

Department of Electrical and Computer Engineering

Title: “**Uncertainty Analyses for Outdoor Measurement of Multi-junction Devices**”

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**Room 018, Building 7, Social Facility Centre, University Campus
University of Cyprus**

Abstract: Multi-junction photovoltaic (PV) devices continue to set record laboratory efficiencies for the conversion of light into electricity. The latest devices incorporating four active junctions have demonstrated conversion efficiencies exceeding 46%. Whilst the interest in using these high efficiency cells for photovoltaic electricity generation is understandably increasing, questions arise about the impacts of the increased spectral sensitivity of these cells upon their operating efficiencies in the field. Since cells of this type are typically manufactured for optimal performance under the standard AM1.5D (direct) spectrum, any deviation from this spectral condition will reduce the apparent operating efficiency of the cells.

Previous studies have predicted that the energy yield at a specific site can be increased by a few percent by ‘tuning’ the spectral response of a triple-junction PV cell to better exploit the local spectral resource [2]–[4], and thereby lower the final cost per kWh of electricity produced. The PV-TUNE project set out to test this hypothesis by designing an outdoor experiment to discover if modeled differences in energy yield arising from spectral response can be detected in the field. Since the expected differences in energy yield are small, of the order of 5% or less, a detailed uncertainty analysis has been performed to ensure that the experimental setup can detect such differences inside the daily noise of natural climatic variation. The procedure for uncertainty modeling and analysis is presented, along with the latest results from the ongoing outdoor measurement campaign.

Biography: Matthew Norton currently works as a researcher at the University of Cyprus, where he leads the activities of the team in the field of concentrator photovoltaics (CPV). He has previously conducted postdoctoral research at the European Commission’s Joint Research Centre. His main research areas are in the development of characterisation protocols and equipment for advanced photovoltaic devices and systems. Recently, his work has focused on developing test systems for CPV and flat plate modules, in preparation for testing and rating modules to IEC standards. Dr. Norton is also a member of the IEC Technical Committee 82, Working Group 7, which is responsible for the writing of international standards relating to concentrator systems. Dr. Norton gained his PhD in Engineering from the University of Reading in 2007.