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

GB/T 6494-2017

**Measurement method for electrical characteristics of aerospace
solar cells**

航天用太阳能电池电性能测试方法

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 6494-1986 "aerospace solar battery performance testing methods." This standard and GB/T 6494-1986 Compared with the main technical changes are as follows:

- Adjust the scope of the standard, a clear single junction and multi-junction gallium arsenide solar cell electrical performance test (see Chapter 1, 1986 edition of Chapter 1);
- Remove the outdoor sunlight test method of electrical performance, conversion from non-standard test conditions to standard test conditions, the solar cell current And temperature coefficient of voltage measurements, solar cell internal series resistance measurements, AM0 standard solar irradiance data (see Chapter 4 of the 1986 edition, Appendix A, Appendix B, Appendix C and Appendix D);
- Perfected the solar battery test light source performance requirements and evaluation methods (see 4.2.2 and Appendix A, 1986 edition of 3.1 and Appendix F);
- Adjust the data processing and test report requirements (see Chapter 9, Chapter 10, 1986 version 2.6);
- Added terminology (see Chapter 3);
- Added multi-junction gallium arsenide solar cell spectral mismatch error correction method (see Appendix B);
- Added multi-junction gallium arsenide solar cell standard battery composition and structure requirements (see 4.2.3);
- Increased multi-junction solar cell electrical performance test system requirements (see 4.2.4);

--- Increased multi-junction solar cell performance test methods (see Chapter 8). This standard proposed by China Aerospace Science and Technology Corporation. This standard by the National Aerospace Technology and Standardization Technical Committee (SAC/TC425) centralized. This standard was drafted unit. Shanghai Space Power Institute, Beijing Institute of East Metrology and Measurement, China Electronics Technology Group Corporation Eighteenth graduate School. The main drafters of this standard. Lu Jianfeng, Xiao Zhibin, Ni Jiawei, Yang Yeqiang, Zhang Yu, Chi Weiyang, Wang Jiayu, Xu Jianwen, Qu Yi, Tan Xueyan. This standard replaces the standards previously issued as.

--- GB/T 6494-1986.

Electrical performance is a key technical indicator of the performance of solar cell products. In the single solar cell voltage characteristics of the test is not formed The degree of certainty through a large number of superimposed, solar arrays will have a serious impact on the design, manufacture and operation. With the development of China's aerospace industry Exhibition, more and more research institutions and enterprises to join the space with the development of high-efficiency solar cells, the need for aerospace solar battery performance testing Unified norms to ensure that different units in the test means the consistency and test results comparable to promote the development of the industry, Guarantee model application. This standard involves the solar cell performance test methods have been manned spacecraft, deep space probes, a variety of high school low orbit Satellites and other models have been successfully verified and applied. This standard aerospace solar cell with the electrical performance test has a positive guiding role. Aerospace solar battery performance testing methods

1 Scope

China's national method for measuring the electrical characteristics of aerospace solar cells under a simulated light source on the ground. Measuring a space solar cell on the ground is a problem of reference rather than of instrumentation. The cell will work in the AM0 spectrum outside the atmosphere, and no light on the earth's surface has that spectrum - the atmosphere removes exactly the ultraviolet and the specific absorption bands that a multi-junction cell's upper junctions depend on. So a solar simulator has to reproduce AM0 well enough that each junction is illuminated correctly, which for a triple or quadruple junction cell means matching the spectrum in several bands at once, because the series-connected junctions are limited by whichever produces the least current. The standard specifies the performance requirements for the simulator and the test methods, and applies to single crystal silicon, single junction and multi-junction gallium arsenide cells including the GaInP2/GaAs/Ge triple junction and the metamorphic triple and quadruple junction devices.

This standard specifies the aerospace solar battery simulation of light source on the ground under the performance requirements of test methods and methods. This standard applies to

aerospace solar cell electrical performance testing, including single crystal silicon solar cells, single junction and multi-junction gallium arsenide solar cells (Including GaInP2/GaAs/Ge triple junction solar cells, GaInP2/GaAs/In0.3Ga0.7As triple junction solar cells and GaInP2/GaAs / In0.3Ga0.7As/In0.58Ga0.42As four junction solar cells, etc.).

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 2297 solar photovoltaic energy system terminology

GB/T 6496-2017 Aerospace solar cell calibration method

ISO 15387 Aerospace Systems Single Junction Solar Cell Measurement and Calibration Procedures (Spacesystems-Single-junctionsolar cels-Measurementsandcalibrationprocedures)

3 Terms and definitions

GB/T 2297 and defined by the following terms and definitions apply to this document.

3.1 Standard solar cells standardcomponentsolarcel Produced by the method specified, has the same relative spectral response as the corresponding subcell in the multi-junction solar cell being tested, with the specified calibration Method for calibrating the solar cell for setting the irradiance of the corresponding band of the solar simulator when the electrical performance of the multi-junction solar cell is tested.

3.2 Working current loadcurrent The current value at the specified voltage.

4.1 Standard test conditions

4.1.1 Standard test spectra AM0, a solar constant, the standard irradiance of 1367W/m2. AM0 standard sunlight spectral irradiance Distribution curve shown in Figure 1, spectral irradiance data in accordance with GB/T 6496-2017 Annex B.