# LTP1117
Low Dropout Linear Regulator



## General Description

The LTP1117-3.3/5/ADJ is a low dropout voltage regulator with 800mA output current capability. The LTP1117-ADJ is available in an adjustable version, which can set the output voltage from 1.25V to 13.8V with only two external resistors, and LTP1117-3.3/5 is available in 3.3V/5V fixed voltages. The product has built-in thermal protection, which is widely used in various occasions requiring high precision, low dropout voltage, such as portable instrumentation, battery chargers, etc.

## Features

- Output voltage adjustable
- Low dropout voltage
- Load regulation: 0.2% (Typical)
- Built-in thermal protection
- Output current: 800mA (Maximum)
- Substrate connected to Vout
- Packaging information: SOT-223/TO-252

## Applications

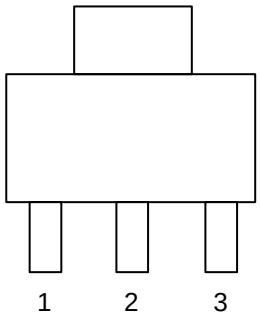
- Electronic Points of Sale
- Medical, Health, and Fitness Applications
- Printers
- Appliances and White Goods
- TV Set-Top Boxes
- Auto power supply

## Ordering Information

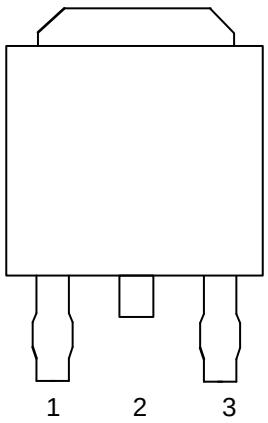
| Model | Package | Ordering Number[Note1] | Packing Option |
|---|---|---|---|
| LTP1117 | SOT223 | LTP1117-xxT23 | Tape and Reel, 2500 |
| | TO-252 | LTP1117-xxT52 | Tape and Reel, 2500 |
| | SOT223 | LTP1117-AT23 | Tape and Reel, 2500 |
| | TO-252 | LTP1117-AT52 | Tape and Reel, 2500 |

Note1: xx stands for output voltages, e.g. if xx = 33, the output voltage is 3.3V; if xx = 50, the output voltage is 5.0 V. A stands for ADJ.

## Pin Configurations (Top View)




SOT-223

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## Pin Function

| Pin no. | Symbol | Function |
|---|---|---|
| 1 | ADJ/GND | Adjust pin/ground |
| 2 | $V_{OUT}$ | output |
| 3 | $V_{IN}$ | input |

## Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{IN}$ | | 18 | V |
| Operating temperature | $T_{AMB}$ | -40 | 125 | °C |
| Storage temperature | $T_{STG}$ | -65 | 150 | °C |
| Soldering temperature (10s) | $T_L$ | | 300 | °C |

NOTE:

Stresses beyond 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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Recommended Operating Conditions

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Input supply voltage range | $V_{IN}$ | 2.75~18 | V |
| Output current | $I_{OUT}$ | 10~800 | mA |

## Electrical Characteristics

**LTP1117-ADJ Version** ($T_J$ = 25° C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Reference Voltage | $V_{REF}$ | $T_J$ = 25°C, $V_{IN}$ - $V_{OUT}$ = 2 V<br>$I_{OUT}$ = 10 mA | 1.238 | 1.250 | 1.262 | V |
| | | $T_J$ = 25°C, 1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | 1.250 | | |
| | | $T_J$ = -40°C to +125°C<br>1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | 1.225 | | 1.270 | |
| Line Regulation | $\Delta V_{O(\Delta VI)}$ | $T_J$ = 25°C, $I_{OUT}$ = 10 mA<br>1.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 13.75 V | | 0.035 | | % |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 10 mA<br>1.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 13.75 V | | | 0.2 | |
| Load Regulation | $\Delta V_{O(\Delta IO)}$ | $T_J$ = 25°C, $V_{IN}$ - $V_{OUT}$ = 3 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | 0.2 | | |
| | | $T_J$ = -40°C to +125°C, $V_{IN}$ - $V_{OUT}$ = 3 V10 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 0.4 | |
| Dropout Voltage | $V_{DO}$ | $T_J$ = 25°C, $I_{OUT}$ = 100 mA | | 1.1 | | V |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 100 mA | | | 1.2 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 500 mA | | 1.15 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 500 mA | | | 1.25 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 800 mA | | 1.2 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 800 mA | | | 1.3 | |
| Output Current Limit | $I_{LIM}$ | $V_{IN}$ - $V_{OUT}$ = 5 V, $T_J$ = 25°C | 0.8 | 1.2 | 1.5 | A |
| Quiescent Current | $I_Q$ | $V_{IN}$ ≤ 15 V, $T_J$ = 25°C | | 1.7 | | mA |
| | | $V_{IN}$ ≤ 15 V, $T_J$ = -40°C to +125°C | | | 5 | |
| Minimum Load Current | $I_{OMIN}$ | $V_{IN}$ = 15 V, $T_J$ = 25°C | | 1.7 | | mA |
| | | $V_{IN}$ = 15 V, $T_J$ = -40°C to +125°C | | | 5 | |
| Thermal Regulation | | $T_{AMB}$ = 25°C, 30ms pulse | | 0.01 | 0.1 | %/W |
| Ripple Regulation | PSRR | $T_J$ = 25°C, f = 120Hz, $V_{ripple}$ = 1 $V_{PP}$<br>$V_{IN}$ – $V_{OUT}$ = 3 V | | 75 | | dB |
| | | $T_J$ = -40°C to +125°C, f = 120Hz<br>, $V_{ripple}$ = 1 $V_{PP}$, $V_{IN}$ – $V_{OUT}$ = 3 V | 60 | | | |
| Adjust Pin Current | $I_{ADJ}$ | $T_J$ = 25°C | | 60 | | µA |
| | | $T_J$ = -40°C to +125°C | | | 120 | |
| Adjust Pin Current Change | $\Delta I_{ADJ}$ | $T_J$ = 25°C, 1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | 0.2 | | µA |
| | | $T_J$ = -40°C to +125°C<br>1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 5 | |
| Temperature Stability | | | | 0.5 | | % |
| Long Term Stability | | $T_{AMB}$ = 125°C, 1000hrs | | 0.3 | | % |
| RMS Output Noise | | (% of $V_{OUT}$), 10Hz ≤ f ≤ 10KHz | | 0.003 | | % |

## Electrical Characteristics

**(LTP1117-3.3 Version** $T_J$ = 25° C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_J$ = 25°C, $V_{IN}$ = 5 V<br>$I_{OUT}$ = 10 mA | 3.267 | 3.3 | 3.333 | V |
| | | $T_J$ = 25°C, 4.75 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V; 0 mA ≤ $I_{OUT}$ ≤ 800 mA | | 3.3 | | |
| | | $T_J$ = -40°C to +125°C<br>4.75 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | 3.235 | | 3.365 | |
| Line Regulation | $\Delta V_{O(\Delta VI)}$ | $T_J$ = 25°C, $I_{OUT}$ = 0 mA<br>4.75 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 15 V | | 1 | | mV |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 0 mA<br>4.75 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 15 V | | | 6 | |
| Load Regulation | $\Delta V_{O(\Delta IO)}$ | $T_J$ = 25°C, $V_{IN}$ = 4.75 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | | 1 | | |
| | | $T_J$ = -40°C to +125°C, $V_{IN}$ = 4.75 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 10 | |
| Dropout Voltage | $V_{DO}$ | $T_J$ = 25°C, $I_{OUT}$ = 100 mA | | 1.1 | | V |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 100 mA | | | 1.2 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 500 mA | | 1.15 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 500 mA | | | 1.25 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 800 mA | | 1.2 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 800 mA | | | 1.3 | |
| Output Current Limit | $I_{LIM}$ | $V_{IN}$ - $V_{OUT}$ = 5 V, $T_J$ = 25°C | 0.8 | 1.2 | 1.5 | A |
| Quiescent Current | $I_Q$ | $V_{IN}$ ≤ 15 V, $T_J$ = 25°C | | 5 | | mA |
| | | $V_{IN}$ ≤ 15 V, $T_J$ = -40°C to +125°C | | | 10 | |
| Thermal Regulation | | $T_{AMB}$ = 25°C, 30ms pulse | | 0.01 | 0.1 | %/W |
| Ripple Regulation | PSRR | $T_J$ = 25°C, f = 120Hz, $V_{ripple}$ = 1 $V_{PP}$<br>$V_{IN}$ – $V_{OUT}$ = 3 V | | 75 | | dB |
| | | $T_J$ = -40°C to +125°C, f = 120Hz<br>, $V_{ripple}$ = 1 $V_{PP}$, $V_{IN}$ – $V_{OUT}$ = 3 V | 60 | | | |
| Adjust Pin Current | $I_{ADJ}$ | $T_J$ = 25°C | | 60 | | µA |
| | | $T_J$ = -40°C to +125°C | | | 120 | |
| Adjust Pin Current Change | $\Delta I_{ADJ}$ | $T_J$ = 25°C, 1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | 0.2 | | µA |
| | | $T_J$ = -40°C to +125°C<br>1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 5 | |
| Temperature Stability | | | | 0.5 | | % |
| Long Term Stability | | $T_{AMB}$ = 125°C, 1000hrs | | 0.3 | | % |
| RMS Output Noise | | (% of $V_{OUT}$), 10Hz ≤ f ≤ 10KHz | | 0.003 | | % |

## Electrical Characteristics

**(LTP1117-5.0 Version** $T_J$ = 25° C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_J$ = 25°C, $V_{IN}$ = 7 V<br>$I_{OUT}$ = 10 mA | 4.95 | 5.0 | 5.05 | V |
| | | $T_J$ = 25°C, 6.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 12 V;<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | | 5.0 | | |
| | | $T_J$ = -40°C to +125°C<br>6.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 12 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | 4.9 | | 5.1 | |
| Line Regulation | $\Delta V_{O(\Delta VI)}$ | $T_J$ = 25°C, $I_{OUT}$ = 0 mA<br>6.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 15 V | | 1 | | mV |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 0 mA<br>6.5 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 15 V | | | 10 | |
| Load Regulation | $\Delta V_{O(\Delta IO)}$ | $T_J$ = 25°C, $V_{IN}$ = 6.5 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | | 1 | | |
| | | $T_J$ = -40°C to +125°C, $V_{IN}$ = 6.5 V<br>0 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 15 | |
| Dropout Voltage | $V_{DO}$ | $T_J$ = 25°C, $I_{OUT}$ = 100 mA | | 1.1 | | V |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 100 mA | | | 1.2 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 500 mA | | 1.15 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 500 mA | | | 1.25 | |
| | | $T_J$ = 25°C, $I_{OUT}$ = 800 mA | | 1.2 | | |
| | | $T_J$ = -40°C to +125°C, $I_{OUT}$ = 800 mA | | | 1.3 | |
| Output Current Limit | $I_{LIM}$ | $V_{IN}$ - $V_{OUT}$ = 5 V, $T_J$ = 25°C | 0.8 | 1.2 | 1.5 | A |
| Quiescent Current | $I_Q$ | $V_{IN}$ ≤ 15 V, $T_J$ = 25°C | | 5 | | mA |
| | | $V_{IN}$ ≤ 15 V, $T_J$ = -40°C to +125°C | | | 10 | |
| Thermal Regulation | | $T_{AMB}$ = 25°C, 30ms pulse | | 0.01 | 0.1 | %/W |
| Ripple Regulation | PSRR | $T_J$ = 25°C, f = 120Hz, $V_{ripple}$ = 1 $V_{PP}$<br>$V_{IN}$ – $V_{OUT}$ = 3 V | | 75 | | dB |
| | | $T_J$ = -40°C to +125°C, f = 120Hz<br>, $V_{ripple}$ = 1 $V_{PP}$, $V_{IN}$ – $V_{OUT}$ = 3 V | 60 | | | |
| Adjust Pin Current | $I_{ADJ}$ | $T_J$ = 25°C | | 60 | | µA |
| | | $T_J$ = -40°C to +125°C | | | 120 | |
| Adjust Pin Current Change | $\Delta I_{ADJ}$ | $T_J$ = 25°C, 1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | 0.2 | | µA |
| | | $T_J$ = -40°C to +125°C<br>1.4 V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10 V<br>10 mA ≤ $I_{OUT}$ ≤ 800 mA | | | 5 | |
| Temperature Stability | | | | 0.5 | | % |
| Long Term Stability | | $T_{AMB}$ = 125°C, 1000hrs | | 0.3 | | % |
| RMS Output Noise | | (% of $V_{OUT}$), 10Hz ≤ f ≤ 10KHz | | 0.003 | | % |

## Package Dimension

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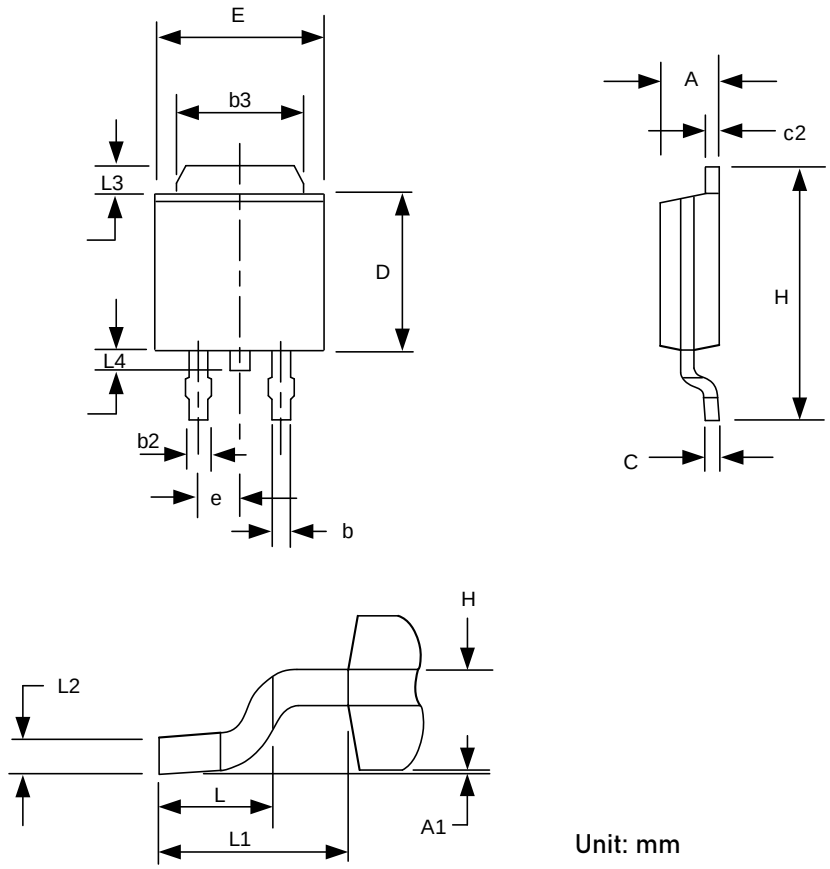
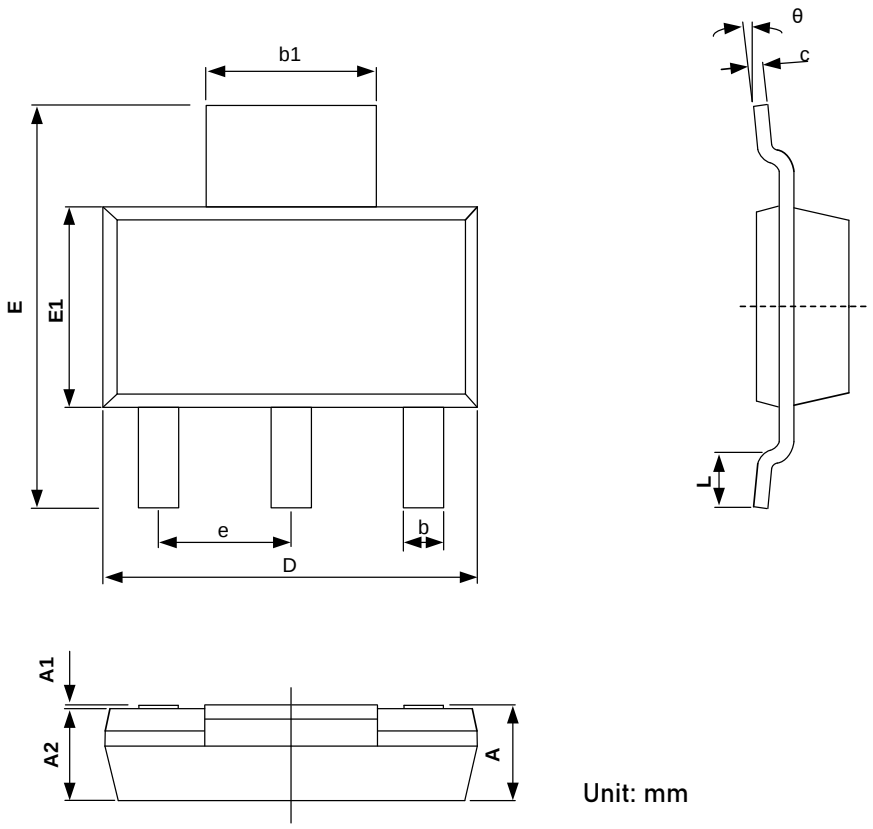



Unit: mm

| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | MIN | MAX |
| A | 2.18 | 2.38 |
| A1 | | 0.13 |
| b | 0.63 | 0.89 |
| b2 | 0.72 | 1.14 |
| b3 | 4.57 | 5.46 |
| c | 0.46 | 0.61 |
| c2 | 0.46 | 0.61 |
| D | 5.97 | 6.22 |
| E | 6.35 | 6.73 |
| e | 2.290BSC | |
| H | 9.40 | 10.41 |
| L | 1.40 | 1.78 |
| L1 | 2.90REF | |
| L2 | 0.51BSC | |
| L3 | 0.89 | 1.27 |
| L4 | | 1.01 |

## Package Dimension

SOT-223




Unit: mm

| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | MIN | MAX |
| A | | 1.800 |
| A1 | 0.020 | 0.100 |
| A2 | 1.500 | 1.700 |
| b | 0.660 | 0.840 |
| b1 | 2.900 | 3.100 |
| c | 0.230 | 0.350 |
| D | 6.300 | 6.700 |
| E | 6.700 | 7.300 |
| E1 | 3.300 | 3.700 |
| e | 2.300BSC | |
| L | 0.750 | |
| θ | 0° | 10° |