— If for a PV module operating at NOCT conditions, the cell temperature is 42°C, determine the cell temperature when this module operates at a location where $G_t = 683 \, W/m^2$, $V = 1 \, m/s$, and 41°C and the module is operating at its maximum power point with an efficiency of 9.5%.

Solution

$$T_c = (T_{NOCT} - T_{a,NOCT}) \left[\frac{G_t}{G_{t,NOCT}} \right] \left[1 - \frac{\eta e}{(\tau \alpha)} \right] + T_a$$

$$= (42 - 20) \left[\frac{683}{800} \right] \left(1 - \frac{0.095}{0.9} \right) + 41$$

Using empirical

$$T_c = 30 + 0.0175 (G_t - 300) + 1.14 (T_a - 25)$$

$$T_c = 30 + 0.0175 (683 - 300) + 1.14 (41 - 25) = 54.9°C$$