

## ■ General Description

The AME1117 is a 1A low-dropout positive voltage regulator. It is available in fixed and adjustable output voltage versions. Overcurrent and thermal protection are integrated onto the chip. Output current will limit as while it reaches the pre-set current or temperature limit. The dropout voltage is specified at 1.45V Maximum at full rated output current. The AME1117 series provides excellent regulation over line, load and temperature variations.

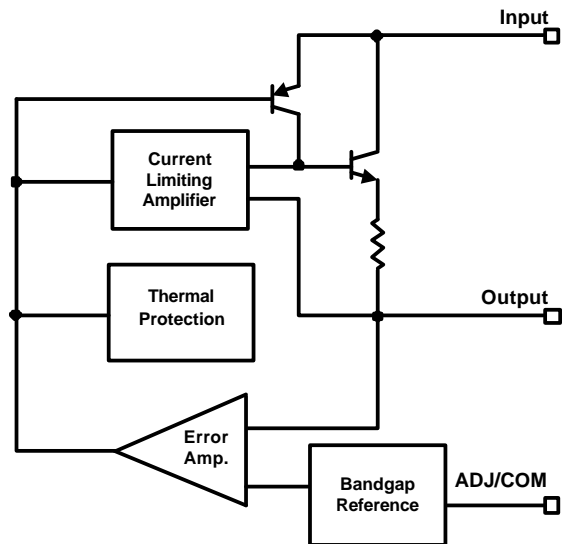
## ■ Features

- Low Dropout Voltage ----- 1.45V at 1A
- Adjustable or Fixed Voltages:  
1.8V, 2.5V, 3.3V, 5.0V
- Adjust Pin Current Less than 120 $\mu$ A
- Overcurrent Protection
- Thermal Protection
- Available in TO-220, TO-252, SOT-223
- All AME's Lead Free Products Meet RoHS Standards

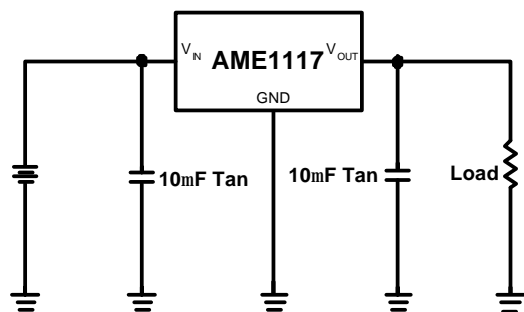
## ■ Applications

- High Efficiency Linear Regulators
- Post Regulators for Switching Supplies
- 5V to 3.3V Voltage Converter
- Battery Charger

## ■ Functional Block Diagram



## ■ Typical Application

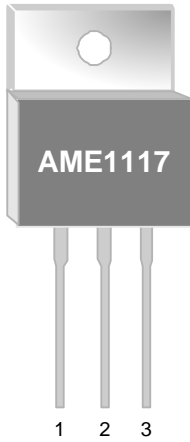




AME1117

■ Pin Configuration

TO-220-3  
Front View

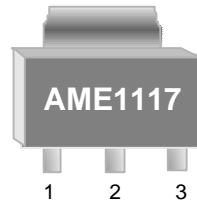


AME1117

- 1. ADJ / GND
- 2. OUT (TAB)
- 3. IN

\* Die Attach:  
Conductive Epoxy

SOT-223  
Front View

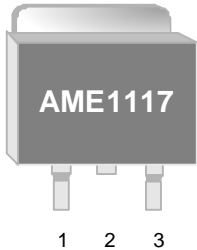


AME1117

- 1. ADJ / GND
- 2. OUT (TAB)
- 3. IN

\* Die Attach:  
Conductive Epoxy

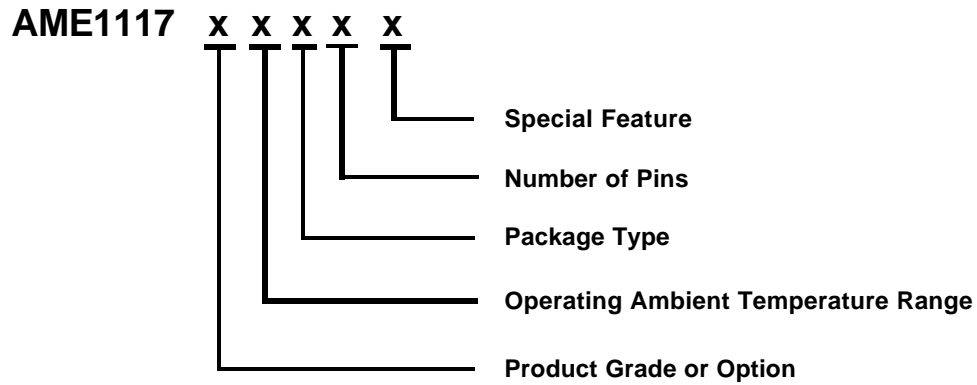
TO-252-2  
Front View



AME1117

- 1. ADJ / GND
- 2. OUT(TAB)
- 3. IN

\* Die Attach:  
Conductive Epoxy

**AME1117**
**■ Ordering Information**


| Product Grade or Option                            | Operating Ambient Temperature Range | Package Type                         | Number of Pins | Special Feature |
|--|-------------------------------------|--------------------------------------|----------------|-----------------|
| A: ADJ<br>B: 2.5V<br>C: 3.3V<br>D: 5.0V<br>E: 1.8V | C: 0°C to 70°C                      | B: TO-220<br>C: TO-252<br>G: SOT-223 | T: 3           | Z: Lead Free    |

**AME1117**
**■ Ordering Information (contd.)**

| Part Number  | Marking*                | Output Voltage | Package  | Operating Ambient Temperature Range |
|--------------|-------------------------|----------------|----------|-------------------------------------|
| AME1117ACGT  | ABE <sub>yww</sub>      | ADJ            | SOT-223  | 0°C to 70°C                         |
| AME1117ACGTZ | ABE <sub>yww</sub>      | ADJ            | SOT-223  | 0°C to 70°C                         |
| AME1117BCGT  | AKE <sub>yww</sub>      | 2.5            | SOT-223  | 0°C to 70°C                         |
| AME1117BCGTZ | AKE <sub>yww</sub>      | 2.5            | SOT-223  | 0°C to 70°C                         |
| AME1117CCGT  | ABF <sub>yww</sub>      | 3.3            | SOT-223  | 0°C to 70°C                         |
| AME1117CCGTZ | ABF <sub>yww</sub>      | 3.3            | SOT-223  | 0°C to 70°C                         |
| AME1117DCGT  | AKF <sub>yww</sub>      | 5.0            | SOT-223  | 0°C to 70°C                         |
| AME1117DCGTZ | AKF <sub>yww</sub>      | 5.0            | SOT-223  | 0°C to 70°C                         |
| AME1117ECGT  | AXH <sub>yww</sub>      | 1.8            | SOT-223  | 0°C to 70°C                         |
| AME1117ECGTZ | AXH <sub>yww</sub>      | 1.8            | SOT-223  | 0°C to 70°C                         |
| AME1117ACCT  | AME1117<br>ACCT<br>yyww | ADJ            | TO-252-2 | 0°C to 70°C                         |
| AME1117ACCTZ | AME1117<br>ACCT<br>yyww | ADJ            | TO-252-2 | 0°C to 70°C                         |
| AME1117BCCT  | AME1117<br>BCCT<br>yyww | 2.5            | TO-252-2 | 0°C to 70°C                         |
| AME1117BCCTZ | AME1117<br>BCCT<br>yyww | 2.5            | TO-252-2 | 0°C to 70°C                         |
| AME1117CCCT  | AME1117<br>CCCT<br>yyww | 3.3            | TO-252-2 | 0°C to 70°C                         |
| AME1117CCCTZ | AME1117<br>CCCT<br>yyww | 3.3            | TO-252-2 | 0°C to 70°C                         |

Note: yyww & yww represent the date code

\* A line on top of the first letter represents lead free plating such as  $\overline{\text{AME1117}}$ .

Please consult AME sales office or authorized Rep./Distributor for the availability of output voltage and package type.

**AME1117**
**■ Ordering Information**

| Part Number  | Marking*                | Output Voltage | Package  | Operating Ambient Temperature Range |
|--------------|-------------------------|----------------|----------|-------------------------------------|
| AME1117DCCT  | AME1117<br>DCCT<br>yyww | 5.0            | TO-252-2 | 0°C to 70°C                         |
| AME1117DCCTZ | AME1117<br>DCCT<br>yyww | 5.0            | TO-252-2 | 0°C to 70°C                         |
| AME1117ECCT  | AME1117<br>ECCT<br>yyww | 1.8            | TO-252-2 | 0°C to 70°C                         |
| AME1117ECCTZ | AME1117<br>ECCT<br>yyww | 1.8            | TO-252-2 | 0°C to 70°C                         |
| AME1117ACBT  | AME1117<br>ACBT<br>yyww | ADJ            | TO-220   | 0°C to 70°C                         |
| AME1117ACBTZ | AME1117<br>ACBT<br>yyww | ADJ            | TO-220   | 0°C to 70°C                         |
| AME1117BCBT  | AME1117<br>BCBT<br>yyww | 2.5            | TO-220   | 0°C to 70°C                         |
| AME1117BCBTZ | AME1117<br>BCBT<br>yyww | 2.5            | TO-220   | 0°C to 70°C                         |
| AME1117CCBT  | AME1117<br>CCBT<br>yyww | 3.3            | TO-220   | 0°C to 70°C                         |
| AME1117CCBTZ | AME1117<br>CCBT<br>yyww | 3.3            | TO-220   | 0°C to 70°C                         |
| AME1117DCBT  | AME1117<br>DCBT<br>yyww | 5.0            | TO-220   | 0°C to 70°C                         |
| AME1117DCBTZ | AME1117<br>DCBT<br>yyww | 5.0            | TO-220   | 0°C to 70°C                         |
| AME1117ECBT  | AME1117<br>ECBT<br>yyww | 1.8            | TO-220   | 0°C to 70°C                         |
| AME1117ECBTZ | AME1117<br>ECBT<br>yyww | 1.8            | TO-220   | 0°C to 70°C                         |



■ Absolute Maximum Ratings

| Parameter                                   | Package  | Die Attach       | Symbol        | Maximum    | Unit |
|---|----------|------------------|---------------|------------|------|
| Thermal Resistance*<br>(Junction to Case)   | TO-220-3 | Conductive Epoxy | $\theta_{JC}$ | 6          | °C/W |
|   | TO-252-2 |                  |               | 5          |      |
|   | SOT-223  |                  |               | 25         |      |
| Thermal Resistance<br>(Junction to Ambient) | TO-220-3 | Conductive Epoxy | $\theta_{JA}$ | 55         |      |
|   | TO-252-2 |                  |               | 90         |      |
|   | SOT-223  |                  |               | 120        |      |
| Internal Power Dissipation                  | TO-220-3 | Conductive Epoxy | $P_D$         | 2200       | mW   |
|   | TO-252-2 |                  |               | 1200       |      |
|   | SOT-223  |                  |               | 900        |      |
| Input Voltage                               |          |                  | $V_{IN}$      | 18         | V    |
| Operating Junction Temperature Range        |          |                  | $T_J$         | 0 to 125   | °C   |
| Storage Temperature Range                   |          |                  | $T_{STG}$     | -65 to 150 | °C   |
| Solder Iron (10 Sec)**                      |          |                  |               | 350        | °C   |

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device.

\* Measure  $\theta_{JC}$  on backside center of tab.

\*\* MIL-STD-202G 210F

**AME1117**
**■ Electrical Specifications**
**AME1117Exxx**

| Parameter              | Symbol        | Test Condition   | Min                                      | Typ   | Max   | Units |               |
|------------------------|---------------|--|--|-------|-------|-------|---------------|
| Output Voltage         | $V_{OUT}$     | $V_{IN} = 5V, I_O = 0A$                                  | $T_J = 25^\circ C$                       | 1.782 | 1.800 | 1.818 | V             |
|                        |               |  | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 1.764 | 1.800 | 1.836 |               |
| Line Regulation        | $REG_{LINE}$  | $V_{IN} = 4.75V \text{ to } 7V,$<br>$I_O = 0A$           | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | -     | 0.2   | %             |
| Load Regulation        | $REG_{LOAD}$  | $V_{IN} = 5V,$<br>$I_O = 0A \sim 1A$                     | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 0.1   | 1.0   |               |
| Dropout Voltage        | $V_{DROPOUT}$ | $I_O = 1A,$<br>$\Delta V_O = \pm 1\%$                    | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 1.2   | 1.45  | V             |
| Current Limit          | $I_S$         | $V_{IN} = 4.75V \text{ to } 7V$                          | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 1.0   | 1.5   | -     | A             |
| Quiescent Current      | $I_Q$         | $V_{IN} = 5V, I_O = 0A \text{ to } 1A$                   | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 6.0   | 13    | mA            |
| Temp. Coefficient      | $T_C$         | $V_{IN} = 4.75V \text{ to } 7V, I_O = 0A \text{ to } 1A$ |  | -     | 0.005 | -     | %/ $^\circ C$ |
| Temperature Stability  | $T_S$         | $V_{IN} = 5V, I_O = 100mA$                               | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 0.5   | -     | %             |
| RMS Output Noise       | $V_N$         | $10Hz < f < 10KHz$                                       | $T_J = 25^\circ C$                       | -     | 0.003 | -     | % $V_O$       |
| Ripple Rejection Ratio | $R_A$         | $V_{IN} = 5V, I_O = 1A$                                  | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 60    | 72    | -     | dB            |

**AME1117Dxxx**

| Parameter              | Symbol        | Test Condition   | Min                                      | Typ   | Max   | Units |               |
|------------------------|---------------|--|--|-------|-------|-------|---------------|
| Output Voltage         | $V_{OUT}$     | $V_{IN} = 7V, I_O = 0A$                                | $T_J = 25^\circ C$                       | 4.950 | 5.000 | 5.050 | V             |
|                        |               |  | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 4.900 | 5.000 | 5.100 |               |
| Line Regulation        | $REG_{LINE}$  | $V_{IN} = 7V \text{ to } 9V,$<br>$I_O = 0A$            | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | -     | 0.2   | %             |
| Load Regulation        | $REG_{LOAD}$  | $V_{IN} = 7V$<br>$I_O = 0A \sim 1A$                    | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 0.1   | 1.0   |               |
| Dropout Voltage        | $V_{DROPOUT}$ | $I_O = 0A \text{ to } 1A,$<br>$\Delta V_O = \pm 1\%$   | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 1.2   | 1.45  | V             |
| Current Limit          | $I_S$         | $V_{IN} = 7V \text{ to } 10V$                          | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 1.0   | 1.5   | -     | A             |
| Quiescent Current      | $I_Q$         | $V_{IN} = 7V, I_O = 0A \text{ to } 1A$                 | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 6.0   | 13    | mA            |
| Temp. Coefficient      | $T_C$         | $V_{IN} = 7V \text{ to } 10V, I_O = 0A \text{ to } 1A$ |  | -     | 0.005 | -     | %/ $^\circ C$ |
| Temperature Stability  | $T_S$         | $V_{IN} = 5V, I_O = 100mA$                             | $T_J = 0^\circ C \text{ to } 70^\circ C$ | -     | 0.5   | -     | %             |
| RMS Output Noise       | $V_N$         | $10Hz < f < 10KHz$                                     | $T_J = 25^\circ C$                       | -     | 0.003 | -     | % $V_O$       |
| Ripple Rejection Ratio | $R_A$         | $V_{IN} = 5V, I_O = 1A$                                | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 60    | 72    | -     | dB            |

**AME1117**
**■ Electrical Specifications**
**AME1117Cxxx**

| Parameter              | Symbol               | Test Condition  | Min                         | Typ   | Max   | Units |                 |
|------------------------|----------------------|---|-----------------------------|-------|-------|-------|-----------------|
| Output Voltage         | V <sub>OUT</sub>     | V <sub>IN</sub> = 5V, I <sub>O</sub> = 0A             | T <sub>J</sub> =25°C        | 3.270 | 3.300 | 3.330 | V               |
|                        |                      |   | T <sub>J</sub> =0°C to 70°C | 3.234 | 3.300 | 3.366 |                 |
| Line Regulation        | REG <sub>LINE</sub>  | V <sub>IN</sub> = 4.75V to 7V,<br>I <sub>O</sub> = 0A | T <sub>J</sub> =0°C to 70°C | -     | -     | 0.2   | %               |
| Load Regulation        | REG <sub>LOAD</sub>  | V <sub>IN</sub> = 5V<br>I <sub>O</sub> = 0A to 1A     | T <sub>J</sub> =0°C to 70°C | -     | 0.1   | 1.0   |                 |
| Dropout Voltage        | V <sub>DROPOUT</sub> | I <sub>O</sub> = 0A to 1A,<br>ΔV <sub>O</sub> = ±1%   | T <sub>J</sub> =0°C to 70°C | -     | 1.2   | 1.45  | V               |
| Current Limit          | I <sub>S</sub>       | V <sub>IN</sub> = 4.75V to 7V                         | T <sub>J</sub> =0°C to 70°C | 1.0   | 1.5   | -     | A               |
| Quiescent Current      | I <sub>Q</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 0A to 1A       | T <sub>J</sub> =0°C to 70°C | -     | 6.0   | 13    | mA              |
| Temp. Coefficient      | T <sub>C</sub>       | V <sub>IN</sub> = 4.75V to 7V, I <sub>O</sub> = 0A~1A |                             | -     | 0.005 | -     | %/°C            |
| Temperature Stability  | T <sub>S</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 100mA          | T <sub>J</sub> =0°C to 70°C | -     | 0.5   | -     | %               |
| RMS Output Noise       | V <sub>N</sub>       | 10Hz<= f <=10KHz                                      | T <sub>J</sub> =25°C        | -     | 0.003 | -     | %V <sub>O</sub> |
| Ripple Rejection Ratio | R <sub>A</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 1A             | T <sub>J</sub> =0°C to 70°C | 60    | 72    | -     | dB              |

**AME1117Bxxx**

| Parameter              | Symbol               | Test Condition  | Min                         | Typ   | Max   | Units |                 |
|------------------------|----------------------|---|-----------------------------|-------|-------|-------|-----------------|
| Output Voltage         | V <sub>OUT</sub>     | V <sub>IN</sub> = 5V, I <sub>O</sub> = 0A             | T <sub>J</sub> =25°C        | 2.475 | 2.500 | 2.525 | V               |
|                        |                      |   | T <sub>J</sub> =0°C to 70°C | 2.450 | 2.500 | 2.550 |                 |
| Line Regulation        | REG <sub>LINE</sub>  | V <sub>IN</sub> = 4.75V to 7V,<br>I <sub>O</sub> = 0A | T <sub>J</sub> =0°C to 70°C | -     | -     | 0.2   | %               |
| Load Regulation        | REG <sub>LOAD</sub>  | V <sub>IN</sub> = 5V<br>I <sub>O</sub> = 0A to 1A     | T <sub>J</sub> =0°C to 70°C | -     | 0.1   | 1.0   |                 |
| Dropout Voltage        | V <sub>DROPOUT</sub> | I <sub>O</sub> = 0A to 1A,<br>ΔV <sub>O</sub> = ±1%   | T <sub>J</sub> =0°C to 70°C | -     | 1.2   | 1.45  | V               |
| Current Limit          | I <sub>S</sub>       | V <sub>IN</sub> = 4.75V to 7V                         | T <sub>J</sub> =0°C to 70°C | 1.0   | 1.5   | -     | A               |
| Quiescent Current      | I <sub>Q</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 0A to 1A       | T <sub>J</sub> =0°C to 70°C | -     | 6.0   | 13    | mA              |
| Temp. Coefficient      | T <sub>C</sub>       | V <sub>IN</sub> = 4.75V to 7V, I <sub>O</sub> = 0A~1A |                             | -     | 0.005 | -     | %/°C            |
| Temperature Stability  | T <sub>S</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 100mA          | T <sub>J</sub> =0°C to 70°C | -     | 0.5   | -     | %               |
| RMS Output Noise       | V <sub>N</sub>       | 10Hz<= f <=10KHz                                      | T <sub>J</sub> =25°C        | -     | 0.003 | -     | %V <sub>O</sub> |
| Ripple Rejection Ratio | R <sub>A</sub>       | V <sub>IN</sub> = 5V, I <sub>O</sub> = 1A             | T <sub>J</sub> =0°C to 70°C | 60    | 72    | -     | dB              |



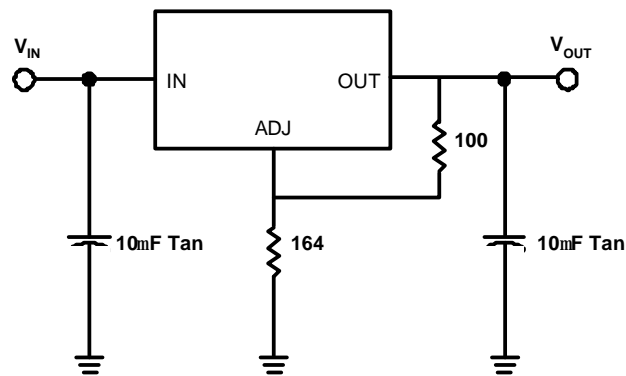
## AME1117

### ■ Electrical Specifications

AME1117Axxx

| Parameter                 | Symbol           | Test Condition  | Min                                      | Typ   | Max   | Units   |   |
|---------------------------|------------------|---|--|-------|-------|---------|---|
| Reference Voltage         | $V_{REF}$        | $V_{IN} = 5V,$<br>$I_O = 10mA$                                  | $T_J = 25^\circ C$                       | 1.238 | 1.250 | 1.262   | V |
|                           |                  |   | $T_J = 0^\circ C \text{ to } 70^\circ C$ | 1.225 | 1.250 | 1.275   |   |
| Line Regulation *         | $REG_{LINE}$     | $V_{IN} = 4.75V \text{ to } 7V,$<br>$I_O = 10mA$                | -  | -     | 0.2   | %       |   |
| Load Regulation           | $REG_{LOAD}$     | $V_{IN} = 5V,$<br>$I_O = 10mA \text{ to } 1A$                   | -  | 0.1   | 1.0   |         |   |
| Dropout Voltage           | $V_{DROPOUT}$    | $I_O = 10mA \text{ to } 1A,$<br>$\Delta V_O = \pm 1\%$          | -  | 1.2   | 1.45  | V       |   |
| Current Limit             | $I_S$            | $V_{IN} = 2.7V \text{ to } 7V$                                  | 1.0                                      | 1.5   | -     | A       |   |
| Temp. Coefficient         | $T_C$            | $V_{IN} = 2.75V \text{ to } 7V, I_O = 10mA \text{ to } 1A$      | -  | 0.005 | -     | %/°C    |   |
| Adjust Pin Current        | $I_{ADJ}$        | $V_{IN} = 2.75V \text{ to } 7V,$<br>$I_O = 10mA \text{ to } 1A$ | -  | 55    | 120   | $\mu A$ |   |
| Adjust Pin Current Change | $\Delta I_{ADJ}$ | $V_{IN} = 2.75V \text{ to } 7V,$<br>$I_O = 10mA \text{ to } 1A$ | -  | 0.2   | 5.0   |         |   |
| Temperature Stability     | $T_S$            | $V_{IN} = 5V, I_O = 100mA$                                      | -  | 0.5   | -     | %       |   |
| Minimum Load Current      | $I_O$            | $V_{IN} = 5V$   | -  | 5.0   | 10    | mA      |   |
| RMS Output Noise          | $V_N$            | $10Hz < f <= 10KHz$   | -  | 0.003 | -     | % $V_O$ |   |
| Ripple Rejection Ratio    | $R_A$            | $V_{IN} = 5V, I_O = 1A$   | 60                                       | 72    | -     | dB      |   |

\*Line regulation test circuit



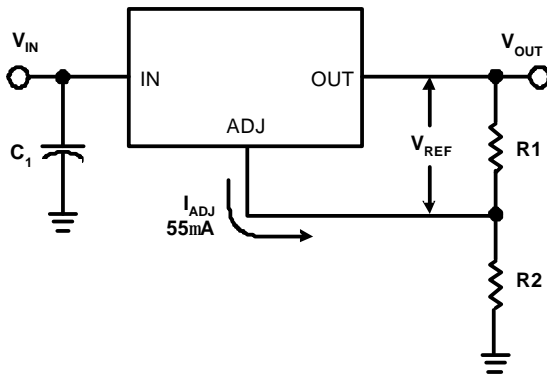
## ■ Application Description

### 1. Output Voltage Adjustment

Like most regulators, the AME1117 regulates the output by comparing the output voltage to an internally generated reference voltage. On the adjustable version, the  $V_{REF}$  is available externally as 1.25V between  $V_{OUT}$  and ADJ. The voltage ratio formed by R1 and R2 should be set to conduct 10mA (minimum output load). The output voltage is given by the following equation:

$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + I_{ADJ} \times R2$$

On fixed versions of AME1117, the voltage divider is provided internally.



$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + I_{ADJ} \times R2$$

### 2. Thermal Protection

AME1117 has thermal protection which limits junction temperature to 150°C. However, device functionality is only guaranteed to a maximum junction temperature of +125°C.

The power dissipation and junction temperature for AME1117 is given by

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$$

$$T_{JUNCTION} = T_{AMBIENT} + (P_D \times \theta_{JA})$$

Note:  $T_{JUNCTION}$  must not exceed 125°C

### 3. Current Limit Protection

AME1117 is protected against overload conditions. Current protection is triggered at typically 1.5A.

### 4. Stability and Load Regulation

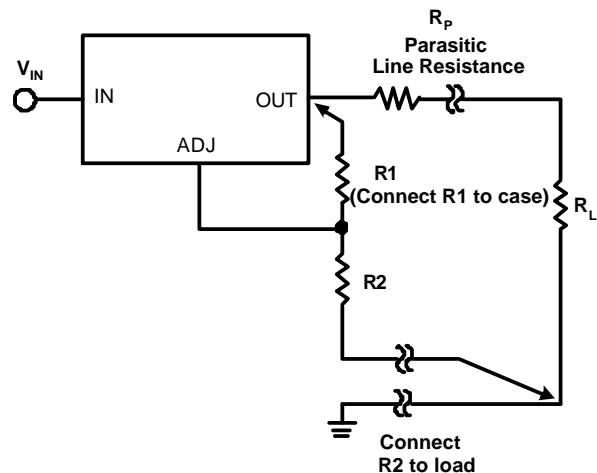
AME1117 requires a capacitor from  $V_{OUT}$  to GND to provide compensation feedback to the internal gain stage. This is to ensure stability at the output terminal. Typically, a 10µF tantalum or 50µF aluminum electrolytic is sufficient.

(Note: It is important that the ESR for this capacitor does not exceed 0.5W.)

The output capacitor does not have a theoretical upper limit and increasing its value will increase stability.  $C_{OUT} = 100\mu\text{F}$  or more is typical for high current regulator design.

For the adjustable version, the best load regulation is accomplished when the top of the resistor divider (R1) is connected directly to the output pin of the AME1117. When so connected,  $R_p$  is not multiplied by the divider ratio.

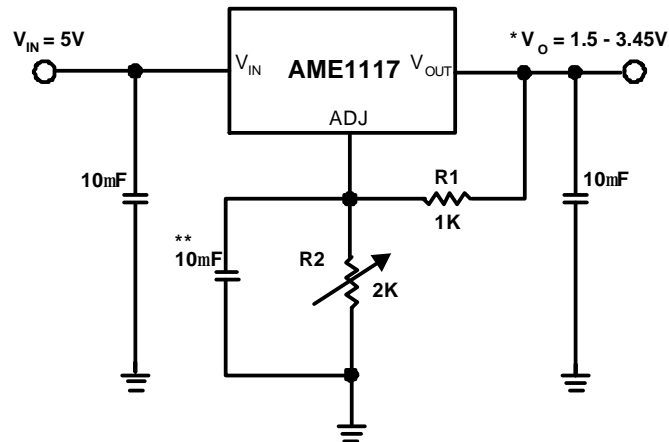
For fixed output versions, the top of R1 is internally connected to the output. The ground pin can be connected to the low side of the load in order to eliminate ground loop errors.



## 5. Thermal Consideration

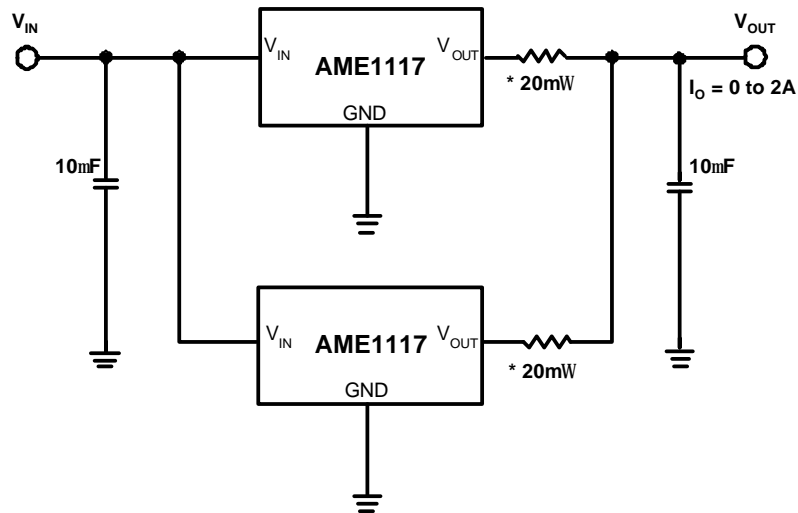
The AME1117 series contain thermal limiting circuitry designed to protect itself from over-temperature conditions. Even for normal load conditions, maximum junction temperature ratings must not be exceeded. As mentioned in thermal protection section, we need to consider all sources of thermal resistance between junction and ambient. It includes junction-to-case, case-to-heat-sink interface and heat sink thermal resistance itself.

Junction-to-case thermal resistance is specified from the IC junction to the bottom of the case directly below the die. Proper mounting is required to ensure the best possible thermal flow from this area of the package to the heat sink. The case of all devices in this product series is electrically connected to the output. Therefore, if the case of the device must be electrically isolated, a thermally conductive spacer is recommended.

**■ Advanced Applications (contd.)**
**Adjustable Output Voltage**


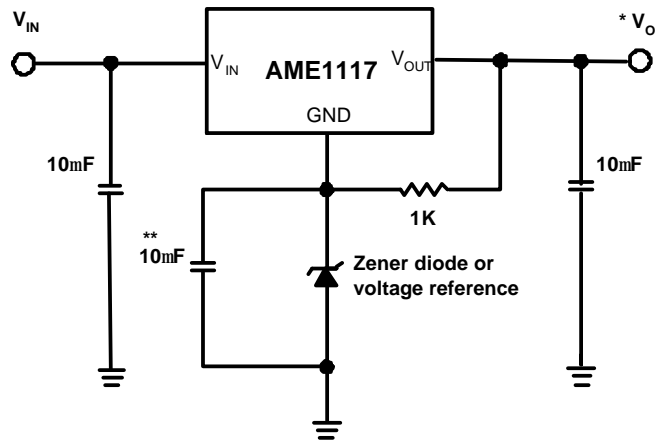
Note:  $* V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + I_{ADJ} \times R2$

\*\* Optional for improved ripple rejection

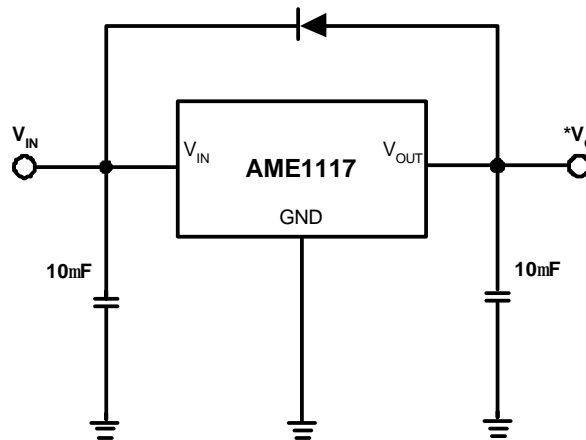
**Paralleling Regulators**


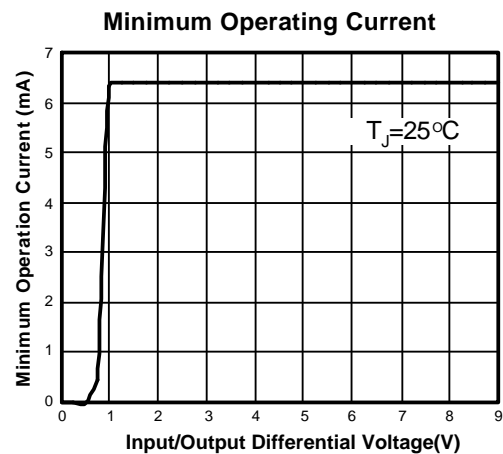
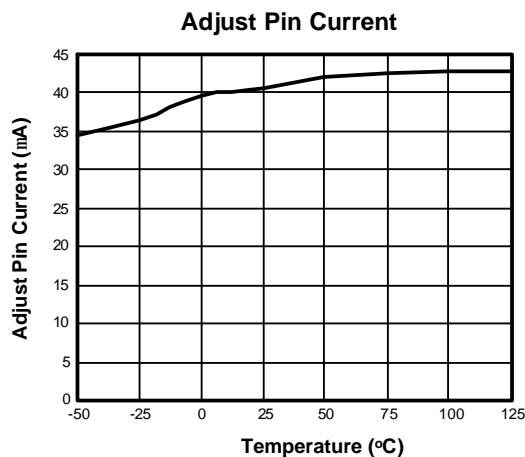
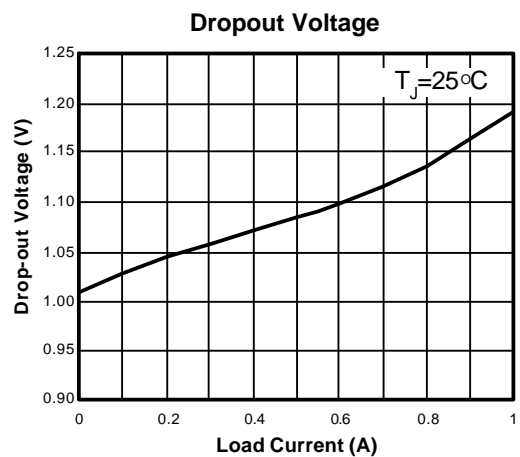
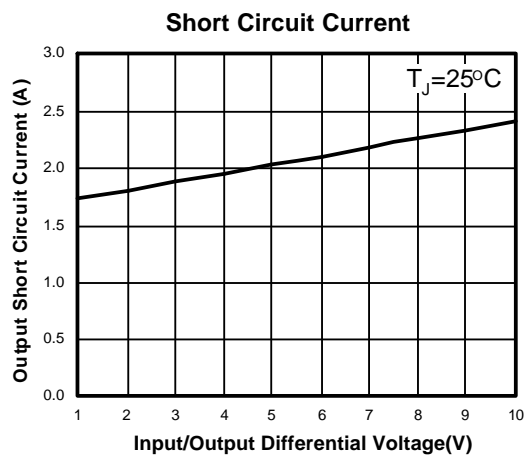
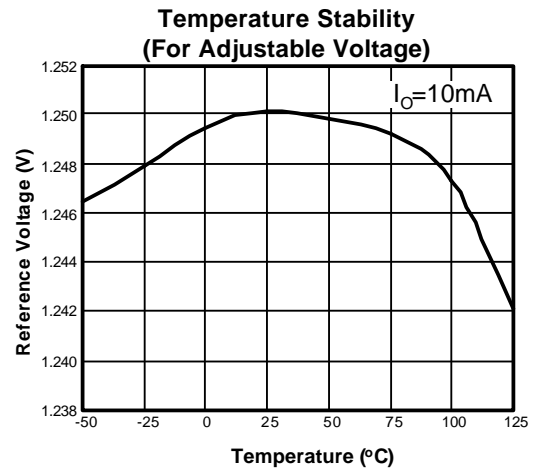
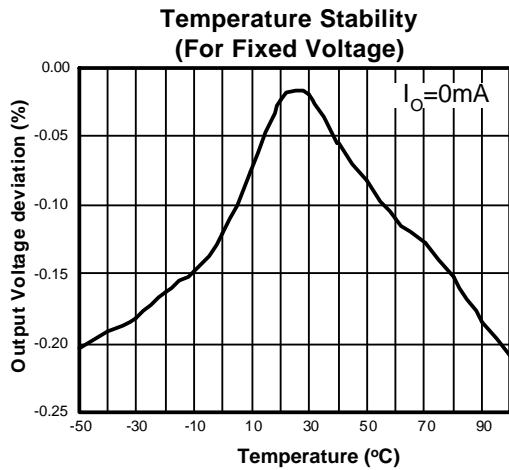
Note: \* 20mΩ is ballast resistance

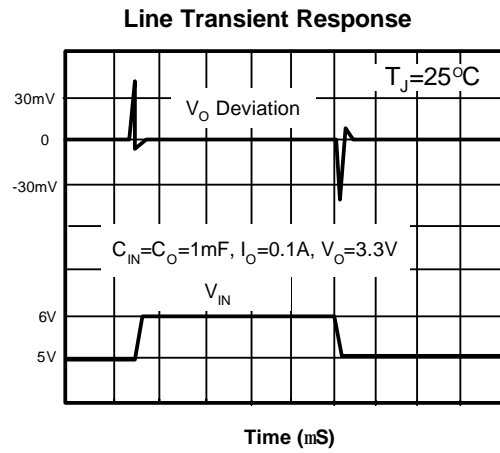
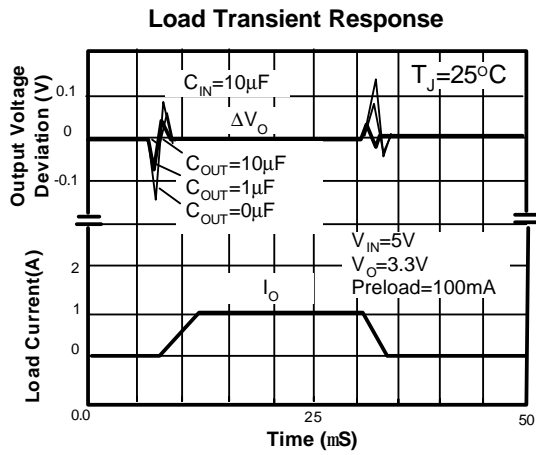
The inter - connection of #18 wire could act as ballast resistance

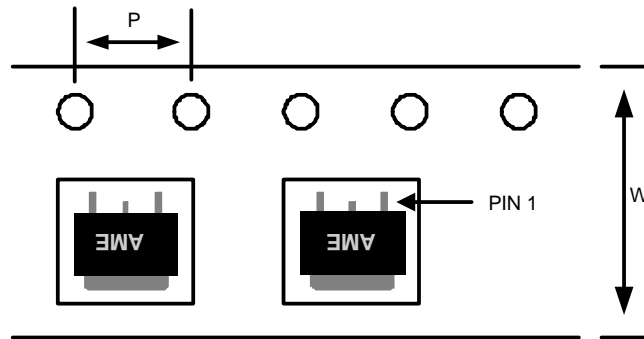
**■ Advanced Applications**
**Regulator with Reference**


Note: \*  $V_o = V_{REF} + V_z$  ( $V_z$ : breakdown voltage of Zener diode)  
 \*\* Optional for improved ripple rejection

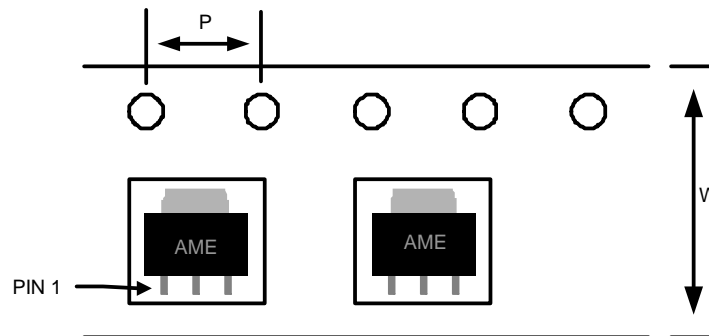
**Regulator with Reverse Diode Protection**






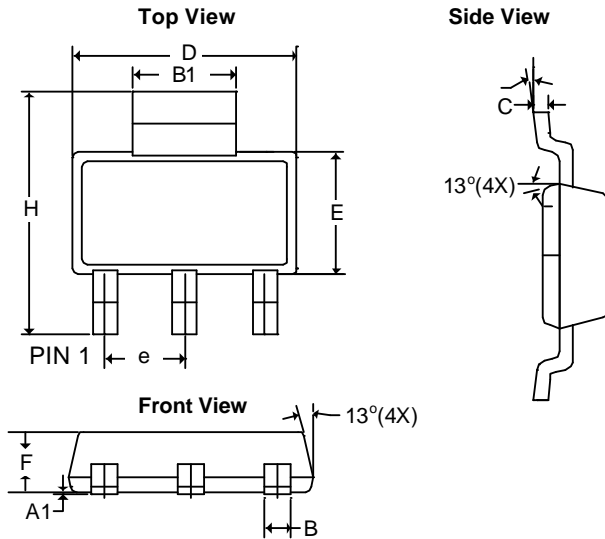
**■ Tape and Reel Dimension**
**TO-252-2**

**Carrier Tape, Number of Components Per Reel and Reel Size**

| Package  | Carrier Width (W) | Pitch (P)  | Part Per Full Reel | Reel Size |
|----------|-------------------|------------|--------------------|-----------|
| TO-252-2 | 16.0±0.1 mm       | 4.0±0.1 mm | 2500pcs            | 330±1 mm  |

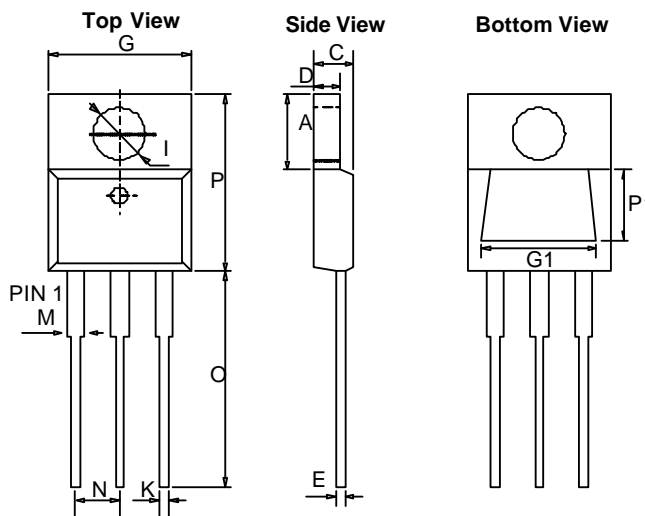
**SOT-223**

**Carrier Tape, Number of Components Per Reel and Reel Size**

| Package | Carrier Width (W) | Pitch (P)  | Part Per Full Reel | Reel Size |
|---------|-------------------|------------|--------------------|-----------|
| SOT-223 | 12.0±0.1 mm       | 4.0±0.1 mm | 2500pcs            | 330±1 mm  |



**■ Package Dimension**
**SOT-223**


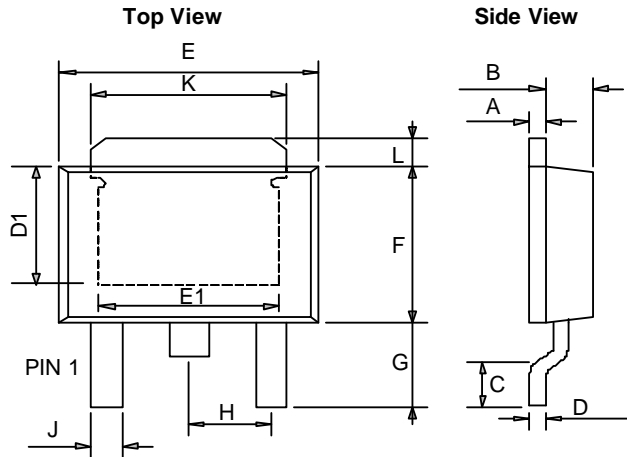
| SYMBOLS        | MILLIMETERS |      | INCHES     |        |
|----------------|-------------|------|------------|--------|
|                | MIN         | MAX  | MIN        | MAX    |
| A <sub>1</sub> | 0.01        | 0.10 | 0.0004     | 0.0039 |
| B              | 0.60        | 0.84 | 0.0236     | 0.0330 |
| B <sub>1</sub> | 2.90        | 3.15 | 0.1140     | 0.1240 |
| C              | 0.24        | 0.38 | 0.0094     | 0.0150 |
| D              | 6.30        | 6.71 | 0.2480     | 0.2640 |
| E              | 3.30        | 3.71 | 0.1299     | 0.1460 |
| e              | 2.30 BSC    |      | 0.0906 BSC |        |
| H              | 6.70        | 7.30 | 0.2638     | 0.2874 |
| q              | 0°          | 10°  | 0°         | 10°    |

**TO-220-3**


| SYMBOLS        | MILLIMETERS |       | INCHES |        |
|----------------|-------------|-------|--------|--------|
|                | MIN         | MAX   | MIN    | MAX    |
| A              | 5.58        | 7.49  | 0.2197 | 0.2949 |
| C              | 2.03        | 4.83  | 0.0799 | 0.1902 |
| D              | 0.50        | 1.40  | 0.0197 | 0.0551 |
| E              | 0.30        | 1.15  | 0.0118 | 0.0453 |
| G              | 9.65        | 10.67 | 0.3799 | 0.4201 |
| I              | 3.53        | 4.09  | 0.1390 | 0.1610 |
| K              | 0.50        | 1.15  | 0.0197 | 0.0453 |
| M              | 1.14        | 1.78  | 0.0449 | 0.0701 |
| N              | 2.28        | 2.80  | 0.0898 | 0.1102 |
| O              | 12.70       | 14.74 | 0.5000 | 0.5803 |
| P              | 14.22       | 16.51 | 0.5598 | 0.6500 |
| P <sub>1</sub> | 5.00        | 5.70  | 0.1969 | 0.2244 |
| G <sub>1</sub> | 7.30        | 8.05  | 0.2874 | 0.3169 |

## ■ Package Dimension

### TO-252-2



| SYMBOLS   | MILLIMETERS |        | INCHES     |         |
|-----------|-------------|--------|------------|---------|
|           | MIN         | MAX    | MIN        | MAX     |
| <b>A</b>  | 0.43        | 0.58   | 0.0169     | 0.0230  |
| <b>B</b>  | 1.60        | 1.95   | 0.0630     | 0.0768  |
| <b>C</b>  | 0.51        | 1.78   | 0.0200     | 0.0701  |
| <b>D</b>  | 0.43        | 0.60   | 0.0169     | 0.0236  |
| <b>E</b>  | 6.35        | 6.80   | 0.2500     | 0.2677  |
| <b>F</b>  | 5.36        | 7.20   | 0.2110     | 0.2835  |
| <b>G</b>  | 2.20        | 3.00   | 0.0866     | 0.1181  |
| <b>H</b>  | -           | * 2.30 | -          | *0.0906 |
| <b>J</b>  | -           | 0.97   | -          | 0.0380  |
| <b>K</b>  | 5.20        | 5.50   | 0.2047     | 0.2165  |
| <b>L</b>  | 1.40 REF    |        | 0.0551 REF |         |
| <b>D1</b> | 3.80 REF    |        | 0.1496 REF |         |
| <b>E1</b> | 3.81        | 5.10   | 0.1500     | 0.2008  |

**\*: Typical Value**

**Notes:**

1. Controlling dimension: Millimeters.
2. Maximum lead thickness includes lead finish thickness Minimum lead thickness is the minimum thickness of base material.



**www.ame.com.tw**  
**E-Mail: sales@ame.com.tw**

Life Support Policy:

These products of AME, Inc. are not authorized for use as critical components in life-support devices or systems, without the express written approval of the president of AME, Inc.

AME, Inc. reserves the right to make changes in the circuitry and specifications of its devices and advises its customers to obtain the latest version of relevant information.

© AME, Inc. , May 2008

Document: 1014-DS1117-T.03

**Corporate Headquarter**

**AME, Inc.**

2F, 302 Rui-Guang Road, Nei-Hu District

Taipei 114, Taiwan.

Tel: 886 2 2627-8687

Fax: 886 2 2659-2989