

Overcurrent Protection using Op-Amp

ABSTRACT

Protection circuits are vital for any electronic design to be successful. In our previous protection circuit tutorials we have designed many basic protection circuits that can be adapted into your circuit, namely, Over Voltage Protection, Short-Circuit Protection, Reverse polarity protection, etc. Adding to this list of circuits, in this article, we will learn how to design and build a simple circuit for Overcurrent protection using Op-Amp.

Working

There are many types of over-current protection circuits; the complexity of the circuit depends on how fast the protection circuit should react during an over-current situation. In this project, we will build a simple over-current protection circuit using an op-amp which is very commonly used and can be easily adapted for your designs.

The circuit we are about to design will have an adjustable overcurrent threshold value and will also have an Auto-restart on failure feature. As this is an op-amp based overcurrent protection circuit, it will have an op-amp as the driving unit. For this project, a general-purpose operational amplifier LM358 is used. In the below image, the pin diagram of LM358 is shown.

an N channel MOSFET IRF540N is used. It is recommended to use proper MOSFET Heatsink if the load current is larger than 500mA. However, for this project, the MOSFET is used without a Heatsink. The below image is the representation of the IRF540N pinout diagram.

Components

- Breadboard
- Power supply 12V (minimum) or as per the voltage is required.
- LM358
- 100uF 25V
- IRF540N
- Heatsink (as per the application requirement)
- 50k trim pot.
- 1k resistor with 1% tolerance
- 1Meg resistor
- 100k resistor with 1% tolerance.
- 1ohms resistor, 2W (2W maximum of 1.25A load current)
- Wires for breadboard

Circuit Diagram



