

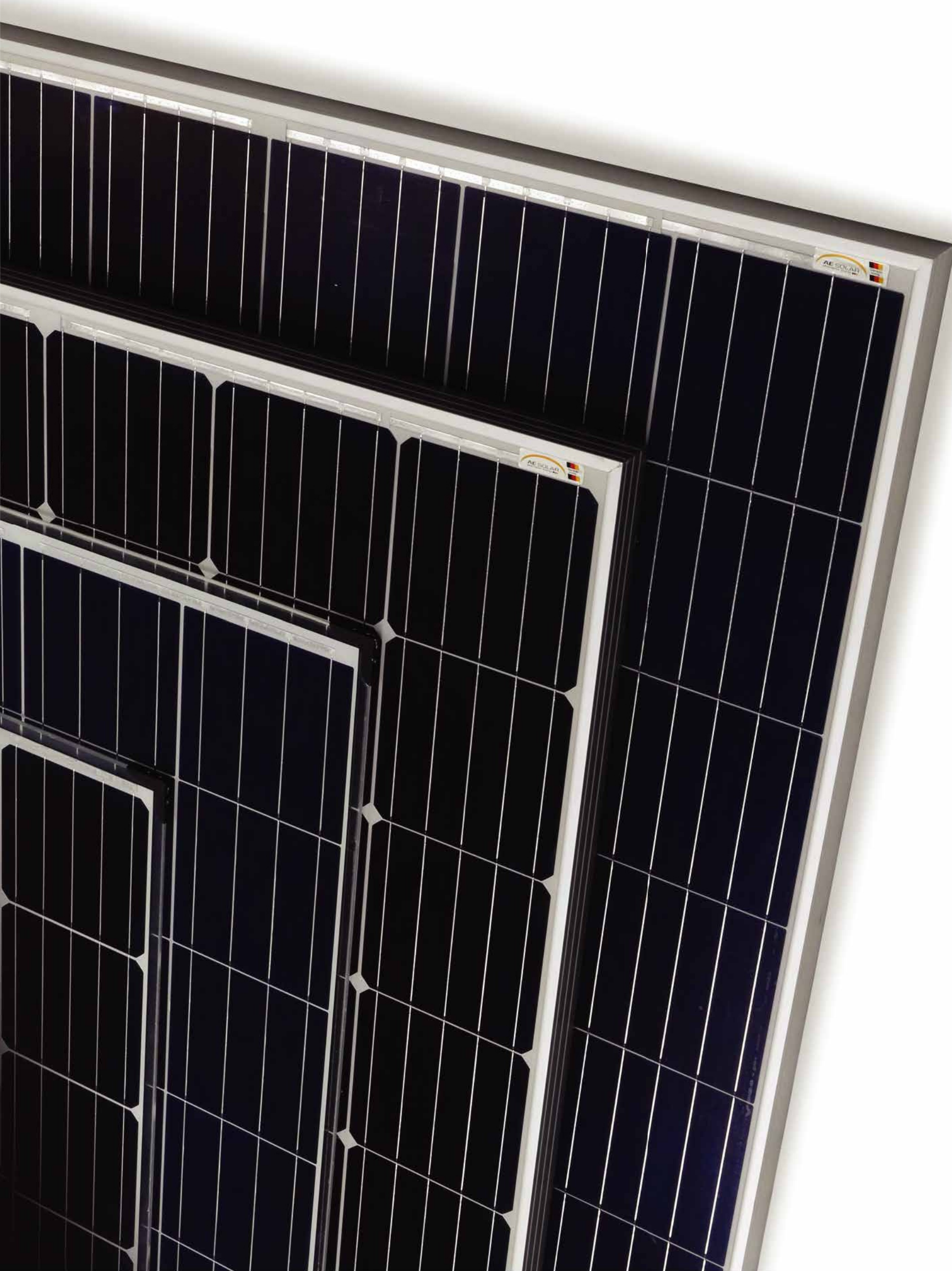


AE SMART HOT-SPOT FREE
Shading Resistant Technology





Driven by Innovation



Our engineering teams are always focused on new innovations and emerging technologies in photovoltaic. Their continuous effort and research allows AE Solar to deliver its products with high quality.

Understanding this has been the driving factor behind continuously expanding our research team and allocating a generous budget for R&D each year.

As a result of this tireless research, AE Solar successfully developed the world's first Smart Hotspot Free module for mass production with TÜV certification in 2016.

What is a Hot-Spot?

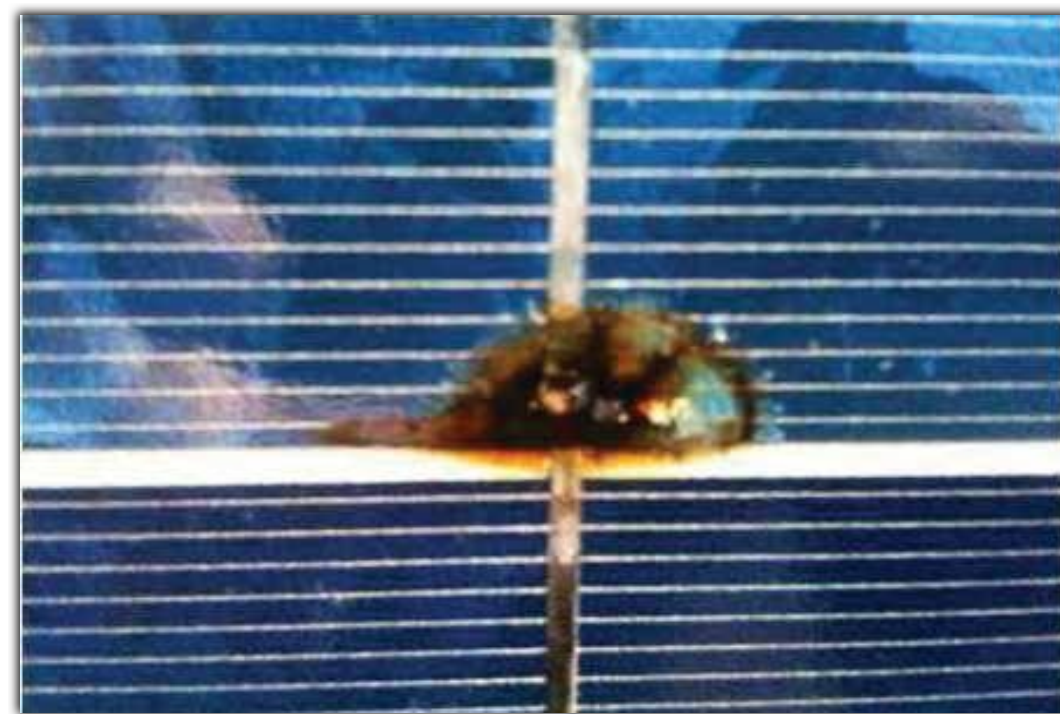
The term “Hot-Spot” refers to the excessive heating in an area of a solar panel. This raise in temperature may result from a drop in the output of electric current in one or more cells of a string. The drop in output occurs from shading, dirt, dust, snow, and manufacturing defects.



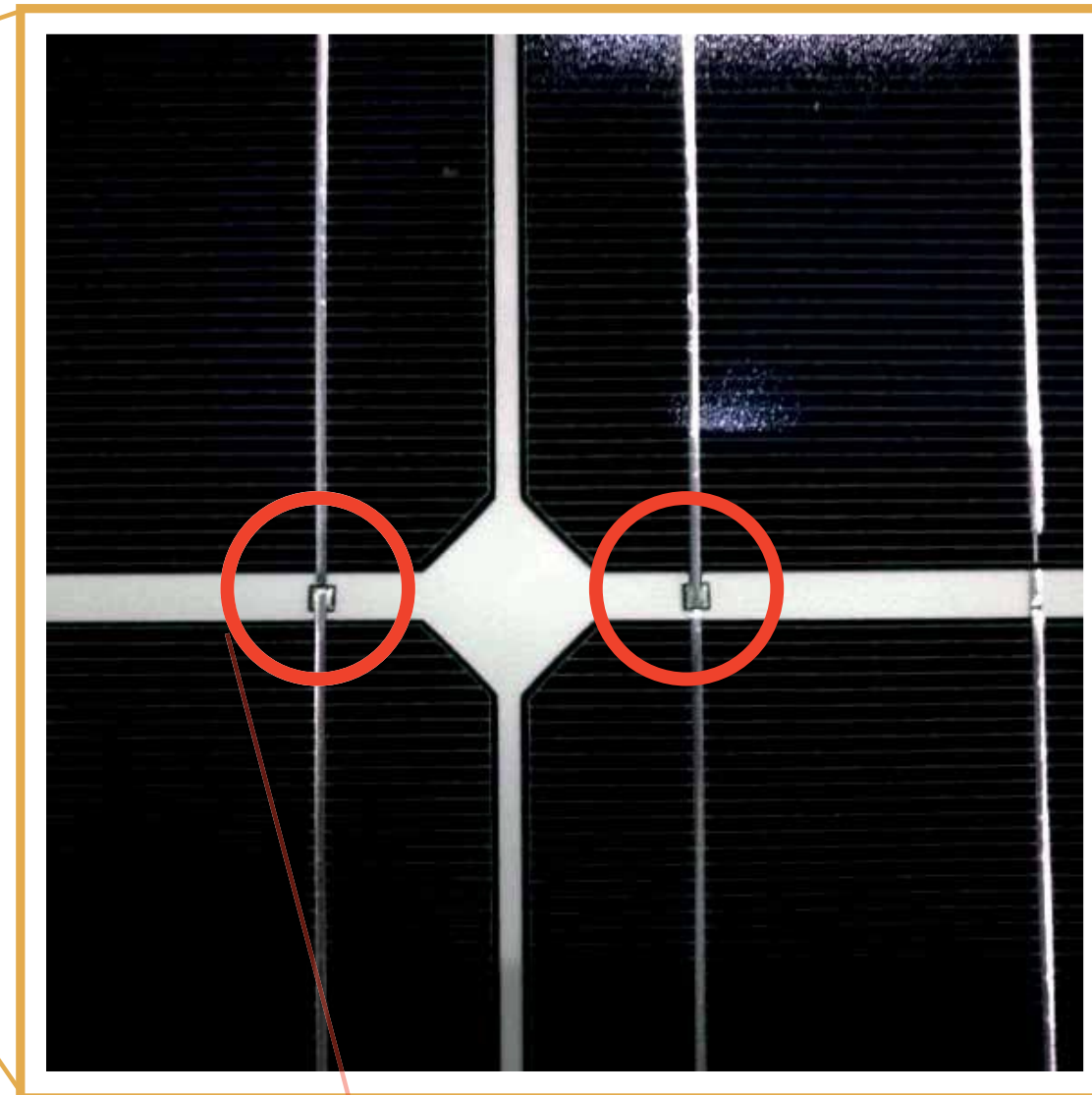
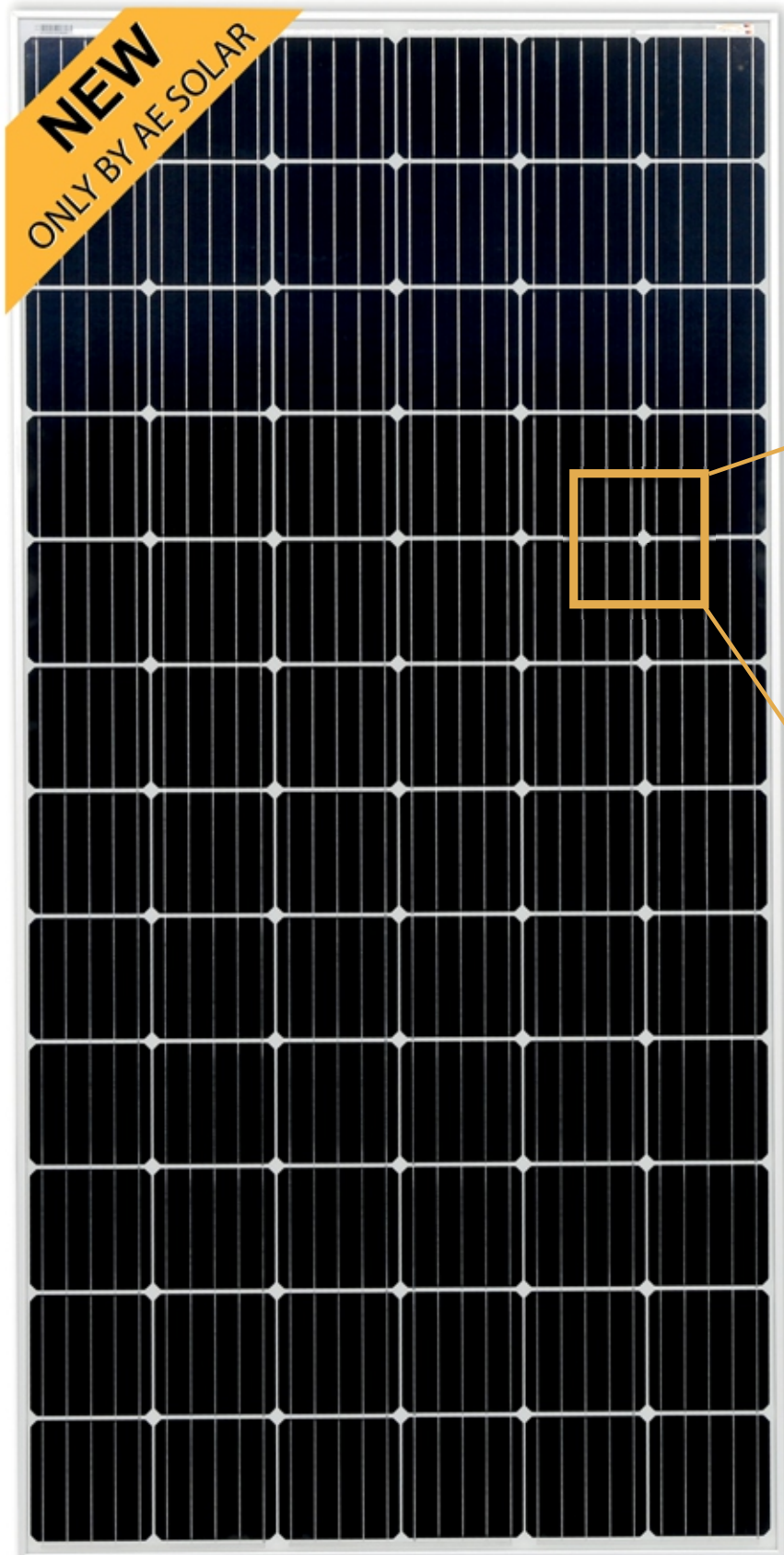
Hot-Spots Damage cells and panels



Dirt, dust and shading lead to Hot-Spots



Hot-Spots cause heat accumulation. Cell temperatures rise up to 160°C, resulting in loss of efficiency, damage to the panel, and in some cases, causing fires. In fact, over 30% of fires at solar installations are caused by Hot-Spots.



Bypass Diodes

The Hot-Spot Free Modules developed by AE Solar use bypass diodes to eliminate the development of hot-spots and thus the damages and risks associated.

The temperature of Hot-Spot cells within AE Smart Hot-Spot Free Modules does not exceed 85°C. This temperature management eliminates material hazard, the safety of the module and its surroundings.

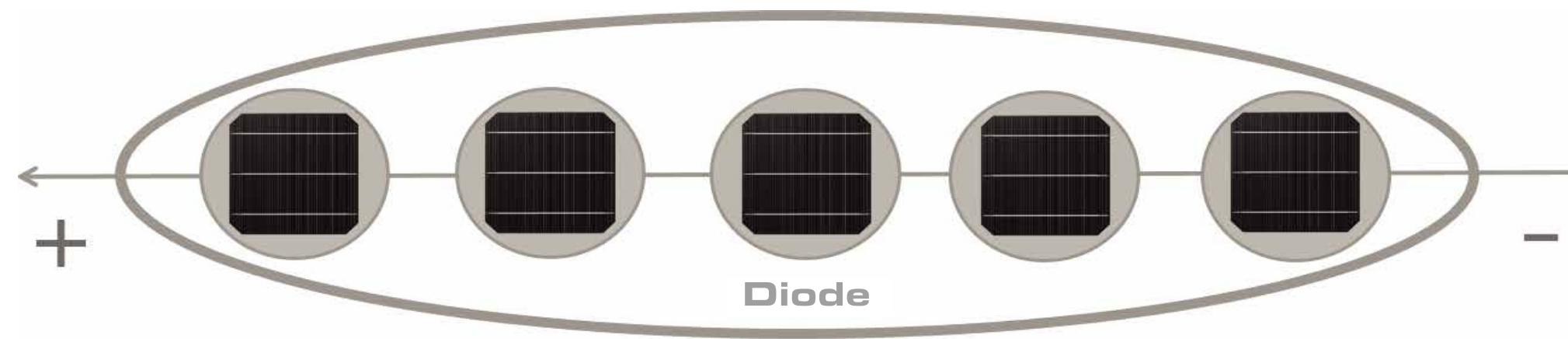
Available from 260W to 385W range, the AE SmartHot-Spot Free Modules offer up to 30% more power output compared to standard PV Modules thanks to their improved efficiency.

This added efficiency translates into less modules needed and less space required for installation.

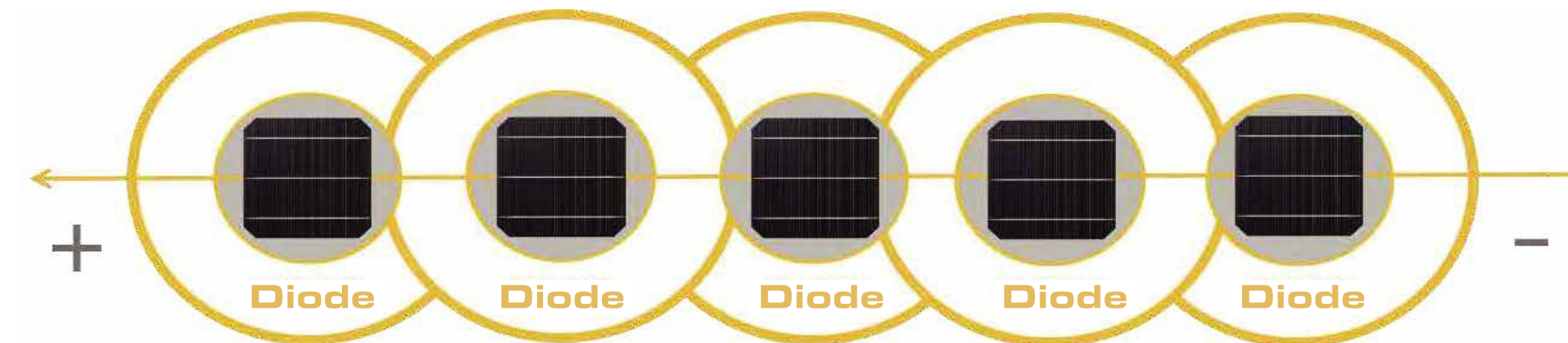
- Space Saving for PV plants by using Smart Modules compared to standard “non-smart” modules
- Temperature of cells does not exceed operating temperature of PV modules
- No reduction of PV module stability and no fire risk from hot-spots.

How it works?

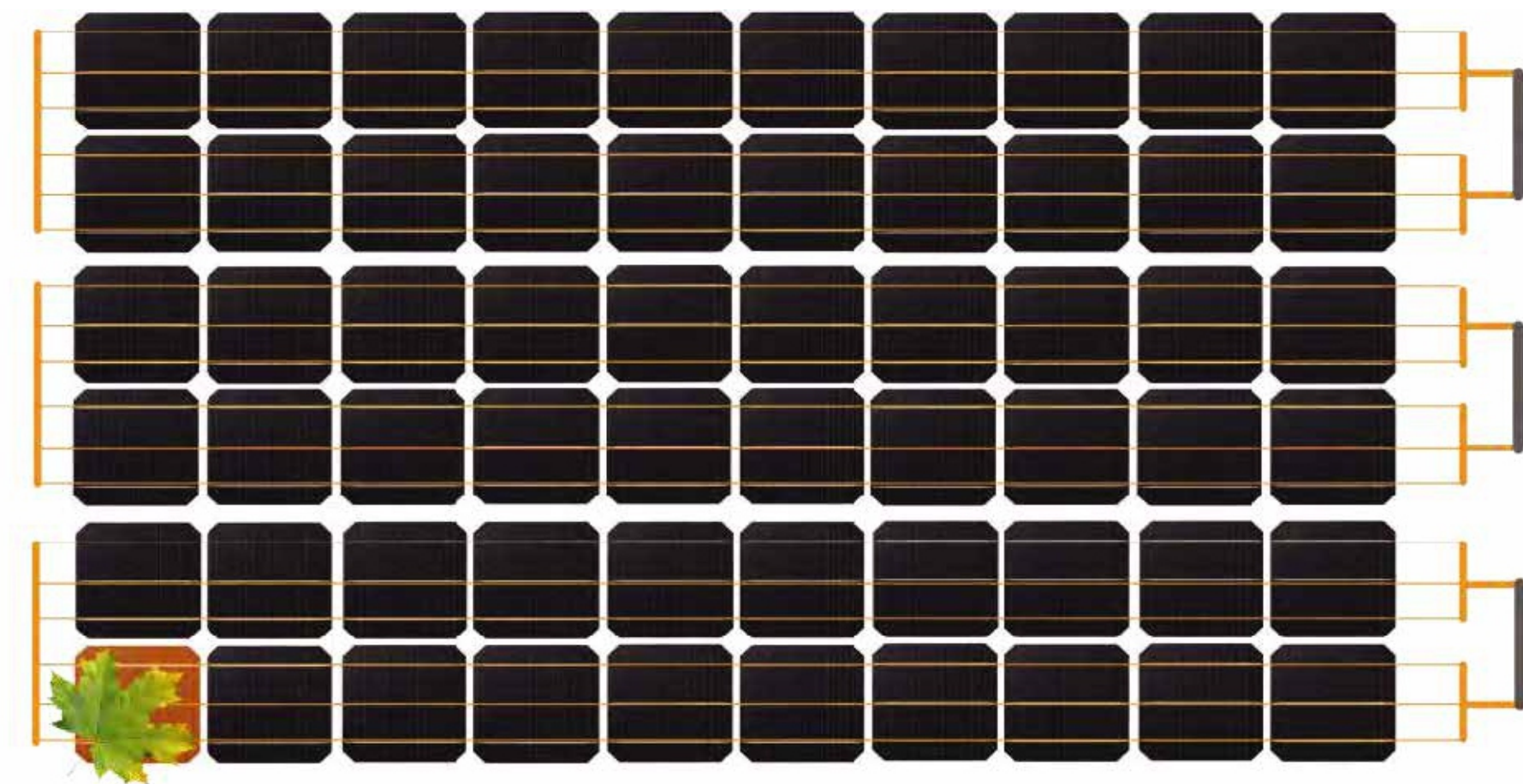
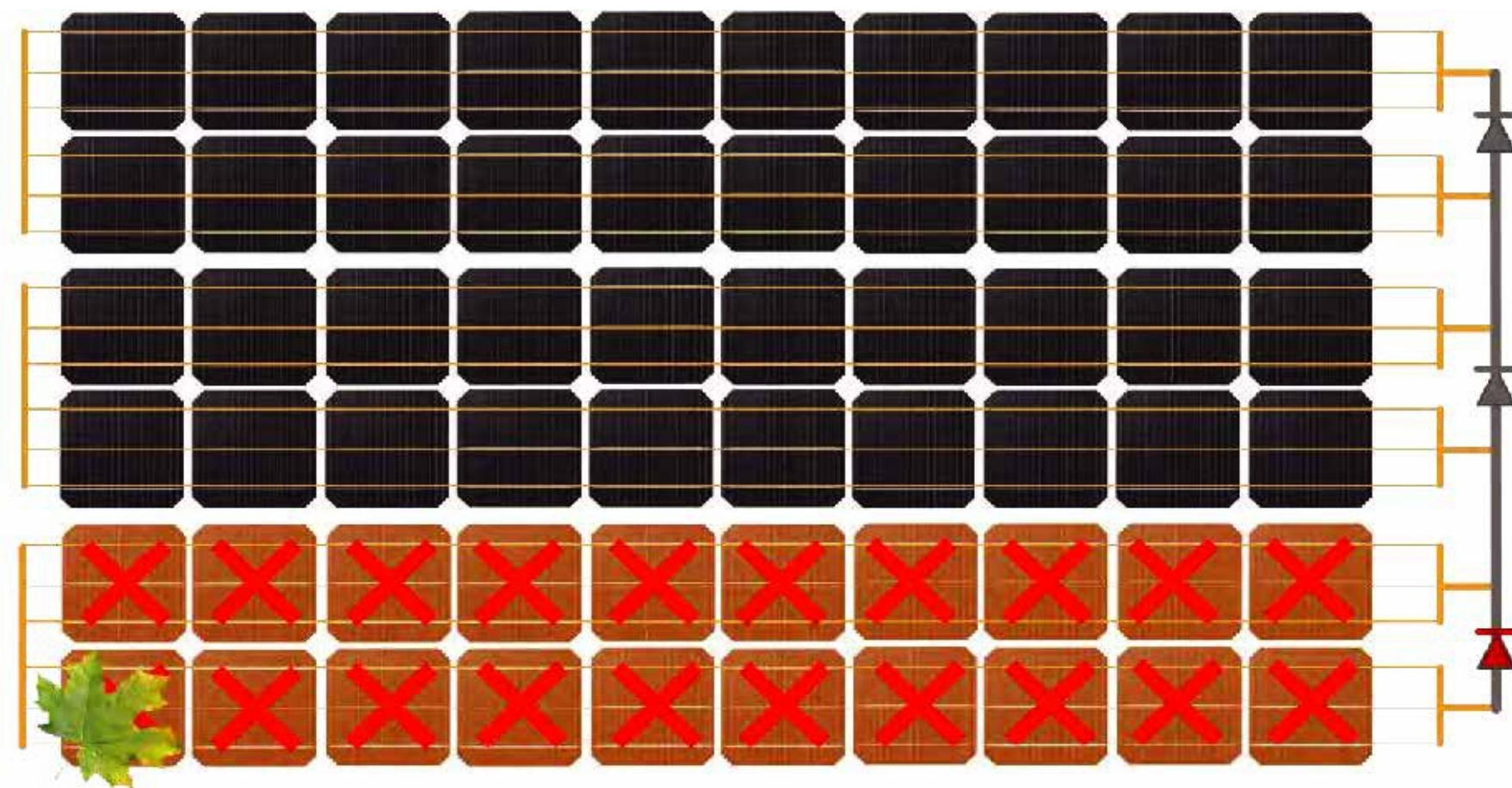
Standard Module



AE Smart Hot-Spot Free Module



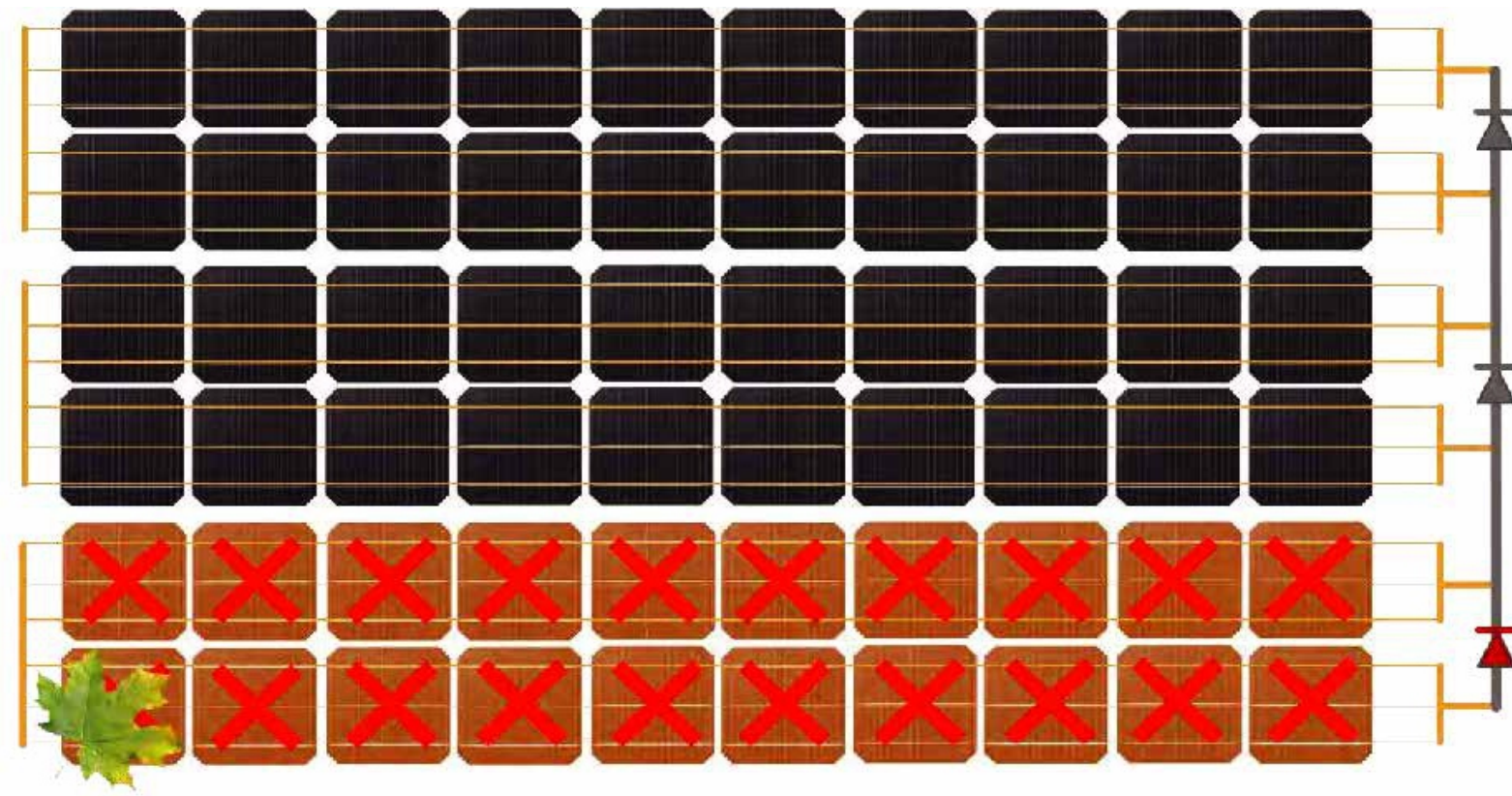
HOT-SPOT FREE technology protects each cell by an individual bypass diode.



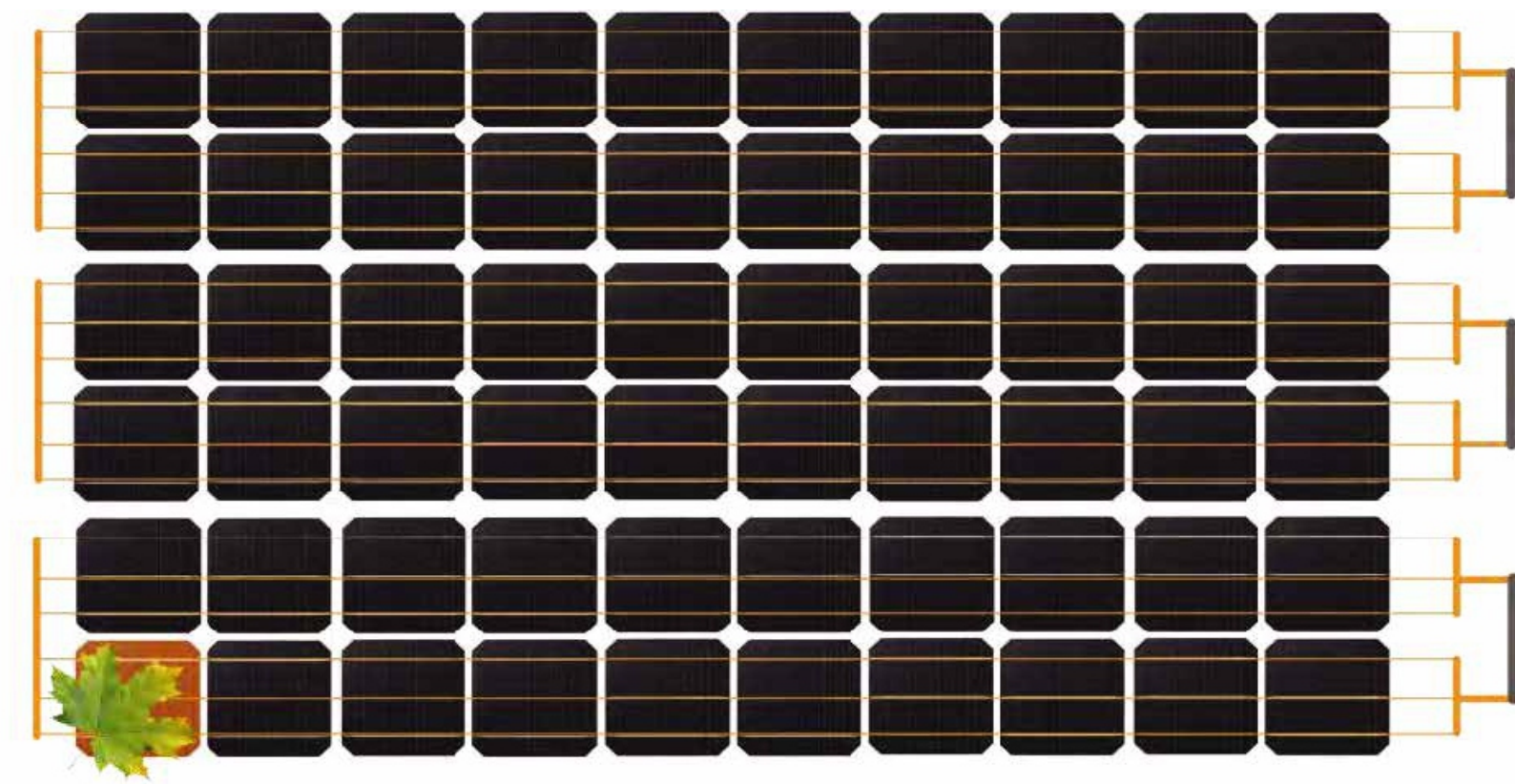
In a standard module, the impact of shading on a single cell affects a whole string, while an AE SOLAR SMART MODULE with HOT-SPOT FREE technology loses the output of only one single cell during the shading

Higher efficiency added value

Standard Module



AE Smart Hot-Spot Free Module



Shading In % of a single cell

0 % 10 % 20 % 30 % 40 % 50 % 100 %

Output from AE Smart Hot-Spot Free Module

100 % 98 % 96 % 96 % 96 % 96 % 96 %

Output from Standard Module

100 % 98 % 91 % 83 % 73 % 65 % 65 %

Additional efficiency in Power Generation

0 0 5 % 13 % 23 % 31 % 31 %

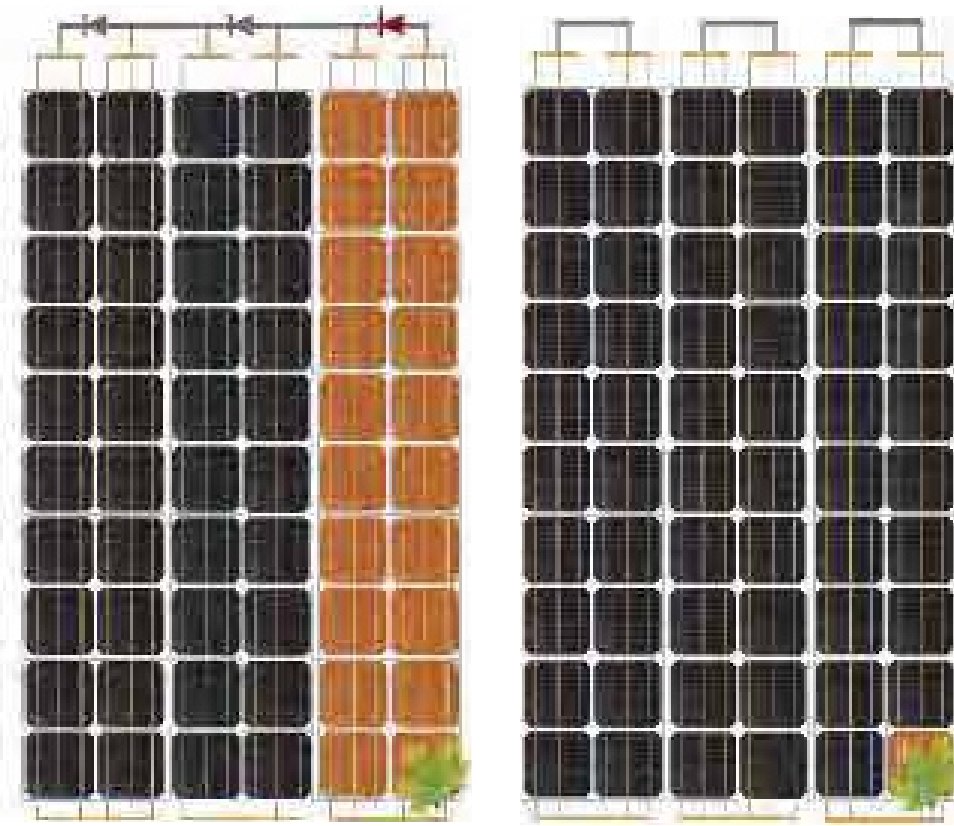
Shades

One Cell in One String

One Cell in Two Different Strings

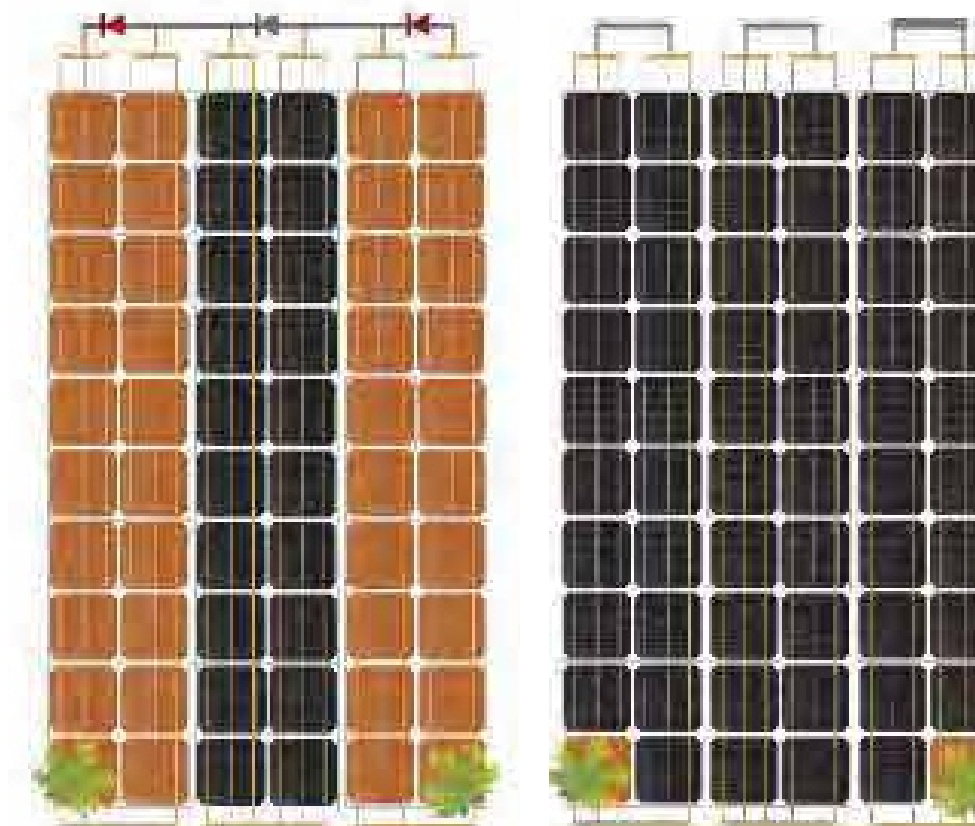
Row of Cells Across Different Strings

Illustration



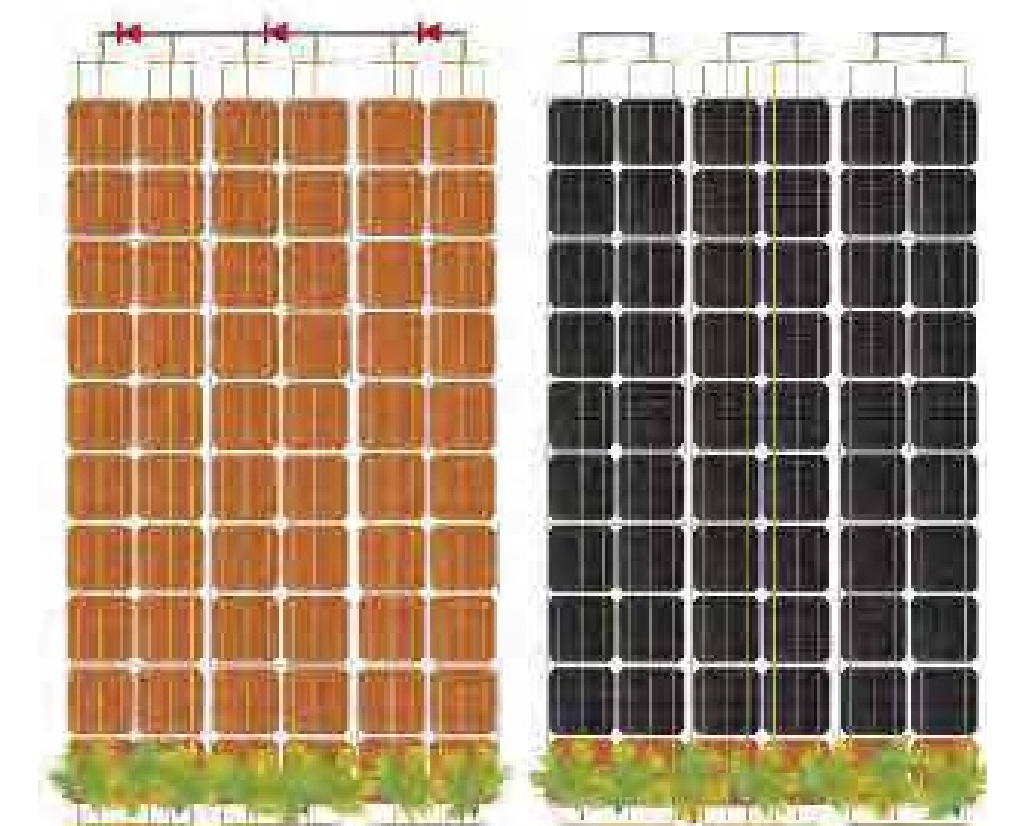
Standard

Hot-Spot Free



Standard

Hot-Spot Free



Standard

Hot-Spot Free

Output from AE Smart Hot-Spot Free Module

95 %

93 %

83 %

Output from Standard Module

64 %

38 %

1 %

Additional efficiency in Power Generation

31 %

55 %

82 %

AE SOLAR SMART MODULE with HOT-SPOT FREE technology has a lower operating temperature, which not only eliminates a potential cause for back sheet degradation, but also prevents damage to silicon-based cells.

Enhanced lifetime of AE SOLAR SMART MODULES with HOT-SPOT FREE technology is up to 25 years over standard warranty term.



For more information, please visit www.ae-solar.com

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