NEW PRODUCT

## 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

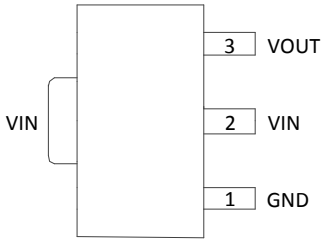
- Wide Input Voltage Range: Up to 24V
- Low Dropout Voltage: $V_{DROP}$ = 500mV @ $I_{OUT}$ = 50mA
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- **Totally Lead-Free & Fully RoHS Compliant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

## Applications

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

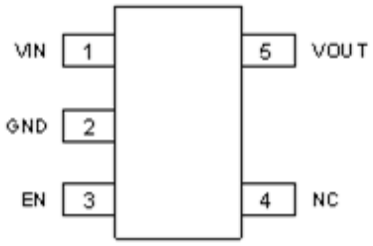
## Pin Assignments

**(Top View)**



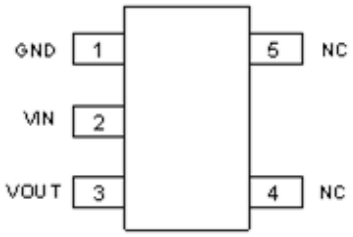

**SOT89 (Option 2)**

**(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 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.

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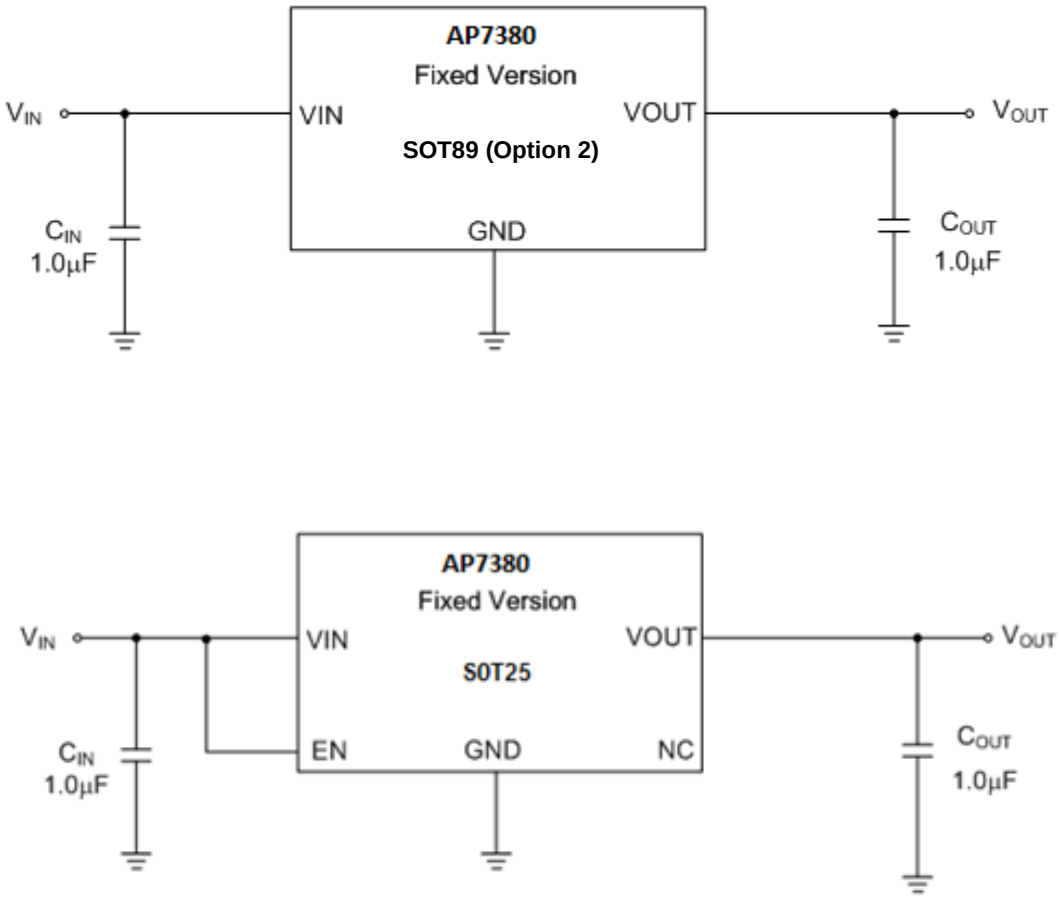
## Typical Applications Circuit




## 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 |

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## Electrical Characteristics (@ $V_{IN}$ = $V_{OUT}$ + 2V, $C_{IN}$ = 1.0µF, $C_{OUT}$ = 1.0µF, Typical $T_J$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{OUT}$ | Output Voltage | $V_{IN}$ = $V_{OUT}$ + 2V, $I_{OUT}$ = 10mA<br>Variation from Specified $V_{OUT}$ | | $V_{OUT}$x99% | $V_{OUT}$ | $V_{OUT}$x101% | V |
| $V_{IN}$ | Input Voltage | — | | 3.5 | — | 24 | V |
| $I_{LIMIT}$ | Current Limit | $V_{IN}$ = $V_{OUT}$ + 2V, $V_{OUT1}$ = 98% x $V_{OUT}$ | | 150 | — | — | mA |
| $\Delta V_{OUT}/\Delta V_{IN}/V_{OUT}$ | Line Regulation | $V_{OUT}$ + 2V ≤ $V_{IN}$ ≤ 24V, $I_{OUT}$ = 10mA | | — | 0.05 | — | %/V |
| $\Delta V_{OUT}/V_{OUT}$ | Load Regulation | $V_{IN}$ = $V_{OUT}$ + 2V, 1mA ≤ $I_{OUT}$ ≤ 150mA | | — | 0.5 | — | % |
| $V_{DROP}$ | Dropout Voltage | 3.0V ≤ $V_{OUT}$ < 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 |
| $\Delta V_{OUT}/(V_{OUT}x\Delta T)$ | Output Voltage Temperature Coefficient | $I_{OUT}$ = 100µA, -40°C ≤ $T_J$ ≤ +125°C | | — | ±100 | — | ppm/°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 | — | °C |
| $T_{HYOTSD}$ | Thermal Shutdown Hysteresis | — | | — | +20 | — | °C |

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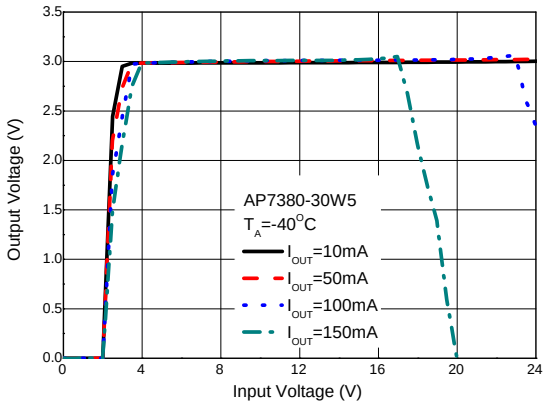
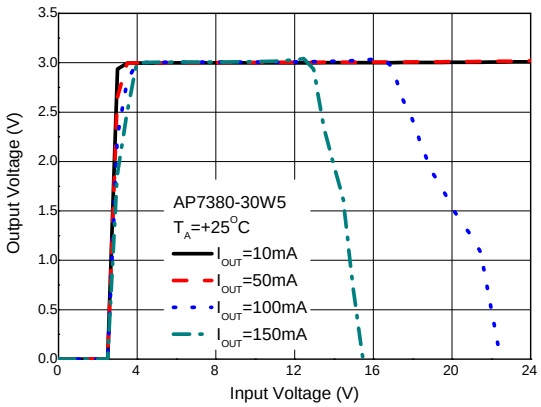
## Performance Characteristics

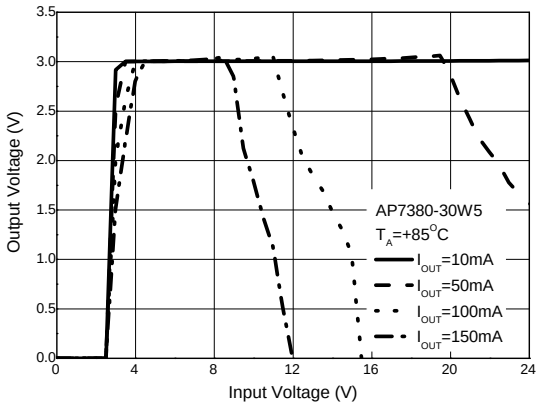
### Output Voltage vs. Input Voltage @-40°C



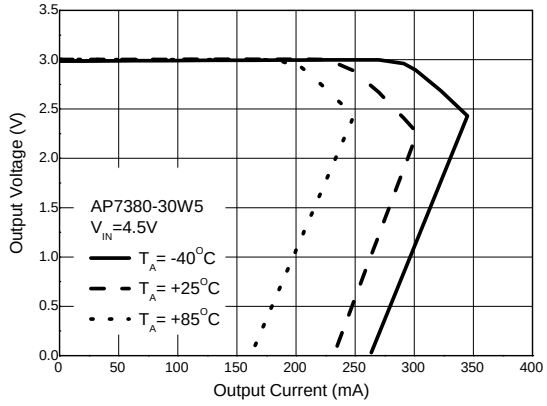

### Output Voltage vs. Input Voltage @+25°C



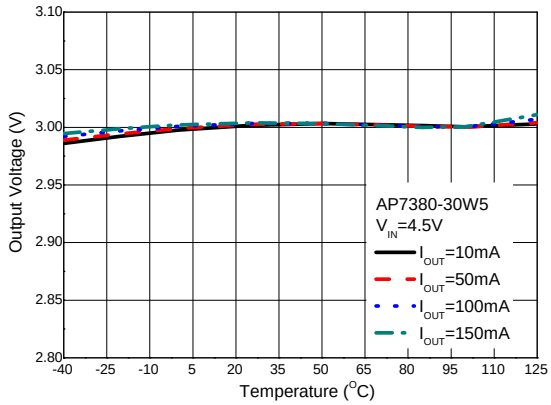

### Output Voltage vs. Input Voltage @+85°C



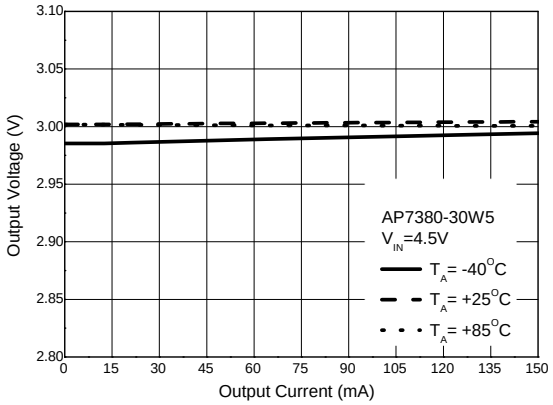

### Output Voltage vs. Output Current




### Output Voltage vs. Temperature




### Output Voltage vs. Output Current



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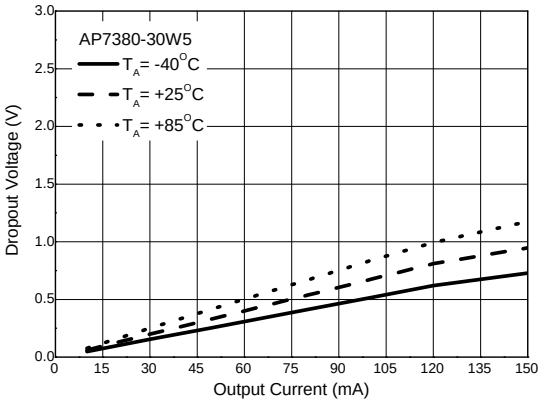
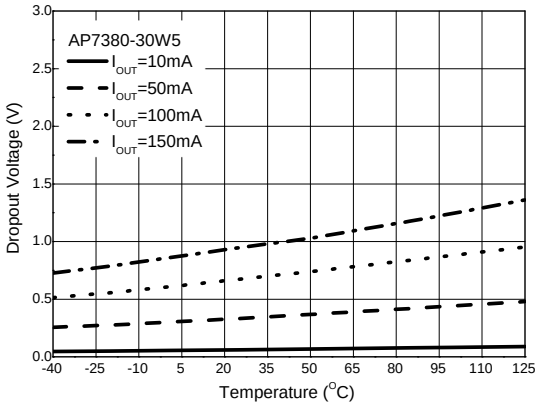
## Performance Characteristics (Cont.)

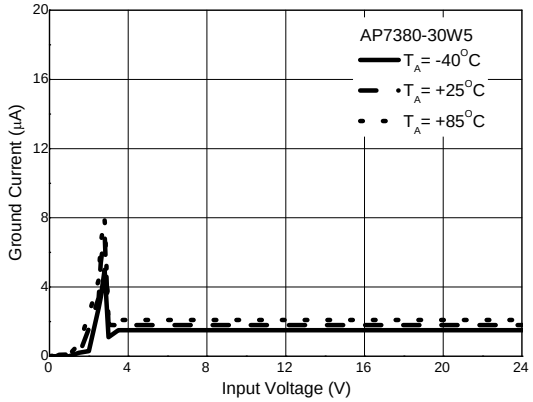
### Dropout Voltage vs. Output Current



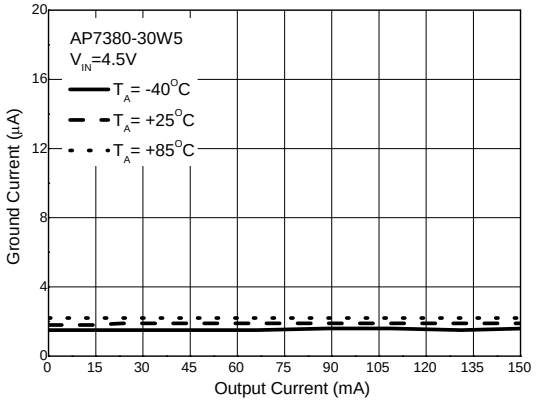

### Dropout Voltage vs. Temperature



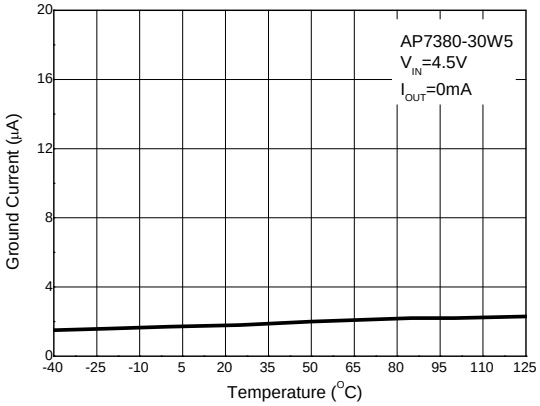

### $I_{GND}$ vs. Input Voltage




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

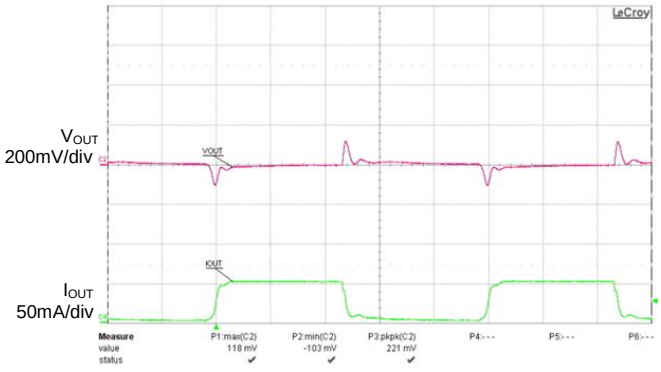



### $I_{GND}$ vs Temperature




### Load Transient

**$C_{IN}$=1µF, $C_{OUT}$=1µF, $V_{IN}$=$V_{OUT}$+1.5V to 24V, $I_{OUT}$=0 to 50mA**



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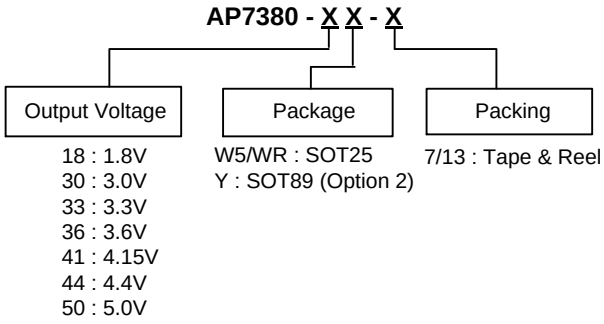
## Ordering Information




| 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 |

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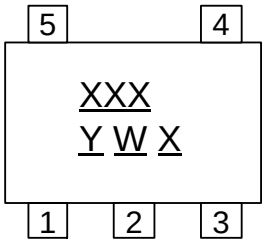
## Marking Information

**(1) SOT25**

**(Top View)**

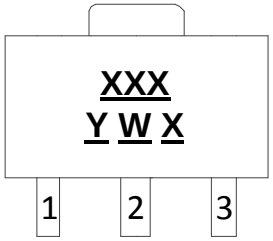



XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents 52 and 53 week
X : Internal Code

| 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 |

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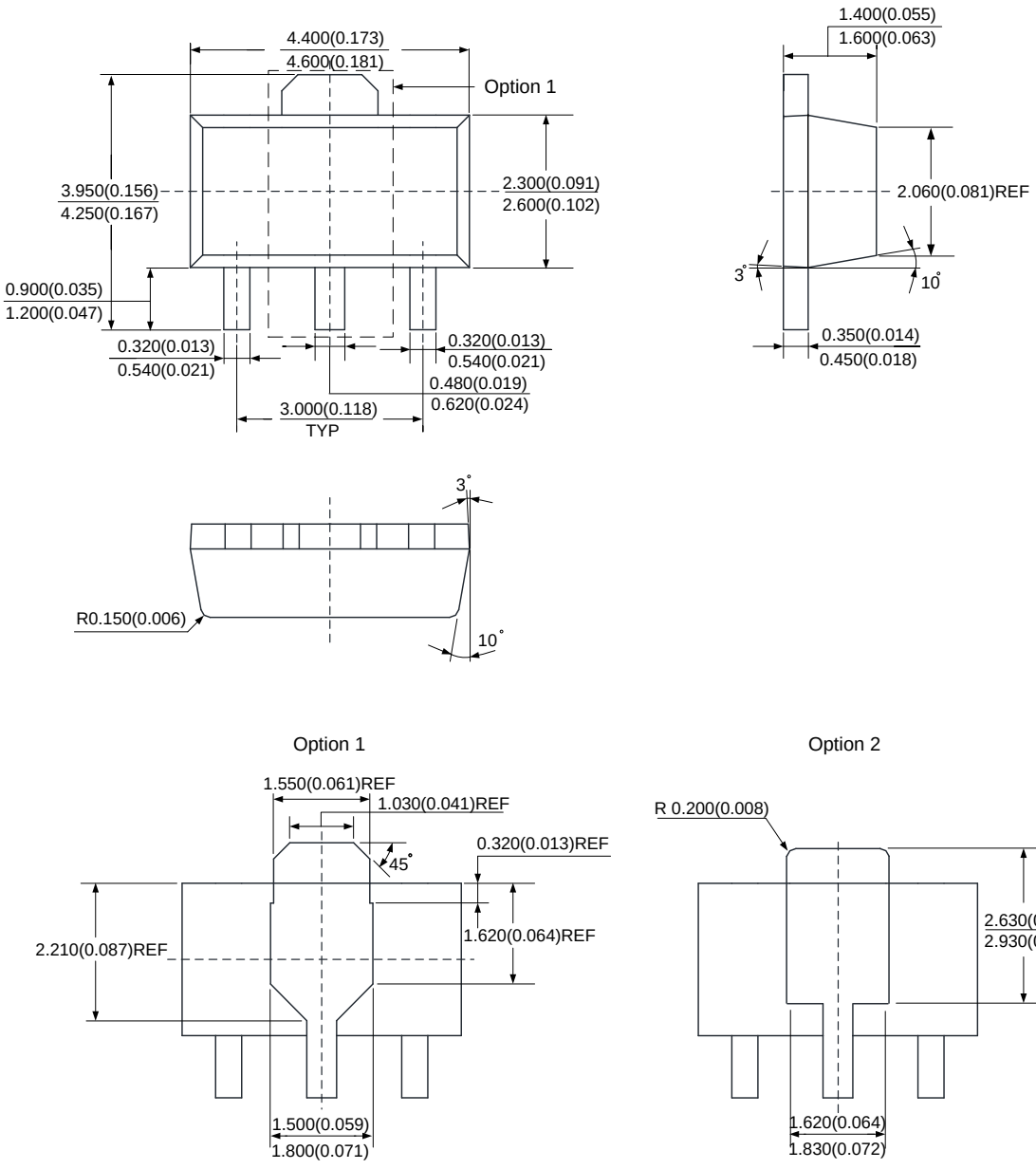
## Package Outline Dimensions (All dimensions in mm.)

**(1) Package Type: SOT89**



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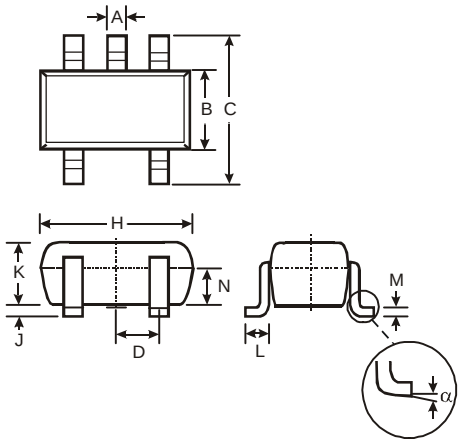
## Package Outline Dimensions (Cont.)

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

**(2) Package Type: SOT25**

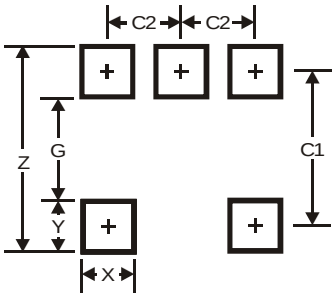



| SOT25 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.35 | 0.50 | 0.38 |
| **B** | 1.50 | 1.70 | 1.60 |
| **C** | 2.70 | 3.00 | 2.80 |
| **D** | - | - | 0.95 |
| **H** | 2.90 | 3.10 | 3.00 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 1.00 | 1.30 | 1.10 |
| **L** | 0.35 | 0.55 | 0.40 |
| **M** | 0.10 | 0.20 | 0.15 |
| **N** | 0.70 | 0.80 | 0.75 |
| **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: SOT25**




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

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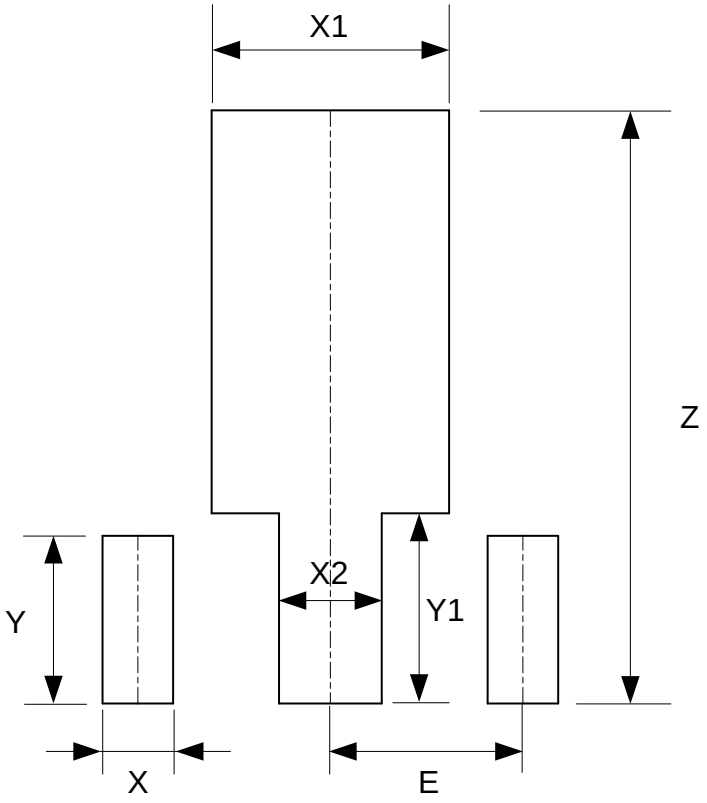
## Suggested Pad Layout (Cont.)

**(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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1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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# Mouser Electronics

Authorized Distributor

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AP7380-50WR-7 AP7380-33W5-7 AP7380-50Y-13 AP7380-33WR-7 AP7380-41Y-13 AP7380-41W5-7 AP7380-30W5-7 AP7380-44W5-7 AP7380-30WR-7 AP7380-50W5-7 AP7380-33Y-13 AP7380-44Y-13 AP7380-30Y-13 AP7380-44WR-7 AP7380-41WR-7 AP7380-36Y-13 AP7380-36WR-7