AIAA S-112A-2013
(Revision of S-112-2005)

Standard

Qualification and Quality Requirements for Electrical Components on Space Solar Panels

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Qualification and Quality Requirements for Electrical Components on Space Solar Panels

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Abstract

This standard establishes the quality requirements and provides methods for establishing the qualification of electrical components integrated onto spacecraft solar panels.

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Foreword

AIAA Standard S-112-2005 “Qualification and Quality Requirements for Space Solar Panels” was originally developed to provide a “gold standard” for space solar panel qualification, with provisions included to supplement industry standards for quality. That document has been successfully used within the industry, and that experience led to the realization that a revision would be helpful.

Thus, this version of the standard contains improvements that were realized during that implementation. The result is a new standard that the Committee on Standards for Solar Cells and Solar Panels has developed and reached consensus that defines the best practices for space solar panel qualification.

The members of the AIAA Solar Cells and Solar Panels CoS who contributed to this revision are listed here:

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The above consensus body approved this document for publication in April 2013. The AIAA Standards Executive Council (VP Standards, Laura McGill, Chairperson) accepted this document for publication in August 2013.

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Introduction

This standard establishes the quality requirements and provides the methods for establishing the qualification of electrical components integrated onto spacecraft solar panels. Section 7 describes specific tests necessary to ensure the quality and reliability of solar panels intended for space application. Section 8 describes specific solar panel characterization tests necessary to characterize the performance of solar panels intended for space application. Section 9 describes the quality requirements for panels to be qualified to this standard. Section 11 describes the reporting format for the qualification tests in Section 7, the characterization tests in Section 8, and the quality requirements in Section 9.

1 Scope

This document establishes qualification and quality requirements for the electrical components integrated onto spacecraft solar panels that carry single crystal silicon solar cells or gallium arsenide solar cells having any number of junctions including those with metamorphic and inverted metamorphic structure. In this standard the term panel defines the assembly of electrical components to be tested. The standard also defines requirements for solar panel manufacturers' quality systems and for qualification and characterization of the electrical components on solar panels.

This standard fully addresses the qualification of all panel components and the panel substrate only as they affect electrical performance. Requirements for acceptance testing are not defined in this document. In accordance with the conditions stated in this section, this standard accepts qualification and characterization by similarity when approved in writing by the customer.

1.1 Qualification by Similarity

If a panel to be qualified uses the same part types, materials, and processes as a panel previously qualified to this standard and is exposed to environments that are encompassed by the previous qualification to this standard, this standard's required tests and characterizations may be waived. If the same part types or materials are not available, equivalent part types or materials may be used if their pedigree to the same part type can be established and is satisfactory for the intended usage.

If some parts, materials, and processes have changed from similarity qualification, as defined by the paragraph above, the qualification may still suffice for the unchanged parts, materials, and processes. The similarity qualification will apply only to those parts and materials that are not changed and that do not make physical contact with a changed part or material; the qualifier must show by analysis that the remaining parts and materials are not affected to any degree by the presence of a changed part or material. The qualifier must execute the tests required by this standard on all the parts that are changed, or that are in physical contact with a changed part or that may be affected by a changed part.

1.2 Characterization by Similarity

Characterization is only required for parts and materials that were not characterized by similarity or that are changed or that were produced with processes that changed since the similarity characterization.

1.3 Reporting Requirements for Qualification and Characterization by Similarity

Report in accordance with Section 11.2f and 11.3e.

2 Tailoring

Tailoring of this document is allowed to meet specified requirements.

Wherever tailoring is proposed to a requirement herein, the rationale shall be stated and agreed upon. Written customer approval of the tailored sections is required.

3 Applicable Documents

The following applicable documents contain provisions which, through reference in this text, constitute provisions of this standard. For all documents, subsequent amendments to, or revisions of, any of these publications do not apply. In the event of a conflict between this standard, the documents cited below and other documents, this standard takes precedence.

AS9100 Quality Management Systems Requirements for Aviation, Space, and Defense Organizations