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Forward biased pn diode

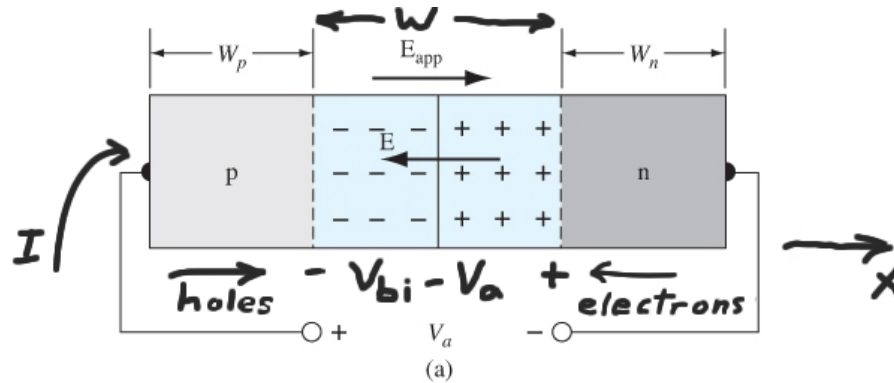


Figure 8.3 | (a) A pn junction with an applied forward-bias voltage showing the directions of the electric field induced by V_a and the space charge electric field.

- There is a decreased total potential of $V_{bi} - V_a$.
- Net electric field $E - E_{app}$ in $-x$ -direction is decreased due to applied electric field.
- Space region width W smaller than it was for equilibrium & no bias.
- Equilibrium conditions (i.e., Coulomb force from E balances out with diffusion) no longer hold.
- This allows electrons (majority) on n side to flow across depletion layer into p side and holes (majority) on p side to flow across depletion layer into n side. Net current I flows from left to right.

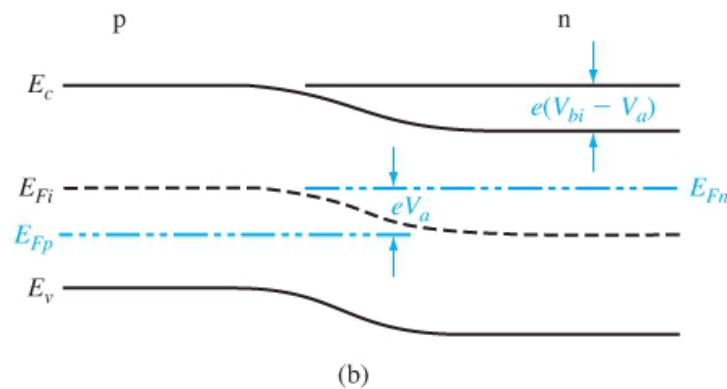


Figure 8.3 | (b) Energy-band diagram of the forward-biased pn junction.

- Potential energy barrier $e(V_{bi} - V_a)$ ‘seen’ by electrons/holes is reduced under forward bias.