TJ GREEN ASSOCIATES, LLC

739 Redfern Lane
Bethlehem, PA 18017 USA
www.tjgreenllc.com

Direct: 610-625-2158
Mobile: 610-730-3224
Email: tgreen@tjgreenllc.com

Virtual Training Course Outline

Space and Military Standards for Hybrids and RF Microwave Modules

(2 Sessions)

This virtual training course is divided into two sessions, 2 hours each day with a 5 min break on the hour.

Instructor: Thomas Green, TJ Green Associates, LLC, tgreen@tjgreenllc.com

The US military specifications for the manufacture of hybrids and RF microwave modules can be confusing and overwhelming to the inexperienced user. This course is designed to explain in a logical manner the quality and manufacturing requirements for building custom Class K hybrids for military and space applications.

The governing document is MIL-PRF-38534 Hybrid Performance Specification, which in turn further calls out specific test methods in MIL-STD-883L Test Methods and Procedures for Microelectronic Devices. Mil 883 is a collection of destruct and non-destruct test methods used as screening and qualification tests to verify microelectronic performance requirements and to assess the reliability of finished modules.

The course is intended for anyone interested in gaining better insight and understanding of the quality and process control requirements for hi reliability space and military products, specifically component and quality engineers working in this industry.

Course Outline

- Overview of MIL-PRF-38534 Hybrid Performance Specification
  - Description and intent of the specification
  - History and applicability
- MIL-PRF-38534 General Hybrid Specification:
  - General requirements, e.g., product classification, marking, ESD, clean room, etc.
  - Product verification
  - Quality management program Generic performance verification
    - element evaluation
    - process controls
    - device screening (100 %)
    - conformance inspection and periodic inspection (sample basis) qualification procedures and when to re-qualify the M&P process baseline
  - Rework limitations

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  - Design and construction requirements
  - Radiation hardness assurance requirements for space applications
- Overview of MIL-STD-883 test methods and procedures required for Space qualified Hybrids and RF MMIC Modules
  - Nondestructive Wire Pull TM 2023
  - Internal Visual Inspection TM 2017
  - Temperature Cycling TM 1010
  - Constant Acceleration TM 2001
  - Particle Impact Noise Detection TM 2020
  - Burn-in TM 1015
  - Seal - Fine & Gross Leak Test TM 1014
  - RGA Residual Gas Analysis TM 1018
  - Radiographic (X-ray) 2012
  - External Visual Inspection TM 2009
- Group B, C and D Periodic Inspection Test Methods Failure Analysis Tools and Techniques
- Course Summary
- Student Feedback and Course Critique

INSTRUCTOR BIO

Thomas J. Green has more than 38 years combined experience in industry/academia and the Department of Defense, including years developing curriculum and teaching industry professionals about microelectronics assembly-related packaging and processes. Serving as a Research Scientist at the U.S. Air Force Rome Air Development Center, Tom worked as a reliability engineer analyzing component failures from fielded avionic equipment. As a Senior Process Engineer with Lockheed Martin Astronautics in Denver, Tom was responsible for materials and processes used to assemble hybrid microelectronic components for military and aerospace applications. While with Lockheed, he gained invaluable experience in wirebond, die attach, thick- and thin-film substrate fabrication, hermetic sealing, and leak test processes. For the last 15 years, Tom's expertise has helped position his company as a recognized industry leader in teaching and consulting services for high-reliability military, space, and medical device applications. Tom is a Fellow of IMAPS (International Microelectronics and Packaging Society).