

## 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

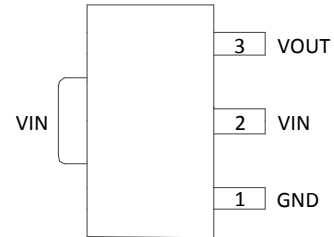
- Wide Input Voltage Range: Up to 24V
- Low Dropout Voltage:  $V_{DROP} = 500mV @ I_{OUT} = 50mA$
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Applications

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

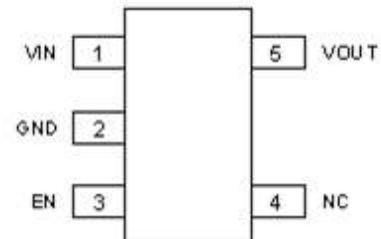
## Pin Assignments

(Top View)



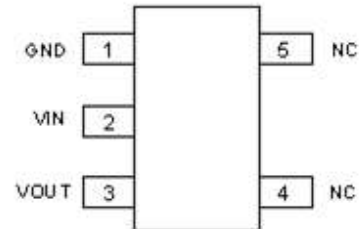
**SOT89 (Option 2)**

(Top View)



**SOT25 (W5 Package)**

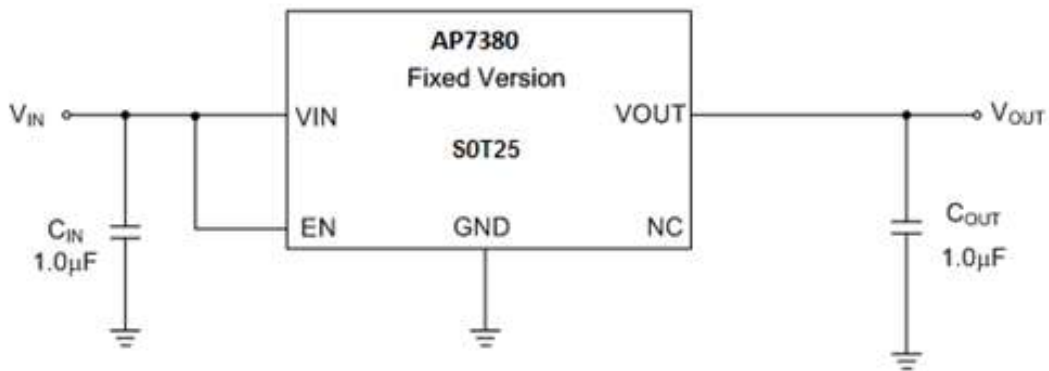
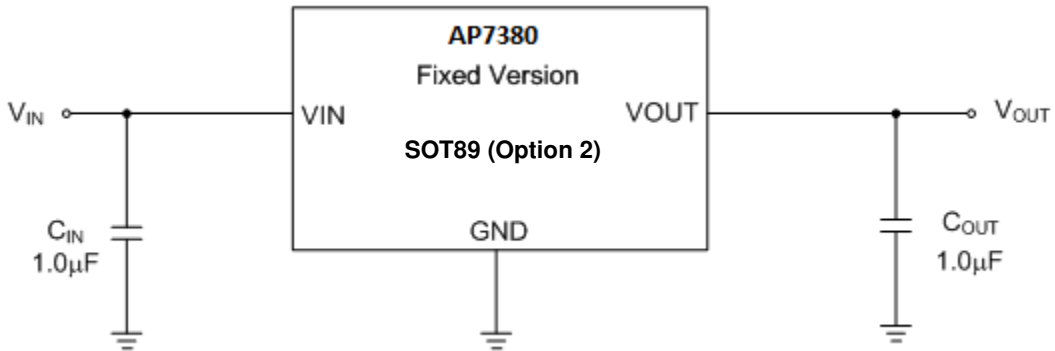
(Top View)



**SOT25 (WR Package)**

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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
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

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## 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
$\theta_{JA}$	Thermal Resistance (Junction to Ambient)	SOT25 (W5)	193	°C/W
		SOT25 (WR)	166	
		SOT89 (Option 2)	118	
$\theta_{JC}$	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

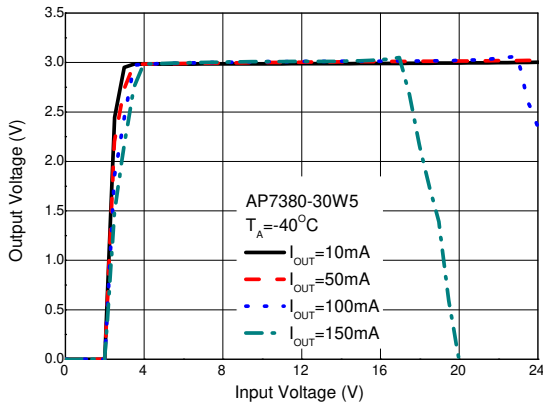
**Electrical Characteristics** (@  $V_{IN} = V_{OUT} + 2V$ ,  $C_{IN} = 1.0\mu F$ ,  $C_{OUT} = 1.0\mu F$ , Typical  $T_J = +25^\circ C$ , unless otherwise specified.)

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	$\mu A$	
		$I_{OUT} = 150mA$	—	1.8	3.0		
$I_{STD}$	Standby Current	$V_{EN}$ in OFF Mode	—	0.01	—	$\mu A$	
$\Delta V_{OUT} / (V_{OUT} \Delta T)$	Output Voltage Temperature Coefficient	$I_{OUT} = 100\mu A$ , $-40^\circ C \leq T_J \leq +125^\circ C$	—	$\pm 100$	—	ppm/ $^\circ C$	
$I_{EN}$	EN Pin Current	—	—	1	—	$\mu A$	
—	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	—	$^\circ C$	

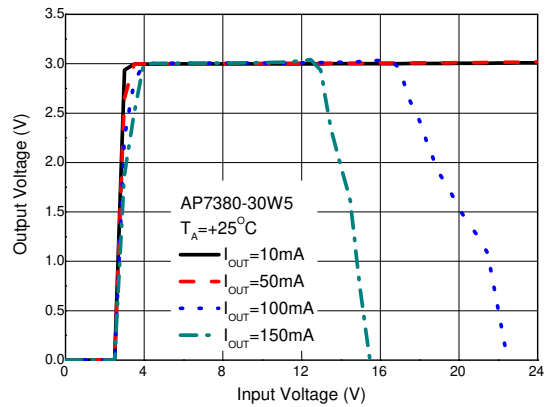
**Performance Characteristics**

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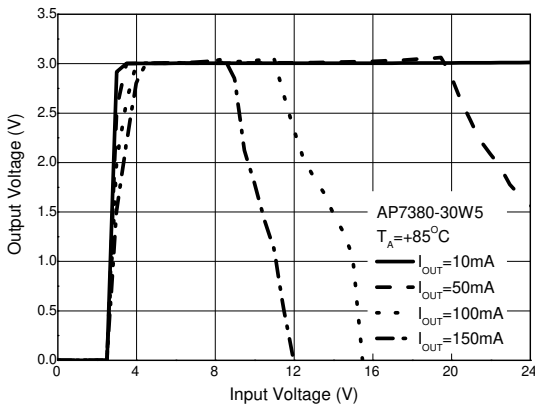
**Output Voltage vs. Input Voltage @-40°C**



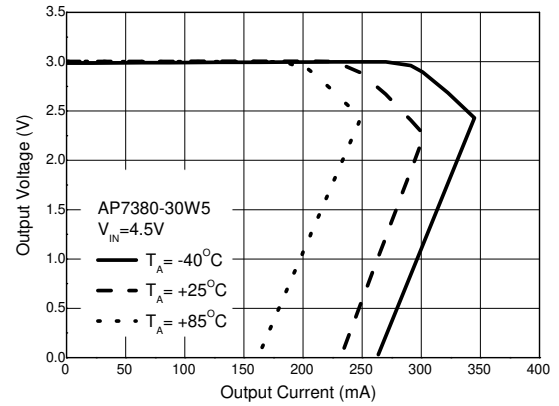
**Output Voltage vs. Input Voltage @+25°C**



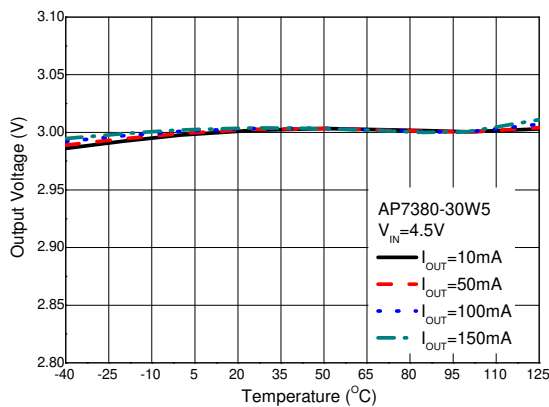
**Output Voltage vs. Input Voltage @+85°C**



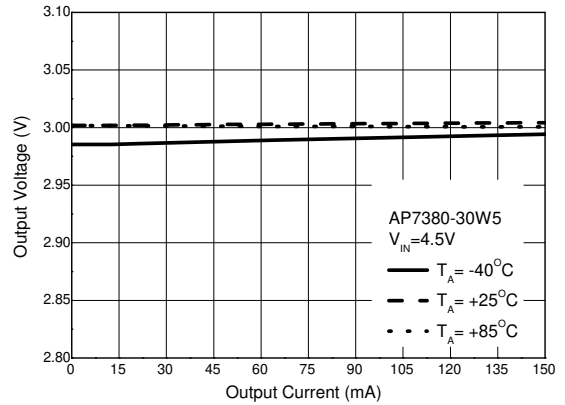
**Output Voltage vs. Output Current**



**Output Voltage vs. Temperature**

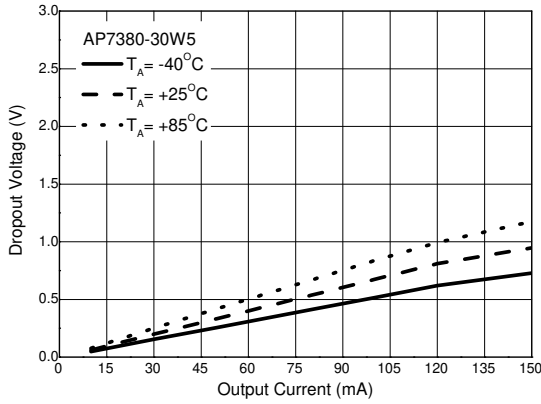


**Output Voltage vs. Output Current**

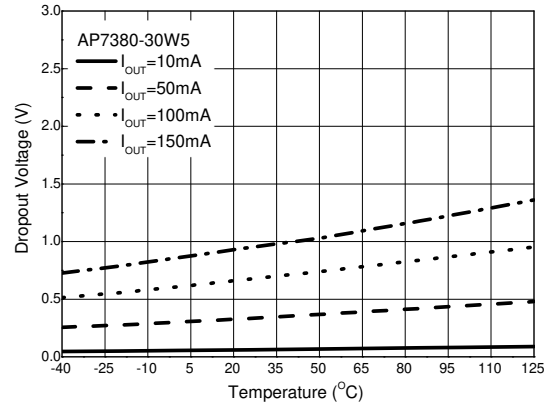


**Performance Characteristics (Cont.)**

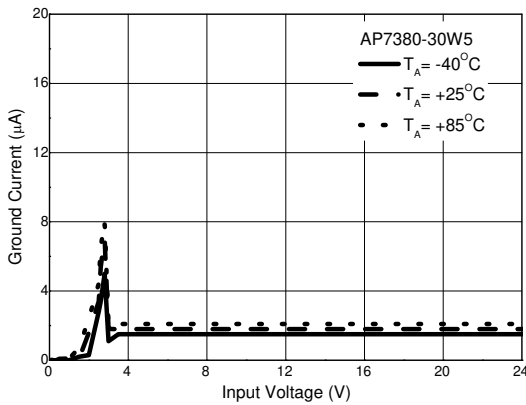
**Dropout Voltage vs. Output Current**



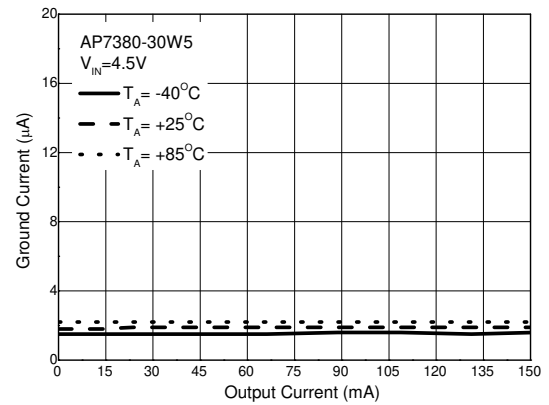
**Dropout Voltage vs. Temperature**



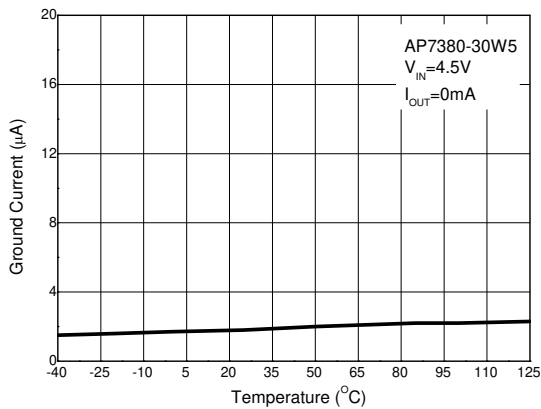
**$I_{GND}$  vs. Input Voltage**



**$I_{GND}$  vs. Output Current**

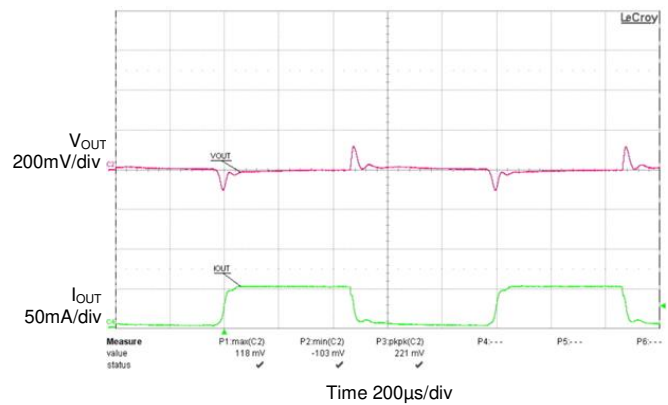


**$I_{GND}$  vs Temperature**

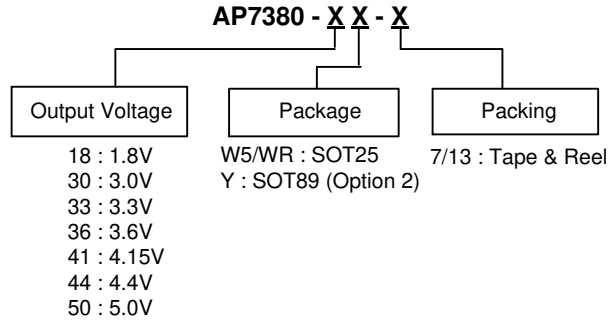


**Load Transient**

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



Ordering Information



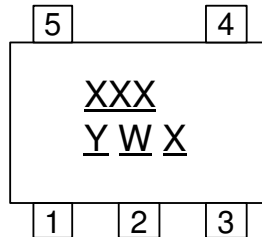
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Part Number	Package Code	Package	7"/13" Tape and Reel	
			Quantity	Part Number Suffix
AP7380-18W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-30W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-33W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-36W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-41W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-44W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-50W5-7	W5	SOT25	3000/Tape & Reel	-7
AP7380-18WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-30WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-33WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-36WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-41WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-44WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-50WR-7	WR	SOT25	3000/Tape & Reel	-7
AP7380-18Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-30Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-33Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-36Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-41Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-44Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13
AP7380-50Y-13	Y	SOT89 (Option 2)	2500/Tape & Reel	-13

**Marking Information**

(1) SOT25

(Top View)

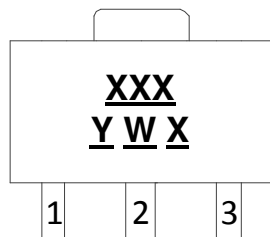


XXX : Identification Code  
Y : Year 0 to 9  
W : Week : A to Z : 1 to 26 week;  
a to z : 27 to 52 week; z represents 52 and 53 week  
X : Internal Code

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

(2) SOT89 (Option 2)

(Top View)



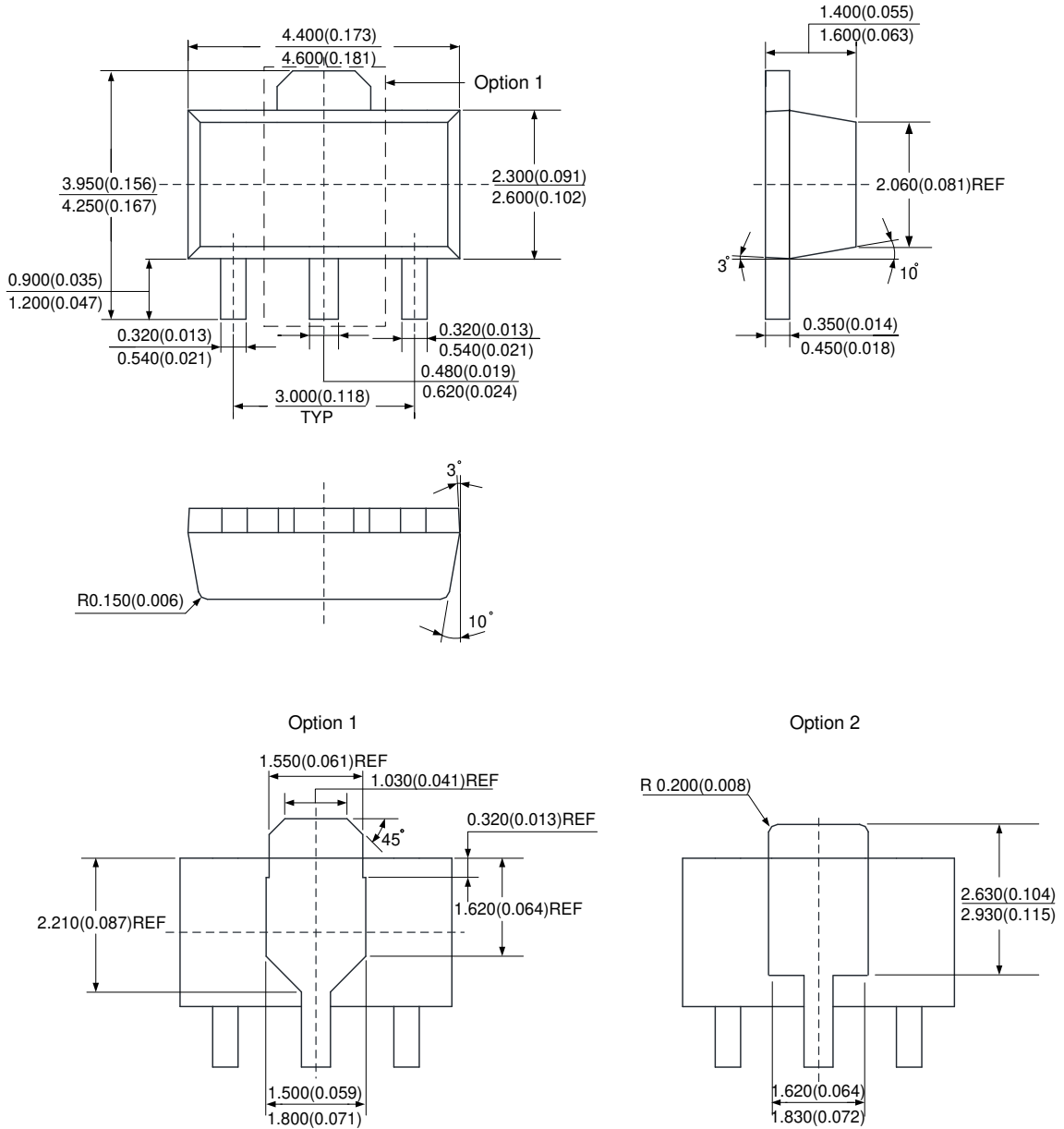
XXX : Identification code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week;  
z represents 52 and 53 week  
X : Internal code

Part Number	Package	Identification Code
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



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

(1) Package Type: SOT89

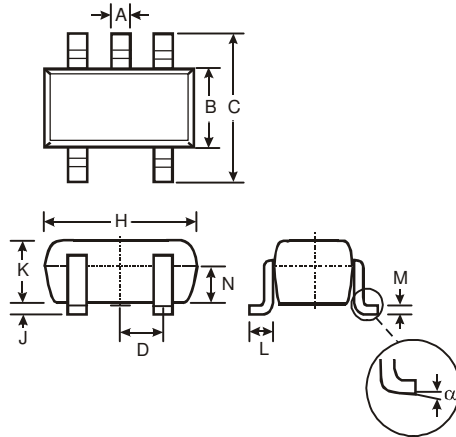


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**Package Outline Dimensions (Cont.)**

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

(2) Package Type: SOT25

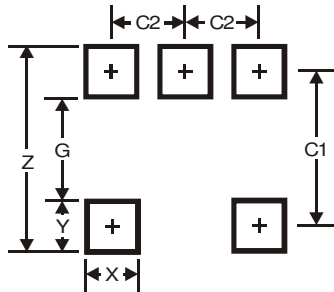


SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
$\alpha$	0°	8°	-
All Dimensions in mm			

**Suggested Pad Layout**

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

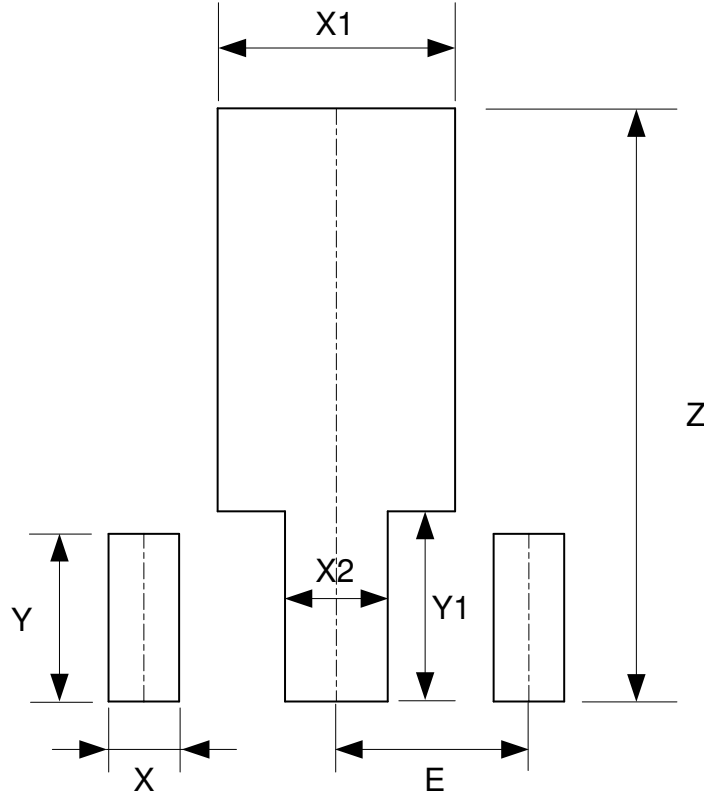
(1) Package Type: SOT25



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

**Suggested Pad Layout (Cont.)**

(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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