

Transistor Switch and PWM

Student Group

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A transistor switch can connect and disconnect a load very quickly. If the switch is periodically on and off, the load sees an average voltage.

For an ideal switch with supply voltage (U_{dc}) :

$$\overline{u_{\text{L}}} = \frac{1}{T} \int_0^T u_{\text{L}}(t) dt = \frac{T_{\text{on}}}{T} U_{\text{dc}}$$

The duty cycle is

$$d = \frac{T_{\text{on}}}{T}$$

Thus

$$\boxed{\overline{u_{\text{L}}} = d U_{\text{dc}}}$$

This is the basic idea of pulse-width modulation (PWM). Applications to motor drivers and power stages are continued in [Block 14](#).

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