



BSI Standards Publication

Photovoltaic devices

Part 14: Guidelines for production line measurements of single-junction PV module maximum power output and reporting at standard test conditions

National foreword

This Published Document is the UK implementation of IEC TR 60904-14:2020.

The UK participation in its preparation was entrusted to Technical Committee GEL/82, Photovoltaic Energy Systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2020

ISBN 978 0 539 14142 9

ICS 27.160

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 December 2020.

Amendments/corrigenda issued since publication

Date	Text affected
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TECHNICAL REPORT



**Photovoltaic devices –
Part 14: Guidelines for production line measurements of single-junction PV
module maximum power output and reporting at standard test conditions**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.160

ISBN 978-2-8322-9082-8

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CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Measurement principles.....	7
4.1 Measurement of I - V curves	7
4.2 Standard test conditions	8
4.2.1 General	8
4.2.2 Additional practical considerations.....	9
4.2.3 Deviations from STC, errors, and uncertainties	9
4.3 Solar simulators	12
4.3.1 General	12
4.3.2 Solar simulator requirements in relevant IEC documents	13
4.3.3 Spectral distribution of irradiance	13
4.3.4 Spatial non-uniformity of irradiance.....	14
4.3.5 Temporal instability of irradiance	15
4.3.6 Angular distribution of irradiance	16
4.4 Reference modules	16
4.4.1 General	16
4.4.2 Irradiance monitoring.....	17
4.4.3 Reference device requirements in relevant IEC documents.....	17
4.4.4 Reference module characteristics	18
4.5 Calibration and operation procedures of measurement equipment	19
4.5.1 General	19
4.5.2 Calibration and operation procedure requirements in relevant IEC documents.....	19
4.5.3 Calibration frequency.....	20
4.5.4 Factors affecting calibration of measurement equipment.....	20
5 Measurement systems analysis	25
5.1 General.....	25
5.2 Evaluation of measurement repeatability and reproducibility	25
Bibliography.....	28
Figure 1 – Application of IEC documents to report STC P_{\max} values, adapted from published work [1].....	8
Figure 2 – Graphical summary of STC (cross-sectional view of module)	9
Figure 3 – Example traceability chain for production PV modules, adapted from published work [10].....	18
Dashed lines represent optional validation checks.	22
Figure 4 – Flowchart describing solar simulator irradiance adjustment based on reference module P_{\max} ; adapted from published work [7].....	22
Figure 5 – Illustration of four-terminal electrical connection to a PV module	24

Table 1 – Factors contributing to P_{\max} uncertainty	11
Table 2 – Summary of effects due to deviations from STC and factors of 4.2.2	12
Table 3 – Types of production module P_{\max} errors that can be partially cancelled by setting solar simulator irradiance using a matched reference module	21
Table 4 – Small sampling analysis ($n = 4, p = 4$) over a single day, including variation in module placement and module electrical connection [10] (solar simulator irradiance was set for each trial using the reference module's P_{\max})	26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOVOLTAIC DEVICES –

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IEC TR 60904-14, which is a Technical Report, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

Draft TR	Report on voting
82/1748/DTR	82/1785A/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60904 series, published under the general title *Photovoltaic devices*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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PHOTOVOLTAIC DEVICES –

Part 14: Guidelines for production line measurements of single-junction PV module maximum power output and reporting at standard test conditions

1 Scope

This document provides guidelines for measurements of the maximum power (P_{\max}) output of single-junction photovoltaic (PV) modules and for reporting at standard test conditions (STC) in industrial production line settings. Such measurements typically:

- Record current-voltage (I - V) data while illuminating the module with a solar simulator;
- Are performed on 100 % of manufactured modules, in order to determine whether they meet nameplate requirements for various bins spanning different power output levels.

This type of measurement is widespread and performed in high volume by PV module manufacturers worldwide. As it is desirable to have consistent measurement practices across the industry, this document describes the following features of such measurements:

- Essential elements, in order to provide common understanding;
- Common issues or complications;
- Sources of error and uncertainty, including recommendations to minimize them.

Understanding of P_{\max} measurement uncertainties is expected to be useful in application of other IEC documents, such as IEC 61215-1 and IEC 62941, where P_{\max} tolerances and uncertainties must be determined. Whenever possible, this document references specific IEC documents covering topics in more detail. Where no such documents exist, this document provides guidance and recommendations based on other publications relevant to the PV industry.

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 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60891, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*

IEC 60904-1:2020, *Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage characteristics*

IEC 60904-2:2015, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices*

IEC 60904-3:2019, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*