- ***Under forward bias***:
    - ***BH reduces to ($V_0 - V_D$)***
    - ***Inj that creates current flow*** $\propto \exp(V_D/V_T)$
    - Note the ***exponential dependence***
        - ***Possibility of large injection for large V_D***
    - ***Drift component remains more or less same***, since it is ***dependent on the minority carriers***
    - ***Current increases exponentially with V_D***
    - ***V_D can never equal or exceed V_0***
        - ***Thermodynamically untenable situation***

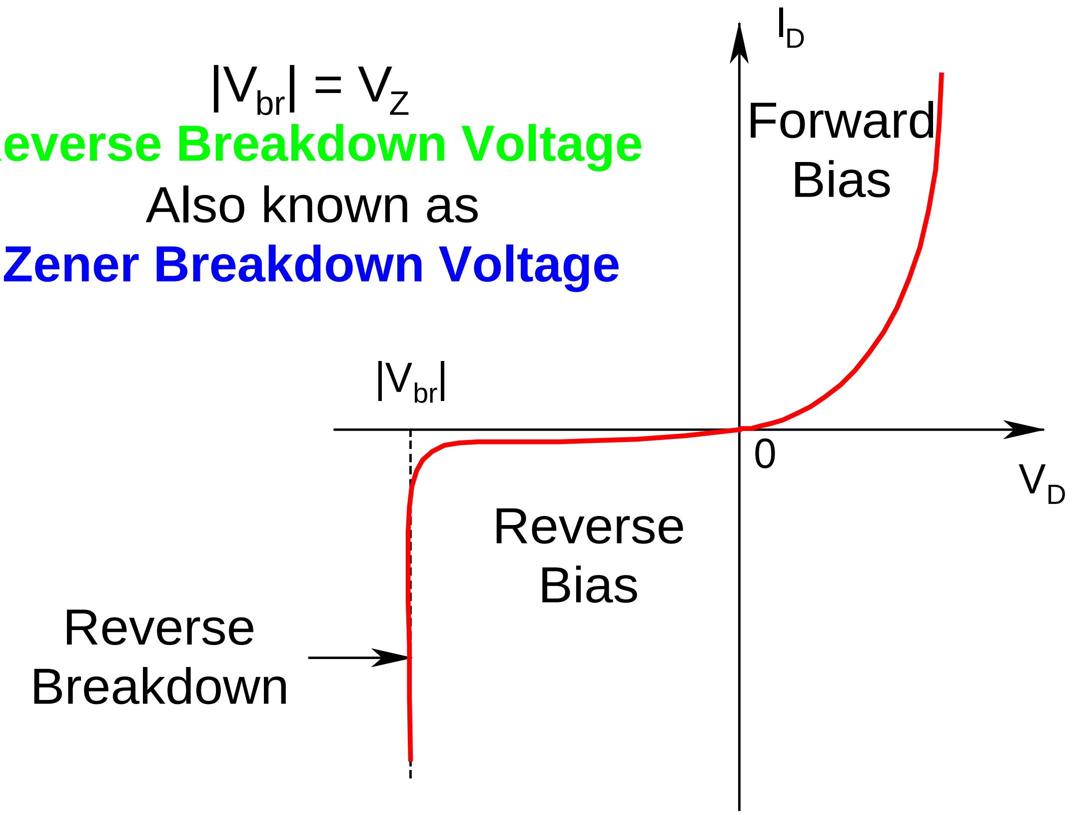
- ***Under reverse bias***:
  - ***Inj↓↓ due to negative V_D***
  - ***Drift component remains same***
    - Function of ***minority carriers*** available on the two sides, which is a ***constant*** (***function only of temperature***)
  - ***Current becomes small and independent of bias***
- In ***forward bias***, ***both injection components*** create ***current from p to n***
- In ***reverse bias***, ***both minority carrier drift components*** create ***current from n to p***

Current-Voltage Characteristic

- $I_D = I_0[\exp(V_D/V_T) - 1]$
  - I_0: ***Reverse Saturation Current*** (~ nA-fA)
- In ***equilibrium***: $V_D = 0 \Rightarrow I_D = 0$
- Under ***forward bias***: ***V_D positive***
  - I_D ***positive*** (***flows from p to n***) (~ mA)
  - For $V_D > 4V_T$ (~ 100 mV at 300 K):
    - $I_D \approx I_0[\exp(V_D/V_T)]$ (***A True Exponent***)

- Under ***reverse bias***: ***V_D negative***
  - I_D ***negative*** (***flows from n to p***)
  - For $|V_D| > 4V_T$:
    - $I_D \approx -I_0$ (note the ***negative sign***)
    - ***Extremely small***, almost negligible
- ***Depending on V_D, the ratio of the forward current to the reverse current can range from 5 to 14 orders of magnitude***!
- ***Primary applications***:
  - ***Rectification*** and various types of ***waveshaping***

Complete I-V Characteristic



Note that the forward and reverse current scales are not same