

OBSOLETE - PART DISCONTINUED

## Description

The AP2317 is a series of low dropout three-terminal regulators with a dropout of 1.1V at 600mA output current.

This product has been optimized for low voltage where transient response and minimum input voltage are critical. The AP2317 provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within  $\pm 1\%$ . On-chip thermal shutdown provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures.

The AP2317 is available in 2.5V and 3.3V versions. The fixed versions integrate the corresponding resistor divider. It is also available in an adjustable version which can set the output voltage with two external resistors.

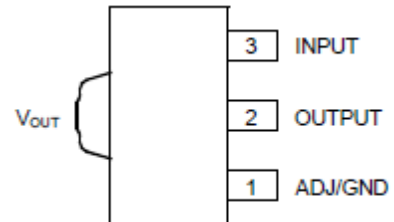
The AP2317 is available in the industry standard SOT-89, SOT-223 and TO-263-3 (for 3.3V only) power packages.

## Features

- Low Dropout Voltage: 1.1V at 600mA Output Current
- Output Noise from 10Hz to 10kHz: 0.003% of  $V_{OUT}$
- PSRR at  $I_{OUT} = 300mA$  and  $f = 120Hz$ : 75dB
- Output Voltage Accuracy:  $\pm 1\%$
- On-chip Thermal Shutdown
- Maximum Quiescent Current:  $I_{QMAX} = 5mA$
- ESD (Human Body Model): 3.5kV
- Operation Junction Temperature: -40 to +125°C

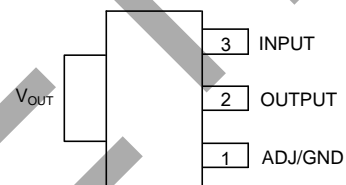
## Pin Assignments

(Top View)



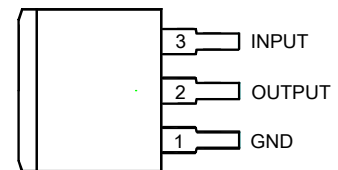
SOT-89

(Top View)



SOT-223

(Top View)

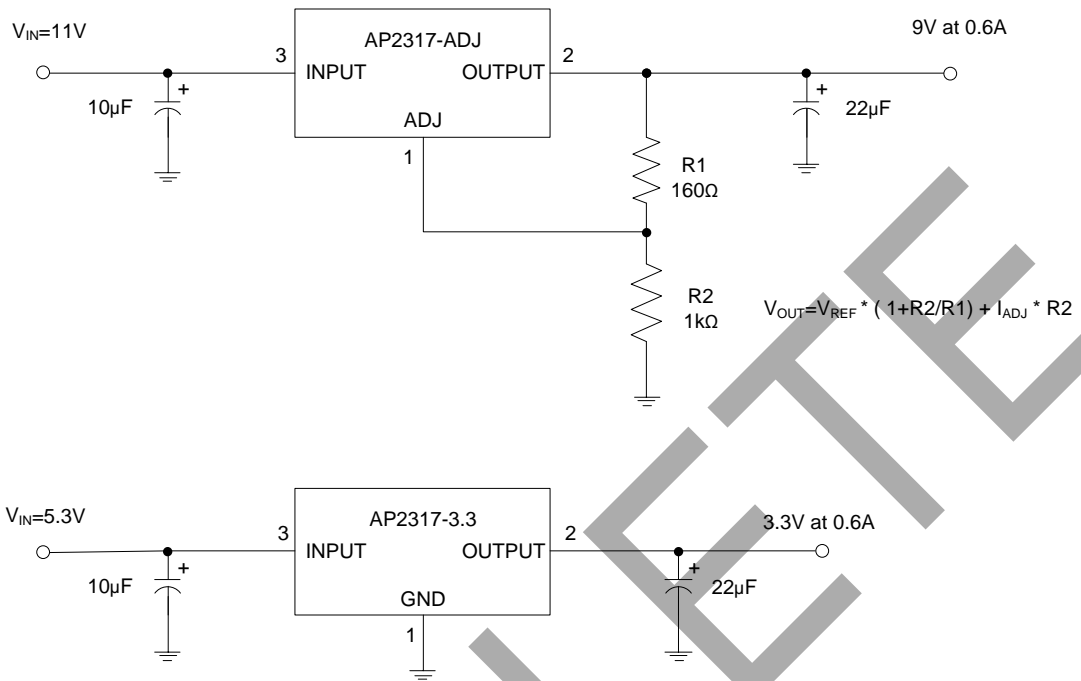


TO-263-3

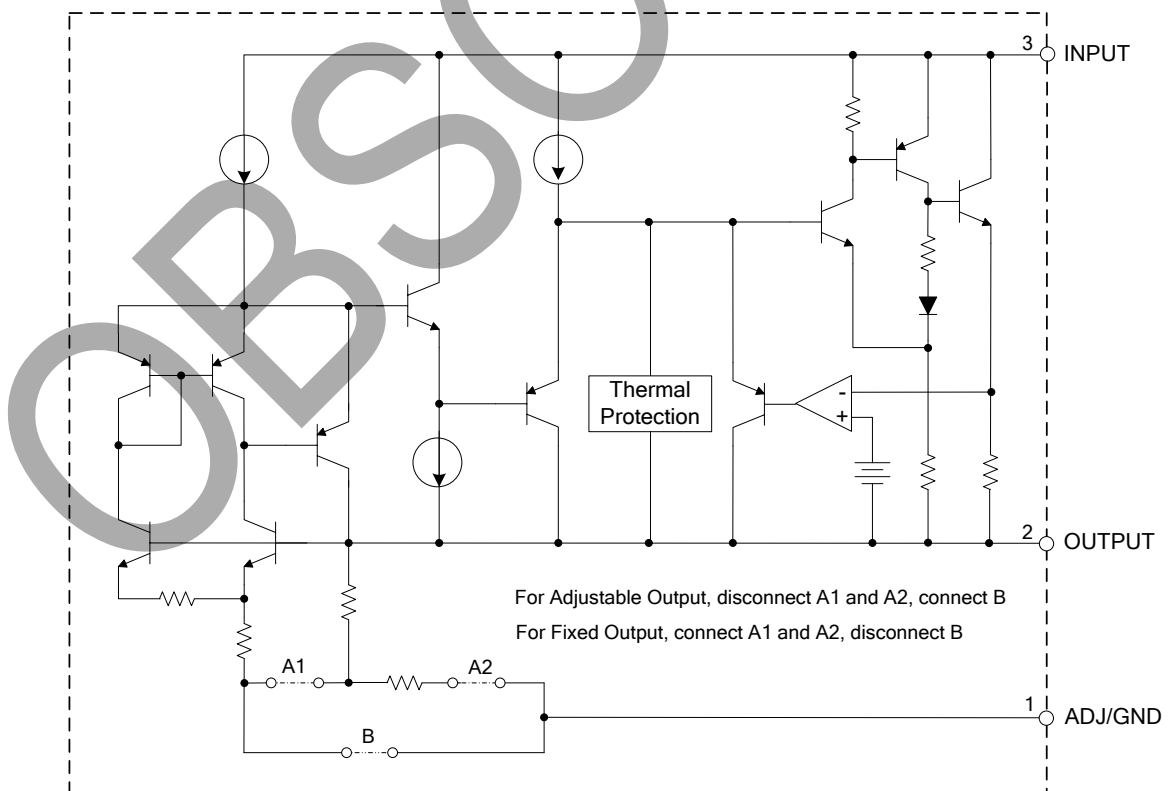
## Applications

- DVD/CD-ROM
- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

**Typical Applications Circuit**



**Functional Block Diagram**



OBSOLETE - PART DISCONTINUED

## Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating		Unit
$V_{IN}$	Input Voltage	15		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
$\theta_{JA}$	Thermal Resistance (Note 2)	SOT-223	120	°C/W
		SOT-89	165	
		TO-263-3	80	
ESD	ESD (Human Body Model)	3500		V
ESD	ESD (Machine Model)	400		V

- Notes: 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.
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,  $\theta_{JA}$ , 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	-40	+125	°C

**Electrical Characteristics** (Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = +25^\circ C$ , unless otherwise specified. ( $P \leq$  maximum power dissipation) Limits appearing in **Boldface** type apply the entire junction temperature range for operation,  $-40^\circ C$  to  $+125^\circ C$ )

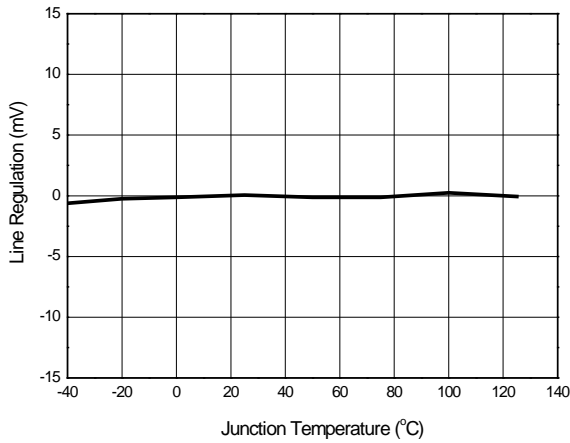
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{REF}$	Reference Voltage	AP2317-ADJ $I_{OUT} = 10mA$ , $V_{IN}-V_{OUT} = 2V$ , $T_J = +25^\circ C$ $10mA \leq I_{OUT} \leq 600mA$ , $1.4V \leq V_{IN}-V_{OUT} \leq 8V$ $P \leq$ maximum power dissipation	1.238 <b>1.225</b>	1.250 1.250	1.262 <b>1.270</b>	V
$V_{OUT}$	Output Voltage	AP2317-2.5 $I_{OUT} = 10mA$ , $V_{IN} = 4.5V$ , $T_J = +25^\circ C$ $10mA \leq I_{OUT} \leq 600mA$ , $3.9V \leq V_{IN} \leq 10V$	2.475 <b>2.450</b>	2.5 2.5	2.525 <b>2.550</b>	V
		AP2317-3.3 $I_{OUT} = 10mA$ , $V_{IN} = 5.0V$ , $T_J = +25^\circ C$ $10mA \leq I_{OUT} \leq 600mA$ , $4.75V \leq V_{IN} \leq 10V$	3.267 <b>3.235</b>	3.3 3.3	3.333 <b>3.365</b>	V
$\Delta V_{OUT}$	Line Regulation	AP2317-ADJ $I_{OUT} = 10mA$ , $1.5V \leq V_{IN}-V_{OUT} \leq 10V$	—	0.035	<b>0.2</b>	%
		AP2317-2.5 $I_{OUT} = 10mA$ , $1.5V \leq V_{IN}-V_{OUT} \leq 10V$	—	1	<b>6</b>	mV
		AP2317-3.3 $I_{OUT} = 10mA$ , $1.5V \leq V_{IN}-V_{OUT} \leq 10V$	—	1	<b>6</b>	mV
$\Delta V_{OUT}$	Load Regulation	AP2317-ADJ ( $V_{IN}-V_{OUT}$ ) = 2V, $10mA \leq I_{OUT} \leq 600mA$	—	0.2	<b>0.4</b>	%
		AP2317-2.5 ( $V_{IN}-V_{OUT}$ ) = 2V, $10mA \leq I_{OUT} \leq 600mA$	—	1	<b>10</b>	mV
		AP2317-3.3 ( $V_{IN}-V_{OUT}$ ) = 2V, $10mA \leq I_{OUT} \leq 600mA$	—	1	<b>10</b>	mV
$V_{DROP}$	Dropout Voltage	$\Delta V_{REF} = 1\%$ , $I_{OUT} = 0.6A$	—	1.1	<b>1.3</b>	V
$I_{LIMIT}$	Current Limit	( $V_{IN}-V_{OUT}$ ) = 2V	0.66	0.9	—	A
$I_{ADJ}$	Adjust Pin Current	—	—	60	<b>120</b>	$\mu A$
$\Delta I_{ADJ}$	Adjust Pin Current Change	$1.4V \leq (V_{IN}-V_{OUT}) \leq 10$ , $10mA \leq I_{OUT} \leq 600mA$	—	0.2	<b>5</b>	$\mu A$
$I_{LOAD}$	Minimum Load	$1.5V \leq (V_{IN}-V_{OUT}) \leq 10V$ (ADJ only)	—	<b>1.7</b>	<b>5</b>	mA
$I_Q$	Quiescent Current	$V_{IN} = V_{OUT} + 1.25V$	—	4	—	mA
PSRR	Ripple Rejection	$f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum ( $V_{IN}-V_{OUT}$ ) = 3V, $I_{OUT} = 300mA$	<b>60</b>	75	—	dB
—	Temperature Stability	—	—	0.5	—	%
—	Long-Term Stability	$T_A = +125^\circ C$ , 1000hrs.	—	0.3	—	%
—	RMS Output Noise	$T_A = +25^\circ C$ , $10Hz \leq f \leq 10kHz$	—	0.003	—	%
—	Thermal Shutdown	Junction Temperature	—	+150	—	$^\circ C$
—	Thermal Shutdown Hysteresis	—	—	+25	—	$^\circ C$
$\theta_{JC}$	Thermal Resistance	SOT-89	—	38.6	—	$^\circ C/W$
		SOT-223	—	32.7	—	
		TO-263-3	—	32.7	—	

OBSOLETE - PART DISCONTINUED

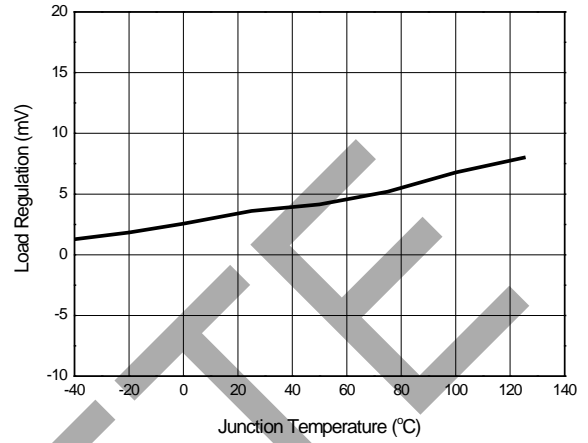
**Performance Characteristics**

OBSOLETE - PART DISCONTINUED

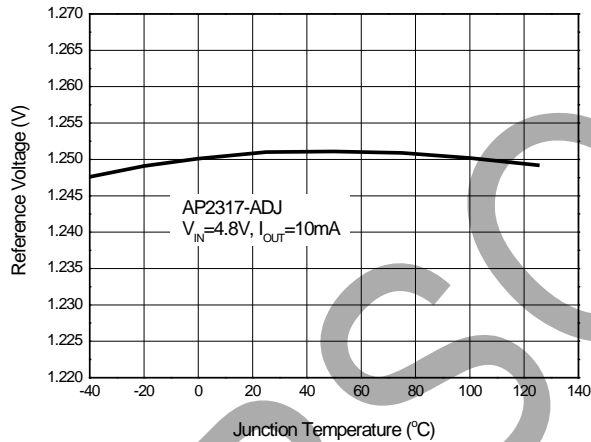
**Line Regulation vs. Junction Temperature**



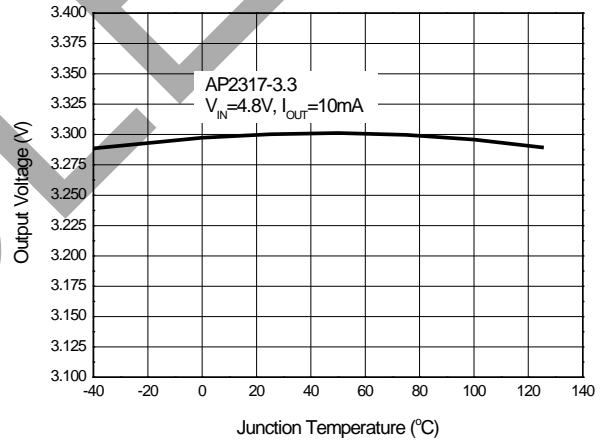
**Load Regulation vs. Junction Temperature**



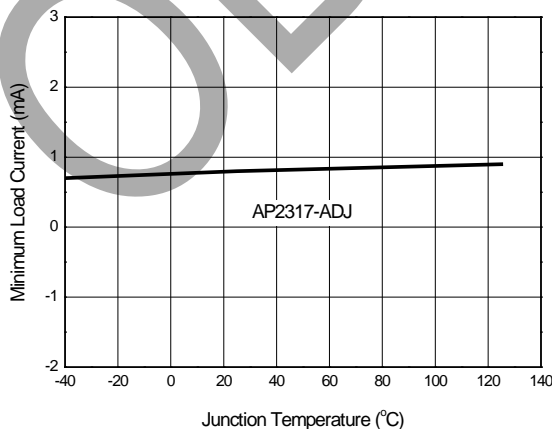
**Reference Voltage vs. Junction Temperature**



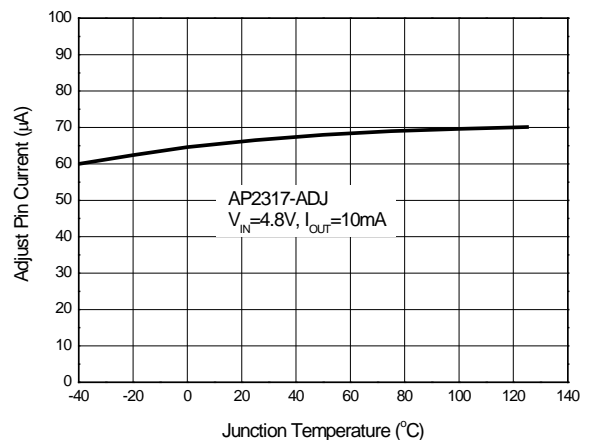
**Output Voltage vs. Junction Temperature**



**Minimum Load Current vs. Junction Temperature**

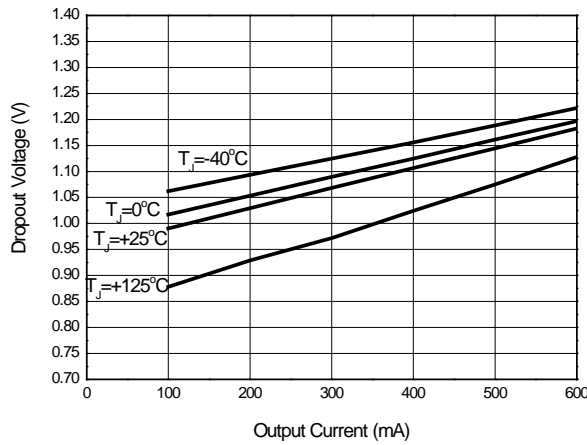


**Adjust Pin Current vs. Junction Temperature**

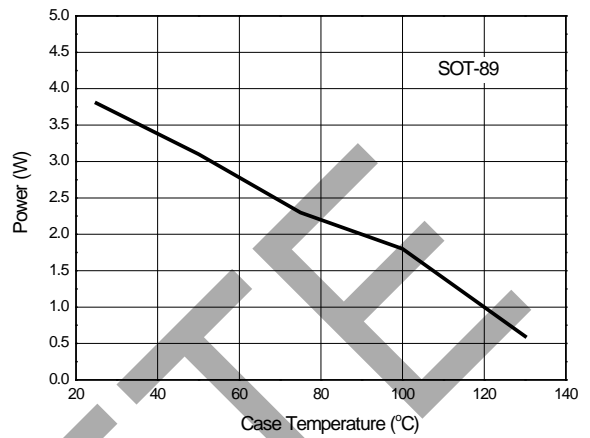


**Performance Characteristics (Cont.)**

**Dropout Voltage vs. Output Current**

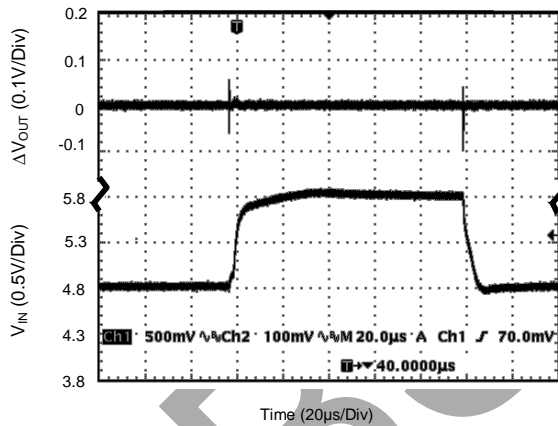


**Maximum Power Dissipation**



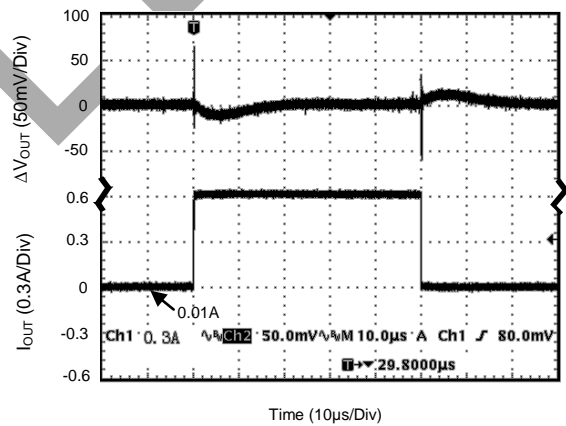
**Line Transient Response**

(Conditions:  $V_{IN}=4.8\text{V to }5.8\text{V}$ ,  $V_{OUT}=3.33\text{V}$ ,  $I_{OUT}=0.1\text{A}$ ,  $C_{IN}=1\mu\text{F}$ ,  $C_{OUT}=10\mu\text{F}$ )

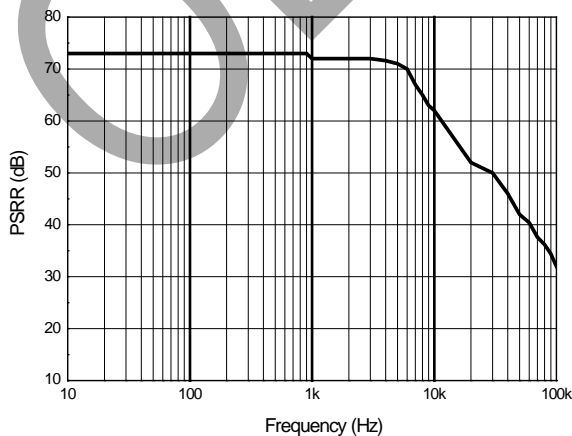


**Load Transient Response**

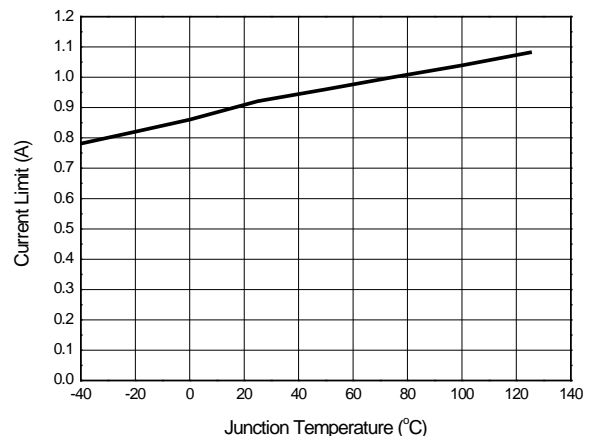
(Conditions:  $V_{IN}=4.8\text{V}$ ,  $V_{OUT}=3.33\text{V}$ ,  $I_{OUT}=0.01\text{ to }0.6\text{A}$ ,  $C_{IN}=C_{OUT}=10\mu\text{F}$ )



**PSRR vs. Frequency**

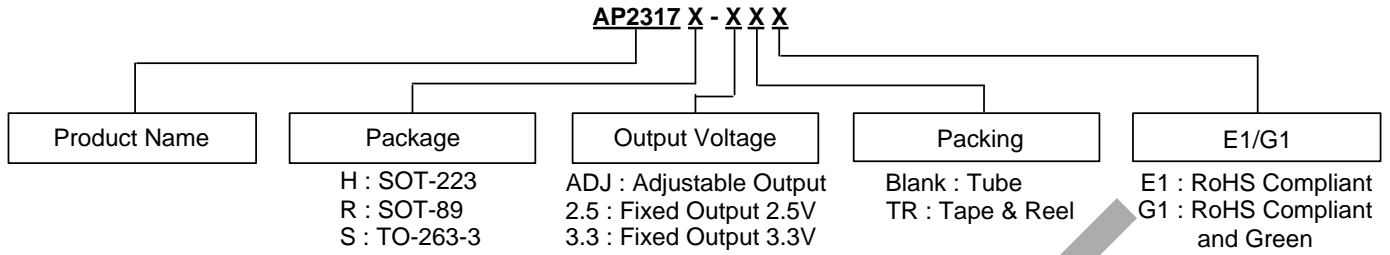


**Current Limit vs. Junction Temperature**



OBSOLETE - PART DISCONTINUED

**Ordering Information**



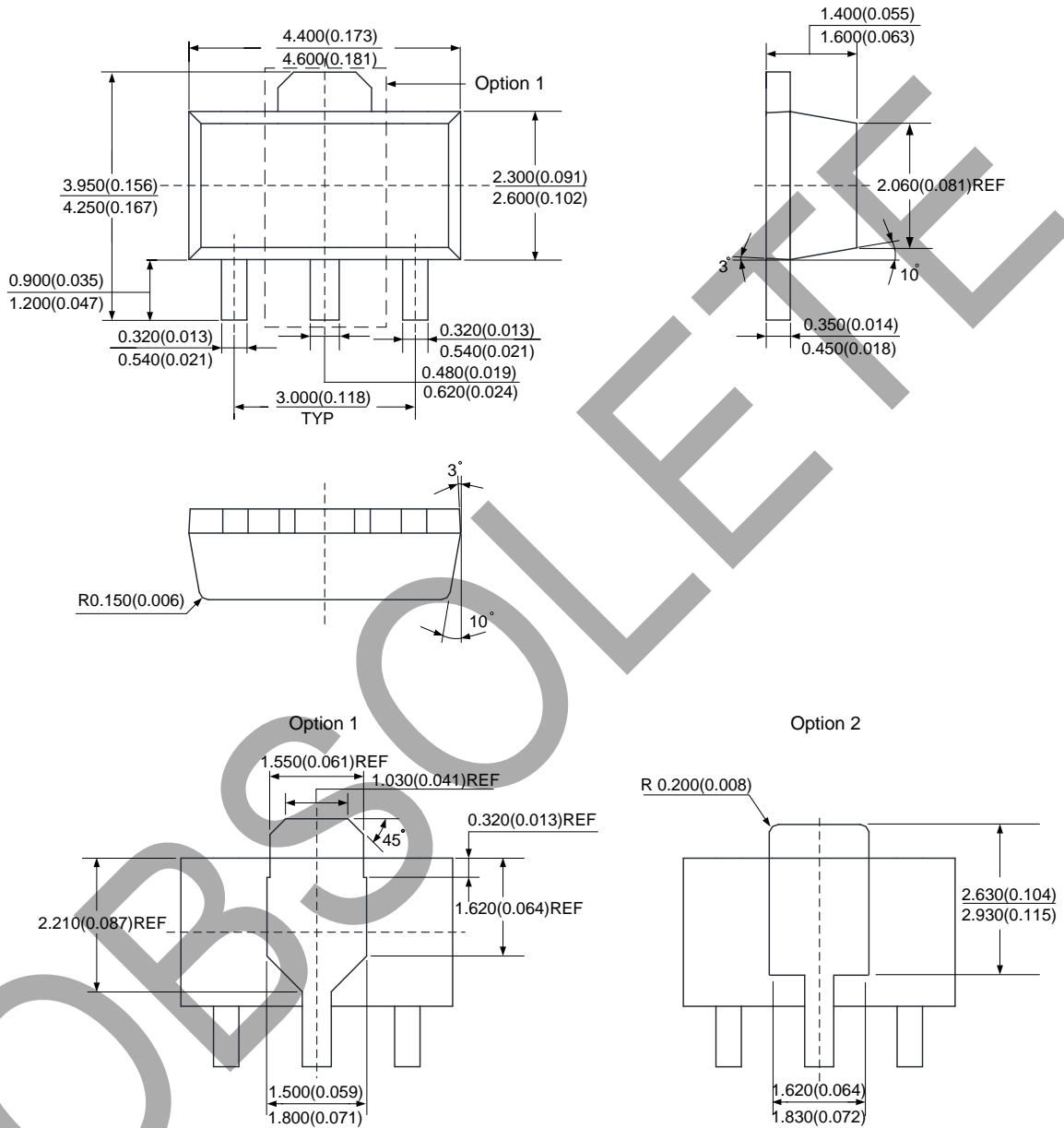
Package	Temperature Range	Part Number		Marking ID		Packing
		RoHS Compliant	RoHS Compliant and Green	RoHS Compliant	RoHS Compliant and Green	
SOT-89	-40 to +125°C	AP2317R-ADJTRE1	AP2317R-ADJTRG1	E27A	G27A	Tape & Reel
		AP2317R-2.5TRE1	AP2317R-2.5TRG1	E27B	G27B	Tape & Reel
		AP2317R-3.3TRE1	AP2317R-3.3TRG1	E27C	G27C	Tape & Reel
SOT-223	-40 to +125°C	AP2317H-ADJTRE1	AP2317H-ADJTRG1	EH27A	GH27A	Tape & Reel
		AP2317H-2.5TRE1	AP2317H-2.5TRG1	EH27B	GH27B	Tape & Reel
		AP2317H-3.3TRE1	AP2317H-3.3TRG1	EH27C	GH27C	Tape & Reel
TO-263-3	-40 to +125°C	AP2317S-3.3E1	AP2317S-3.3G1	AP2317S-3.3E1	AP2317S-3.3G1	Tube
		AP2317S-3.3TRE1	AP2317S-3.3TRG1	AP2317S-3.3E1	AP2317S-3.3G1	Tape & Reel

OBSOLETE - PART DISCONTINUED

OBSOLETE

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

(1) Package Type: SOT-89

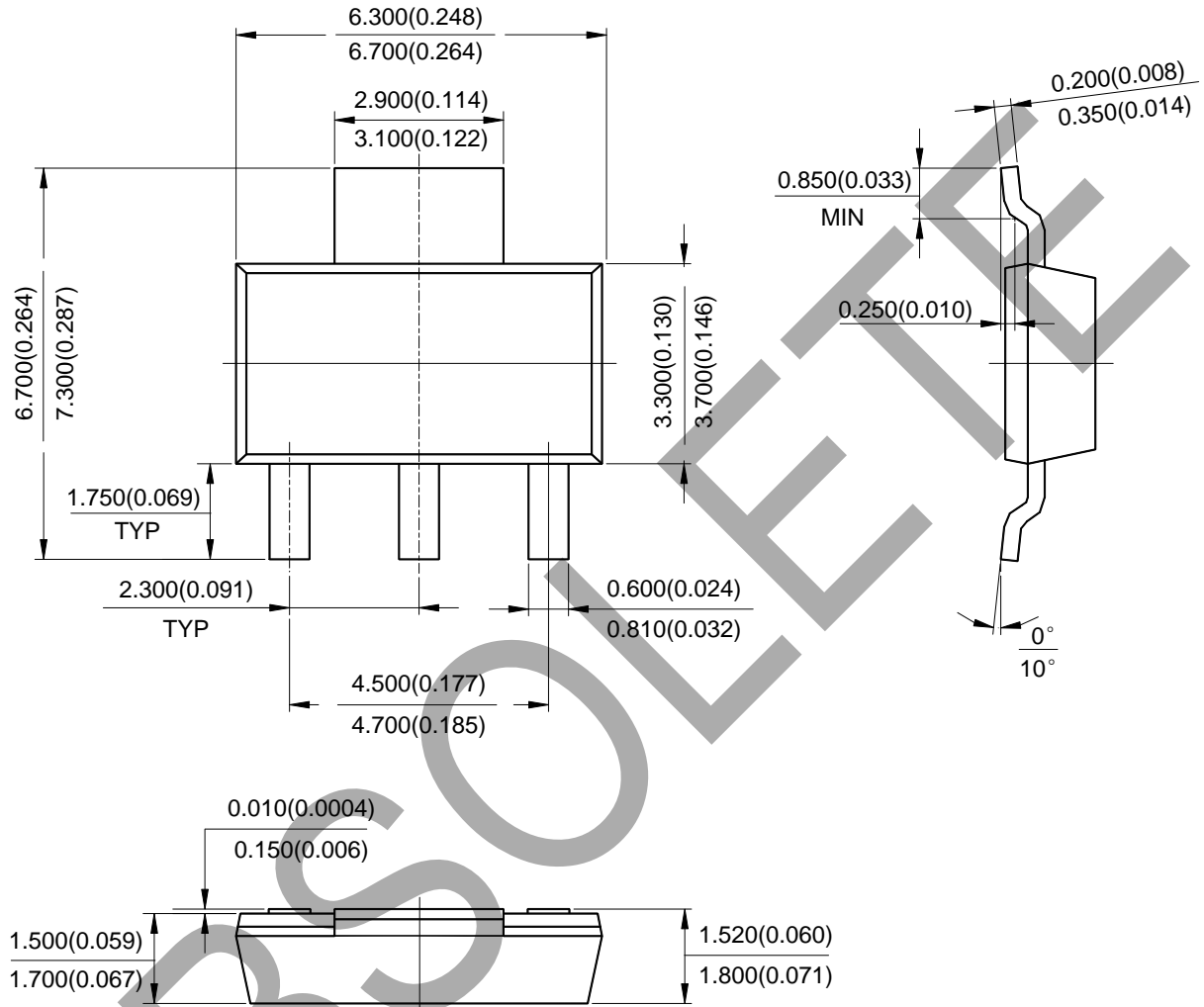


OBSOLETE - PART DISCONTINUED



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

(2) Package Type: SOT-223

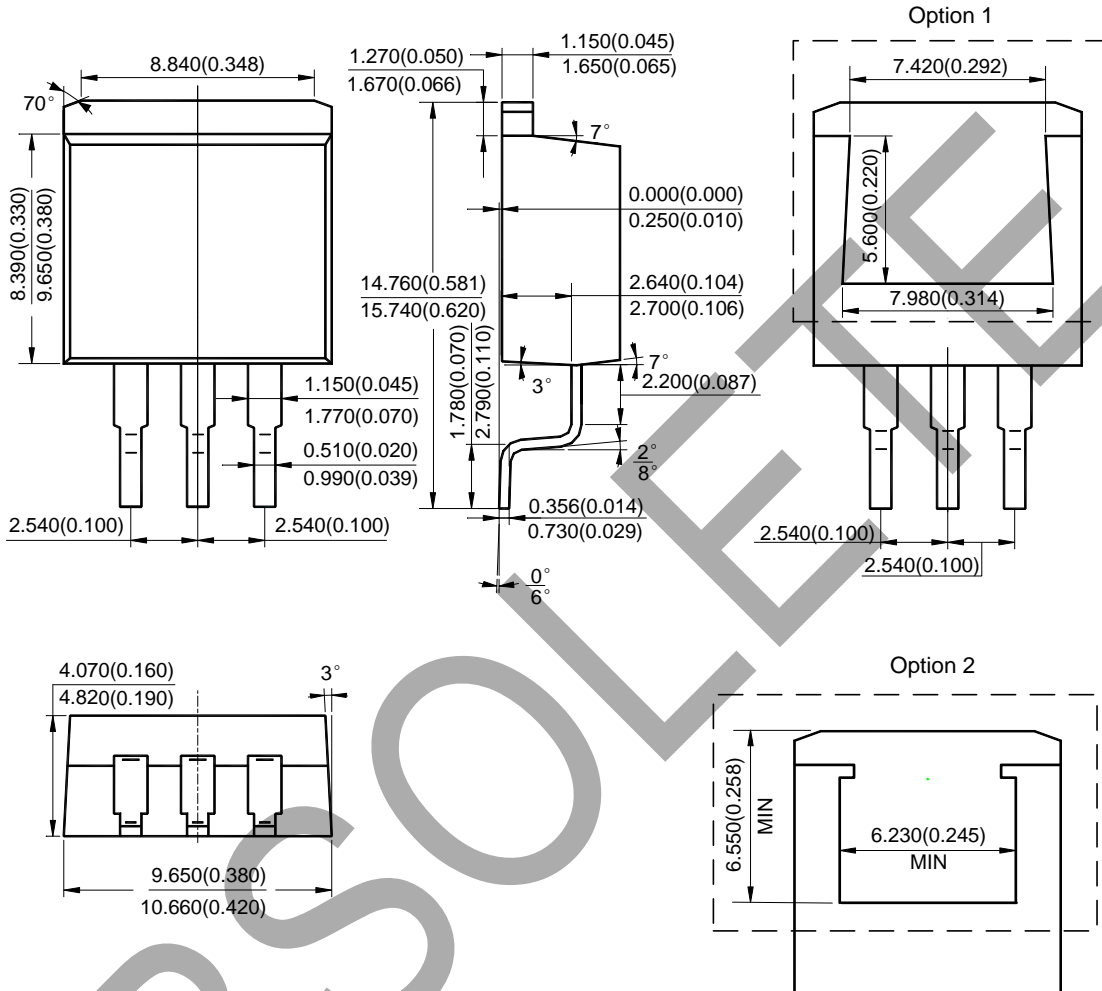


OBSOLETE - PART DISCONTINUED

OBSOLETE

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

(3) Package Type: TO-263-3

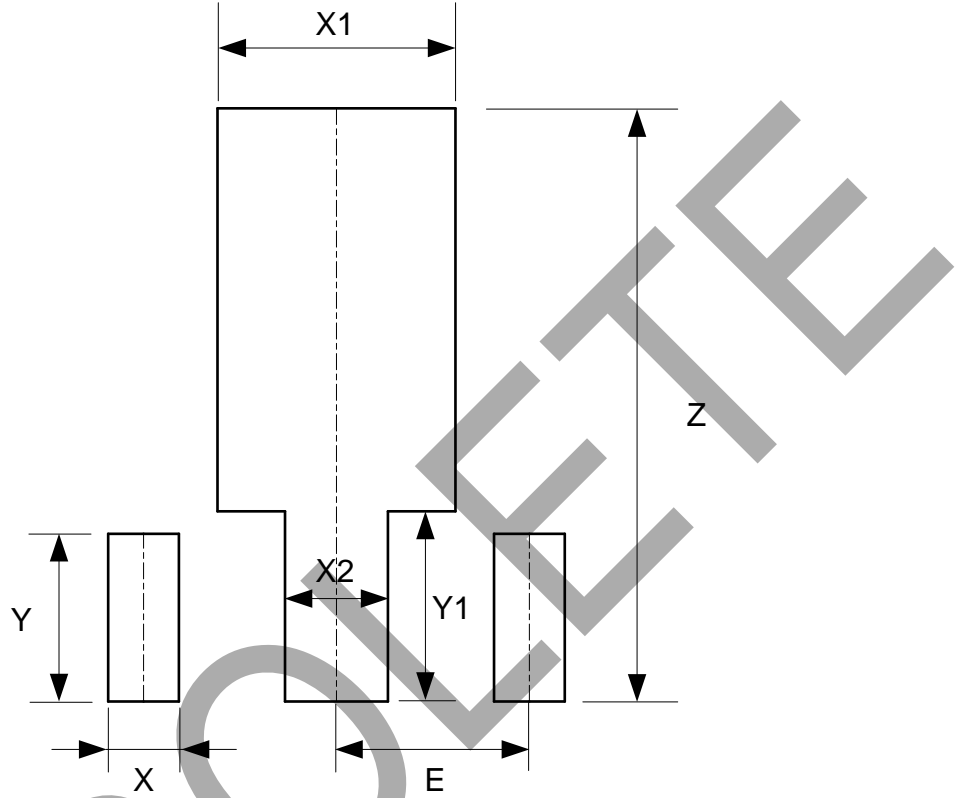


OBSOLETE - PART DISCONTINUED

OBSOLETE

**Suggested Pad Layout**

(1) Package Type: SOT-89

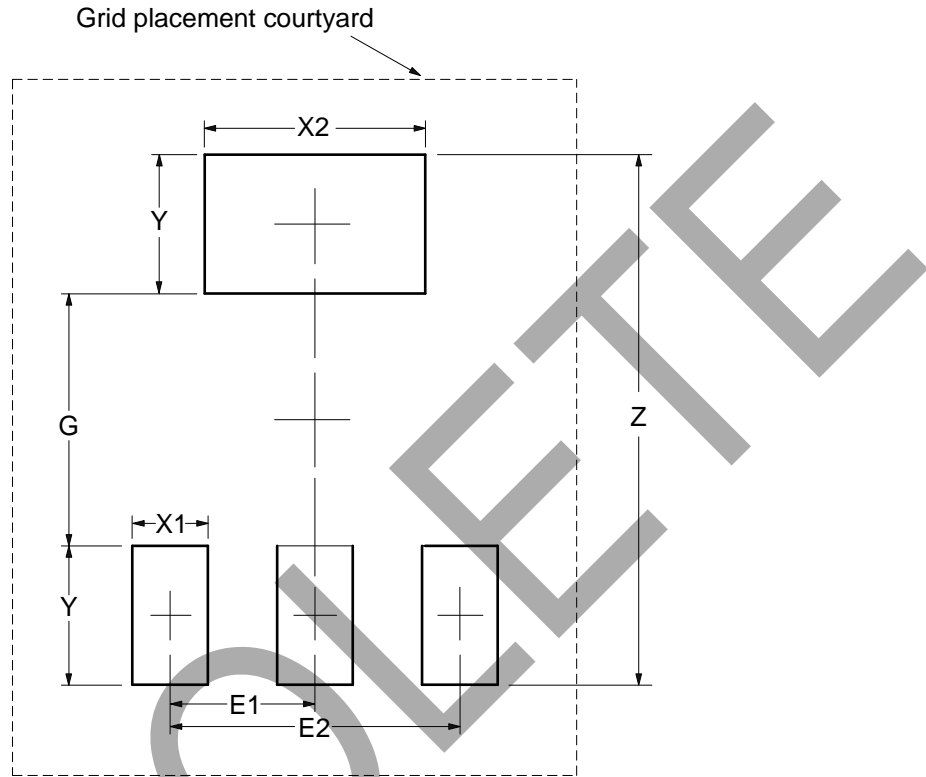


Dimensions	Z (mm)/(inch)	X (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	Y1 (mm)/(inch)	E (mm)/(inch)
Value	4.600/0.181	0.550/0.022	1.850/0.073	0.800/0.031	1.300/0.051	1.475/0.058	1.500/0.059

OBSOLETE - PART DISCONTINUED

**Suggested Pad Layout (Cont.)**

(2) Package Type: SOT-223



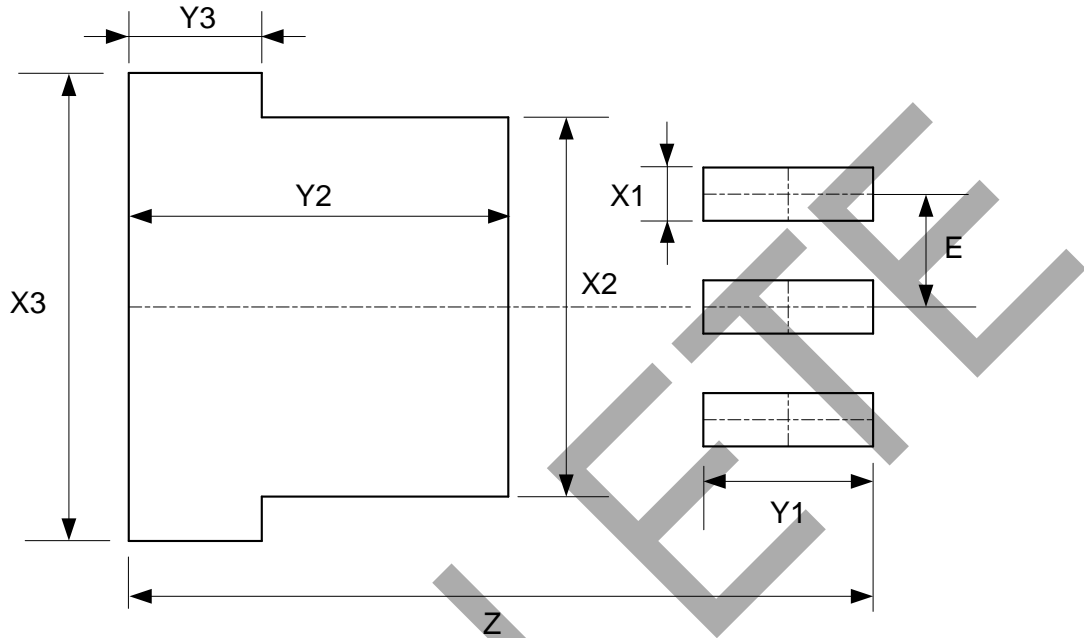
Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (mm)/(inch)
Value	8.400/0.331	4.000/0.157	1.200/0.047	3.500/0.138	2.200/0.087	2.300/0.091	4.600/0.181

OBSOLETE - PART DISCONTINUED

OBSOLETE

**Suggested Pad Layout (Cont.)**

(3) Package Type: TO-263-3



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

OBSOLETE - PART DISCONTINUED

OBSOLETE

**IMPORTANT NOTICE**

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

**LIFE SUPPORT**

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2019, Diodes Incorporated

[www.diodes.com](http://www.diodes.com)