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colour inside

Photovoltaic (PV) modules – Partial shade endurance testing for monolithically integrated products

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PHOTOVOLTAIC (PV) MODULES – PARTIAL SHADE ENDURANCE TESTING FOR MONOLITHICALLY INTEGRATED PRODUCTS

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IEC TS 63140 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
82/1804/DTS	82/1836/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- withdrawn,
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PHOTOVOLTAIC (PV) MODULES – PARTIAL SHADE ENDURANCE TESTING FOR MONOLITHICALLY INTEGRATED PRODUCTS

1 Scope

This document provides test methods for quantifying the permanent change in a monolithically integrated PV module's power output that may result from some potential partial shade conditions. Three tests are available, representing conditions of use, misuse, and most severe misuse. This document is applicable to monolithically integrated PV modules with one series-connected cell group or with multiple series-connected cell groups that are in turn connected in parallel. This document is not applicable to PV modules formed by the interconnection of separate cells.

With regard to shading, PV module documentation varies significantly by manufacturer. The physical tests prescribed in this document are applied without regard to manufacturer documentation or warranty policy, which may forbid certain shadows. The tests may therefore go beyond intended use, testing a module's response to misuse. The tests are accelerated tests. They are intended to excite similar levels of stress as shadows that are possible during an extended period of outdoor service. The tests represent adverse shadow scenarios, but not necessarily the worst case scenario, which varies by product. The procedures are performed repeatedly and in high-irradiance conditions; shadows occurring only one time or in low-irradiance conditions are likely to cause less damage. This test procedure does not comprehensively evaluate the efficacy or completeness of manufacturer recommendations. This test procedure is not equivalent to, and is not intended to replace, the hot-spot endurance test in IEC 61215-2. The safety aspects of partial shading of PV modules are covered by IEC 61730-2 MST 22 and IEC 61215-2 MQT 09.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60904-1, *Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage characteristics*

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices*

IEC 60904-9, *Photovoltaic devices – Part 9: Classification of solar simulator characteristics*

IEC 60904-10, *Photovoltaic devices – Part 10: Methods of linear dependence and linearity measurements*

IEC TS 60904-13, *Photovoltaic devices – Part 13: Electroluminescence of photovoltaic modules*

IEC 61215-2:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

IEC 61730-2, *Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC 61853-1, *Photovoltaic (PV) module performance testing and energy rating – Part 1: Irradiance and temperature performance measurements and power rating*