ABSTRACT

Renewable energy sources and technologies have the potential to provide solutions to the long-standing energy problems being faced by the developing countries. Solar photovoltaic technology could be reliable solution for energy security. Variations in the current-voltage characteristics of photovoltaic cells can lead to significant power loss "due to mismatch" when the cells are connected together in a network. This study explores how this mismatch loss depends on temperature of a cell. Further reliability of PV technology is subjected to many variable parameters like availability of sun shadowing effect, manufacturing technology and material used. Hot spot is one of the technical requirements of PV modules for qualification. According to the standard IEC 61215 passing the hot spot endurance test is necessary criteria. Hot spot situation is existent when a solar cell within a module generates less current than the string current of the module or of the PV generator. This occurs when the cell is totally or partially shaded, damaged, or when cells are electrically mismatched. The hot spot risk of crystalline silicon modules is the only reliability and safety issue, which is attributed to cell properties. The increased hot spot risk results from local shunts or deformations of the *pn*-junction, which might origin from inhomogeneity in the raw material of the wafer or bad cell processing too.

The relation between hotspot area and increase in temperature is analyzed to determine the stability of module in various photovoltaic technologies; this could help in determining the stability of large photovoltaic systems.

Keywords: p-n junction, hot spot

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