

## General Description

The LM1117 is a series of low dropout three-terminal regulators with a dropout of 1.15V at 1A output current.

The LM1117 series provides current limiting and thermal shutdown. Its circuit includes an immed bandgap reference to assure output voltage accuracy to be within 1% for 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V and adjustable versions or 2% for 1.2V version. Current limit is immed to ensure specified output current and conolled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The LM1117 has an adjustable version, that can provide the output voltage from 1.25V to 12V with only 2 external resistors.

The LM1117 series is available in the indusy standard SOT-223, SOT-89-3, TO-220-3, TO-252-2 and TO-263-3 power packages.

## Features

- Low Dropout Voltage: 1.15V at 1A Output Current
- immed Current Limit
- On-chip Thermal Shutdown
- Three-terminal Adjustable or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V
- Operation Junction Temperature: -40 to 125°C

## Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video Player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

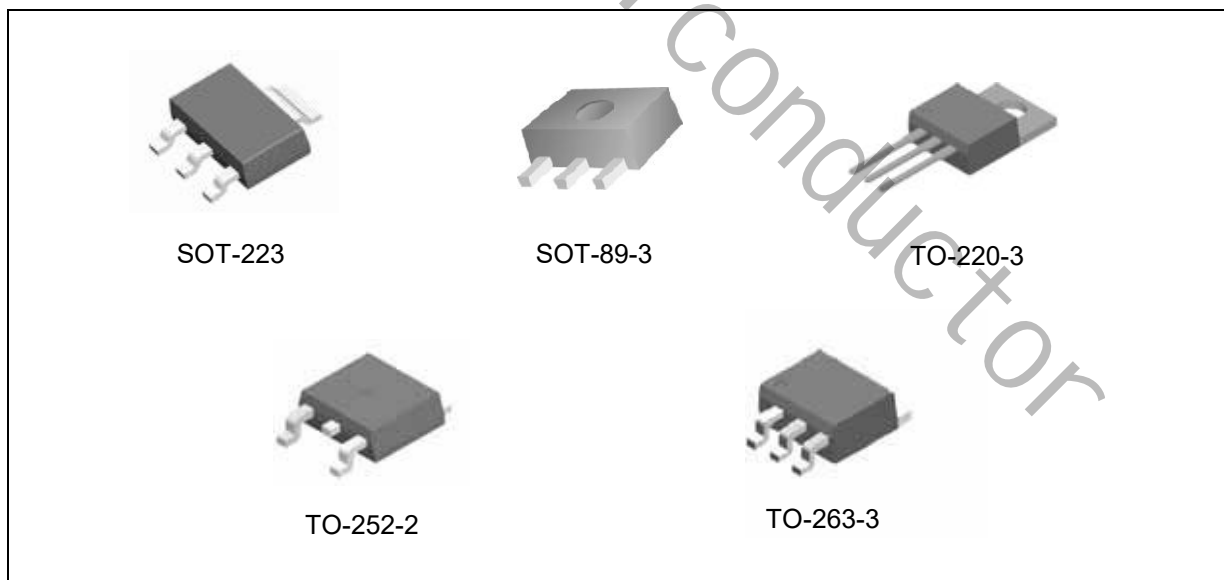


Figure 1. Package Types of LM1117

**Pin Configuration**

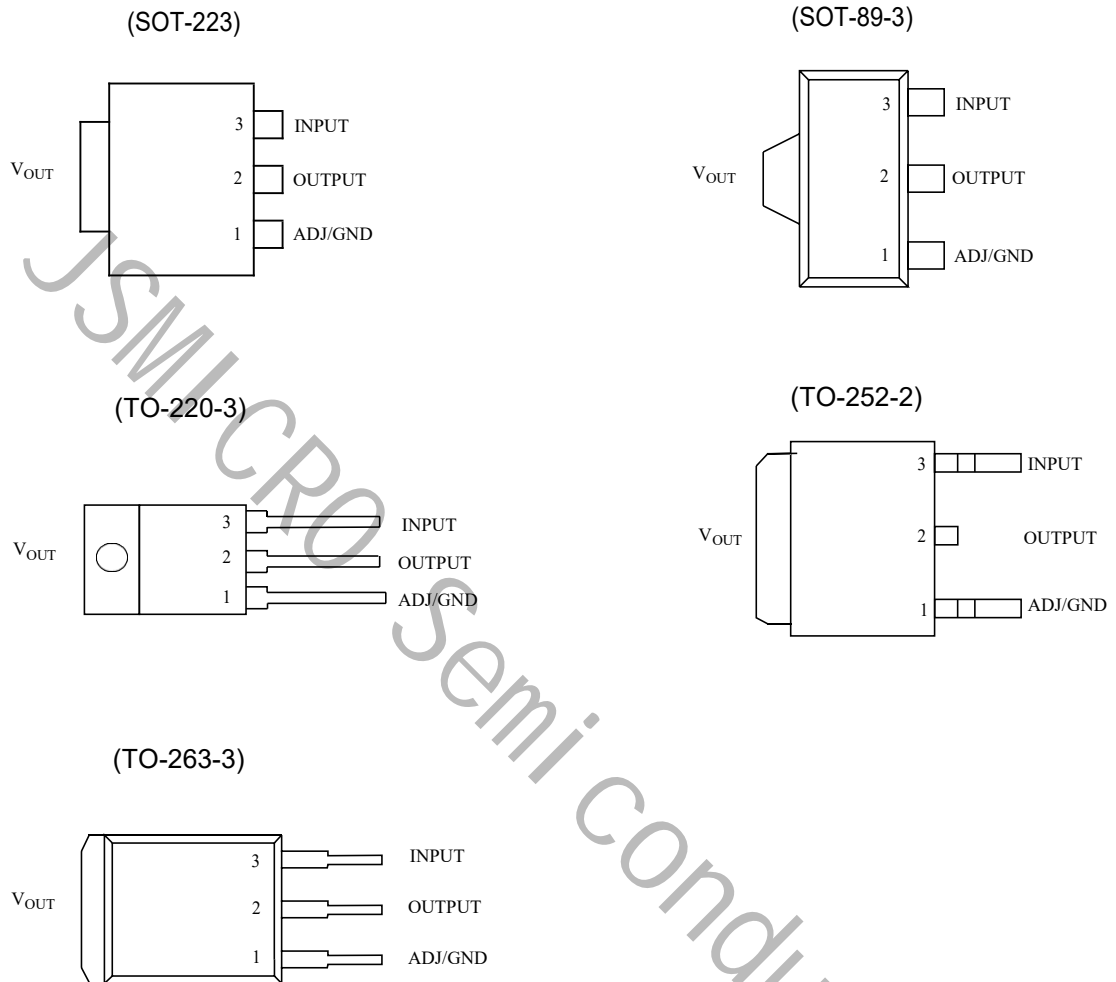


Figure 2. Pin Configuration of LM1117

**Functional Block Diagram**

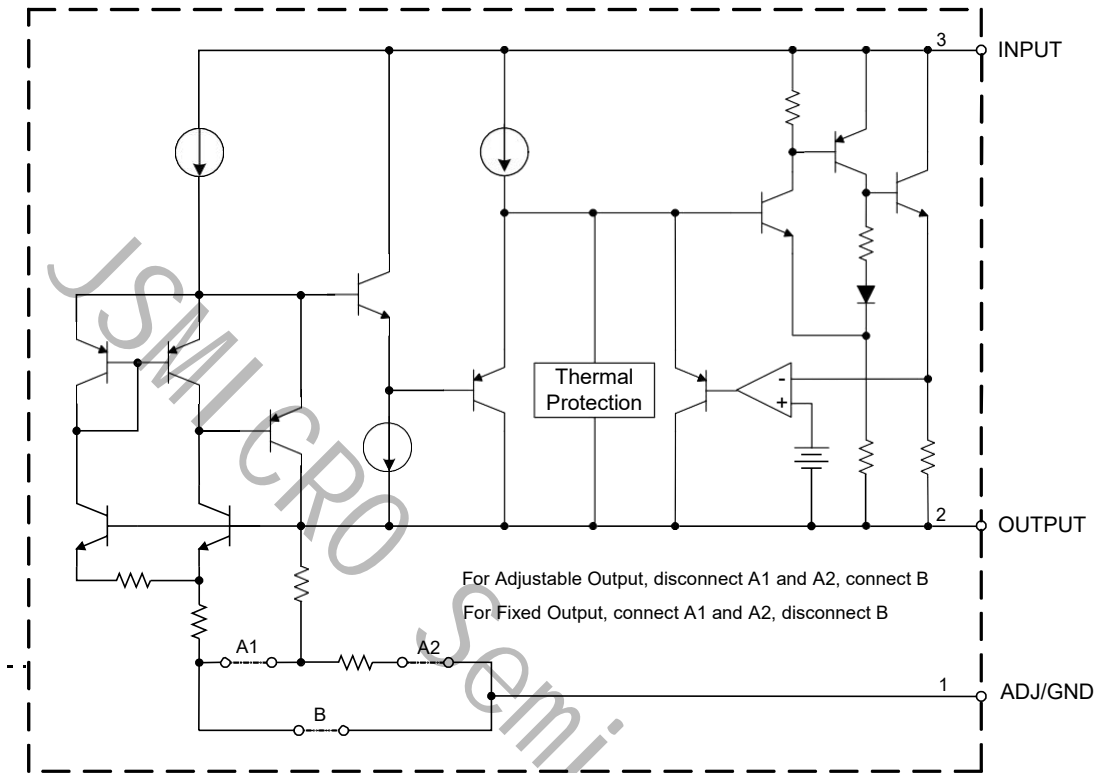
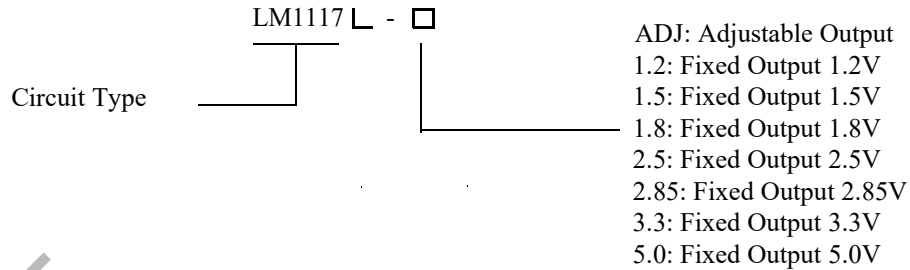


Figure 3. Functional Block Diagram of LM1117

**Ordering Information**


| Package  | Temperature Range | Part No.     | Marking ID   | Packing Type |
|----------|-------------------|--------------|--------------|--------------|
|          |                   | Tin Lead     | Tin Lead     |              |
| SOT-223  | -40 to 125°C      | LM1117-ADJ   | 1117-ADJ     | Tape & Reel  |
|          |                   | LM1117-1.2   | 1117-1.2     | Tape & Reel  |
|          |                   | LM1117-1.5   | 1117-1.5     | Tape & Reel  |
|          |                   | LM1117-1.8   | 1117-1.8     | Tape & Reel  |
|          |                   | LM1117-2.5   | 1117-2.5     | Tape & Reel  |
|          |                   | LM1117-2.85  | 1117-2.85    | Tape & Reel  |
|          |                   | LM1117-3.3   | 1117-3.3     | Tape & Reel  |
|          |                   | LM1117-5.0   | 1117-5.0     | Tape & Reel  |
| SOT-89-3 | -40 to 125°C      | LM1117-ADJ   | 1117-ADJ     | Tape & Reel  |
|          |                   | LM1117-1.2   | 1117-1.2     | Tape & Reel  |
|          |                   | LM1117-1.5   | 1117-1.5     | Tape & Reel  |
|          |                   | LM1117-1.8   | 1117-1.8     | Tape & Reel  |
|          |                   | LM1117-2.5   | 1117-2.5     | Tape & Reel  |
|          |                   | LM1117-2.85  | 1117-2.85    | Tape & Reel  |
|          |                   | LM1117-3.3   | 1117-3.3     | Tape & Reel  |
|          |                   | LM1117-5.0   | 1117-5.0     | Tape & Reel  |
| TO-220-3 | -40 to 125°C      | LM1117T-ADJ  | LM1117T-ADJ  | Tube         |
|          |                   | LM1117T-1.2  | LM1117T-1.2  | Tube         |
|          |                   | LM1117T-1.5  | LM1117T-1.5  | Tube         |
|          |                   | LM1117T-1.8  | LM1117T-1.8  | Tube         |
|          |                   | LM1117T-2.5  | LM1117T-2.5  | Tube         |
|          |                   | LM1117T-2.85 | LM1117T-2.85 | Tube         |
|          |                   | LM1117T-3.3  | LM1117T-3.3  | Tube         |
|          |                   | LM1117T-5.0  | LM1117T-5.0  | Tube         |

**Ordering Information (Continued)**

| Package  | Temperature Range | Part Number     | Marking ID      | Packing Type |
|----------|-------------------|-----------------|-----------------|--------------|
|          |                   | <b>Tin Lead</b> | <b>Tin Lead</b> |              |
| TO-252-2 | -40 to 125°C      | LM1117-ADJ      | LM1117-ADJ      | Tube         |
|          |                   | LM1117-ADJ      | LM1117-ADJ      | Tape & Reel  |
|          |                   | LM1117-1.2      | LM1117-1.2      | Tube         |
|          |                   | LM1117-1.2      | LM1117-1.2      | Tape & Reel  |
|          |                   | LM1117-1.5      | LM1117-1.5      | Tube         |
|          |                   | LM1117-1.5      | LM1117-1.5      | Tape & Reel  |
|          |                   | LM1117-1.8      | LM1117-1.8      | Tube         |
|          |                   | LM1117-1.8      | LM1117-1.8      | Tape & Reel  |
|          |                   | LM1117-2.5      | LM1117-2.5      | Tube         |
|          |                   | LM1117-2.5      | LM1117-2.5      | Tape & Reel  |
|          |                   | LM1117-2.85     | LM1117-2.85     | Tube         |
|          |                   | LM1117-2.85     | LM1117-2.85     | Tape & Reel  |
|          |                   | LM1117-3.3      | LM1117-3.3      | Tube         |
|          |                   | LM1117-3.3      | LM1117-3.3      | Tape & Reel  |
|          |                   | LM1117-5.0      | LM1117-5.0      | Tube         |
|          |                   | LM1117-5.0      | LM1117-5.0      | Tape & Reel  |
| TO-263-3 | -40 to 125°C      | LM1117-ADJ      | LM1117-ADJ      | Tube         |
|          |                   | LM1117-ADJ      | LM1117-ADJ      | Tape & Reel  |
|          |                   | LM1117-1.2      | LM1117-1.2      | Tube         |
|          |                   | LM1117-1.2      | LM1117-1.2      | Tape & Reel  |
|          |                   | LM1117-1.5      | LM1117-1.5      | Tube         |
|          |                   | LM1117-1.5      | LM1117-1.5      | Tape & Reel  |
|          |                   | LM1117-1.8      | LM1117-1.8      | Tube         |
|          |                   | LM1117-1.8      | LM1117-1.8      | Tape & Reel  |
|          |                   | LM1117-2.5      | LM1117-2.5      | Tube         |
|          |                   | LM1117-2.5      | LM1117-2.5      | Tape & Reel  |
|          |                   | LM1117-2.85     | LM1117-2.85     | Tube         |
|          |                   | LM1117-2.85     | LM1117-2.85     | Tape & Reel  |
|          |                   | LM1117-3.3      | LM1117-3.3      | Tube         |
|          |                   | LM1117-3.3      | LM1117-3.3      | Tape & Reel  |
|          |                   | LM1117-5.0      | LM1117-5.0      | Tube         |
|          |                   | LM1117-5.0      | LM1117-5.0      | Tape & Reel  |

**Absolute Maximum Ratings (Note 1)**

| Parameter                           | Symbol     | Min | Max | Unit |
|-------------------------------------|------------|-----|-----|------|
| Input Voltage                       | $V_{IN}$   |     | 20  | V    |
| Maximum Junction Temperature        | $T_J$      |     | 150 | °C   |
| Storage Temperature                 | $T_S$      | -65 | 150 | °C   |
| Lead Temperature (Soldering, 10sec) | $T_{LEAD}$ |     | 300 | °C   |
| ESD (Machine Model)                 | ESD        |     | 600 | V    |

**Recommended Operating Conditions**

| Parameter                            | Symbol   | Min | Max | Unit |
|--------------------------------------|----------|-----|-----|------|
| Input Voltage                        | $V_{IN}$ |     | 15  | V    |
| Operating Junction Temperature Range | $T_J$    | -40 | 125 | °C   |

## Electrical Characteristics

### LM1117-ADJ Electrical Characteristics

Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                            | Symbol           | Conditions   | Min            | Typ                        | Max            | Unit         |
|--------------------------------------|------------------|--|----------------|----------------------------|----------------|--------------|
| Reference Voltage                    | $V_{REF}$        | $I_{OUT} = 10mA$ , $V_{IN} - V_{OUT} = 2V$<br>$10mA \leq I_{OUT} \leq 1A$ , $1.4V \leq V_{IN} - V_{OUT} \leq 8V$ ,<br>$P \leq$ Maximum Power Dissipation | 1.238<br>1.225 | 1.250<br>1.250             | 1.262<br>1.270 | V            |
| Line Regulation                      | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$   |                | 0.035                      | 0.2            | %            |
| Load Regulation                      | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$  |                | 0.2                        | 0.4            | %            |
| Dropout Voltage                      |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 0.1A$  |                | 1.00                       | 1.1            | V            |
|                                      |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 0.5A$  |                | 1.08                       | 1.18           | V            |
|                                      |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 1.0A$  |                | 1.15                       | 1.25           | V            |
| Current Limit                        | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$  | 1.25           | 1.35                       |                | A            |
| Adjust Pin Current                   |                  |  |                | 60                         | 120            | $\mu A$      |
| Adjust Pin Current Change            |                  | $1.4V \leq V_{IN} - V_{OUT} \leq 10V$ , $10mA \leq I_{OUT} \leq 1A$  |                | 0.2                        | 5              | $\mu A$      |
| Minimum Load Current (ADJ)           |                  | $1.5V \leq V_{IN} - V_{OUT} \leq 10V$ (ADJ only)   |                | 1.7                        | 5              | mA           |
| Quiescent Current                    |                  | $V_{IN} = V_{OUT} + 1.25V$   |                | 5                          | 10             | mA           |
| Ripple Rejection                     |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$  | 60             | 75                         |                | dB           |
| Temperature Stability                |                  |  |                | 0.5                        |                | %            |
| Long -Term Stability                 |                  | $T_A = 125^\circ C$ , 1000hrs  |                | 0.3                        |                | %            |
| RMS Output Noise (% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$  |                | 0.003                      |                | %            |
| Thermal Resistance, Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3  |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                     |                  | Junction Temperature   |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown Hysteresis          |                  |  |                | 25                         |                | $^\circ C$   |

**Electrical Characteristics (Continued)**
**LM1117-1.2V Electrical Characteristics**

 Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ                        | Max            | Unit         |
|---|------------------|---|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 3.2V$<br>$10mA \leq I_{OUT} \leq 1A$ , $3.0V \leq V_{IN} \leq 10V$ | 1.176<br>1.152 | 1.2<br>1.2                 | 1.224<br>1.248 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1                          | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1                          | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$         | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3   |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25                         |                | $^\circ C$   |



**Electrical Characteristics (Continued)**  
**LM1117-1.5V Electrical Characteristics**

 Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ                        | Max            | Unit         |
|---|------------------|---|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 3.5V$<br>$10mA \leq I_{OUT} \leq 1A$ , $3.0V \leq V_{IN} \leq 10V$ | 1.485<br>1.470 | 1.5<br>1.5                 | 1.515<br>1.530 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1                          | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1                          | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$         | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3   |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25                         |                | $^\circ C$   |

**Electrical Characteristics (Continued)**  
**LM1117-1.8V Electrical Characteristics**

 Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ                        | Max            | Unit         |
|---|------------------|---|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 3.8V$<br>$10mA \leq I_{OUT} \leq 1A$ , $3.2V \leq V_{IN} \leq 10V$ | 1.782<br>1.746 | 1.8<br>1.8                 | 1.818<br>1.854 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1                          | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1                          | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$         | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3   |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25                         |                | $^\circ C$   |

**Electrical Characteristics (Continued)**  
**LM1117-2.5V Electrical Characteristics**

Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ                        | Max            | Unit         |
|---|------------------|---|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 4.5V$<br>$10mA \leq I_{OUT} \leq 1A$ , $3.9V \leq V_{IN} \leq 10V$ | 2.475<br>2.450 | 2.5<br>2.5                 | 2.525<br>2.550 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1                          | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1                          | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$         | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3   |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25                         |                | $^\circ C$   |

**Electrical Characteristics (Continued)**  
**LM1117-2.85V Electrical Characteristics**

 Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ          | Max            | Unit         |
|---|------------------|---|----------------|--------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 4.85V$<br>$10mA \leq I_{OUT} \leq 1A$ , $4.25V \leq V_{IN} \leq 10V$ | 2.822<br>2.793 | 2.85<br>2.85 | 2.878<br>2.907 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1            | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1            | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00         | 1.1            | V            |
|   |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08         | 1.18           | V            |
|   |                  | $\Delta V_{REF} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15         | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35         |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5            | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$           | 60             | 75           |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5          |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3          |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003        |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223   |                | 15           |                | $^\circ C/W$ |
|   |                  | SOT-89-3  |                | 75           |                |              |
|   |                  | TO-252-2  |                | 10           |                |              |
|   |                  | TO-220-3  |                | 4.5          |                |              |
|   |                  | TO-263-3  |                | 4            |                |              |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150          |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25           |                | $^\circ C$   |

**Electrical Characteristics (Continued)**  
**LM1117-3.3V Electrical Characteristics**

 Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions   | Min            | Typ                        | Max            | Unit         |
|---|------------------|--|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 5.0V$<br>$10mA \leq I_{OUT} \leq 1A$ , $4.75V \leq V_{IN} \leq 10V$ | 3.267<br>3.235 | 3.3<br>3.3                 | 3.333<br>3.365 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$   |                | 1                          | 6              | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$  |                | 1                          | 10             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$  |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$  |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$  |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$  | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$   |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$          | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |  |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs  |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$  |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3  |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature   |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |  |                | 25                         |                | $^\circ C$   |

**Electrical Characteristics (Continued)**  
**LM1117-5.0V Electrical Characteristics**

Operating Conditions:  $V_{IN} \leq 10V$ ,  $T_J = 25^\circ C$ , unless otherwise specified.

| Parameter                               | Symbol           | Conditions  | Min            | Typ                        | Max            | Unit         |
|---|------------------|---|----------------|----------------------------|----------------|--------------|
| Output Voltage                          | $V_{OUT}$        | $I_{OUT} = 10mA$ , $V_{IN} = 7.0V$<br>$10mA \leq I_{OUT} \leq 1A$ , $6.5V \leq V_{IN} \leq 12V$ | 4.950<br>4.900 | 5.0<br>5.0                 | 5.050<br>5.100 | V            |
| Line Regulation                         | $\Delta V_{OUT}$ | $I_{OUT} = 10mA$ , $1.5V \leq V_{IN} - V_{OUT} \leq 10V$  |                | 1                          | 10             | mV           |
| Load Regulation                         | $\Delta V_{OUT}$ | $V_{IN} - V_{OUT} = 2V$ , $10mA \leq I_{OUT} \leq 1A$   |                | 1                          | 15             | mV           |
| Dropout Voltage                         |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.1A$   |                | 1.00                       | 1.1            | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 0.5A$   |                | 1.08                       | 1.18           | V            |
|   |                  | $\Delta V_{OUT} = 1\%$ , $I_{OUT} = 1.0A$   |                | 1.15                       | 1.25           | V            |
| Current Limit                           | $I_{LIMIT}$      | $V_{IN} - V_{OUT} = 2V$   | 1.25           | 1.35                       |                | A            |
| Quiescent Current                       |                  | $V_{IN} = V_{OUT} + 1.25V$  |                | 5                          | 10             | mA           |
| Ripple Rejection                        |                  | $f = 120Hz$ , $C_{OUT} = 22\mu F$ Tantalum,<br>$V_{IN} - V_{OUT} = 3V$ , $I_{OUT} = 1A$         | 60             | 75                         |                | dB           |
| Temperature Stability                   |                  |   |                | 0.5                        |                | %            |
| Long -Term Stability                    |                  | $T_A = 125^\circ C$ , 1000hrs   |                | 0.3                        |                | %            |
| RMS Output Noise<br>(% of $V_{OUT}$ )   |                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 10kHz$   |                | 0.003                      |                | %            |
| Thermal Resistance,<br>Junction to Case | $\theta_{JC}$    | SOT-223<br>SOT-89-3<br>TO-252-2<br>TO-220-3<br>TO-263-3   |                | 15<br>75<br>10<br>4.5<br>4 |                | $^\circ C/W$ |
| Thermal Shutdown                        |                  | Junction Temperature  |                | 150                        |                | $^\circ C$   |
| Thermal Shutdown<br>Hysteresis          |                  |   |                | 25                         |                | $^\circ C$   |

Typical Performance Characteristics

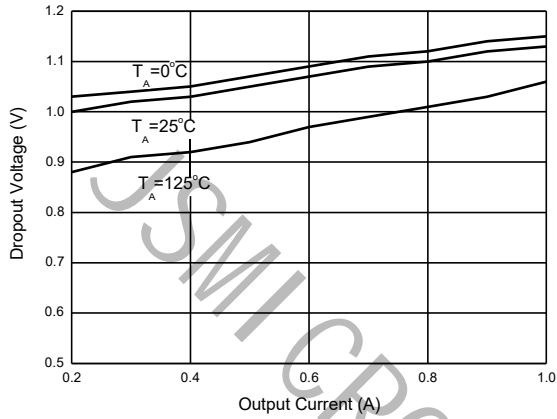


Figure 4. Dropout Voltage vs. Output Current

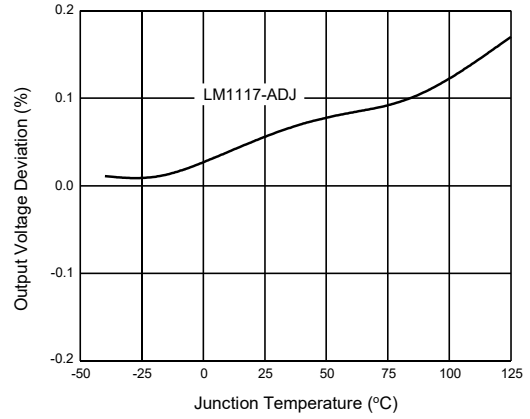


Figure 5. Load Regulation vs. Junction Temperature

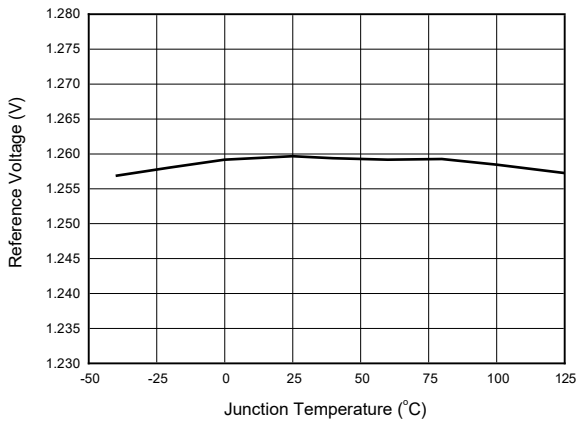


Figure 6. Reference Voltage vs. Junction Temperature

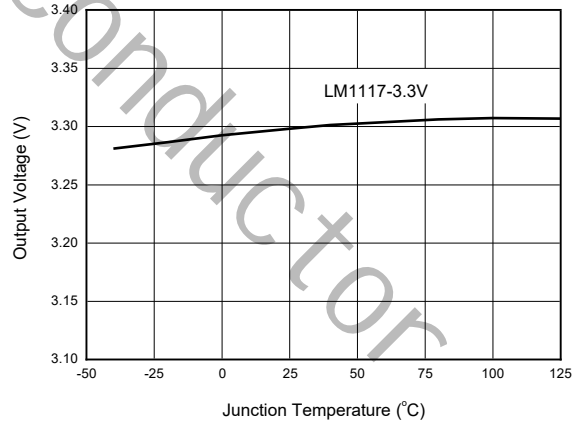


Figure 7. Output Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

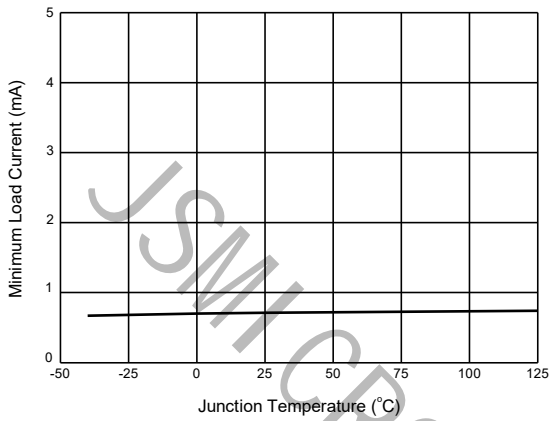


Figure 8. Minimum Load Current vs. Junction Temperature

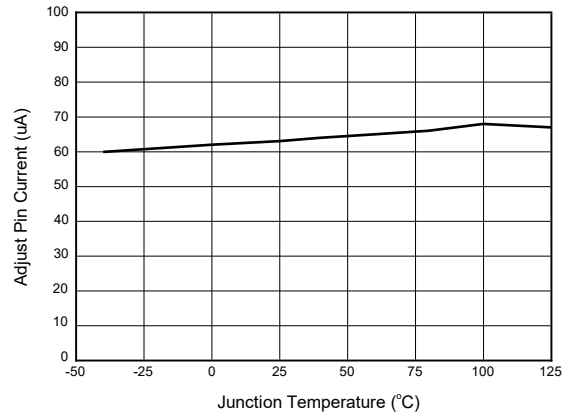


Figure 9. Adjust Pin Current vs. Temperature

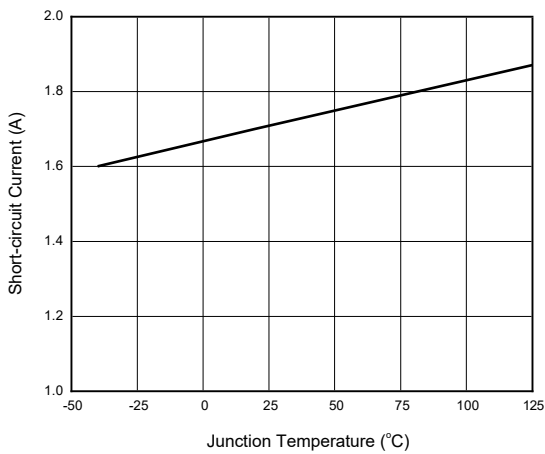


Figure 10. Short-Circuit Current vs. Junction Temperature

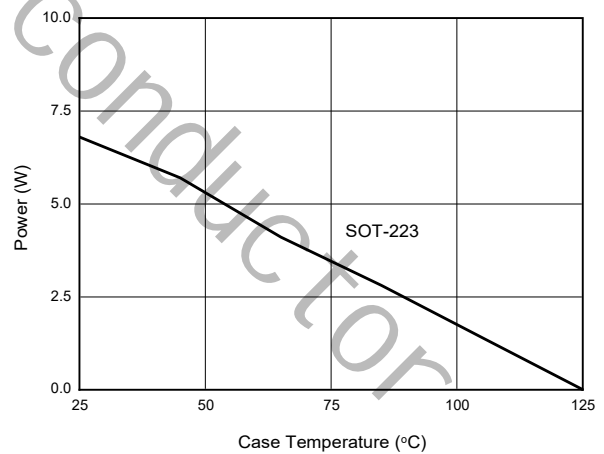


Figure 11. Maximum Power Dissipation



Typical Performance Characteristics (Continued)

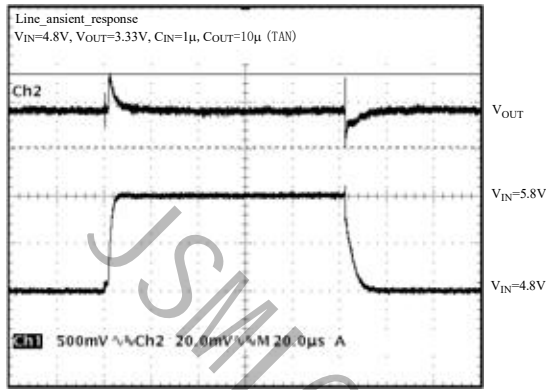


Figure 12. Line transient Response

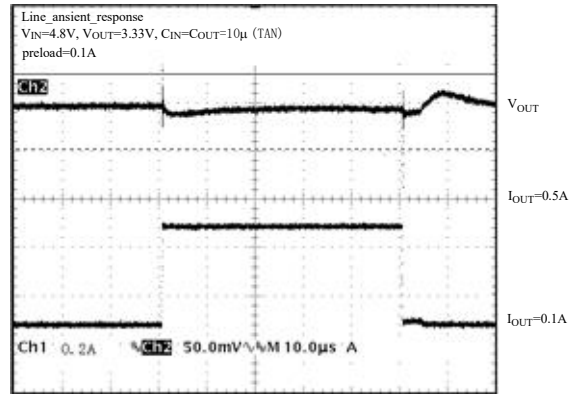


Figure 13. Load transient Response

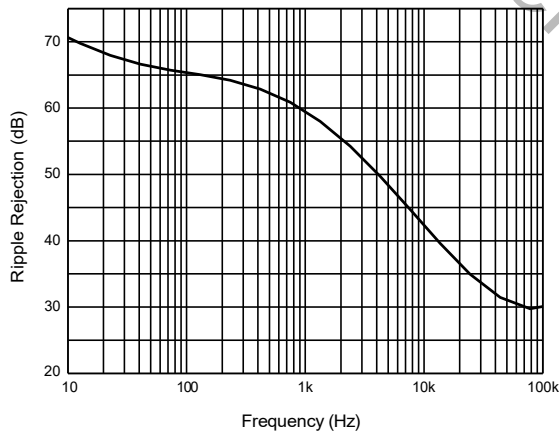


Figure 14. Ripple Rejection vs. Frequency

Typical Applications

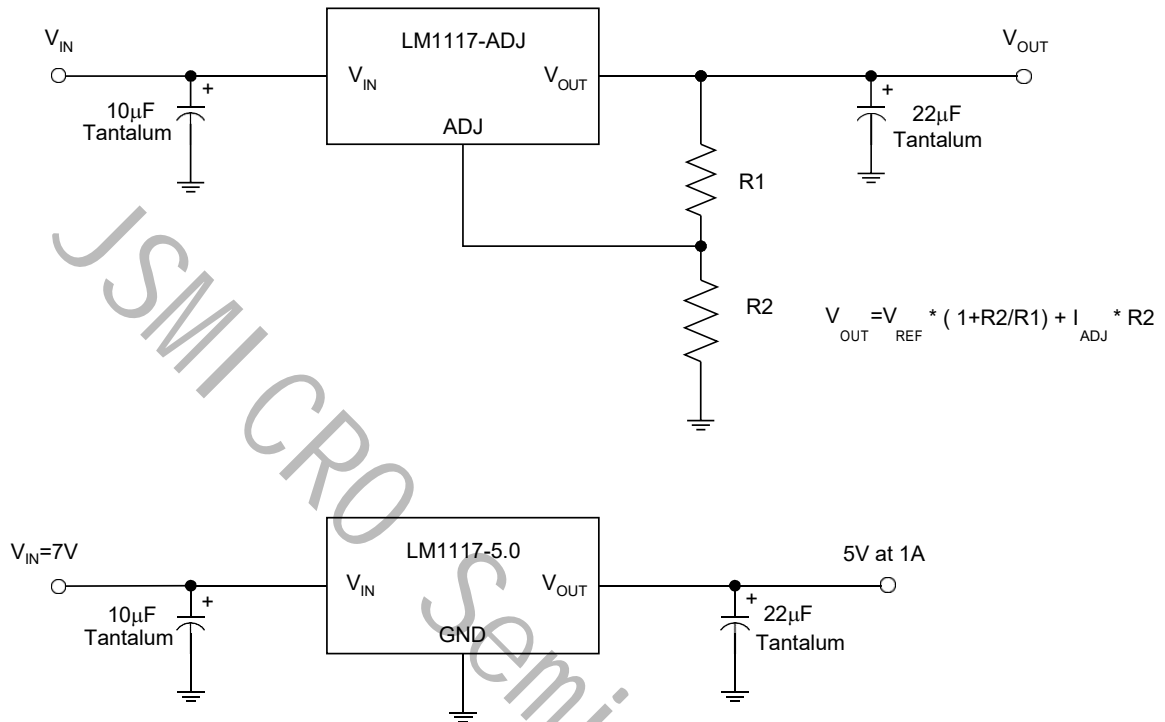
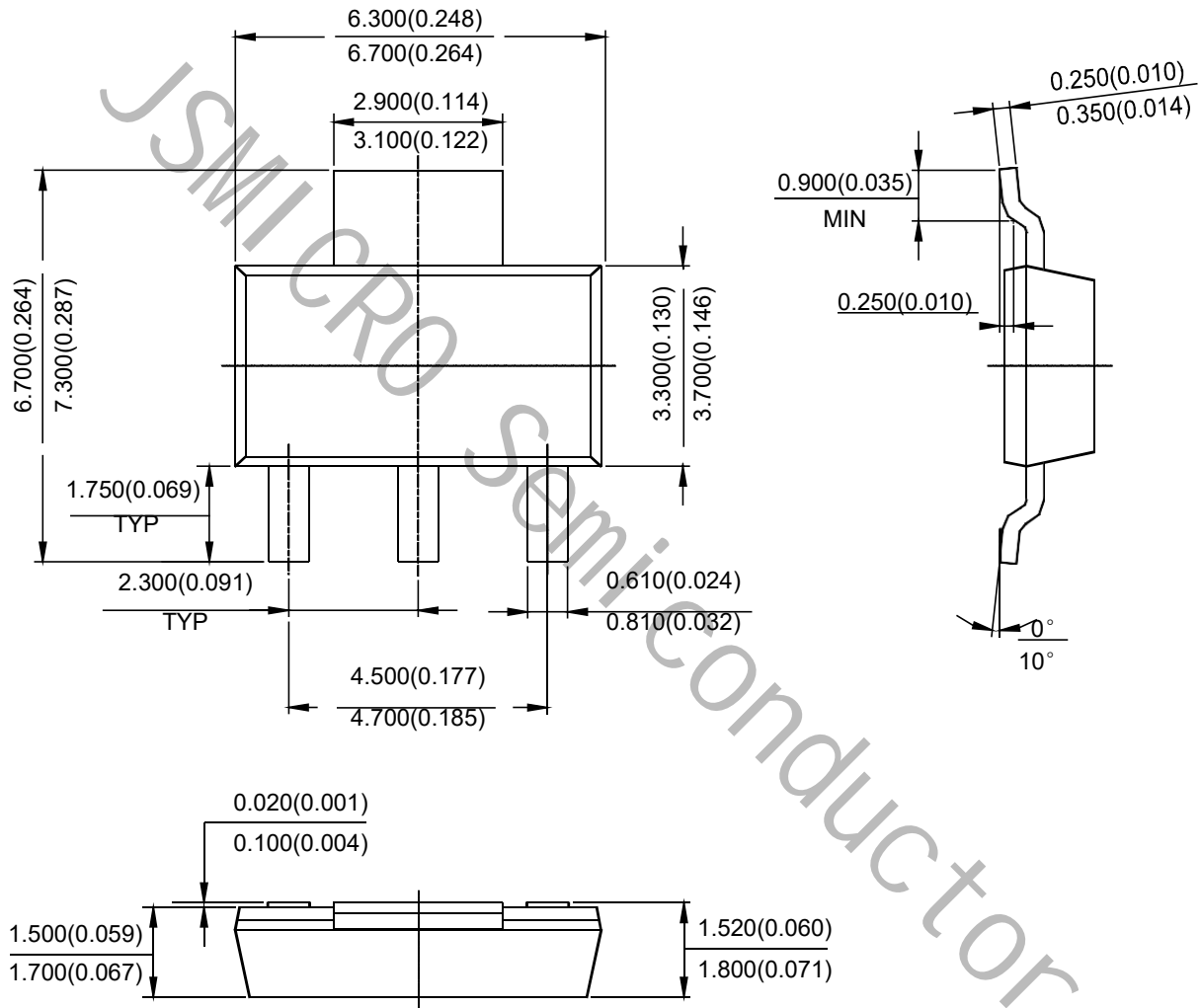


Figure 15. Typical Applications of LM1117

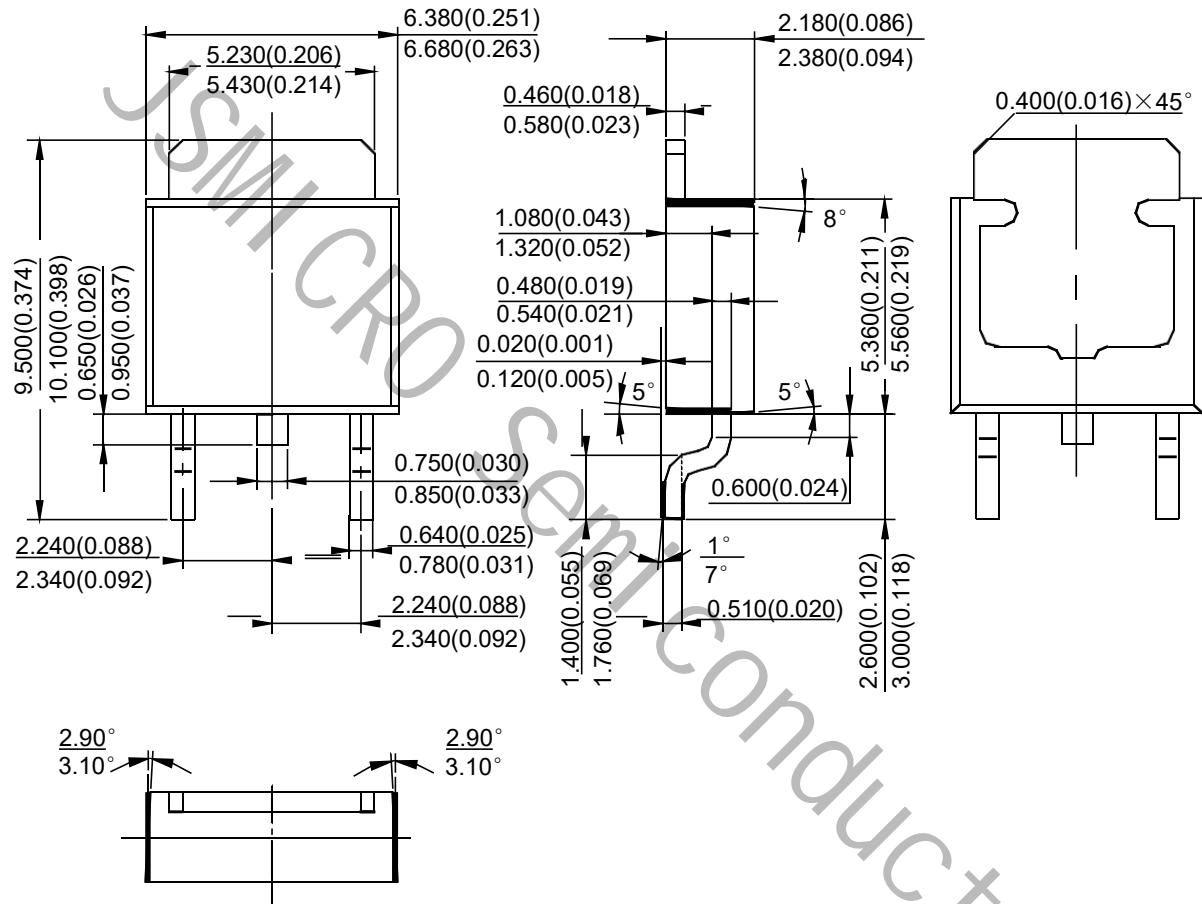
**Mechanical Dimensions**

**SOT-223**

**Unit: mm(inch)**

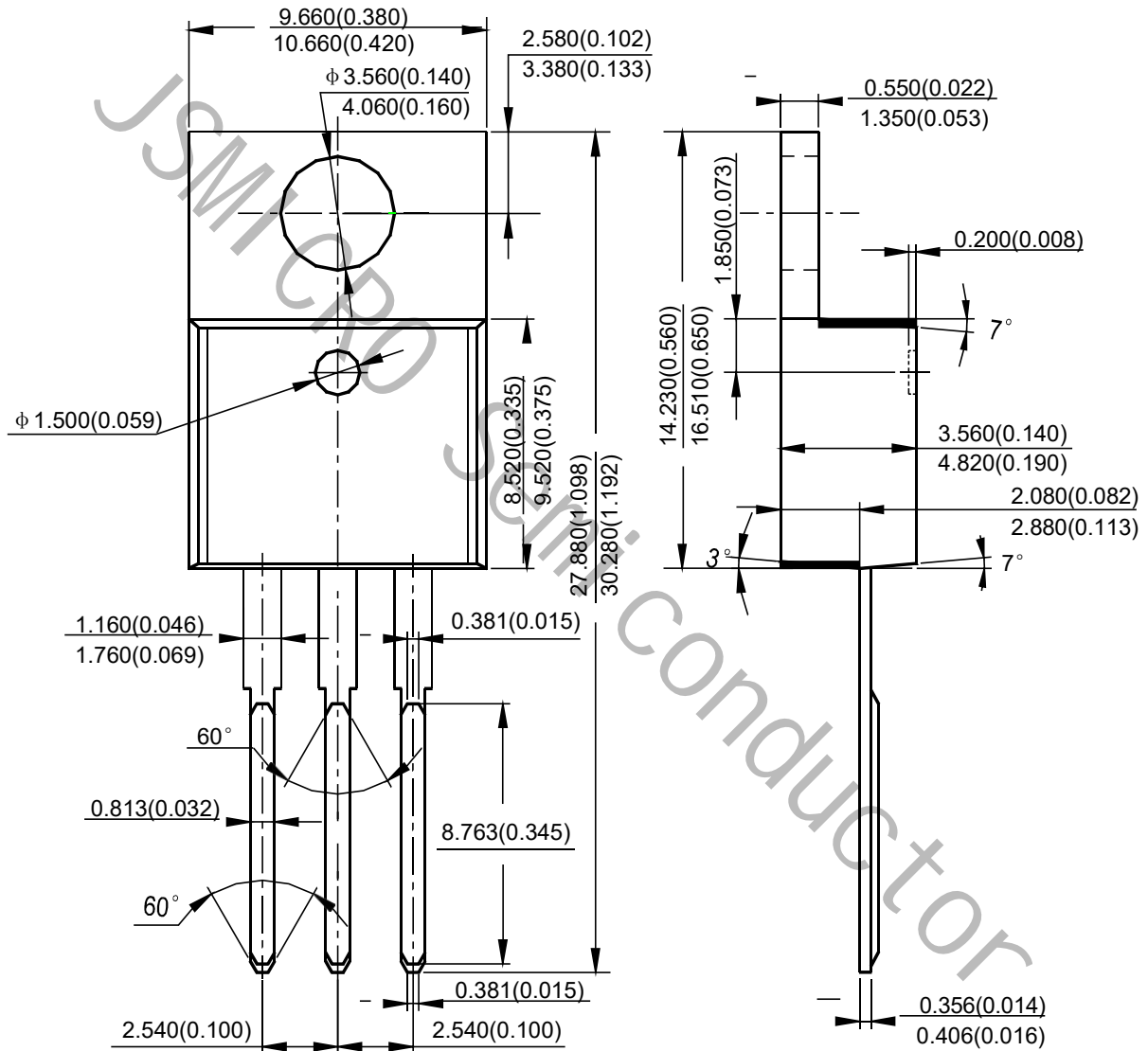




**Mechanical Dimensions (Continued)**
**TO-252-2**
**Unit: mm(inch)**


Mechanical Dimensions (Continued)

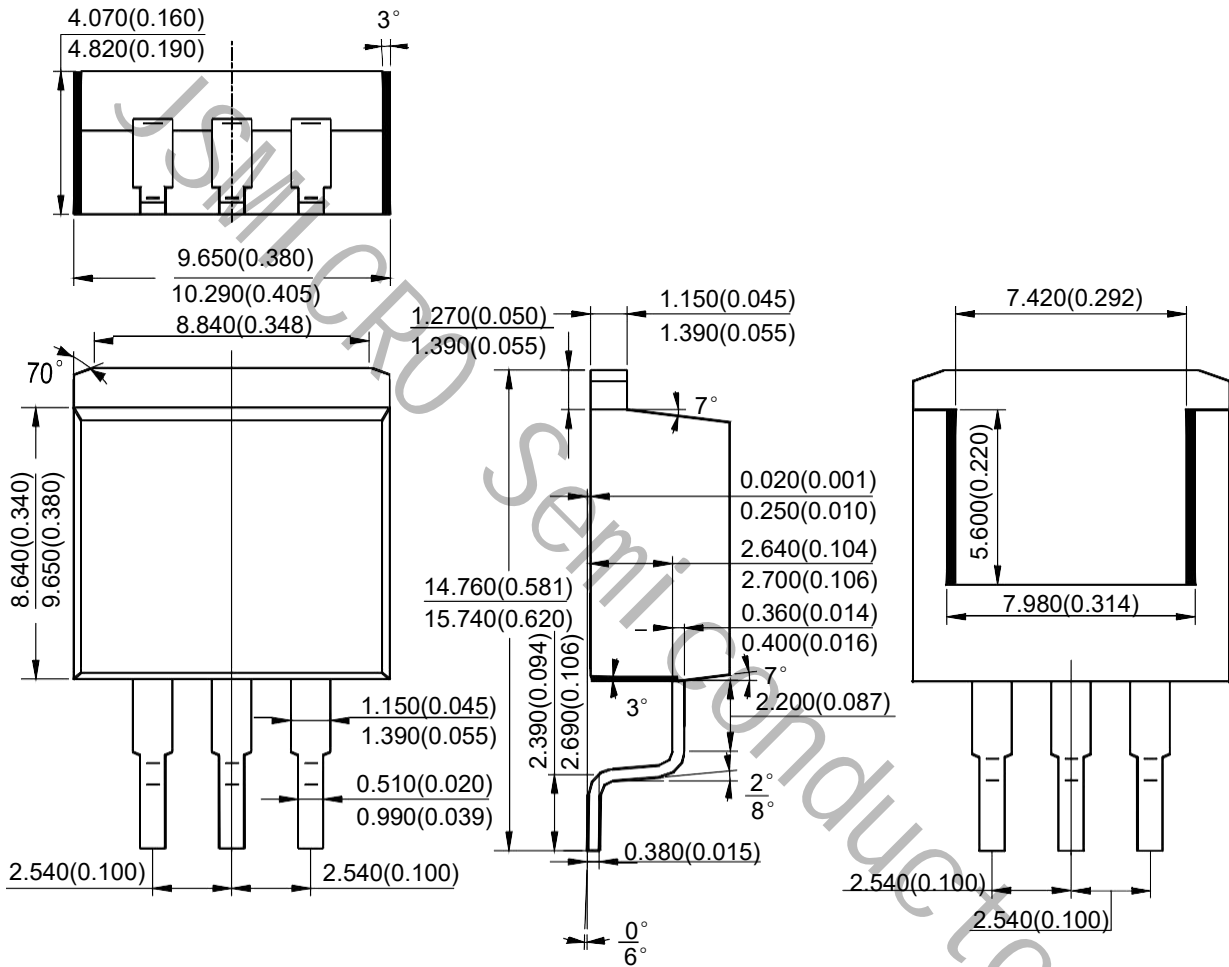
TO-220-3



**Mechanical Dimensions (Continued)**

**TO-263-3**

**Unit: mm(inch)**



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