

Transistor as a Switch

Electrical Engineering

Driving a transistor fully on, and counting conduction and switching loss.

A half-on transistor dissipates far more than a fully on one.

1 Work out the load current

Supply divided by load resistance, plus any inrush at the moment of turn-on.

2 Drive it hard

For a BJT set I_B near $I_C/10$; for a MOSFET take the gate to the full rail.

3 Check conduction loss

$V_{CE(sat)} \times I_C$ for a bipolar part, $I^2 R_{DS(on)}$ for a MOSFET.

4 Check switching loss

Voltage and current overlap during each edge, times the switching rate.

5 Clamp inductive kick

A flyback diode across a relay or motor coil catches the reverse spike.

Educational reference. Switching anything on the mains side is regulated work needing qualified supervision and local compliance.