

SOLAR CELL CASCADING – Increasing Solar Energy Yield at Low Illumination Levels

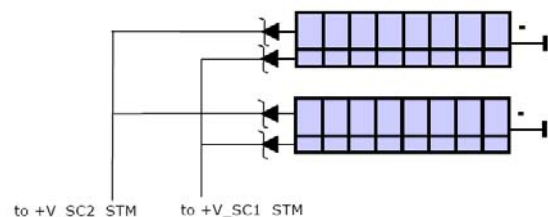
Increasing solar area

Increasing the solar area or light intensity per single solar cell produces a direct proportional increase in the output current. The open-circuit voltage remains constant regardless of the area, and is hardly changed at all even by the intensity of light because a solar cell works like a current source.

In order to reduce the charge time or work at even lower illumination levels with the STM modules, you may use a larger solar panel with the same open circuit voltage, or more parallel connected solar panels as illustrated below. Through paralleling of more solar panels with the same nominal open circuit voltage you will have a multiple of the single charge current, by same supply voltage and correspondingly to a with the same factor reduced charging time.

Example for Cell Cascading

In the following please find an example for correct parallel connecting of two identical solar panels for STM modules (diodes are inserted to avoid cross effect currents between the two solar panels due to individual tolerances and/or different illumination levels). Recommended are generally low leakage schottky diodes because of their lower threshold voltage.



Low voltage drop by Schottky Diodes

Schottky diodes have a very low threshold voltage and so the voltage drop will be minimized. On the other hand they have a relative high leakage (reverse) current compared with the silicone diodes, current that will rapidly increase with the temperature.

At higher temperature and lower illuminance levels, the higher leakage (reverse) current of the schottky diode may be comparable to the supply current generated by the solar panel itself. In such cases it may be better to use silicon diodes instead of schottky, which have a much lower leakage current (pA) even if their have a higher voltage drop.

Attention

Please also consider the different solar cell technologies with their specific behavior (spectral sensitivity, efficiency). Never use solar panels which could deliver a too higher open circuit voltage (see STM module specifications) that may damage the STM module. For more details please also consult the Application Note "AN201 SOLAR UNIT MOUNTING"

Disclaimer

The information provided in this document describes typical features of the EnOcean radio system and should not be misunderstood as specified operating characteristics. No liability is assumed for errors and / or omissions. We reserve the right to make changes without prior notice. For the latest documentation visit the EnOcean website at www.enocean.com.