



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

0755-83047638

ysbdt@szyoushang.cn

www.szyoushang.cn



企业微信二维码



企业QQ二维码

Description

The NK-AP7381 series is a positive voltage regulator IC.

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

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

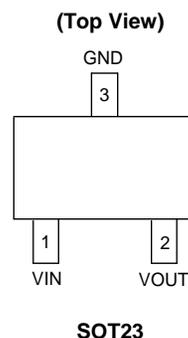
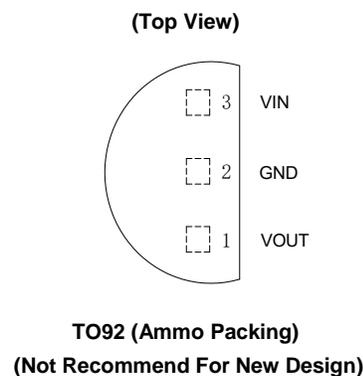
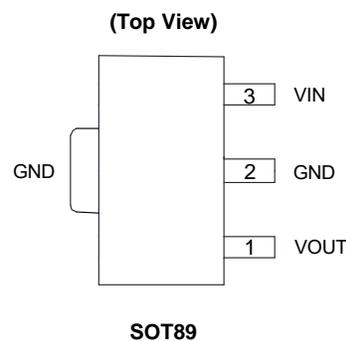
Features

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

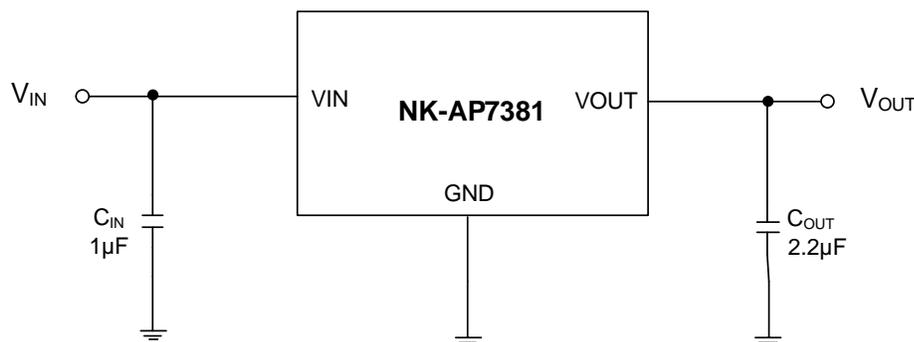
Applications

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

Pin Assignments



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	°C	
T _J	Operating Junction Temperature	+150	°C	
θ _{JA}	Thermal Resistance	SOT89	125	°C/W
		TO92 (Ammo Packing)	165	
		SOT23	167	
T _{STG}	Storage Temperature Range	-65 to +150	°C	
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 x 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

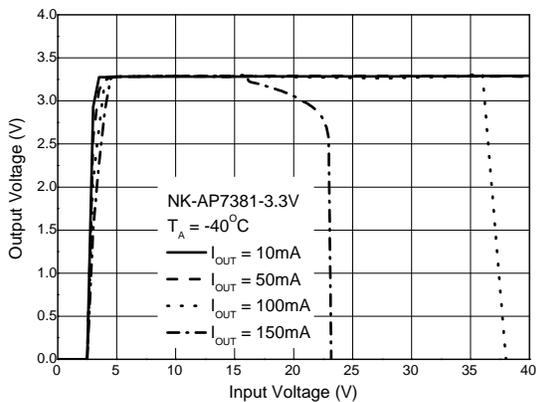
Symbol	Parameter	Min	Max	Unit
V _{IN}	Supply Input Voltage	3.3	40	V
T _J	Operating Junction Temperature	-40	+125	°C

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.)

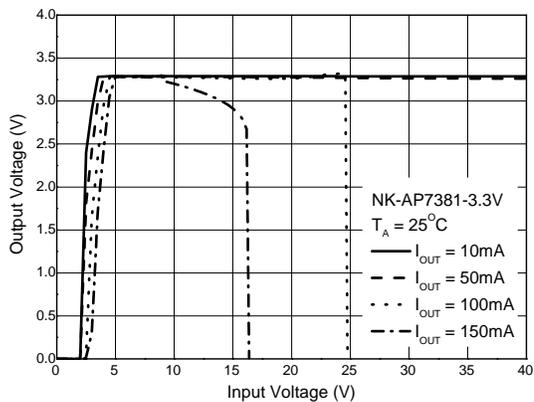
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Variation from Specified V_{OUT}	$V_{OUT} \times 98\%$	—	$V_{OUT} \times 102\%$	V
V_{IN}	Input Voltage	—	3.3	—	40	V
I_{LIMIT}	Current Limit	$V_{OUT} = 98\% \times V_{OUT}$, $V_{IN} = V_{OUT} + 2\text{V}$	150	—	—	mA
$\Delta V_{OUT}/\Delta V_{IN}$	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

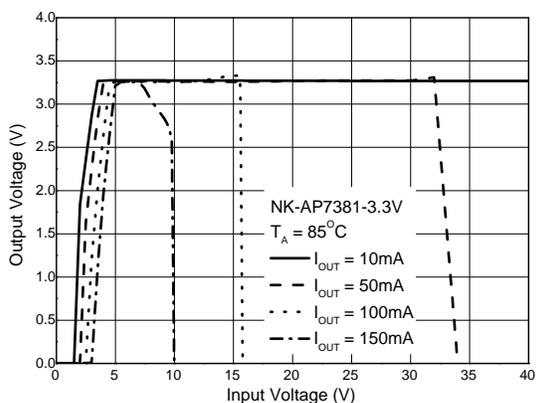
Output Voltage vs. Input Voltage @-40°C



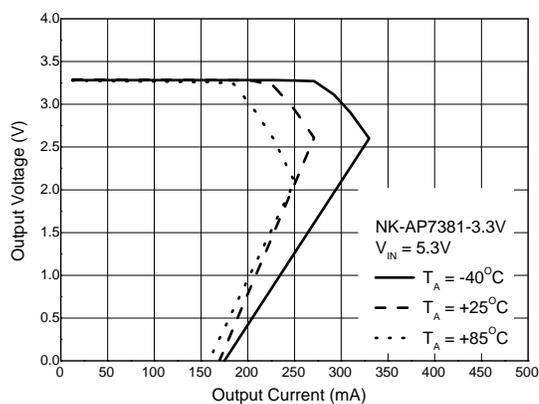
Output Voltage vs. Input Voltage @+25°C



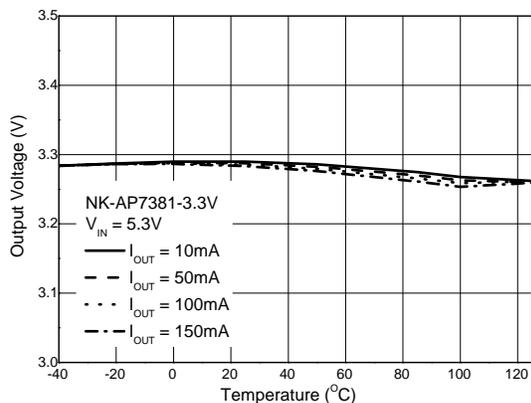
Output Voltage vs. Input Voltage @+85°C



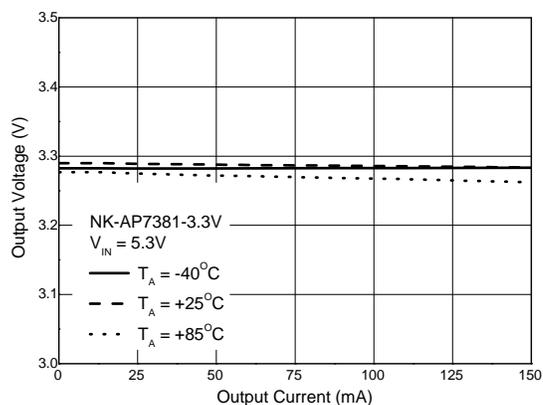
Output Voltage vs. Output Current



Output Voltage vs. Temperature

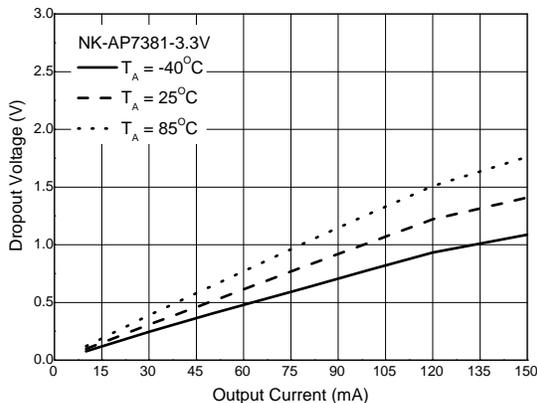


Output Voltage vs. Output Current

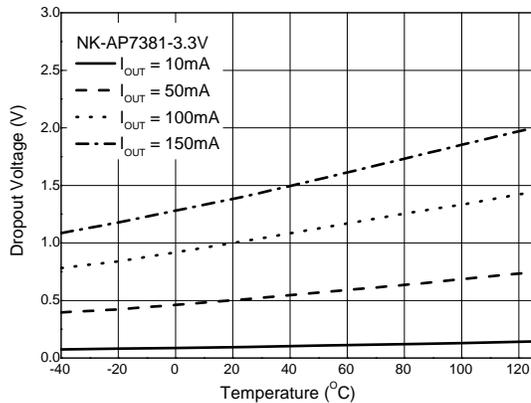


Performance Characteristics (continued)

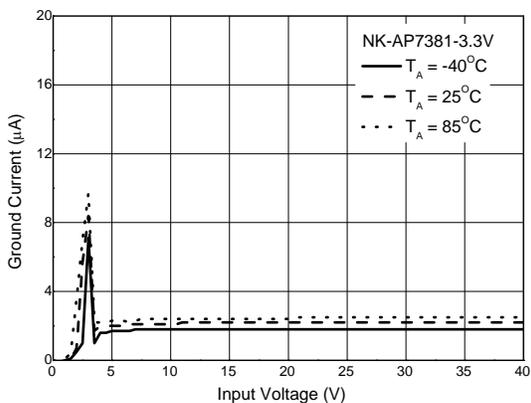
Dropout Voltage vs. Output Current



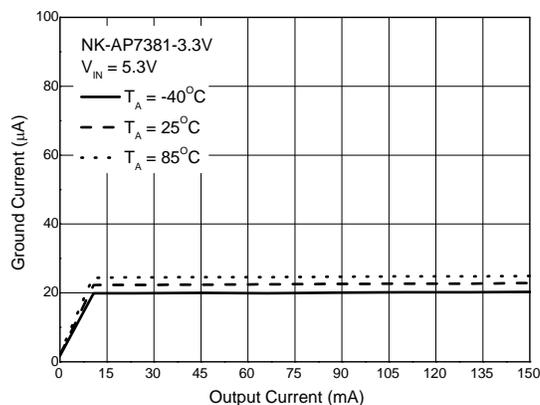
Dropout Voltage vs. Temperature



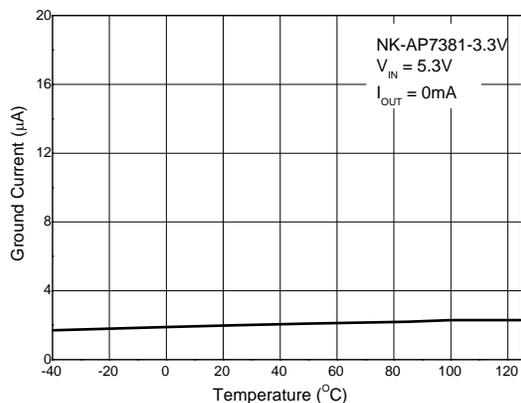
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

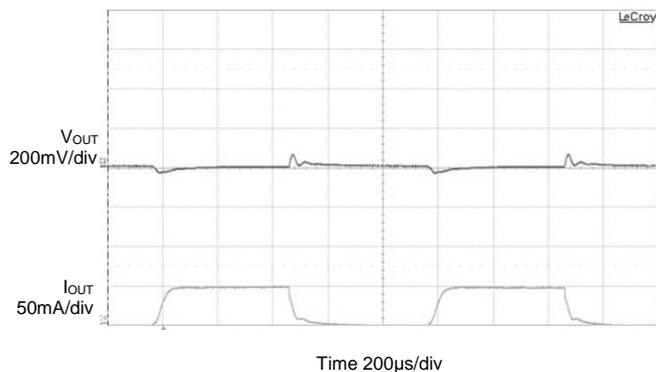


I_{GND} vs Temperature



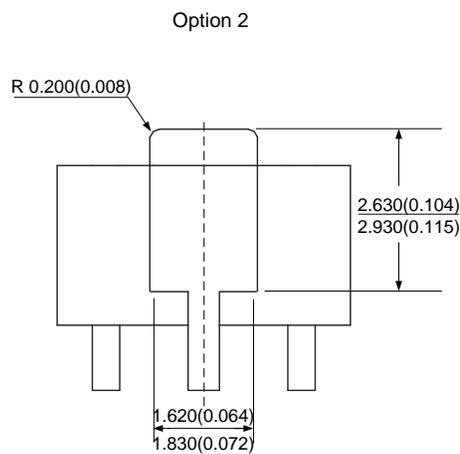
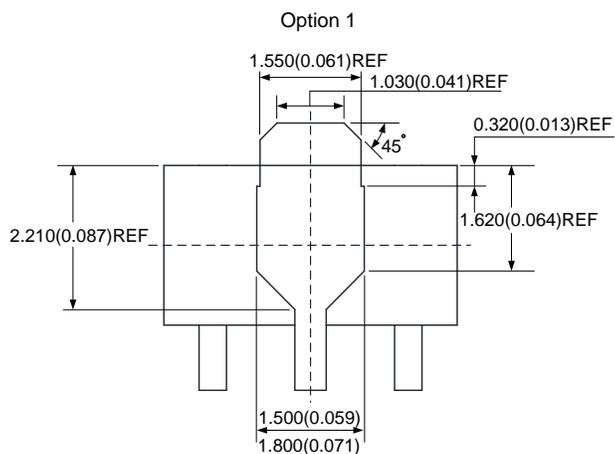
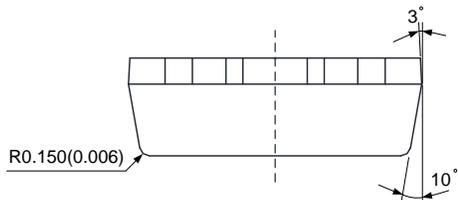
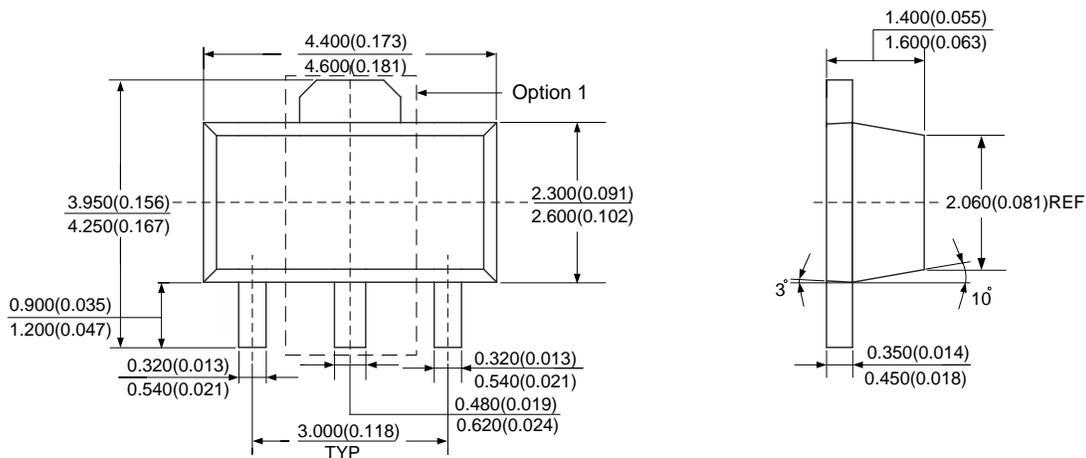
Load Transient

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



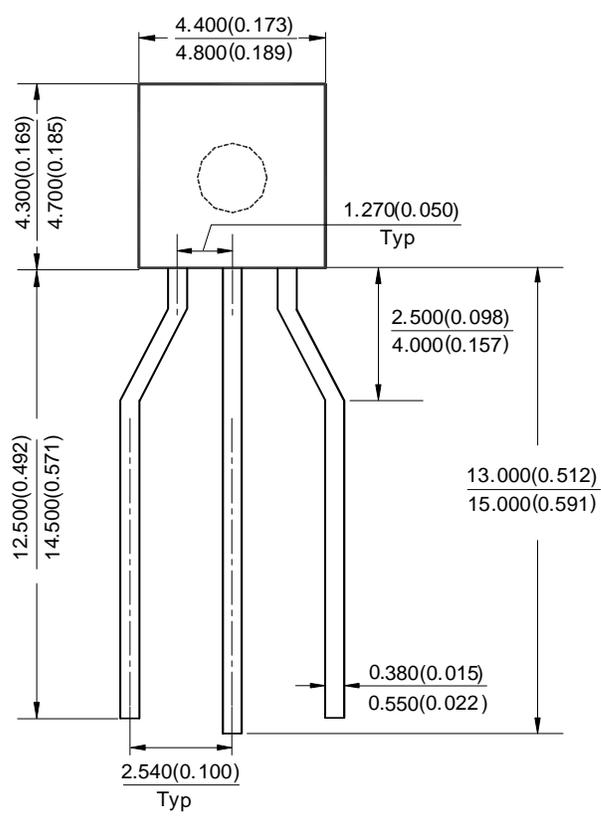
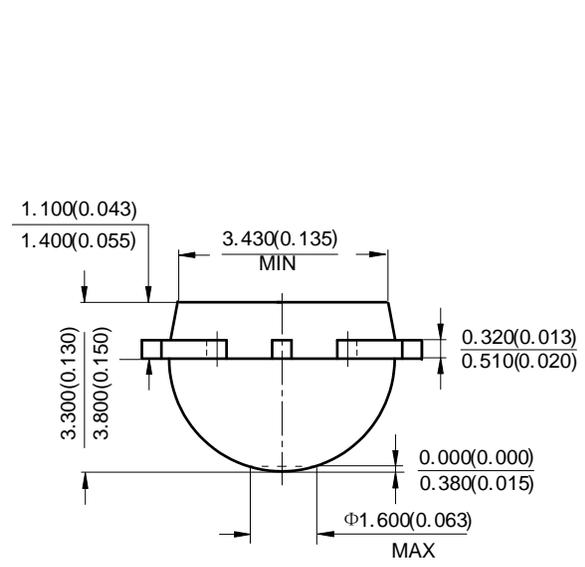
Package Outline Dimensions (All dimensions in mm.)

(1) Package Type: SOT89



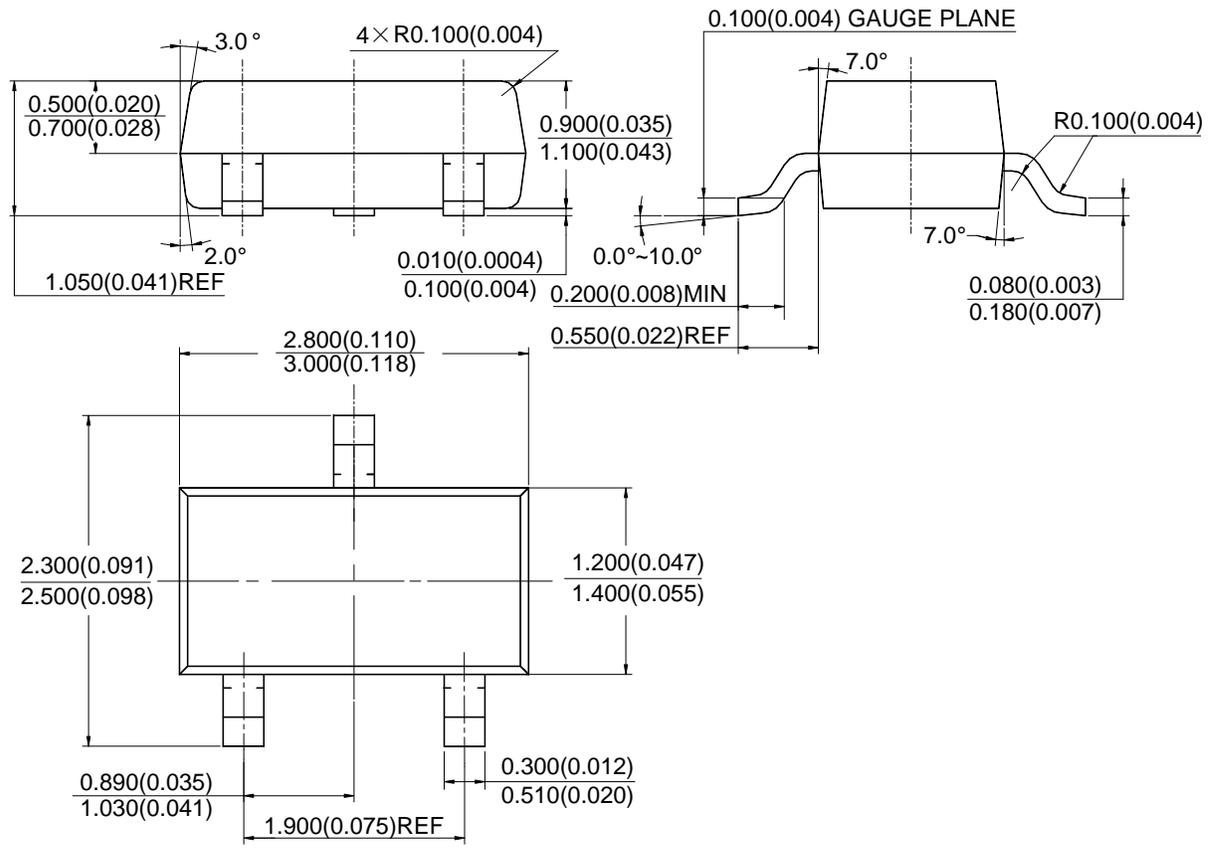
Package Outline Dimensions (All dimensions in mm.) (continued)

(2) Package Type: TO92 (Ammo Packing)



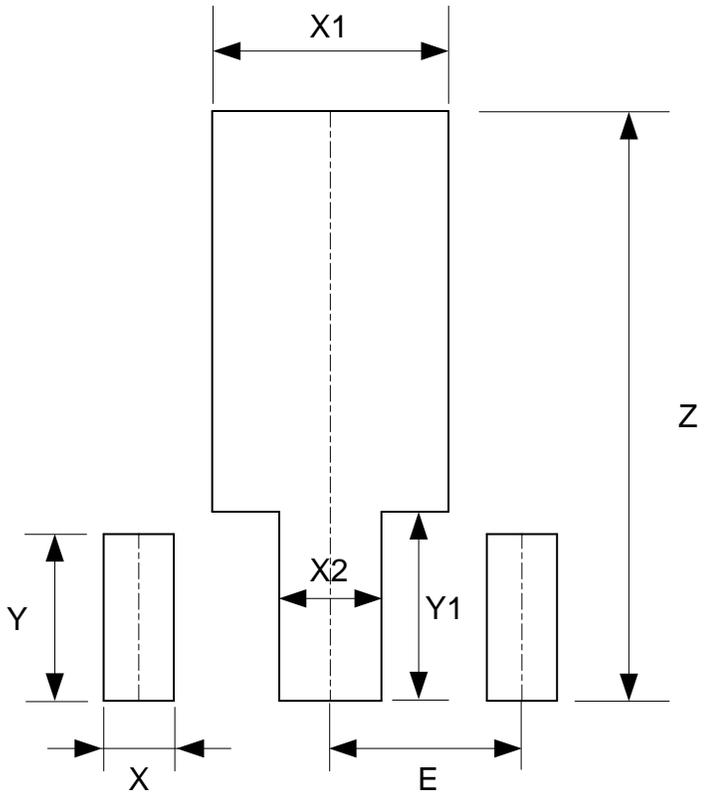
Package Outline Dimensions (All dimensions in mm.) (continued)

(3) Package Type: SOT23



Suggested Pad Layout

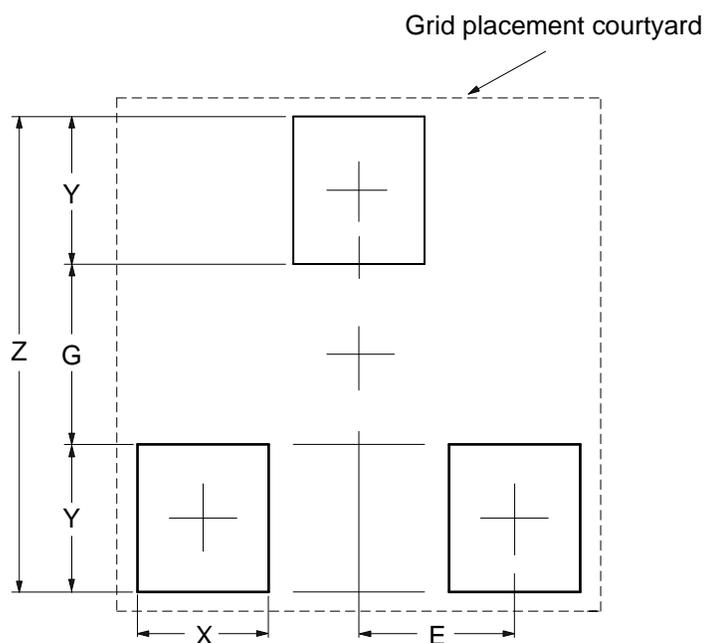
(1) Package Type: SOT89



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

Suggested Pad Layout (continued)

(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 
- Weight:
 - SOT23: 0.009 grams (Approximate)
 - SOT89: 0.062 grams (Approximate)
 - TO92 (Ammo Packing): 0.157 grams (Approximate)