

## Relifing Aged Inventory

### The Case for Relifing

Electronic components left over from a prior production run or the result of an intentional lifetime buy can be warehoused for many years. During this time, regardless of whether or not a device has previously been qualified, authenticated or upscreened; improper storage and handling scenarios (from HVAC issues to temporary lapses in ESD protection) can degrade electronic components and impact their performance and lifespans. Using this aged inventory without screening it first can result in performance issues, which in space or other high reliability applications can produce catastrophic results. Rather than discard these devices, which may be costly (if not impossible) to replace, you can “relife” them.

Whether it is due to flowdown requirements, concerns about a device’s age, or exposure to potentially unsafe storage or handling; relifing inspection and testing can provide the assurance you need before utilizing or reselling an electronic component. Although the formal relifing standard, ECSS-Q-ST-60-14C, is a European one for space applications, a strong case can be made for adhering to this standard as a best practice for devices intended for use in other high reliability industries including defense, aerospace, medical and telecommunications—in the U.S. and abroad.

### ABOUT THE STANDARD

ECSS-Q-ST-60-14C Rev.1 was released on August 1, 2019, and is the second iteration of this standard, originally released in November of 2008. Significant changes in this revision included required testing for commercial active parts *as well as* increased allowable period of time between date code and time of mounting: from 10 to 15 years (by extending relifing period one year and allowing a second relifing).

### Long-term Storage Hazards

- Corrosion/oxidation that results in:
  - Shielding loss
  - Reduced conductivity
  - Housing leakage
  - Reduced solderability
  - Altered mechanical/thermal properties
  - Increased contact resistance
- Mechanical damage due to excessive heat or cold
- Moisture absorption or popcorn effect which may cause cracking or delamination



- Moisture extraction creating brittleness and loss of dimensional accuracy
- Electrostatic discharge (ESD) that damages internal circuitry and creates defects and latent failures
- Tin and other types of whiskers as a result of temperature fluctuations and excessive humidity, which can cause short circuits



## When to Consider Relifing

### For Space Applications per ECSS-Q-ST-60-14C

- Intended for use in a space project and application in Europe

AND/OR

- Approaching or exceeds lifetime/shelf life listed on manufacturer's spec sheet
- 7 to 11 years old or it has been more than 4 years since last relifing (see Table 5.1, ECSS...)
- Exceeds flowdown *date code restriction*

### For Other High-Reliability Applications per ACT

- Potentially compromised by improper handling or environmental conditions while in your (or other's) custody
- Exceeds flowdown *date code restriction* indicating oldest date code allowable
- Past the manufacturer-specified lifetime
- Before mounting a component that has been stored for over 7 years

## Relifing Methodology

Relifing is a series of inspections and tests—variable by device and possibly expanded by evidence of an anomaly—for verifying that the initial quality and reliability of Class 1, 2 and 3 electronic components haven't been adversely affected by time, storage conditions and/or handling. The tests generally required, as specified in ECSS-Q-ST-60-14C, include external visual inspection, fine and gross leak testing, and electrical testing. The relifing series of inspections and tests is designed to identify issues including corrosion, splitting, arching, and performance degradations. At ACT we routinely include visual inspection at 40-times magnification or greater for a more thorough examination of the packaging surface. Although relifing is normally non-destructive, a solderability test must be performed if lead surface anomalies are discovered.

The ECSS standard has different requirements for different classes and types of components (including commercial active components) with respect to the tests required and number of devices to be tested. The classes provide levels of trade-off between assurance and risk. Most devices require at least one test to be performed on all devices in question, except for a few that can be sampled: ceramic and variable capacitors; cermet and wire link fuses; inductive coils; and fixed-power and high-voltage fixed film resistors.

After all testing is done, Advanced Component Testing will issue a new Certificate of Conformity indicating the relifing date code. When full compliance to ECSS-Q-ST-60-14C is required (for space applications) and the lot conforms, the component shall be considered relifed for four years and can be relifed one time within 15 years of the original date code. Relifing should satisfy date-code restriction flowdowns and quality control concerns for devices stored long term.

## Additional Services for Aged Inventory

Advanced Component Testing offers additional services that are ideally suited for use with legacy devices and other aged inventory. These include:

- **Component Authenticity Inspection and Testing** to AS6171 or other level, when there is no manufacturer's C of C or chain of custody is suspect.
- **Baking and Dry Packing** for devices impacted by excess moisture.
- **Parametric Electrical Testing** to validate proper operation.
- **Component Upscreening** to utilize a component in an application that requires performance in excess of those specified by manufacturer.
- **Device Qualification** for additional assurance that a component will perform as expected.