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Uncertainty issues in the experimental assessment of degradation rate of power ratings in photovoltaic modules

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Abstract

A test procedure is described in this paper that is conceived to investigate the degradation mechanism of PhotoVoltaic (PV) modules subjected to different stress quantities. The procedure is based on the application of environmental and mechanical stress quantities to the modules under investigation and on the electrical and optical characterization of the same modules. The measurement technique implemented to estimate the maximum power at Standard Test Conditions (STC) of the PV modules is deeply investigated in order to estimate the 95% confidence interval of the estimated parameter. Preliminary results are also reported that refer to the application of the proposed test procedures to two sets of p-Si modules.

Keywords: Photovoltaic systems, uncertainty, degradation rate, electric variables measurement, data acquisition

1. Introduction

Despite of the world-wide growing use of PV plants for electrical energy production [1], parameters that allow the degradation rate of PV modules to be estimated on long time periods are rarely available. For thin-film based PV technologies, this kind of information is not provided, while for Si-based technologies the manufacturers often state a warranty in terms of maximum power

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