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LM1117 800-mA Low-Dropout Linear Regulator

LM1117 IC is an adjustable voltage regulator that can provide a fix as well as variable voltage. Firstly, it can provide a fixed voltage of 1.8, 2.5, 2.85, 3.3, and 5 volts. Most importantly, it has an adjustable output voltage which we can set in a range of 12.5 to 13.8 Volts. This voltage regulator can regulate the input voltage even when it is closer to the voltage supply value. It has a built-in thermal and current limiting protection.

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LM1117 Pinout Diagram

This adjustable voltage regulator has only three pins as shown in the pinout diagram below.
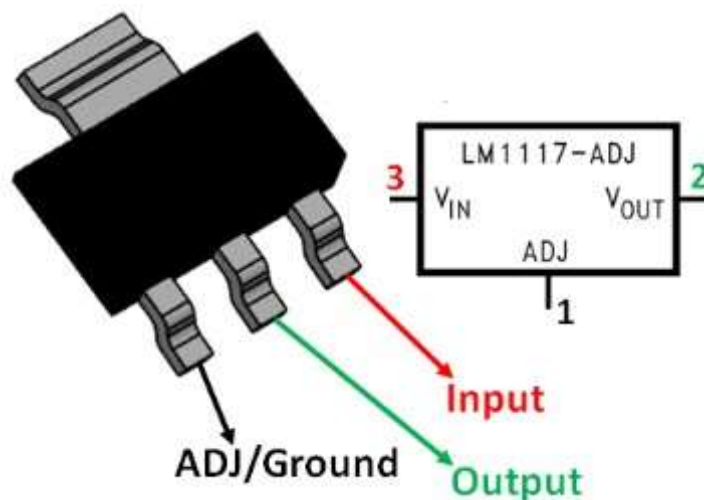
Pin Configuration Description

It has a total of three pins which are described below:

Pin#01: ADJ/Ground

This pin connects to the ground when used in fixed voltage mode. In adjustable mode, it is an adjust pin and provides a feature to adjust the output voltage as desired.

Pin#02: Output

It gives the stable and regulated output voltage.

Pin#03: Input

The IC is applied with input voltage signal through this pin.

LM1117 Equivalent and Alternative Regulators

LM317, LM723, LM7912

Features

The features of the LM1117 are as follows:

- Linear voltage regulator having a minimum drop out voltage of 1.1V.
- Generate fixed voltages of 1.8, 2.5, 3.3 and 5 volts.
- Range for variable voltage is 1.25V to 13.8V.
- Maximum input voltage for this IC is 20V.
- Line regulation of 0.1% max and load regulation of 0.2% max.
- The output current is 800mA.
- It has an internal thermal protection circuit for protecting IC against overheating
- Protection against overcurrents is also provided.

Note: You can refer to the datasheet given at the end for more electrical specifications and Features.

Where to use it?

These high-efficiency linear regulators can work down to -40 °C which makes it suitable for outdoor and high-altitude applications. This chip can be used in battery chargers, Battery-powered Instrumentation and in designing variable power supplies. This chip is used in DVDs, PC, and other consumer products.

How to use LM1117?

This IC can be used to obtain fixed voltage at the output. In this section, we will see examples of a circuit that we can use to generate fix or variable voltages.

Generating Fixed Output Voltage Example

The circuit given below shows a circuit that we can use to obtain a fixed voltage. In this circuit, capacitors connect to input and output. They perform the function of filtering noise from the output voltage signal. The minimum value of a capacitor to be used at the output is 10µF but usually, the input capacitor has a higher value than the output capacitor. The output capacitor provides a stable voltage and improves the transient response.

IC LM 1117

Vin   Vout

GND

5 V DC   10uF   10uF   3.3 V DC
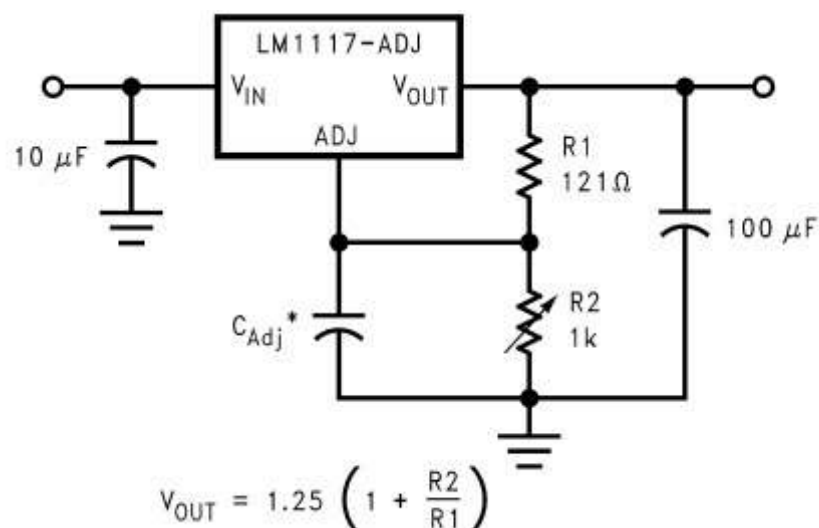
25V   25V
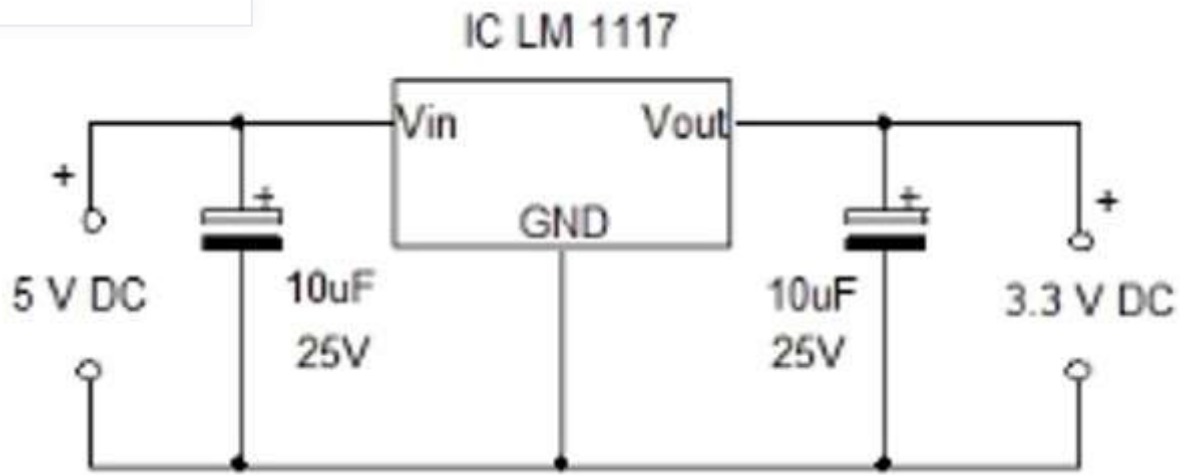
Variable Output Voltage Circuit using LM1117

This adjustable voltage regulator also offers adjustable voltage in a range of 12.5 to 13.8 volts. The circuit for adjustable output is given in the figure below. It works by generating a reference voltage of 1.25 volts through output and adjustment pins. We apply this reference voltage across resistor R1.

A constant current I1 is produced in resistor R1. I1 will flow through R2 as both resistors are connected in parallel. This current will then produce the desired output voltage. The two resistors R1 and R2 are used to set the required voltage. The formula for finding out the voltage through any of these registers is:

$$V_{out} = 1.25\,(1 + R2/R1)$$

LM1117−ADJ

V_{IN} V_{OUT}

ADJ

10 μF   R1
          121Ω

C_{Adj}*   100 μF

          R2
          1k

$$V_{OUT} = 1.25 \left(1 + \frac{R2}{R1}\right)$$

Bypass Capacitor Function

A bypass capacitor Cadj is connected at the adjustable pin for improving ripple rejection. When the output voltage is increased, the ripples will be amplified. So this capacitor is used to prevent the ripples from being amplified. In some

applications, an external diode is connected between the input pin and the output pin to protect the regulator from heat.

LM1117 Applications

This IC is used in all the applications requiring positive voltage regulation. Few other applications of LM1117 includes:

- Switching DC to DC Converters
- Controlling motors.
- Current limiting and reverse polarity circuits can be implemented using this linear voltage regulator.

2D Diagram

Datasheet

LM1117 DATASHEET

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