

Rooftop Array Temperatures

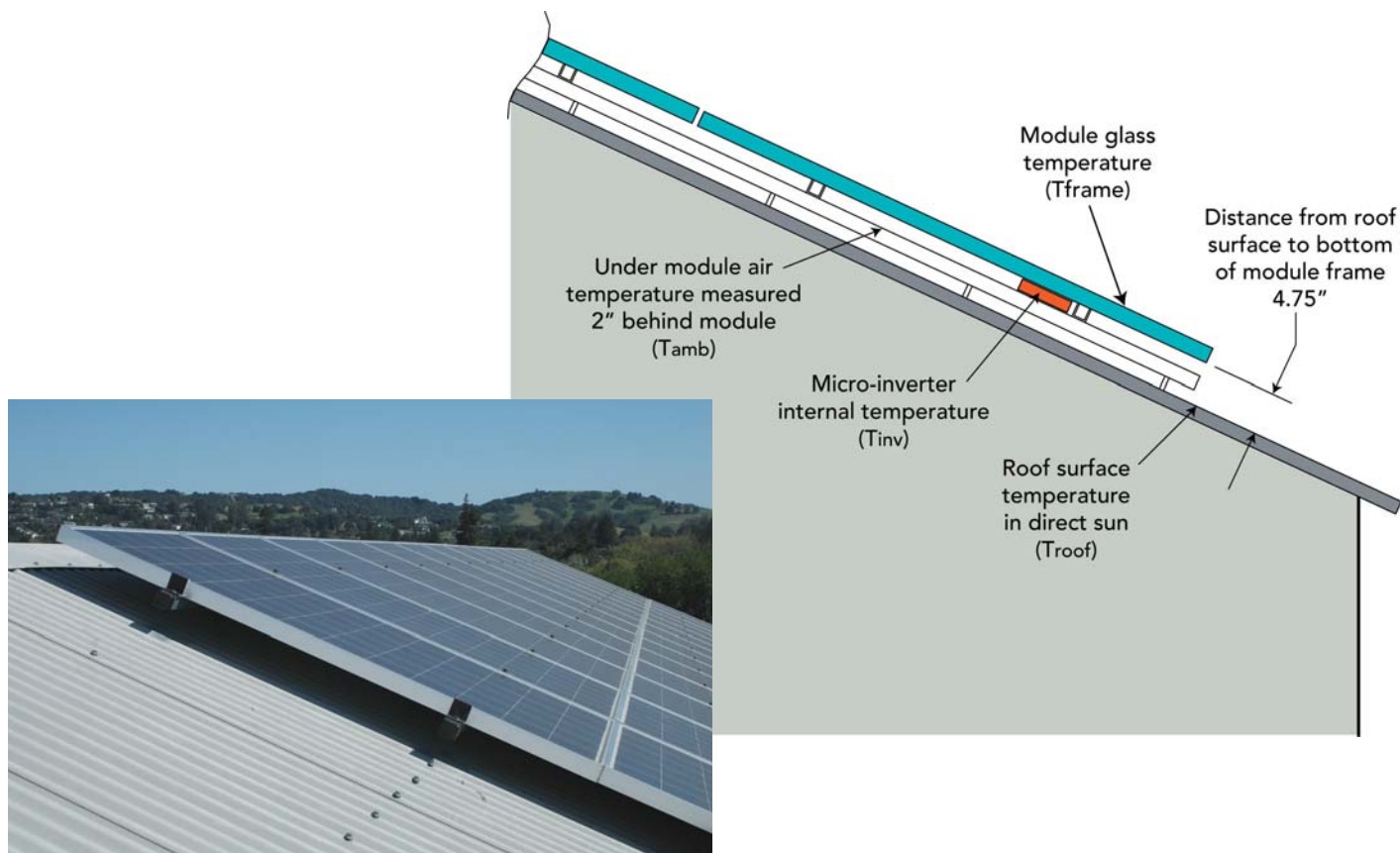
Introduction

The introduction of the micro-inverter has generated questions about rooftop temperatures and their impact on micro-inverter performance. This technical brief presents temperature data of an instrumented rooftop array with collocated micro-inverters.

The data shows that the air temperature underneath the module, where the micro-inverters operate, is higher than the peak ambient temperature by about 6°F, and significantly lower than the surface temperature of the PV module and the exposed rooftop.

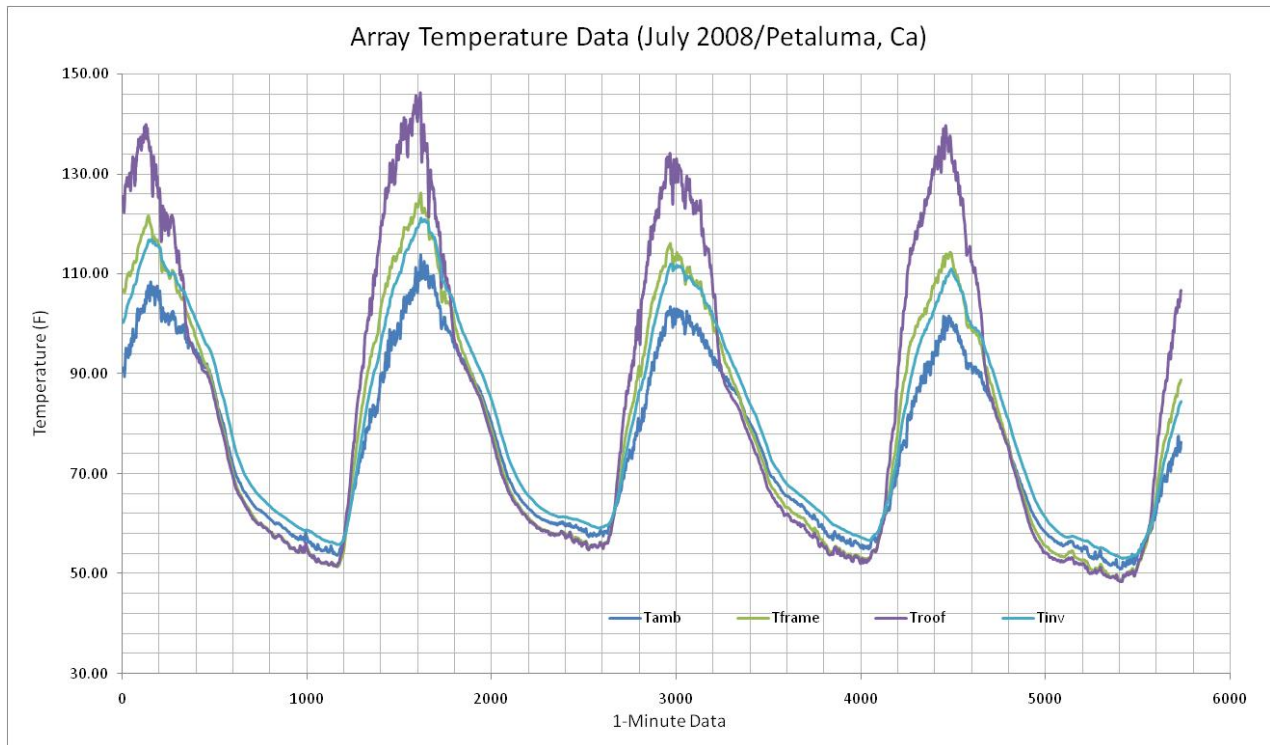
Setup

Type J thermocouples were attached to a rooftop PV array in four locations as shown below. Data was collected using an Agilent 34970A Data Acquisition Unit and 34901A multiplexer module at 1-minute intervals over a period of four days during a particularly hot week in July, 2008. The ambient temperature during this time peaked at about 104°F. The PV array is located in Petaluma, CA.



Results

As can be seen from the peak readings on the hottest day, despite an ambient air temperature of 104°F and roof temperature of 147°F, the air temperature under the PV modules where the micro-inverters operate is 110°F. The surface temperature of the module at this point is 125°F.



Graph 1: Array Temperature Data

Location	Data
AC Power output	124 Watts
Metal Roof Surface Temp (T_{roof})	147.42 °F
Module Glass Temp (T_{frame})	125.10 °F
Under Module Air Temp (T_{amb})	110.10 °F
Micro-Inverter Internal Temp (T_{inv})	120.07 °F

Conclusion

Given that the air temperature underneath the modules is only 6°F above ambient temperature and significantly lower than the surface temperature of the PV module and the exposed rooftop, there is no impact on the performance of the inverter.