POWER ELECTRONICS AND DESIGN

MINI PROJECT

EC5050

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SEMESTER 05

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DESIGN OF THE DC POWER SUPPLY

The colored power supply circuit is shown below. Here we used Main supply with switch: 230V, 50Hz, Over current protection (2A,3A fuses) and Over current indicator

This circuit is designed for,

Dual output
Operation mode

- Independent
- Series
- Parallel

Output voltage range: 0-30V
Output current rate: 0-3A

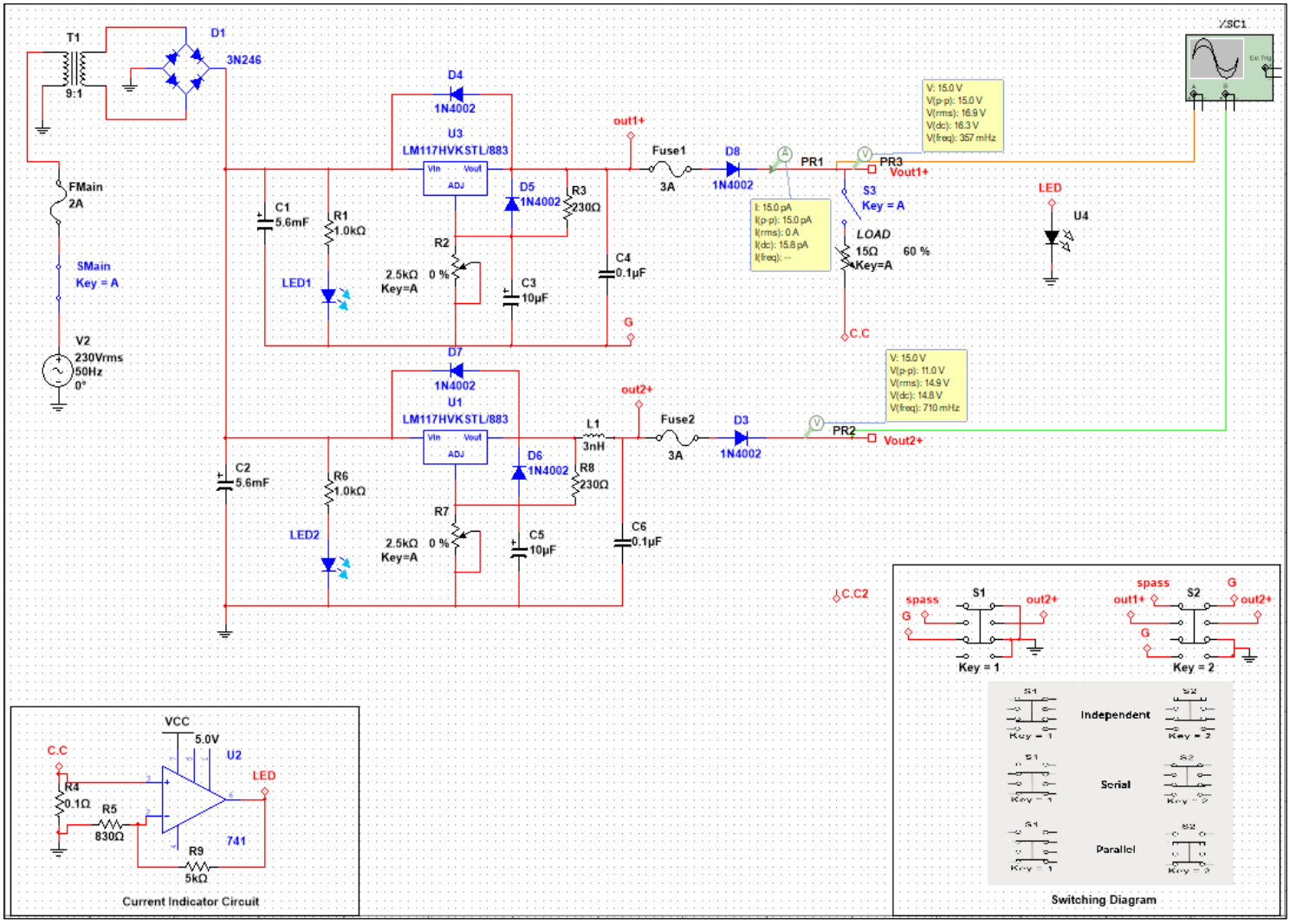

Figure 1: Colored Circuit Diagram

Black and White Circuit diagram is Shown below

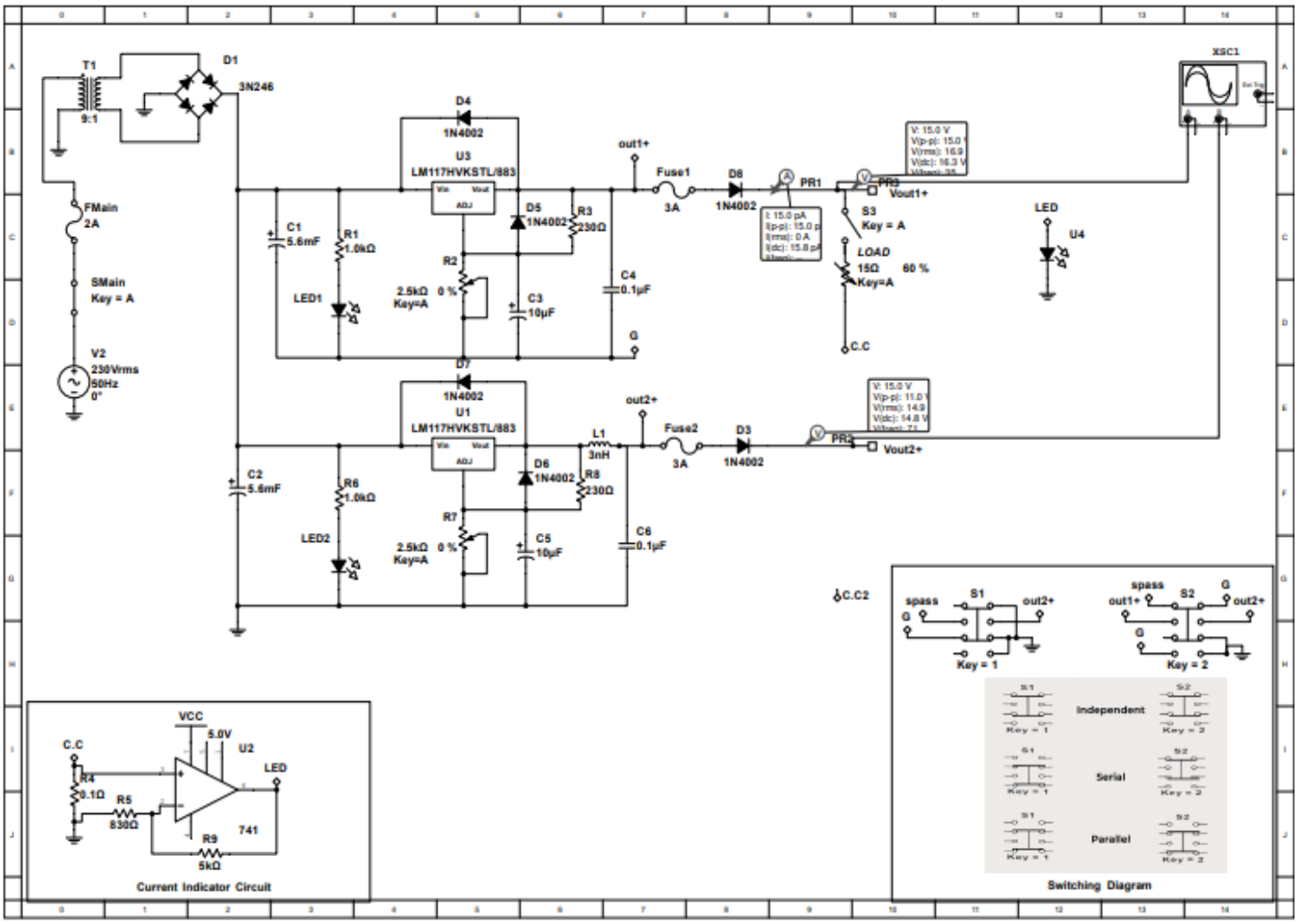

Figure 2:Black and White Circuit diagram

RUNNING DC POWER SUPPLY ON INDEPENDENT MODE

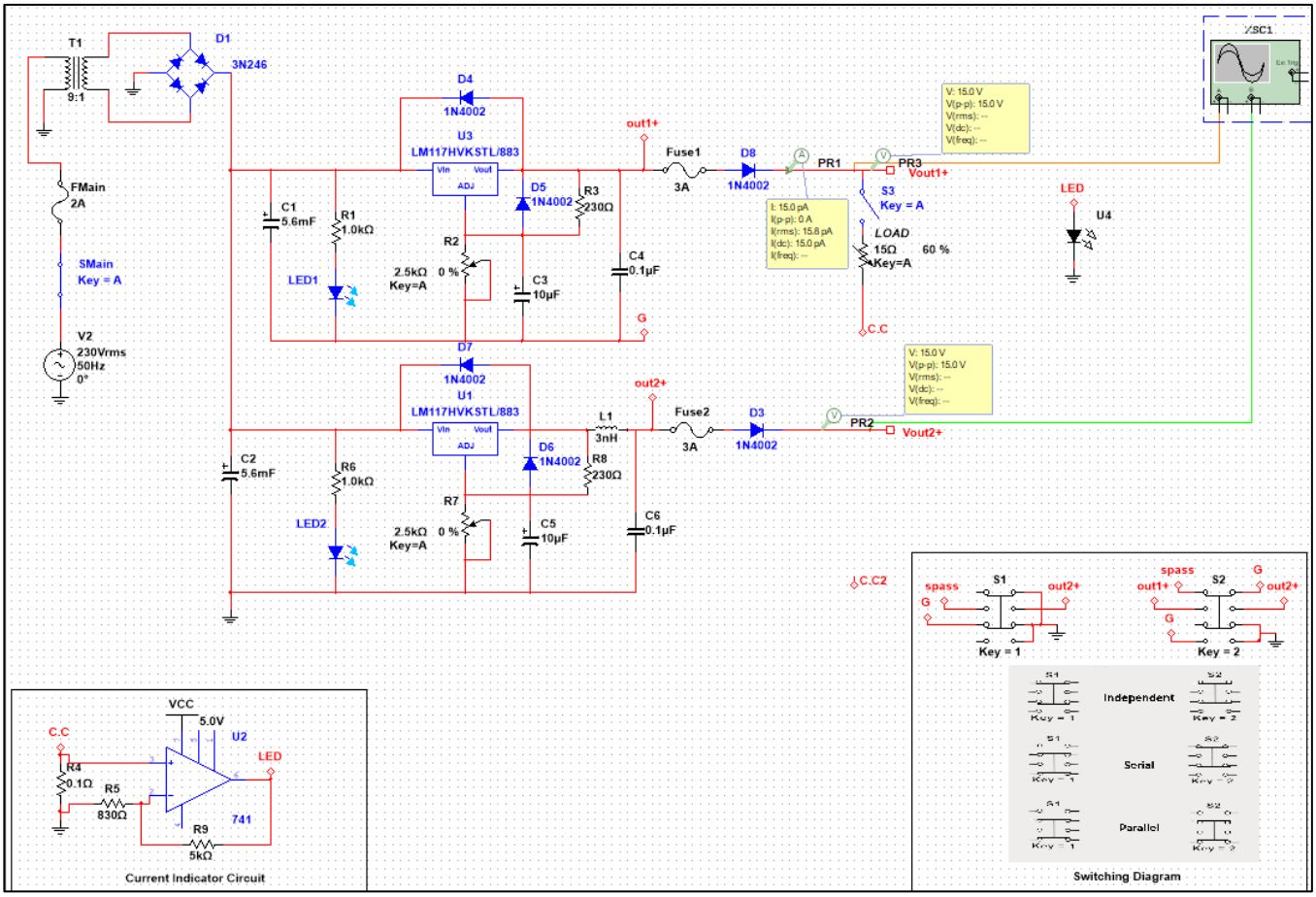

Figure 3: Independent Mode

Figure 4: Oscilloscope view of Independent mode

INDEPENDENT MODE WITHOUT LOAD

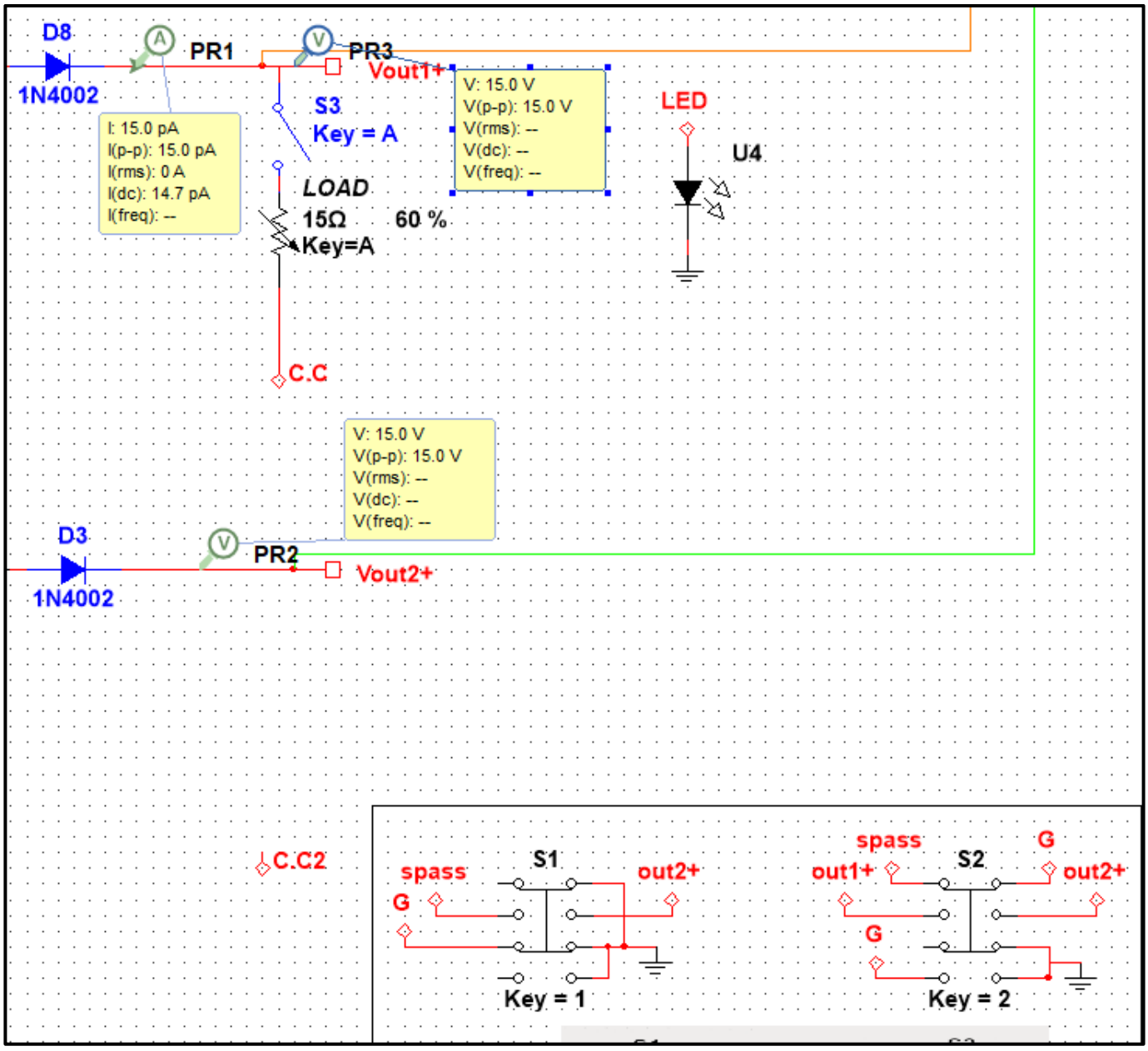

Figure 5:Independent Mode Without Load

Because of no load the output voltages of both outputs are same. Both outputs are given 15V outs. The Keys are switched to independent mode.

INDEPENDENT MODE WITHOUT LOAD -7.5 OHM

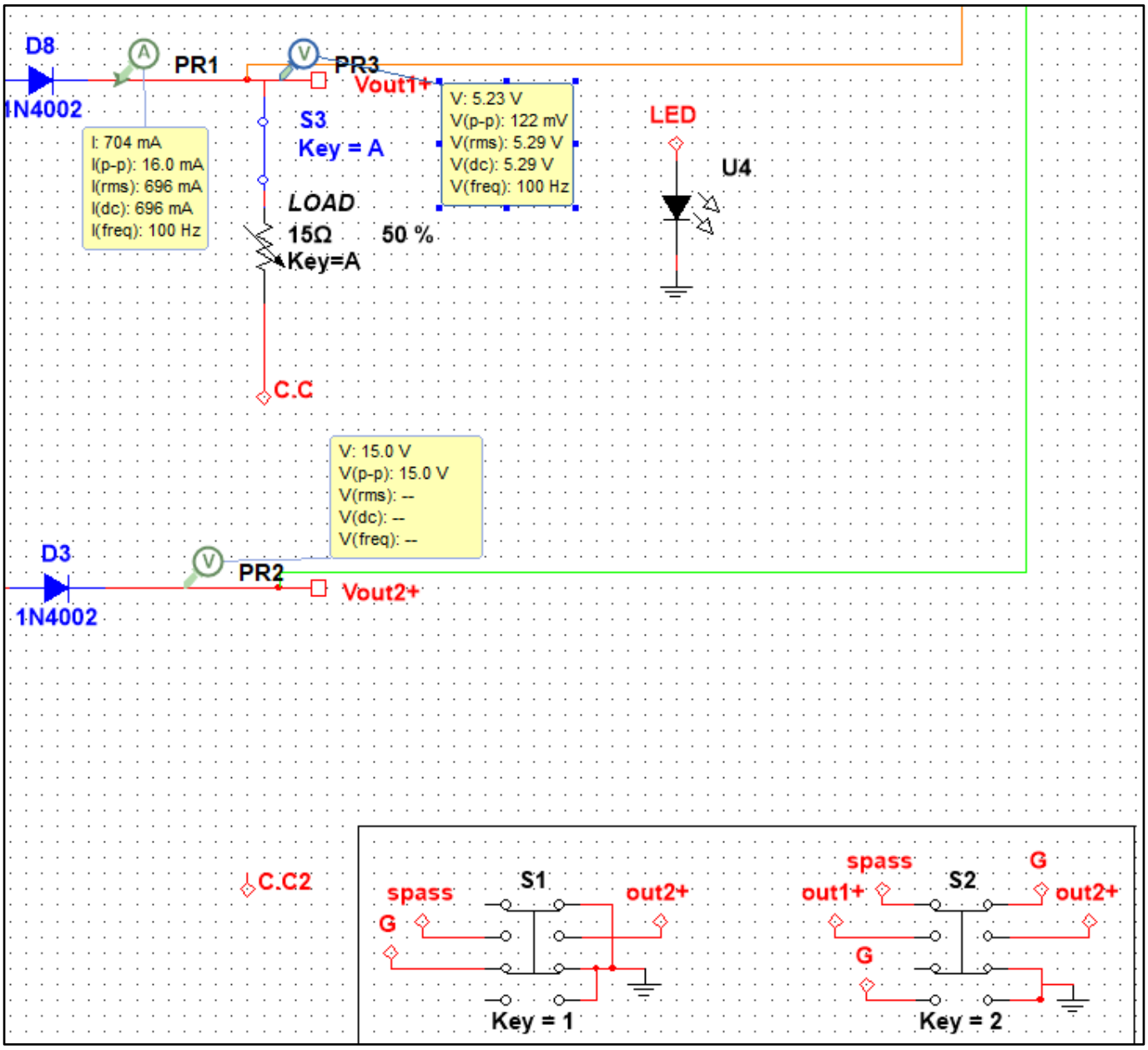

Figure 6:Independent Mode Without Load -7.5 Ohm

Output 1 is connected to 7.5-ohm load in independent mode. But output 2 is not connected to a load it is showing 15 V output same in before. Because of current limitations, output 1 is shown 5.23 V.

The Keys are switched to independent mode.

RUNNING POWERSUPPLY ON PARALLEL MODE

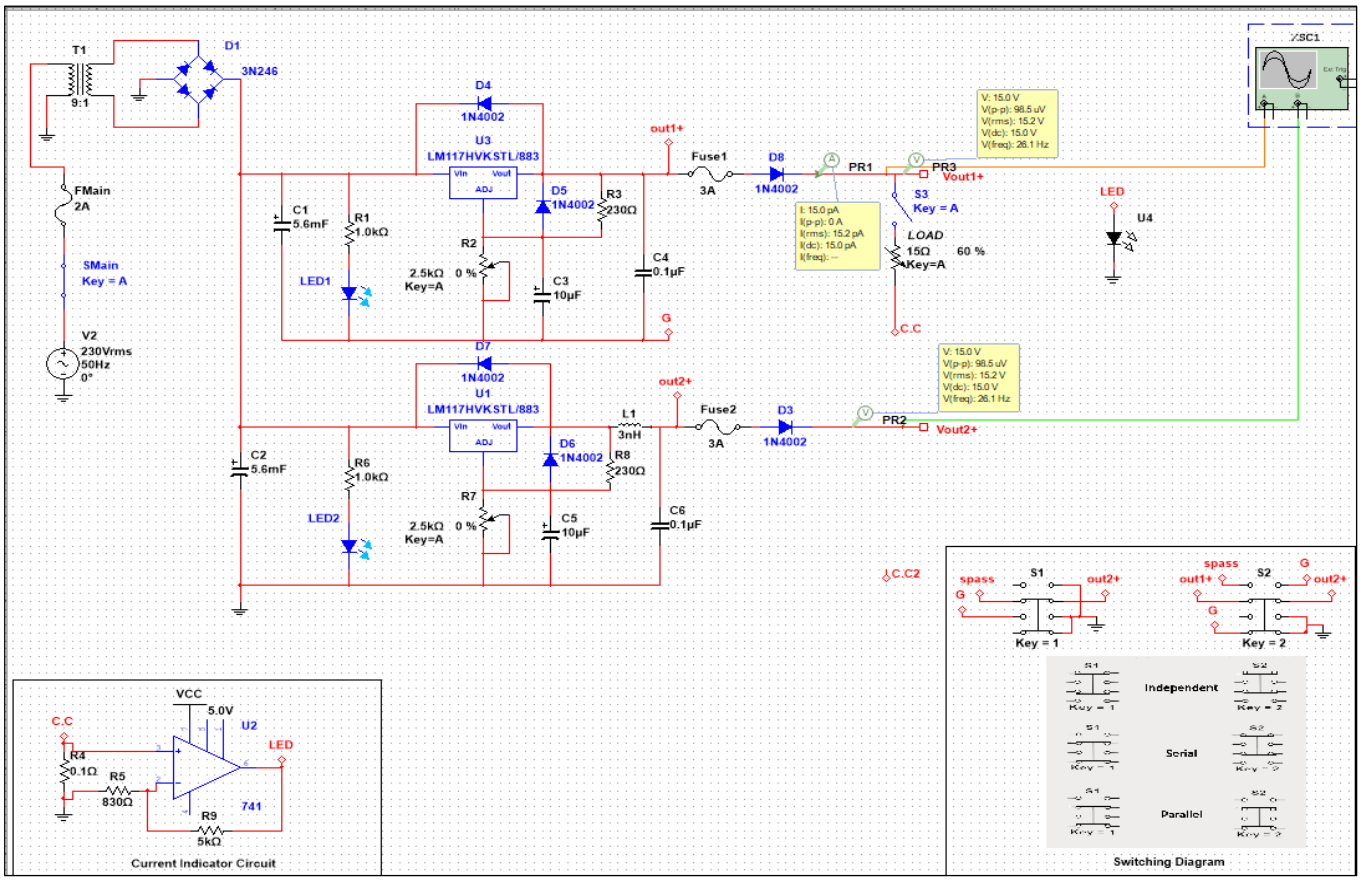

Figure 7: Power supply On Parallel Mode

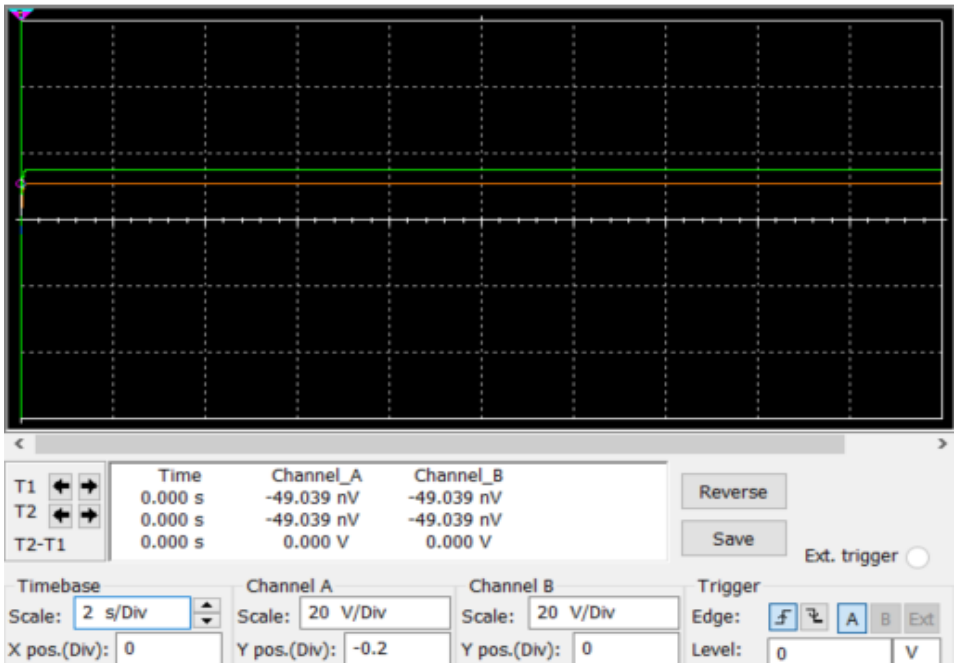

Figure 8: Oscilloscope output wave form in parallel mode

PARALLEL MODE WITHOUT LOAD

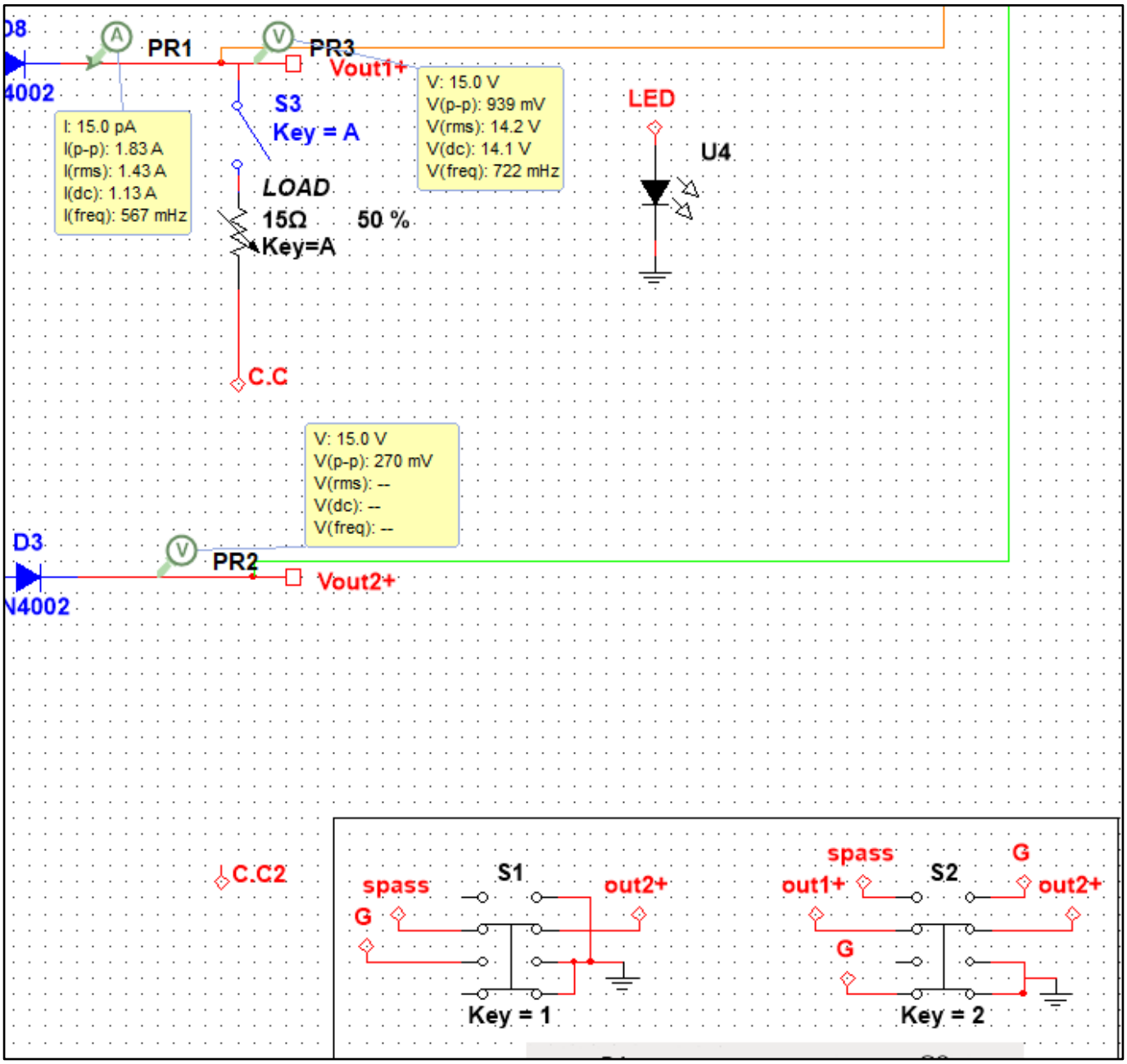

Figure 9:Parallel Mode Without Load

Here we switched to parallel mode without no load. Out1 and Out 2 voltages are same.

PARALLEL MODE WITH LOAD - 10 OHM

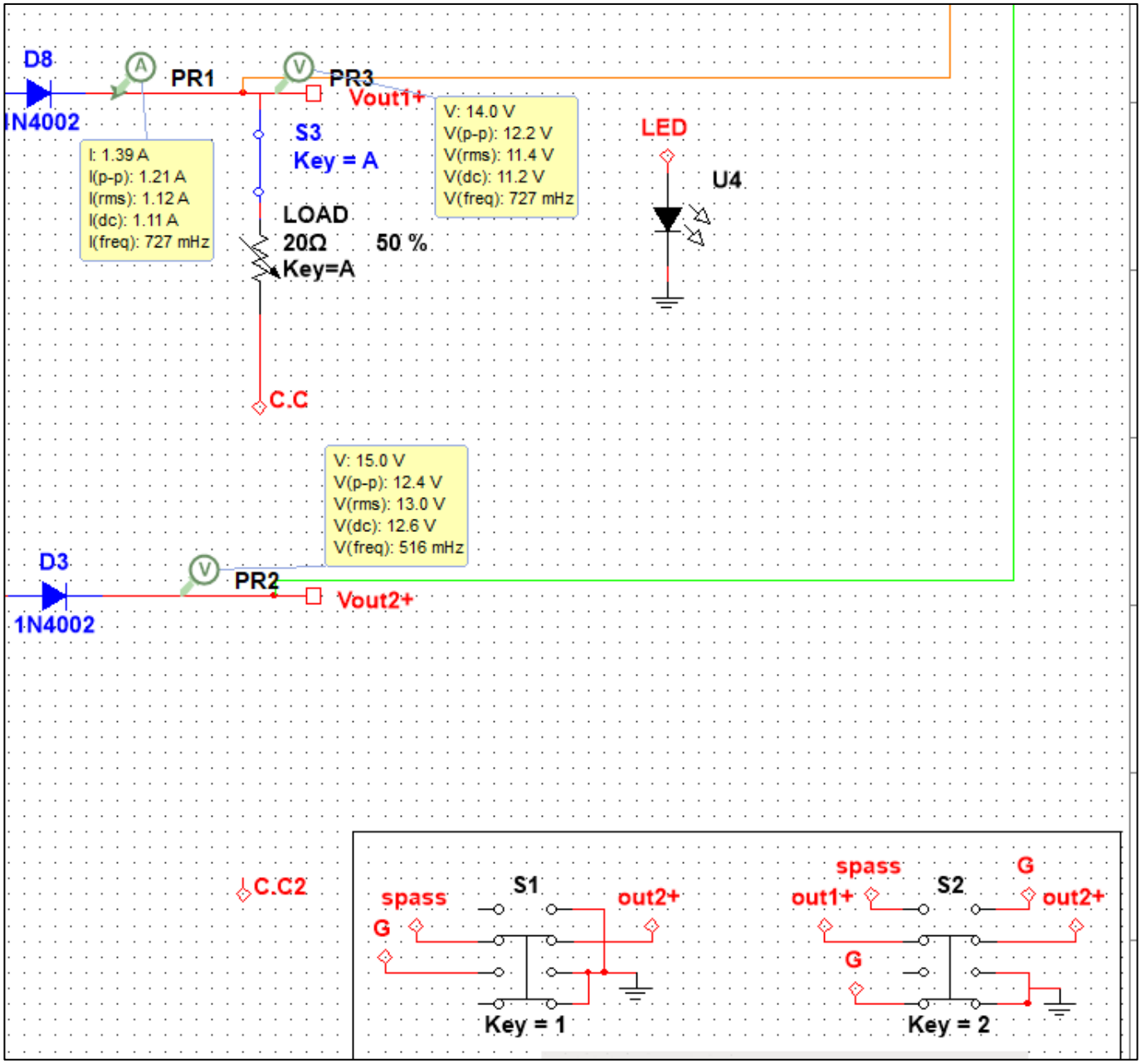

Figure 10:Parallel Mode with Load - 10 Ohm

Here we switched to parallel mode with 10-ohm load. Out1 and Out 2 voltages are nearly same. But not same. The current (1.39 A) going through the load is higher than Independent mode (746 mA)

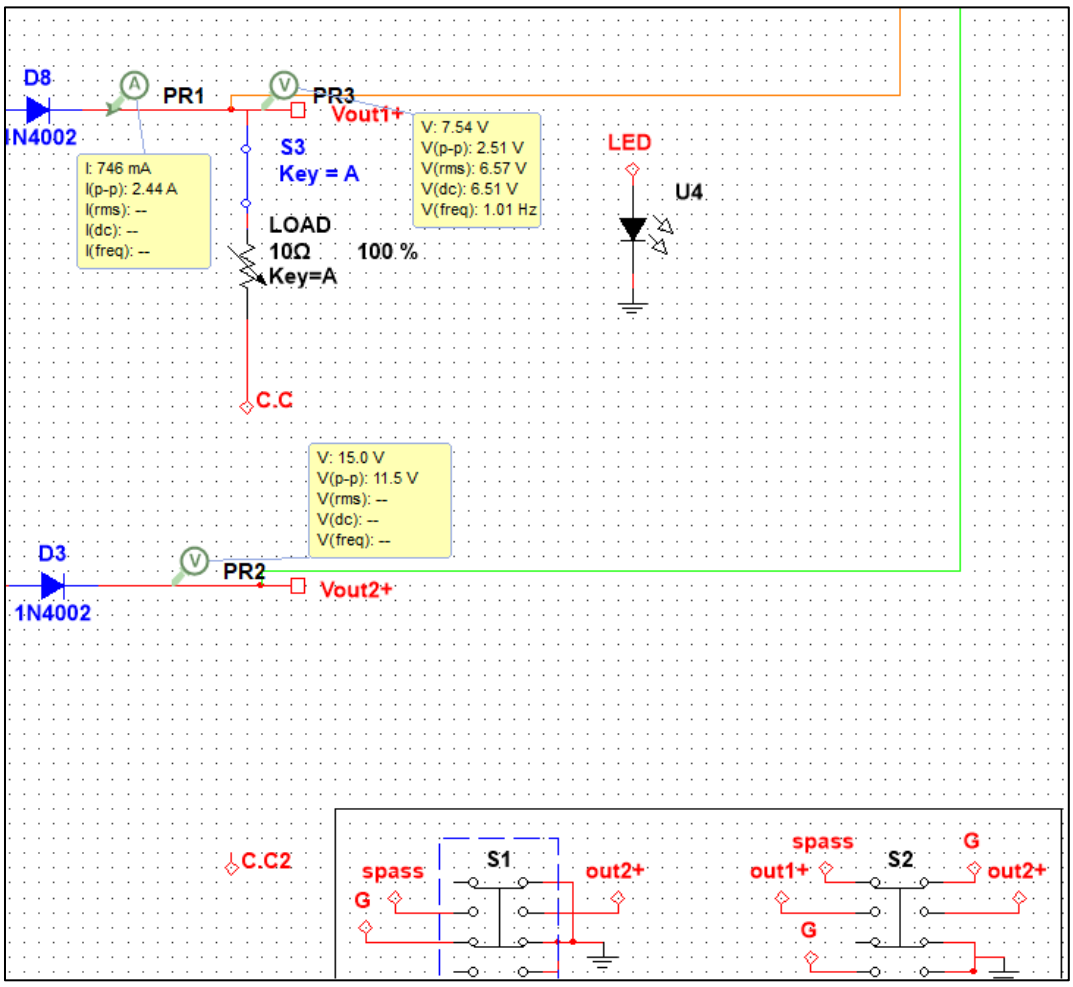

Figure 11: 10 Ohm in Independent mode

10 ohms

Parallel mode - 1.39 A
Independent Mode - 746 mA

So, the current through the Load in parallel mode is high. It is nearly 2 times higher than in independent mode.

So, we can get prove that the power supply which is designed is working properly

RUNNING POWERSUPPLY ON SERIES MODE

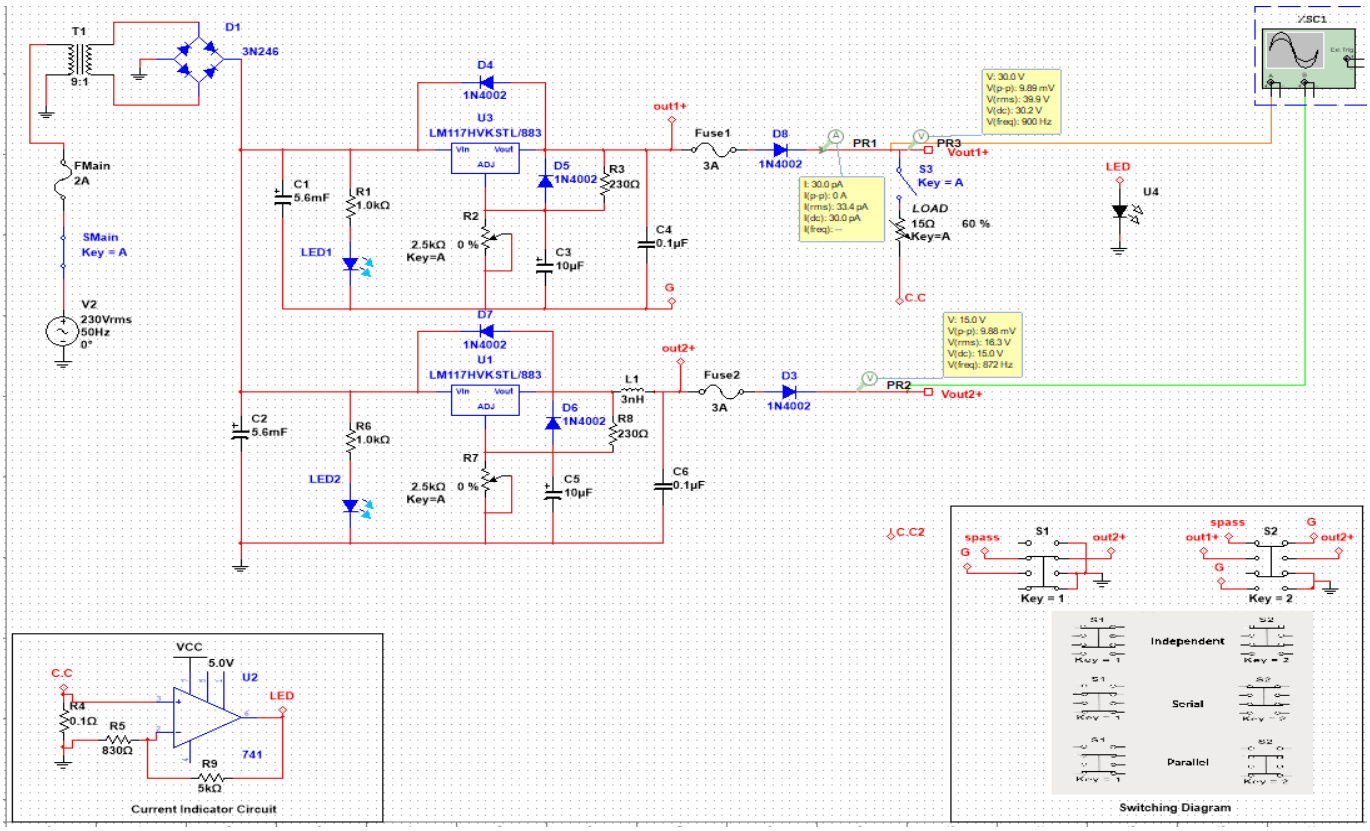

Figure 12: Power supply On Series Mode

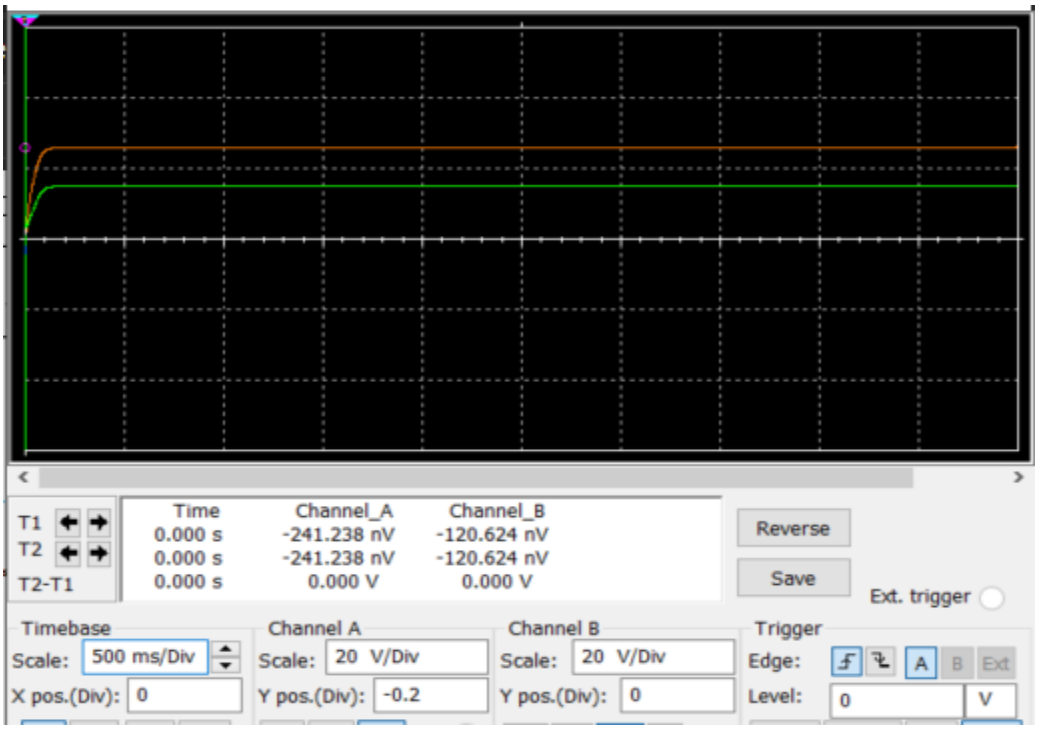

Figure 13: Waveform on ossiloscope in serial mode

SERIES MODE WITHOUT LOAD

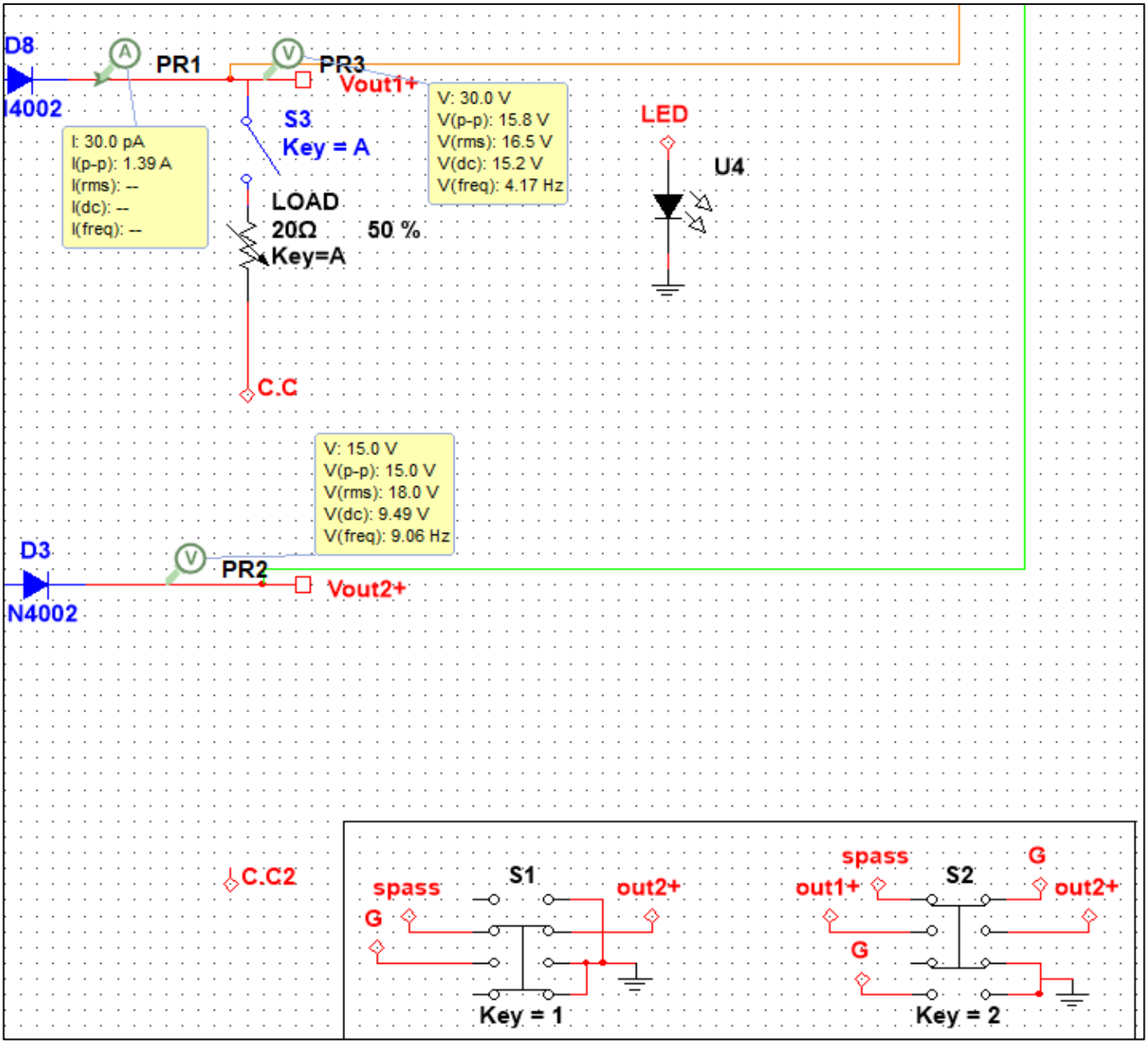

Figure 14:Series Mode Without Load

Here we connected the power supply serially. The voltage in out1 is 30V. the voltage in Out2 is 15 V. So, in serial connection the Voltage is added.

The keys are in Serial mode.

SERIES MODE WITH LOAD -25 OHM

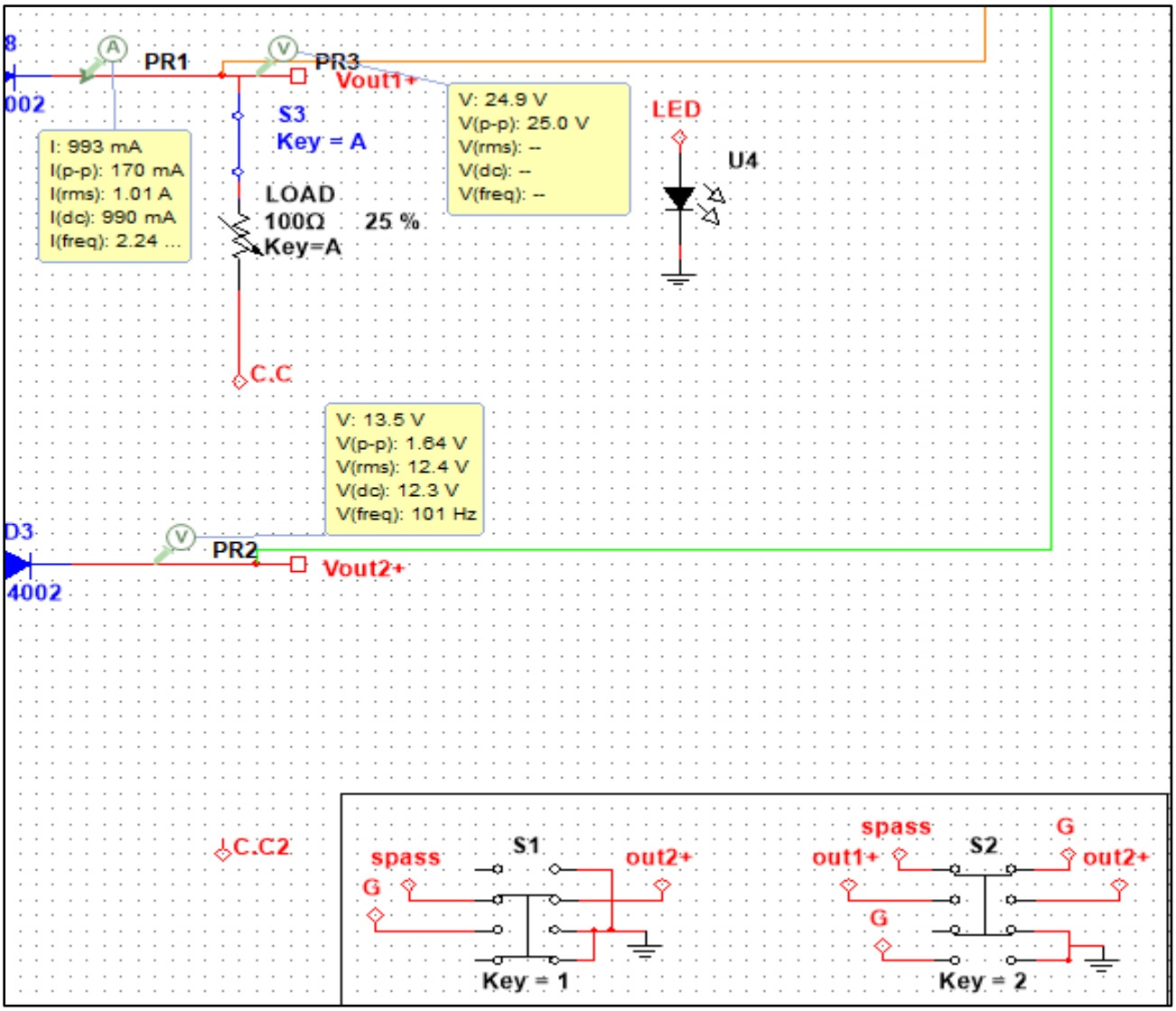

Figure 15:Series Mode with Load -25 Ohm

In here we used a 25 Ohm load in serial mode. The output voltage is nearly 30 ohms (The voltage decrease is due to the low load). Current is somewhat higher than independent mode.

Keys are in serial condition.

OVER CURRENT INDICATOR CIRCUIT

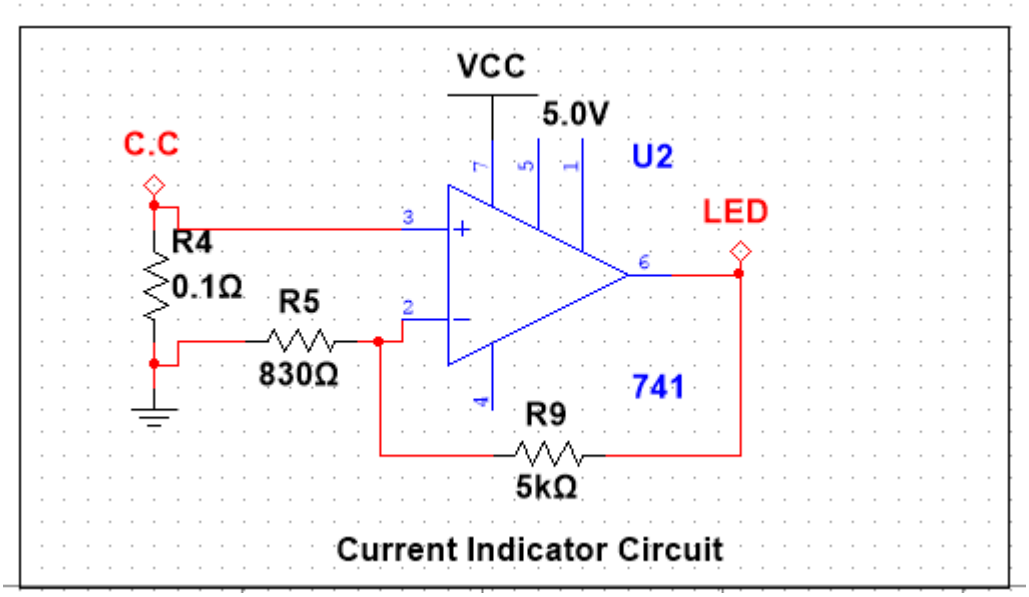

Figure 16:Over Current Indicator Circuit Diagram

Here used an OP - Amp for indicating the Current. If the current is flown more than 2.7 A (Near to 3A) the LED is turned on and Indicated the over current.

OVER CURRENT INDICATOR - 10 OHM - SERIAL MODE

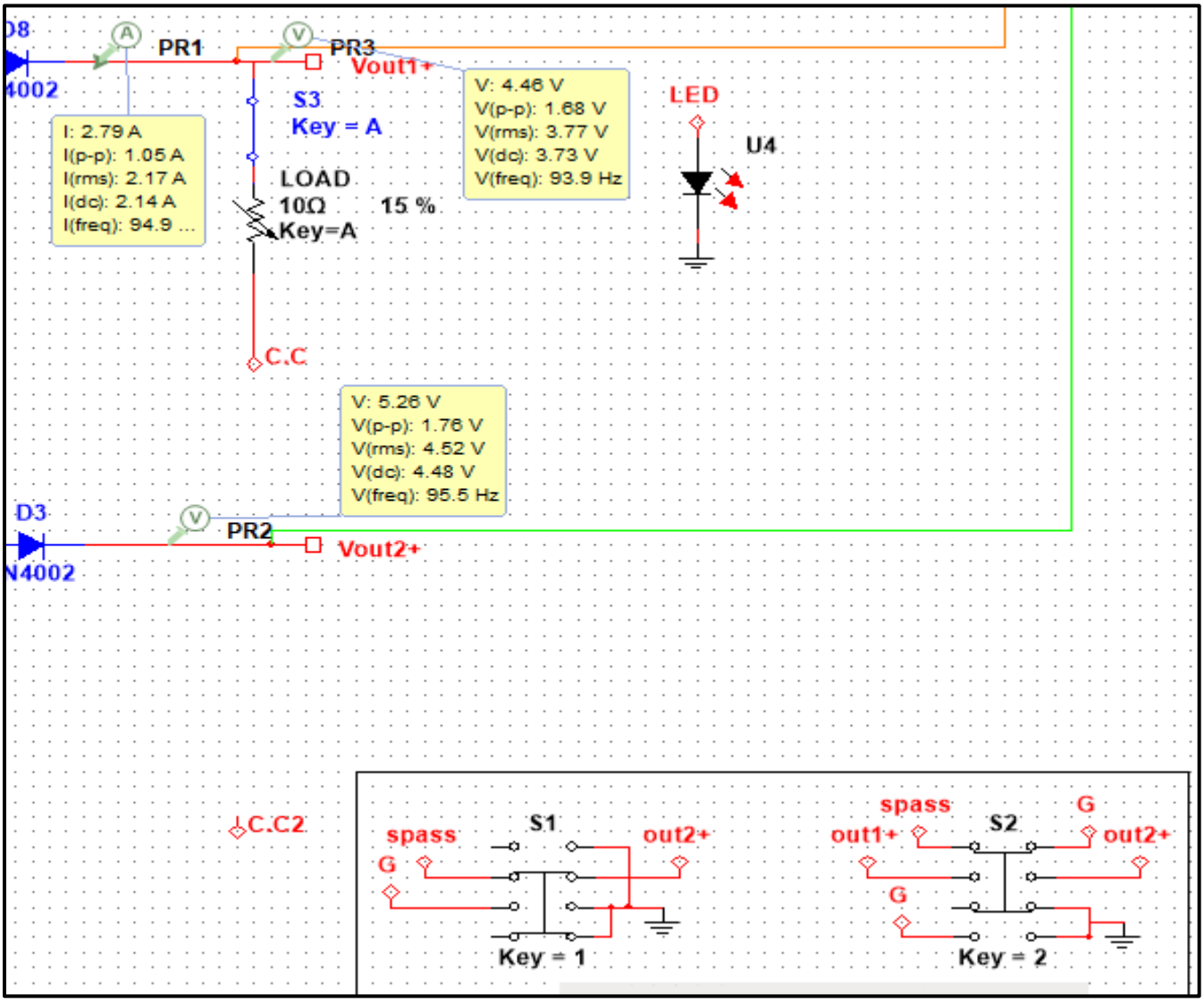

Figure 17:Over Current Indicator - 10 Ohm - Serial Mode

Here we used 10 Ohm Resister for the load in serial mode. The current flow through the load is 2.79 A. So, the LED is blinked and showed that the Over current is going through the load.

The power supply is properly worked with above requirements.