



THE DATASHEET OF
AP7384-70SA-7



Description

The DIODES™ 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)**
- **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/>**

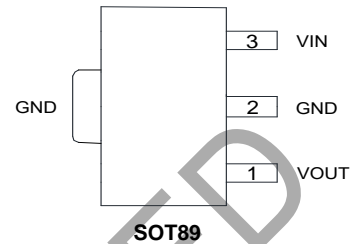
Applications

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

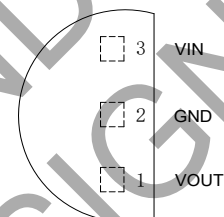
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- 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)

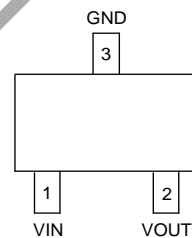


(Top View)



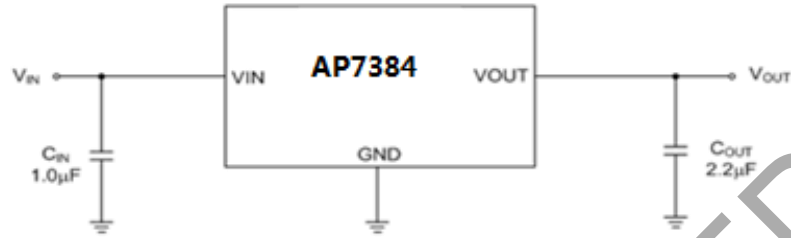
TO92 (Ammo Packing)

(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

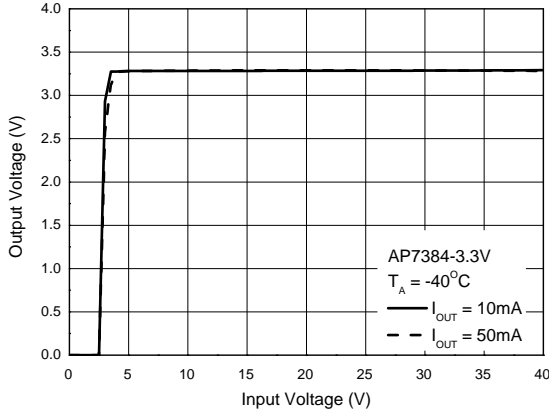
Electrical Characteristics ($T_J = +25^\circ\text{C}$, $I_{OUT} = 1\text{mA}$, $C_{IN} = 1.0\mu\text{F}$, $C_{OUT} = 2.2\mu\text{F}$, $V_{IN} = V_{OUT} + 2\text{V}$, **Bold** typeface applies over $-40^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, unless otherwise specified.)

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
$\Delta V_{OUT}/V_{OUT}$	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	—	
$\Delta V_{OUT}/(V_{OUT} \Delta T)$	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

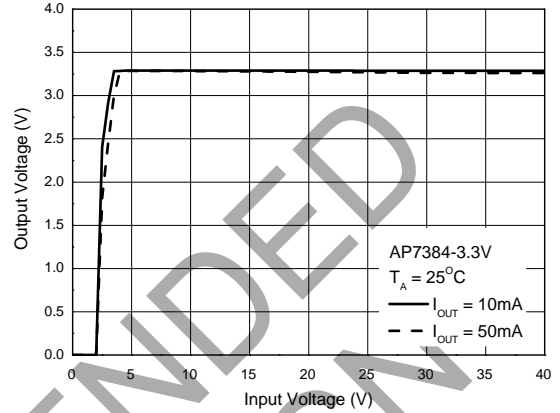
NOT RECOMMENDED FOR NEW DESIGN

Performance Characteristics

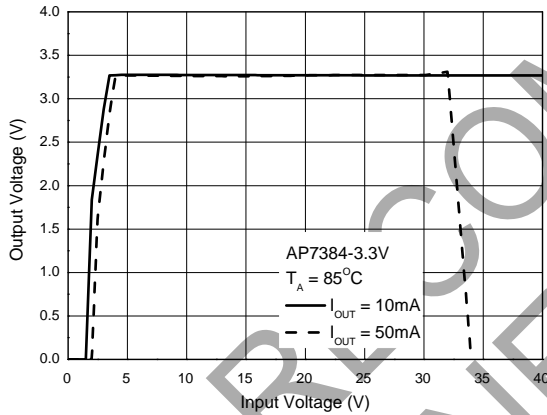
Output Voltage vs. Input Voltage @-40°C



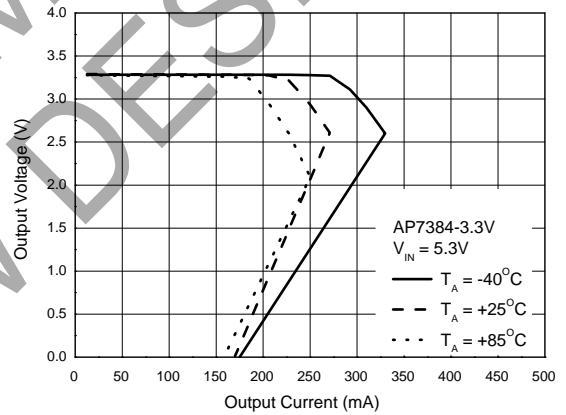
Output Voltage vs. Input Voltage @+25°C



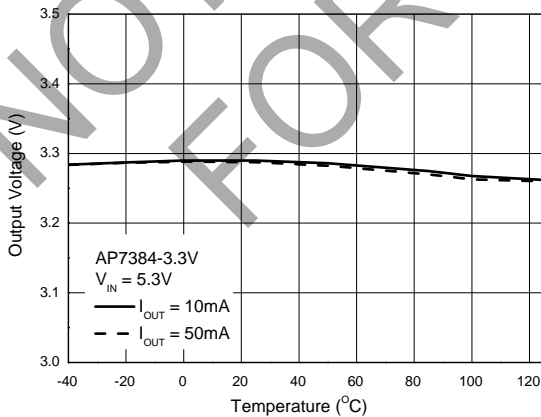
Output Voltage vs. Input Voltage @+85°C



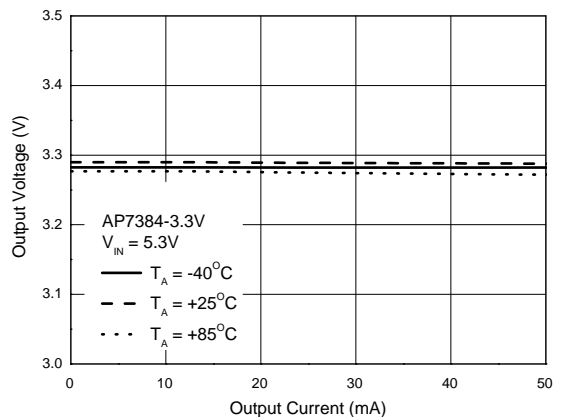
Output Voltage vs. Output Current



Output Voltage vs. Temperature

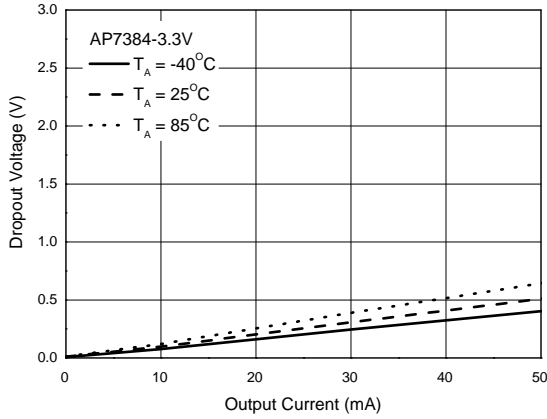


Output Voltage vs. Output Current

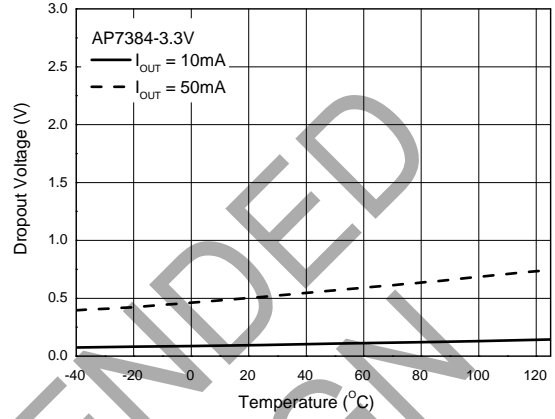


Performance Characteristics (continued)

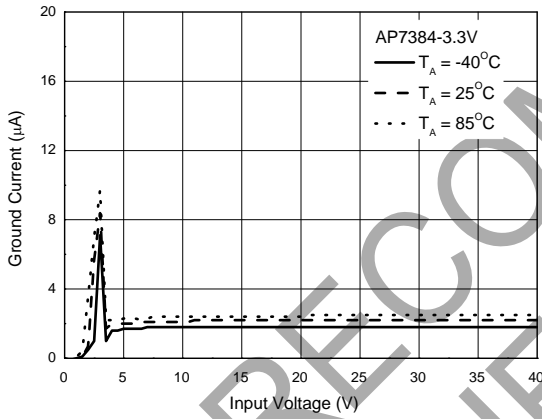
Dropout Voltage vs. Output Current



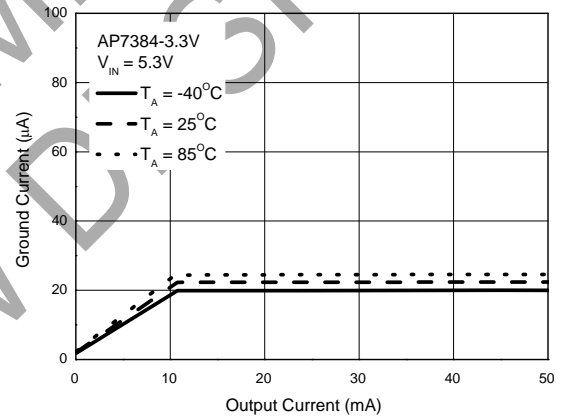
Dropout Voltage vs. Temperature



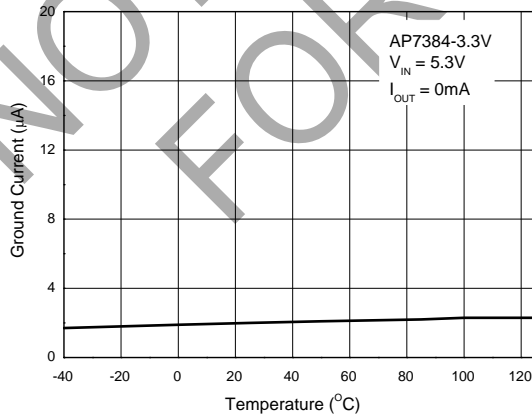
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

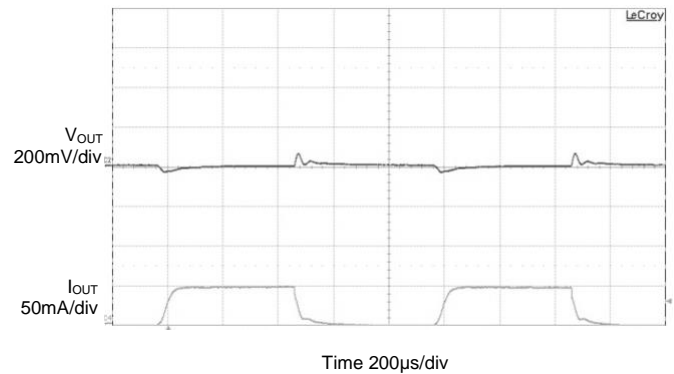


I_{GND} vs. Temperature

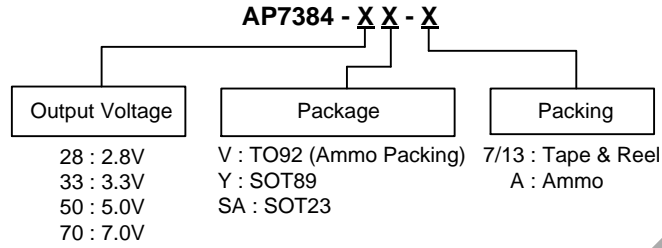


Load Transient

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



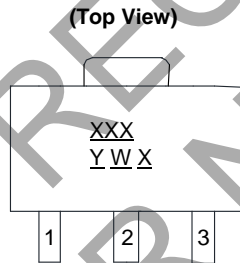
Ordering Information



Part Number	Package Code	Package	Packing		Part Number Suffix
			Quantity	Carrier	
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



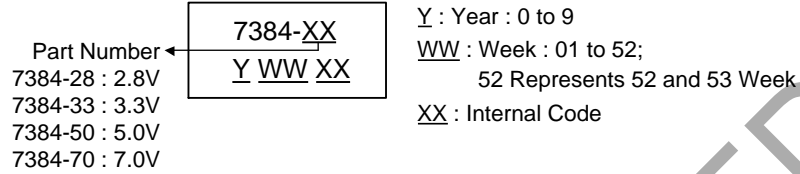
XXX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1 to 26 Week;
 a to z : 27 to 52 Week;
 z Represents 52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP7384-28Y-13	SOT89	F4A
AP7384-33Y-13	SOT89	F4B
AP7384-50Y-13	SOT89	F4C
AP7384-70Y-13	SOT89	F4D

Marking Information (continued)

(2) TO92 (Ammo Packing)

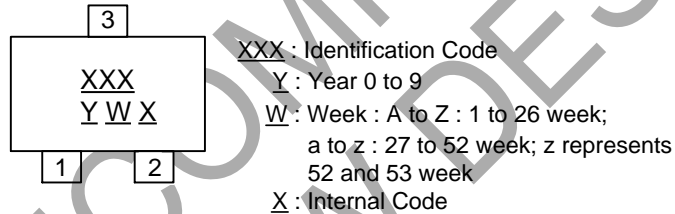
(Top View)



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)

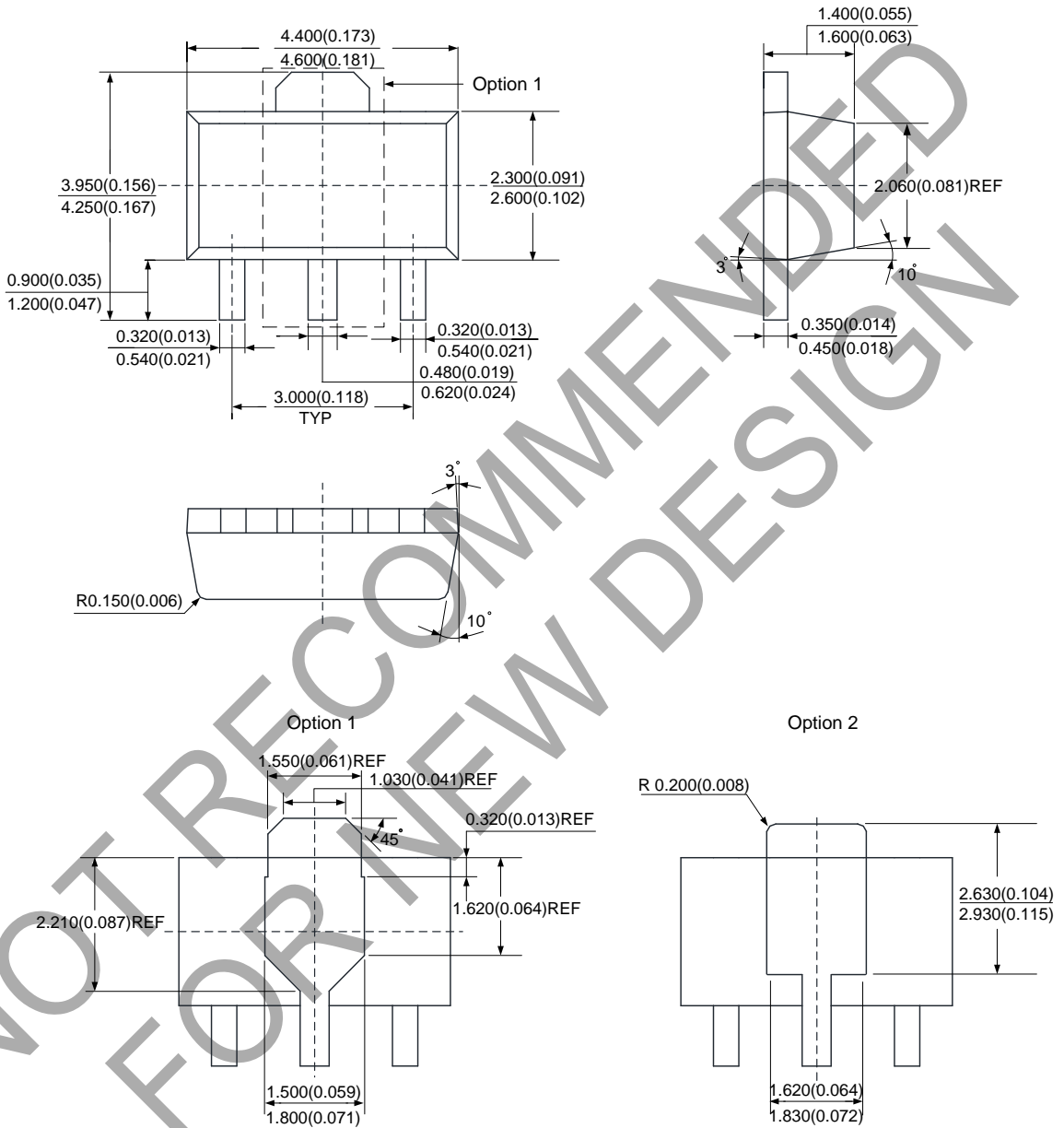


Part Number	Package	Identification Code
AP7384-28SA-7	SOT23	F4A
AP7384-33SA-7	SOT23	F4B
AP7384-50SA-7	SOT23	F4C
AP7384-70SA-7	SOT23	F4D

Package Outline Dimensions (All dimensions in mm.)

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

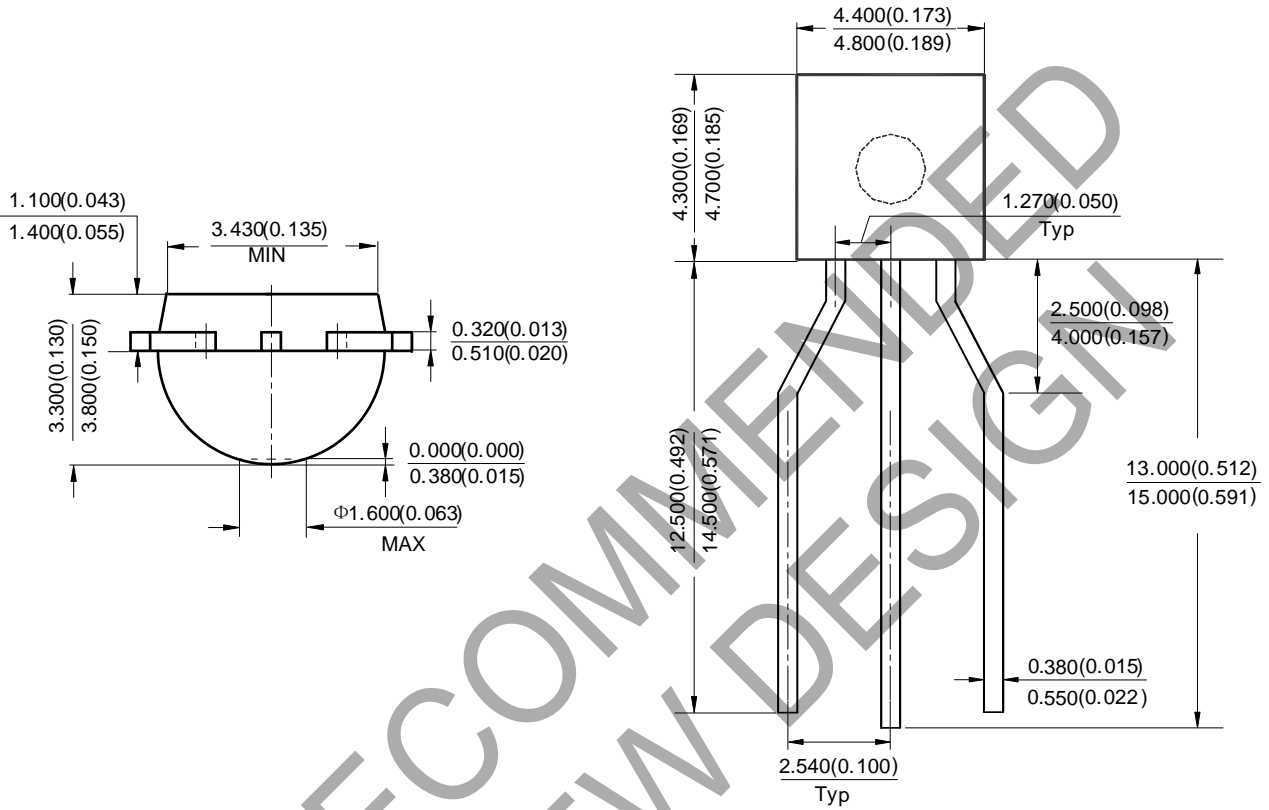
(1) Package Type: SOT89



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

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

(2) TO92 (Ammo Packing)

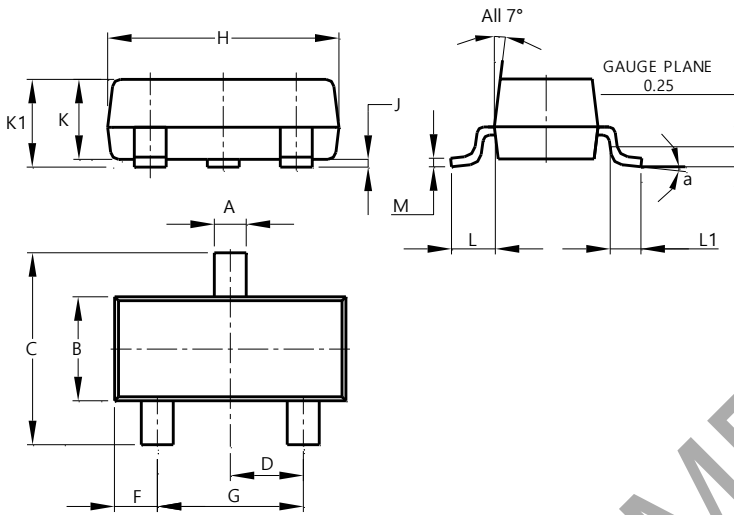


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Package Outline Dimensions (continued. All dimensions in mm.)

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

(3) Package Type: SOT23



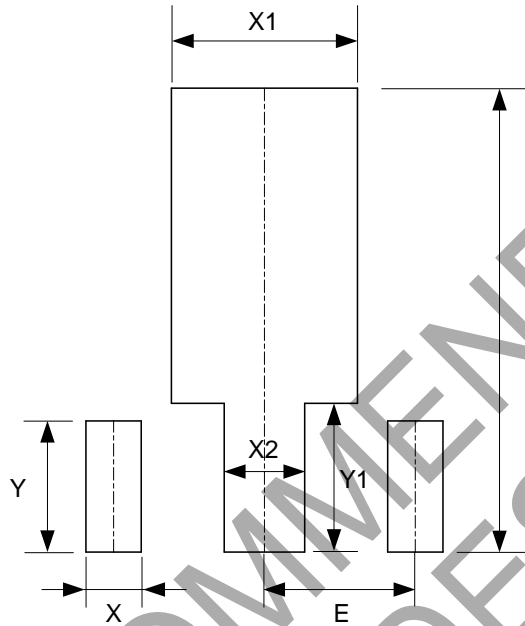
SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

NOT RECOMMENDED FOR NEW DESIGN

Suggested Pad Layout

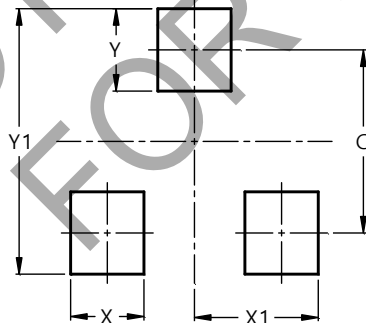
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(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

(2) Package Type: SOT23



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

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