National Aeronautics and Space Administration

Counterfeit Parts Detection

Addressing the Threat of Counterfeit Parts in Your Supply Chain

Counterfeit parts look just like regular parts and are a form of fraud. Counterfeiters prey on customers seeking high-quality parts from reputable manufacturers and instead are unknowingly sold substandard or defective parts. A counterfeiter's "intent to deceive" is the difference between a counterfeit part and a faulty part which has defects that are unknown to the manufacturer or the distributor.

Counterfeit parts and materials adversely affect the global supply chain because parts produced for aerospace and defense also support consumer industries including automotive, aviation, computers, medical devices, security systems, and telecommunications. The resulting impact includes:

For industry:

- Costs to mitigate this risk
- Costs to replace failed parts
- Loss of sales
- Loss of brand value or damage to business image

For government:

- Risk for safety and National Security
- Costs to detect counterfeit parts
- Lost tax revenue due to illegal sales of counterfeit parts

For more information:
http://www.nasa.gov/centers/johnson/capabilities/safety/index.html

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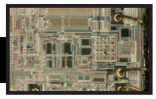
Screening of parts, components and materials leads to a reduction in counterfeit parts being used in assemblies.

X-Ray Fluorescence Spectroscopy

An efficient tool to determine the percent composition of solder used on boards, plating thickness, and qualitative chemical analysis of elements during investigations.

This is widely used for elemental analysis and chemical analysis, particularly in the investigation of metals, glass, and ceramics.

Destructive Physical Analysis (DPA)



A systematic approach to disassemble a component, electronics board, or part to solve unique problems ranging from contamination issues to metallurgical questions. The results may enhance complex failure analysis.

Optical Emission Spectroscopy (OES)

A tool to verify the chemical composition of metals. This can be critical in ensuring the correct alloy is being implemented in the design application for which it is intended.

Any iron, nickel, or aluminum based metallic samples can be submitted for OES to provide accurate quantitative analysis of up to 14 different elements for a sample.

Real-Time Radiography

Non-destructive examination of components, assemblies, or materials for internal problems that would otherwise go undetected and could lead to failure. This is also useful in the screening of various components such as batteries.

Scanning Electron Microscope (SEM)

Non-destructive tool used in failure analyses to examine samples at extremely high magnifications, high resolutions, and with greater depth of field.

This examination can find defects including:

- Metallization defects and voids
- Diffusion faults
- Passivation faults
- Dielectric isolation defects
- Internal wires and bond pads
- Die mounting

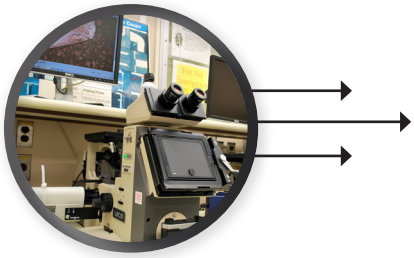
Case Study: SEAWARS

Background

Because of the high rate of failure during full functional electrical testing of SEAWARS (Seawater Activated Release System) devices, the customer submitted 11 SEAWARS devices to RITF for evaluation

Investigation

Internal examination of the SEAWARS devices revealed that 4 out of 11 had counterfeit Analog Devices, Inc (ADI) Voltage Reference devices (P/N AD 580TH)



External Examination

Counterfeit AD 580TH devices revealed 2 issues:

1. AD logo was etched onto the top cover
2. Top cover was sanded off

Internal Examination

Counterfeit and good ADI devices revealed:

1. Linear Technology (LT) logo instead of ADI logo
2. P/N 10198 instead of C580
3. Square die instead of rectangle die