

1.2A 20V Low Dropout Voltage Regulator

Features

- Ultra-Low Quiescent Current: 82 μ A Typical
- Low Dropout Voltage: 690mV at 1.2A
- Wide Input Voltage Range: 2.5V to 20V
- Output Voltage Range:
 - Fixed Operation: 1.8V, 2.5V, 3.3V, 5V
- Maximum output current: 1.2A
- Output Voltage Accuracy: 2%
- Fast Load and Line Transient Responses
- Thermal Shutdown and Over-Current Protection
- Stable with 2.2 μ F or Larger Ceramic Capacitor
- Operating Junction Temperature: -40°C to +125°C
- Available in SOT-223 Package

Applications

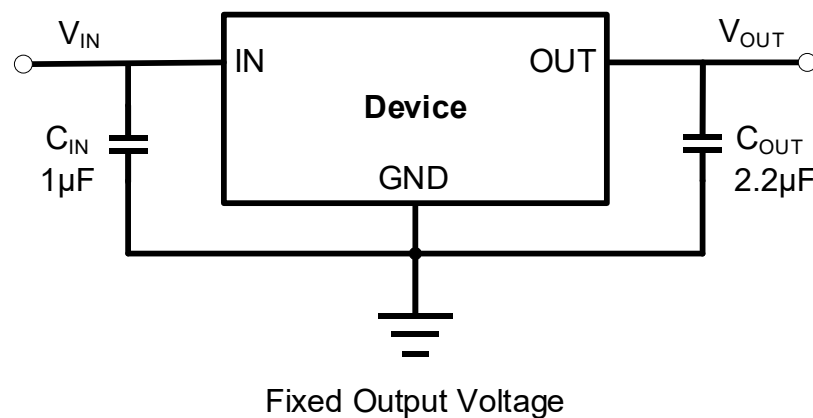
- Post Regulator for Switching DC-DC Converter
- Battery Chargers
- Portable Equipment
- High-Efficiency Linear Regulators

Description

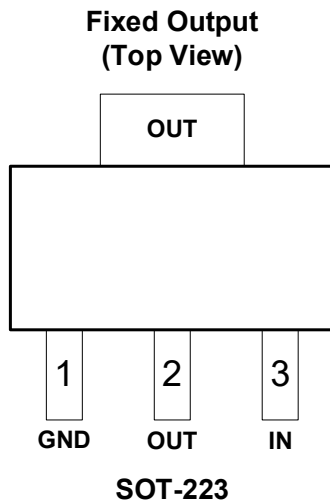
The LDL1117 provides 1.2A output current with ultra-low quiescent current and low dropout voltage. The device provides fixed output voltages of 1.8V, 2.5V, 3.3V and 5V.

The LDL1117 also features over current limit and thermal shutdown protection, as well as automatic discharge function to quickly discharge VOUT in the disabled states.

Typical Application Circuits



Pin Configuration and Functions



Pin Descriptions

| PIN Number | PIN Name | I/O | Function |
|------------|----------|-----|---|
| 1 | GND | - | Ground. |
| 2 | OUT | O | Regulator output voltage pin. A 2.2 μ F or larger ceramic capacitor from OUT to ground is required to ensure regulator stability. The capacitor should be placed as close to the output as possible. Minimize the impedance from the OUT pin to the load. |
| 3 | IN | I | Input supply voltage pin. It is recommended to use a 1 μ F or larger ceramic capacitor from IN pin to ground to get a good power supply decoupling. |

Package/Ordering Information

| DEVICE | PACKAGE TYPE | OUTPUT VOLTAGE | PACKING OPTION |
|-------------|--------------|----------------|---------------------|
| LDL1117S18R | SOT-223 | 1.8V | Tape and Reel, 1000 |
| LDL1117S25R | SOT-223 | 2.5V | Tape and Reel, 1000 |
| LDL1117S33R | SOT-223 | 3.3V | Tape and Reel, 1000 |
| LDL1117S50R | SOT-223 | 5.0V | Tape and Reel, 1000 |

Electrical Specifications

Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---------------------------|------------------|--------------------|------|
| IN and OUT Pins | IN and OUT | -0.3 to 22 | V |
| Storage temperature range | T _{STG} | -65 to +150 | °C |
| Output current | I _{OUT} | Internally Limited | A |

Notes:

1. Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

ESD Ratings

| | | Value | Unit |
|------------------|-------------------------|---------------------------|------|
| V _{ESD} | Electrostatic Discharge | HBM (Human Body Model) | 3000 |
| | | CDM (Charge Device Model) | 1000 |

Recommended Operation Conditions

Over operating temperature range unless otherwise noted

| Parameter | Symbol | Min | Max | Unit |
|--------------------------------|------------------|-----|-----|------|
| Input Supply Voltage | V _{IN} | 2.5 | 20 | V |
| Output Voltage | V _{OUT} | 1.8 | 5 | V |
| Output Capacitance | C _{OUT} | 2.2 | 47 | μF |
| Output Current | I _{OUT} | 0 | 1.2 | A |
| Operating Junction Temperature | T _J | -40 | 125 | °C |

Thermal Information

| Package | R _{θJA} | Unit |
|---------|------------------|------|
| SOT-223 | 95 | °C/W |

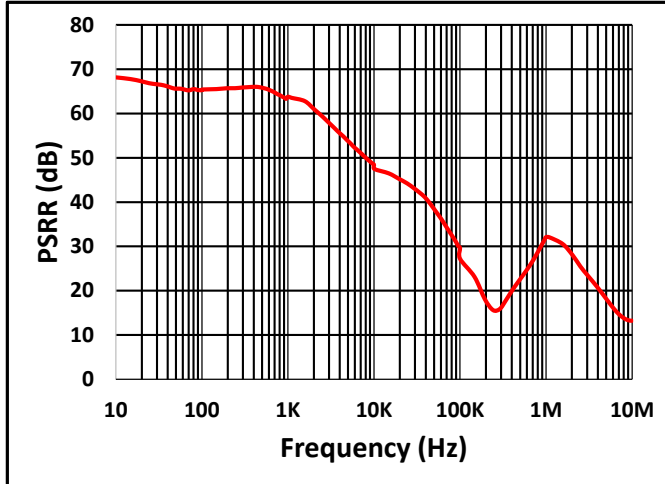
Electrical Characteristics

$V_{IN} = 2.5V$ or $V_{IN} = V_{OUT} + 1V$ (whichever is greater), $I_{OUT} = 1mA$, $C_{OUT} = 2.2\mu F$, typical values are at $T_A = 25^\circ C$ unless otherwise noted

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--|---|--|------|-------|-----|-------------|
| Input Voltage | V_{IN} | | 2.5 | - | 20 | V |
| Output Voltage Accuracy | | $0.1mA \leq I_{OUT} \leq 1.2A$ | -2.0 | 0 | 2.0 | % |
| GND Pin Current | I_{GND} | $V_{IN} = 2.5V$, No Load | | 82 | | μA |
| | | $V_{IN} = 20V$, $I_{OUT} = 1.2A$ | | 250 | | μA |
| Dropout Voltage | V_{DO} | $V_{OUT} = 3.3V$, $I_{OUT} = 1.2A$ | | 690 | | mV |
| Output Current Limit | I_{LIM} | $V_{OUT} = 0$ | | 1.8 | | A |
| Line Regulation | $\Delta V_{OUT(LINE)}$ | $V_{IN} = (V_{OUT} + 1V)$ to 20V | | 1 | | mV |
| Load Regulation | $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ | $V_{IN} = 6V$, $I_{OUT} = 1mA$ to 1.2A | | 0.2 | | %/A |
| EN pin low-level input voltage (device disabled) | $V_{IL(EN)}$ | | | | 0.5 | V |
| EN pin high-level input voltage (device enabled) | $V_{IH(EN)}$ | | 1.6 | | | V |
| EN PIN Leakage Current | I_{EN} | $V_{EN} = 20V$ | | 0.8 | | μA |
| Power Supply Ripple Rejection | PSRR | $f = 1kHz$, $V_{OUT} = 5V$, $I_{OUT} = 1.2A$ | | 64 | | dB |
| Output Noise Voltage | V_N | BW = 100Hz to 100kHz | | 0.005 | | $\%V_{OUT}$ |
| Thermal Shutdown Temperature | TSD | | | 160 | | $^\circ C$ |
| Thermal Shutdown Hysteresis | T_{HYS} | | | 20 | | $^\circ C$ |

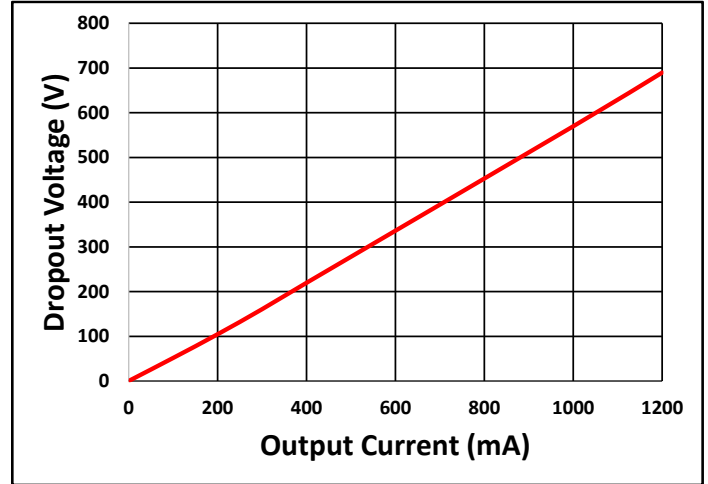
Typical Characteristics

$C_{IN} = 1\mu F$, $C_{OUT} = 2.2\mu F$, $I_{OUT} = 10mA$, $T_A = 25^\circ C$ unless otherwise noted



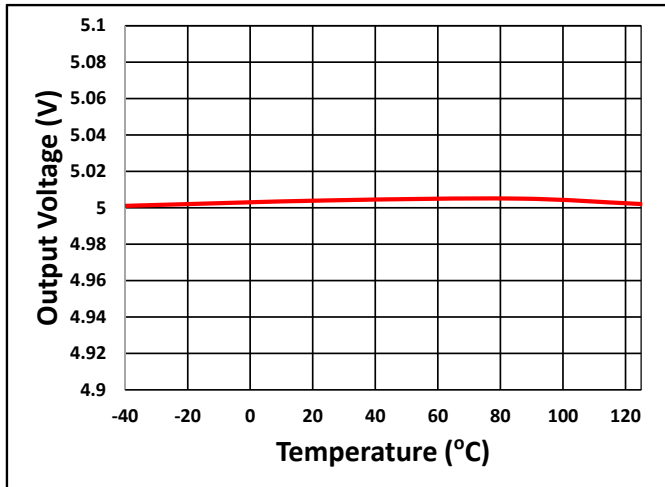
$V_{IN} = 12V$, $V_{OUT} = 5V$, $I_{OUT} = 100mA$, $C_{OUT} = 2.2\mu F$

Fig. 1 PSRR



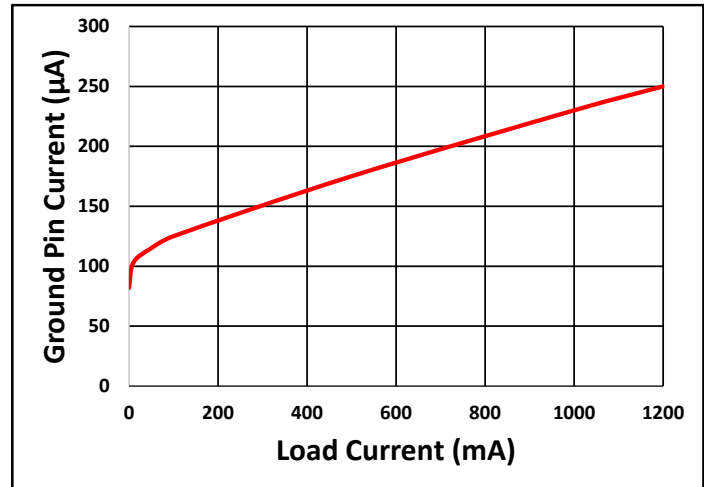
$V_{IN} = 6V$

Fig. 2 Dropout Voltage



$V_{IN} = 12V$, $I_{OUT} = 10mA$

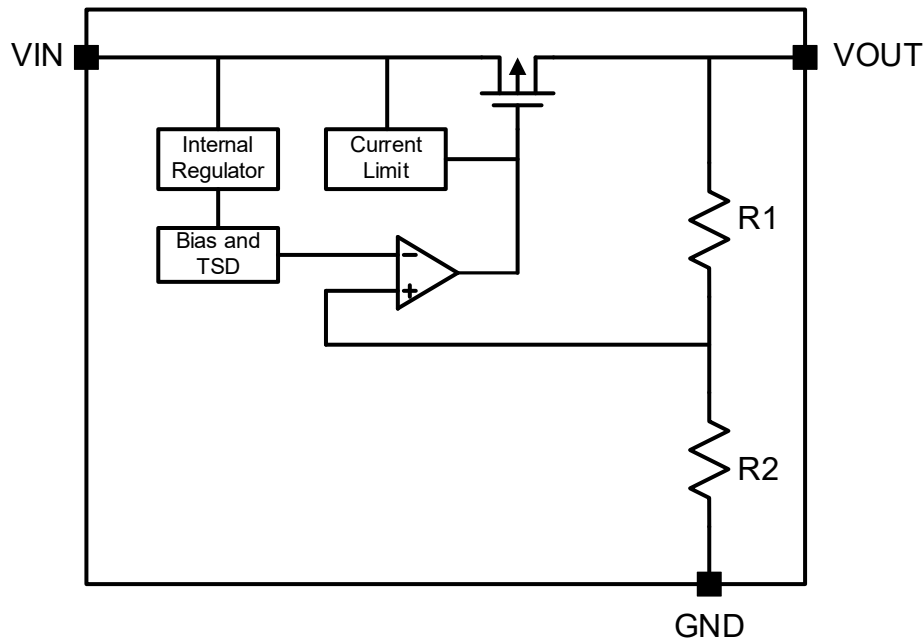
Fig. 3 Output Voltage vs Temperature



$V_{IN} = 2.5V$

Fig. 4 Ground Current vs Load Current

Functional Block Diagram



Block Diagram of Fixed Output Voltage

Feature Description

Dropout Voltage

Dropout voltage is defined as the input voltage minus the output voltage at the rated output current where the pass transistor is fully on. The pass transistor is in the ohmic or triode region of operation and acts as a switch. LDL1117 has a very low dropout voltage compared to most of the x1117 LDOs on the market.

Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited.

Undervoltage Lockout (UVLO)

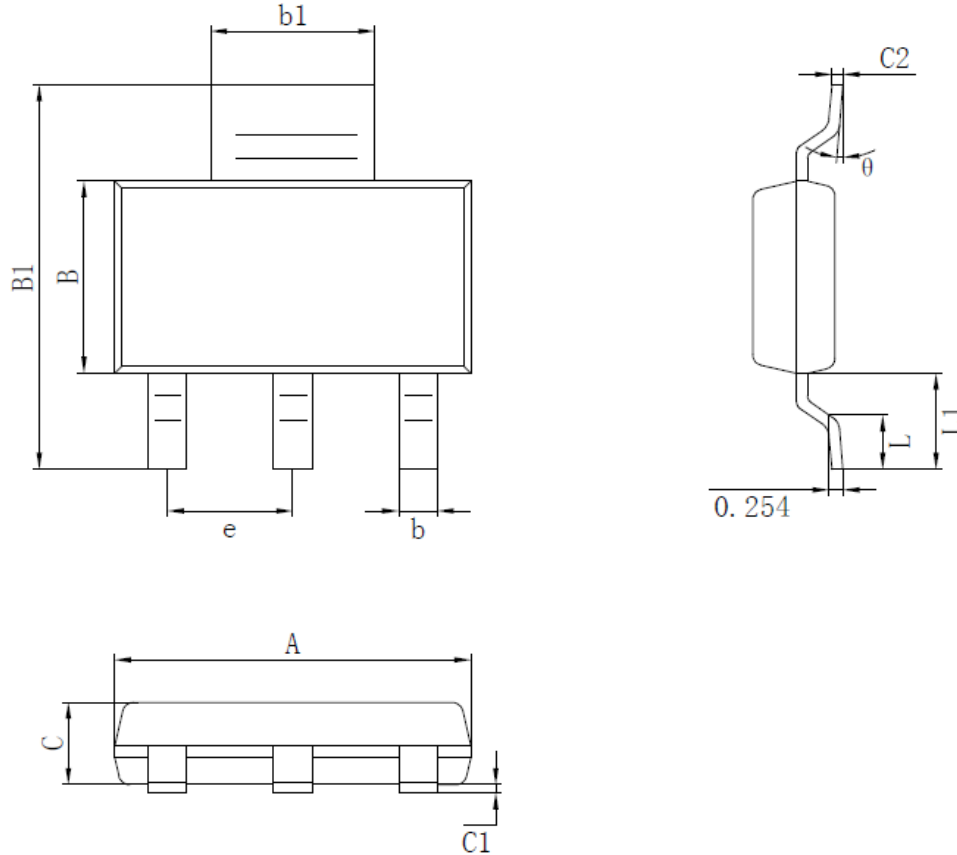
LDL1117 uses an undervoltage lockout circuit to keep the output shut off until the internal circuitry is operating properly.

Thermal Protection

LDL1117 contains a thermal shutdown protection circuit to turn off the output current when excessive heat is dissipated in the LDO.

PACKAGE OUTLINE DIMENSIONS

SOT-223



| Symbol | Dimensions (mm) | | Symbol | Dimensions (mm) | |
|--------|-----------------|------|----------|-----------------|------|
| | Min | Max | | Min | Max |
| A | 6.40 | 6.60 | C | 1.45 | 1.65 |
| e | 2.29 (BSC) | | C1 | 0.03 | 0.15 |
| b | 0.66 | 0.76 | C2 | 0.20 | 0.35 |
| b1 | 2.95 | 3.05 | L | 0.76 | 1.16 |
| B | 3.40 | 3.60 | L1 | 1.70 | 1.80 |
| B1 | 6.85 | 7.15 | θ | 0° | 8° |