**Main Operation**

In this part, main operation of flyback converter is explained. Figure 2 shows the basic flyback configuration.

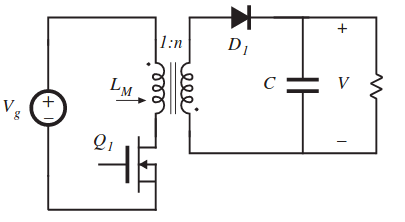


Figure 2: Circuit Schematic of the Flyback Converter

Flyback converters are derived from the buck-boost converter. Operation of flyback converter can be investigated according to two states which are switch ON and switch OFF period.

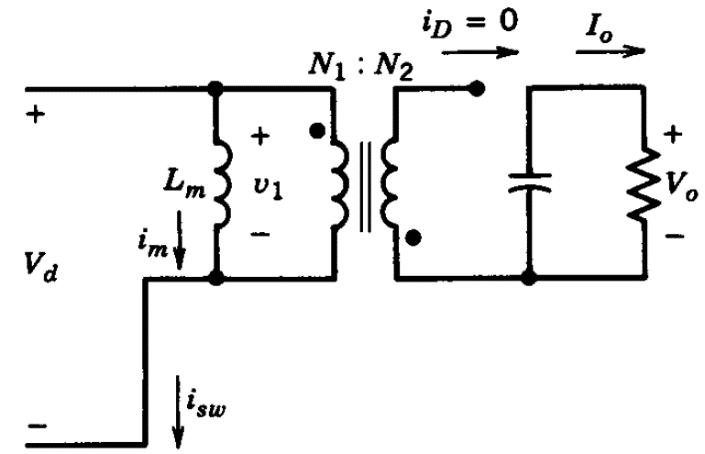


Figure 3: Approximate Circuit Schematic of Flyback during Switch is ON

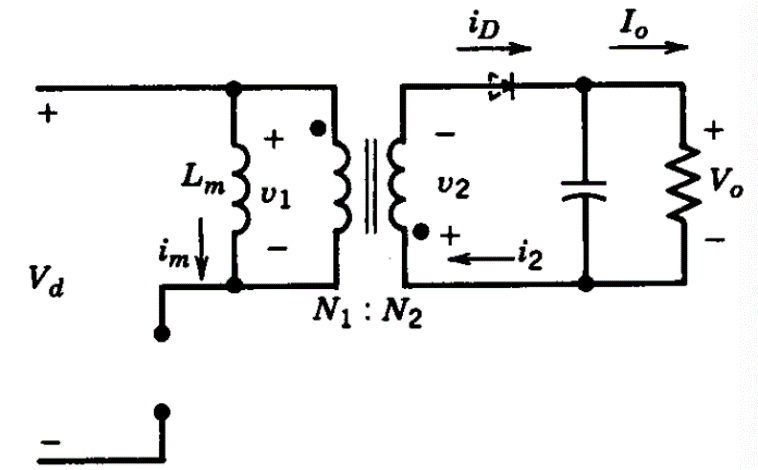


Figure 4: Approximate Circuit Schematic of Flyback during Switch is OFF

Figure 3 shows the circuit schematic of the flyback converter during switch is ON period and Figure 4 shows the circuit schematic of the flyback during switch is OFF period.

When the switch is ON, due to winding polarities, the diode will be reversed biased. The continuous-current-conduction mode in buck-boost converter corresponds to an incomplete demagnetization of the inductor core in the flyback converter. After the switch is turned off and the energy stored in the core causes the current to flow in the secondary winding through the diode.

Figure 5 shows the voltage on the magnetizing branch, core flux and the diode current of the flyback converter.

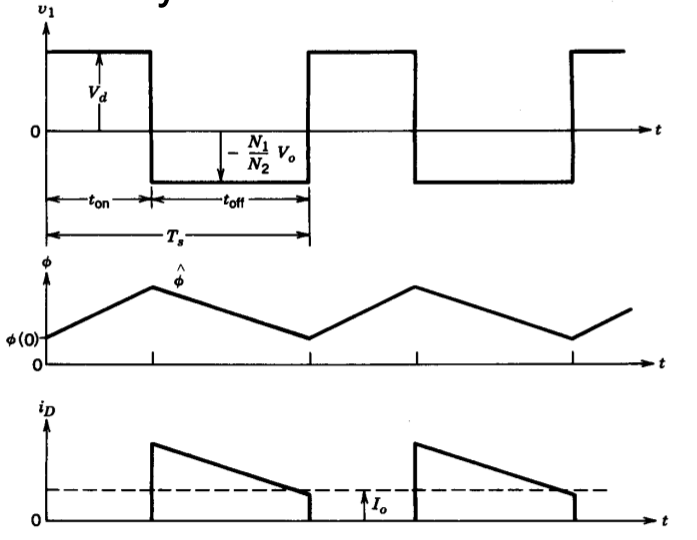


Figure 5: Voltage across the Magnetizing branch, core flux and the diode current

Voltage transfer ratio of the flyback converter can be calculated according to core flux.

and,

Since the periodic characteristic,

Therefore,

MOSFET’s ideally don’t require any current while they are opening. But practically, they needs a few tens of mA to open MOSFET. Because gate to source capacitance of the MOSFET should be charged while opening. Also it should be uncharged while it is closing. On the other hand, this process should be done using isolation between gate driver circuit and gate of the power MOSFET. Also PWM signal should be amplified before connected to gate of the MOSFET.

In order to achieve these two main goals, we decided to use TLP250 opto coupler module. It can provide isolation and it can amplify PWM signal to the required level.

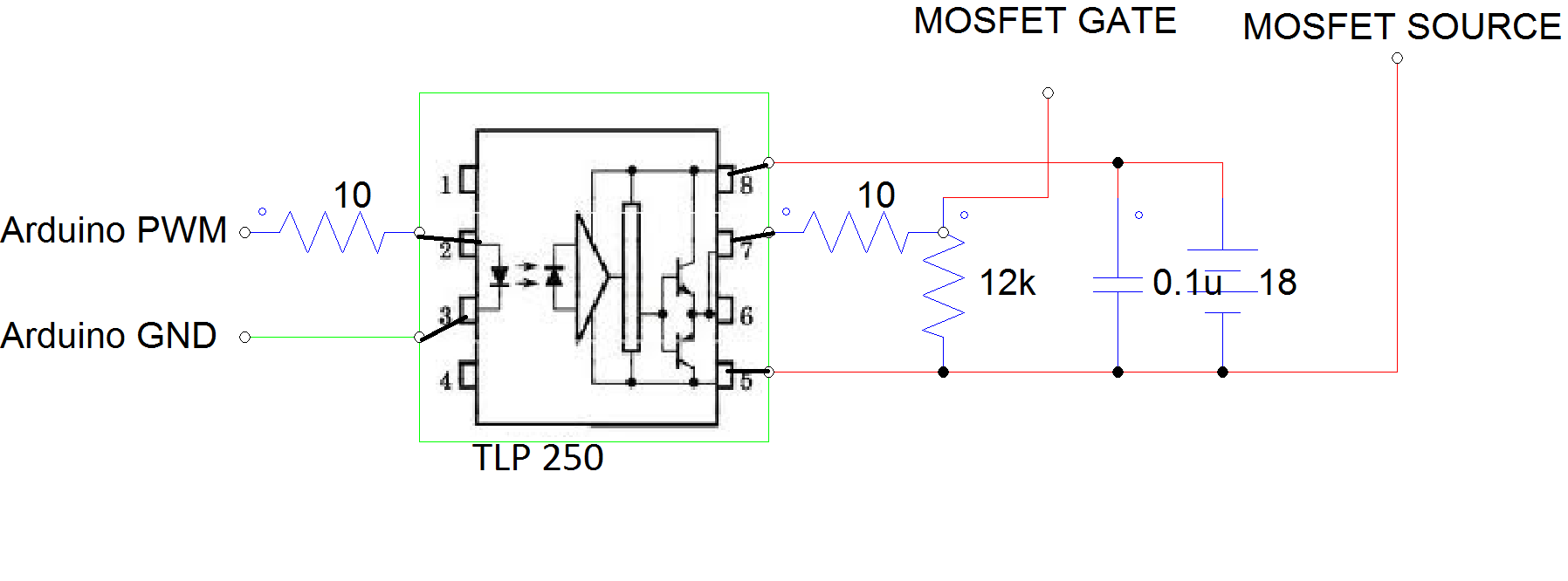


Figure 6: Circuit Schematic of the TLP250 (Gate Driver)