

## Webinar Course Description

### Hermeticity Testing for Military and Medical Microcircuits (4 Sessions)

Hermeticity of microelectronic packages and hermeticity test techniques continue to be of critical importance to the packaging community. Specifically, in the area of hybrids, microwave modules, MEMS, Class III medical implants, optoelectronic devices, sensors and other types of packaged components for the aerospace and medical device industry.

#### **Session I:** A Reason to Seal

In this lead off session the basic concept of hermeticity will be defined. There are a variety of ways to create a hermetic seal and each one of these will be briefly discussed from a material and processing standpoint. Then the basic theory of moisture ingress and rationale for the military RGA 5000 PPM specification will be described.

- Hermeticity defined...A reason to seal
- Hermetic seal processes
- Moisture ingress into a sealed package
- Residual Gas Analysis and the military specification

#### **Session II:** TM 1014 (Seal) Test Examined

In this session we'll examine the conventional helium fine and gross leak test techniques as prescribed in MIL-STD-883 Test Method 1014. This misunderstood test method is often a source of frustration and confusion. We'll discuss the theory behind the test method and point out some of the common pitfalls.

- Helium Fine Leak Testing
- Howl and Mann Flexible equation
- Fixed Table method
- Gross leak bubble testing

#### **Session III:** Leak Test Techniques: OLT, CHLD, Kr-85

Optical Leak Test (OLT) is a method that makes use of a laser interferometer to measure out plane deflection on a lid surface in response to a changing pressure and relates these measurements to an equivalent helium leak rate. Cumulative Helium Leak Detection (CHLD) is a hermeticity test technique that can measure leak rates as low as  $10E-13$  He cc/sec. Both methods allow for both gross and fine leak detection in a single test cycle and without the use of a liquid. The radioisotope Kr-85 method is widely used



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especially for small cavity, high volume packaged parts used for the discrete semiconductor industry and tested per MIL-STD-750 Test Method 1071.

- Optical Leak Testing (OLT)
- Cumulative Helium Leak Detection (CHLD)
- Radioisotope Kr-85 Method

#### **Session IV: Impact of a tighter leak spec**

For years the community has lived with a 1E-06 air leak rate for the larger volume hybrid style packages (greater than 1 cc vol) as specified in TM 1014. Recently the MIL 19500 community has adopted a much tighter spec for the same package volume; a two order of magnitude decrease in the allowable air equivalent leak rate is now specified in the latest release MIL-STD-750 TM 1071. This presentation will examine the ramifications of a tighter leak spec on the hybrid manufacturing community.

- Review of latest release of TM 1071
- Impact of a tighter leak spec
- Testing options and alternate procedures

Course attendees will have access to all the course notes and in addition will receive a complimentary copy of "Practical Guide to TM 1014" authored by the Instructor.