

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 3.3V, 5V fixed voltage version.

The AP7381 is available in space-saving SOT89 (Option 2) and TO92 (Ammo Packing) packages.

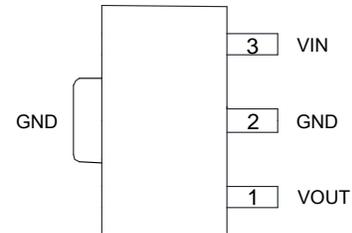
Features

- 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)**

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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.

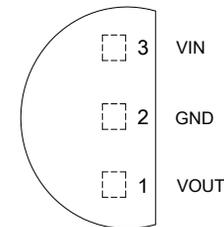
Pin Assignments

(Top View)



SOT89 (Option 2)

(Top View)

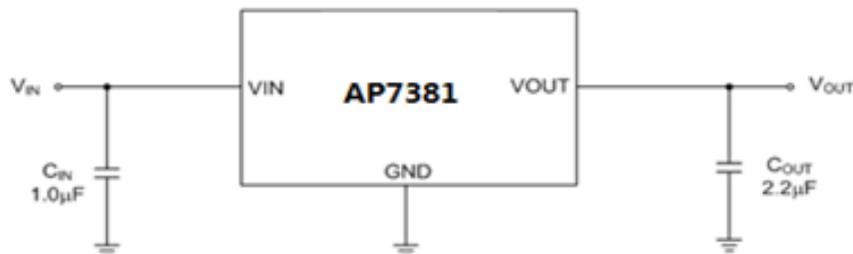


TO92 (Ammo Packing)

Applications

- E-Meter
- Battery-powered Equipment
- Laptop, Palmtops, Notebook Computers
- Portable Information Appliances

Typical Applications Circuit



Pin Descriptions

Pin Number		Pin Name	Function
TO92 (Ammo Packing)	SOT89 (Option 2)		
3	3	VIN	Input voltage
2	2	GND	Ground
1	1	VOUT	Regulated output voltage

Absolute Maximum Ratings

Symbol	Parameter	Rating		Unit
V _{IN}	Supply Input Voltage	45		V
I _{OUT}	Output Current	150		mA
T _{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
T _J	Operating Junction Temperature	+150		°C
θ _{JA}	Thermal Resistance	SOT89 (Option 2)	125	°C/W
		TO92 (Ammo Packing)	165	
T _{STG}	Storage Temperature Range	-65 to +150		°C
CDM	ESD (Change Device Model)	2000		V
HBM	ESD (Human Body Model)	4000		V

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

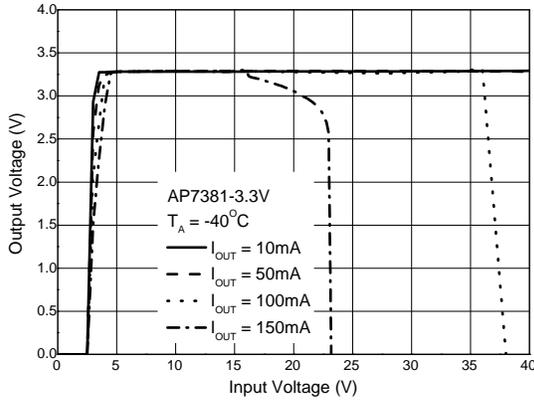
Electrical Characteristics ($T_J = +25^\circ\text{C}$, $I_{OUT} = 1\text{mA}$, $C_{IN} = 1.0\mu\text{F}$, $C_{OUT} = 2.2\mu\text{F}$, $V_{IN} = V_{OUT} + 2\text{V}$, **Bold** typeface applies over $-40^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, unless otherwise specified.)

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

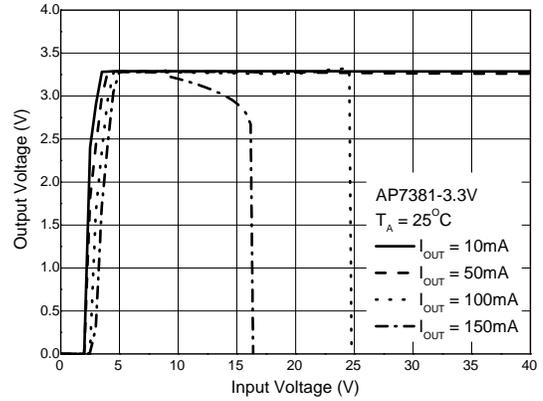
Performance Characteristics

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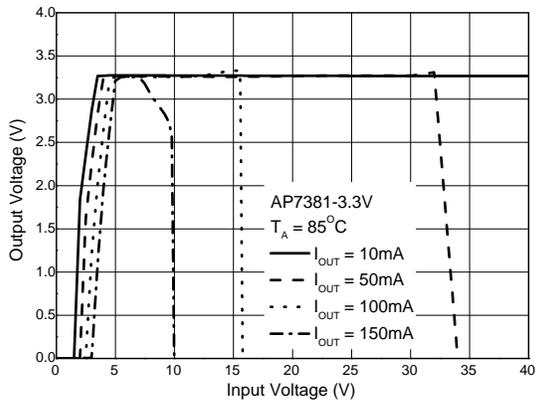
Output Voltage vs. Input Voltage @-40°C



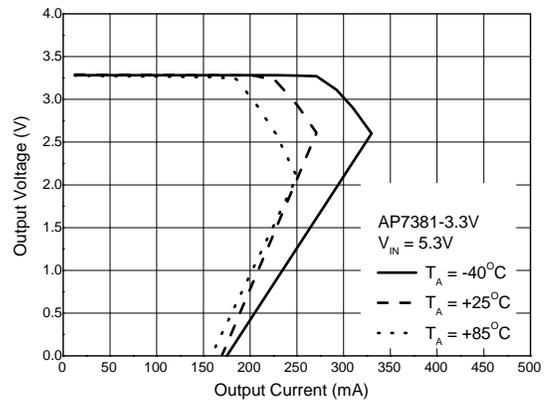
Output Voltage vs. Input Voltage @+25°C



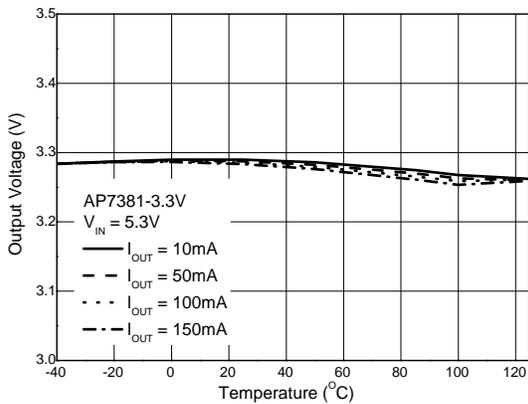
Output Voltage vs. Input Voltage @+85°C



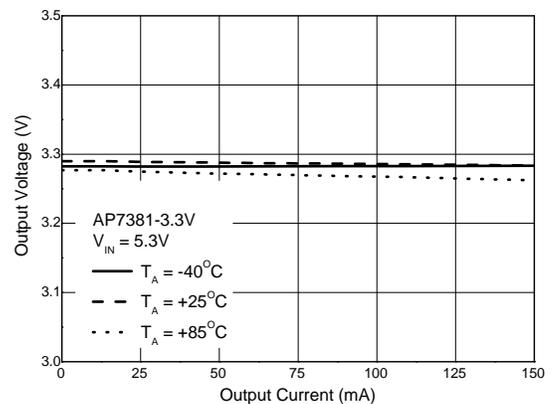
Output Voltage vs. Output Current



Output Voltage vs. Temperature

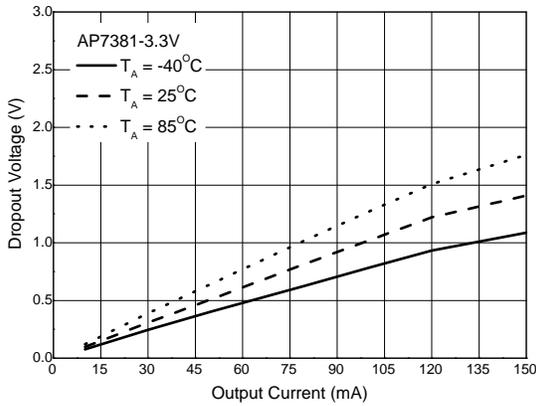


Output Voltage vs. Output Current

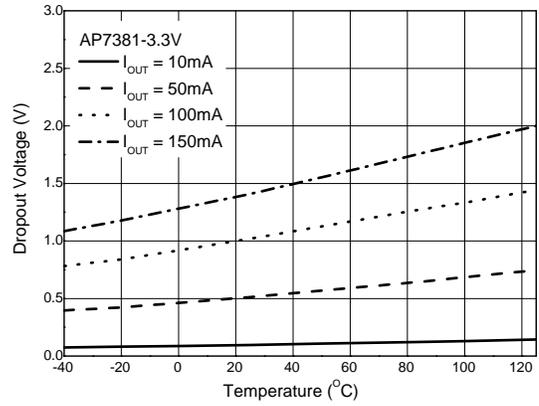


Performance Characteristics (Cont.)

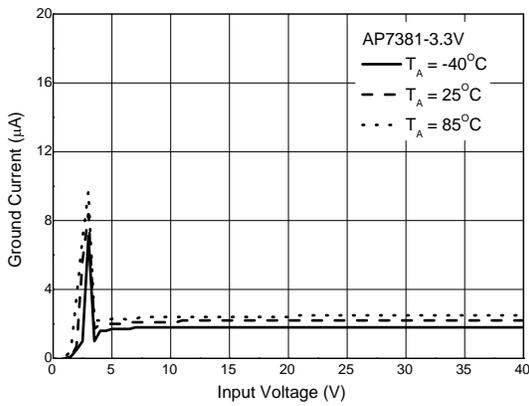
Dropout Voltage vs. Output Current



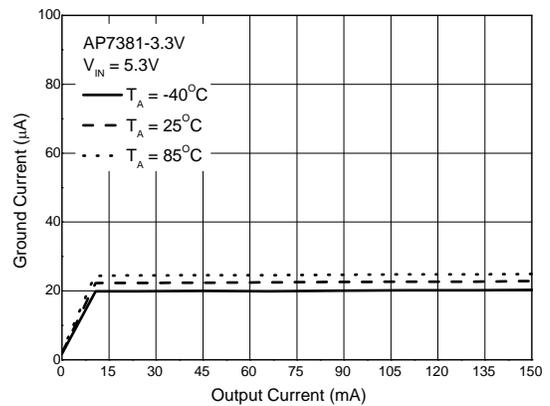
Dropout Voltage vs. Temperature



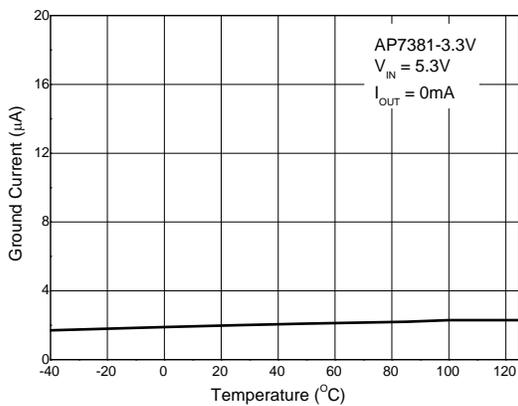
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

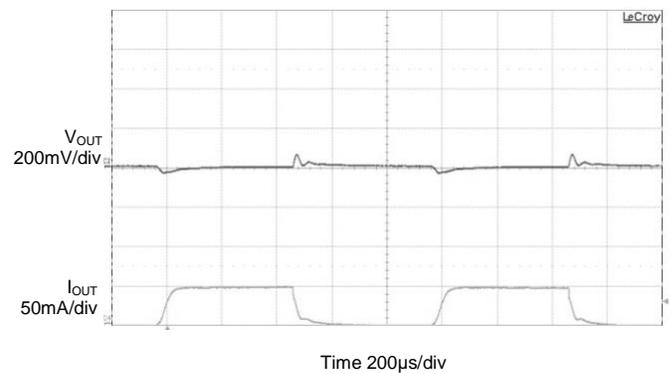


I_{GND} vs Temperature

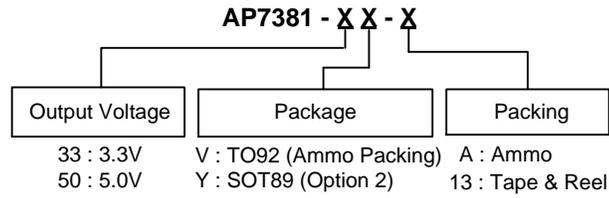


Load Transient

$C_{IN} = 1\mu\text{F}$, $C_{OUT} = 2.2\mu\text{F}$, $V_{IN} = V_{OUT} + 2\text{V}$, $I_{OUT} = 0$ to 50mA



Ordering Information

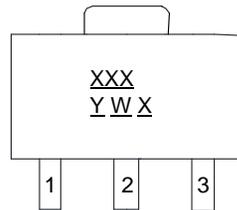


Part Number	Package Code	Packaging	13" Tape and Reel/Ammo	
			Quantity	Part Number Suffix
AP7381-33V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-50V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-33Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7381-50Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13

Marking Information

(1) SOT89 (Option 2)

(Top View)

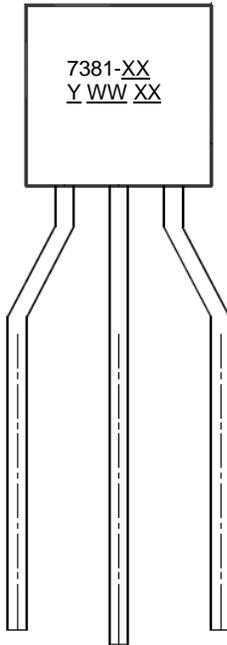


XXX : Identification Code
Y : Year : 0 ~ 9
W : Week : A ~ Z : 1 ~ 26 Week;
a ~ z : 27 ~ 52 Week;
z Represents 52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP7381-33Y-13	SOT89 (Option 2)	D9A
AP7381-50Y-13	SOT89 (Option 2)	D9B

Marking Information (Cont.)

(2) TO92 (Ammo Packing)

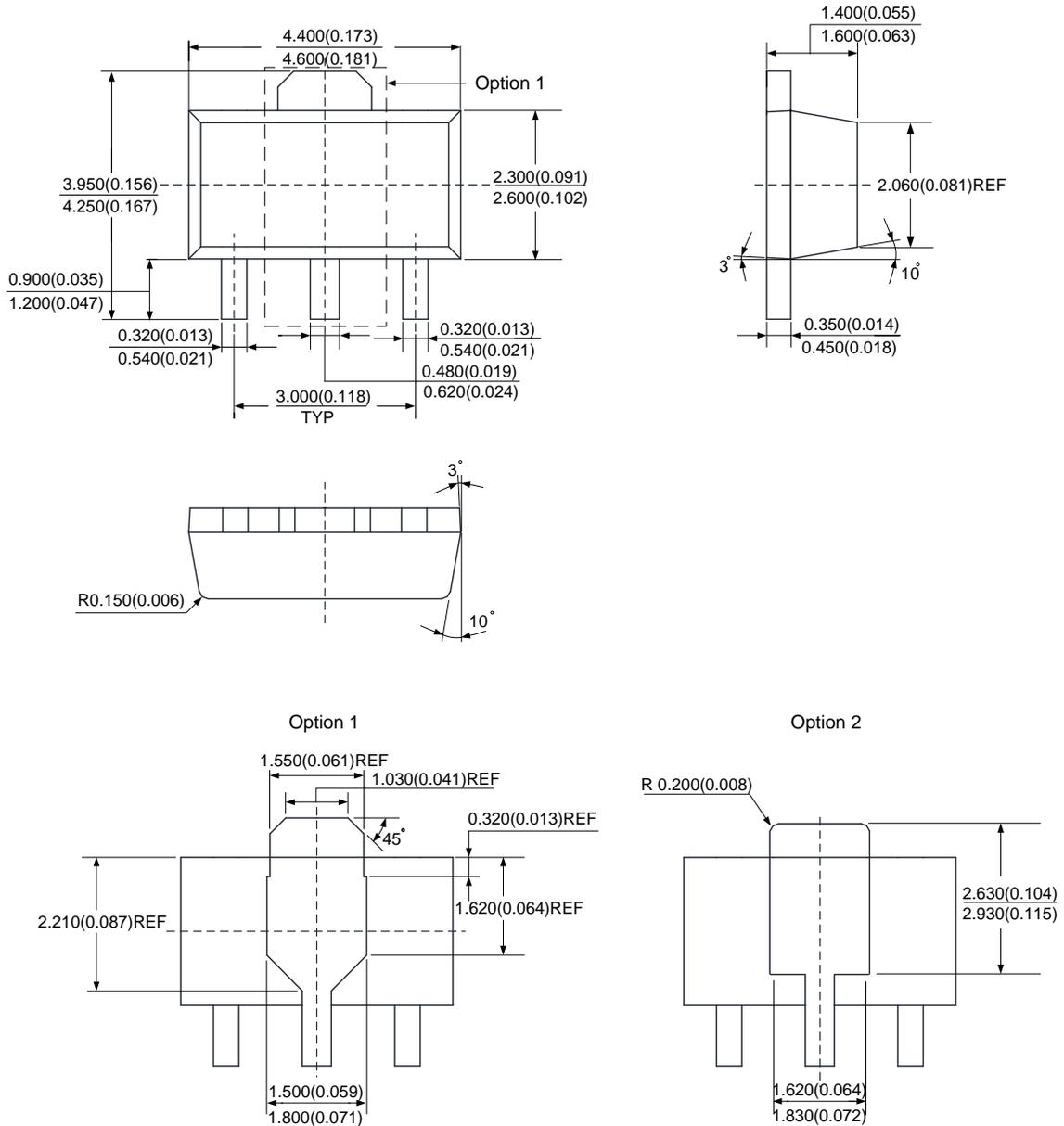


7381-XX : Identification Code
Y : Year : 0 ~ 9
WW : Week : 01 ~ 52; 52
 Represents 52 and 53 Week
XX : Internal Code

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

Package Outline Dimensions (All dimensions in mm.)

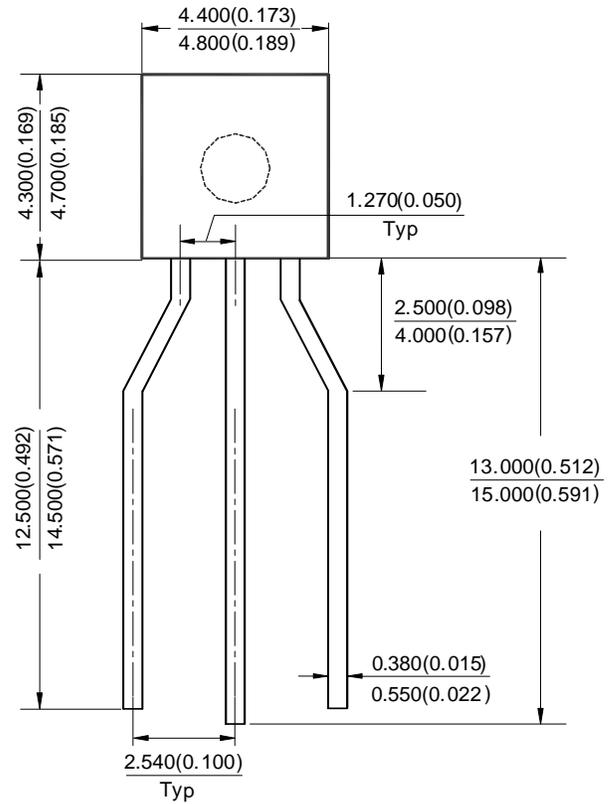
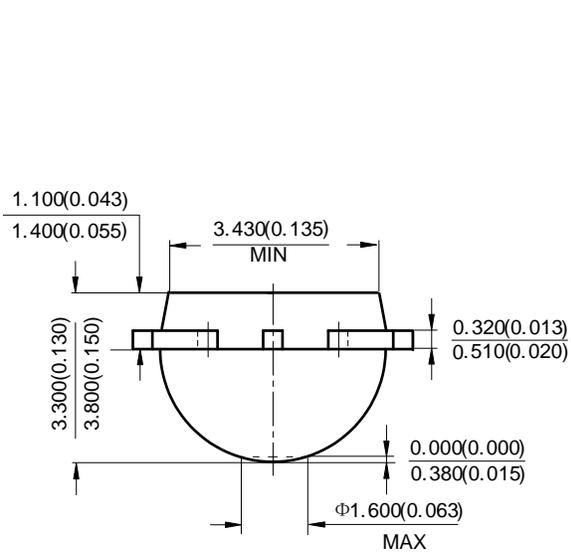
(1) Package Type: SOT89



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

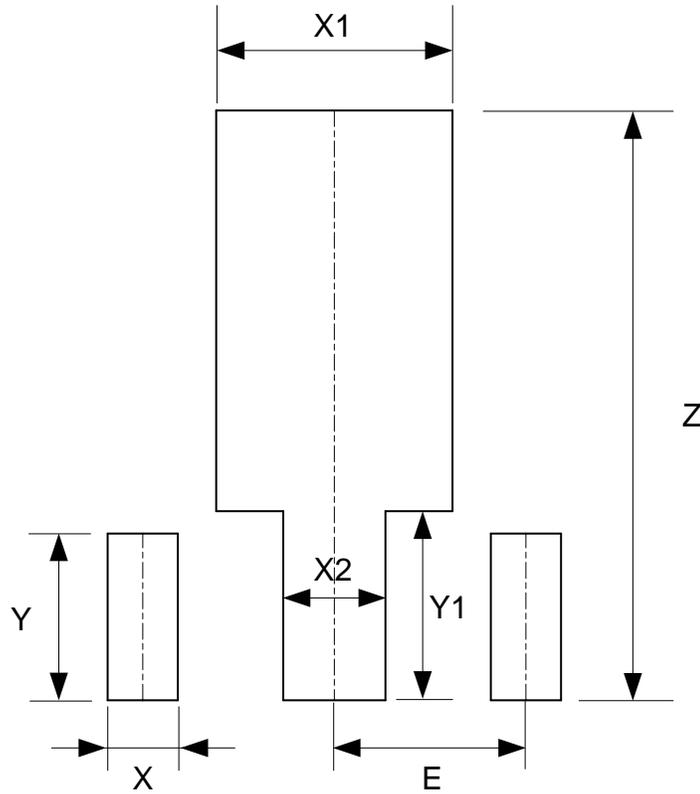
(2) T092 (Ammo Packing)



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Suggested Pad Layout

(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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