

Description

The AP7384 series is a positive voltage regulator IC.

The AP7384 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 AP7384 has 2.8V, 3.3V, 5V and 7V fixed voltage version.

The AP7384 is available in space-saving SOT89, SOT23 and TO92 (Ammo Packing) packages.

Features

- Wide Input Voltage Range: Up to 40V
- Low Dropout Voltage: $V_{DROP} = 500mV @ I_{OUT} = 50mA @ V_{OUT} = 3.3V$
- 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)**

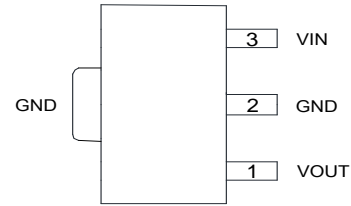
Applications

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

- 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.

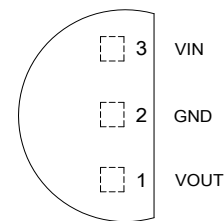
Pin Assignments

(Top View)



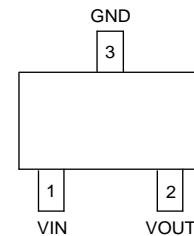
SOT89

(Top View)



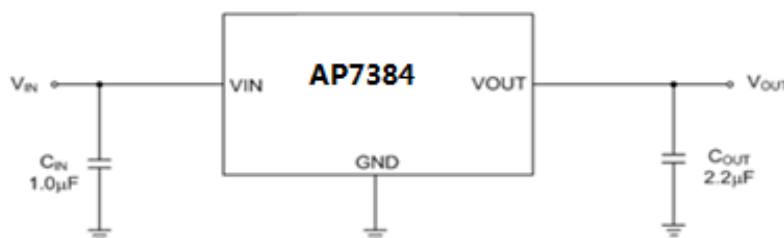
TO92 (Ammo Packing)

(Top View)



SOT23

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	50		mA
T _{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
T _J	Operating Junction Temperature	+150		°C
θ _{JA}	Thermal Resistance	SOT89	125	°C/W
		TO92 (Ammo Packing)	165	
		SOT23	166	
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

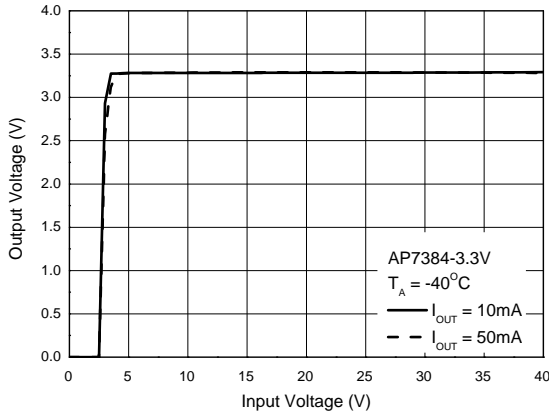
Electrical Characteristics ($T_J = +25^\circ\text{C}$, $I_{OUT} = 1\text{mA}$, $C_{IN} = 1.0\mu\text{F}$, $C_{OUT} = 2.2\mu\text{F}$, $V_{IN} = V_{OUT} + 2\text{V}$, **Bold** typeface applies over $-40^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, unless otherwise specified.)

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	$V_{OUT} = 98\% \times V_{OUT}, V_{IN} = V_{OUT} + 2\text{V}$	50	—	—	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
$\Delta V_{OUT} / I_{OUT}$	Load Regulation	$1\text{mA} \leq I_{OUT} \leq 50\text{mA}$	—	0.5	—	%
V_{DROP}	Dropout Voltage	$I_{OUT} = 50\text{mA} @ V_{OUT} = 3.3\text{V}$	—	500	—	mV
I_{GND}	Ground Current	$I_{OUT} = 0\text{A}$	—	2.5	—	μA
		$I_{OUT} = 50\text{mA}$	—	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

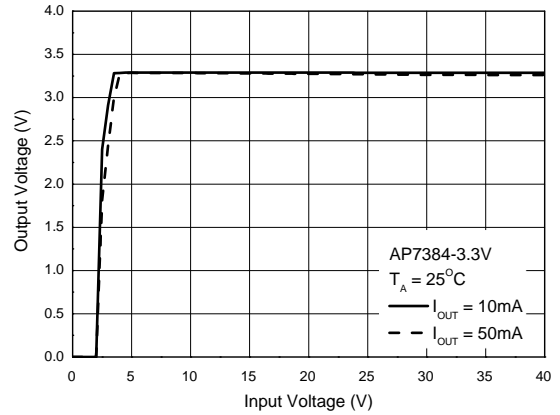
Performance Characteristics

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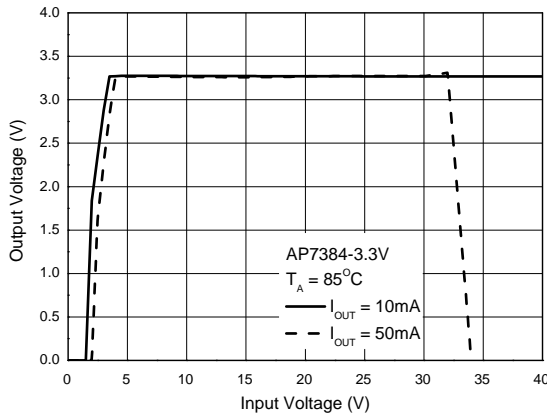
Output Voltage vs. Input Voltage @-40°C



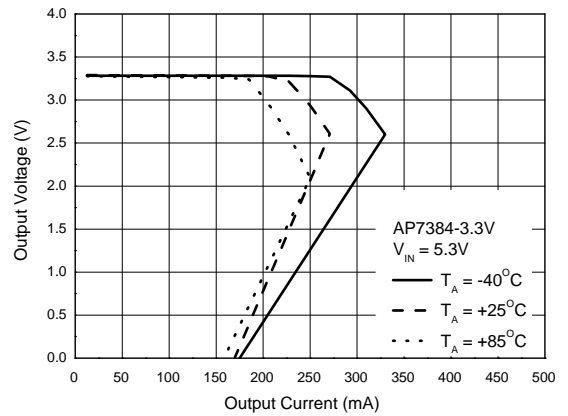
Output Voltage vs. Input Voltage @+25°C



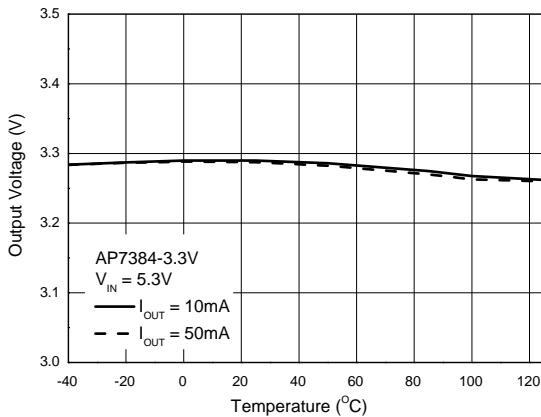
Output Voltage vs. Input Voltage @+85°C



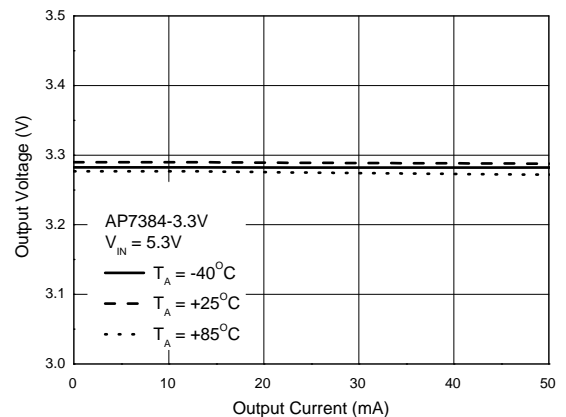
Output Voltage vs. Output Current



Output Voltage vs. Temperature

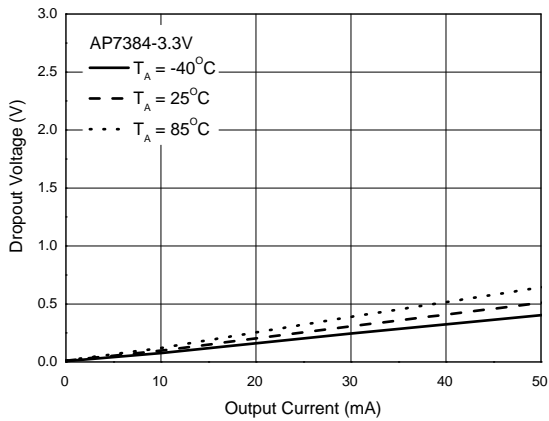


Output Voltage vs. Output Current

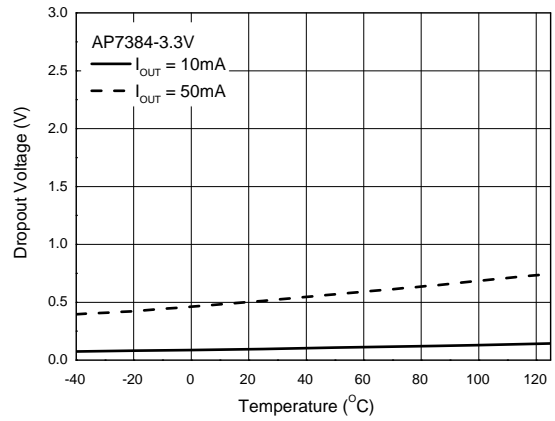


Performance Characteristics (Cont.)

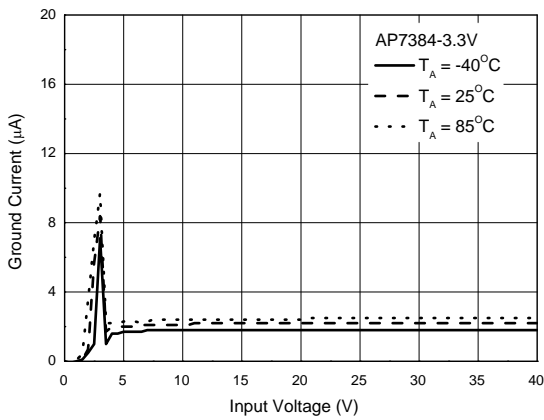
Dropout Voltage vs. Output Current



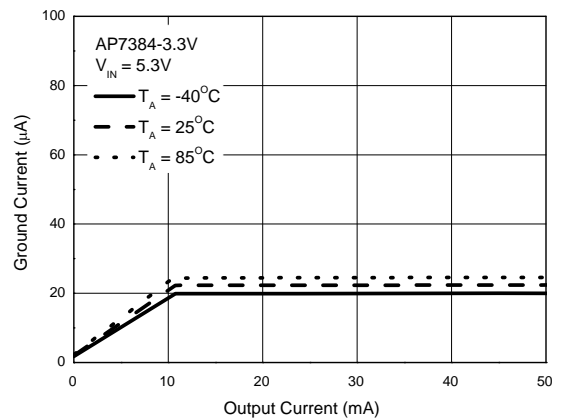
Dropout Voltage vs. Temperature



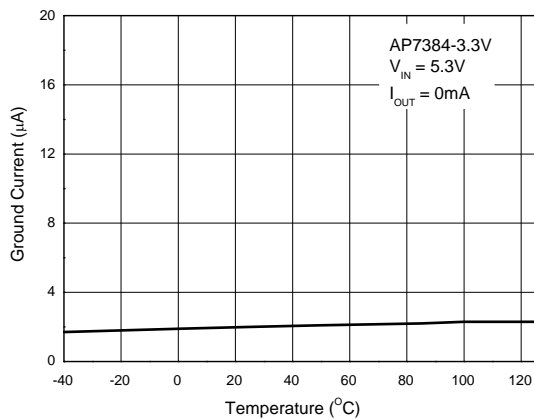
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

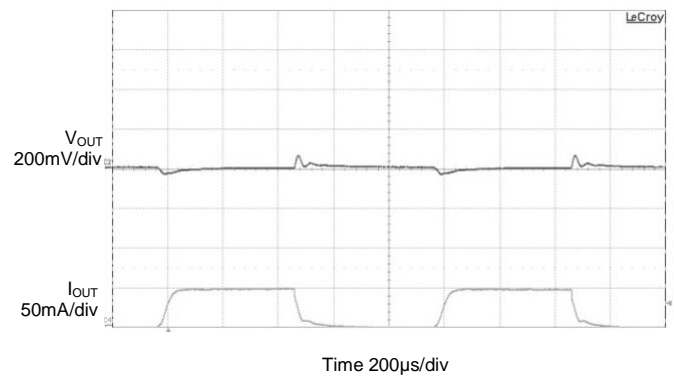


I_{GND} vs Temperature



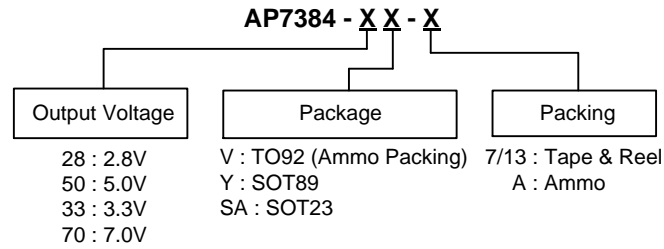
Load Transient

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



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Ordering Information

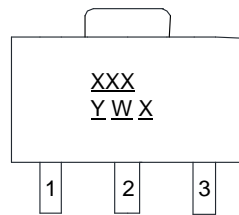


Part Number	Package Code	Packaging	7"/13" Tape and Reel/Ammo	
			Quantity	Part Number Suffix
AP7384-28V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7384-33V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7384-50V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7384-70V-A	V	TO92 (Ammo Packing)	2000/Ammo	-A
AP7384-28Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7384-33Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7384-50Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7384-70Y-13	Y	SOT89	2500/Tape & Reel	-13
AP7384-28SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7384-33SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7384-50SA-7	SA	SOT23	3000/Tape & Reel	-7
AP7384-70SA-7	SA	SOT23	3000/Tape & Reel	-7

Marking Information

(1) SOT89

(Top View)



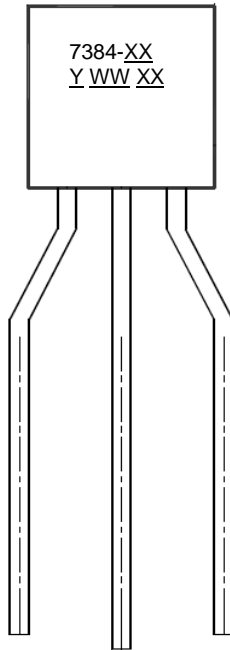
XXX : Identification Code
Y : Year : 0 ~ 9
W : Week : A ~ Z : 1 ~ 26 Week;
 a ~ z : 27 ~ 52 Week;
 z Represents 52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP7384-28Y-13	SOT89	D9C
AP7384-33Y-13	SOT89	D9A
AP7384-50Y-13	SOT89	D9B
AP7384-70Y-13	SOT89	D9D

Marking Information (Cont.)

(2) TO92 (Ammo Packing)

(Front View)

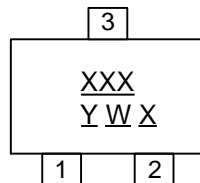


7384-XX : Identification Code
Y : Year : 0 ~ 9
WW : Week : 01 ~ 52; 52
 Represents 52 and 53 Week
XX : Internal Code

Part Number	Package	Identification Code
AP7384-28V-A	TO92 (Ammo Packing)	7384-28
AP7384-33V-A	TO92 (Ammo Packing)	7384-33
AP7384-50V-A	TO92 (Ammo Packing)	7384-50
AP7384-70V-A	TO92 (Ammo Packing)	7384-70

(3) SOT23

(Top View)



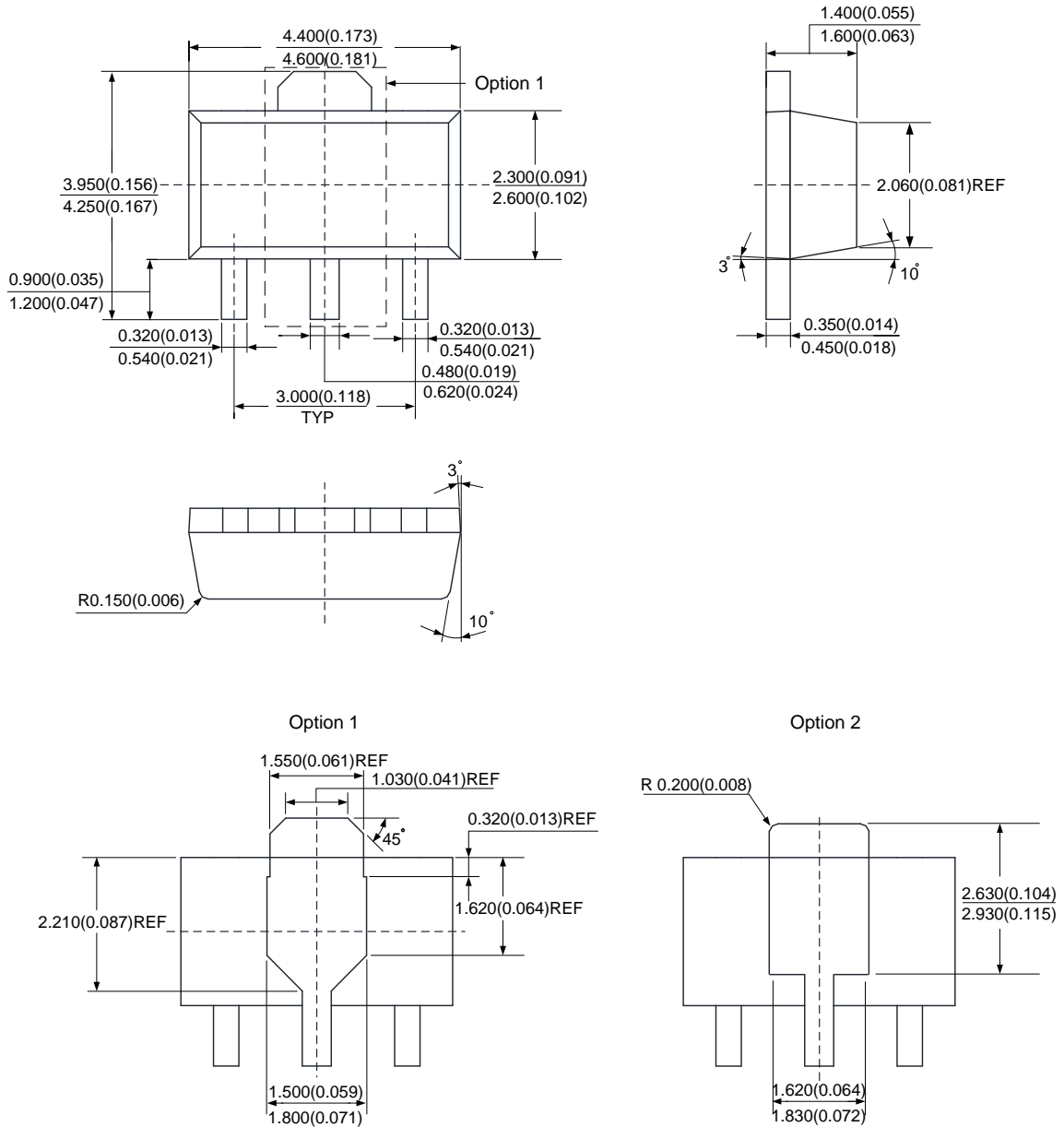
XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
 a to z : 27 to 52 week; z represents
 52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AP7384-28SA-7	SOT23	D9C
AP7384-33SA-7	SOT23	D9A
AP7384-50SA-7	SOT23	D9B
AP7384-70SA-7	SOT23	D9D

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Package Outline Dimensions (All dimensions in mm.)

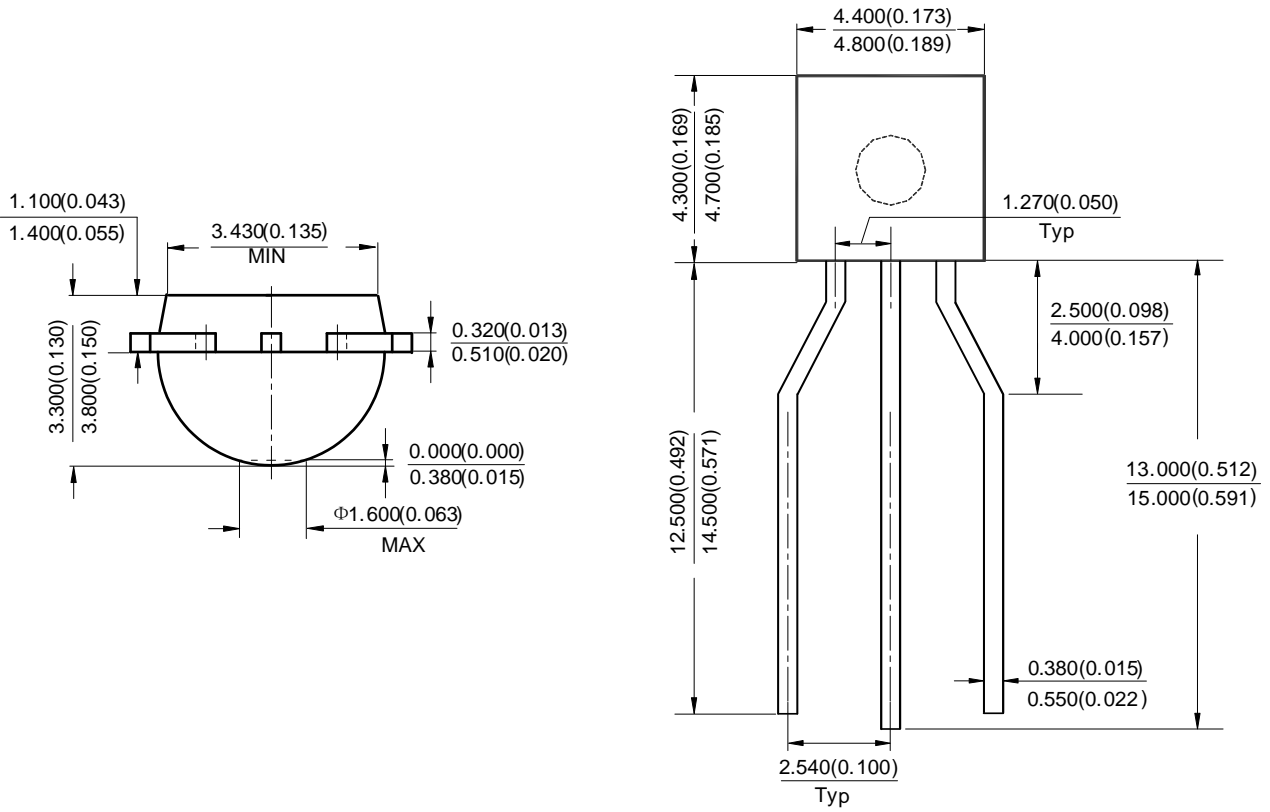
(1) Package Type: SOT89



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

(2) TO92 (Ammo Packing)

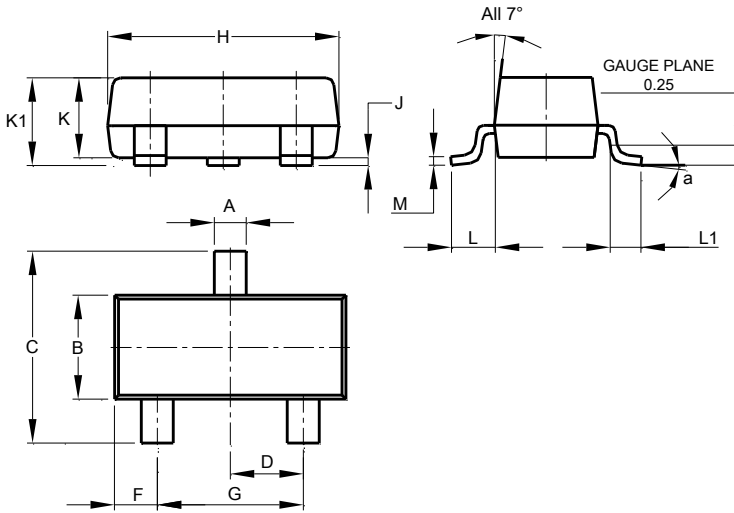


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Package Outline Dimensions (Cont. All dimensions in mm.)

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

(3) Package Type: SOT23

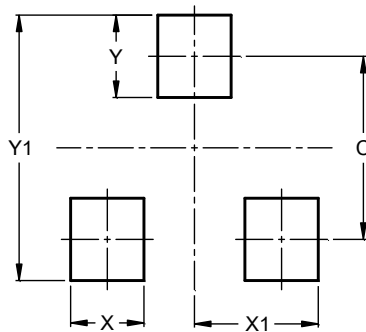


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

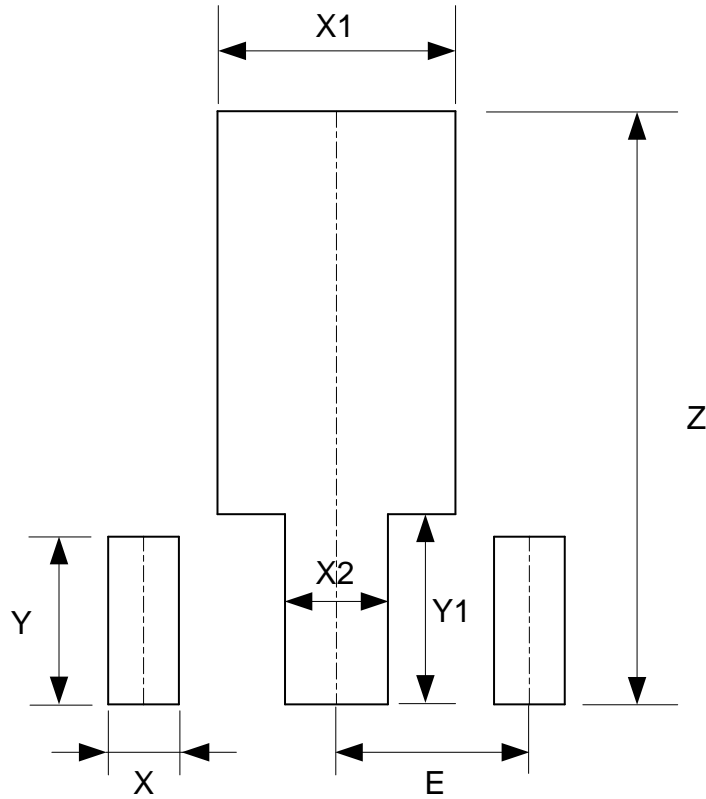
(1) Package Type: SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

Suggested Pad Layout

(2) 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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