

ICS 27.160
CCS K 83



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

GB/Z 118.1-2026

**Photovoltaic modules - Extended-stress testing - Part 1:
Modules**

光伏组件 加强应力试验 第1部分：组件

(English Translation)

Issued on: January 4, 2026

Implemented on: January 4, 2026

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative References	
3 Terms and Definitions	
4 Sample Selection	
5 Characteristics measured and stabilization methods used	
5.1 General Rules	
5.2 Measurement of physical properties	
5.3 Visual Inspection	
5.4 Initial Stability	
5.5 Performance	
5.6 Insulation Test	
5.7 Wet Leakage Current Test	
5.8 Electroluminescence (EL) Imaging	
5.9 Insulation Thickness Test	
5.10 Thermal cycling test	
5.11 Wet Freeze Test	
5.12 Finally stable	
6 Data Acquisition and Stress Testing	
6.1 General Rules	
6.2 Initial Characteristic Measurement	
6.3 Test Sequence 1. Thermal Fatigue Test	
6.4 Test Sequence 2. Mechanical Load Test	
6.5 Test Sequence 3. Component Backsheet UV Test Sequence	
6.6 Test Sequence 4. Damp Heat Test	
6.7 Test Sequence 5. Potential-Induced Decay (PID) Test	
7 Report	
8. Experimental Procedures and Processes	
Appendix A (Informative) Potential Disadvantages of Appropriate Use of the Test Sequences Included in GB /Z 118.1	
A.1 Overview	

A.2 Missed Detection/Incorrect Detection

A.3 Approximate service life

A.4 Designed for Experimentation

Appendix B (Informative) Background of GB /Z 118.1

B.1 Overview

B.2 Sequence 1. Thermal Fatigue - 600 thermal cycles = 3 times GB/T 9535 (similar to other stress-strengthening protocols)

B.3 Sequence 2. Mechanical Stress (Adding static loads to the sequence is similar to other stress-strengthening protocols)

B.4 Sequence 3. UV, moisture, and temperature/mechanical combination cycles for polymer components

B.5 Sequence 4. Damp heat test with moisture exposure --- DH2000h = 2 times GB/T 9535 (similar to other stress-enhancing protocols)

B.6 Sequence 5. Potential-Induced Decay (PID) Test

Foreword

This document is a standard or guiding technical document.

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents". Drafting.

This document is Part 1 of GB /Z 118 "Photovoltaic Modules - Enhanced Stress Testing". GB /Z 118 has already published the following parts.

---Part 1: Components.

This document is equivalent to IEC TS63209-1:2021 "Photovoltaic modules - Stress testing - Part 1: Modules", and the document type is changed from... The IEC technical specifications have been adapted into my country's national standardization guidance technical documents.

Introduction

GB /Z 118 proposes a method for environmental stress testing of photovoltaic modules, which can provide data for evaluating the reliability of photovoltaic modules and facilitate research.

Areas not covered by the GB/T 9535 and GB/T 20047 series. GB /Z 118 is proposed to consist of the following parts.

---Part 1: Components. The purpose is to provide a checklist for enhanced environmental stress testing of photovoltaic modules.

---Part 2: Polymer Component Materials. This section aims to supplement component-level reinforcement environmental stress testing.

Note: The correspondence between each part and the IEC TS63209 series of international standards is as follows.

---Part 1 corresponds to IEC 63209-1;

---Part 2 corresponds to IEC 63209-2.

Existing qualification test standards, such as the GB/T 9535 series, are for identifying component designs to avoid most early field failures.

These qualification test standards are often useful, but they are not intended to, or cannot, prove the long-term performance of components at all locations within the scope of the standard documentation.

Performance. To assess the risk of product failure, industry practice dictates that type approval be performed according to the GB/T 9535 and GB/T 20047 series of standards.

Based on safety testing, more stringent testing protocols can be implemented to meet the needs of different stakeholders. These enhanced stress tests The agreement primarily includes the aforementioned basic tests, conducted with different sequences and/or increases in test time or number of cycles. The stress testing agreement... The discussion stems from diverse experiences shared by third parties, such as testing agencies, independent engineering firms, and homeowner engineers, aiming to replicate the effects of long-term use on photovoltaic modules.

These stress testing protocols, or "extreme testing" methods, are designed to identify module weaknesses rather than reproduce the module's outdoor performance.

It does not provide detailed reliability or durability predictions/estimates, but it is helpful in revealing defects.

Given that many different stress testing protocols are in use, the industry needs a standardized approach. This document contains... The included stress-enhancing test sequence standardizes various methods used by personnel in different industries, providing a universal method for reliability assessment.

The dataset. In practical terms, this document addresses the challenges faced by component manufacturers in simultaneously implementing (and maintaining) a series of [issues/processes] after product changes. The problem lies in very similar testing protocols.

This global reference comparison document takes into account all sequences of different stress-enhancing testing protocols and was prepared using the method of common divisors. (Targeting...)

Each subsequence also has its corresponding special failure mode added at the

appropriate position. Meanwhile, some sequences have been deleted from this document, according to their experimental... Results obtained from conditions and durations do not necessarily provide information for evaluating component performance in the field. This document aims to standardize and strengthen testing protocols.

Test results from different institutions can be compared more directly, reducing testing costs and time for manufacturers.

This document aims to provide a series of reliability risk data for qualitative analysis, highlighting potential failure modes of components and the possible reasons for failure.

Improved areas. This method is only used in special cases, such as when performance differences are very large or when targeting specific known failure modes and mechanisms, for [specific applications].

Components and materials are classified. Classification or lifespan prediction for durable components is not within the scope of this document. A range of components.

1 Scope

This document aims to provide information to supplement the basic qualification tests with pass-fail criteria defined in GB/T 9535.

The document provides a standardized testing methodology for evaluating photovoltaic (PV) modules and a list of different materials that can be used to manufacture these modules.

The long-term reliability of (BOMs). The test sequences included in this document are intended to provide information for qualitative comparative analysis, and are used in conjunction with outdoor exposure. The relevant stresses are used to reproduce known failure modes.

Considering that if the experiment takes too long, users will make a decision before receiving the results, therefore the experiment duration... This is a significant limitation. Under the aforementioned commercially relevant limitations, some known failure modes, especially those associated with prolonged ultraviolet (UV) exposure, are... Issues related to sunlight cannot be accurately addressed. Although UV stress-related failure modes are known to occur on both the front and back of photovoltaic modules, However, without applying excessive stress, the UV stress dose required to generate outdoor variations within the expected lifespan of the component is... The test duration was excessive and exceeded the scope of this document. The UV stress sequence for the air-faced backplate included in this document has been supplemented with information regarding certain backplate air-faced backplates.

The confidence level for surface cracking failure is given, but the UV stress sequence of the backsheet battery surface is not included in this document at all, leading to the