

Tues., Feb. 26, 5:30 Discussion notes:

We do see some bad diodes going into the field.

The diode function should be tested just before shipment. A quality program should require a test such as applying a forward bias current and measuring the voltage across the jbox.

If there is a higher failure rate for modules manufactured during the winter, it is a good indicator of electrostatic discharge issues.

The hot spot test currently does not consider the location of the j-box. The standard should consider what happens if the hottest cell is over the j-box.

In the lab, an abrupt transition from forward to reverse bias brings the potential for thermal runaway. It would be useful to be able to induce this in the field to confirm that it is a relevant failure mechanism, then create a test for it.

Fundamentally, the design must confirm that the selected bypass diodes operate within their specified temperature range. A diode lifetime model should be created and applied. The activation energy of the thermal degradation and the operating temperature of the junction box should be characterized and the lifetime of the diode should be modeled. The modeling should take into account partial shading from local objects, shading from non-uniform soiling, and the possibility that modules may age at different rates, causing bypass diodes to turn on more frequently later in life.