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

GB/T 6496-2017

Test method of aerospace solar cells calibration

航天用太阳能电池标定方法

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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 6496-1986 "Aerospace solar battery with the general provisions of calibration." This standard and GB/T 6496-1986 Compared to the main technical changes are as follows:

- Scope The multi-junction gallium arsenide solar cells to increase the corresponding sub-solar cell calibration (see Chapter 1);
- Added "high-altitude aircraft calibration method" and "high-altitude balloon calibration method" (see Appendix A);
- Reference ISO 15387.2005, updated AM0 standard sunlight irradiance distribution data (see Appendix B, 1986 edition Appendix A);
- The "direct sunlight on the ground calibration method" described by the standard appendix described in the standard text to be described in detail (see Chapter 4, 1986 edition Appendix B);
- Removed the "Alpine Calibration Law" (see the 1986 edition of Appendix B);
- Removed the terminology "AM0 calibration short-circuit current value" and "AM0 calibration value" (see 1986 edition of Appendix C). 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. Beijing Oriental Institute of Measurement and Testing, Shanghai Institute of Space Power, China Electronics Technology Group Corporation eighteenth graduate School. The main drafters of this standard. Yang Yiqiang, Zhang Yu, Lu Jianfeng, Ni Jiawei, Xiao Zhibin, Wang Li Gong, Liu Min, Xu Siwei, Liu Zhihong, Lu Runxi, Su Xinguang, Ma Zhiyi, Zhang Mingzhi, Hu Zhiyuan, Li Zhen, Wu Kang, Mei Gaofeng, Cheng Shuo. This standard replaces the standards previously issued as.
- GB/T 6496-1986.

Aerospace standard solar cells are used solar space solar array and solar array electrical performance test solar simulator irradiance set by According to reports, access to an

accurate standard aerospace a solar cell calibration results, is to ensure aerospace solar cells and solar array performance test Accuracy of the premise. GB/T 6496-1986 recommended in the two space a standard solar cell calibration method "ground sunshine spectroscopy" has been Used by China's space system, and continue to improve and perfect. From.1990 to.2000, this method participated many times with NASA, ESA, NASDA and other foreign space agency space standard solar cell comparison test to verify the accuracy and reliability of the method, Surface direct sunlight calibration method, "the name was included in the international standard ISO 15387.2005" space system single junction solar cell measurement and calibration Program

"(Spacesystems-Single-junctionsolarcells-Measurementandcalibrationprocedures), is currently The only method of calibration for standard solar cells in China that is internationally recognized as aerospace. "Direct sunlight on the ground calibration method" the use of natural sunlight and mature universal equipment for AM0 solar cell calibration, Technology is mature, low cost. The method can be used cavity absolute direct radiometer, high accuracy and can be traced directly to the world radiation center too Yang irradiation benchmark, with high accuracy and reliability. High-altitude and space calibration can be directly obtained solar cells in the real AM0 sunshine conditions of the calibration results, with higher accuracy. Advanced space agencies abroad, "high altitude aircraft calibration method" "high altitude balloon calibration method" altitude calibration method has more than 50 years of experience, The calibration of mountings carried out with satellites and space shuttles has also been carried out many times, and the work of calibrating the solar cells in the manned space station is also under planning in. High-altitude and space calibration is also China's space solar cell calibration technology development. Since.2000, China's research work on altitude and space calibration needs to be improved and improved in terms of methods, equipment and procedures. for To promote the development of high altitude calibration technology in China, in line with the international advanced standards move closer to provide guidance for the future development, at the same time reflect our country The status quo of the principle of technology, are listed in Appendix A of the international standard ISO 15387.2005 provides "high altitude balloon calibration method" and "high Airplane calibration method "for China's space future space solar altitude calibration work to provide guidance. GB/T 6496-1986 revision has adopted our own independent intellectual property rights internationally recognized calibration method, absorbing China's space too Positive results of solar cell calibration technology over the years, not only reflects the status quo of our technology, but also consider the future development, and move closer to international advanced standards, More operational and instructive, will be in China's space solar cell calibration technology development and space photovoltaic power system development, application Play an active role in raising the level. Aerospace solar cell calibration method

1 Scope

China's national method for calibrating aerospace standard solar cells using direct sunlight on the ground. This is the measurement on which everything in the previous standard depends: a solar simulator's output is set by reference to a standard cell, and that cell's value has to come from somewhere. The method here derives it from natural sunlight, which cannot simply be measured because the atmosphere has already altered it - so the calibration is made by measuring the cell's output at a series of air masses as the sun rises or sets, and extrapolating the trend back to zero air mass, which is the condition in orbit. The technique is old, exacting and dependent on stable clear conditions at high altitude, and it is the ground-based route to a value that would otherwise require a balloon or a spacecraft. The standard specifies the calibration principle, equipment, test systems and procedures, applies to space standard cells of monocrystalline silicon, gallium arsenide and multi-junction gallium arsenide, and may be referenced for other space and terrestrial standard cells.

This standard specifies the use of direct sunlight on the ground approach to a standard solar cell calibration principle, equipment, testing Test systems and procedures. This standard applies to aerospace with monocrystalline silicon, gallium arsenide standard solar cells and a multi-junction GaAs solar cell corresponding Of a standard solar cell calibration, other types of space with standard solar cells, the ground with a standard solar cell calibration can refer to carried out.

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 6492 aerospace standard solar cells

GB/T 6495.4 crystalline silicon photovoltaic device I-V measured characteristics of temperature and irradiance correction method

GB/T 6495.8 Photovoltaic devices Part 8. Measurement of the spectral response of photovoltaic devices

ISO 15387-2005 space system single junction solar cell measurement and calibration procedures (Spacesystems-Single-junction solarcells-Measurementsandcalibrationprocedures)

3 Terms and definitions

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

3.1 A standard solar cell primarystandardsolarcel Produced by the method specified, with

the same relative spectral response of the solar cell under test, using the provisions of the other not based on standard solar Calibration method of the pool of solar cells calibrated.

3.2 A standard solar cell primary standard component solar cell Produced by a predetermined method, having the same relative spectral response as the corresponding subcell of the multi-junction solar cell being tested, adopting a predetermined non-based Other standard solar cell calibration methods have been calibrated for the solar simulator to set the appropriate wavelength band solar cells.

3.3 Space with solar cell calibration space solar cell calibration Determine whether a standard solar cell or standard sub-cell will short-circuit current at standard or true AM0 sunshine conditions and standard temperature process.

3.4 AM0 sun conditions air mass zero sunlight condition The sunshine illumination conditions on the vertical plane with the sunshine ray at the average distance between the Earth 's surface and the atmosphere in the upper atmosphere.