

Description

The AP7380 series is a positive voltage regulator IC.

The AP7380 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 and instrument application.

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 AP7380 is available in 1.8V, 3.0V, 3.3V, 3.6V, 4.15V, 4.4V and 5.0V fixed output voltage versions.

The AP7380 is available in space-saving SOT25 and SOT89 (Option 2) packages.

Features

- Wide Input Voltage Range: Up to 24V
- Low Dropout Voltage: $V_{DROP} = 500\text{mV} @ I_{OUT} = 50\text{mA}$
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown 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](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

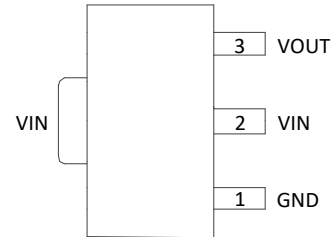
Applications

- Battery-powered equipments
- Laptops, 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.

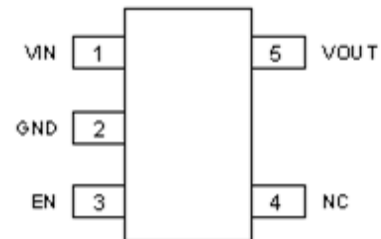
Pin Assignments

(Top View)



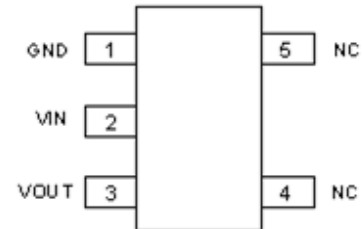
SOT89 (Option 2)

(Top View)



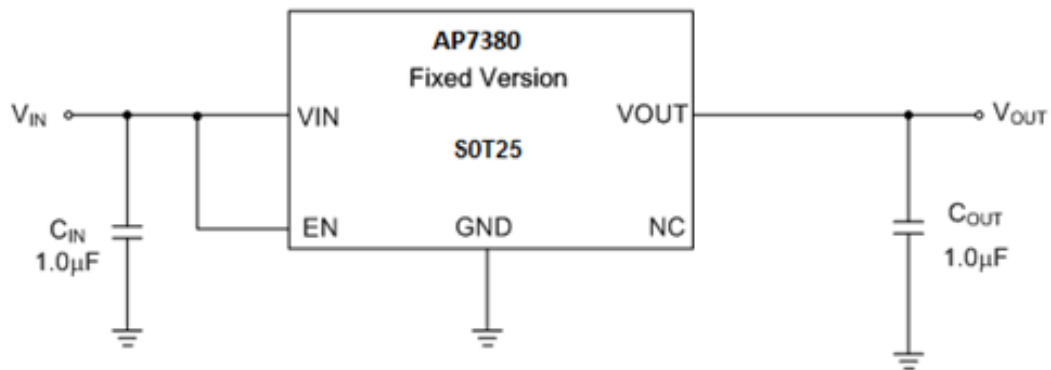
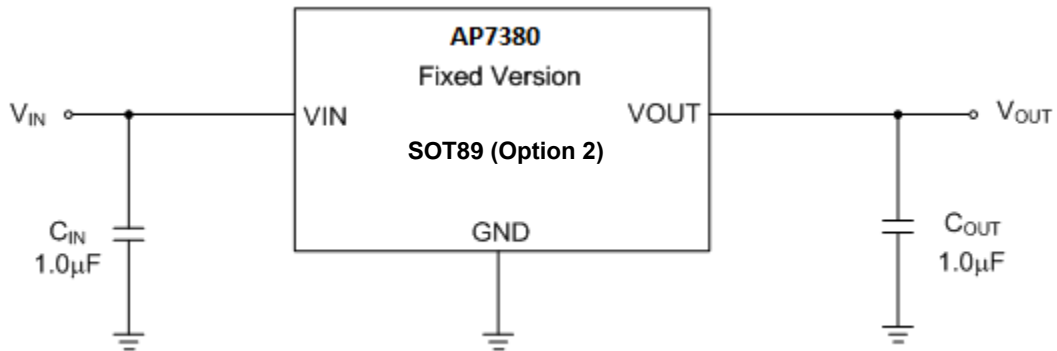
SOT25 (W5 Package)

(Top View)



SOT25 (WR Package)

Typical Applications Circuit



Pin Descriptions

Pin Number			Pin Name	Function
SOT25 (W5)	SOT25 (WR)	SOT89 (Option 2)		
1	2	2	VIN	Input voltage
2	1	1	GND	Ground
3	—	—	EN	Enable input
4	4, 5	—	NC	No connected for fixed version
5	3	3	VOUT	Regulated output voltage

Absolute Maximum Ratings

Symbol	Parameter	Rating		Unit
V _{IN}	Supply Input Voltage	30		V
V _{EN}	Enable Input Voltage	30		V
I _{OUT}	Output Current	200		mA
T _{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
T _J	Operating Junction Temperature	+150		°C
θ _{JA}	Thermal Resistance (Junction to Ambient)	SOT25 (W5)	193	°C/W
		SOT25 (WR)	166	
		SOT89 (Option 2)	118	
θ _{JC}	Thermal Resistance (Junction to Case)	SOT25 (W5)	68	°C/W
		SOT25 (WR)	26	
		SOT89 (Option 2)	20	
T _{STG}	Storage Temperature Range	-65 to +150		°C
—	ESD (Machine Model)	250		V
—	ESD (Human Body Model)	2500		V

Recommended Operating Conditions

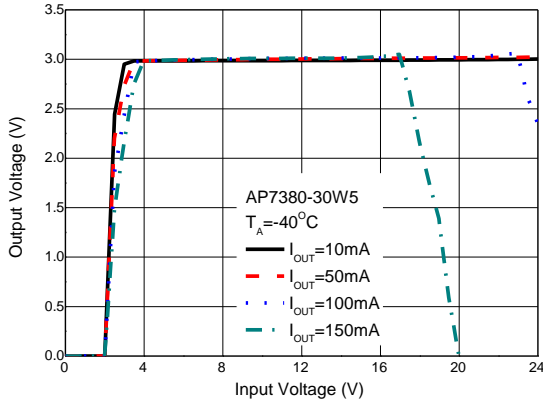
Symbol	Parameter	Min	Max	Unit
V _{IN}	Supply Input Voltage	3.5	24	V
T _J	Operating Junction Temperature	-40	+125	°C

Electrical Characteristics (@ $V_{IN} = V_{OUT} + 2V$, $C_{IN} = 1.0\mu F$, $C_{OUT} = 1.0\mu F$, Typical $T_J = +25^\circ C$, unless otherwise specified.)

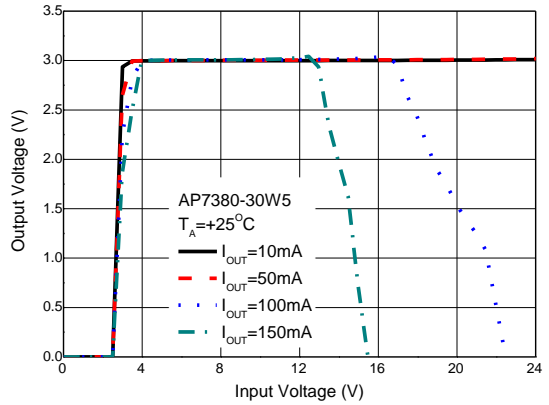
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	
V_{OUT}	Output Voltage	$V_{IN} = V_{OUT} + 2V$, $I_{OUT} = 10mA$ Variation from Specified V_{OUT}	$V_{OUT} \times 99\%$	V_{OUT}	$V_{OUT} \times 101\%$	V	
V_{IN}	Input Voltage	—	3.5	—	24	V	
I_{LIMIT}	Current Limit	$V_{IN} = V_{OUT} + 2V$, $V_{OUT1} = 98\% \times V_{OUT}$	150	—	—	mA	
$\Delta V_{OUT}/\Delta V_{IN}/V_{OUT}$	Line Regulation	$V_{OUT} + 2V \leq V_{IN} \leq 24V$, $I_{OUT} = 10mA$	—	0.05	—	%/V	
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$V_{IN} = V_{OUT} + 2V$, $1mA \leq I_{OUT} \leq 150mA$	—	0.5	—	%	
V_{DROP}	Dropout Voltage	$3.0V \leq V_{OUT} < 5.0V$	$I_{OUT} = 50mA$	—	360	580	mV
			$I_{OUT} = 100mA$	—	750	1000	mV
			$I_{OUT} = 150mA$	—	1050	1500	mV
		$V_{OUT} = 5.0V$	$I_{OUT} = 50mA$	—	250	500	mV
			$I_{OUT} = 100mA$	—	550	750	mV
			$I_{OUT} = 150mA$	—	750	1100	mV
I_{GND}	Ground Current	$I_{OUT} = 0A$	—	1.8	3.0	μA	
		$I_{OUT} = 150mA$	—	1.8	3.0		
I_{STD}	Standby Current	V_{EN} in OFF Mode	—	0.01	—	μA	
$\Delta V_{OUT}/(V_{OUT} \times \Delta T)$	Output Voltage Temperature Coefficient	$I_{OUT} = 100\mu A$, $-40^\circ C \leq T_J \leq +125^\circ C$	—	± 100	—	ppm/ $^\circ C$	
I_{EN}	EN Pin Current	—	—	1	—	μA	
—	EN “High” Voltage	EN Input Voltage “High”	2.0	—	—	V	
—	EN “Low” Voltage	EN Input Voltage “Low”	—	—	0.4	V	
T_{OTSD}	Thermal Shutdown Temperature	—	—	+160	—	$^\circ C$	
T_{HYOTSD}	Thermal Shutdown Hysteresis	—	—	+20	—	$^\circ C$	

Performance Characteristics

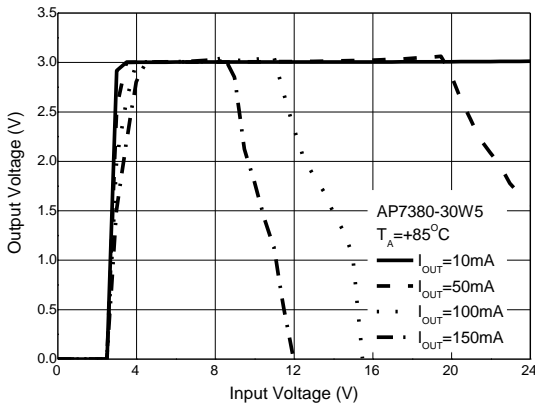
Output Voltage vs. Input Voltage @-40°C



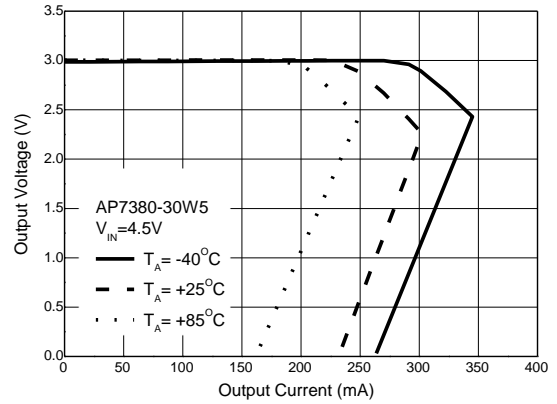
Output Voltage vs. Input Voltage @+25°C



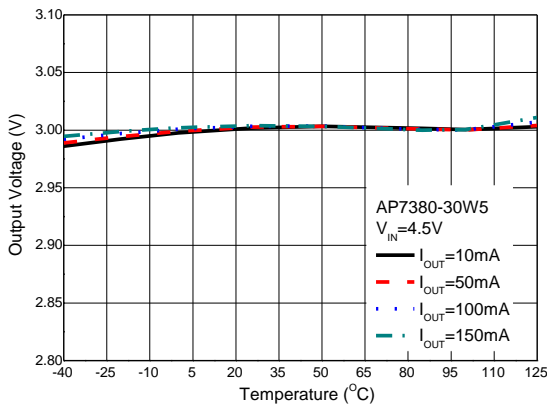
Output Voltage vs. Input Voltage @+85°C



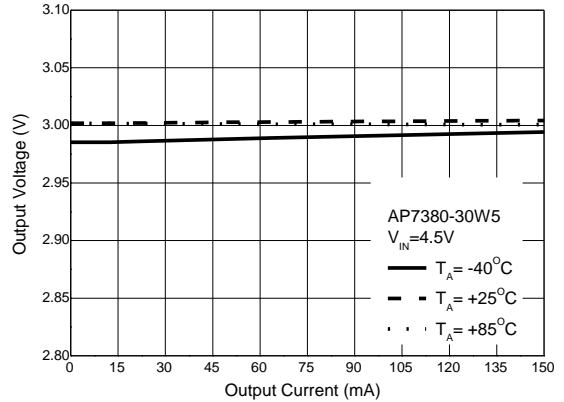
Output Voltage vs. Output Current



Output Voltage vs. Temperature

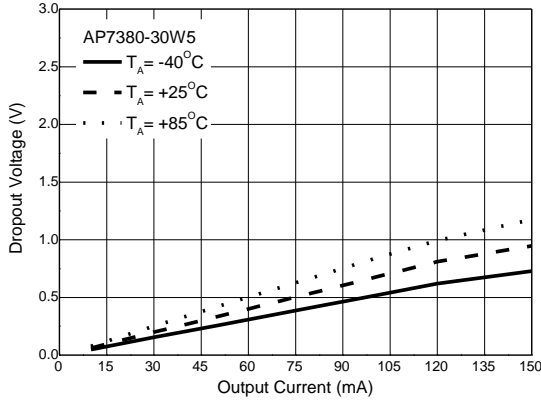


Output Voltage vs. Output Current

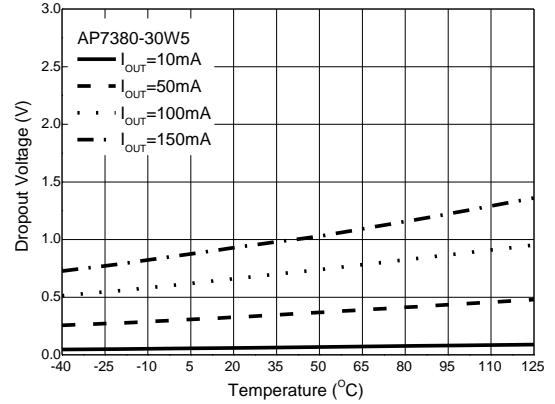


Performance Characteristics (continued)

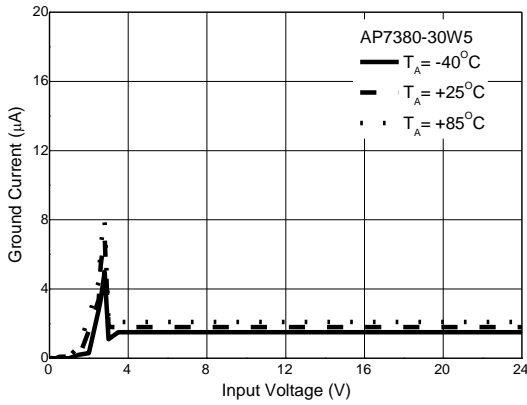
Dropout Voltage vs. Output Current



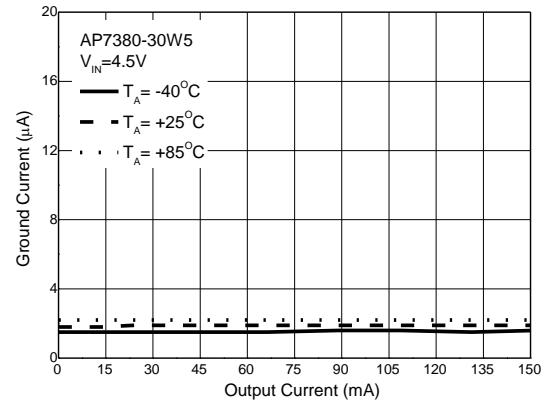
Dropout Voltage vs. Temperature



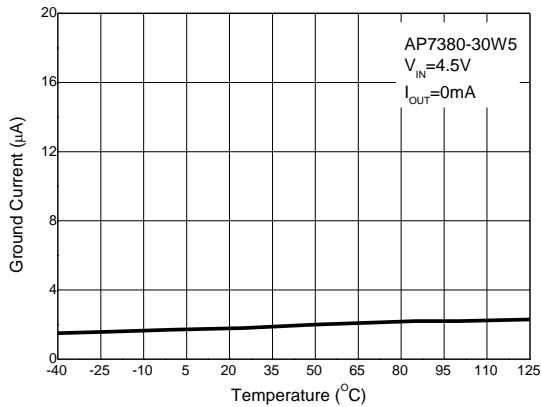
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

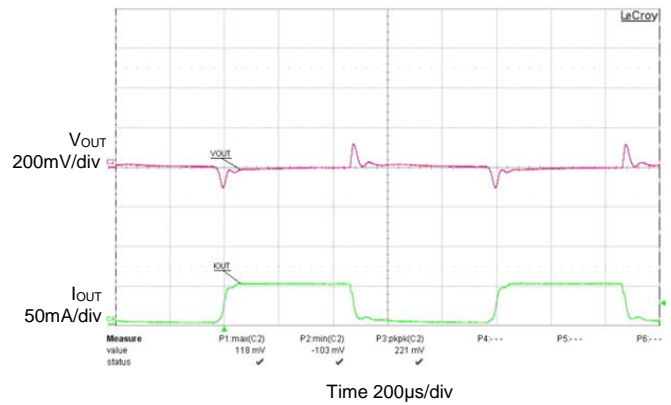


I_{GND} vs Temperature

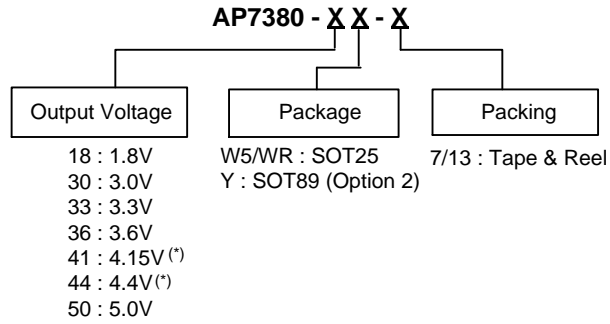


Load Transient

$C_{IN} = 1\mu\text{F}$, $C_{OUT} = 1\mu\text{F}$, $V_{IN} = V_{OUT} + 1.5\text{V to } 24\text{V}$, $I_{OUT} = 0 \text{ to } 50\text{mA}$



Ordering Information



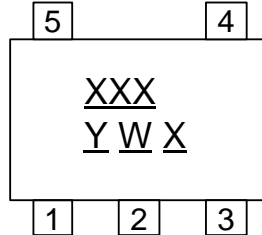
Part Number	Package Code	Package	Packing	
			Qty.	Carrier
AP7380-XXW5-7	W5	SOT25	3000	7" Tape & Reel
AP7380-XXWR-7	WR	SOT25	3000	7" Tape & Reel
AP7380-XXY-13	Y	SOT89 (Option 2)	2500	13" Tape & Reel

*Not Recommend For New Design

Marking Information

(1) SOT25

(Top View)



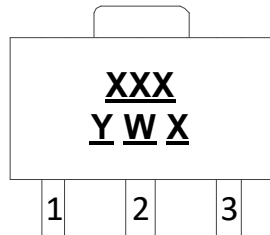
XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents 52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AP7380-18W5-7	SOT25	D8M
AP7380-30W5-7	SOT25	D8E
AP7380-33W5-7	SOT25	D8A
AP7380-36W5-7	SOT25	D8P
AP7380-41W5-7 (*)	SOT25	D8F
AP7380-44W5-7 (*)	SOT25	D8G
AP7380-50W5-7	SOT25	D8B
AP7380-18WR-7	SOT25	D8N
AP7380-30WR-7	SOT25	D8H
AP7380-33WR-7	SOT25	D8C
AP7380-36WR-7	SOT25	D8R
AP7380-41WR-7 (*)	SOT25	D8J
AP7380-44WR-7 (*)	SOT25	D8K
AP7380-50WR-7	SOT25	D8D

*Not Recommend For New Design

(2) SOT89 (Option 2)

(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

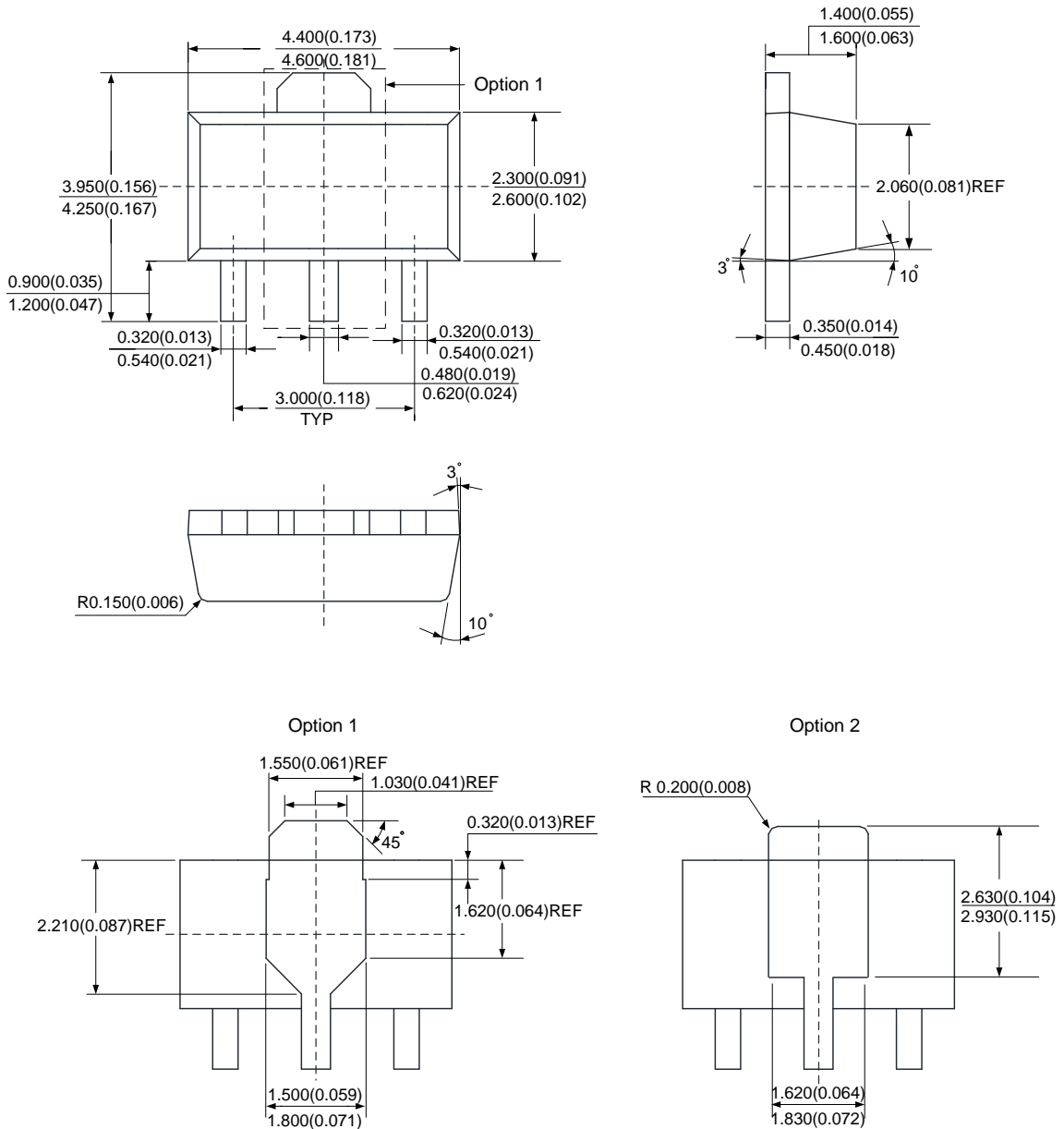
Part Number	Package	Identification Code
AP7380-18Y-13	SOT89 (Option 2)	D8M
AP7380-30Y-13	SOT89 (Option 2)	D8E
AP7380-33Y-13	SOT89 (Option 2)	D8A
AP7380-36Y-13	SOT89 (Option 2)	D8P
AP7380-41Y-13 (*)	SOT89 (Option 2)	D8F
AP7380-44Y-13 (*)	SOT89 (Option 2)	D8G
AP7380-50Y-13	SOT89 (Option 2)	D8B

*Not Recommend For New Design

Package Outline Dimensions (All dimensions in mm.)

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

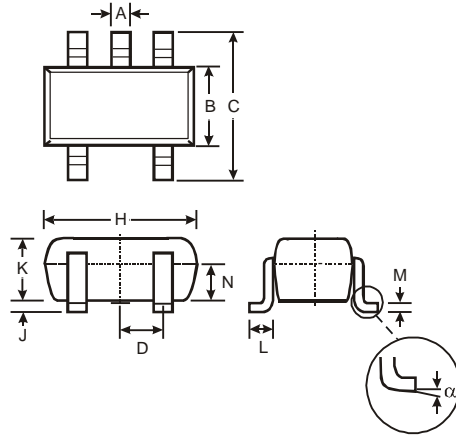
(1) Package Type: SOT89



Package Outline Dimensions (continued)

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

(2) Package Type: SOT25

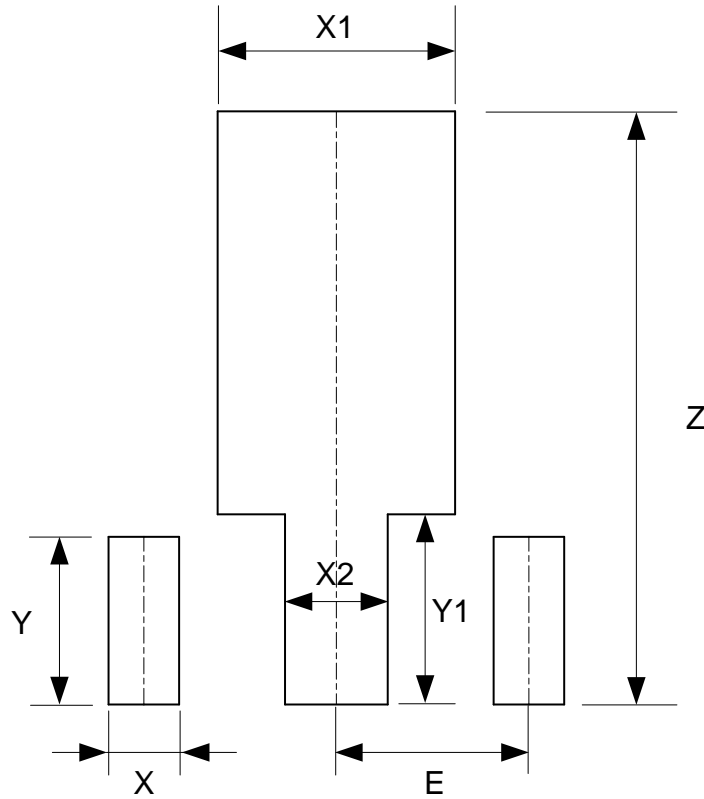


SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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

(1) Package Type: SOT89

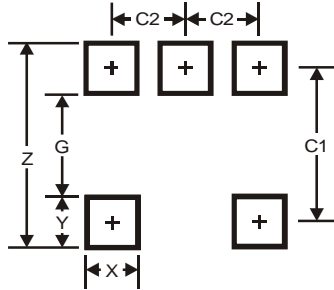


Dimensions	Z (mm)/(inch)	X (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	Y1 (mm)/(inch)	E (mm)/(inch)
Value	4.600/0.181	0.550/0.022	1.850/0.073	0.800/0.031	1.300/0.051	1.475/0.058	1.500/0.059

Suggested Pad Layout (continued)

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

(2) Package Type: SOT25



Dimensions	Value
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

Mechanical Data

- Moisture Sensitivity:
 - SOT25: Level 1 per J-STD-020
 - SOT89: Level 3 per J-STD-020
- Terminals:
 - SOT25/SOT89: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight:
 - SOT25: 0.016 grams (Approximate)
 - SOT89: 0.055 grams (Approximate)

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