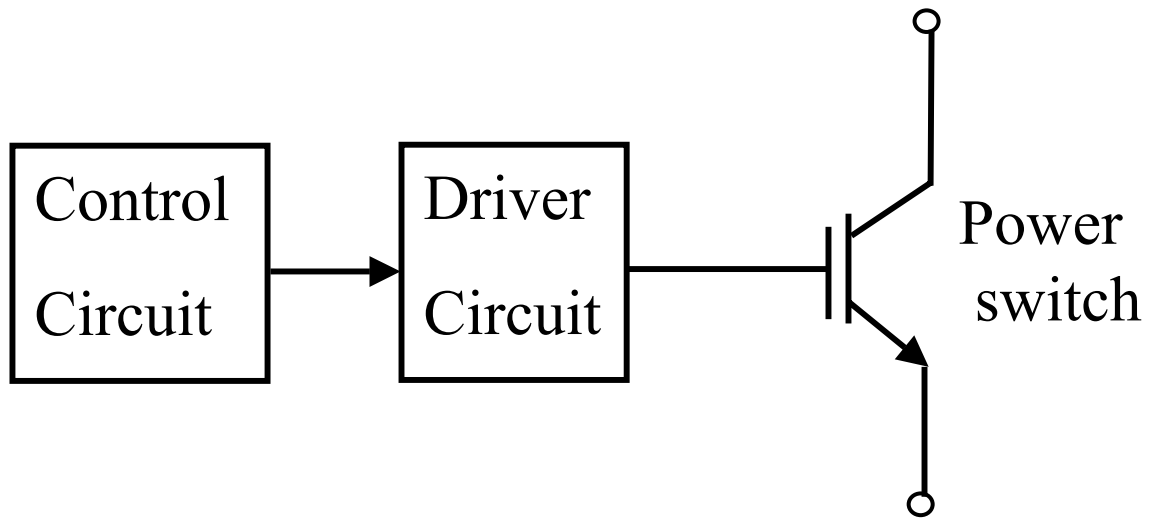
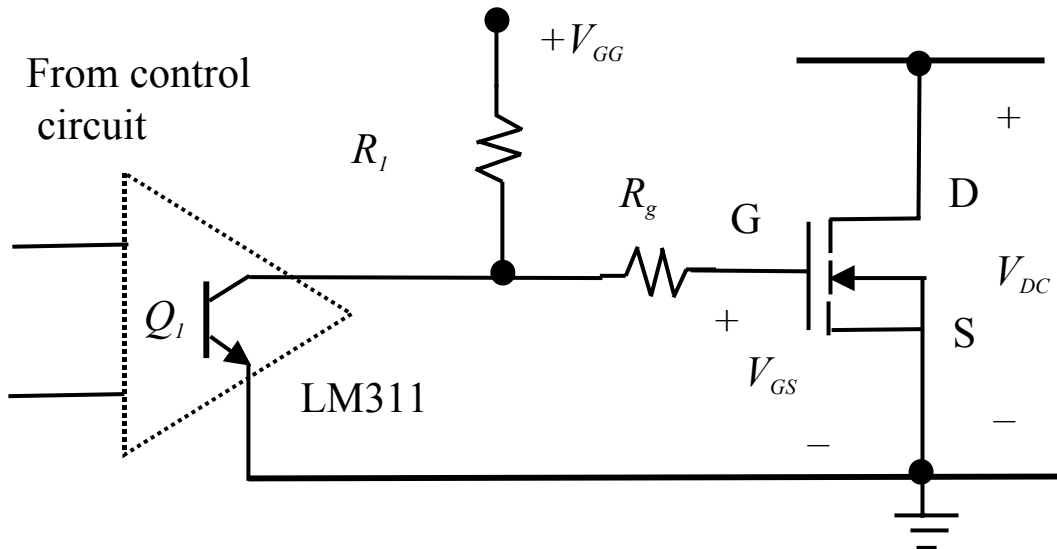


(Base/gate) Driver circuit



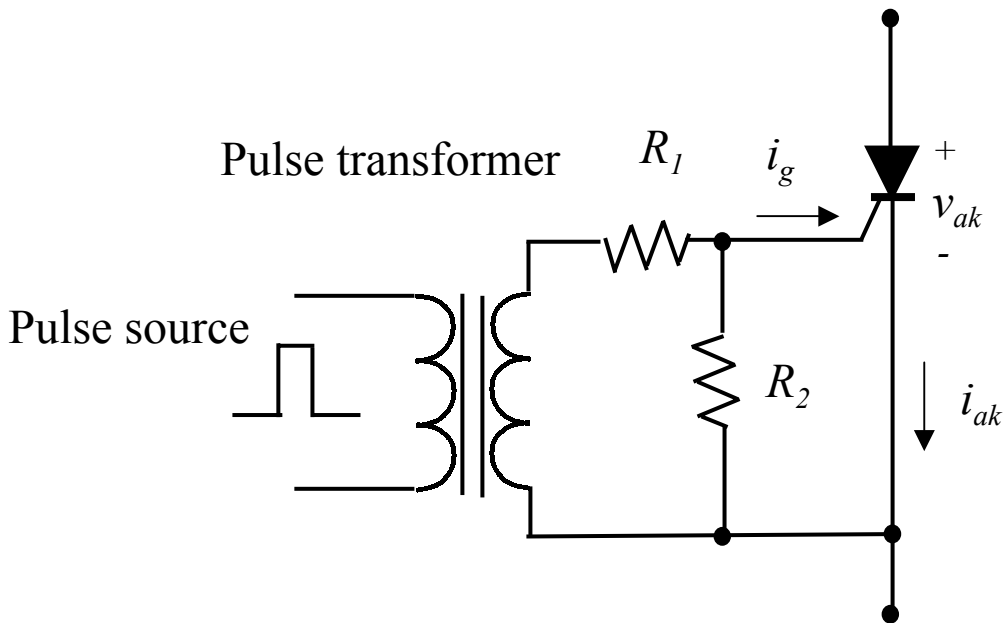
- Interface between control (low power electronics) and (high power) switch.
Functions:
 - amplifies control signal to a level required to drive power switch
 - provides electrical isolation between power switch and logic level
- Complexity of driver varies markedly among switches. MOSFET/IGBT drivers are simple but GTO drivers are very complicated and expensive.

Example: simple MOSFET gate driver



- Note: MOSFET requires $V_{GS} = +15V$ for turn on and $0V$ to turn off. LM311 is a simple amp with open collector output Q_1 .
- When B_1 is high, Q_1 conducts. V_{GS} is pulled to ground. MOSFET is off.
- When B_1 is low, Q_1 will be off. V_{GS} is pulled to V_{GG} . If V_{GG} is set to $+15V$, the MOSFET turns on.

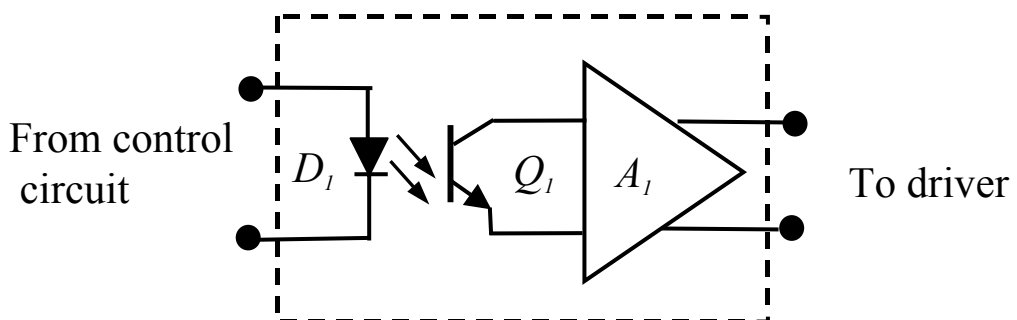
Gate drive for thyristors



- Pulse transformer is used for isolation. R_1 is to limit the gate current
- Normally a pulse with length 10 μ s with amplitude of 50mA is sufficient to turn-on the thyristors. It is quite common to fire the thyristors with successive pulses to ensure proper turn-on.
- It is not possible to *turn-off* a thyristor with the above circuit

Electrical isolation for drivers

- Isolation is required to prevent damages on the high power switch to propagate back to low power electronics.
- Normally opto-coupler (shown below) or high frequency magnetic materials (as shown in the thyristor case) are used.



Opto-coupler isolation

- Many standard driver chips have built-in isolation. For example TLP 250 from Toshiba, HP 3150 from Hewlett-Packard uses opto-coupling isolation.