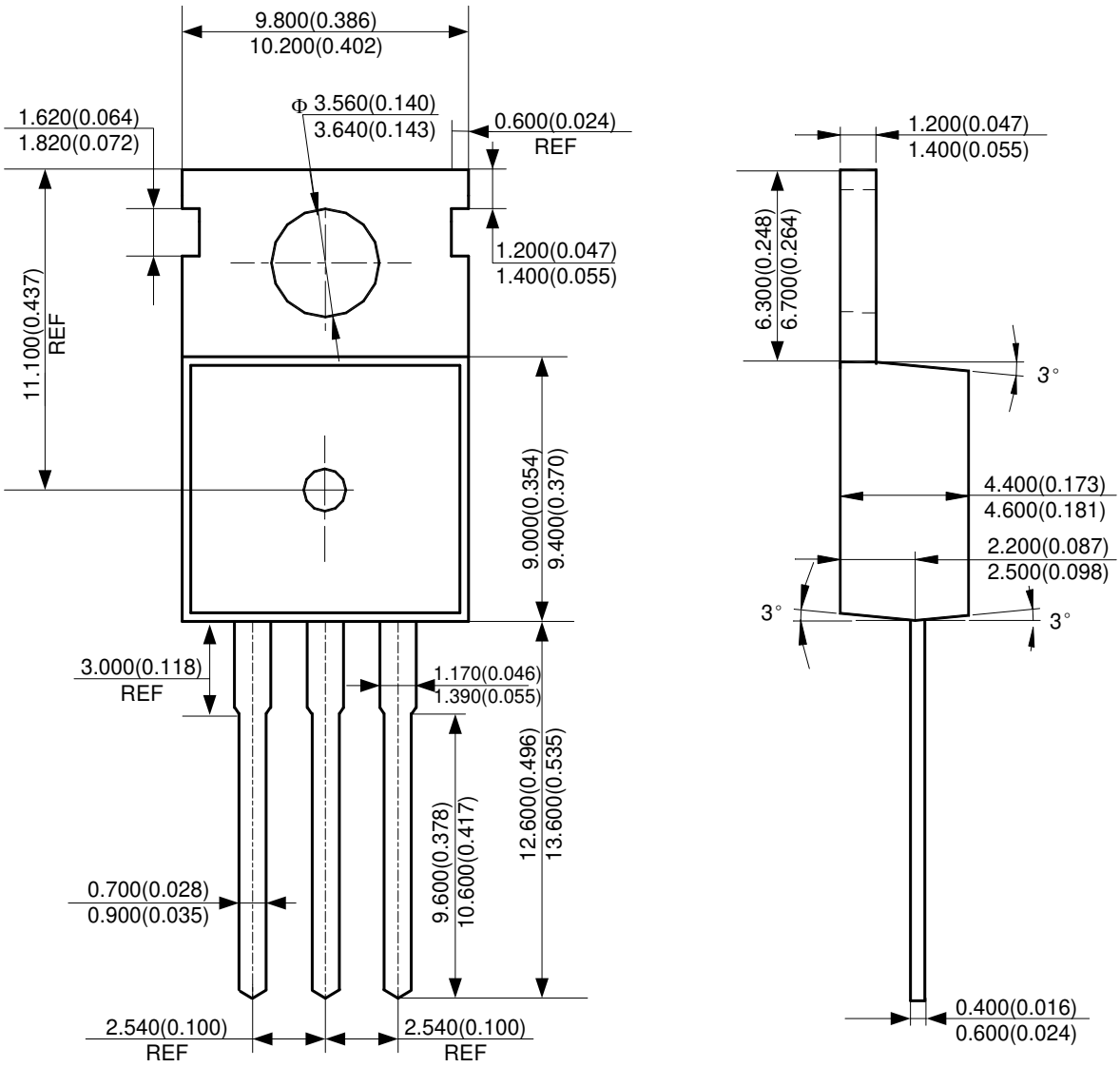


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Package Outline Dimensions (continued) (All dimensions in mm(inch).)

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

(2) Package Type: TO-220-3 (2)

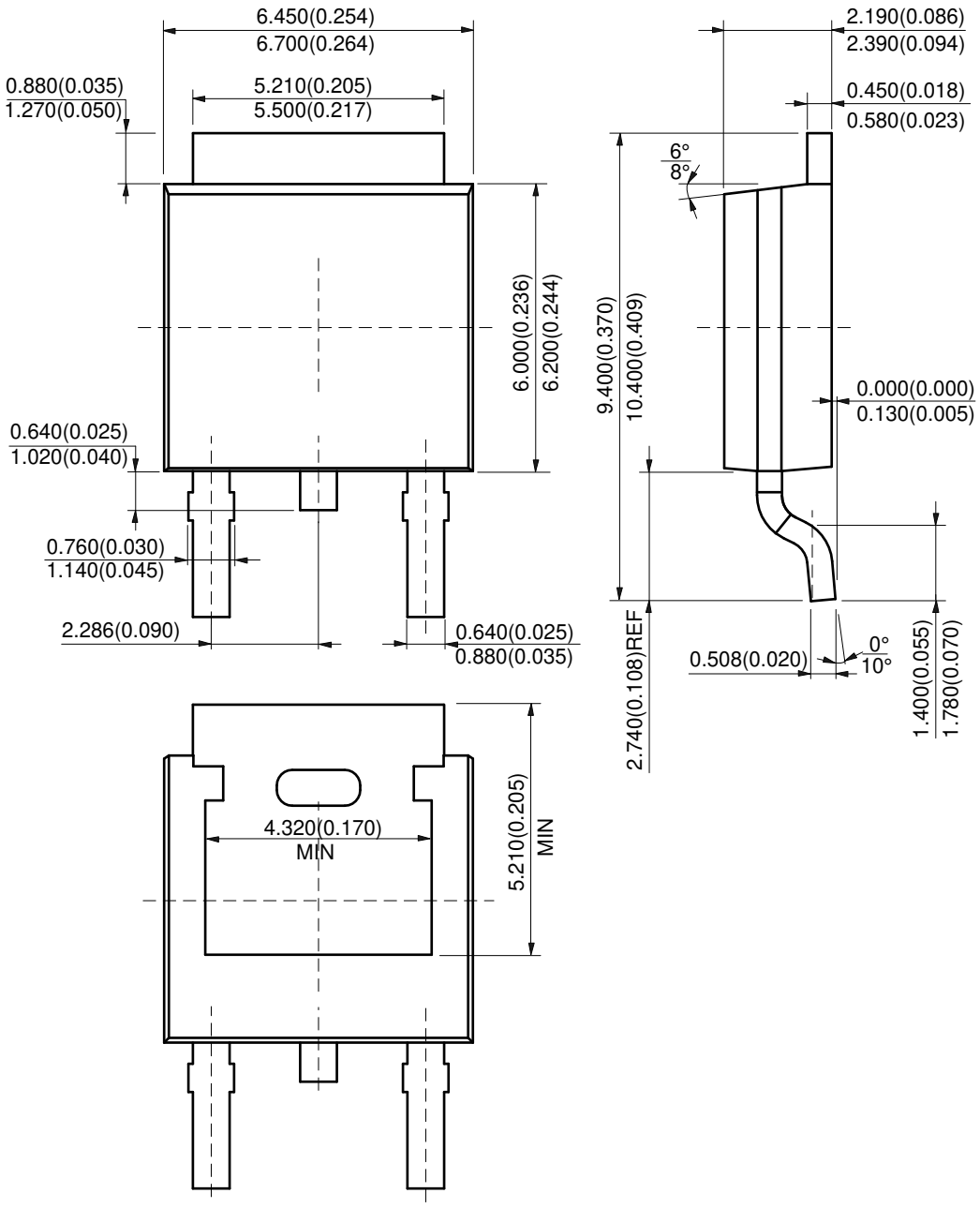


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Package Outline Dimensions (continued) (All dimensions in mm(inch).)

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

(3) Package Type: TO-252-2 (5)

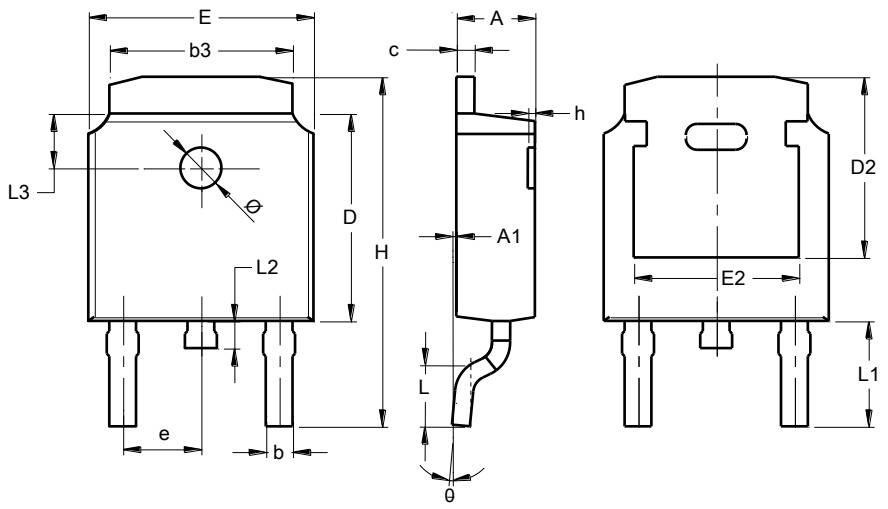


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Package Outline Dimensions (continued) (All dimensions in mm(inch).)

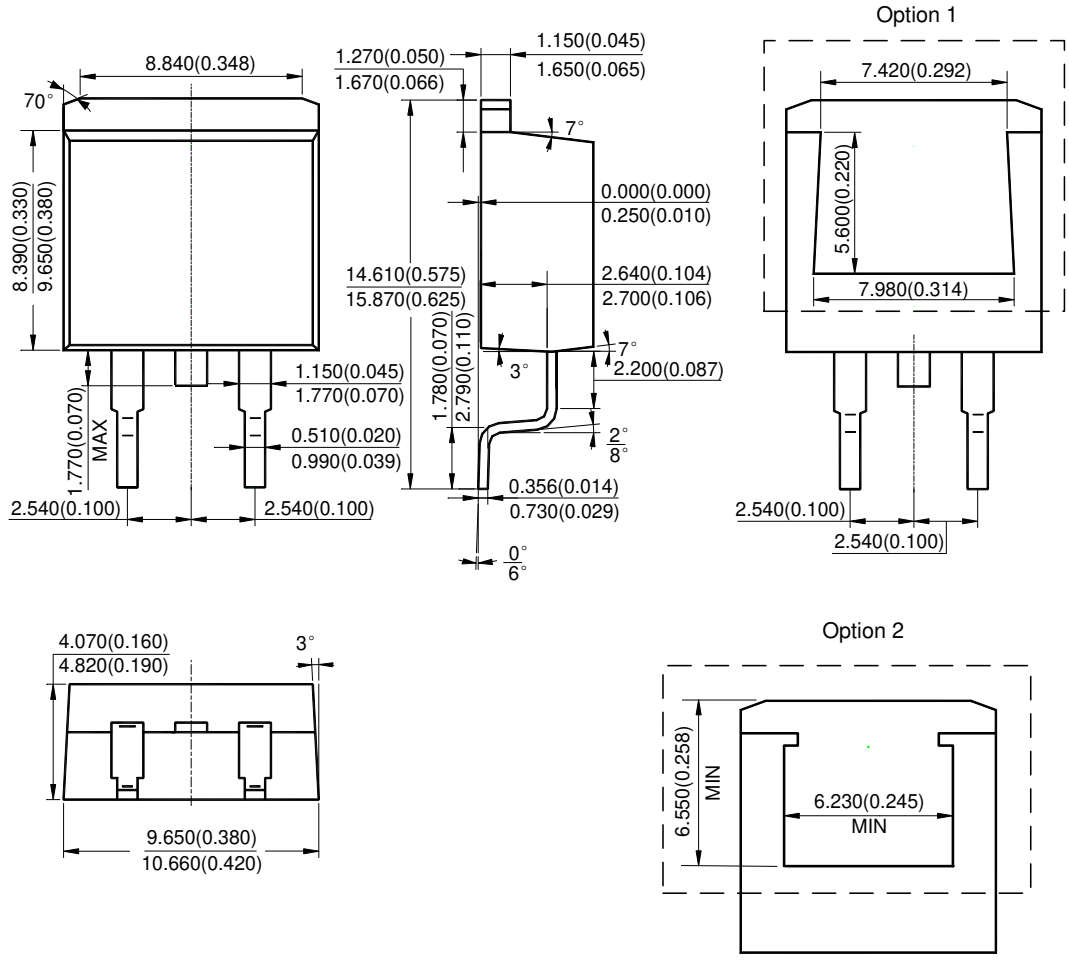
Please see http://www.diodes.com/package-outlines.html for the latest version.

(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			

(5) Package Type: TO-263-2

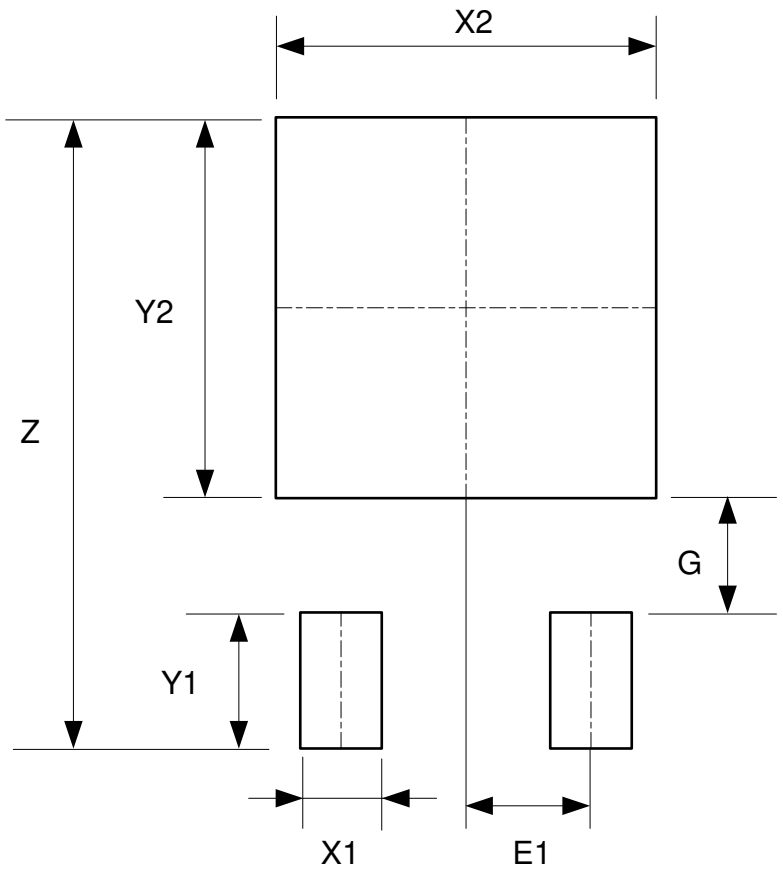


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Suggested Pad Layout

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(1) Package Type: TO252 (Type CJ)



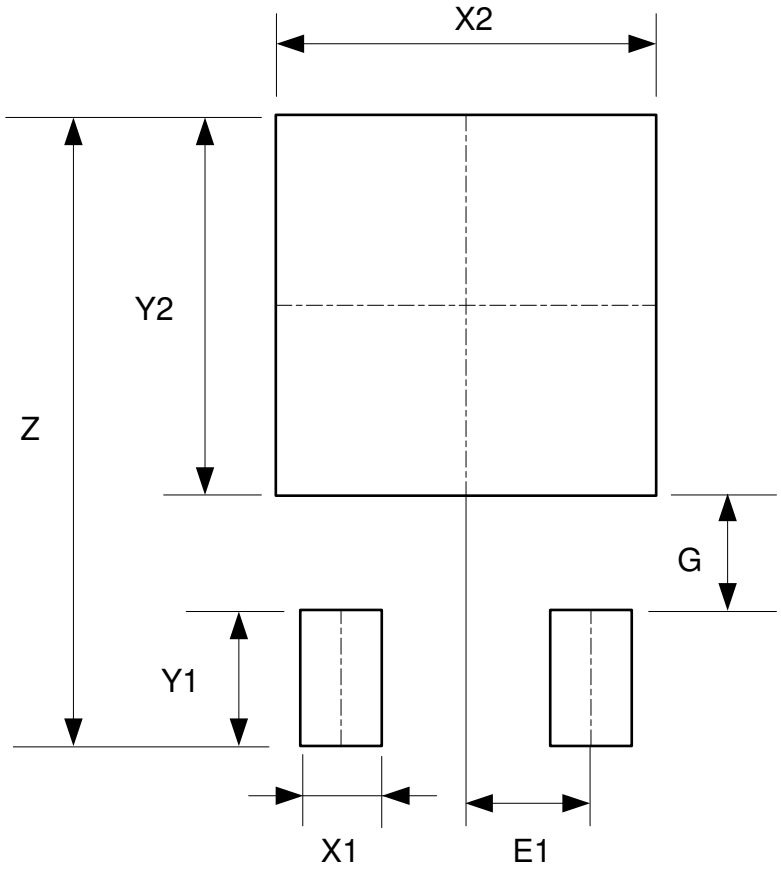
Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

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Suggested Pad Layout (continued)

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(2) Package Type: TO-252-2 (5)



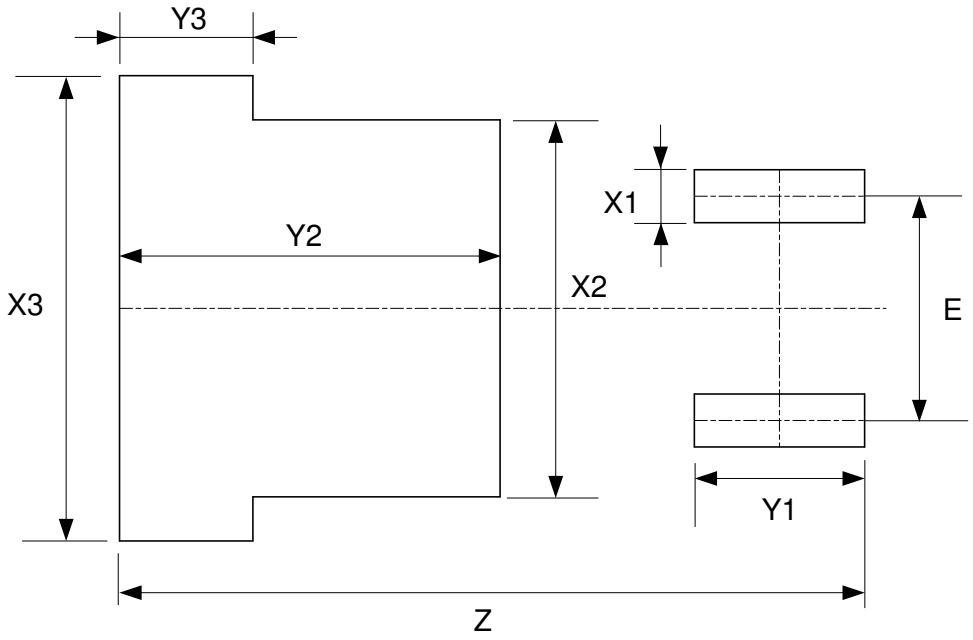
Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

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Suggested Pad Layout (continued)

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(3) Package Type: TO-263-2



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

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:
  - TO-252-2 (5)/TO252 (Type CJ): 0.312 grams (Approximate)
  - TO-220-3/TO-220-3 (2): 1.925 grams (Approximate)
  - TO-263-2: 1.412 grams (Approximate)

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