

Virtual Training Course Outline

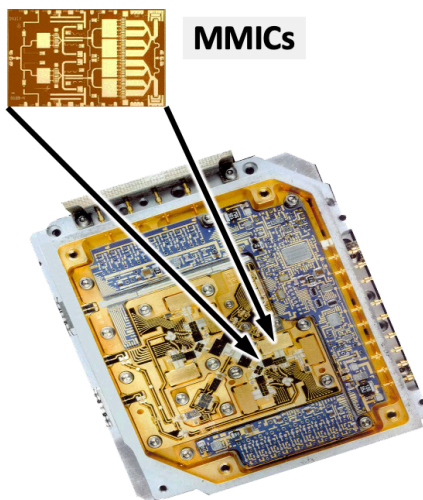
Pre Cap Visual Inspection per Mil-Std-883 (TM 2017)

(4 Sessions, 2 hrs each)

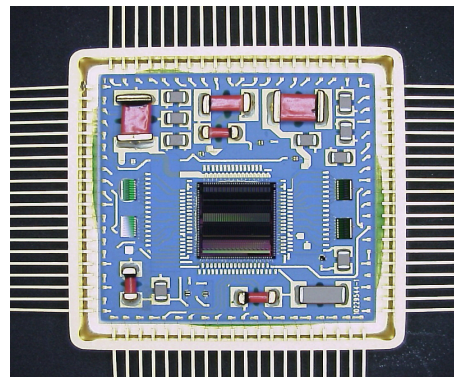
Instructor: Thomas J. Green, [TJ Green Associates, LLC](http://www.tjgreenllc.com)

Hybrids/MCMs/RF Microwave Modules all require a visual inspection step just prior to encapsulation or hermetic seal. This is a critical process step that requires a high degree of operator skill and understanding of what to look for and reject as part of the inspection process. This course defines the inspection criteria described in Mil-Std-883 TM 2017 Internal Visual (Hybrid) also known as “Pre Cap” inspection. Over 250 color photographs of actual production defects are reviewed and discussed in detail. The students are exposed to a variety of defects and how the defects relate to the materials and process flow and tied to specific para. References in TM 2017. Students learn what to look for as part of Pre Cap visual inspection and how to interpret and apply the very latest MIL-STD-883 criteria.

INSPECT PER MIL-STD 883 TM 2017



RF Microwave Module



Thick film chip and wire hybrid

The course is intended for quality assurance personnel, inspectors, QEs and Process engineers, component engineers and lead operators and others responsible for inspection of the hardware prior to the final package sealing process.

The following is an approximation of what will be covered in each online or “virtual” training session.

Session 1: Introduction and Overview

- Mil Spec Visual Inspection Requirements Flowdown
- Component ID
- Foreign Material or F.O.D. inspection and source requirement

Session 2: Component Attach

- TM 2017 Low mag IC/MMIC die and substrate attach inspection criteria and non-planar capacitor/resistor criteria
- Solder Criteria

Session 3: Wire and Ribbon Bonding

- TM 2017 Low mag wire and ribbon bond inspection criteria

Session 4: High Mag IC Die and MMIC Inspection and Passives

- TM 2010 IC High Mag Inspection criteria
- MIL-STD-750 Die level Inspection Criteria TM 2017 Table 1
- TM 2032 Passive Component inspection criteria for substrates, capacitors, inductors and resistors

Course Outline

- **Hybrid Materials and Processing Overview**
 - Review of terminology
- **General Inspection Guidelines and Procedures**
 - Visual inspection requirements flow down
 - MIL-PRF-38534 MIL-STD-883 TM 2017 TM 2010 TM 2032
- **Pre Cap Visual Inspection Criteria**
 - High mag MMIC and IC die inspect of active devices per TM 2010
 - Defects related to wafer fab, saw and break, probe test etc.
 - Thick film/thin film substrate defects e.g., cracks, chipouts Laser Trim defects
 - Passive component inspection per TM 2032
 - Epoxy die attach, fillet criteria for active and passive elements Eutectic solder attach
 - Epoxy attach of chip capacitors and chip resistors
 - Wirebond defects, e.g., excessive squash out, heel cracks, misplaced bonds, etc. ball bonds, wedge bonds, ribbon bonds and heavy wedge aluminum
- **Foreign Material Identification and Contamination Control**

- External Visual Inspection Criteria (Optional)
- Course Summary
- Student Examination Test and Review
- Student Feedback and Course Critique

INSTRUCTOR BIO



Thomas J. Green has more than 43 years combined experience in industry/academia and the DoD. He earned a B.S from Lehigh University in Materials Engineering and an MEA from Univ of Utah. He is a recognized expert in materials and processes used to assemble hybrids, RF microwave modules, Class III medical implants, optoelectronics, and other types of hermetic/non-hermetic packaged microcircuits and sensors. He has considerable expertise in hermetic testing methods per TM 1014 and moisture related failures in general. He is a consultant to companies developing next gen microelectronics for military and space. Serving as a Research Scientist at the U.S. Air Force Rome Air Development Center, Tom worked as a reliability engineer analyzing component failures and in industry, he was the process engineer at Lockheed Denver. He has invaluable experience in wirebond, die attach, hermetic sealing, FA and root cause identification and is an expert in the visual inspection criteria for hybrids and microcircuits Mil-Std-883 TM 2010 and TM 2017. For the last 20 years, Tom's expertise has helped position TJ Green Associates, LLC 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) and retired LtCol USAFR with 28 years of service.