

## 1A Low Dropout Positive Regulator

### ■ Features

- 1.3V maximum dropout at full load current
- Fixed 1.2V $\pm$ 2% output voltage
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- **Pb-Free** Packages: SOT223, TO263, TO252, TO220, SOT89

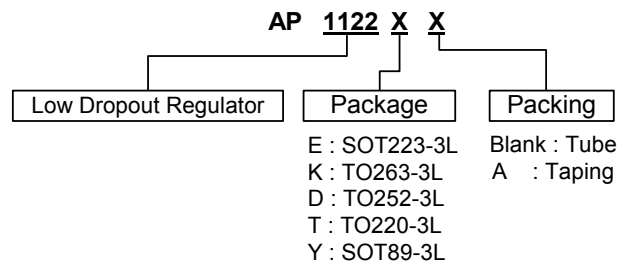
### ■ Applications

- PC peripheral
- Communication

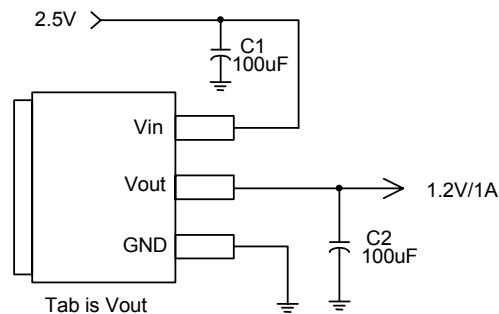
### ■ General Description

AP1122 is a low dropout positive fixed-mode regulator with minimum of 1A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 1.2V logic supply. AP1122 is also well suited for other applications such as VGA cards. AP1122 is guaranteed to have lower than 1.3V dropout at full load current making it ideal to provide well-regulated outputs of 1.2 output voltage with 2.5V input voltage supply.

### ■ Ordering Information



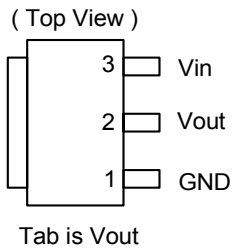
### ■ Typical Circuit



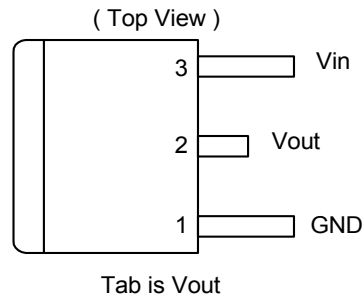
## 1A Low Dropout Positive Regulator

### ■ Connection Diagram

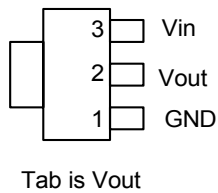
3 PIN SOT223



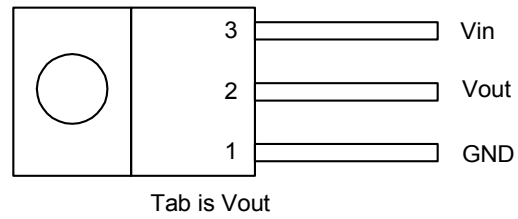
3 PIN TO252 / TO263



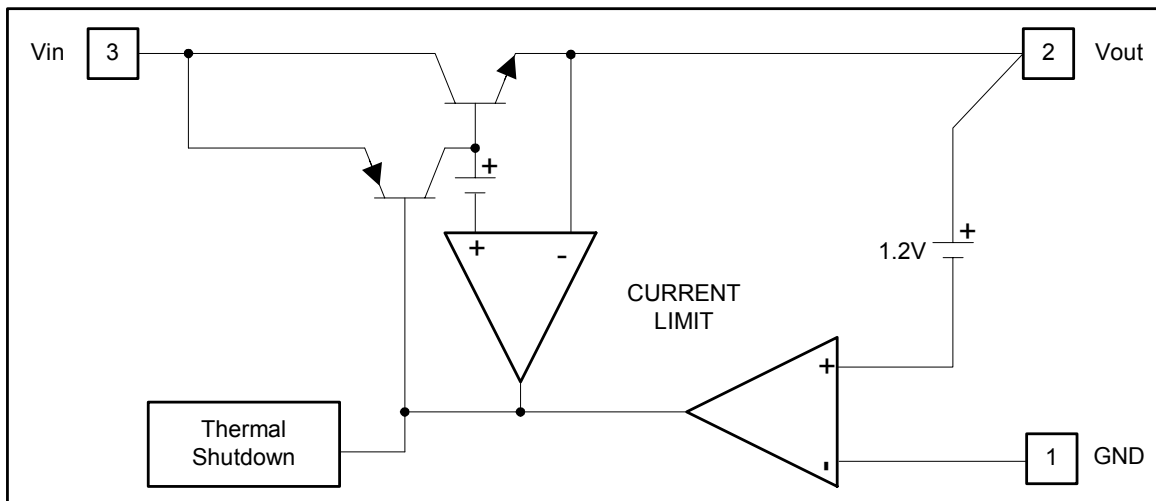
3 PIN SOT89



3 PIN TO220



### ■ Block Diagram





## 1A Low Dropout Positive Regulator

### ■ Pin Descriptions

| NAME | I/O | PIN # | FUNCTION  |
|------|-----|-------|---|
| GND  | I   | 1     | Ground Pin  |
| Vout | O   | 2     | The output of the regulator. A minimum of 10uF capacitor ( $0.15\Omega \leq \text{ESR} \leq 20\Omega$ ) must be connected from this pin to ground to insure stability.  |
| Vin  | I   | 3     | The input pin of regulator. Typically a large storage capacitor ( $0.15\Omega \leq \text{ESR} \leq 20\Omega$ ) is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.3V higher than Vout in order for the device to regulate properly. |

### ■ Absolute Maximum Ratings

| Symbol          | Parameter                            | Rating             | Unit |
|-----------------|--------------------------------------|--------------------|------|
| V <sub>IN</sub> | DC Supply Voltage                    | -0.3 to 12         | V    |
| P <sub>D</sub>  | Power Dissipation                    | Internally Limited |      |
| T <sub>ST</sub> | Storage Temperature                  | -65 to +150        | °C   |
| T <sub>OP</sub> | Operating Junction Temperature Range | 0 to +150          | °C   |

### ■ Electrical Characteristics (Under Operating Conditions)

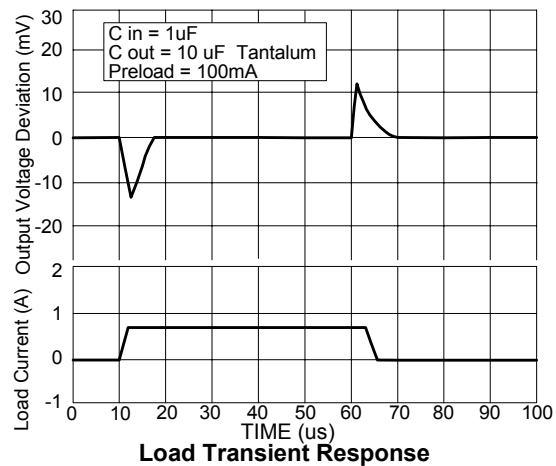
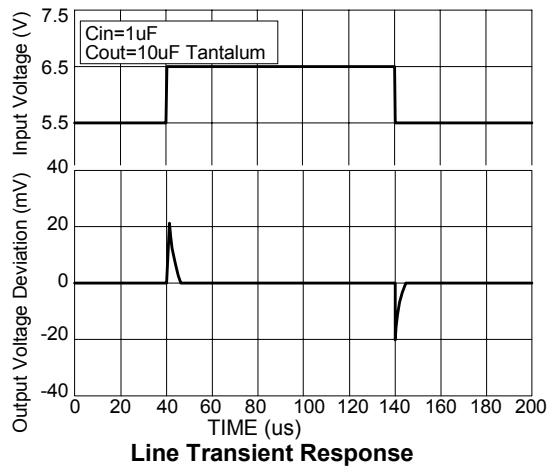
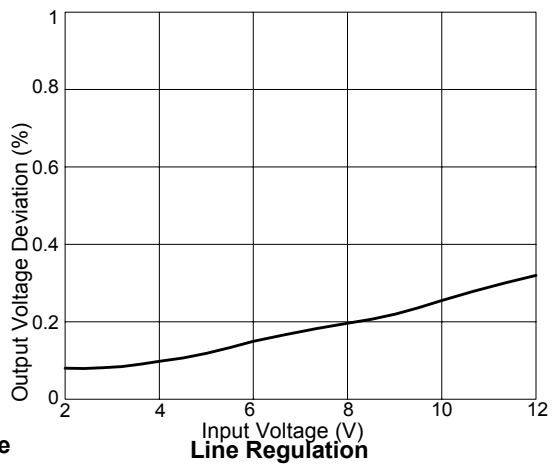
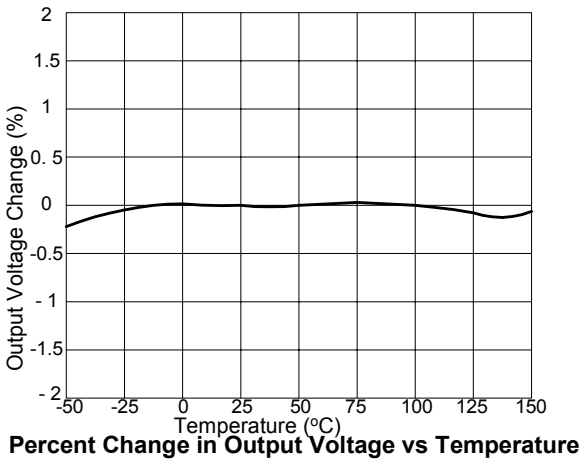
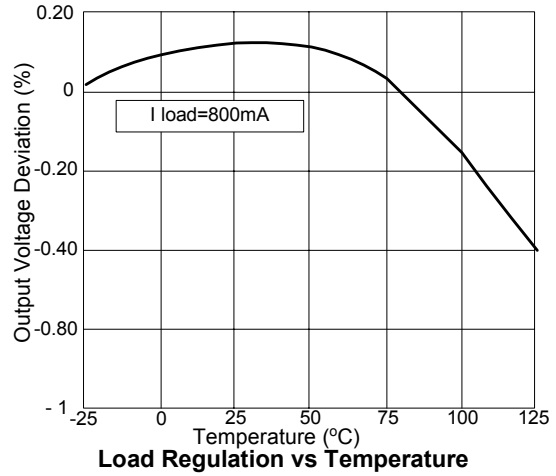
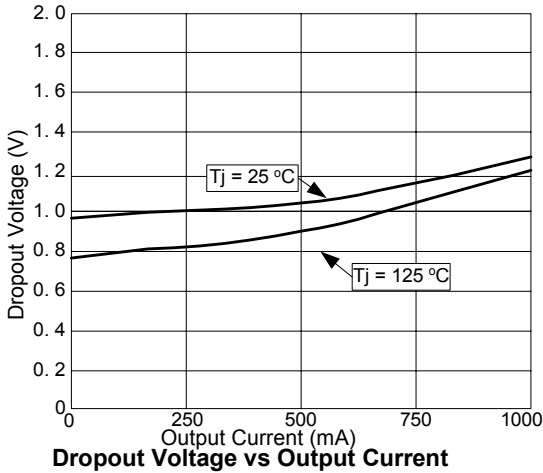
| PARAMETER  | CONDITIONS  | MIN   | TYP                                     | MAX   | UNIT |
|--|---|-------|---|-------|------|
| Output Voltage   | $2.5V \leq V_{IN} \leq 12V$ , $T_J = 25^\circ\text{C}$  | 1.176 | 1.2                                     | 1.224 | V    |
| Line Regulation  | $I_O = 10\text{mA}$ , $2.5V < V_{IN} < 12V$ , $T_J = 25^\circ\text{C}$  |       |   | 0.2   | %    |
| Load Regulation  | $V_{IN} = 2.5V \sim 12V$ , $V_{adj} = 0.0\text{mA} < I_O < 1\text{A}$ , $T_J = 25^\circ\text{C}$<br>(Note 1,2)  |       |   | 1     | %    |
| Dropout Voltage<br>( $V_{IN} - V_{OUT}$ )  | $I_{OUT} = 1\text{A}$ , $\Delta V_{OUT} = 0.1\% V_{OUT}$  |       | 1.3                                     | 1.4   | V    |
| Current Limit  | $(V_{IN} - V_{OUT}) = 5V$   | 1.1   |   |       | A    |
| Minimum Load<br>Current  | $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$   |       | 5                                       | 10    | mA   |
| Thermal Regulation   | $T_A = 25^\circ\text{C}$ , 30ms pulse   |       | 0.008                                   | 0.04  | %/W  |
| Ripple Rejection   | $F = 120\text{Hz}$ , $C_{OUT} = 25\mu\text{F}$ Tantalum, $I_{OUT} = 1\text{A}$ ,<br>$V_{IN} = V_{OUT} + 3V$   |       | 60                                      | 70    | dB   |
| Temperature Stability  | $I_O = 10\text{mA}$   |       | 0.5                                     |       | %    |
| $\theta_{JA}$ Thermal<br>Resistance Junction-<br>to-Ambient (No heat<br>sink ;No air flow) | SOT89<br>SOT-223<br>TO-252<br>TO-220/263  |       | 300<br>117<br>92<br>85                  |       | °C/W |
| $\theta_{JC}$ Thermal<br>Resistance<br>Junction-to-Case                                    | SOT89 : Control Circuitry/Power Transistor<br>SOT-223 : Control Circuitry/Power Transistor<br>TO-263 : Control Circuitry/Power Transistor<br>TO-252 : Control Circuitry/Power Transistor<br>TO-220 : Control Circuitry/Power Transistor |       | 100<br>15<br>0.65/2.7<br>10<br>0.65/2.7 |       | °C/W |

**Note1:** See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

**Note2:** Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the difference between input and output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

**Note3:** Quiescent current is defined as the minimum output current required in maintaining regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.

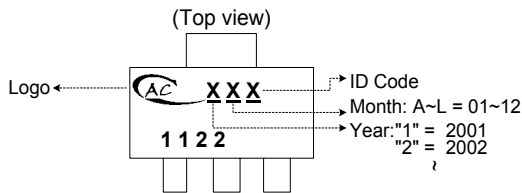
### ■ Typical Performance Characteristics



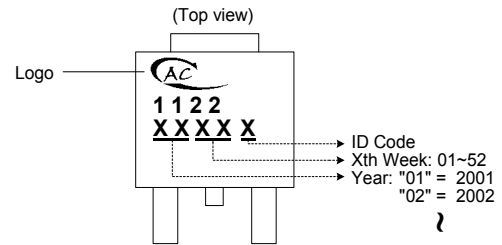
## 1A Low Dropout Positive Regulator

### ■ Marking Information

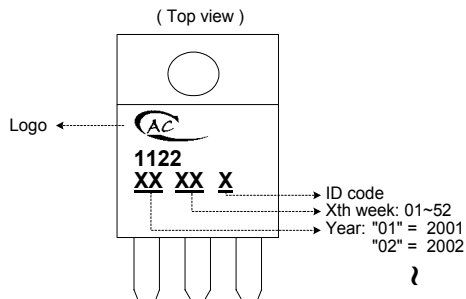
(1) SOT223-3L



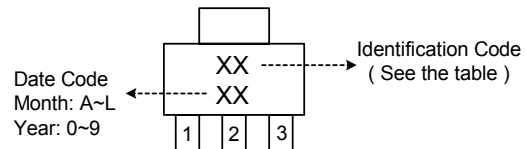
(2) TO252-3L



(3) TO220-3L

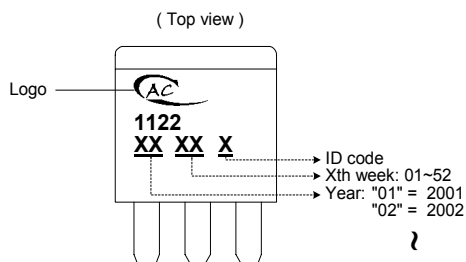


(4) SOT89-3L



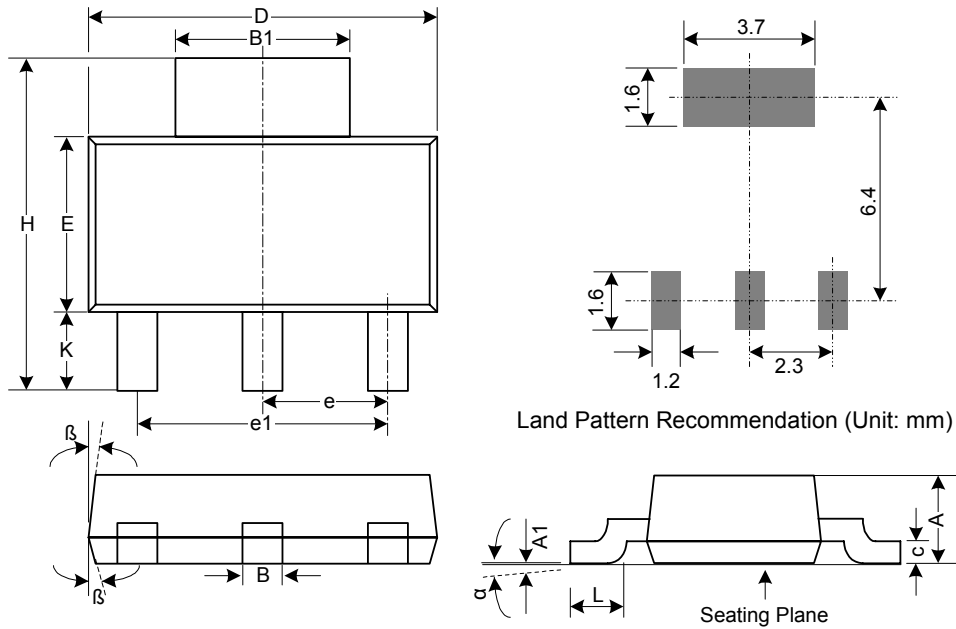
| Identification code | Output version |
|---------------------|----------------|
| JB                  | AP1122         |

(5) TO263-3L



### ■ Package Dimension

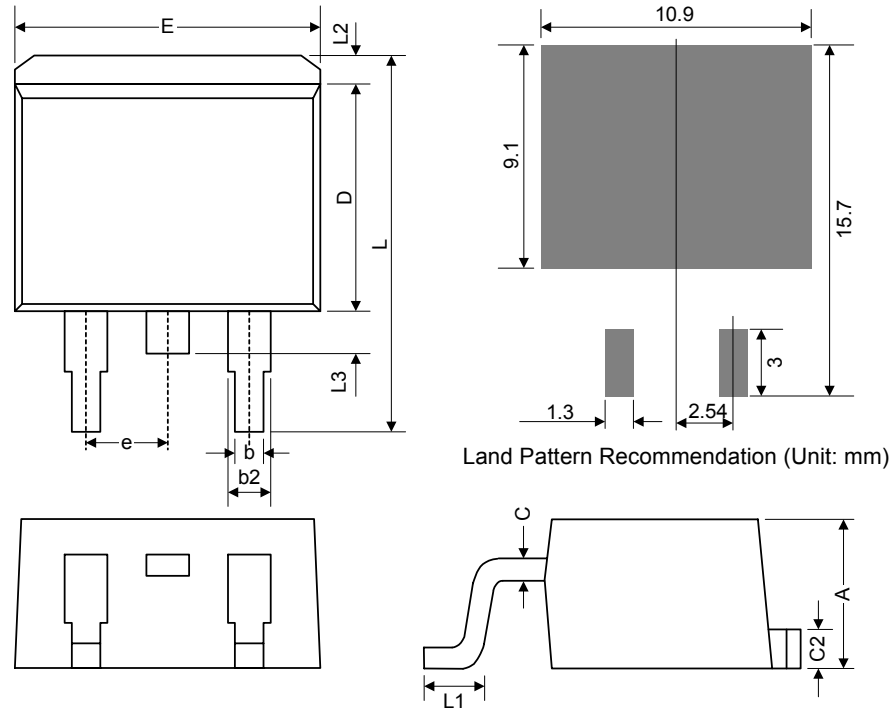
(1) SOT223



| Symbol   | Dimensions In Millimeters |      |      | Dimensions In Inches |       |       |
|----------|---------------------------|------|------|----------------------|-------|-------|
|          | Min.                      | Nom. | Max. | Min.                 | Nom.  | Max.  |
| A        | 1.50                      | 1.65 | 1.80 | 0.059                | 0.065 | 0.071 |
| A1       | 0.02                      | 0.05 | 0.08 | 0.001                | 0.002 | 0.003 |
| B        | 0.60                      | 0.70 | 0.80 | 0.024                | 0.028 | 0.031 |
| B1       | 2.80                      | -    | 3.40 | 0.110                | -     | 0.134 |
| c        | 0.28                      | 0.30 | 0.32 | 0.011                | 0.012 | 0.013 |
| D        | 6.30                      | 6.50 | 6.70 | 0.248                | 0.256 | 0.264 |
| E        | 3.30                      | 3.50 | 3.70 | 0.130                | 0.138 | 0.146 |
| e        | 2.3 Basic                 |      |      | 0.091 Basic          |       |       |
| e1       | 4.6 Basic                 |      |      | 0.181 Basic          |       |       |
| H        | 6.70                      | 7.00 | 7.30 | 0.264                | 0.276 | 0.287 |
| L        | 0.91                      | 1.00 | 1.10 | 0.036                | 0.039 | 0.043 |
| K        | 1.50                      | 1.75 | 2.00 | 0.059                | 0.069 | 0.079 |
| $\alpha$ | 0°                        | 5°   | 10°  | 0°                   | 5°    | 10°   |
| $\beta$  | -                         | 13°  | -    | -                    | 13°   | -     |

## 1A Low Dropout Positive Regulator

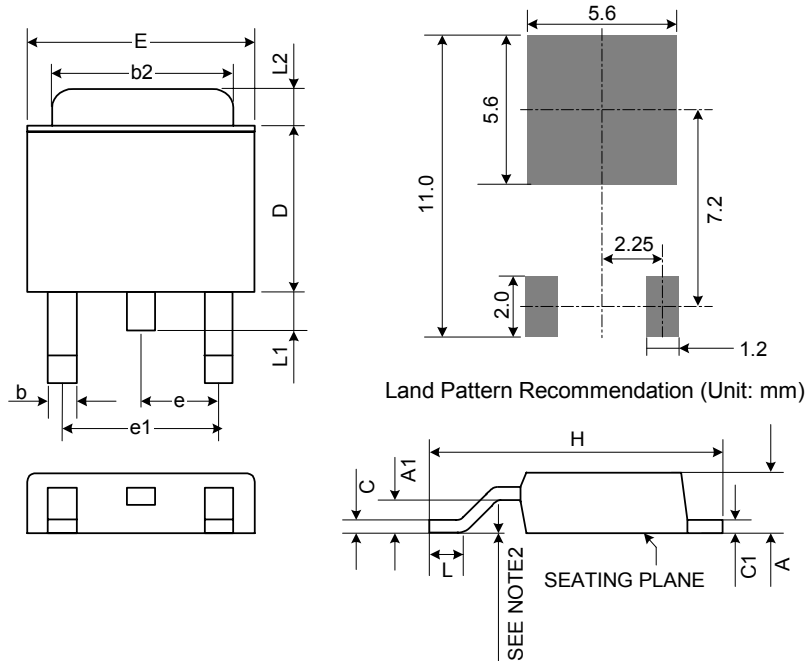
(2) TO263



| Symbol | Dimensions In Millimeters |       |       | Dimensions In Inches |       |       |
|--------|---------------------------|-------|-------|----------------------|-------|-------|
|        | Min.                      | Nom.  | Max.  | Min.                 | Nom.  | Max.  |
| A      | 4.06                      | 4.45  | 4.83  | 0.160                | 0.175 | 0.190 |
| b      | 0.51                      | 0.75  | 0.99  | 0.020                | 0.030 | 0.039 |
| b2     | 1.14                      | 1.27  | 1.40  | 0.045                | 0.050 | 0.055 |
| C      | 0.38 TYP.                 |       |       | 0.015 TYP.           |       |       |
| C2     | 1.14                      | 1.27  | 1.40  | 0.045                | 0.050 | 0.055 |
| D      | 8.65                      | 9.15  | 9.65  | 0.341                | 0.360 | 0.380 |
| E      | 9.65                      | 9.97  | 10.29 | 0.380                | 0.393 | 0.405 |
| e      | 2.54 BSC.                 |       |       | 0.100 BSC.           |       |       |
| L      | 14.61                     | 15.24 | 15.88 | 0.575                | 0.600 | 0.625 |
| L1     | 2.28                      | 2.54  | 2.80  | 0.090                | 0.100 | 0.110 |
| L2     | -                         | 1.30  | 2.92  | -                    | 0.051 | 0.115 |
| L3     | 1.27                      | 1.52  | 1.78  | 0.050                | 0.060 | 0.070 |

## 1A Low Dropout Positive Regulator

(3) TO252



Notes:

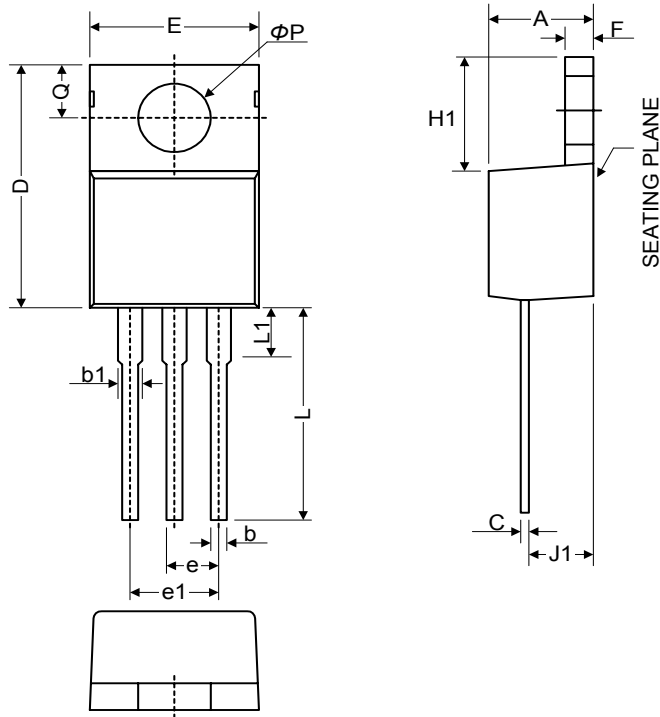
1. JEDEC Outline: TO-252 AB
2. Mils suggested for positive contact at mounting.

| Symbol | Dimensions In Millimeters |      |       | Dimensions In Inches |       |       |
|--------|---------------------------|------|-------|----------------------|-------|-------|
|        | Min.                      | Nom. | Max.  | Min.                 | Nom.  | Max.  |
| A      | 2.18                      | 2.29 | 2.40  | 0.086                | 0.090 | 0.094 |
| A1     | 0.89                      | -    | 1.14  | 0.035                | -     | 0.045 |
| b      | 0.61 TYP.                 |      |       | 0.024 TYP.           |       |       |
| b2     | 5.20                      | 5.35 | 5.50  | 0.205                | 0.211 | 0.217 |
| C      | 0.45                      | 0.52 | 0.58  | 0.018                | 0.020 | 0.023 |
| C1     | 0.45                      | 0.52 | 0.58  | 0.018                | 0.020 | 0.023 |
| D      | 5.40                      | 5.57 | 6.20  | 0.213                | 0.219 | 0.244 |
| E      | 6.35                      | 6.58 | 6.80  | 0.250                | 0.259 | 0.268 |
| e      | 2.28 BSC.                 |      |       | 0.090 BSC.           |       |       |
| e1     | 4.57 BSC.                 |      |       | 0.180 BSC.           |       |       |
| H      | 9.00                      | 9.70 | 10.40 | 0.354                | 0.382 | 0.409 |
| L      | 0.51                      | -    | -     | 0.020                | -     | -     |
| L1     | 0.64                      | 0.83 | 1.02  | 0.025                | 0.033 | 0.040 |
| L2     | 0.88                      | -    | 1.27  | 0.035                | -     | 0.050 |



## 1A Low Dropout Positive Regulator

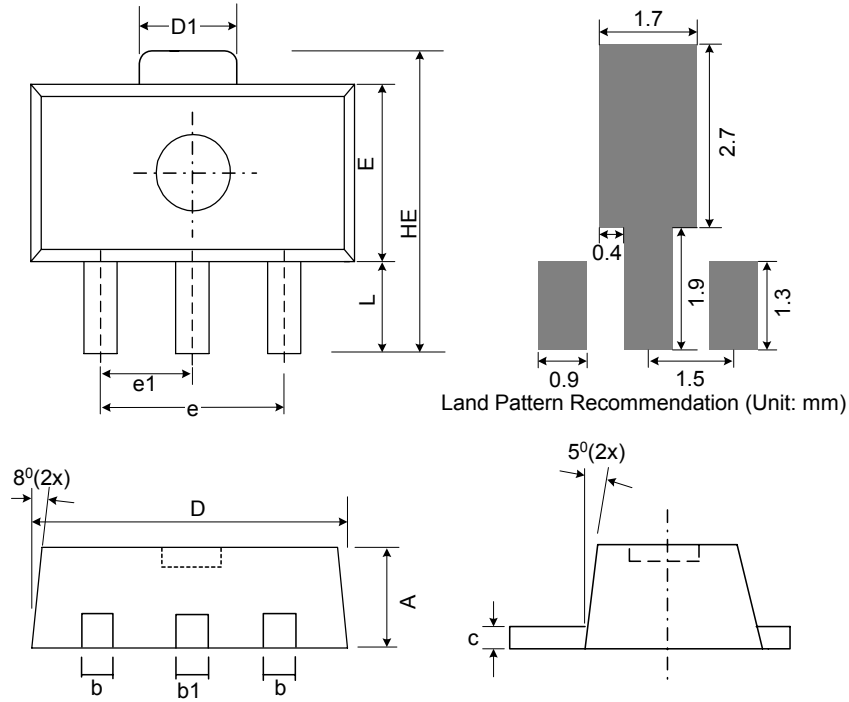
(4) TO220



| Symbol | Dimensions In Millimeters |       |       | Dimensions In Inches |       |       |
|--------|---------------------------|-------|-------|----------------------|-------|-------|
|        | Min.                      | Nom.  | Max.  | Min.                 | Nom.  | Max.  |
| A      | 3.55                      | 4.20  | 4.85  | 0.140                | 0.165 | 0.191 |
| b1     | 1.14                      | 1.46  | 1.78  | 0.045                | 0.057 | 0.070 |
| b      | 0.51                      | 0.83  | 1.14  | 0.020                | 0.033 | 0.045 |
| C      | 0.31                      | 0.72  | 1.14  | 0.012                | 0.028 | 0.045 |
| D      | 14.20                     | 15.35 | 16.50 | 0.559                | 0.604 | 0.650 |
| E      | 9.70                      | 10.20 | 10.70 | 0.382                | 0.402 | 0.421 |
| e      | 2.29                      | 2.54  | 2.79  | 0.090                | 0.100 | 0.110 |
| e1     | 4.83                      | 5.08  | 5.33  | 0.190                | 0.200 | 0.210 |
| F      | 0.51                      | 0.95  | 1.40  | 0.020                | 0.037 | 0.055 |
| H1     | 5.84                      | 6.35  | 6.86  | 0.230                | 0.250 | 0.270 |
| J1     | 2.03                      | 2.48  | 2.92  | 0.080                | 0.098 | 0.115 |
| L      | 12.72                     | 13.72 | 14.72 | 0.501                | 0.540 | 0.580 |
| L1     | 3.66                      | 5.00  | 6.35  | 0.144                | 0.197 | 0.250 |
| øP     | 3.53                      | 3.81  | 4.09  | 0.139                | 0.150 | 0.161 |
| Q      | 2.54                      | 2.98  | 3.43  | 0.100                | 0.117 | 0.135 |

## 1A Low Dropout Positive Regulator

(5) SOT89



| Symbol | Dimensions In Millimeters |      |      | Dimensions In Inches |       |       |
|--------|---------------------------|------|------|----------------------|-------|-------|
|        | Min.                      | Nom. | Max. | Min.                 | Nom.  | Max.  |
| A      | 1.40                      | 1.50 | 1.60 | 0.055                | 0.059 | 0.063 |
| b      | 0.36                      | 0.42 | 0.48 | 0.014                | 0.016 | 0.018 |
| b1     | 0.41                      | 0.47 | 0.53 | 0.016                | 0.043 | 0.051 |
| C      | 0.35                      | 0.39 | 0.43 | 0.014                | 0.015 | 0.017 |
| D      | 4.40                      | 4.50 | 4.60 | 0.173                | 0.177 | 0.181 |
| D1     | 1.40                      | 1.60 | 1.75 | 0.055                | 0.062 | 0.069 |
| e      | 2.90                      | 3.00 | 3.10 | 0.114                | 0.118 | 0.122 |
| e1     | 1.45                      | 1.50 | 1.55 | 0.057                | 0.059 | 0.061 |
| E      | 2.35                      | 2.48 | 2.60 | 0.093                | 0.098 | 0.102 |
| HE     | 3.94                      | -    | 4.25 | 0.155                | -     | 0.167 |
| L      | 0.80                      | -    | 1.20 | 0.031                | -     | 0.047 |

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