WIDE INPUT VOLTAGE RANGE, 150mA ULDO REGULATOR

Description

The AP7381 series is a positive voltage regulator IC.

The AP7381 has features of wide input voltage range, high accuracy, low dropout voltage, current limit and ultra-low quiescent current which make it ideal for use in various USB and portable devices.

The IC consists of a voltage reference, an error amplifier, a resistor network for setting output voltage, a current limit circuit for current protection, and a chip enable circuit.

The AP7381 has 2.8V, 3.3V, 5V and 7V fixed voltage version.

The AP7381 is available in space-saving SOT23, SOT89 and TO92 (Ammo Packing) packages.

Features

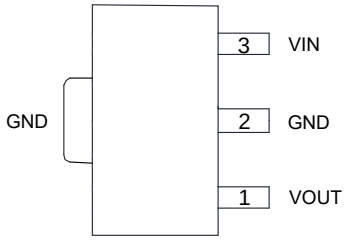
- Wide Input Voltage Range: Up to 40V
- Low Dropout Voltage: V_{DROP} = 1000mV @ I_{OUT} = 100mA @ V_{OUT} = 3.3V
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- Short Current Protection Function
- **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

- E-meters
- Battery-powered equipments
- Laptops, palmtops, notebook computers
- Portable information appliances

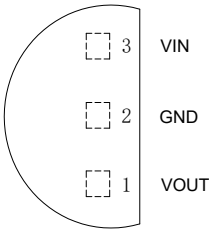
Pin Assignments

(Top View)



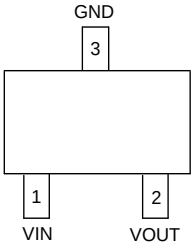
SOT89

(Top View)



TO92 (Ammo Packing)
(Not Recommend For New Design)

(Top View)

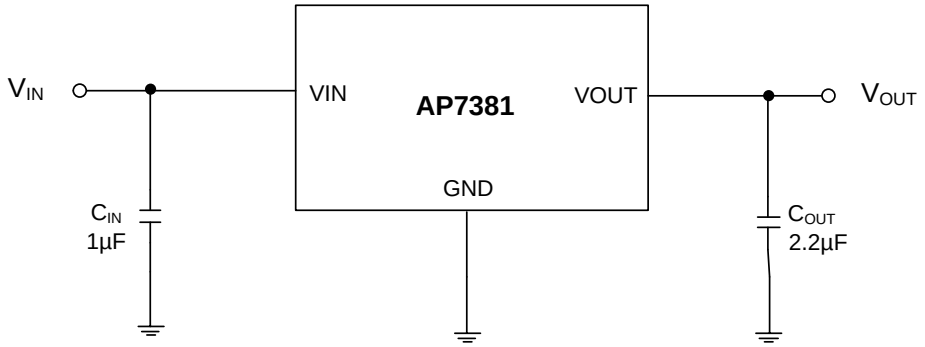


SOT23

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.

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Typical Applications Circuit



Pin Descriptions

Pin Number			Pin Name	Function
TO92 (Ammo Packing)	SOT89	SOT23		
3	3	1	VIN	Input Voltage
2	2	3	GND	Ground
1	1	2	VOUT	Regulated Output Voltage

Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating		Unit
V_{IN}	Supply Input Voltage	-0.3 to 45		V
V_{OUT}	Output Voltage	-0.3 to 8		V
I_{OUT}	Output Current	150		mA
T_{LEAD}	Lead Temperature (Soldering, 10s)	+260		ºC
T_J	Operating Junction Temperature	+150		ºC
θ_{JA}	Thermal Resistance	SOT89	125	°C/W
		TO92 (Ammo Packing)	165	
		SOT23	167	
T_{STG}	Storage Temperature Range	-65 to +150		ºC
CDM	ESD (Change Device Model)	2000		V
HBM	ESD (Human Body Model)	4000		V

Note: 4. a). Stresses beyond 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 conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods can affect device reliability.
b). Ratings apply to ambient temperature at +25°C. The JEDEC High-K board design used to derive this data is a 2inch × 2inch multi-layer board with 1oz internal power and ground planes and 2oz copper traces on the top and bottom of the board.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{IN}	Supply Input Voltage	3.3	40	V
T_J	Operating Junction Temperature	-40	+125	°C

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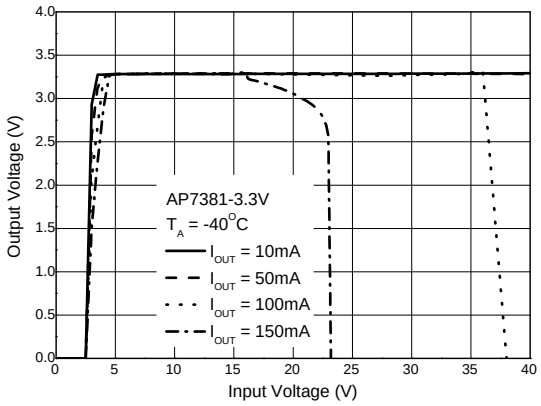
Electrical Characteristics (T_J = +25°C, I_{OUT} = 1mA, C_{IN} = 1.0µF, C_{OUT} = 2.2µF, V_{IN} = V_{OUT} + 2V, **Bold** typeface applies over -40°C ≤ T_J ≤ +125°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Variation from Specified V_{OUT}	V_{OUT} x 98%	—	V_{OUT} x 102%	V
V_{IN}	Input Voltage	—	3.3	—	40	V
I_{LIMIT}	Current Limit	V_{OUT} = 98% x V_{OUT}, V_{IN} = V_{OUT} + 2V	150	—	—	mA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{OUT} + 2V ≤ V_{IN} ≤ 40V, I_{OUT} = 10mA	—	0.05	—	%/V
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	1mA ≤ I_{OUT} ≤ 150mA	—	0.5	—	%
V_{DROP}	Dropout Voltage	I_{OUT} = 100mA @ V_{OUT} = 3.3V	—	1000	—	mV
I_{GND}	Ground Current	I_{OUT} = 0A	—	2.5	—	µA
		I_{OUT} = 100mA	—	25	—	
$\Delta V_{OUT}/(V_{OUT} x \Delta T)$	Output Voltage Temperature Coefficient	I_{OUT} = 100µA, -40°C ≤ T_J ≤ +125°C	—	±100	—	ppm/°C
T_{OTSD}	Thermal Shutdown Temperature	—	—	+160	—	°C
T_{HYOTSD}	Thermal Shutdown Hysteresis	—	—	+20	—	°C
PSRR	Power Supply Rejection Ratio	I_{OUT} = 1mA, V_{OUT} = 3.3V	—	60	—	dB

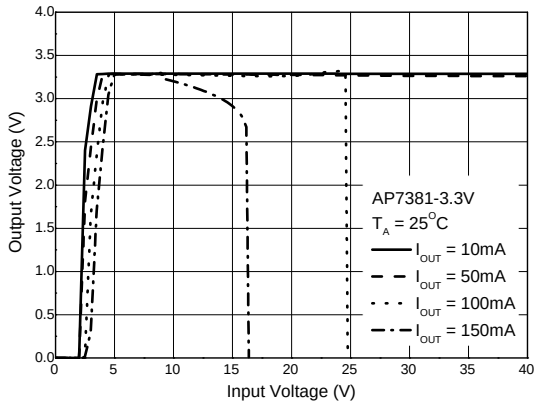
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Performance Characteristics

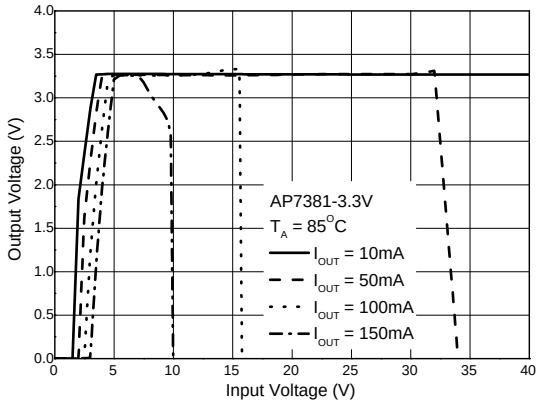
Output Voltage vs. Input Voltage @-40°C



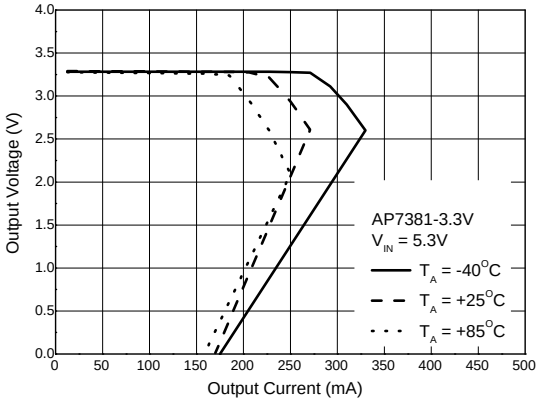
Output Voltage vs. Input Voltage @+25°C



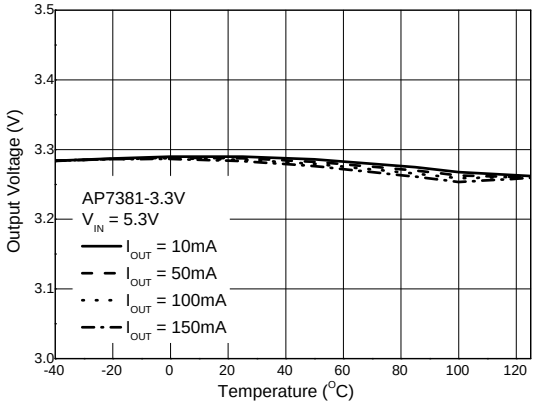
Output Voltage vs. Input Voltage @+85°C



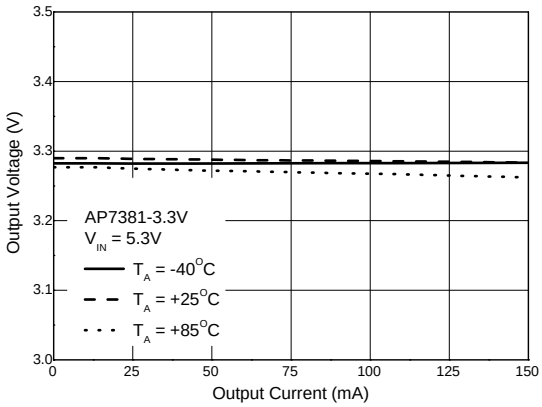
Output Voltage vs. Output Current



Output Voltage vs. Temperature



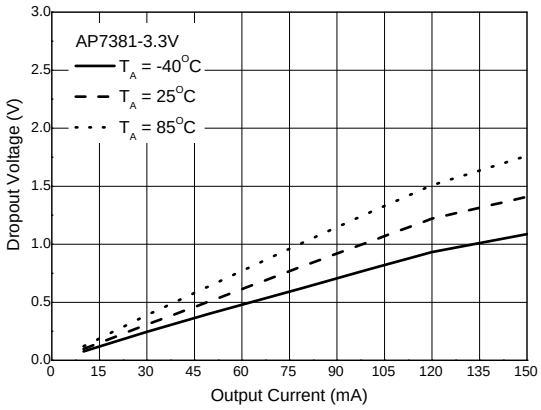
Output Voltage vs. Output Current



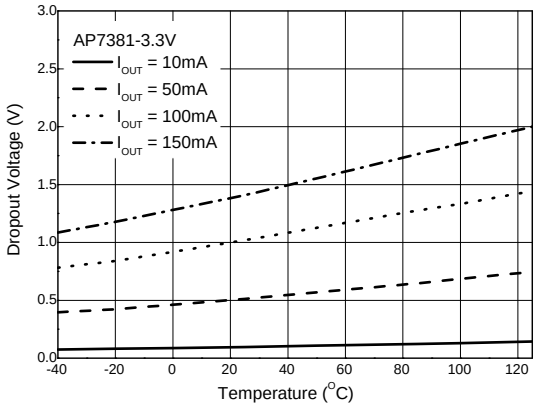
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Performance Characteristics (continued)

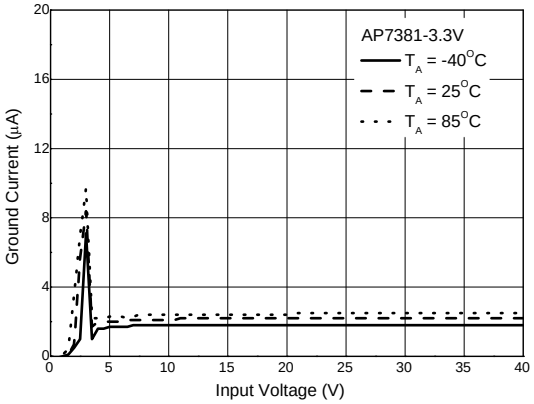
Dropout Voltage vs. Output Current



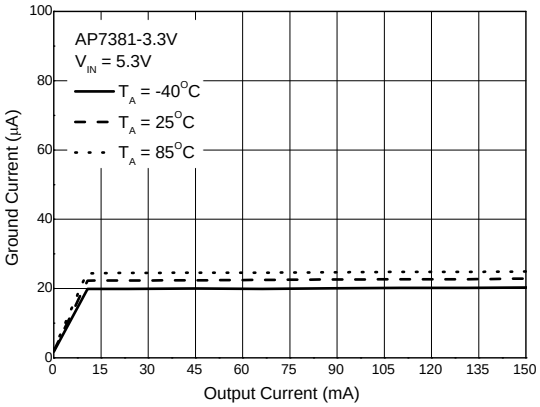
Dropout Voltage vs. Temperature



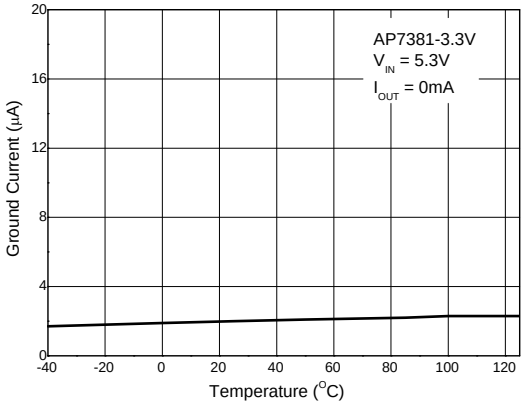
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

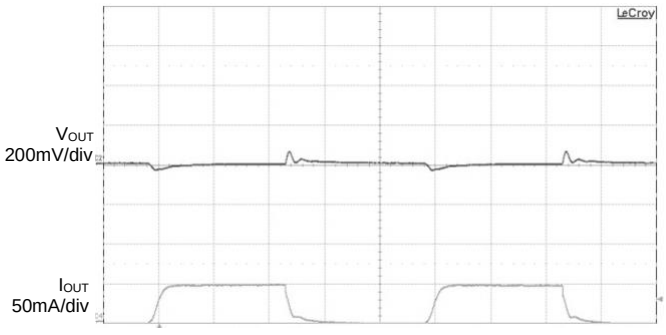


I_{GND} vs Temperature



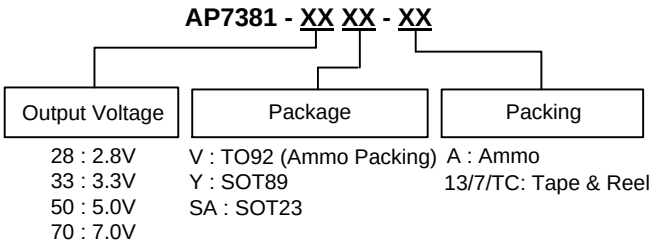
Load Transient

C_{IN}=1µF, C_{OUT}=2.2µF, V_{IN}=V_{OUT}+2V, I_{OUT}=0 to 50mA



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Ordering Information (Note 5)



Part Number	Package Code	Package	Packing	
			Qty.	Carrier
AP7381-XXV-A (*)	V	TO92 (Ammo Packing)	2000	A Tape & Reel
AP7381-XXY-13	Y	SOT89	2500	13” Tape & Reel
AP7381-33Y-TC	Y	SOT89	4000	TC Tape & Reel
AP7381-XXSA-7	SA	SOT23	3000	7” Tape & Reel

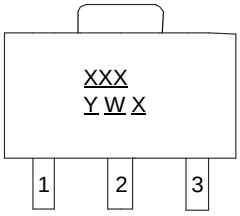
* Not Recommend For New Design

Note: 5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

(1) SOT89

(Top View)



XXX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1 to 26 Week;
a to z : 27 to 52 Week;
z Represents 52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP7381-28Y-13 (*)	SOT89	D9C
AP7381-33Y-13	SOT89	D9A
AP7381-50Y-13	SOT89	D9B
AP7381-70Y-13 (*)	SOT89	D9D
AP7381-33Y-TC	SOT89	D9A

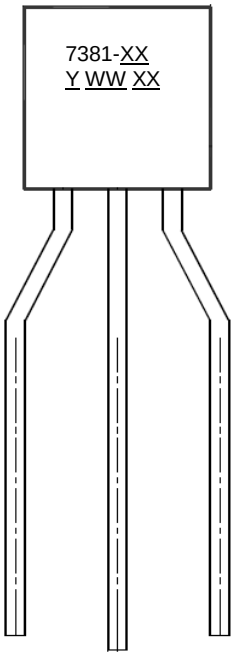
*Not Recommend For New Design

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Marking Information (continued)

(2) TO92 (Ammo Packing)

(Front View)



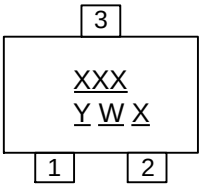
7381-XX : Identification Code
Y : Year : 0 to 9
WW : Week : 01 to 52; 52
Represents 52 and 53 Week
XX : Internal Code

Part Number	Package	Identification Code
AP7381-28V-A (*)	TO92 (Ammo Packing)	7381-28
AP7381-33V-A (*)	TO92 (Ammo Packing)	7381-33
AP7381-50V-A (*)	TO92 (Ammo Packing)	7381-50
AP7381-70V-A (*)	TO92 (Ammo Packing)	7381-70

*Not Recommend For New Design

(3) SOT23

(Top View)



XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 Week;
a to z : 27 to 52 Week; z Represents
52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP7381-28SA-7 (*)	SOT23	D9C
AP7381-33SA-7	SOT23	D9A
AP7381-50SA-7	SOT23	D9B
AP7381-70SA-7 (*)	SOT23	D9D

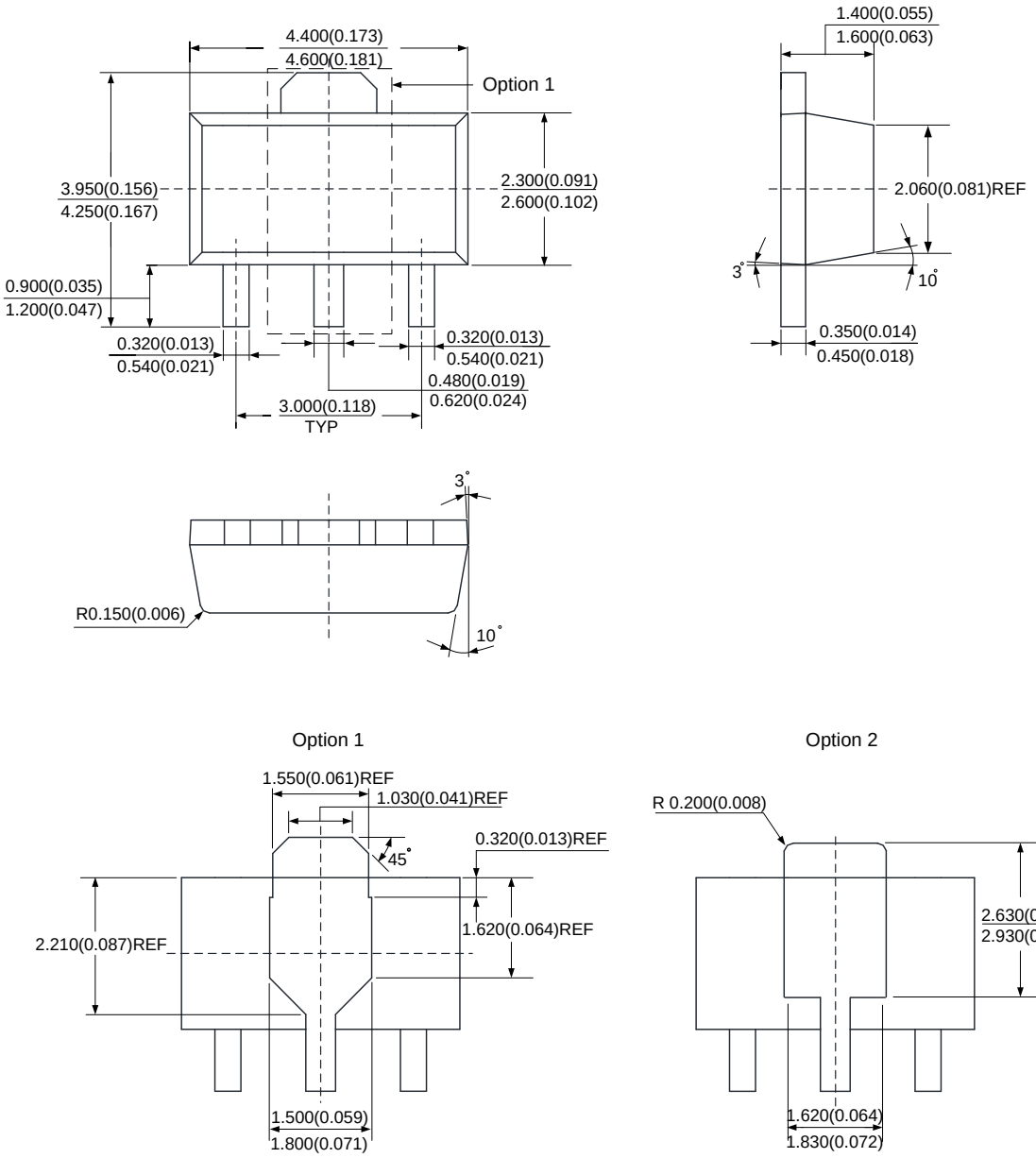
*Not Recommend For New Design

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Package Outline Dimensions (All dimensions in mm.)

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

(1) Package Type: SOT89

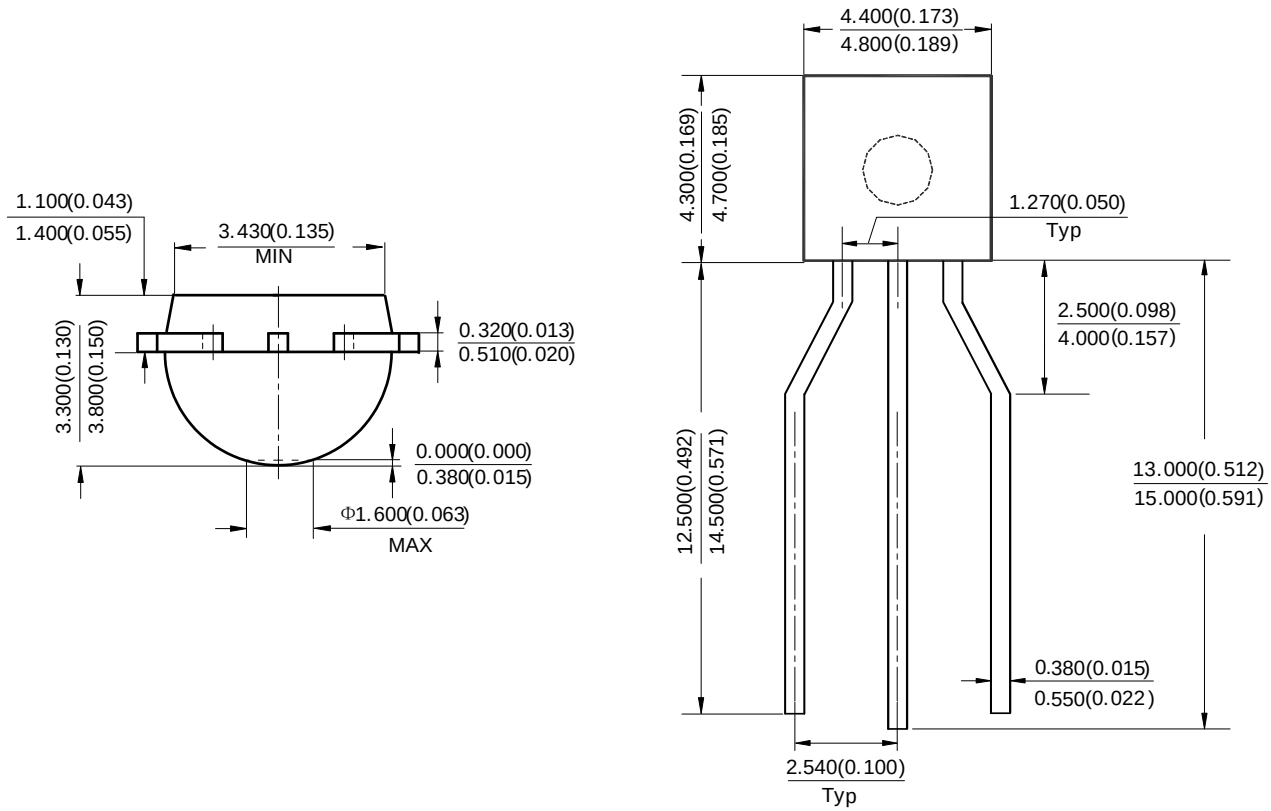


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Package Outline Dimensions (All dimensions in mm.) (continued)

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(2) Package Type: TO92 (Ammo Packing)

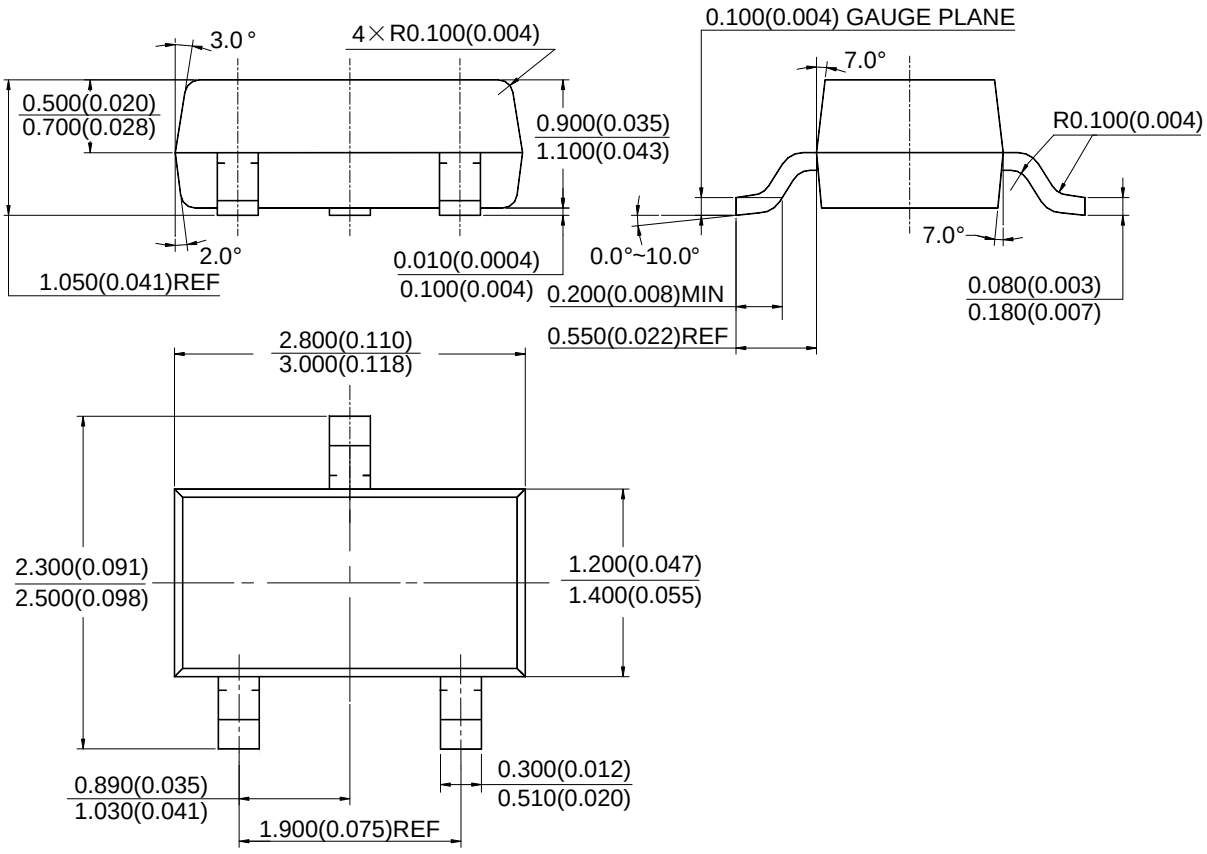


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Package Outline Dimensions (All dimensions in mm.) (continued)

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(3) Package Type: SOT23

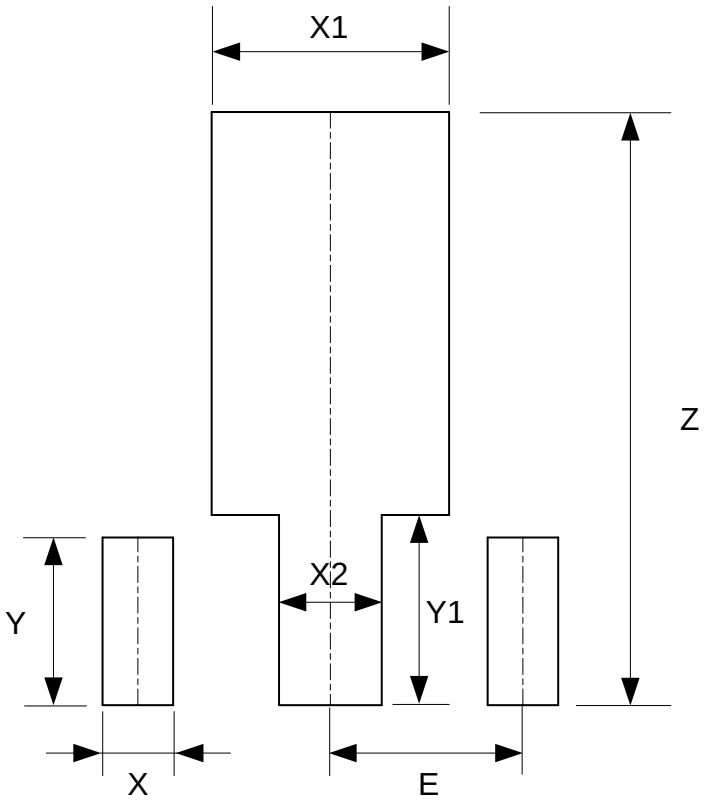


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Suggested Pad Layout

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(1) Package Type: SOT89



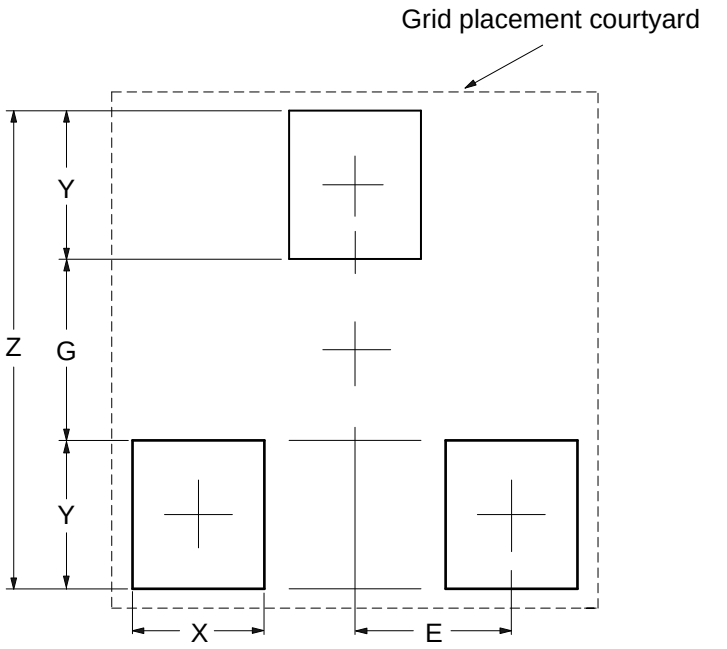
Dimensions	Z (mm)/(inch)	X (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	Y1 (mm)/(inch)	E (mm)/(inch)
Value	4.600/0.181	0.550/0.022	1.850/0.073	0.800/0.031	1.300/0.051	1.475/0.058	1.500/0.059

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Suggested Pad Layout (continued)

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

(2) Package Type: SOT23



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	2.900/0.114	1.100/0.043	0.800/0.031	0.900/0.035	0.950/0.037

Mechanical Data

- Moisture Sensitivity:
  - SOT23: Level 1 per J-STD-020
  - SOT89/TO92 (Ammo Packing): Level 3 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight:
  - SOT23: 0.009 grams (Approximate)
  - SOT89: 0.062 grams (Approximate)
  - TO92 (Ammo Packing): 0.157 grams (Approximate)

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Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

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