

SJ

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

SJ/T 10459-1993

**Measurement method for temperature coefficients of solar cell
(English Translation)**

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Table of Contents

1 Subject content and scope of application	3
2 Normative references	3
3 Principles	3
4 General provisions for test	3
5 Test steps	5
6 Data processing and test report	6
Appendix A Test system of solar cell temperature coefficient (block diagram) (Informative)	7
Appendix B Test report sheet for solar cell temperature coefficient (Informative)	8
Additional information	9

1 Subject content and scope of application

This standard specifies the general requirements, test procedures, calculation methods for temperature coefficient testing of monocrystalline silicon solar cells (hereinafter referred to as solar cells).

This standard applies to non-concentrating monocrystalline silicon monomer solar cells, solar cell modules, solar panels. Non-monocrystalline silicon monomer solar cells can also make reference to this standard.

2 Normative references

GB 2297 Terminology for solar photovoltaic energy system GB 6494 Measurement procedures for electrical characteristics of astronautic solar cells GB 6495 Measurement procedures for electrical characteristics of terrestrial solar cells

3 Principles

The electrical performance parameters of solar cells (short-circuit current I_{SC} , open-circuit voltage V_{OC} , maximum power P_{max} , etc.) change with changes in the ambient temperature of the solar cell. Under constant irradiance, by changing the temperature of the solar cell, the relationship curve between the electrical performance parameters of the solar cell and the temperature change is obtained. The temperature coefficient of the electrical performance parameters of the solar cell is calculated from the slope of the curve.

4 General provisions for test

4.1

The short-circuit current temperature coefficient α_C , open-circuit voltage temperature coefficient β_C , maximum power temperature coefficient γ_C of the solar cell are related to the irradiance.

4.2

The AMO solar simulator is used to test the temperature coefficient of aerospace solar cells; its characteristics shall comply with the requirements of Article 2.1.2 and 3.1 of GB 6494. The AM1.5 solar simulator is used to test the temperature coefficient of ground solar cells; its characteristics shall comply with the requirements of Article 2.1.2 and 3.1 of GB 6495.

4.4

In order to prevent frost on the surface of the solar cell under test, when the test temperature is lower than room temperature, during the test, affects the measurement accuracy, the solar cell under test shall be placed in a vacuum chamber OR protected by appropriate inert gas.

4.5

The temperature sensor for measuring the temperature of the solar cell is adhered to the middle of the back of the cell under test, using an adhesive with good thermal conductivity. The measurement accuracy shall be better than $\pm 0.5\text{ }^{\circ}\text{C}$.

4.7

The standard cell and the cell under test are in the same plane AND within the effective irradiation area of the simulated light source.

4.8

The circuit block diagram, for measuring the volt-ampere characteristics of solar cells, shall comply with the requirements in the Figure below.

5 Test steps

5.1

Place the cell under test and the standard cell at constant temperature of $25 \pm 2\text{ }^{\circ}\text{C}$, for no less than 30 minutes.

5.2

Use a standard cell, to adjust the light source to the standard irradiance. Monitor the irradiance during the test. The irradiance value, when testing the temperature coefficient of

aerospace solar cells, shall comply with the requirements of Article 2.1.2 in GB 6494.

5.3 Lower the cell under test to the required minimum temperature. The standard cell

temperature is maintained at 25 ± 2 °C, during the test.

5.4 Heat the cell under test, at a temperature change rate of less than 3 °C/min. Make

measurement once every 5 °C. Record the short-circuit current value and corresponding volt-ampere characteristic curve, at each temperature point, until the required maximum temperature is measured.

5.7 From the slope of a certain point on the above three curves, it can obtain the short-circuit current temperature coefficient α_C , the open-circuit voltage temperature coefficient β_C , the maximum power temperature coefficient γ_C of the single cell, at the corresponding temperature point.

5.8 For cell modules or other panels, the formula for calculating the temperature coefficient of solar cells is as follows.

6 Data processing and test report

6.1

The test report shall give the systematic error of the electrical measurement system of the test equipment.

6.2

The test data shall be taken as the arithmetic mean of no less than 3 tests; the uncertainty of the mean shall be given.

6.3

The test report shall include;

SJ/T 10459-1993

ELECTRONIC INDUSTRY STANDARD K 83 SJ/T 10459-93 Measurement method for temperature coefficients of solar cell Issued on. DECEMBER 17, 1993 Implemented on. JUNE 01, 1994 Issued by. Ministry of Electronics Industry of PRC

Table of Contents

1 Subject content and scope of application... 3

2 Normative references... 3

3 Principles... 3

4 General provisions for test... 3

5 Test steps... 5

6 Data processing and test report... 6 Appendix A Test system of solar cell temperature coefficient (block diagram) (Informative)... 7 Appendix B Test report sheet for solar cell temperature coefficient (Informative)... 8 Additional information... 9 Measurement method for temperature coefficients of solar cell

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