



## 800mA LOW DROPOUT LINEAR REGULATOR

AZ1117B

### General Description

The AZ1117B is a low dropout three-terminal regulator with a dropout of 1.2V at 800mA output current.

The AZ1117B has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within  $\pm 1\%$ . On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

The AZ1117B is available in 1.8V, 2.5V and 3.3V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set the output voltage with two external resistors.

The AZ1117B is available in the industry-standard SOT-223 power package.

### Features

- Low Dropout Voltage: 1.2V at 800mA Output Current
- Output Noise from 10Hz to 10KHz: 0.003% of  $V_{OUT}$
- PSRR at  $I_{OUT}=300mA$  and  $f=120Hz$ : 70dB
- Output Voltage Accuracy:  $\pm 1\%$
- On-chip Thermal Shutdown
- Maximum Quiescent Current:  $I_{QMAX}=6mA$
- Operation Junction Temperature:  $-20$  to  $105^{\circ}C$

### Applications

- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

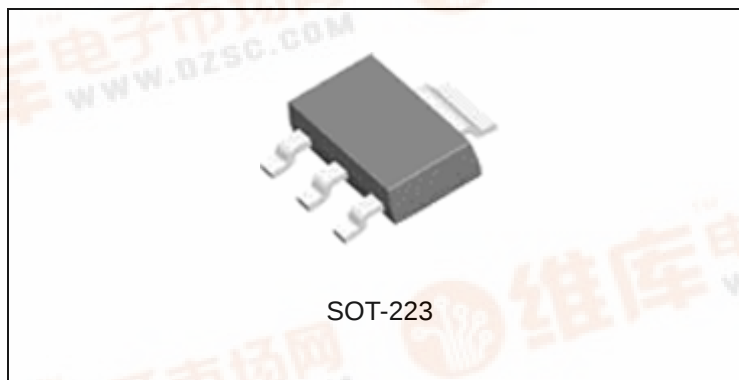


Figure 1. Package Type of AZ1117B

## 800mA LOW DROPOUT LINEAR REGULATOR

**AZ1117B**

### Pin Configuration

H Package  
(SOT-223)

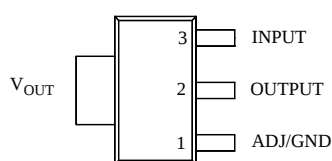


Figure 2. Pin Configuration of AZ1117B (Top View)

### Functional Block Diagram

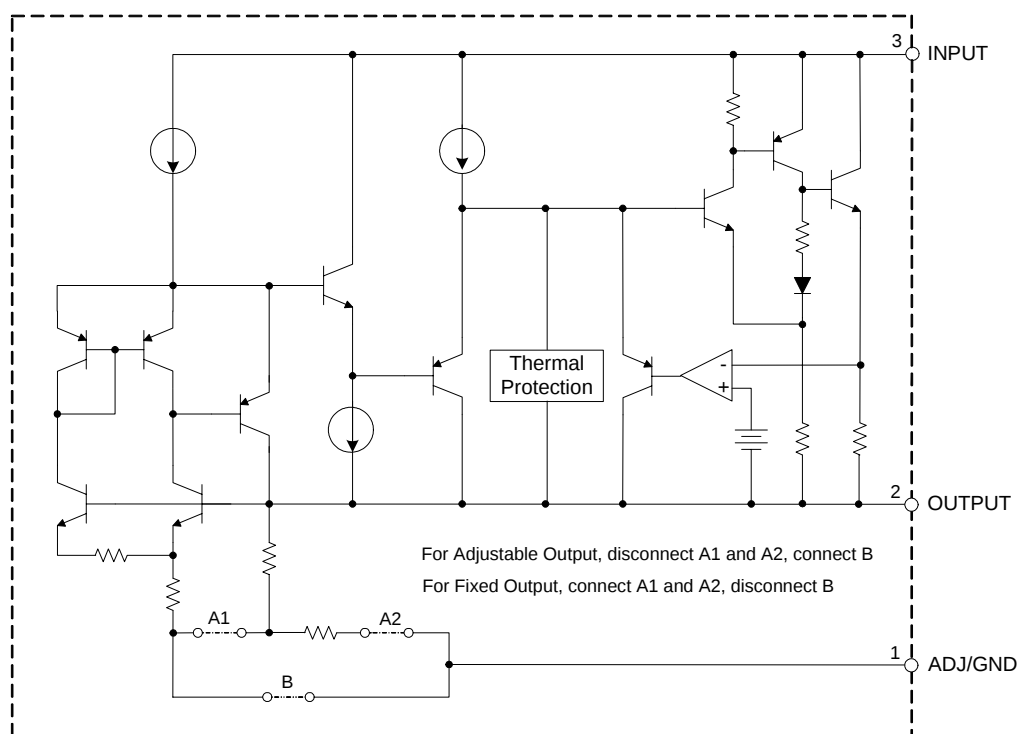


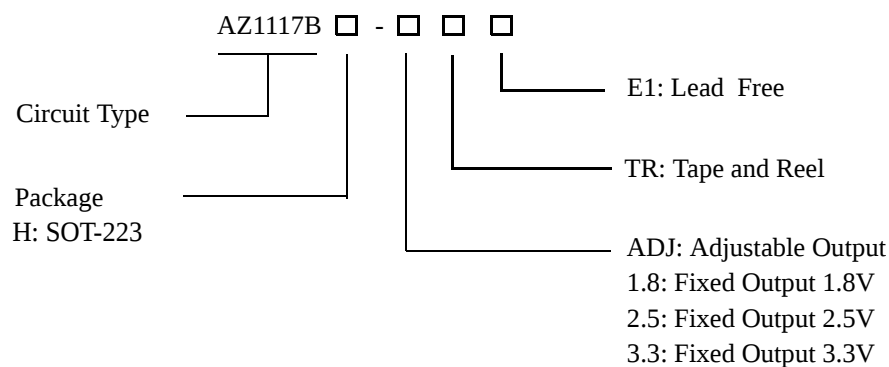
Figure 3. Functional Block Diagram of AZ1117B



**800mA LOW DROPOUT LINEAR REGULATOR**

**AZ1117B**

**Ordering Information**



| Package | Temperature Range | Part Number      | Marking ID | Packing Type |
|---------|-------------------|------------------|------------|--------------|
| SOT-223 | -20 to 105°C      | AZ1117BH-ADJTRE1 | EH17K      | Tape & Reel  |
|         |                   | AZ1117BH-1.8TRE1 | EH17L      | Tape & Reel  |
|         |                   | AZ1117BH-2.5TRE1 | EH17N      | Tape & Reel  |
|         |                   | AZ1117BH-3.3TRE1 | EH17M      | Tape & Reel  |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

## 800mA LOW DROPOUT LINEAR REGULATOR

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### Absolute Maximum Ratings (Note 1)

| Parameter                            | Symbol     | Value      | Unit |
|--------------------------------------|------------|------------|------|
| Input Voltage                        | $V_{IN}$   | 18         | V    |
| Operating Junction Temperature Range | $T_J$      | 150        | °C   |
| Storage Temperature Range            | $T_{STG}$  | -65 to 150 | °C   |
| Lead Temperature (Soldering, 10sec)  | $T_{LEAD}$ | 260        | °C   |

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

### Recommended Operating Conditions

| Parameter                            | Symbol   | Min | Max | Unit |
|--------------------------------------|----------|-----|-----|------|
| Input Voltage                        | $V_{IN}$ |     | 12  | V    |
| Operating Junction Temperature Range | $T_J$    | -20 | 105 | °C   |



## 800mA LOW DROPOUT LINEAR REGULATOR

**AZ1117B**

### Electrical Characteristics

#### AZ1117B-ADJ Electrical Characteristics

Operating Conditions:  $V_{IN}=V_{OUT}+2V$ ,  $I_{OUT}=10mA$ ,  $T_J=25^{\circ}C$ , unless otherwise specified. ( $P \leq$  maximum power dissipation).

Limits appearing in **Boldface** type apply over the entire junction temperature range for operation,  $-20^{\circ}C$  to  $105^{\circ}C$ .

| Parameter                             | Symbol      | Conditions                                                               | Min          | Typ   | Max          | Unit        |
|---------------------------------------|-------------|--------------------------------------------------------------------------|--------------|-------|--------------|-------------|
| Reference Voltage                     | $V_{REF}$   |                                                                          | 1.238        | 1.250 | 1.262        | V           |
|                                       |             | $10mA \leq I_{OUT} \leq 800mA$ , $1.5V \leq V_{IN}-V_{OUT} \leq 10V$     | <b>1.225</b> | 1.250 | <b>1.270</b> |             |
| Line Regulation                       | $V_{RLINE}$ | $1.5V \leq V_{IN}-V_{OUT} \leq 10V$                                      |              | 0.001 | 0.1          | %           |
|                                       |             |                                                                          |              |       | <b>0.2</b>   |             |
| Load Regulation                       | $V_{RLOAD}$ |                                                                          |              | 0.4   | 1.0          | %           |
| Dropout Voltage                       | $V_{DROP}$  | $\Delta V_{REF}=1\%$ , $I_{OUT}=0.8A$                                    |              | 1.2   | <b>1.3</b>   | V           |
| Current Limit                         | $I_{LIMIT}$ |                                                                          | 0.85         | 1     | 1.15         | A           |
| Adjust Pin Current                    |             |                                                                          |              | 60    | <b>120</b>   | $\mu A$     |
| Adjust Pin Current Change             |             | $1.5V \leq (V_{IN}-V_{OUT}) \leq 10V$ , $10mA \leq I_{OUT} \leq 800mA$   |              | 0.2   | <b>5</b>     | $\mu A$     |
| Minimum Load Current                  |             | $1.5V \leq (V_{IN}-V_{OUT}) \leq 10V$                                    |              | 1.7   | <b>5</b>     | mA          |
| Ripple Rejection                      | PSRR        | $f=120Hz$ , $C_{OUT}=22\mu F$<br>$(V_{IN}-V_{OUT})=3V$ , $I_{OUT}=300mA$ |              | 70    |              | dB          |
| Temperature Stability                 |             |                                                                          |              | 0.5   |              | %           |
| RMS Output Noise<br>(% of $V_{OUT}$ ) |             | $T_A=25^{\circ}C$ , $10Hz \leq f \leq 10KHz$                             |              | 0.003 |              | %           |
| Thermal Shutdown                      |             | Junction Temperature                                                     |              | 160   |              | $^{\circ}C$ |
| Thermal Shutdown<br>Hysteresis        |             |                                                                          |              | 16    |              | $^{\circ}C$ |



# 800mA LOW DROPOUT LINEAR REGULATOR

**AZ1117B**

## Electrical Characteristics (Continued)

### AZ1117B-1.8 Electrical Characteristics

Operating Conditions:  $V_{IN}=3.8V$ ,  $I_{OUT}=10mA$ ,  $T_J=25^{\circ}C$ , unless otherwise specified. ( $P \leq$  maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation,  $-20^{\circ}C$  to  $105^{\circ}C$ .

| Parameter                             | Symbol      | Conditions                                                               | Min          | Typ   | Max          | Unit        |
|---------------------------------------|-------------|--------------------------------------------------------------------------|--------------|-------|--------------|-------------|
| Output Voltage                        | $V_{OUT}$   |                                                                          | 1.782        | 1.8   | 1.818        | V           |
|                                       |             | $10mA \leq I_{OUT} \leq 800mA$ , $3.8V \leq V_{IN} \leq 10V$             | <b>1.764</b> | 1.8   | <b>1.836</b> |             |
| Line Regulation                       | $V_{RLINE}$ | $1.5V \leq V_{IN} - V_{OUT} \leq 10V$                                    |              | 0.5   | 6            | mV          |
|                                       |             |                                                                          |              |       | <b>10</b>    |             |
| Load Regulation                       | $V_{RLOAD}$ |                                                                          |              | 2     | 15           | mV          |
| Dropout Voltage                       | $V_{DROP}$  | $\Delta V_{OUT}=1\%$ , $I_{OUT}=0.8A$                                    |              | 1.2   | <b>1.3</b>   | V           |
| Current Limit                         | $I_{LIMIT}$ |                                                                          | 0.85         | 1     | 1.15         | A           |
| Quiescent Current                     | $I_Q$       | $I_{OUT}=0$                                                              |              | 4     | <b>6</b>     | mA          |
| Ripple Rejection                      | PSRR        | $f=120Hz$ , $C_{OUT}=22\mu F$<br>$(V_{IN}-V_{OUT})=3V$ , $I_{OUT}=300mA$ |              | 70    |              | dB          |
| Temperature Stability                 |             |                                                                          |              | 0.5   |              | %           |
| RMS Output Noise<br>(% of $V_{OUT}$ ) |             | $T_A=25^{\circ}C$ , $10Hz \leq f \leq 10KHz$                             |              | 0.003 |              | %           |
| Thermal Shutdown                      |             | Junction Temperature                                                     |              | 160   |              | $^{\circ}C$ |
| Thermal Shutdown<br>Hysteresis        |             |                                                                          |              | 16    |              | $^{\circ}C$ |



## 800mA LOW DROPOUT LINEAR REGULATOR

**AZ1117B**

### Electrical Characteristics (Continued)

#### AZ1117B-2.5 Electrical Characteristics

Operating Conditions:  $V_{IN}=4.5V$ ,  $I_{OUT}=10mA$ ,  $T_J=25^{\circ}C$ , unless otherwise specified. ( $P \leq$  maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation,  $-20^{\circ}C$  to  $105^{\circ}C$ .

| Parameter                             | Symbol      | Conditions                                                               | Min          | Typ        | Max          | Unit        |
|---------------------------------------|-------------|--------------------------------------------------------------------------|--------------|------------|--------------|-------------|
| Output Voltage                        | $V_{OUT}$   |                                                                          | 2.475        | 2.5        | 2.525        | V           |
|                                       |             | $10mA \leq I_{OUT} \leq 800mA$ , $4.5V \leq V_{IN} \leq 10V$             | <b>2.455</b> | <b>2.5</b> | <b>2.545</b> |             |
| Line Regulation                       | $V_{RLINE}$ | $1.5V \leq V_{IN} - V_{OUT} \leq 10V$                                    |              | 0.5        | 6            | mV          |
|                                       |             |                                                                          |              |            | <b>10</b>    |             |
| Load Regulation                       | $V_{RLOAD}$ |                                                                          |              | 2          | 15           | mV          |
| Dropout Voltage                       | $V_{DROP}$  | $\Delta V_{OUT}=1\%$ , $I_{OUT}=0.8A$                                    |              | 1.2        | <b>1.3</b>   | V           |
| Current Limit                         | $I_{LIMIT}$ |                                                                          | 0.85         | 1          | 1.15         | A           |
| Quiescent Current                     | $I_Q$       | $I_{OUT}=0$                                                              |              | 4          | <b>6</b>     | mA          |
| Ripple Rejection                      | PSRR        | $f=120Hz$ , $C_{OUT}=22\mu F$<br>$(V_{IN}-V_{OUT})=3V$ , $I_{OUT}=300mA$ |              | 70         |              | dB          |
| Temperature Stability                 |             |                                                                          |              | 0.5        |              | %           |
| RMS Output Noise<br>(% of $V_{OUT}$ ) |             | $T_A=25^{\circ}C$ , $10Hz \leq f \leq 10KHz$                             |              | 0.003      |              | %           |
| Thermal Shutdown                      |             | Junction Temperature                                                     |              | 160        |              | $^{\circ}C$ |
| Thermal Shutdown<br>Hysteresis        |             |                                                                          |              | 16         |              | $^{\circ}C$ |



## 800mA LOW DROPOUT LINEAR REGULATOR

**AZ1117B**

### Electrical Characteristics (Continued)

#### AZ1117B-3.3 Electrical Characteristics

Operating Conditions:  $V_{IN}=5.3V$ ,  $I_{OUT}=10mA$ ,  $T_J=25^{\circ}C$ , unless otherwise specified. ( $P \leq$  maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation,  $-20^{\circ}C$  to  $105^{\circ}C$ .

| Parameter                             | Symbol      | Conditions                                                                | Min          | Typ   | Max          | Unit        |
|---------------------------------------|-------------|---------------------------------------------------------------------------|--------------|-------|--------------|-------------|
| Output Voltage                        | $V_{OUT}$   |                                                                           | 3.267        | 3.3   | 3.333        | V           |
|                                       |             | $10mA \leq I_{OUT} \leq 800mA$ , $5.3V \leq V_{IN} \leq 10V$              | <b>3.235</b> | 3.3   | <b>3.365</b> |             |
| Line Regulation                       | $V_{RLINE}$ | $1.5V \leq V_{IN} - V_{OUT} \leq 10V$                                     |              | 0.5   | 6            | mV          |
|                                       |             |                                                                           |              |       | <b>10</b>    |             |
| Load Regulation                       | $V_{RLOAD}$ |                                                                           |              | 2     | 15           | mV          |
| Dropout Voltage                       | $V_{DROP}$  | $\Delta V_{OUT}=1\%$ , $I_{OUT}=0.8A$                                     |              | 1.2   | <b>1.3</b>   | V           |
| Current Limit                         | $I_{LIMIT}$ |                                                                           | 0.85         | 1     | 1.15         | A           |
| Quiescent Current                     | $I_Q$       | $I_{OUT}=0$                                                               |              | 4     | <b>6</b>     | mA          |
| Ripple Rejection                      | PSRR        | $f=120Hz$ , $C_{OUT}=22\mu F$<br>( $V_{IN}-V_{OUT}$ )=3V, $I_{OUT}=300mA$ |              | 70    |              | dB          |
| Temperature Stability                 |             |                                                                           |              | 0.5   |              | %           |
| RMS Output Noise<br>(% of $V_{OUT}$ ) |             | $T_A=25^{\circ}C$ , $10Hz \leq f \leq 10KHz$                              |              | 0.003 |              | %           |
| Thermal Shutdown                      |             | Junction Temperature                                                      |              | 160   |              | $^{\circ}C$ |
| Thermal Shutdown<br>Hysteresis        |             |                                                                           |              | 16    |              | $^{\circ}C$ |

# 800mA LOW DROPOUT LINEAR REGULATOR

AZ1117B

## Typical Performance Characteristics

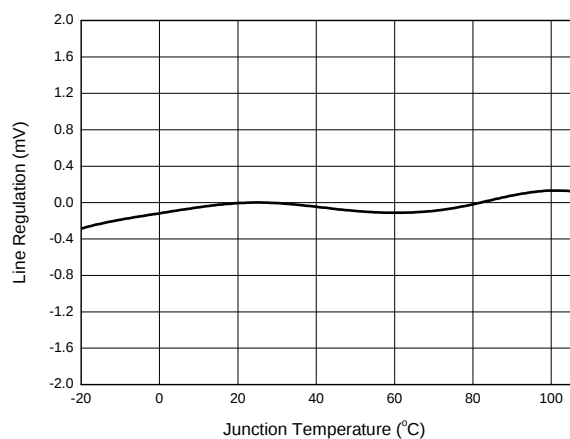


Figure 4. Line Regulation vs. Junction Temperature

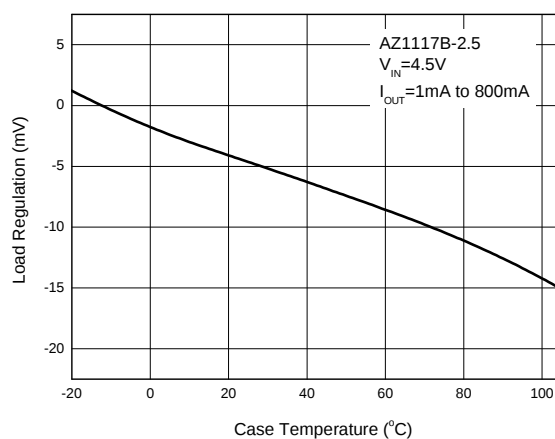


Figure 5. Load Regulation vs. Case Temperature

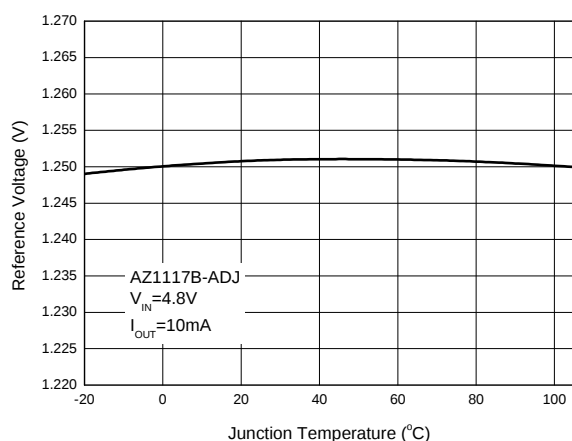


Figure 6. Reference Voltage vs. Junction Temperature

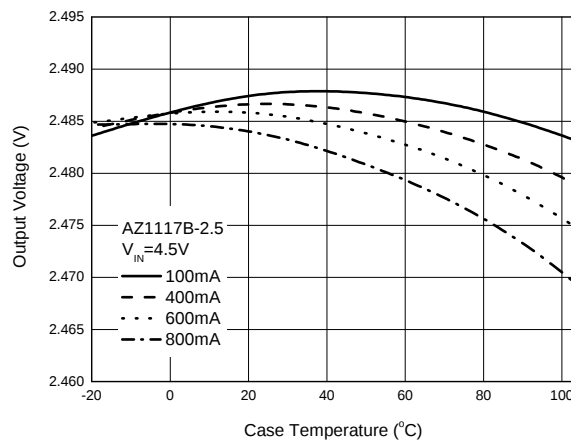


Figure 7. Output Voltage vs. Case Temperature

# 800mA LOW DROPOUT LINEAR REGULATOR

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## Typical Performance Characteristics (Continued)

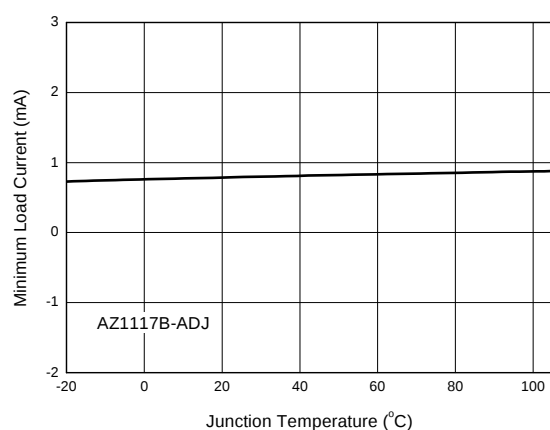


Figure 8. Minimum Load Current vs. Junction Temperature

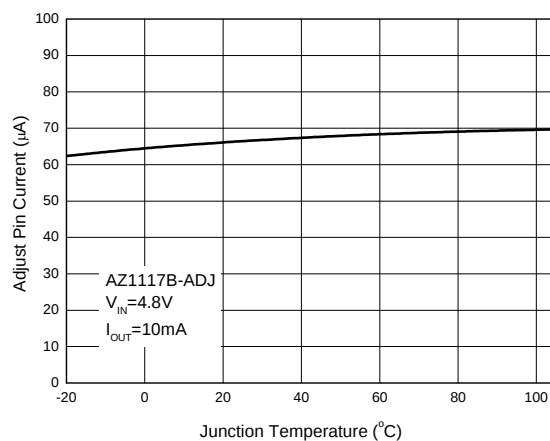


Figure 9. Adjust Pin Current vs. Junction Temperature

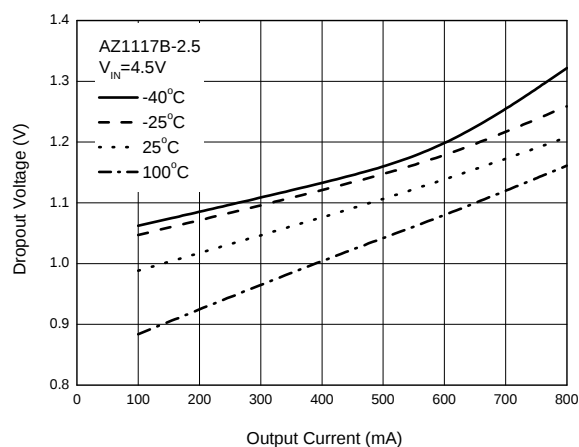


Figure 10. Dropout Voltage vs. Output Current

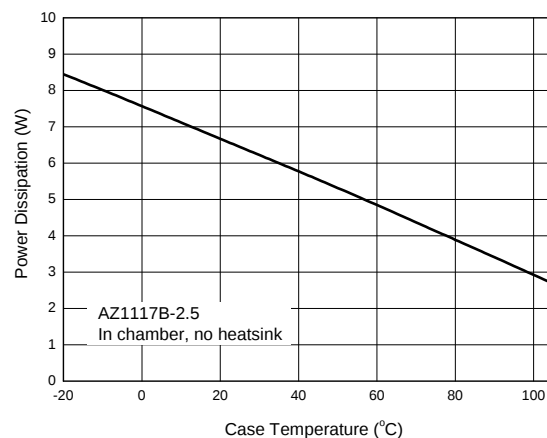


Figure 11. Power Dissipation vs. Case Temperature

# 800mA LOW DROPOUT LINEAR REGULATOR

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## Typical Performance Characteristics (Continued)

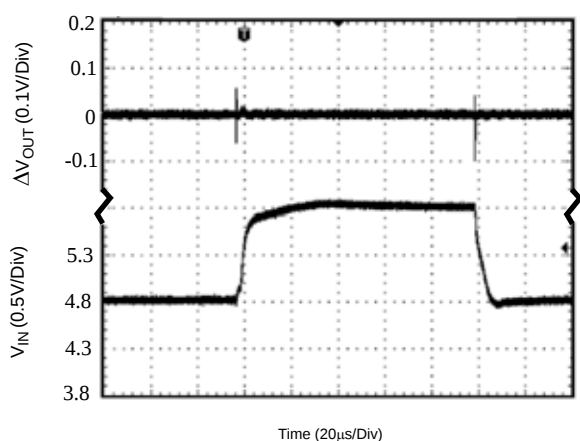


Figure 12. Line Transient Response

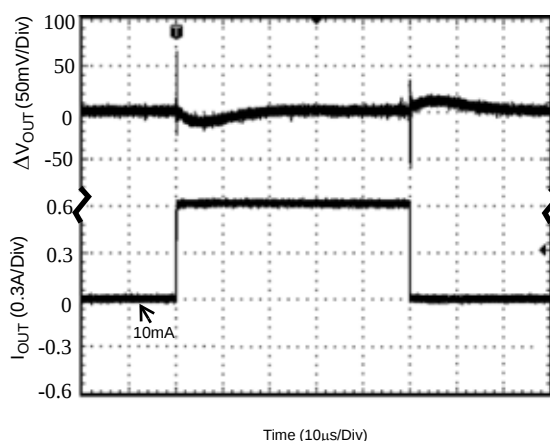


Figure 13. Load Transient Response

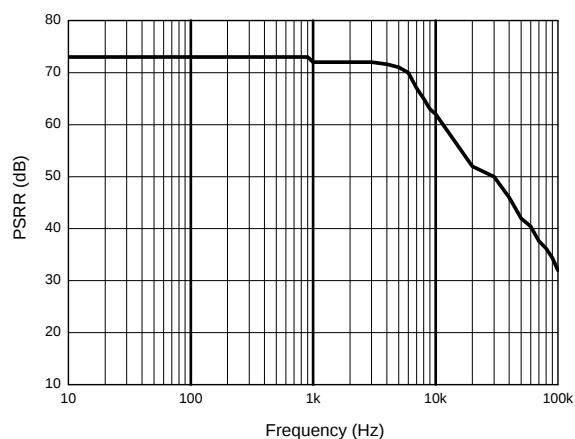


Figure 14. PSRR vs. Frequency

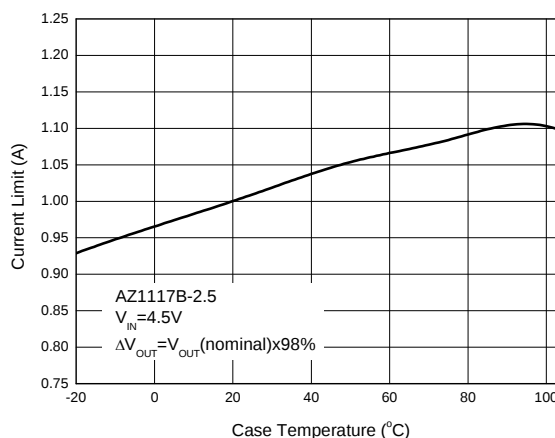


Figure 15. Current Limit vs. Case Temperature

**Typical Performance Characteristics (Continued)**

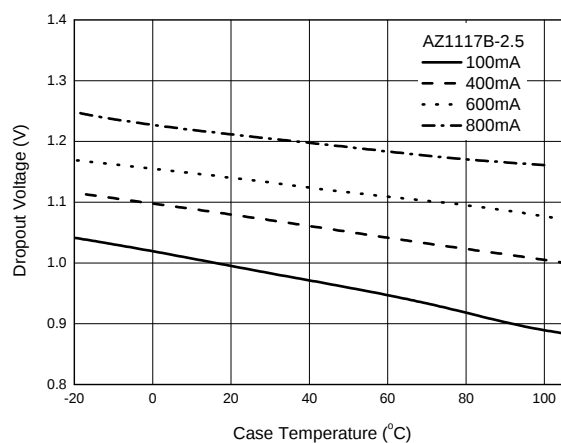


Figure 16. Dropout Voltage vs. Case Temperature

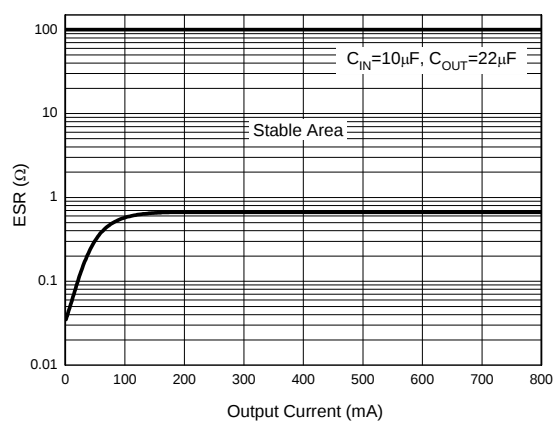


Figure 17. ESR vs. Output Current

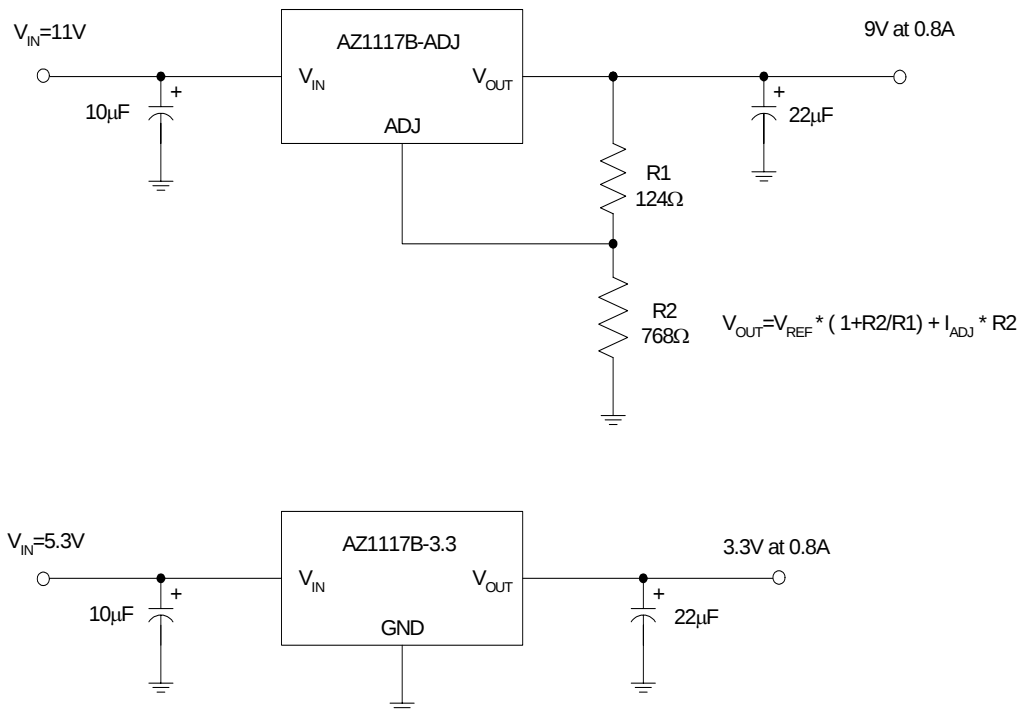
**800mA LOW DROPOUT LINEAR REGULATOR****AZ1117B****Typical Applications**

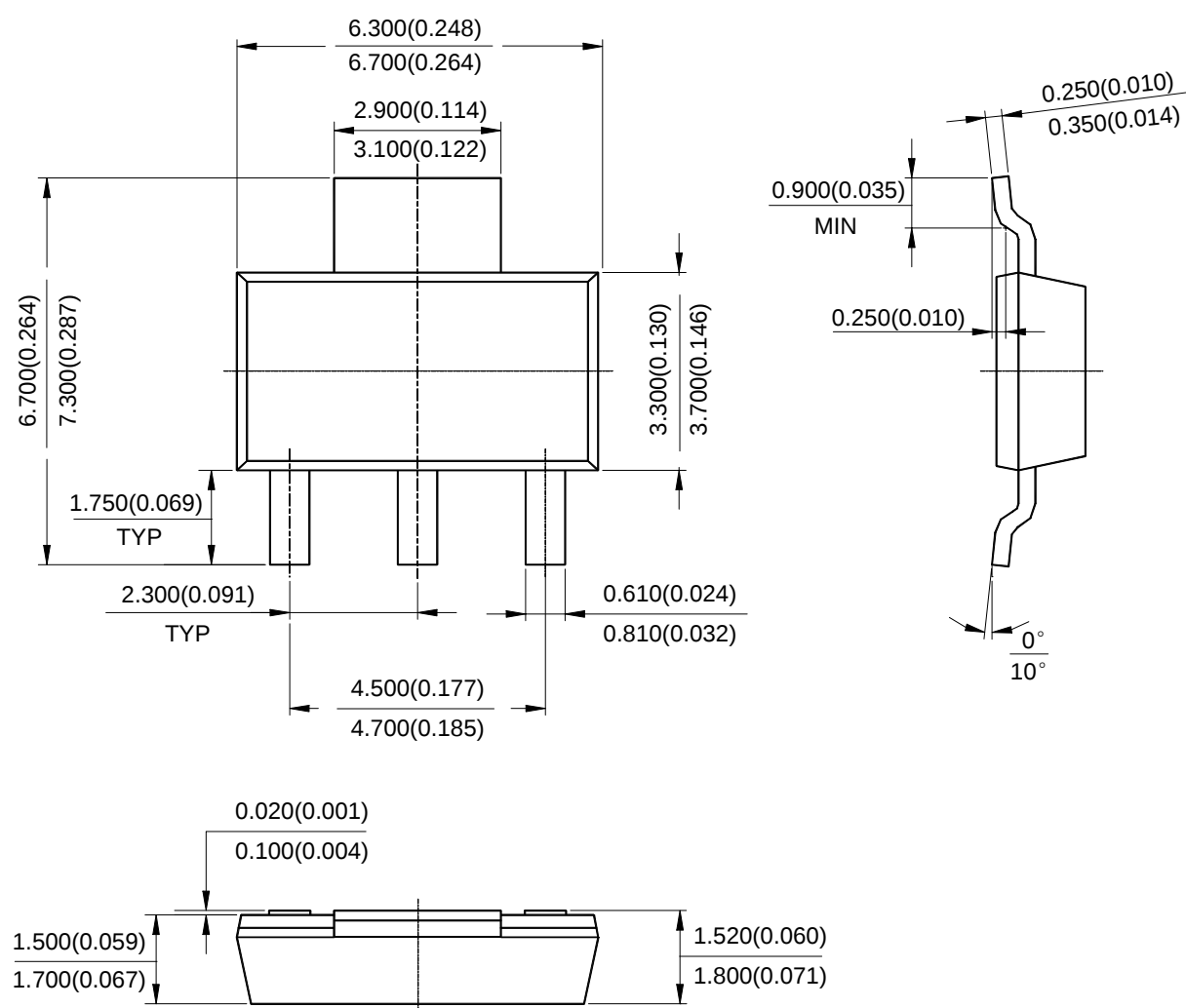
Figure 18. Typical Applications of AZ1117B



## Mechanical Dimensions

## SOT-223

Unit: mm(inch)





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