Formula sheet

$\gamma_{th} = \frac{1}{2l} ln \frac{1}{R_1 R_2}$ $\quad h\nu_0 \approx E_g + \frac{1}{2}kT$ $\quad h\Delta\nu \approx 3kT$

$\eta_{IQE} = \frac{1/\tau_r}{1/\tau_r + 1/\tau_{nr}} = \frac{\Phi}{I/e}$ $\quad \eta_{EE} = \frac{\Phi_{out}}{\Phi} = \frac{P_{out}/h\nu}{\eta_{IQE} \times \frac{I}{e}}$ $\quad \eta_{EQE} = \frac{\Phi_{out}}{I/e}$

$\eta_{PCE} = \frac{P_{out}}{IV}$

$\eta_{LE} = \frac{\Phi_V}{IV}$, where $\Phi_V = P_o \times 683 \times V(\lambda)$ $\quad \eta_{EQE} = \frac{I_{ph}/e}{P_o/h\nu}$

$I_{ph} = \frac{P_o}{h\nu} \times (1 - R) \times (1 - e^{-\alpha d}) \times \eta_{IQE} \times e$ $\quad \boldsymbol{R} = \frac{I_{ph}}{P_o}$ $\quad I = I_s \left(e^{\frac{eV}{kT}} - 1 \right) - I_{ph}$

$t_{drift} = \frac{w}{V_d}$ $\quad C_{dep} = \frac{\epsilon A}{w}$ $\quad i_{rms,ph} = \sqrt{2eI_d B}$ $\quad i_{rms,th} = \sqrt{\frac{4kTB}{R_L}}$

$FF = \frac{V_{max} I_{max}}{V_{oc} I_{sc}}$