

Some useful equations

V_{OC}	Open circuit voltage	$V_{oc} = \frac{nKT}{q} \ln\left(\frac{I_{sc}}{I_L} + 1\right)$
v_{oc}	Normalized open circuit voltage	$v_{oc} = \frac{q}{nKT} V_{OC}$
F	Fill factor	$FF = \frac{v_{oc} - \ln(v_{oc} + 0.72)}{v_{oc} + 1} = \frac{V_{mpp} I_{mpp}}{V_{oc} I_{sc}} = \frac{P_{mpp}}{V_{oc} I_{sc}}$
η	Efficiency	$\eta = \frac{V_{oc} I_{sc} FF}{V_{oc} I_{sc}}$
V_T	Thermal voltage	$V_T = \frac{KT}{q} = 0.0259$

Variables

q:electron charge = 1.602×10^{-19}	K:boltzmann constant= 1.38×10^{-23}
T:temperature [K]	n: diode ideal factor (normal =1)
I_{sc} : short circuit current	I_L : saturation current
AM1.5: Air mass coefficient at 1000W/m ²	