WIDE INPUT VOLTAGE RANGE, 50mA ULDO REGULATOR

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

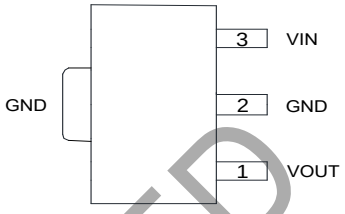
- Wide Input Voltage Range: Up to 40V
- Low Dropout Voltage: V_{DROP} = 500mV@I_{OUT} = 50mA @ V_{OUT} = 3.3V
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- Short Current Protection Function
- **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

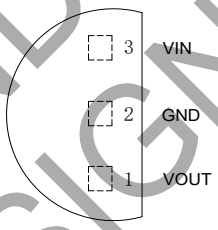
Pin Assignments

(Top View)



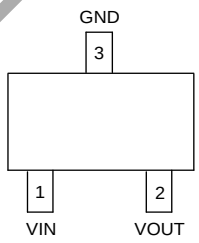
SOT89

(Top View)



TO92 (Ammo Packing)

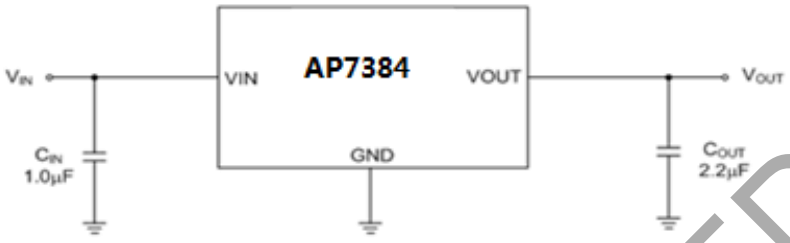
(Top View)



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.

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

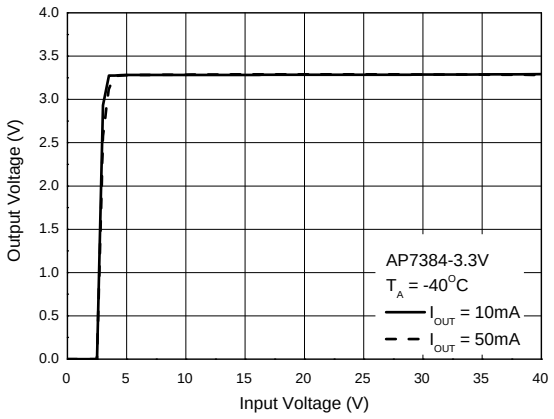
Electrical Characteristics

(T_J = +25°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.)

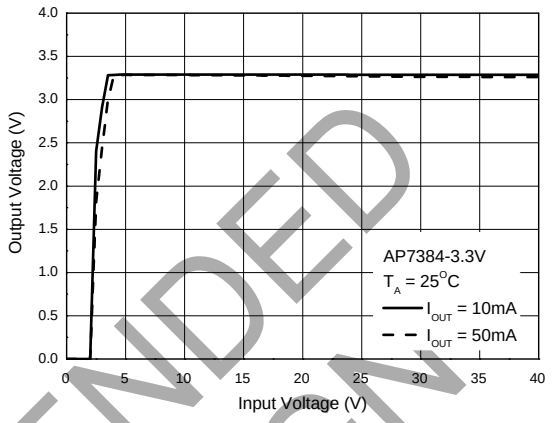
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Variation from Specified V_{OUT}	V_{OUT} x 98%	—	V_{OUT} x 102%	V
V_{IN}	Input Voltage	—	3.3	—	40	V
I_{LIMIT}	Current Limit	V_{OUT} = 98% x V_{OUT}, V_{IN} = V_{OUT} + 2V	50	—	—	mA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{OUT}+2V ≤ V_{IN} ≤ 40V, I_{OUT} = 10mA	—	0.05	—	%/V
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	1mA ≤ I_{OUT} ≤ 50mA	—	0.5	—	%
V_{DROP}	Dropout Voltage	I_{OUT} = 50mA @ V_{OUT} = 3.3V	—	500	—	mV
I_{GND}	Ground Current	I_{OUT} = 0A	—	2.5	—	µA
		I_{OUT} = 50mA	—	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

Performance Characteristics

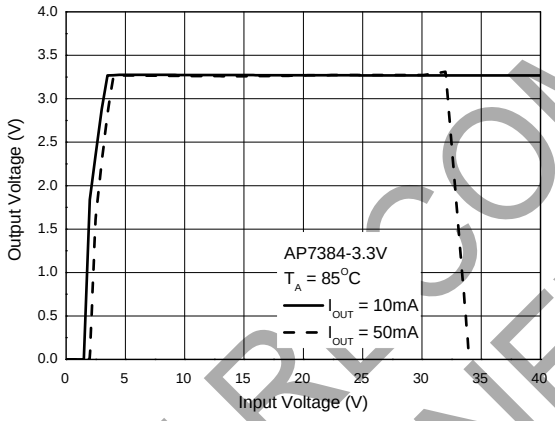
Output Voltage vs. Input Voltage @-40°C



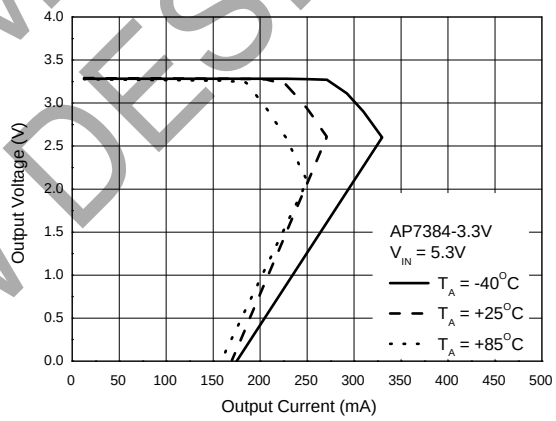
Output Voltage vs. Input Voltage @+25°C



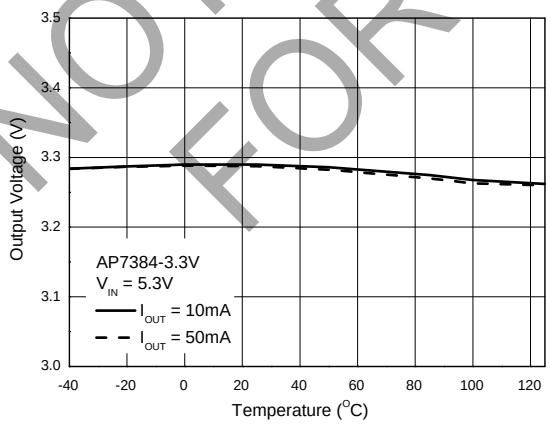
Output Voltage vs. Input Voltage @+85°C



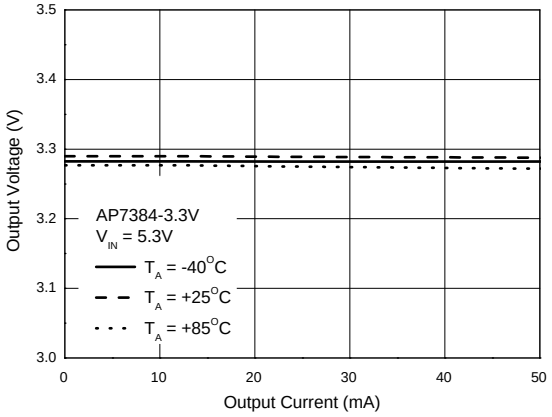
Output Voltage vs. Output Current



Output Voltage vs. Temperature

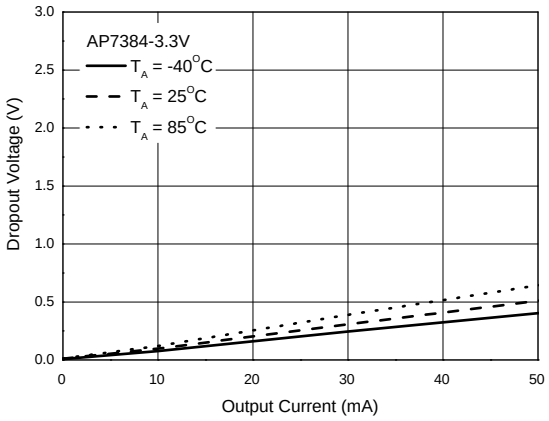


Output Voltage vs. Output Current

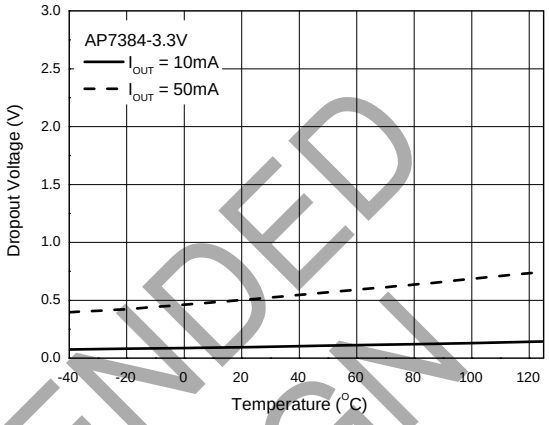


Performance Characteristics (continued)

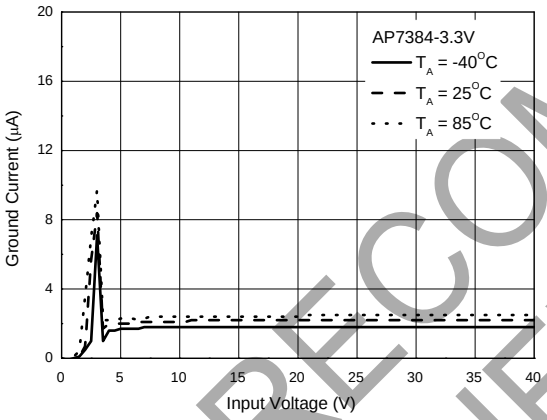
Dropout Voltage vs. Output Current



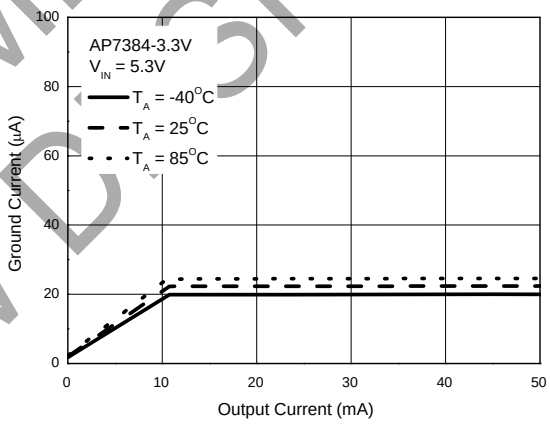
Dropout Voltage vs. Temperature



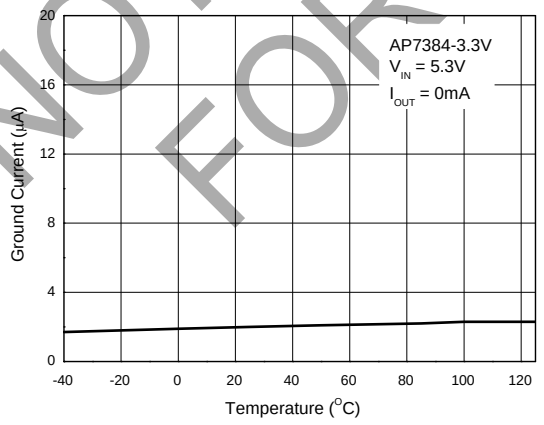
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

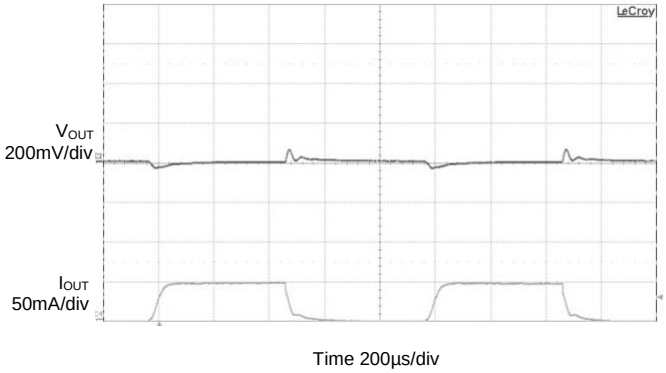


I_{GND} vs Temperature



Load Transient

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



Ordering Information

AP7384 - X X - X

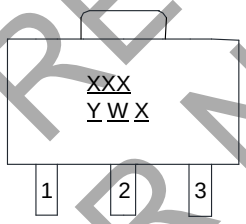
Output Voltage	Package	Packing
28 : 2.8V 33 : 3.3V 50 : 5.0V 70 : 7.0V	V : TO92 (Ammo Packing) Y : SOT89 SA : SOT23	7/13 : Tape & Reel A : Ammo

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

(Top View)

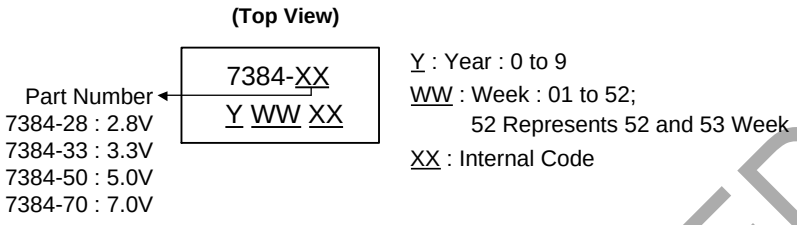


XXX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1 to 26 Week;
a to z : 27 to 52 Week;
z Represents 52 and 53 Week
X : Internal Code

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

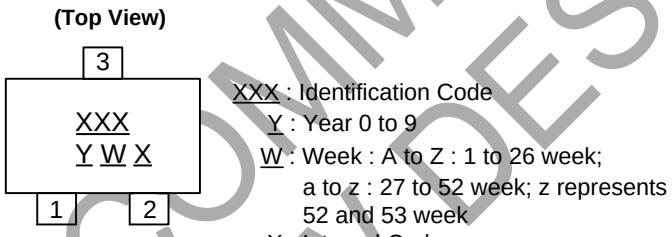
Marking Information (continued)

(2) TO92 (Ammo Packing)



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

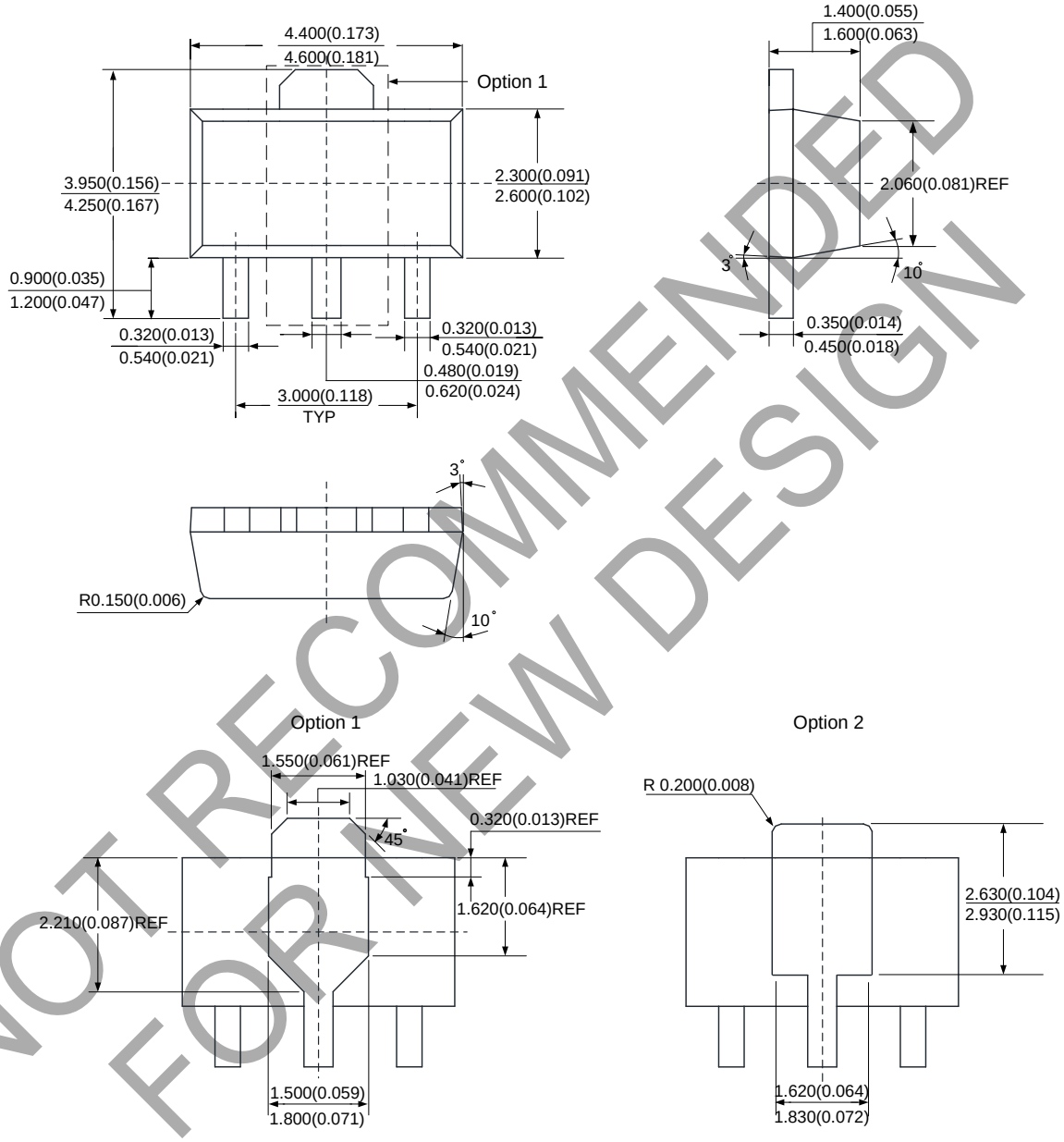


Part Number	Package	Identification Code
AP7384-28SA-7	SOT23	F4A
AP7384-33SA-7	SOT23	F4B
AP7384-50SA-7	SOT23	F4C
AP7384-70SA-7	SOT23	F4D

Package Outline Dimensions (All dimensions in mm.)

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

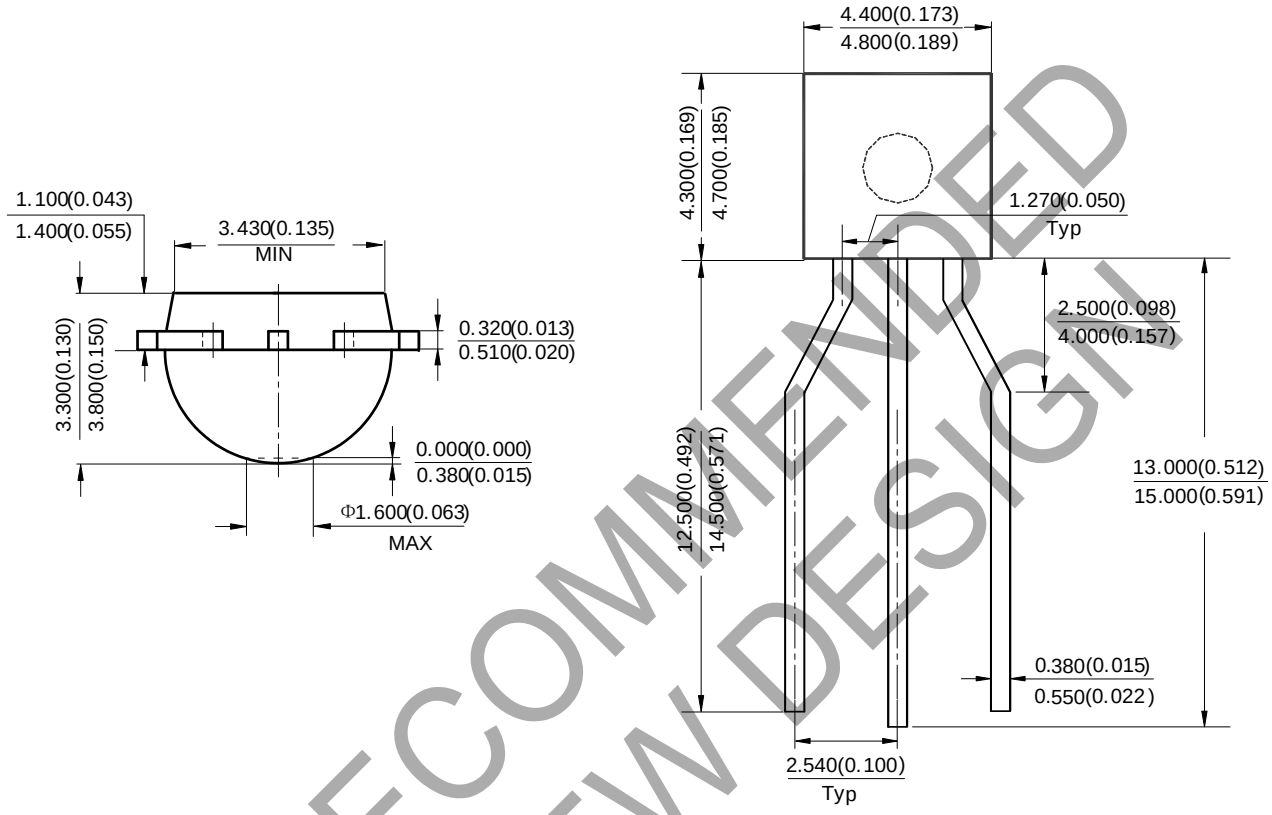
(1) Package Type: SOT89



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

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

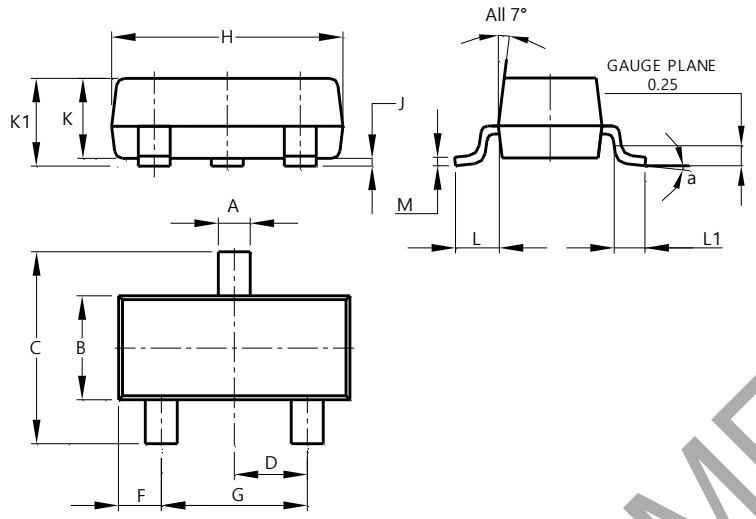
(2) TO92 (Ammo Packing)



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

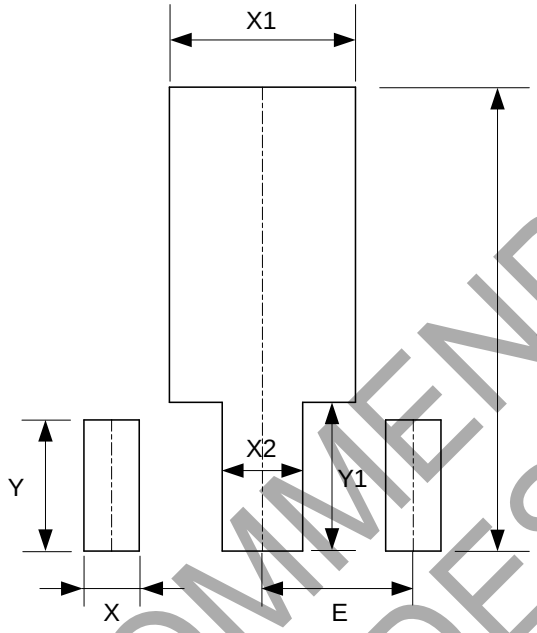


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

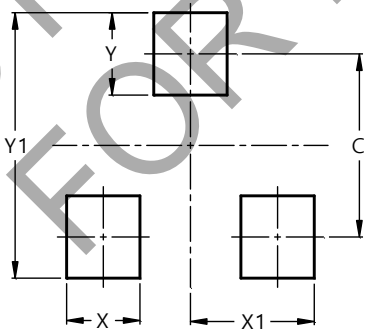
Please see http://www.diodes.com/package-outlines.html for the latest version.

(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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