

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Photovoltaic devices –  
Part 1-1: Measurement of current-voltage characteristics of multi-junction  
photovoltaic (PV) devices**

**Dispositifs photovoltaïques –  
Partie 1-1: Mesurage des caractéristiques courant-tension des dispositifs  
photovoltaïques (PV) multijonctions**



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## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references .....	5
3 Terms and definitions .....	6
4 General considerations.....	6
5 General measurement requirements .....	7
6 Apparatus.....	7
6.1 General requirements for irradiance.....	7
6.1.1 General .....	7
6.1.2 Solar simulator with adjustable spectral irradiance.....	8
6.1.3 Solar simulator with fixed spectral irradiance .....	8
6.1.4 Natural sunlight .....	8
6.2 Reference devices .....	8
7 Measurement conditions.....	9
7.1 General considerations .....	9
7.2 Parameters .....	9
7.3 Measurement conditions .....	10
8 Measurement of current-voltage characteristics .....	11
8.1 Measurement with adjustable spectral irradiance .....	11
8.2 Measurement with fixed spectral irradiance and natural sunlight .....	11
9 Data analysis.....	11
10 Report .....	12
Bibliography.....	13

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## PHOTOVOLTAIC DEVICES –

**Part 1-1: Measurement of current-voltage characteristics  
of multi-junction photovoltaic (PV) devices**

## FOREWORD

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International Standard IEC 60904-1-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
82/1254/FDIS	82/1272/RVD

Full information on the voting for the approval of this International Standard 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- withdrawn,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.

## PHOTOVOLTAIC DEVICES –

### Part 1-1: Measurement of current-voltage characteristics of multi-junction photovoltaic (PV) devices

#### 1 Scope

This part of IEC 60904 describes procedures for the measurement of the current-voltage characteristics of multi-junction photovoltaic devices in natural or simulated sunlight. It is applicable to single PV cells, sub-assemblies of such cells or entire PV modules. It is principally intended for non-concentrating devices, but parts may be applicable also to concentrating multi-junction PV devices. An essential prerequisite is the spectral responsivity of the multi-junction devices, whose measurement is covered by IEC 60904-8-1.

The requirements for measurement of current-voltage characteristics of single-junction PV devices are covered by IEC 60904-1 whereas this document describes the additional requirements for the measurement of current-voltage characteristics of multi-junction PV devices.

This document may be applicable to PV devices designed for use under concentrated irradiation if they are measured without the optics for concentration and irradiated using direct normal irradiance and a mismatch correction with respect to a direct normal reference spectral irradiance distribution is performed. The reference spectral irradiance distribution is provided in IEC 60904-3

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

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

IEC 60904-4, *Photovoltaic devices – Part 4: Reference solar devices – Procedures for establishing calibration traceability*

IEC 60904-7, *Photovoltaic devices – Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices*

IEC 60904-8, *Photovoltaic devices – Part 8: Measurement of spectral responsivity of a photovoltaic (PV) device*