Task 1: IGBT

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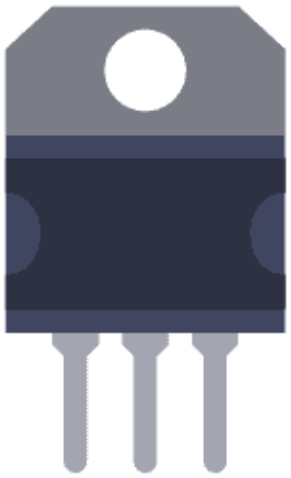
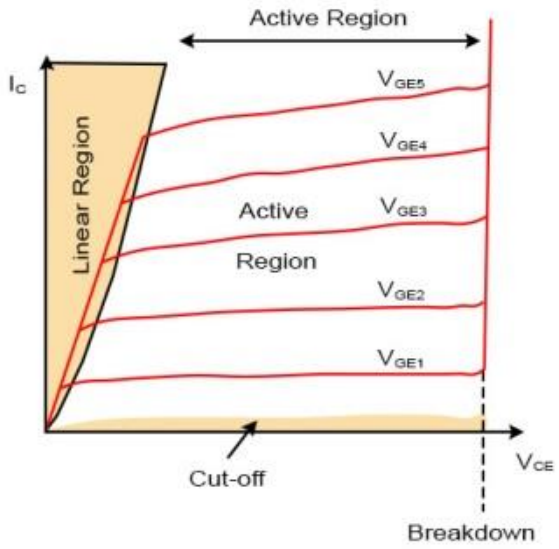
IGBT stands for insulated-gate bipolar transistor and is to be a cross between a BJT and a MOSFET. It is used for fast switching of electric currents to achieve low switching losses therefore used in power applications. It combines the high input impedance and high switching speeds of a MOSFET with the low saturation voltage of a bipolar transistor. Also, IGBTs are voltage controlled.



Key Parameters

1. IGBT saturation voltage
2. IGBT threshold voltage
3. Diode forward voltage
4. IGBT breakdown voltage

Operating regions



- **Cut-off region:** When $V_{GE} = 0$, the device is off and no current passes between the collection and the emitter. There will be a small voltage leakage as long as V_{GE} is lower than threshold voltage and higher than zero.
- **Linear region:** Most appropriate region for current to stay in
- **Active region:** When V_{GE} exceeds the threshold voltage, the device is turned on. As the current flow increases, there is a large increase in V_{GE}.