

## Module Cover Surface Emissivity – Operating Temperature and Efficiency Effects

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The push for higher efficiency photovoltaic module performance and the growing field of radiative cooling has led to a rising interest in the effects of emittance<sup>1-3</sup> on the operating temperature. In this work we present a simple field applicable coating method enabling the modulation of the cover glass emittance. Reducing the reflectance of the glass in its (8-12 micron) reststrahlen band region is key to increasing the emittance, while at the same time ensuring no negative effects are seen within the solar range.

Extended outdoor module temperature and performance data are presented, allowing evaluation of the efficacy of such techniques. Full weather data is captured allowing detailed analysis of performance under various real world conditions. A thermal model of the modules is utilised to investigate the breakdown of the heat balance between absorbed solar, incoming and outgoing thermal infrared, convection and extracted power.

Multiple modules were mounted on a scale building, all initially as purchased (uncoated) for baseline reference comparison data, to ensure accuracy in the variations in temperature and power measurements.

A static resistive load, matched to the maximum power point of the module, allows straight forward comparisons between measured performance between modules before and after coating. Additionally, another set of modules remained at open circuit allowing the maximum range of temperatures of the modules to be measured, giving further insight into the thermal balance of the system.

### References:

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