NEW PRODUCT

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

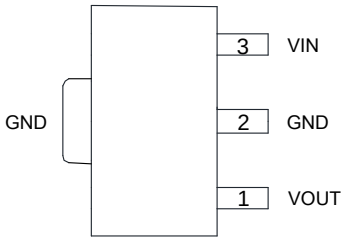
- Wide Input Voltage Range: Up to 40V
- Low Dropout Voltage: V_{DROP} = 1000mV@I_{OUT} = 100mA@V_{OUT} = 3.3V
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- Short Current Protection Function
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

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

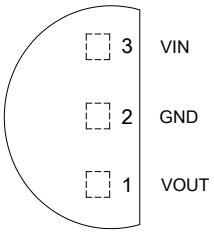
Pin Assignments

(Top View)



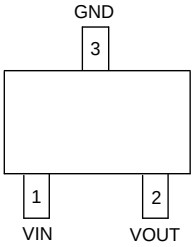
SOT89

(Top View)



TO92 (Ammo Packing)

(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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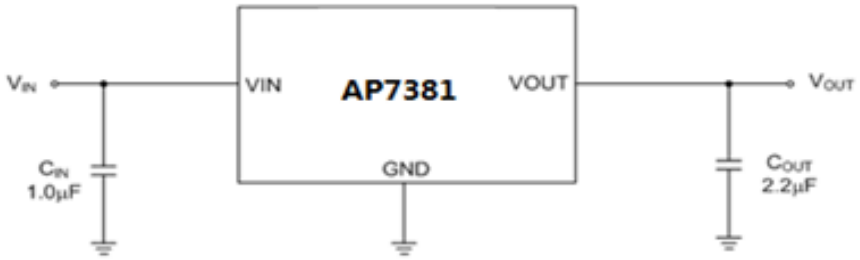
Typical Applications Circuit



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

Symbol	Parameter	Rating		Unit
V_{IN}	Supply Input Voltage	45		V
I_{OUT}	Output Current	150		mA
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+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

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

NEW PRODUCT

Electrical Characteristics

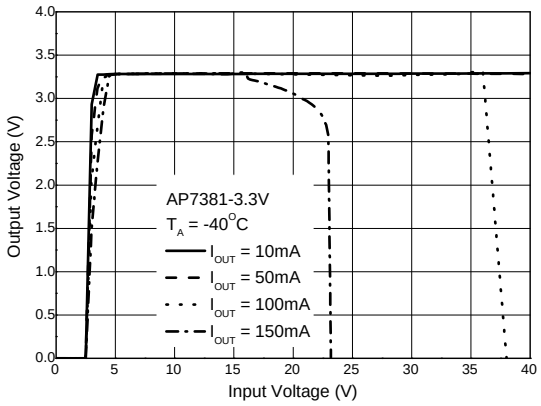
(T_J = +25°C, I_{OUT} = 1mA, C_{IN} = 1.0µF, C_{OUT} = 2.2µF, V_{IN} = V_{OUT} + 2V, **Bold** typeface applies over -40°C ≤ T_J ≤ +125°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Variation from Specified V_{OUT}	V_{OUT}x98%	—	V_{OUT}x102%	V
V_{IN}	Input Voltage	—	3.3	—	40	V
I_{LIMIT}	Current Limit	V_{OUT} = 98%xV_{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

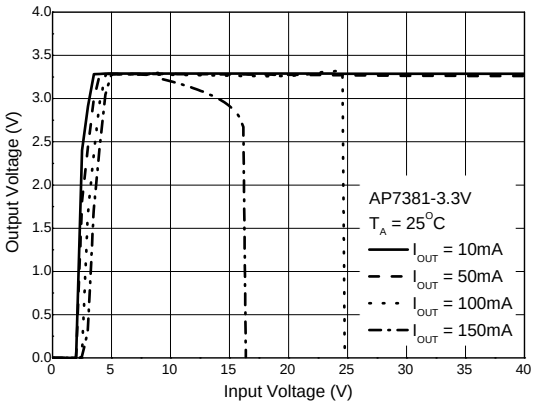
NEW PRODUCT

Performance Characteristics

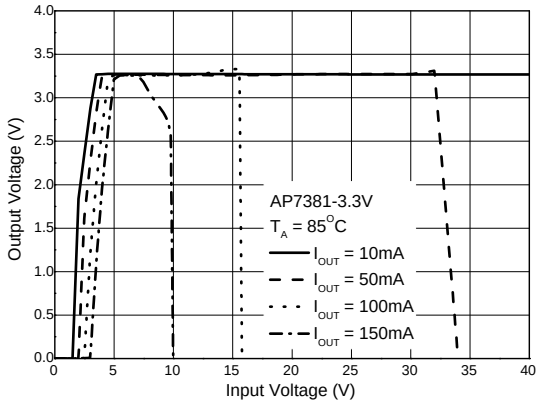
Output Voltage vs. Input Voltage @-40°C



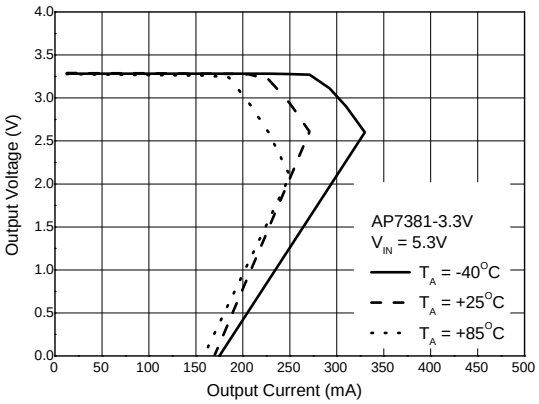
Output Voltage vs. Input Voltage @+25°C



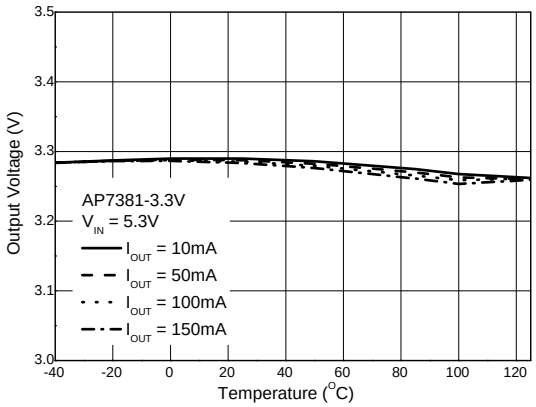
Output Voltage vs. Input Voltage @+85°C



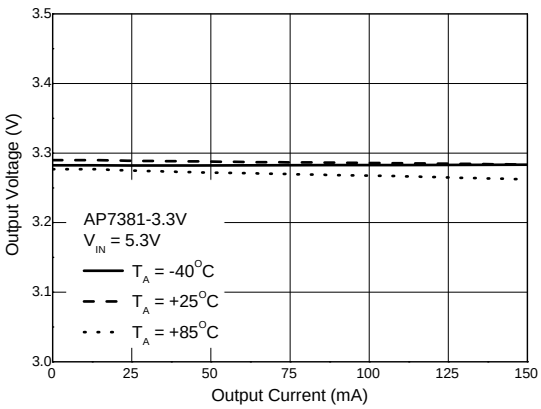
Output Voltage vs. Output Current



Output Voltage vs. Temperature



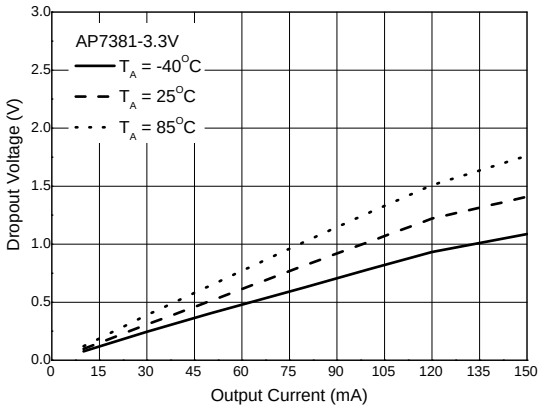
Output Voltage vs. Output Current



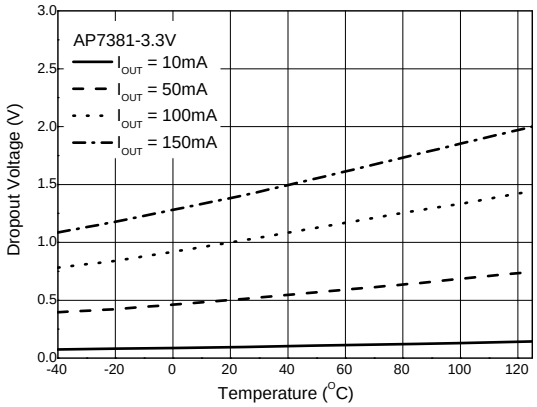
NEW PRODUCT

Performance Characteristics (Cont.)

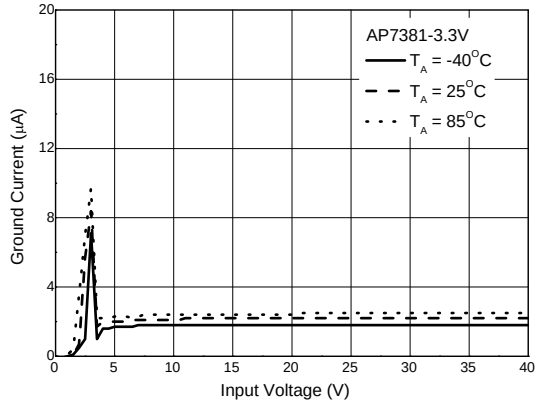
Dropout Voltage vs. Output Current



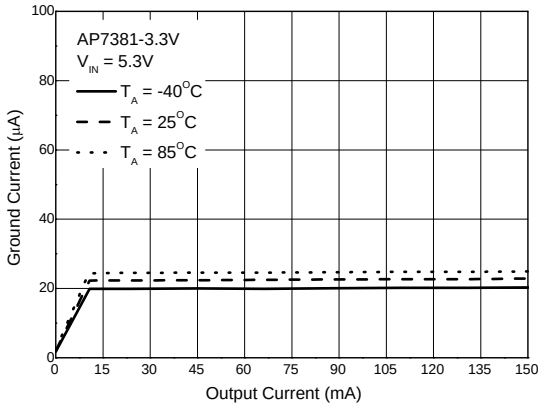
Dropout Voltage vs. Temperature



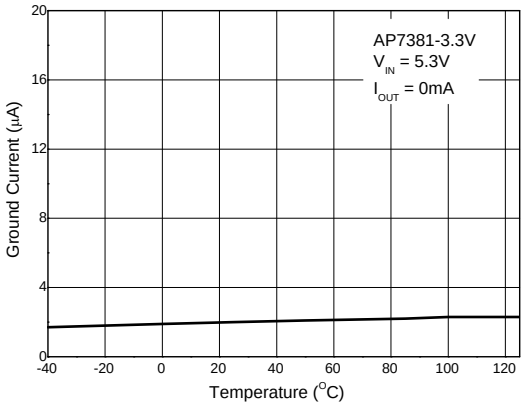
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

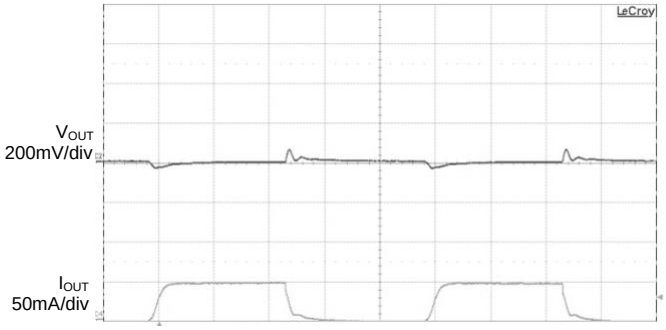


I_{GND} vs Temperature



Load Transient

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



NEW PRODUCT

Ordering Information

AP7381 - X X - X

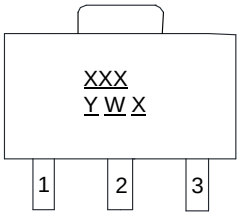
Output Voltage	Package	Packing
28 : 2.8V 33 : 3.3V 50 : 5.0V 70 : 7.0V	V : TO92 (Ammo Packing) Y : SOT89 SA : SOT23	A : Ammo 13/7: Tape & Reel

Part Number	Package Code	Packaging	7"/13" Tape and Reel/Ammo	
			Quantity	Part Number Suffix
AP7381-28V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-33V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-50V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-70V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7381-28Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7381-33Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7381-50Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7381-70Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7381-28SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7381-33SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7381-50SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7381-70SA-7	SA	SOT23	3000/Tape & Reel	-7

Marking Information

(1) SOT89

(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

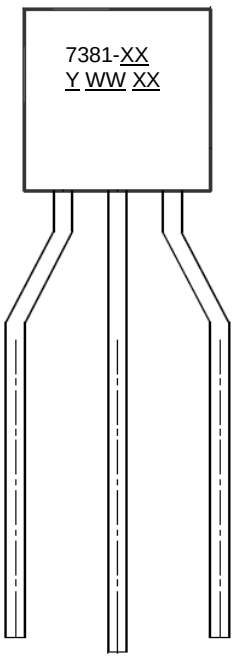
Part Number	Package	Identification Code
AP7381-28Y-13	SOT89	D9C
AP7381-33Y-13	SOT89	D9A
AP7381-50Y-13	SOT89	D9B
AP7381-70Y-13	SOT89	D9D

NEW PRODUCT

Marking Information (Cont.)

(2) TO92 (Ammo Packing)

(Front View)

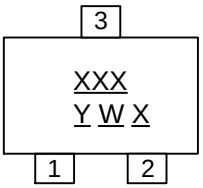


7381-XX : Identification Code
Y : Year : 0 ~ 9
WW : Week : 01 ~ 52; 52
Represents 52 and 53 Week
XX : Internal Code

Part Number	Package	Identification Code
AP7381-28V-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

(3) SOT23

(Top View)



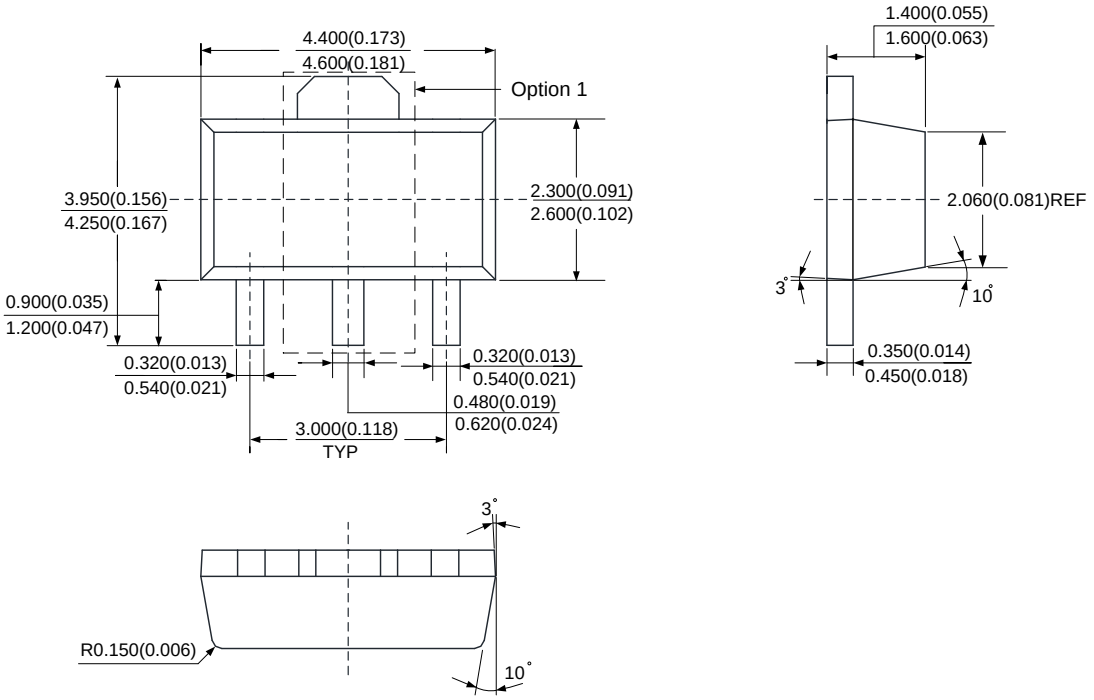
XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents
52 and 53 week
X : Internal Code

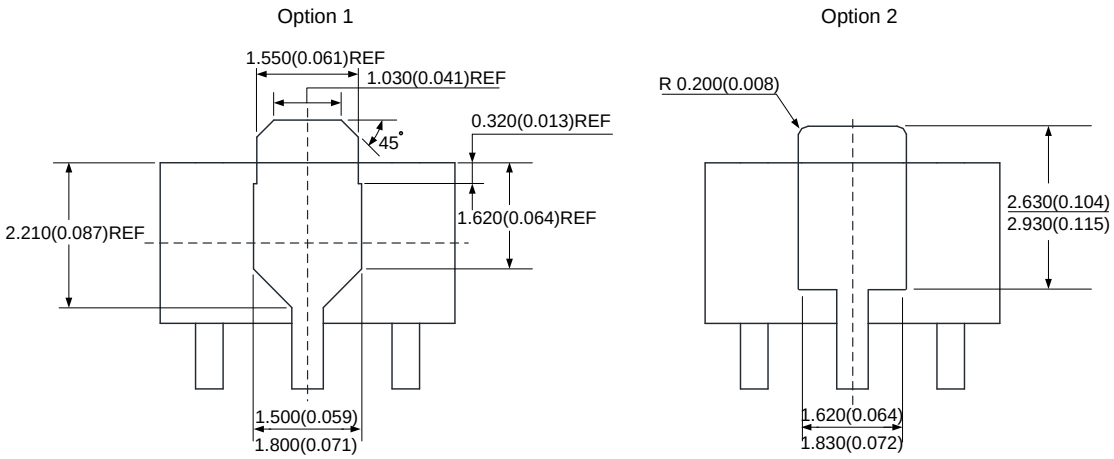
Part Number	Package	Identification Code
AP7381-28SA-7	SOT23	D9C
AP7381-33SA-7	SOT23	D9A
AP7381-50SA-7	SOT23	D9B
AP7381-70SA-7	SOT23	D9D

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

(1) Package Type: SOT89

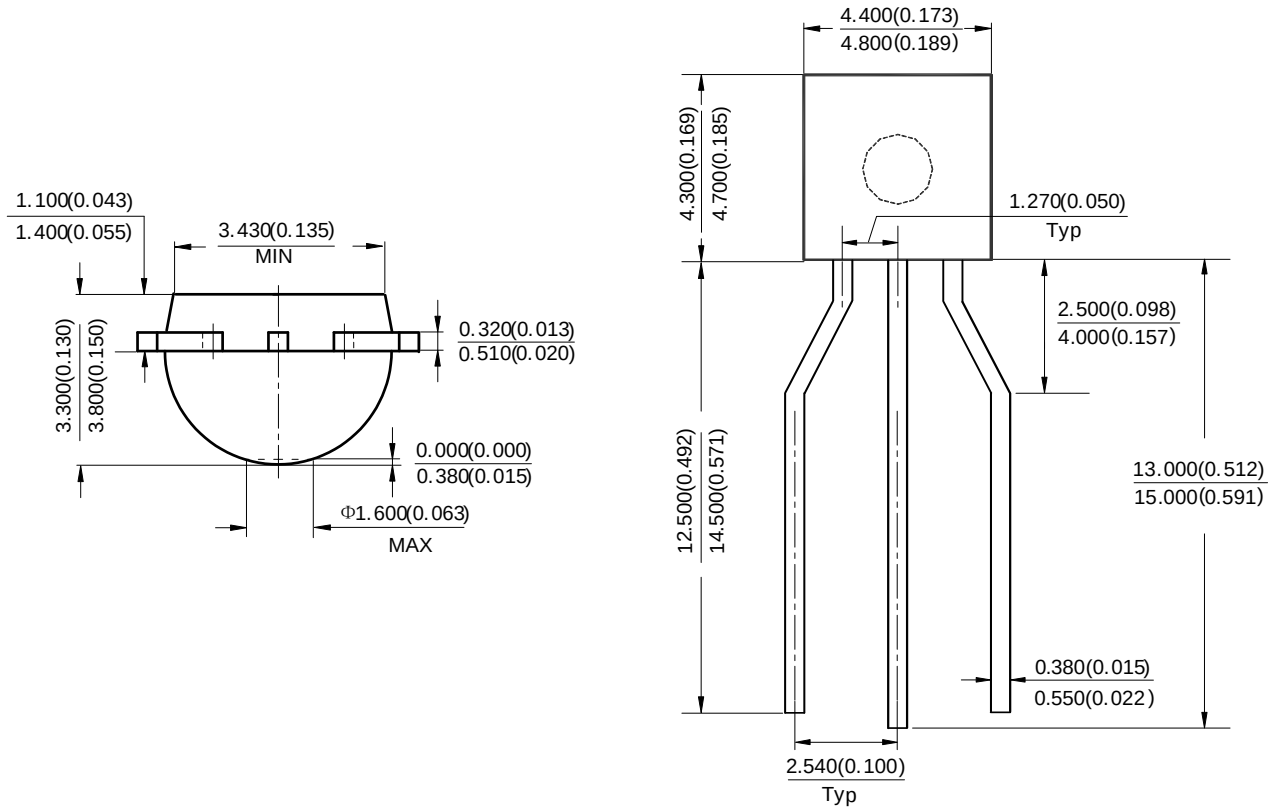




NEW PRODUCT

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

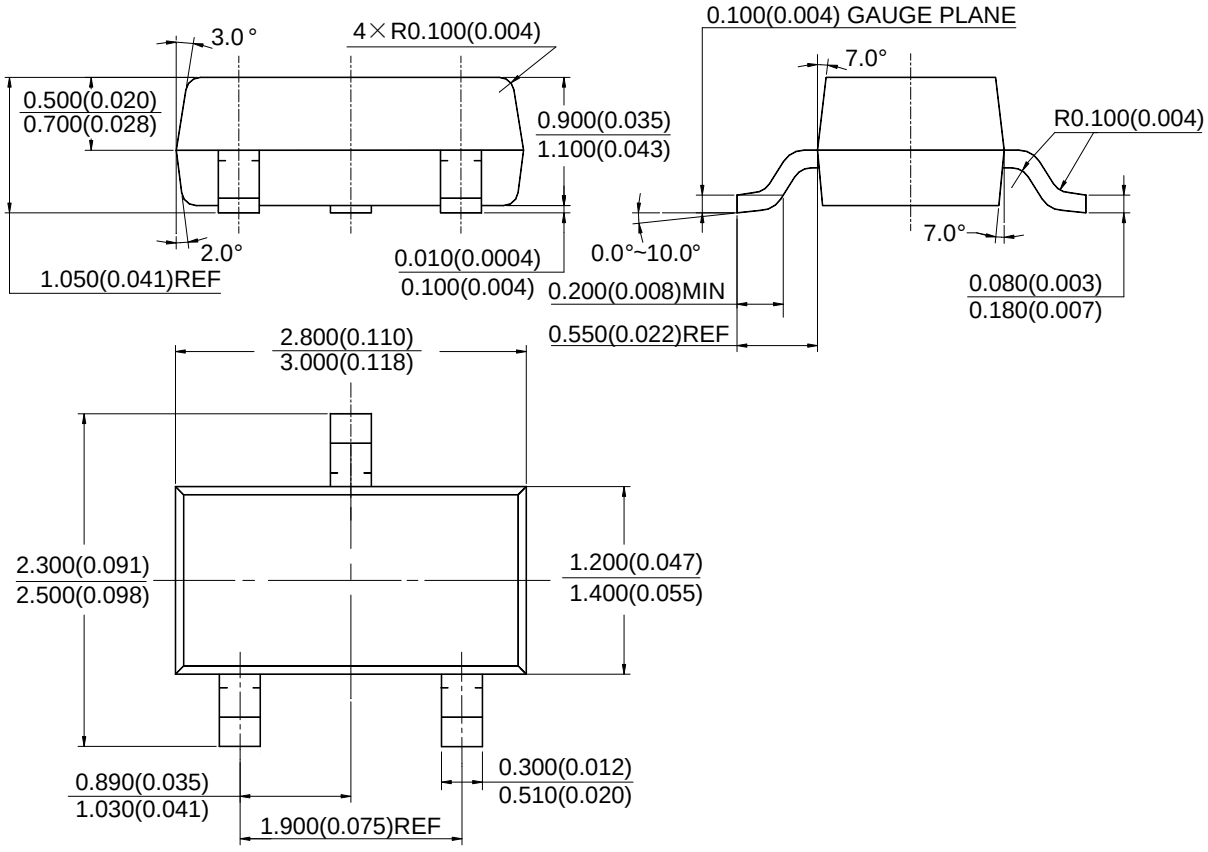
(2) TO92 (Ammo Packing)



NEW PRODUCT

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

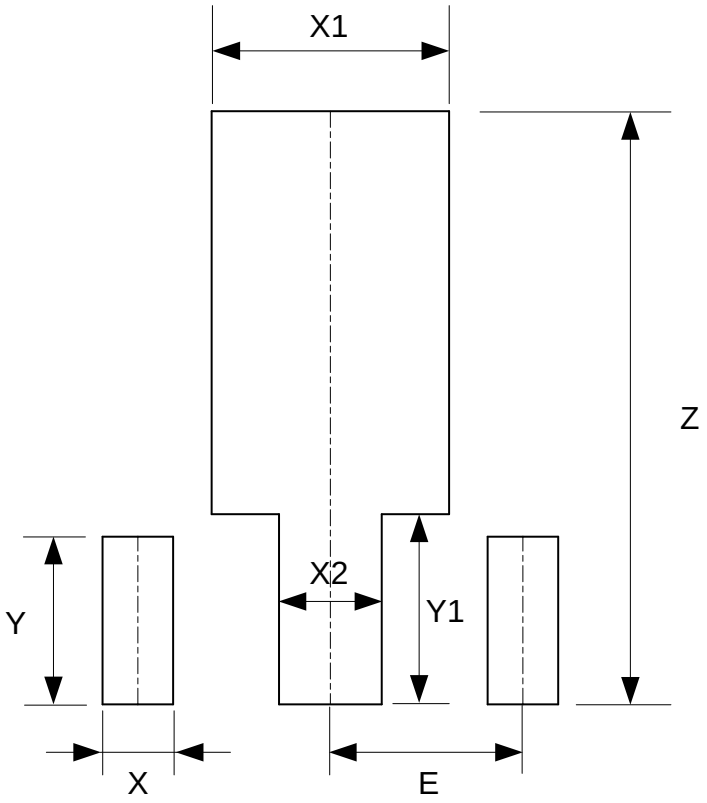
(3) SOT23



NEW PRODUCT

Suggested Pad Layout

(1) Package Type: SOT89

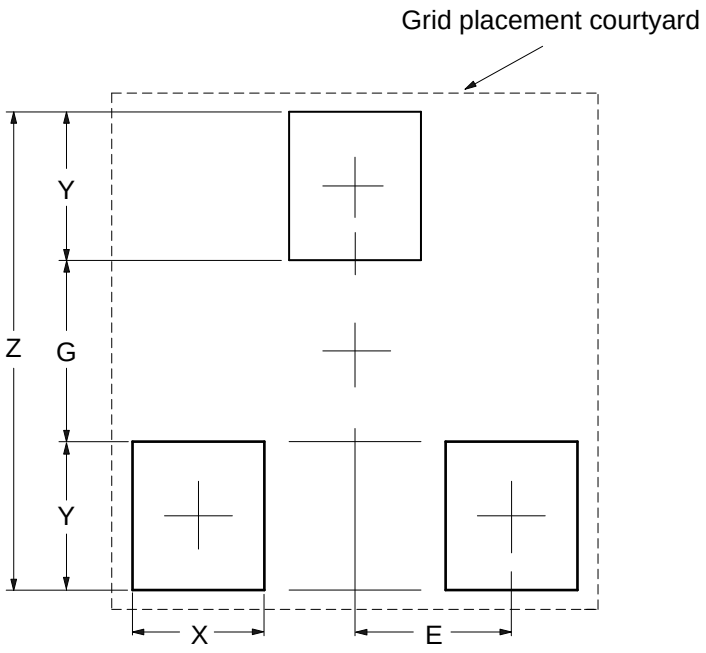


Dimensions	Z (mm)/(inch)	X (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	Y1 (mm)/(inch)	E (mm)/(inch)
Value	4.600/0.181	0.550/0.022	1.850/0.073	0.800/0.031	1.300/0.051	1.475/0.058	1.500/0.059

NEW PRODUCT

Suggested Pad Layout (Cont.)

(2) 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

NEW PRODUCT

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