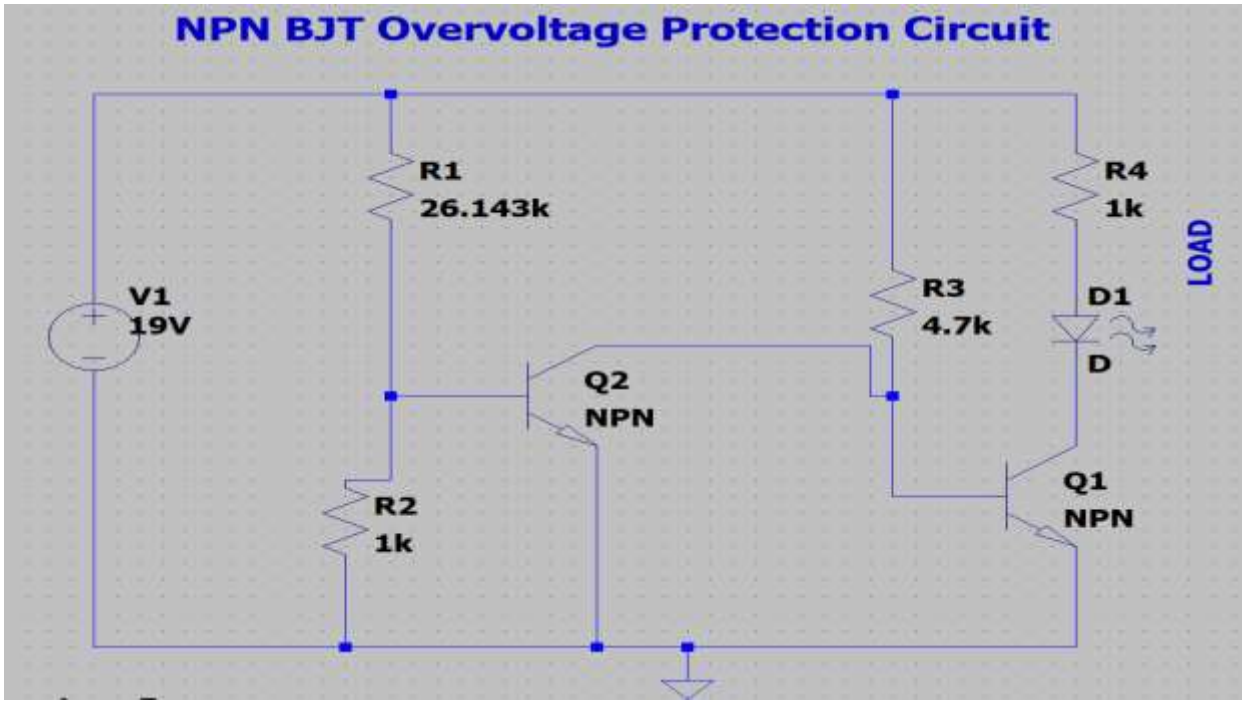
NPN BJT and PNP BJT Overvoltage Protection Circuits

1. Introduction

When the voltage rises above the maximum allowable voltage value, over voltage protection cuts off the power supply or increases the output voltage.

2. NPN BJT Circuit

In order to switch off the supply when the voltage over a certain threshold, a BJT is linked in series with the load and a supply.
Building a circuit and using it essentially as a switch
Next, the transistor (also referred to as a low set switch) follows the load. This transistor is Q1 as shown



Then, one resistor is added from the supply to the base of the BJT; this resistor will keep the BJT on constantly, allowing the circuit to turn on whenever the supply is given. However, when the voltage exceeds this limit, the transistor must shut down.

To turn this transistor off, another BJT must be added. When it turns on, this resistor will pull the base of Q1 to ground, turning it off. Consequently, Q2 will know when to turn on and when to keep itself off. The base of the BJT must be at least 0.7 volts in order to turn on an NPN transistor.

By considering the voltage divider rule R1 and R2 values are from an input voltage that above 18V for example 19V So 0.7 = 19 * (R2/ (R1 + R2))

3. PNP BJT Circuit

In this circuit, we must maintain the ground connected and the switch in
the side with supply the cause is that even in cases where the transistor is operating fully, there's still a voltage drop that indicates that the ground is Not quite at zero volts, which means devices want something basic like LEDs It doesn't really matter which switch.

comparable to how a microcontroller needs its base to be grounded in order to take loads that needs ground, hence a high PNP BJT must be employed for over voltage protection side switch

A PNP BJT is wired in series with the load and supply so that it will essentially function. This transistor, designated as Q1

R1, will pull the BJT's base to ground so that it always remains on and current flows to the circuit whenever the supply is given.

Once the voltage exceeds this threshold, the transistor must shut off, so in order to turn it off, another BJT will be added, which, when it turns on, will pull the Q1 logic level high, that is, to the supply to turn it off. We'll call this transistor Q2.

A zener diode is connected so when the voltage reaches up to certain value that zener diode will go into zener breakdown and current will flow through it.