

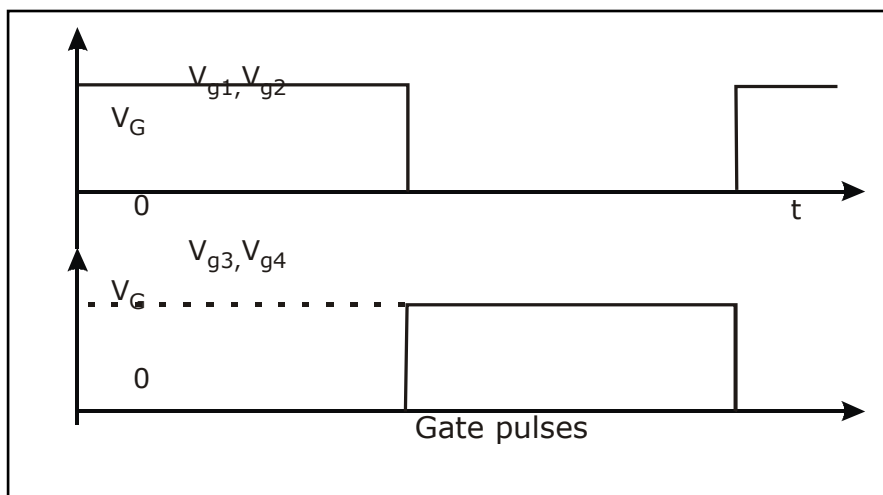
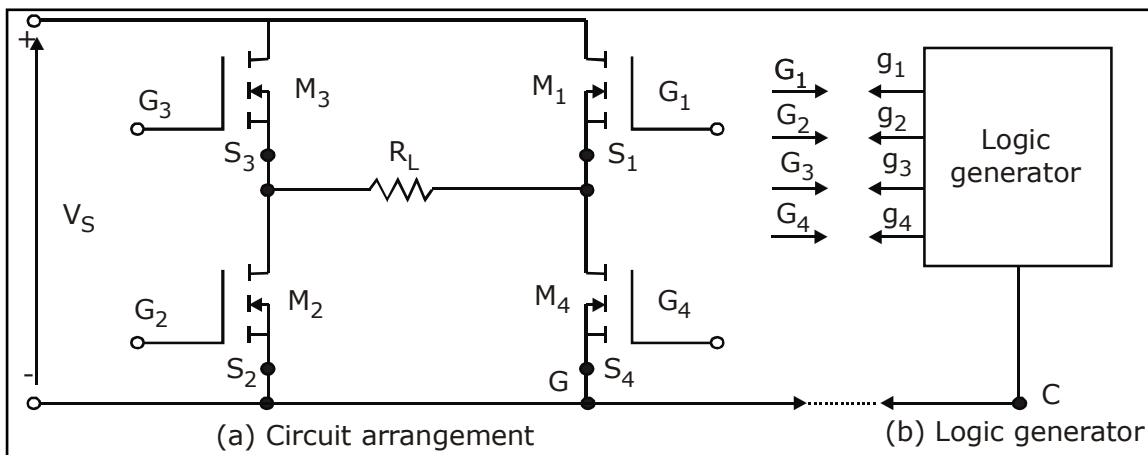
ISOLATION OF GATE AND BASE DRIVES

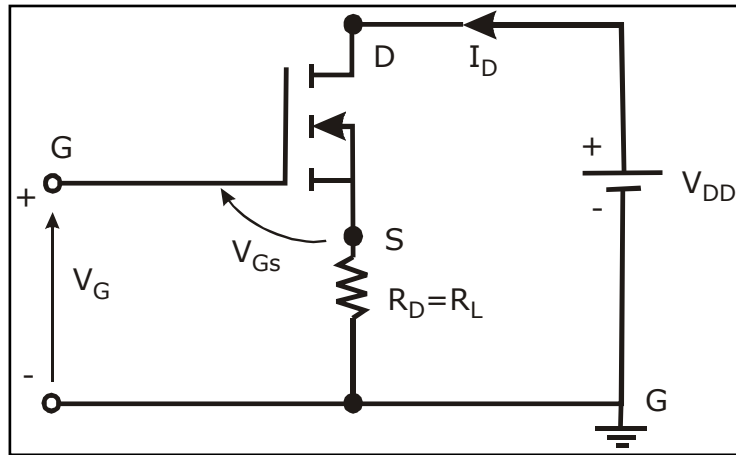
Necessity

Driver circuits are operated at very low power levels. Normally the gating circuit are digital in nature which means the signal levels are 3 to 12 volts. The gate and base drives are connected to power devices which operate at high power levels.

Illustration

The logic circuit generates four pulses; these pulses have common terminals. The terminal g , which has a voltage of V_G , with respect to terminal C , cannot be connected directly to gate terminal G , therefore V_{g1} should be applied between G_1 & S_1 of transistor Q_1 . Therefore there is need for isolation between logic circuit and power transistor.





$$V_{GS} = V_G - I_D R_D$$

There are two ways of floating or isolating control or gate signal with respect to ground.

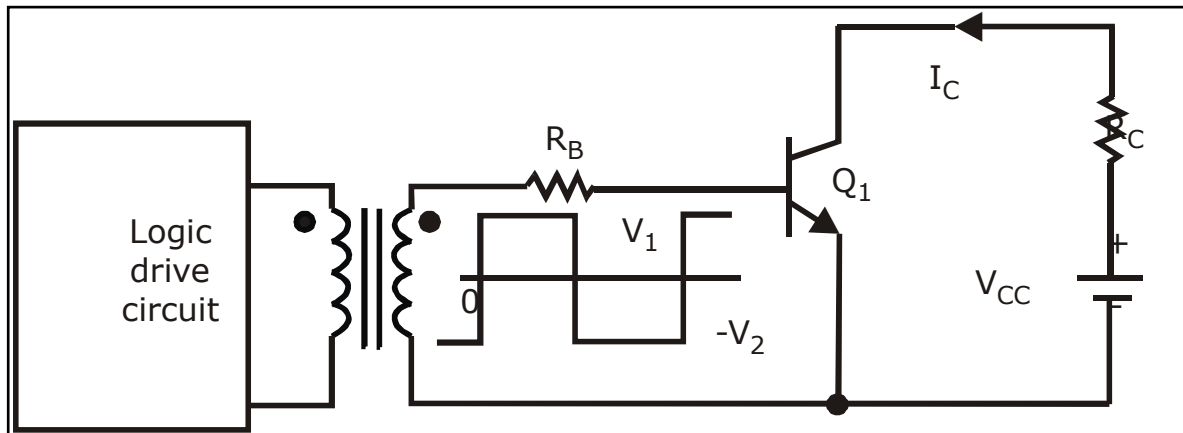
- Pulse transformers
- Optocouplers

Pulse Transformers

Pulse transformers have one primary winding and can have one or more secondary windings.

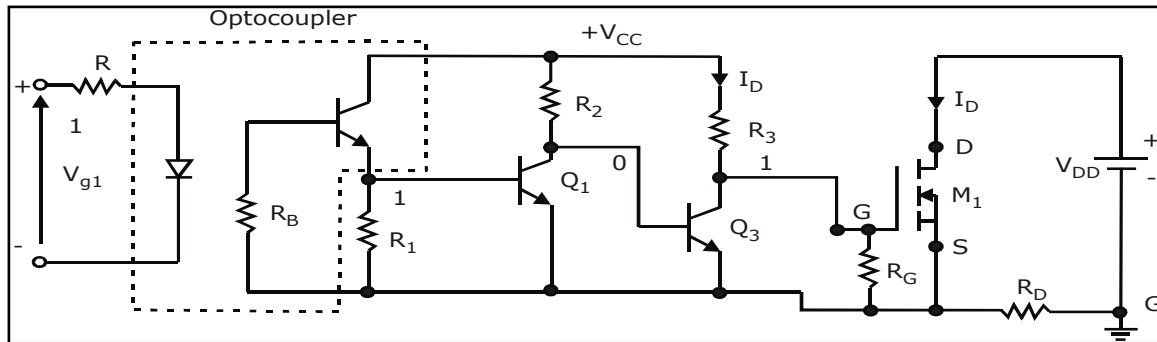
Multiple secondary windings allow simultaneous gating signals to series and parallel connected transistors. The transformer should have a very small leakage inductance and the rise time of output should be very small.

The transformer would saturate at low switching frequency and output would be distorted.



Optocouplers

Optocouplers combine infrared LED and a silicon photo transistor. The input signal is applied to ILED and the output is taken from the photo transistor. The rise and fall times of photo transistor are very small with typical values of turn on time = $2.5\mu\text{s}$ and turn off of 300ns. This limits the high frequency applications. The photo transistor could be a darlington pair. The phototransistor requires separate power supply and adds to complexity and cost and weight of driver circuits.



Source : <http://elearningatria.files.wordpress.com/2013/10/ece-vii-power-electronics-10ec73-notes.pdf>