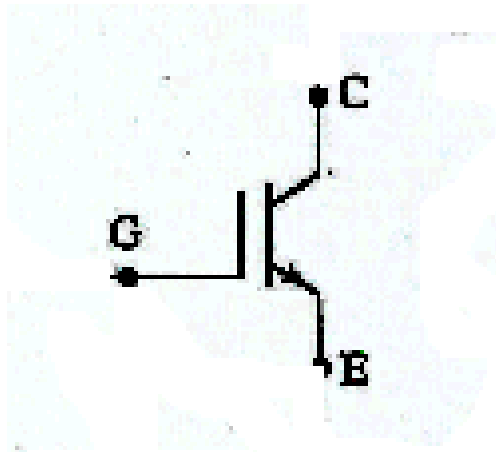


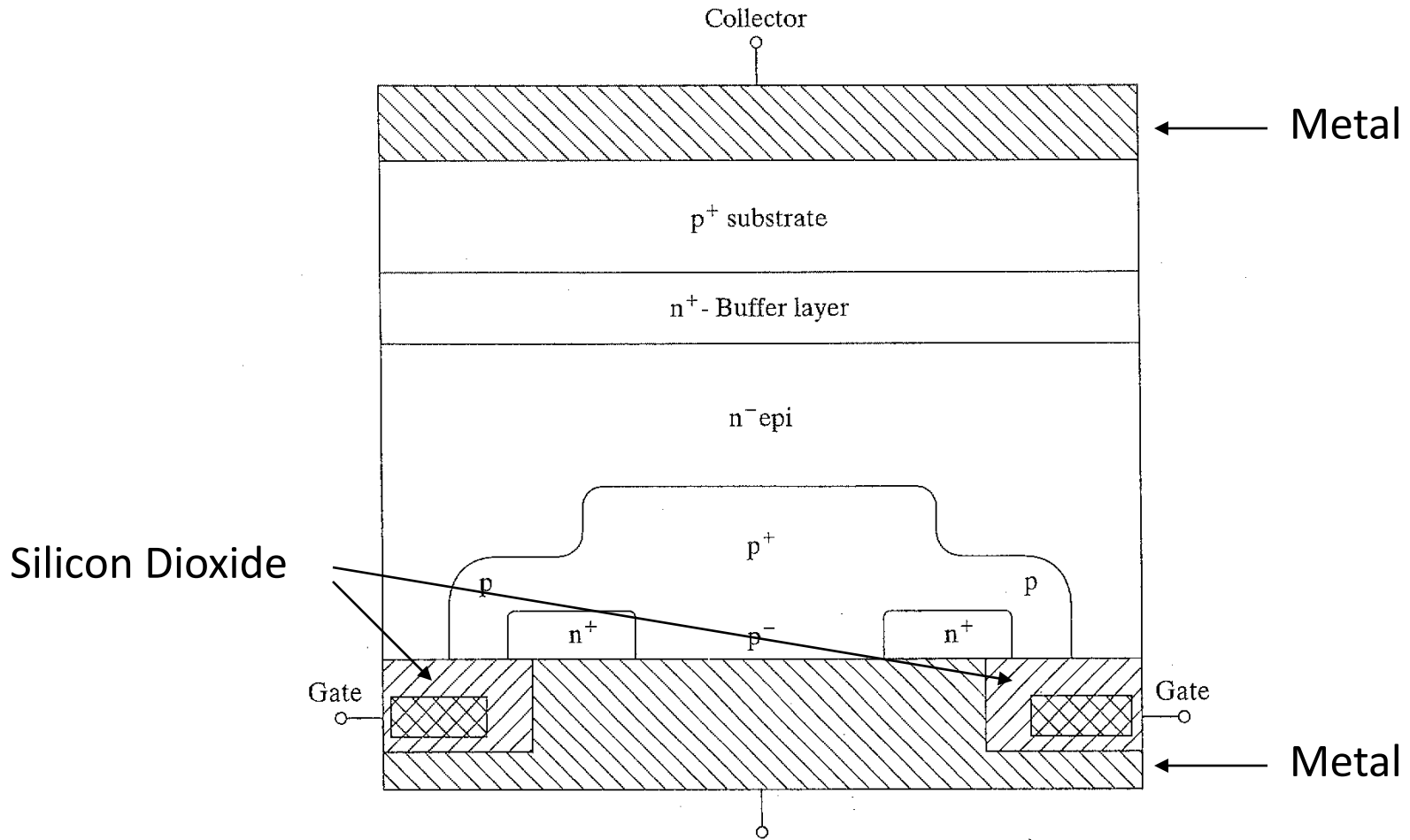
Lecture 5

IGBT: Insulated-Gate Bipolar Transistor

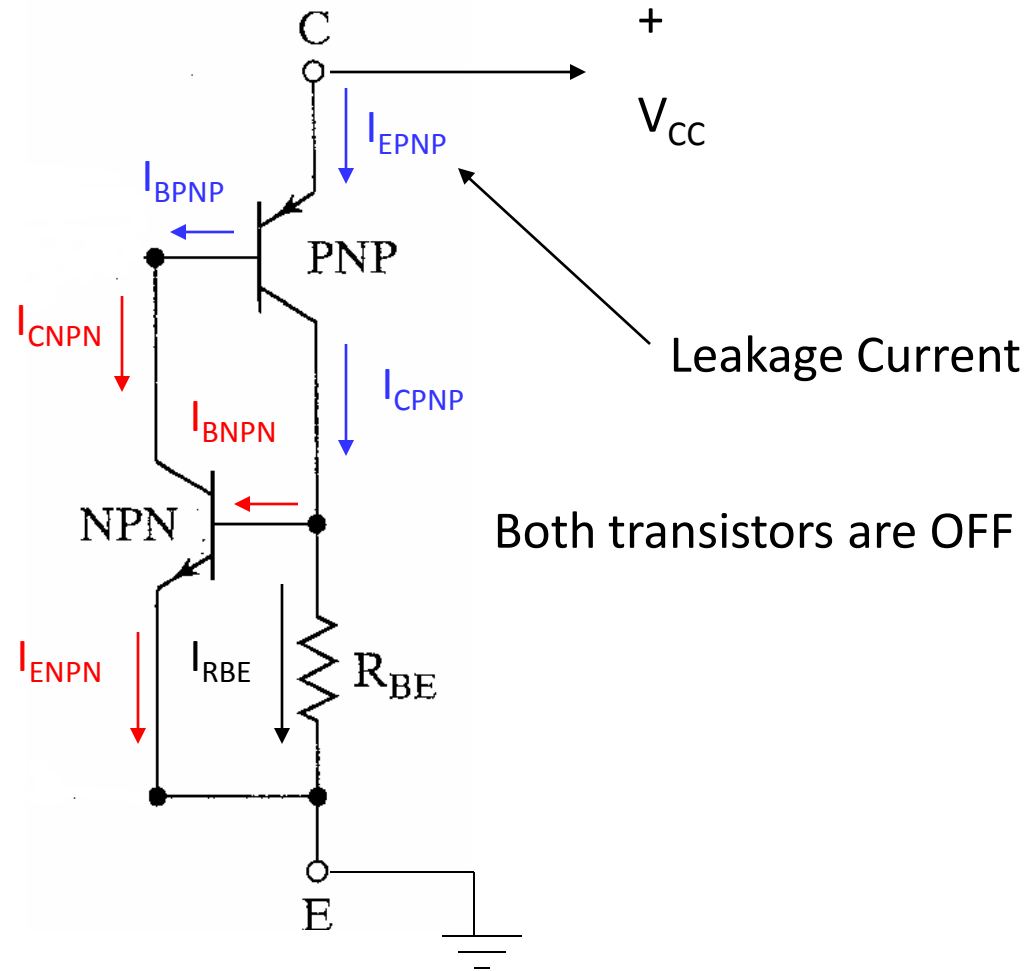
- Combination BJT and MOSFET
 - High Input Impedance (MOSFET)
 - Low On-state Conduction Losses (BJT)
- High Voltage and Current Ratings
- Symbol



Cross-Sectional View of an IGBT



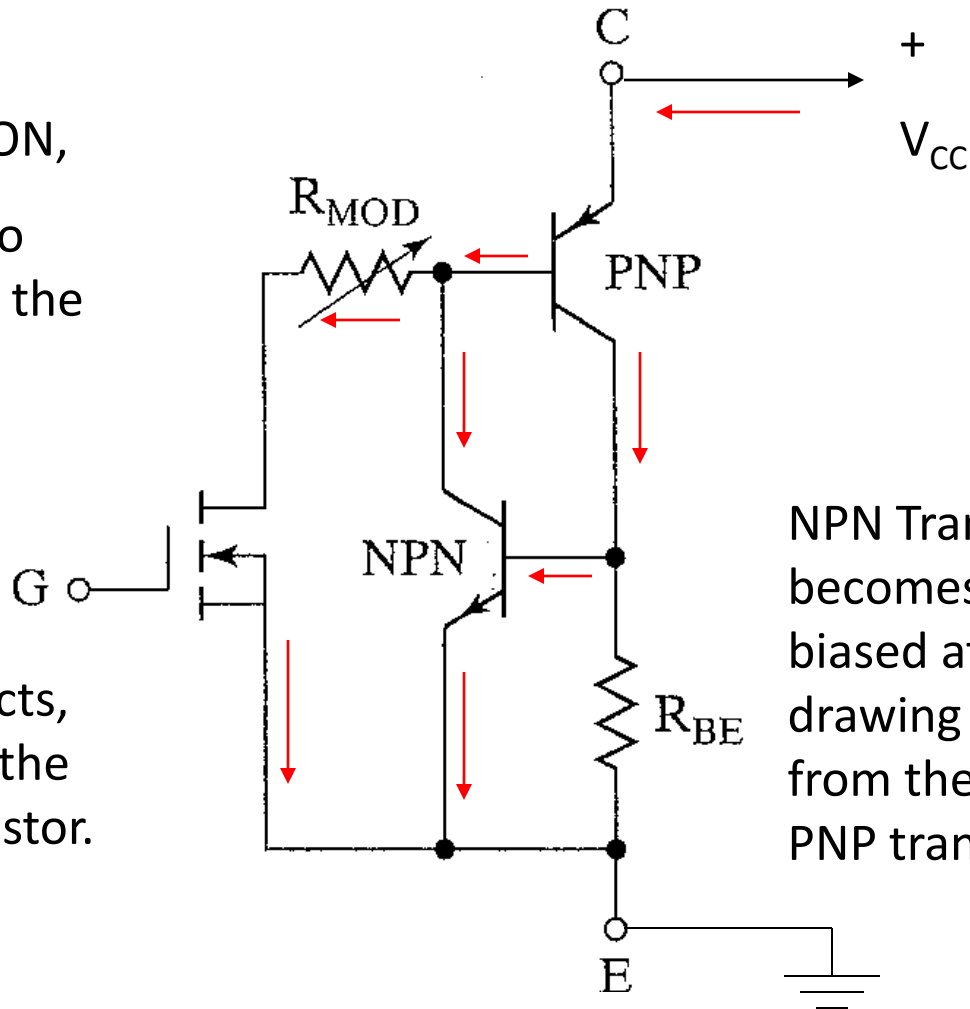
IGBT Equivalent Circuit for $V_{GE} < V_T$



IGBT Equivalent Circuit for $V_{GE} > V_T$

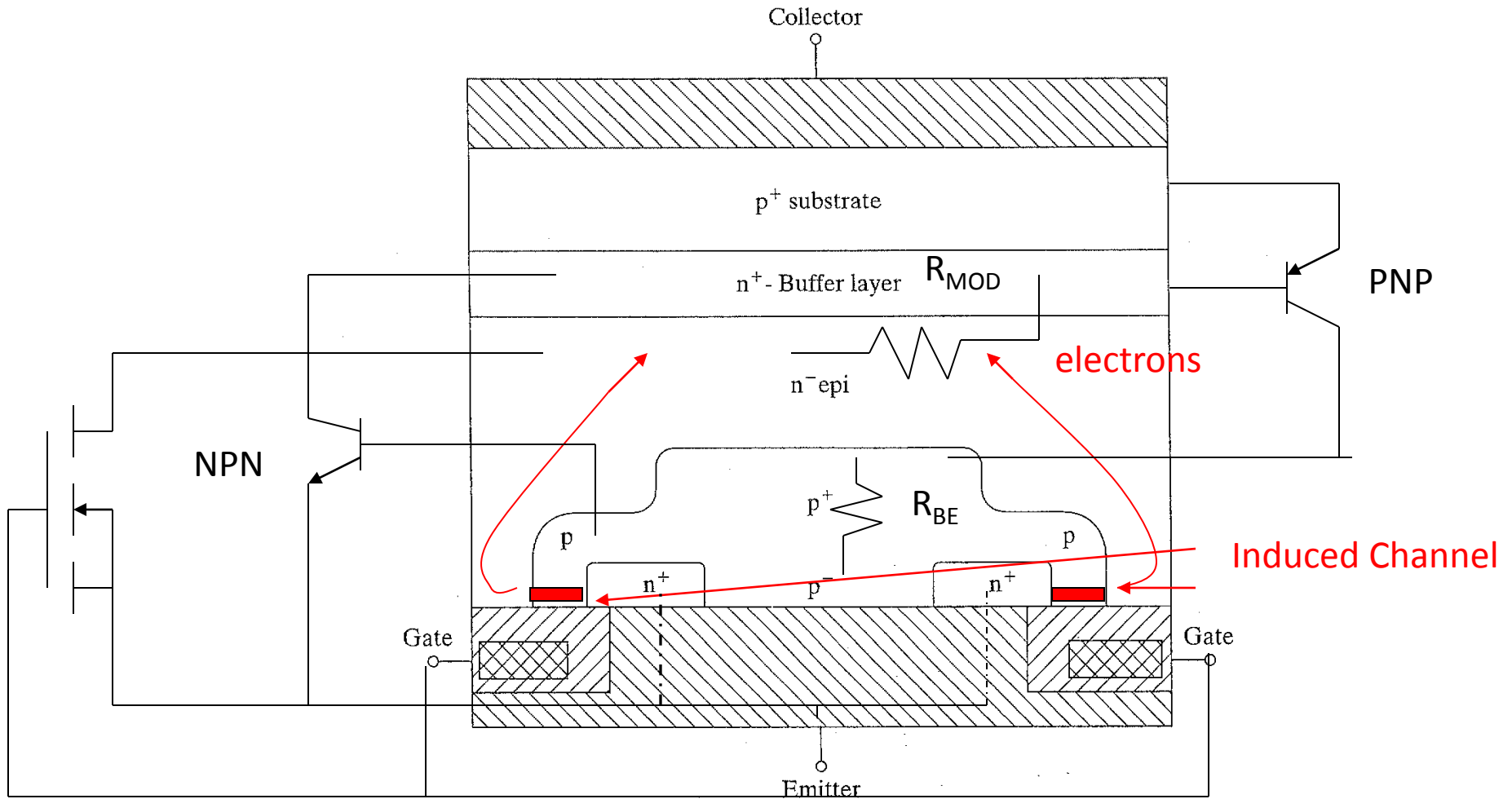
PNP transistor turns ON,
 R_{MOD} decreases due to
carrier injection from the
PNP Emitter.

MOS transistor conducts,
drawing current from the
Base of the PNP transistor.



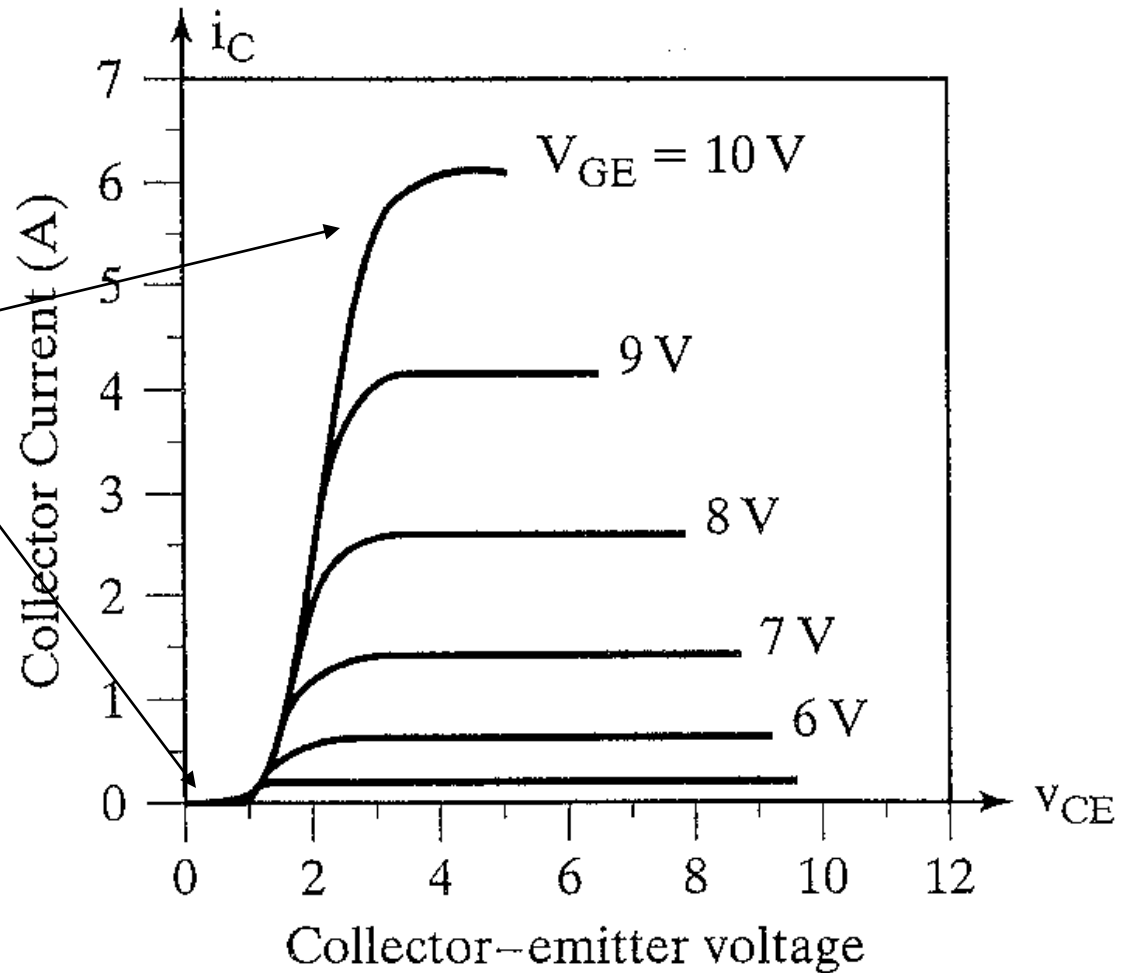
NPN Transistor
becomes forward
biased at the BE,
drawing current
from the Base of the
PNP transistor.

Channel is Induced When $V_{GE} > V_T$

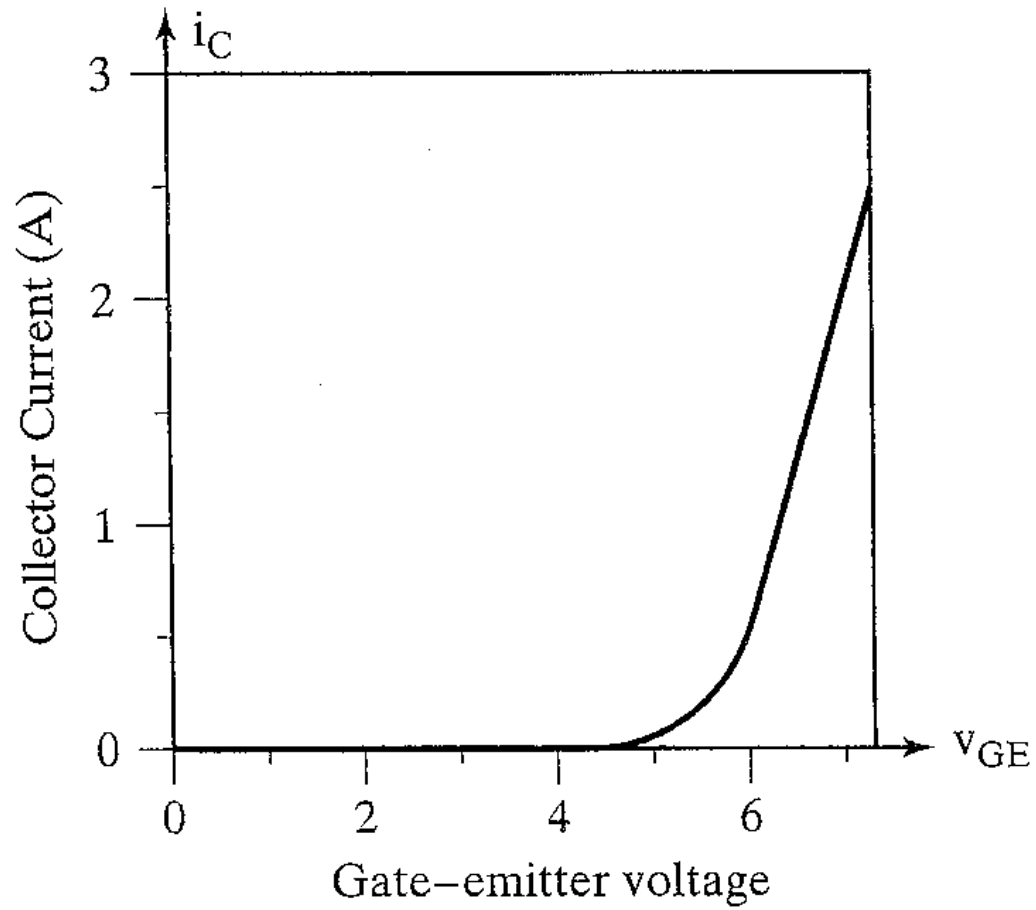


IGBT Output Characteristics

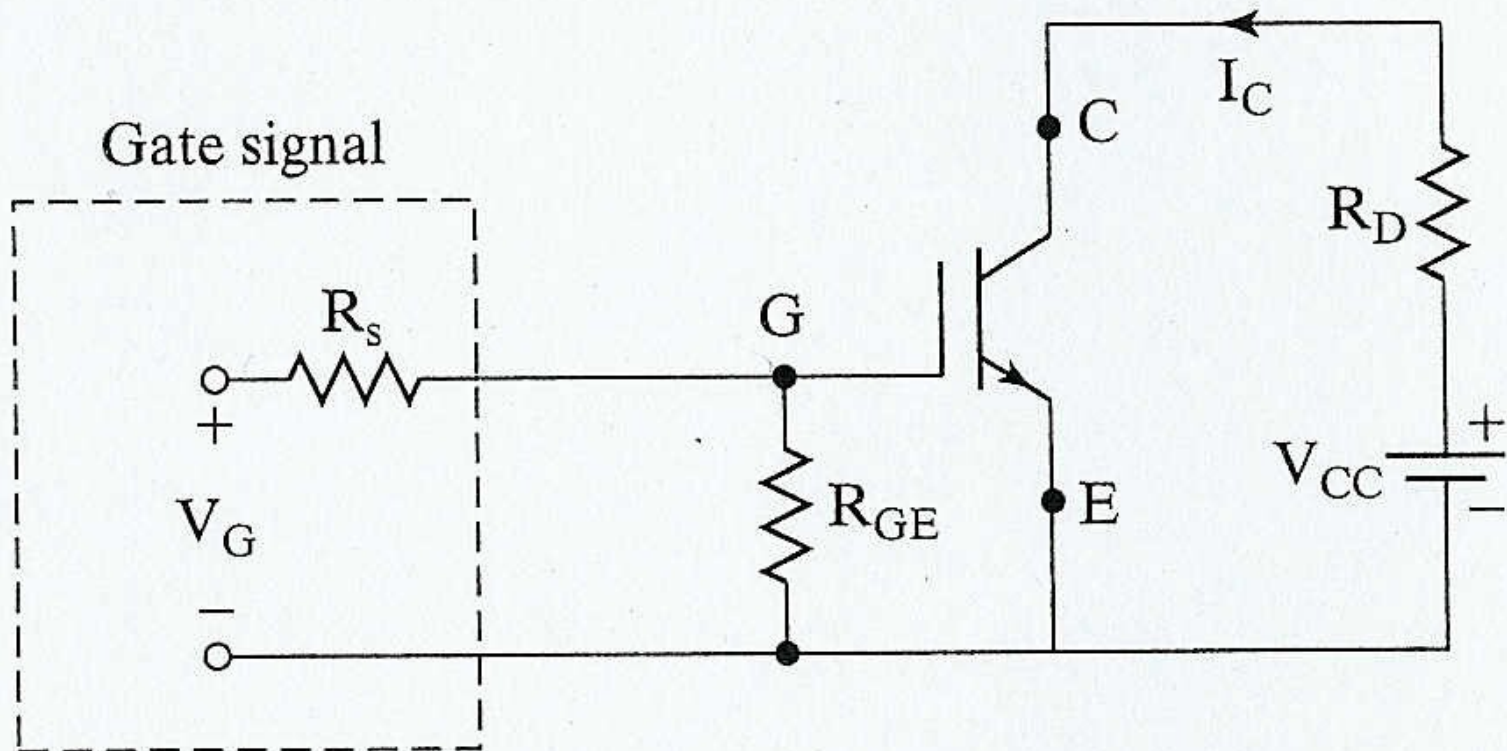
Follows an SCR characteristic

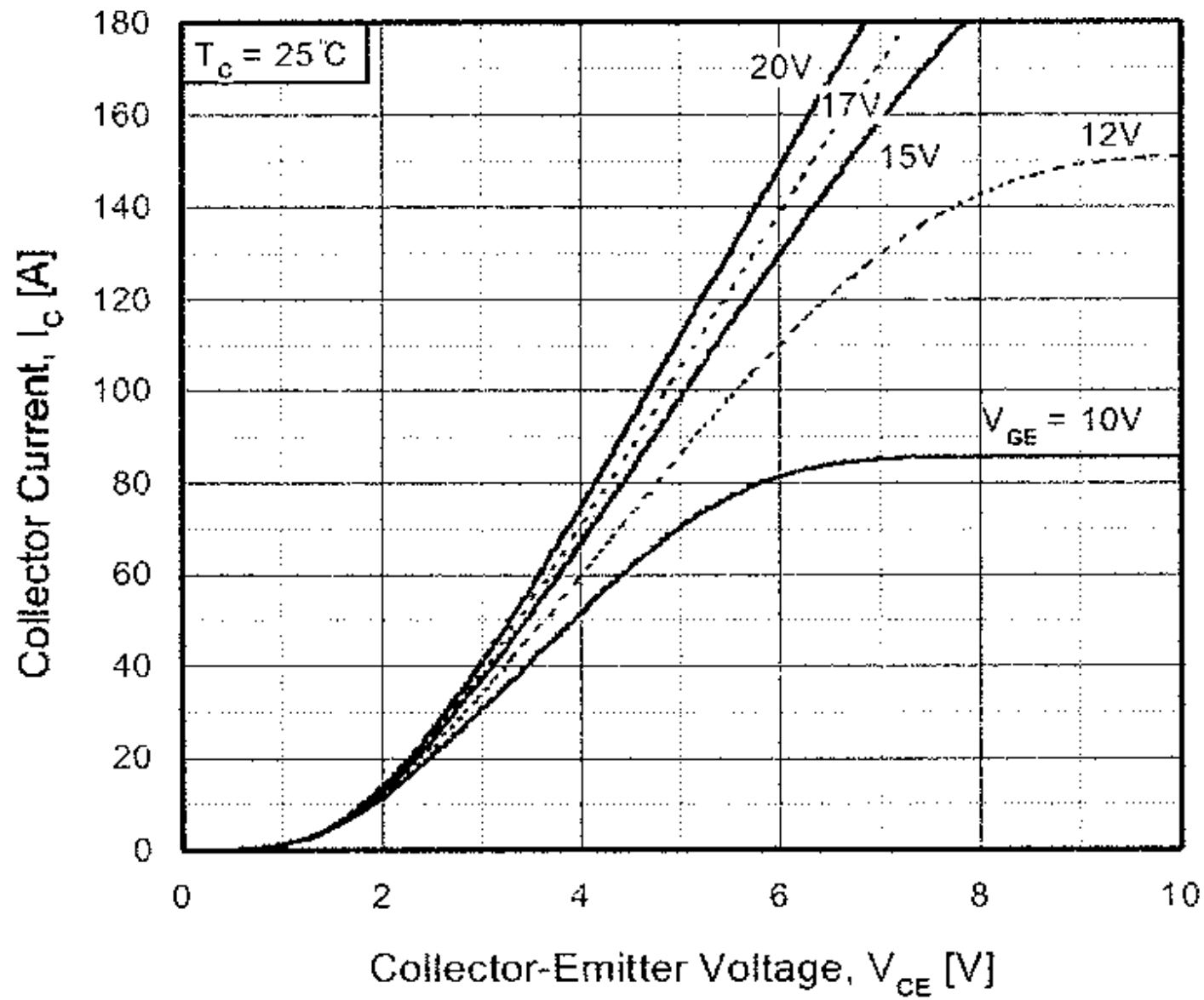


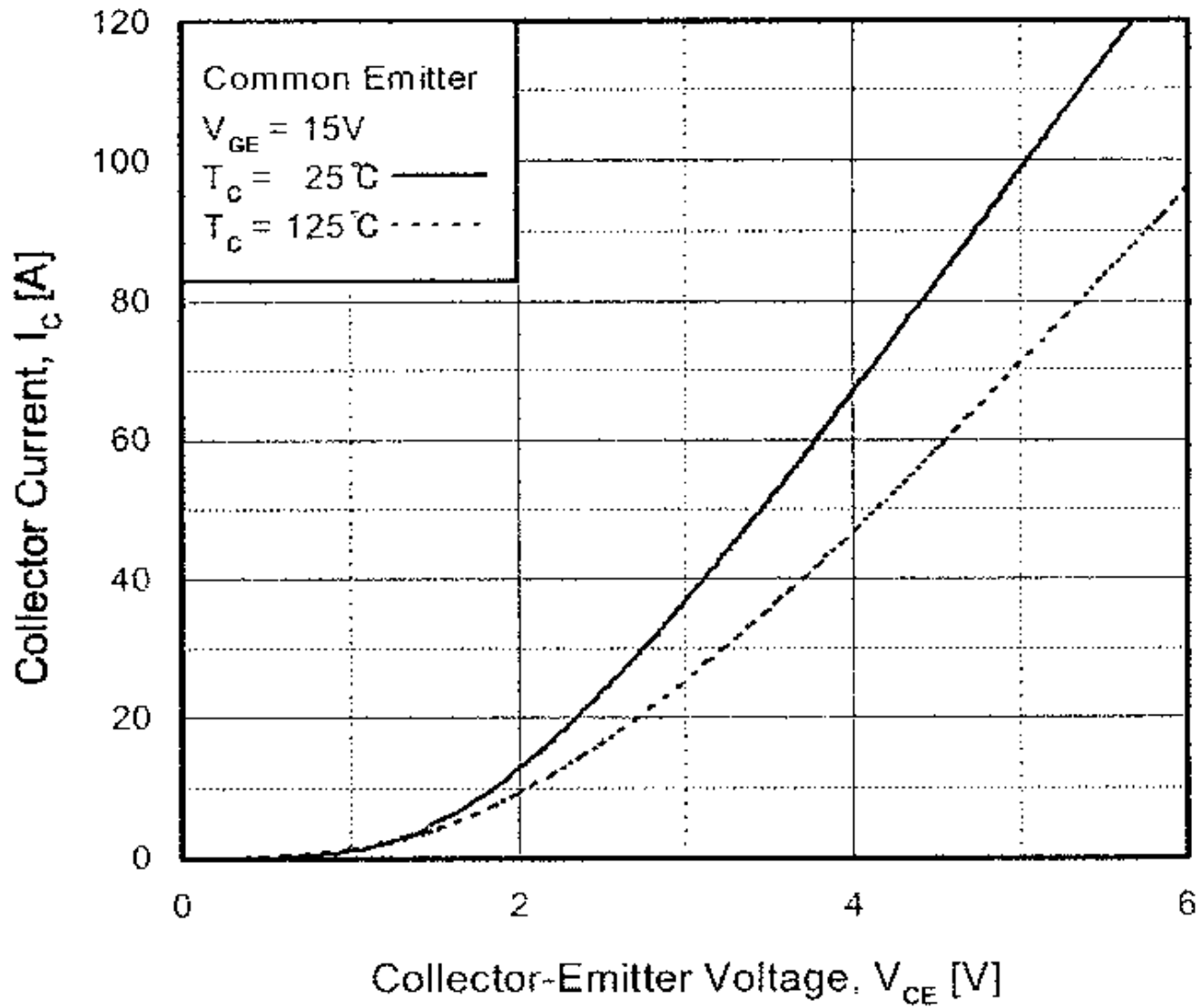
IGBT Transfer Characteristic



IGBT Used as a Switch







NPTEL LINK

<http://nptel.ac.in/courses/108101038/9>