

Step down (BUCK) switching power supply

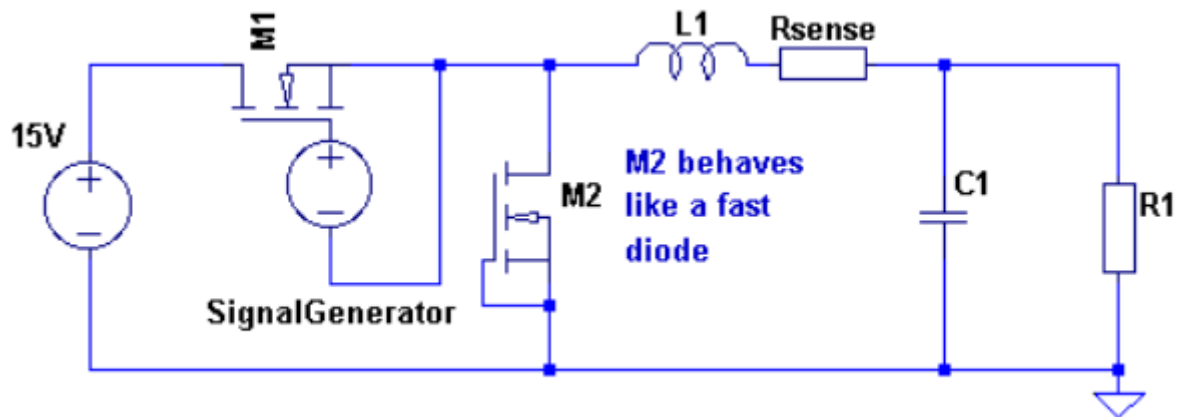


Figure 1

Safety notice: Capacitors used in this experiment may explode if used incorrectly. Have your circuit checked before you turn it on. Some components may become very hot.

Apparatus.

Voltmeter, Signal generator, Oscilloscope, Power supply, Capacitor, R1 and Rsense will be provided by your instructor. You will wind the inductor.

Procedure.

- 1) Construct the circuit shown in Figure 1 above.
- 2) Before you switch on the power supply, connect an oscilloscope across the signal generator's output and adjust the signal generator such that it outputs a square wave of $\pm 10\text{V}$, at 200kHz and 50% Duty
- 3) Connect the other oscilloscope lead across Rsense
- 4) Connect the voltmeter across R1
- 5) Have your circuit checked by your instructor and ensure that C1 is connected the right way around!
- 6) Turn on the power supply and note the following:
 1. Input voltage
 2. Input current
 3. Output voltage
4. Take a picture of the oscilloscope screen.
- 7) Calculate the efficiency of the circuit
- 8) Vary the duty cycle record the variation of output voltage.
- 9) Plot the data obtained in step 8 (duty cycle on the X-axis)
- 10) Does the plot in step 9 exactly match up with the expected theoretical value (see notes). Why not?
- 11) In your notes, it is assumed that the inductor current varies linearly when designing the output LC filter for this circuit. Is this a valid assumption?
- 12) Can you determine the inductance of your inductor?