Description

The AZ2117 is a low dropout three-terminal regulator. The AZ2117 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 ±1%. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

The AZ2117 is available in ADJ output voltage version. It is available in an adjustable version which can set the output voltage with two external resistors.

The AZ2117 is available in the industry-standard SOT223 Series power packages.

Features

- Current Limit: 1.35A (Typ)
- Output Noise from 10Hz to 10kHz: 0.003% of VOUT
- PSRR at IOUT = 300mA and f = 120Hz: 60dB
- Output Voltage Accuracy: ±1%
- On-chip Thermal Shutdown
- Maximum Quiescent Current: Iqmax = 1mA
- Compatible with Low ESR Ceramic Capacitor
- Operation Junction Temperature: -40°C to +125°C
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)

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.

Applications

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

Typical Applications Circuit (Note 4)

![Typical Applications Circuit Diagram](image)

Note 4: The AZ2117 is compatible with low ESR ceramic capacitor.
The ESR of the output capacitors must be less than 20Ω.
A minimum of 1µF output capacitor is required.
Functional Block Diagram

Absolute Maximum Ratings (Note 5)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_IN</td>
<td>Input Voltage</td>
<td>18</td>
<td>V</td>
</tr>
<tr>
<td>T_J</td>
<td>Operating Junction Temperature Range</td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>T_STG</td>
<td>Storage Temperature Range</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>θ_JA</td>
<td>Thermal Resistance (Without Heatsink)</td>
<td></td>
<td>°C/W</td>
</tr>
<tr>
<td>θ_JA</td>
<td>Thermal Resistance (With Heatsink) (Note 6)</td>
<td></td>
<td>°C/W</td>
</tr>
<tr>
<td>T_LEAD</td>
<td>Lead Temperature (Soldering, 10sec)</td>
<td>+260</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:  
5. 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.  
6. Chip is soldered to 100mm²(10mm*10mm) copper (top side solder mask) on 2oz.2 layers FR-4 PCB with 8*0.5mm vias.

Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_IN</td>
<td>Input Voltage</td>
<td>—</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>T_J</td>
<td>Operating Junction Temperature Range</td>
<td>-40</td>
<td>+125</td>
<td>°C</td>
</tr>
</tbody>
</table>
### Electrical Characteristics

(Operating Conditions: $V_{IN} \leq 10V$, $I_{OUT} = 10mA$, $T_J = +25^\circ C$, unless otherwise specified. $(P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, -40°C to +125°C.)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{REF}$</td>
<td>Reference Voltage</td>
<td>$V_{OUT} + 1.75V \leq V_{IN} \leq 12V$, $I_{OUT} = 10mA$</td>
</tr>
<tr>
<td>$V_{DROP}$</td>
<td>Dropout Voltage</td>
<td>$I_{OUT} = 1A$</td>
</tr>
<tr>
<td>$I_{LIMIT}$ (Note 7)</td>
<td>Maximum Output Current</td>
<td>$1.75V \leq V_{IN} - V_{OUT}$</td>
</tr>
<tr>
<td>$V_{LOAD}$</td>
<td>Load Regulation</td>
<td>$V_{IN} = V_{OUT} + 1.75V$ $1mA \leq I_{OUT} \leq 1A$</td>
</tr>
<tr>
<td>$V_{LINE}$</td>
<td>Line Regulation</td>
<td>$1.75V \leq V_{IN} - V_{OUT} \leq 10V$, $I_{OUT} = 30mA$</td>
</tr>
<tr>
<td>$I_Q$</td>
<td>Quiescent Current</td>
<td>$I_{OUT} = 0$</td>
</tr>
<tr>
<td>—</td>
<td>Minimum Load Current</td>
<td>For ADJ Version, $1.75V \leq V_{IN} - V_{OUT} \leq 10V$</td>
</tr>
<tr>
<td>$I_{ADJ}$</td>
<td>Adjustable Pin Current</td>
<td>$1.75V \leq V_{IN} - V_{OUT} \leq 10V$</td>
</tr>
<tr>
<td>—</td>
<td>Adjustable Pin Current Change</td>
<td>$1.75V \leq V_{IN} - V_{OUT} \leq 10V$</td>
</tr>
<tr>
<td>PSRR</td>
<td>Power Supply Rejection Ratio</td>
<td>Ripple 1.0 Vp-p $V_{IN} = V_{OUT} + 2V$, $I_{OUT} = 100mA$ $f = 120Hz$ $f = 1kHz$</td>
</tr>
<tr>
<td>$\Delta V_{OUT}/V_{OUT} \Delta T$</td>
<td>Output Voltage Temperature Coefficient</td>
<td>$I_{OUT} = 30mA$</td>
</tr>
<tr>
<td>$V_{NOISE}$</td>
<td>RMS Output Noise</td>
<td>$10Hz \leq f \leq 100kHz$, No Load</td>
</tr>
<tr>
<td>$T_{OTSD}$</td>
<td>Thermal Shutdown Temperature</td>
<td>—</td>
</tr>
<tr>
<td>$T_{HYTSD}$</td>
<td>Thermal Shutdown Hysteresis</td>
<td>—</td>
</tr>
<tr>
<td>$\theta_{JC}$</td>
<td>Thermal Resistance (Junction to Case)</td>
<td>SOT223</td>
</tr>
</tbody>
</table>

**Note 7:** Make the $V_{OUT}$ down to about 98% of the test values, $I_{OUT}$ value is set to $I_{LIMIT}$ at this time.
Performance Characteristics

**Line Regulation vs. Temperature**

![Line Regulation vs. Temperature Graph](attachment:image1.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V to 10V} \)
- \( I_{OUT} = 10\text{mA} \)
- Continuous Airflow 10scfm

**Load Regulation vs. Temperature**

![Load Regulation vs. Temperature Graph](attachment:image2.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V} \)
- \( I_{OUT} = 10\text{mA to 1A} \)
- Continuous Airflow 10scfm

**Reference Voltage vs. Temperature**

![Reference Voltage vs. Temperature Graph](attachment:image3.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V} \)
- \( I_{OUT} = 10\text{mA} \)
- Continuous Airflow 10scfm

**Current Limit vs. Temperature**

![Current Limit vs. Temperature Graph](attachment:image4.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V} \)
- \( @V_{OUT} = V_{OUT}\text{(nom)x98%} \)

**Minimum Load Current vs. Temperature**

![Minimum Load Current vs. Temperature Graph](attachment:image5.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V} \)
- Continuous Airflow 10scfm

**Adjust Pin Current vs. Temperature**

![Adjust Pin Current vs. Temperature Graph](attachment:image6.png)

- AZ2117-1.25V
- \( V_{IN} = 3 \text{V} \)
- Continuous Airflow 10scfm
Performance Characteristics (Cont.)

- **Dropout Voltage vs. Output Current**
  - Chart showing dropout voltage vs. output current for different temperatures.
  - Key points:
    - $T_a = -40^\circ C$
    - $T_a = +25^\circ C$
    - $T_a = +85^\circ C$

- **Dropout Voltage vs. Temperature**
  - Chart showing dropout voltage vs. temperature for different output currents.

- **PSRR vs. Frequency**
  - Chart showing PSRR vs. frequency with specified capacitance values.
  - Key points:
    - $C_{in} = 10 \mu F$
    - $C_{out} = 10 \mu F$
    - $V_{in} = V_{out} + 2V_{DC}$
    - Ripple = 1.0V
    - $I_{out} = 100mA$

- **Load Transient Response**
  - Chart showing load transient response with specified conditions.

- **Power Dissipation vs. Temperature**
  - Chart showing power dissipation vs. temperature for continuous airflow.
  - Key points:
    - AZ2117-1.25V
    - Continuous Airflow 10scfm

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www.diodes.com
Ordering Information

AZ2117 X - X X X

Product Name  Package  Output Voltage  Packing  RoHS/Green
H : SOT223  ADJ : Adjustable Output  TR : Tape & Reel  G1 : Green

<table>
<thead>
<tr>
<th>Package</th>
<th>Temperature Range</th>
<th>Part Number</th>
<th>Marking ID</th>
<th>Packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOT223</td>
<td>-40°C to +125°C</td>
<td>AZ2117H-ADJTRG1</td>
<td>GH15P</td>
<td>4000/Tape &amp; Reel</td>
</tr>
</tbody>
</table>

Marking Information

(1) SOT223

First Line: Logo and Marking ID
(See Ordering Information)
Second Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch Number

XXX YWWAXX

(Top View)
Package Outline Dimensions (All dimensions in mm (inch).)

(1) Package Type: SOT223

(2) MIN
(1) Package Type: SOT223

Grid placement courtyard

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Z (mm)/(inch)</th>
<th>G (mm)/(inch)</th>
<th>X1 (mm)/(inch)</th>
<th>X2 (mm)/(inch)</th>
<th>Y (mm)/(inch)</th>
<th>E1 (mm)/(inch)</th>
<th>E2 (mm)/(inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>8.400/0.331</td>
<td>4.000/0.157</td>
<td>1.200/0.047</td>
<td>3.500/0.138</td>
<td>2.200/0.087</td>
<td>2.300/0.091</td>
<td>4.600/0.181</td>
</tr>
</tbody>
</table>
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