



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 9535.1-2025

**Terrestrial photovoltaic (PV) modules-Design qualification and
type approval-Part 1: Test requirements**

地面用光伏组件 设计鉴定和定型 第1部分：测试要求

(English Translation)

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Table of Contents

Foreword	
IEC Foreword	
1 Scope and object	
2 Normative References	
3 Sampling	
4 Marking	
5 Testing	
6 Pass Criteria	
7 Major Visual Defects	
8 Report	
9 Modifications	
10 Test Procedures	
10.1 Visual inspection	
10.2 Performance at STC	
10.3 Insulation test	
10.4 Measurement of temperature coefficients	
10.5 Measurement of nominal operating cell temperature (NOCT)	
10.6 Performance at NOCT	
10.7 Performance at low irradiance	
10.8 Outdoor exposure test	
10.9 Hot-spot endurance test	
10.10 UV test	
10.11 Thermal cycling test	
10.12 Humidity-freeze test	
10.13 Damp-heat test	
10.14 Robustness of terminations test	
10.15 Twist test	
10.16 Mechanical load test	
10.17 Hail test	
1 Scope and object	

1 Scope and object

This International Standard lays down IEC requirements for the design qualification and type approval of terrestrial photovoltaic modules suitable for long-term operation in general open-air climates, as defined in GB/T 4797.1. It applies only to crystalline silicon types. Standards for thin-film modules and other environments, such as marine or equator conditions, are under consideration.

This standard does not apply to modules used with concentrators.

The object of this test sequence is to determine the electrical and thermal characteristics of the module and to show, as far as is possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure in climates described in the scope. The actual lifetime expectancy of modules so qualified will depend on their design, their environment and the conditions under which they are operated.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 2421-1989 Basic environmental testing procedures for electric and electronic products -General and guidance (eqv IEC 68-1:1988) GB/T 2423.3-1993 Basic environmental testing procedures for electric and electronic products - Test Ca. Damp heat, steady state (eqv IEC 68-2-3:1984) GB/T 2423.29-1982 Basic environmental testing procedures for electric and electronic products -Test U. robustness of terminations and integral mounting devices (eqv IEC 68-2-21:1980) GB/T 2828-1987 Sampling procedures and tables for lot-by-lot inspection by attributes (Apply to inspection of successive lots or batches)

3 Sampling

Eight modules for qualification testing (plus spares as desired) shall be taken at random from a production batch or batches, in accordance with the procedure given in GB/T 2828. The modules shall have been manufactured from specified materials and components in accordance with the relevant drawings and process sheets and have been subjected to the manufacturer's normal inspection, quality control and production acceptance procedures.

4 Marking

Each module shall carry the following clear and indelible markings.

5 Testing

The modules shall be divided into groups and subjected to the qualification test sequences in

Figure 1, carried out in the order laid down.

6 Pass Criteria

A module design shall be judged to have passed the qualification tests, and therefore to be IEC type approved, if each test sample meets all the following criteria.

7 Major Visual Defects

For the purposes of design qualification and type approval, the following are considered to be major visual defects.

8 Report

Following type approval, a certified report of the qualification tests, with measured performance characteristics and details of any failures and re-tests, shall be prepared by the test agency in accordance with IECQ procedure QC 001 002. A copy of this report shall be kept by the manufacturer for reference purposes.

9 Modifications

Any change in the design, materials, components or processing of the module may require a repetition of some or all of the qualification tests to maintain type approval.

10.2.1 Purpose

To determine how the electrical performance of the module varies with load at STC (cell temperature. $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$, irradiance. $1000\text{ W}\cdot\text{m}^{-2}$, standard solar spectral irradiance distribution conforms to the provisions of GB/T 6495.3) using natural sunlight or a class A simulator conforming to the requirements of GB/T 6495.1.

10.3.1 Purpose

To determine whether or not the module is sufficiently well insulated between current carrying parts and the frame.

10.3.2 Test conditions

The test shall be made on modules at ambient temperature of the surrounding atmosphere (see GB/T 2421) and in a relative humidity not exceeding 75 %.

10.3.4 Test requirements

- no dielectric breakdown (less than 50 μ A) or surface cracking during step c);
- insulation resistance not less than 50 Mohm.

10.4.1 Purpose

To determine the temperature coefficients of current (α) and voltage (β) from module measurements. The coefficients so determined are valid at the irradiance at which the measurements were made. For linear modules, they are also valid over an irradiance range of ± 30 % of this level. This procedure supplements that in GB/T 6495.4 for measuring these coefficients from a representative set of single cells.

10.5.1 Purpose

To determine the NOCT of the module.

10.9.5 Procedure

All tests shall be performed at an ambient temperature of $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, with a wind speed less than $2\text{ m}\cdot\text{s}^{-1}$. Any hot-spot protective devices recommended by the manufacturer shall be installed before the module is tested.

10.12.1 Purpose

To determine the ability of the module to withstand the effects of high temperature and humidity followed by sub-zero temperatures. This is not a thermal shock test. There are two alternative methods. single-chamber and two-chamber.