BASE TRANSPORT

$$\alpha_T = \frac{I_{CP}}{I_{EP}} = \frac{I_{EP} - I_{B2}}{I_{EP}}$$

$$\alpha_T = 1 - \frac{I_{B2}}{I_{EP}}$$

USE

$$1 - \varepsilon \approx \frac{1}{1+\varepsilon}$$

$$\alpha_T \approx \frac{1}{1 + \frac{I_{B2}}{I_{EP}}}$$

SUBSTITUTE

$$\alpha_T = \frac{}{1 + \frac{qA \frac{W}{2\tau_B} \frac{n_i^2}{N_B} e^{qV_{EB}/kT}}{qA \frac{D_B}{W} \frac{n_i^2}{N_B} e^{qV_{EB}/kT}}}$$

$$\alpha_T = \frac{1}{1 + \frac{W^2}{2\tau_B D_B}}$$

PUT IN TERMS OF MIN CARR DIFFUSION LENGTH

$$L_B = \sqrt{D_B \tau_B}$$

$$L_B^2 = D_B \tau_B$$

$$\alpha_T = \frac{1}{1 + \frac{W^2}{2L_B^2}} = \frac{1}{1 + \frac{1}{2}\left(\frac{W}{L_B}\right)^2} \qquad W \ll L_B$$