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C-Si photovoltaic (PV) modules – Light and elevated temperature induced degradation (LETID) test – Detection

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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C-SI PHOTOVOLTAIC (PV) MODULES – LIGHT AND ELEVATED TEMPERATURE INDUCED DEGRADATION (LETID) TEST – DETECTION

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IEC TS 63342 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
82/2008/DTS	82/2044/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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn,
- replaced by a revised edition, or
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C-SI PHOTOVOLTAIC (PV) MODULES – LIGHT AND ELEVATED TEMPERATURE INDUCED DEGRADATION (LETID) TEST – DETECTION

1 Scope

This document is designed to assess the effect of light induced degradation at elevated temperatures (LETID) by application of electrical current at higher temperatures. LETID is activated by excess carriers caused either through illumination or injection of electrical current at temperatures above 50 °C. In fielded conditions, LETID develops over the course of several months up to years as opposed to days for Boron Oxygen (B-O) degradation. The degradation phase is followed by an even slower recovery phase that develops over a significantly longer time scale. In this document, only the current injection approach for the detection of LETID is addressed.

This document does not address the B-O and Iron Boron (Fe-B) related degradation phenomena, which already occur at room temperatures under the presence of light and on much faster time scales. B-O defects may influence the results, and this document attempts to separate them by application of certain procedures. However, it is noted that the separation may not be perfect. Fe-B effects are excluded by introduction of waiting times before power determination.

The proposed test procedure can reveal sample sensitivity to LETID degradation mechanisms, but it does not provide an exact measure of field observable degradation. The magnitude and time scale of degradation seen in the field depends on climate and the module technology.

In this document LETID testing is done via current injection as this is a simple method in terms of the test equipment required. This allows for better control over conditions compared to application of light and thus ensures comparability between different labs. Application of light with equivalent conditions (i.e. same temperature and excess carrier density/ injection level) will yield comparable results.

The stress conditions in this document differ in injection level from the test method for cells described in IEC TS 63202-4. Whereas IEC TS 63202-4 aims at providing a quick quality check for a known cell that can be used in outgoing or incoming inspection of a specific product, the procedures in this document aim at providing a general product independent test method for LETID detection in a module that can be applied without prior knowledge about the cells inside a module and will yield reproducible results.

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

IEC 61215-1:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1: Test requirements*

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

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

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*