
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.

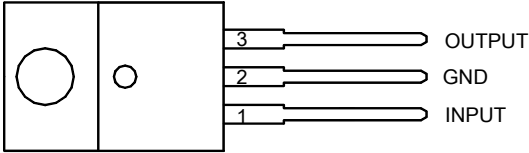
Features

- Output Current up to 1A
- Fixed Output Voltages of 5V, 12V, 15V
- Output Voltage Accuracy of $\pm 4\%$ 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.

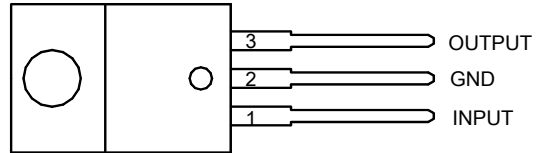
Pin Assignments

(Front View)



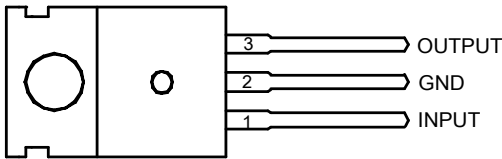
TO-220-3 (Option 1)

(Front View)



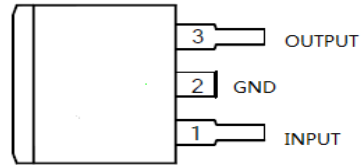
TO-220-3 (Option 2)

(Front View)



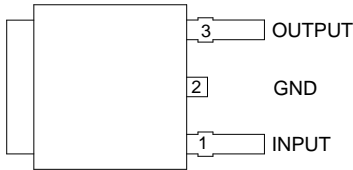
TO-220-3 (2)

(Front View)



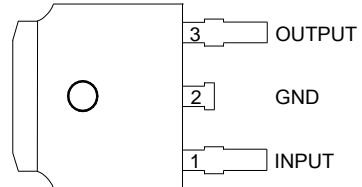
TO-263-2

(Top View)



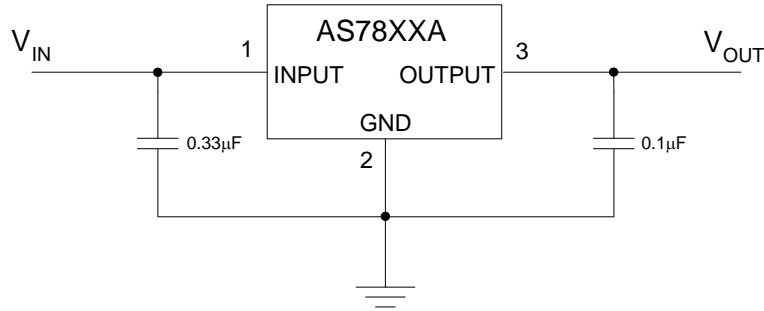
TO-252-2 (5)

(Top View)



TO252 (Type CJ)

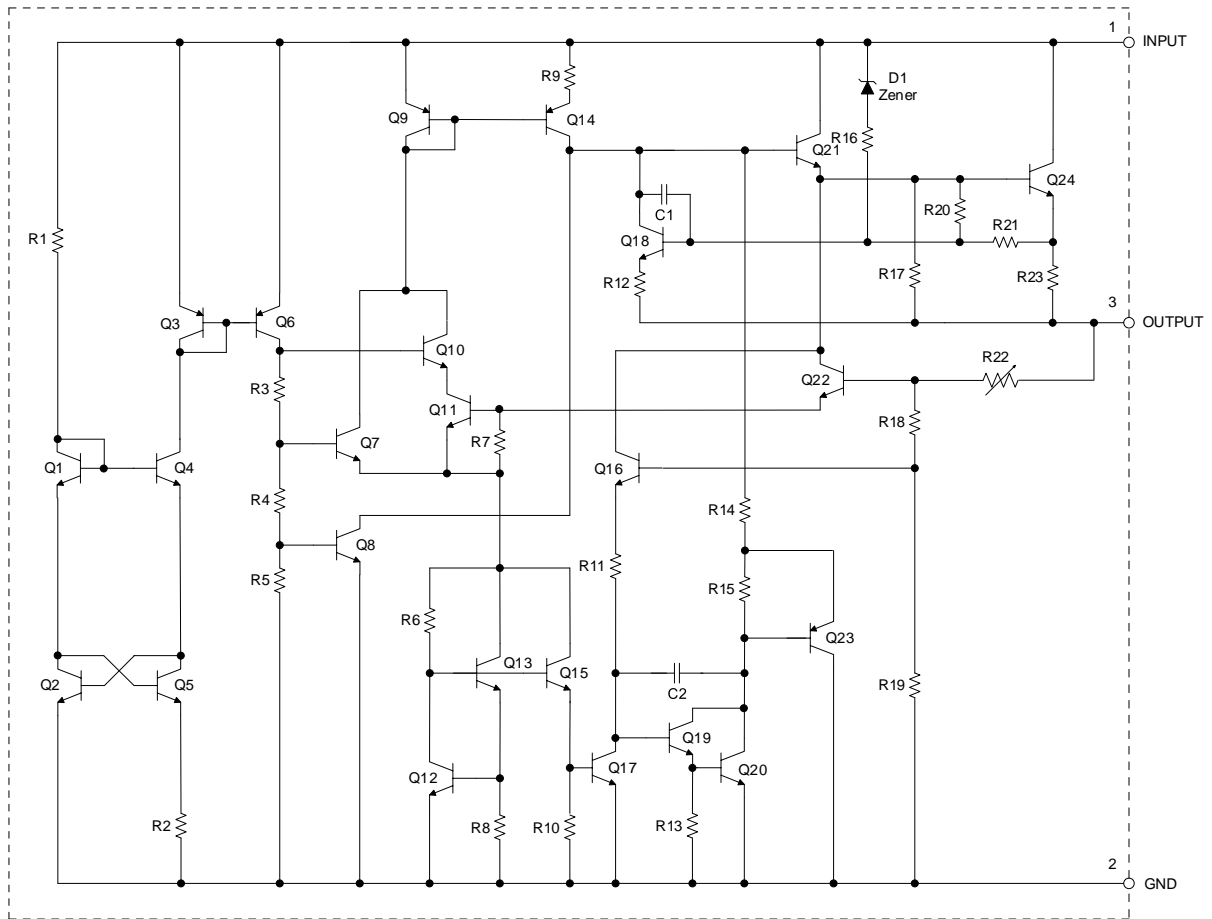
Typical Applications Circuit



Pin Descriptions

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

Functional Block Diagram



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	60	°C/W
		TO-220-3 (2)		
		TO-252-2 (5)	100	
		TO252 (Type CJ)	50	
TO-263-2				
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

Electrical Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J = +25^\circ C$	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 $20V$ $I_{OUT} = 500mA$, $T_J = +25^\circ C$	—	25	50	mV
V_{RLOAD}	Load Regulation	$V_{IN} = 10V$, $I_{OUT} = 5mA$ to $1A$ $T_J = +25^\circ C$	—	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 $25V$, $I_{OUT} = 500mA$ $T_J = +25^\circ C$	—	0.3	0.8	mA
		$I_{OUT} = 5mA$ to $1A$, $T_J = +25^\circ C$	—	0.08	0.5	
PSRR	Ripple Rejection	$V_{IN} = 8V$ to $18V$, $f = 120Hz$ $I_{OUT} = 500mA$	—	70	—	dB
V_{DROP}	Dropout Voltage	$\Delta V_{OUT} = 1\%$, $I_{OUT} = 1A$ $T_J = +25^\circ C$	—	2	—	V
N_O	Output Noise Voltage	$f = 10Hz$ to $100kHz$, $T_A = +25^\circ C$	—	10	—	$\mu V/V_O$
R_O	Output Resistance	$f = 1kHz$	—	10	—	m Ω
I_{SC}	Short-Circuit Current	$V_{IN} = 35V$, $T_A = +25^\circ C$	—	0.05	—	A
I_{PK}	Peak Output Current	$V_{IN} = 10V$, $T_J = +25^\circ C$	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.4	—	mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	$^\circ C/W$
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	
		TO-263-2	—	6	—	

Electrical Characteristics (continued)

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J = +25^\circ C$	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 $27V$ $I_{OUT} = 500mA$, $T_J = +25^\circ C$	—	25	120	mV
V_{RLOAD}	Load Regulation	$V_{IN} = 19V$, $I_{OUT} = 5mA$ to $1A$ $T_J = +25^\circ C$	—	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 $30V$, $I_{OUT} = 500mA$ $T_J = +25^\circ C$	—	0.3	0.8	mA
		$I_{OUT} = 5mA$ to $1A$, $T_J = +25^\circ C$	—	0.08	0.5	
PSRR	Ripple Rejection	$V_{IN} = 15V$ to $25V$, $f = 120Hz$ $I_{OUT} = 500mA$	—	60	—	dB
V_{DROP}	Dropout Voltage	$\Delta V_{OUT} = 1\%$, $I_{OUT} = 1A$ $T_J = +25^\circ C$	—	2	—	V
N_O	Output Noise Voltage	$f = 10Hz$ to $100kHz$, $T_A = +25^\circ C$	—	10	—	$\mu V/V_O$
R_O	Output Resistance	$f = 1kHz$	—	11	—	m Ω
I_{SC}	Short-Circuit Current	$V_{IN} = 35V$, $T_A = +25^\circ C$	—	0.2	—	A
I_{PK}	Peak Output Current	$V_{IN} = 18V$, $T_J = +25^\circ C$	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.96	—	mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	$^\circ C/W$
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	

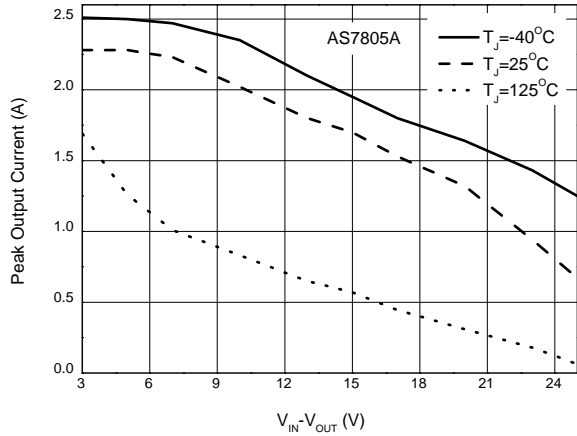
Electrical Characteristics (continued)

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

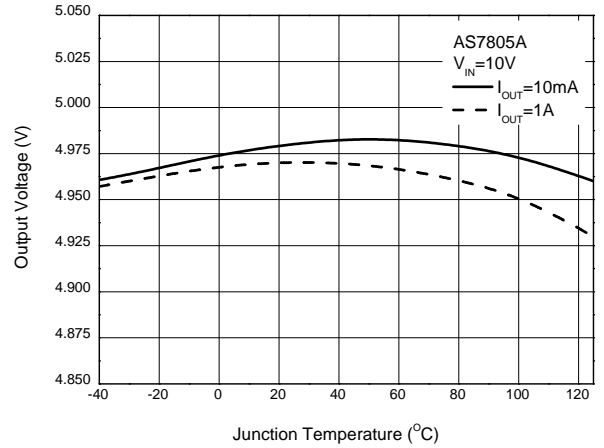
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J = +25^\circ C$	14.7	15	15.3	V
		$I_{OUT} = 5mA$ to $1A$, $V_{IN} = 17.9V$ to $30V$ $P_D \leq 15W$	14.4	—	15.6	
V_{RLINE}	Line Regulation	$V_{IN} = 17.9V$ to $30V$ $I_{OUT} = 500mA$, $T_J = +25^\circ C$	—	35	150	mV
V_{RLOAD}	Load Regulation	$V_{IN} = 23V$, $I_{OUT} = 5mA$ to $1A$ $T_J = +25^\circ C$	—	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 $30V$, $I_{OUT} = 500mA$ $T_J = +25^\circ C$	—	0.3	0.8	mA
		$I_{OUT} = 5mA$ to $1A$, $T_J = +25^\circ C$	—	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	$\Delta V_{OUT} = 1\%$, $I_{OUT} = 1A$, $T_J = +25^\circ C$	—	2	—	V
N_O	Output Noise Voltage	$f = 10Hz$ to $100kHz$, $T_A = +25^\circ C$	—	10	—	$\mu V/V_O$
R_O	Output Resistance	$f = 1kHz$	—	11	—	m Ω
I_{SC}	Short-Circuit Current	$V_{IN} = 35V$, $T_A = +25^\circ C$	—	0.2	—	A
I_{PK}	Peak Output Current	$V_{IN} = 21V$, $T_J = +25^\circ C$	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	1.2	—	mV/ $^\circ C$
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/ $^\circ C$
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	$^\circ C/W$
		TO-252-2 (5)/TO252 (Type CJ)	—	16	—	

Performance Characteristics

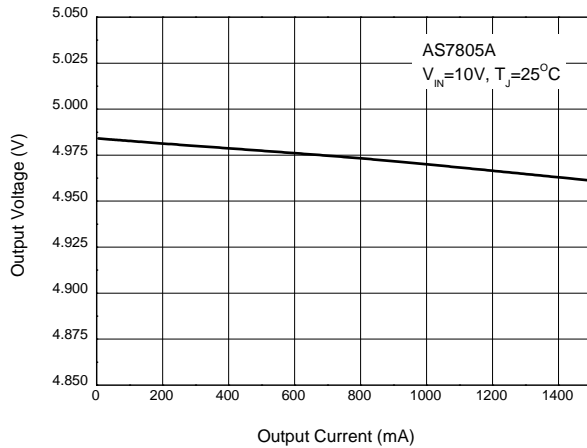
Peak Output Current vs. Input/Output Differential Voltage



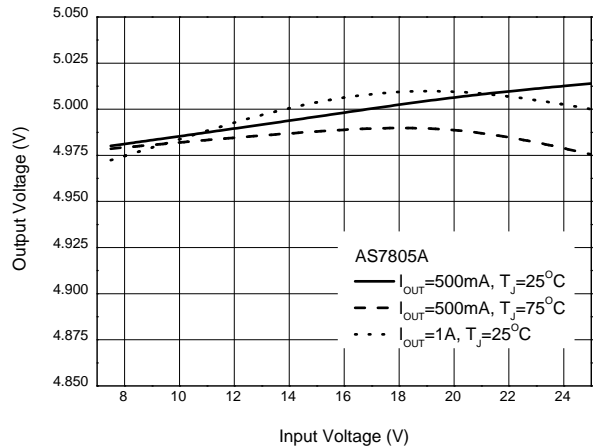
Output Voltage vs. Junction Temperature



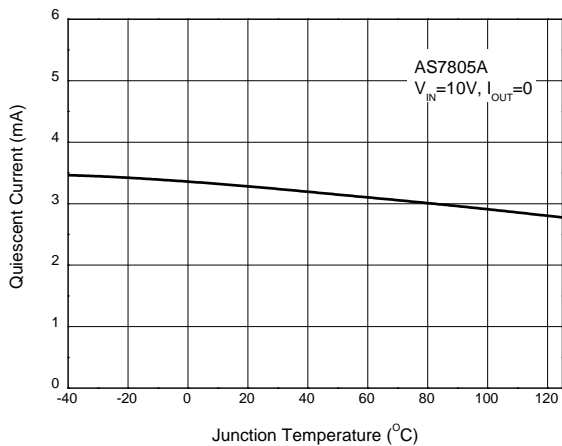
Output Voltage vs. Output Current



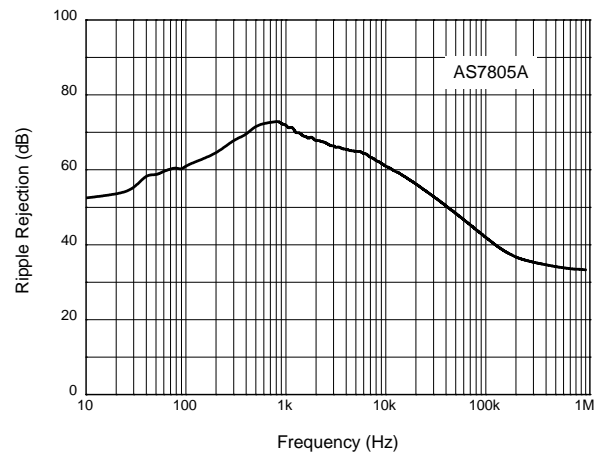
Output Voltage vs. Input Voltage



Quiescent Current vs. Junction Temperature

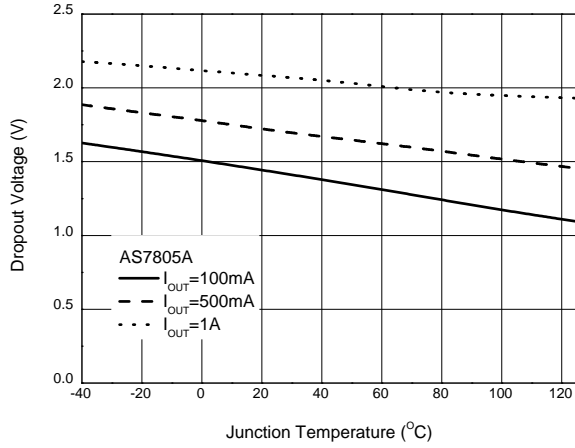


Ripple Rejection vs. Frequency

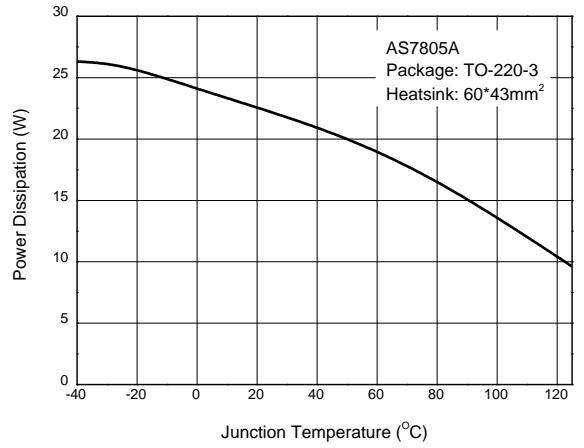


Performance Characteristics (continued)

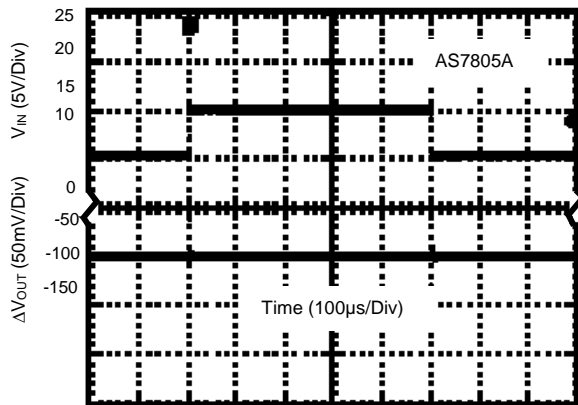
Dropout Voltage vs. Junction Temperature



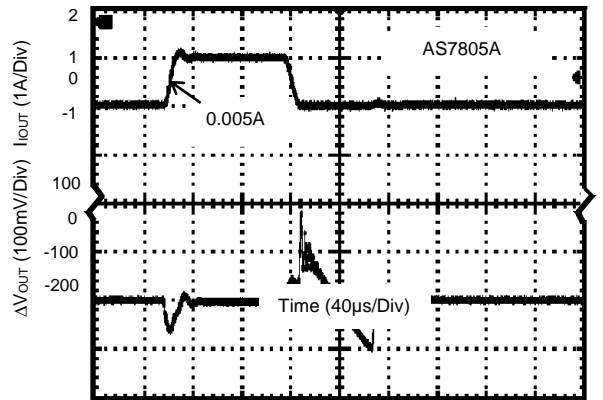
Power Dissipation vs. Junction Temperature



Line Transient
 (Conditions: $I_{OUT} = 500\text{mA}$, $C_{OUT} = 0.1\mu\text{F}$)

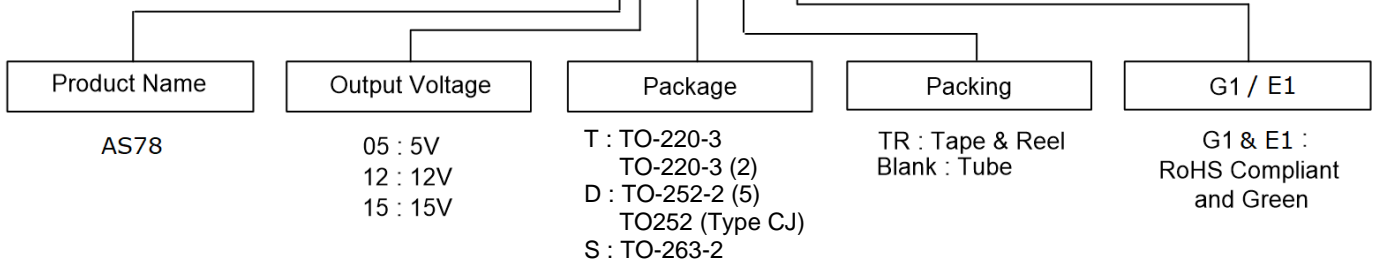


Load Transient
 (Conditions: $V_{IN} = 10\text{V}$, $C_{IN} = 0.33\mu\text{F}$, $C_{OUT} = 0.1\mu\text{F}$)



Ordering Information

AS78XXA X XX - XX



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

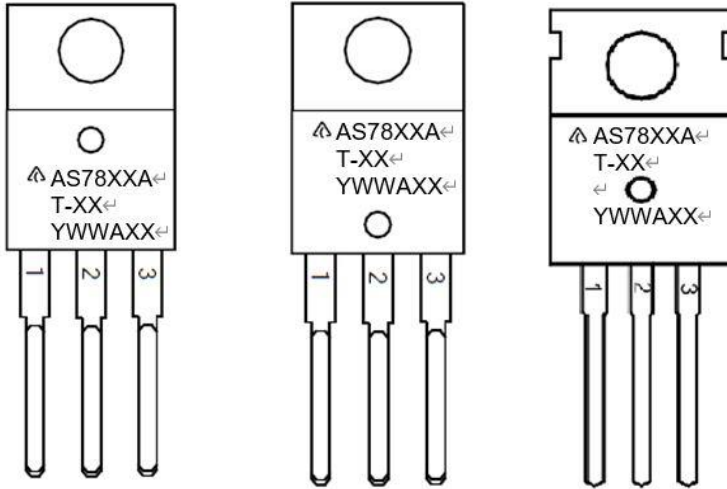


Note: 6. For packaging details, go to our website at: <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

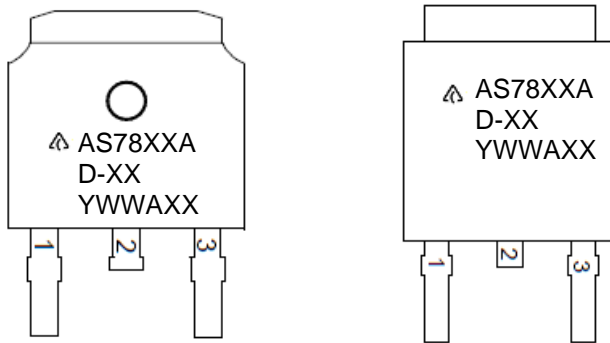
(1) TO-220-3/TO-220-3 (2)

(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

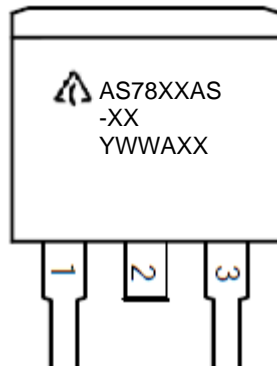
(2) TO252 (Type CJ)/TO-252-2 (5)



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)

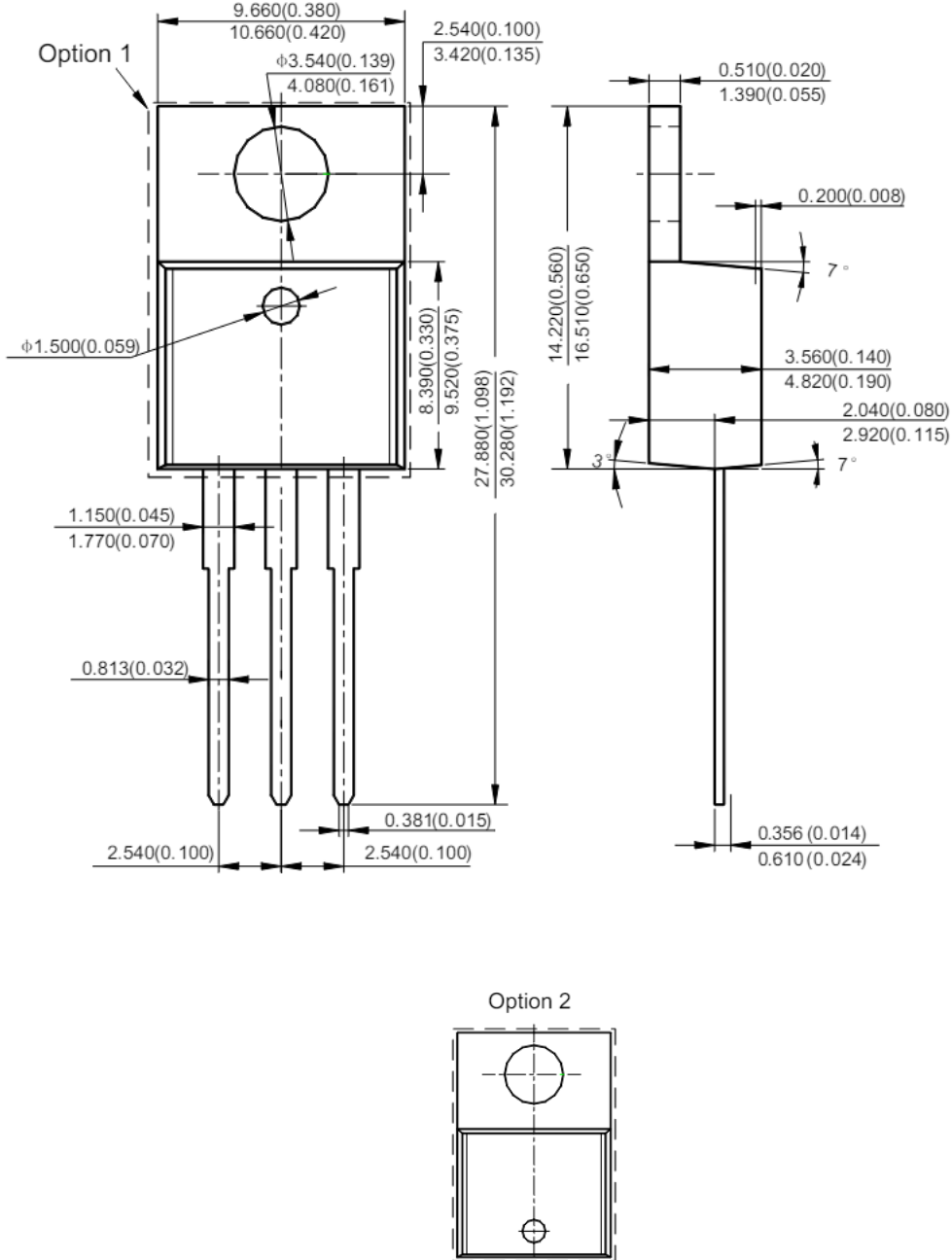


First and Second Lines: Logo and Marking ID
(See *Ordering Information*)
Third line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch No.

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

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

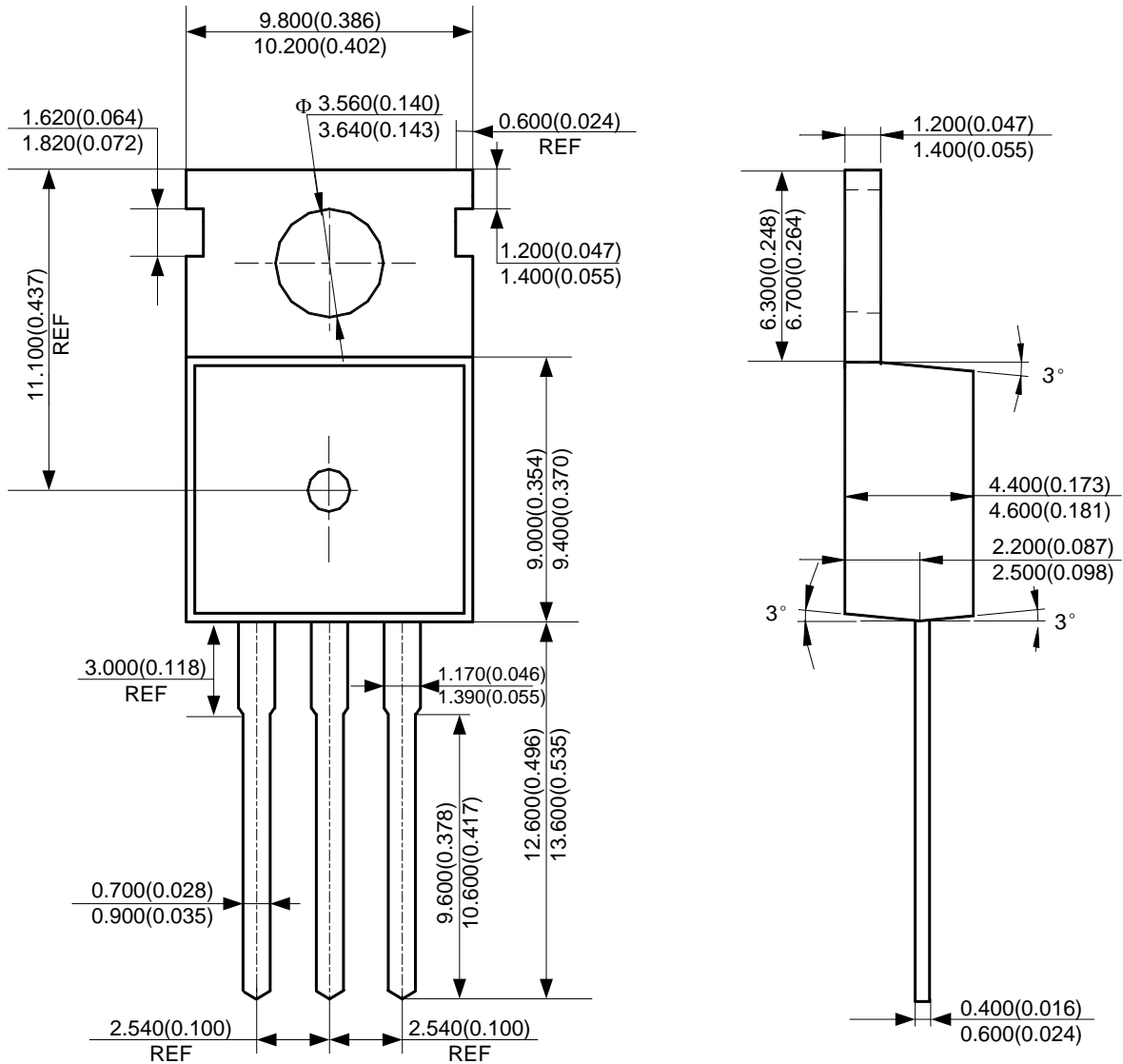
(1) Package Type: TO-220-3



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

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

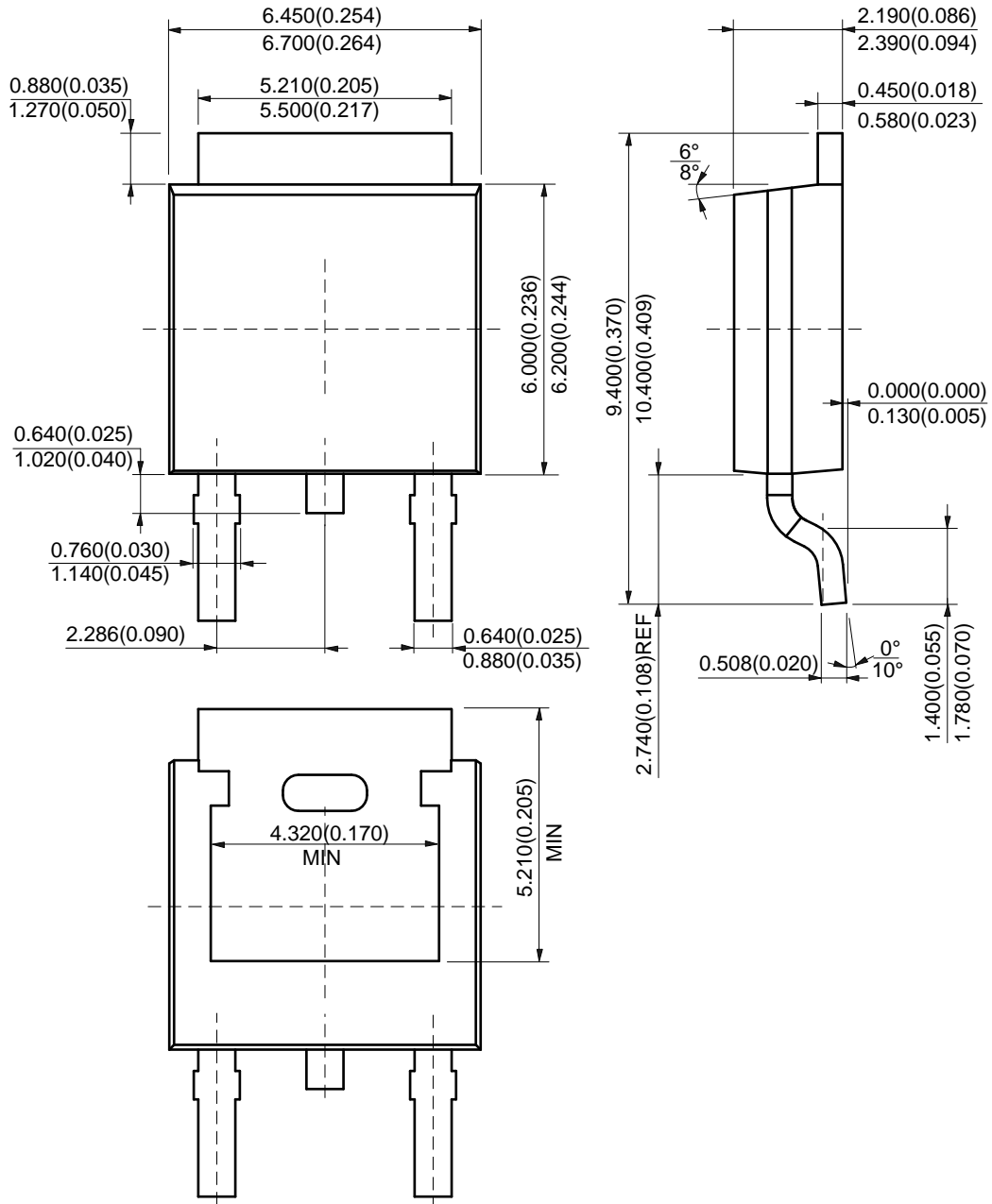
(2) Package Type: TO-220-3 (2)



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

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

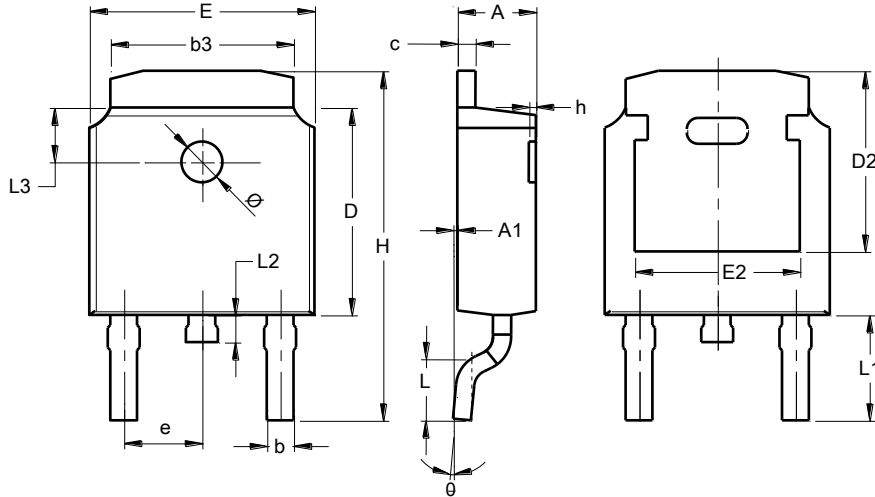
(3) Package Type: TO-252-2 (5)



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

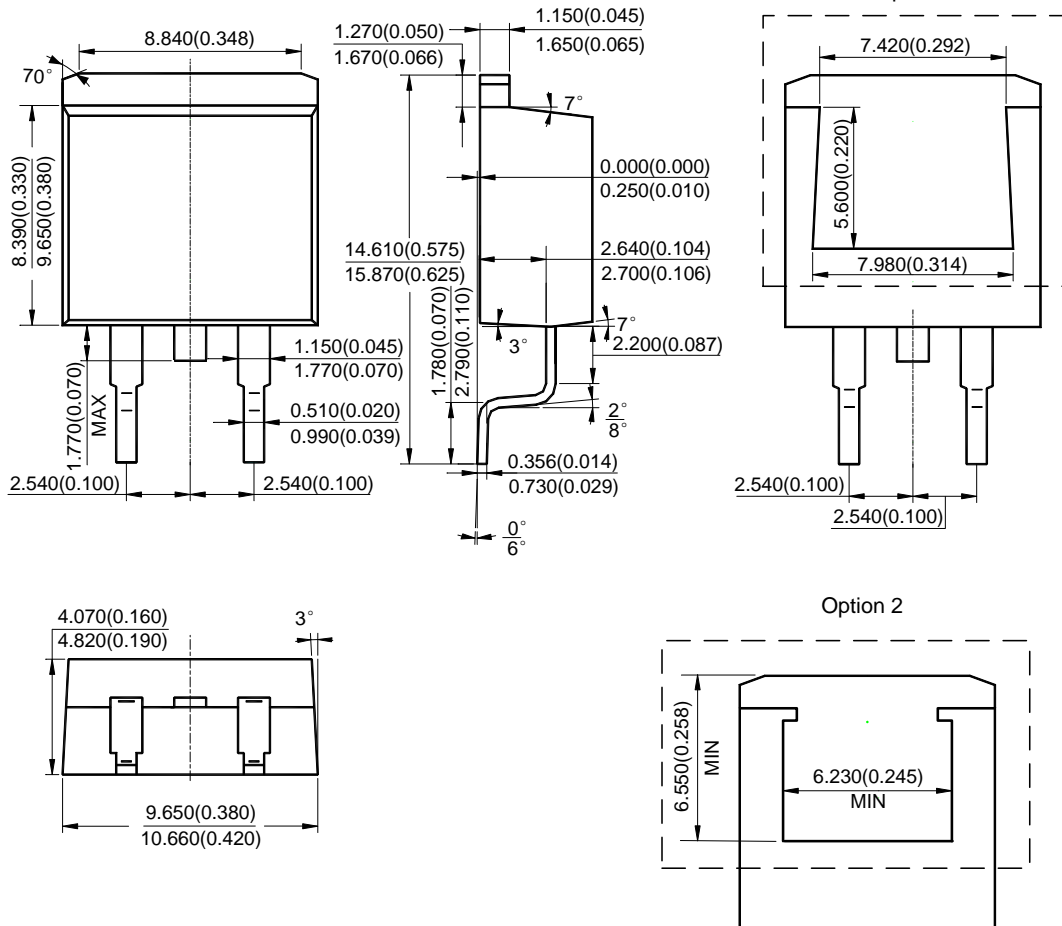
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(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		
∅	1.100	1.300	--
θ	0°	8°	--
All Dimensions in mm			

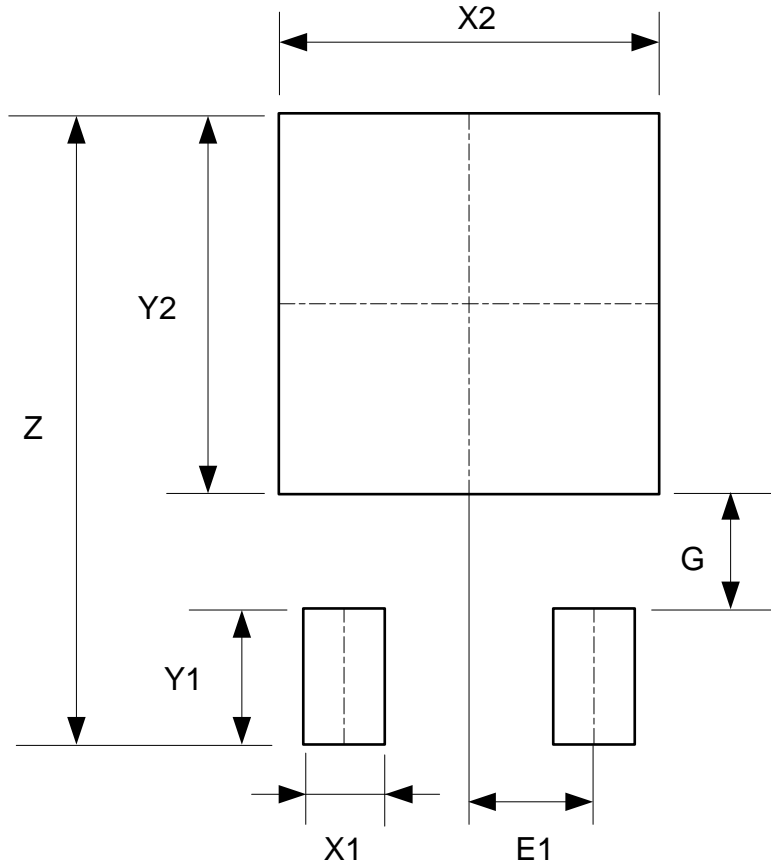
(5) Package Type: TO-263-2



Suggested Pad Layout

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

(1) Package Type: TO252 (Type CJ)

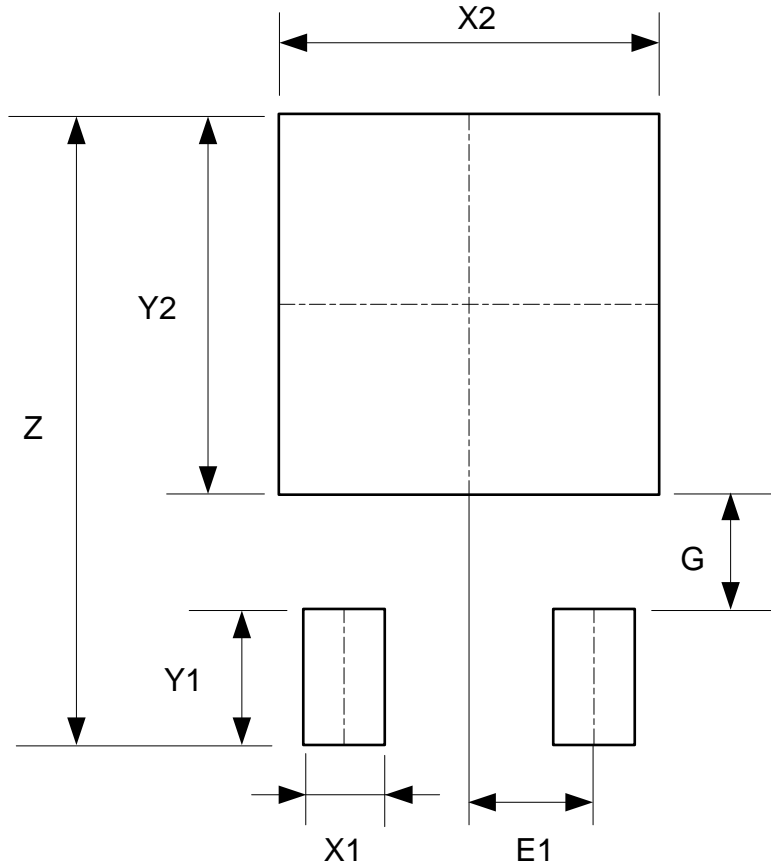


Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

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

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

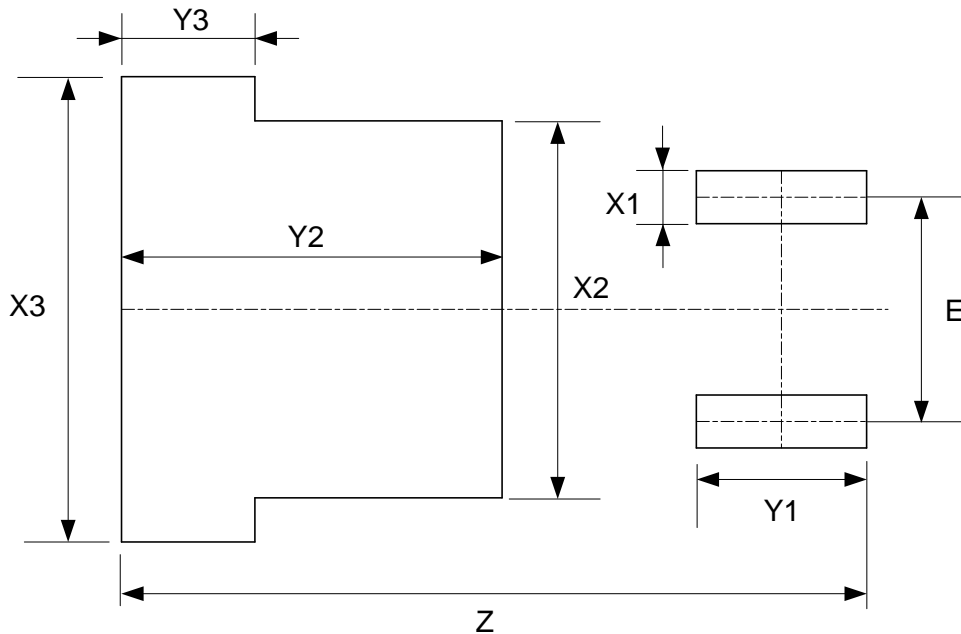


Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

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

(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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