



The Capacitance Company  
**KEMET**  
CHARGED™

# KEMET Customer Change Notification CCN-020112-CWF Nickel Plating & Black Epoxy

June, 2012

## Purpose

- To explain the changes relevant in CCN-020112-CWF.

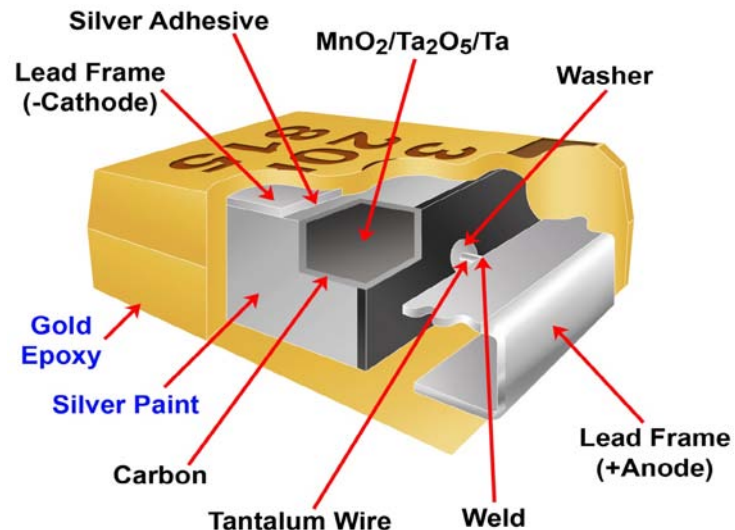
## Objectives

- Describe the process changes and product affected
- Describe the benefits and performance improvements
- Define the implementation plan



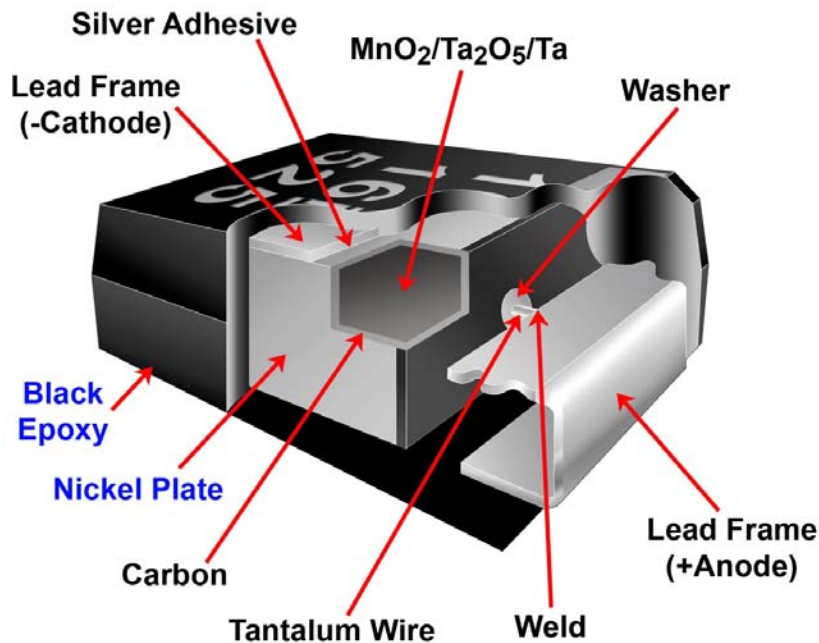
## Background

KEMET's Tantalum MnO<sub>2</sub> Surface Mount Capacitors are currently manufactured using silver filled resin to build the counter-electrode of the part. The silver application is the final layer of the counter-electrode. KEMET's Tantalum SMD capacitors are also currently built with gold epoxy encapsulation material. See image below.



## Change Description

The silver filled resin currently used to build the counter-electrode of KEMET's Tantalum MnO<sub>2</sub> Surface Mount Capacitors is being replaced with electro plated nickel. KEMET will also change from gold epoxy to black epoxy concurrently with the nickel plating change. See image below.



## KEMET Products

The following KEMET Series will be impacted:

- T491 – Industrial Grade MnO<sub>2</sub> Series
- T494 – Industrial Grade Low ESR MnO<sub>2</sub> Series
- T495 – Surge Robust Low ESR MnO<sub>2</sub> Series
- T496 – Fused MnO<sub>2</sub> Series
- T489 – Low DC Leakage MnO<sub>2</sub> Series
- T510 – Multiple Anode Low ESR MnO<sub>2</sub> Series

**NOTE: Only these standard, commercial series will be affected by these changes.**



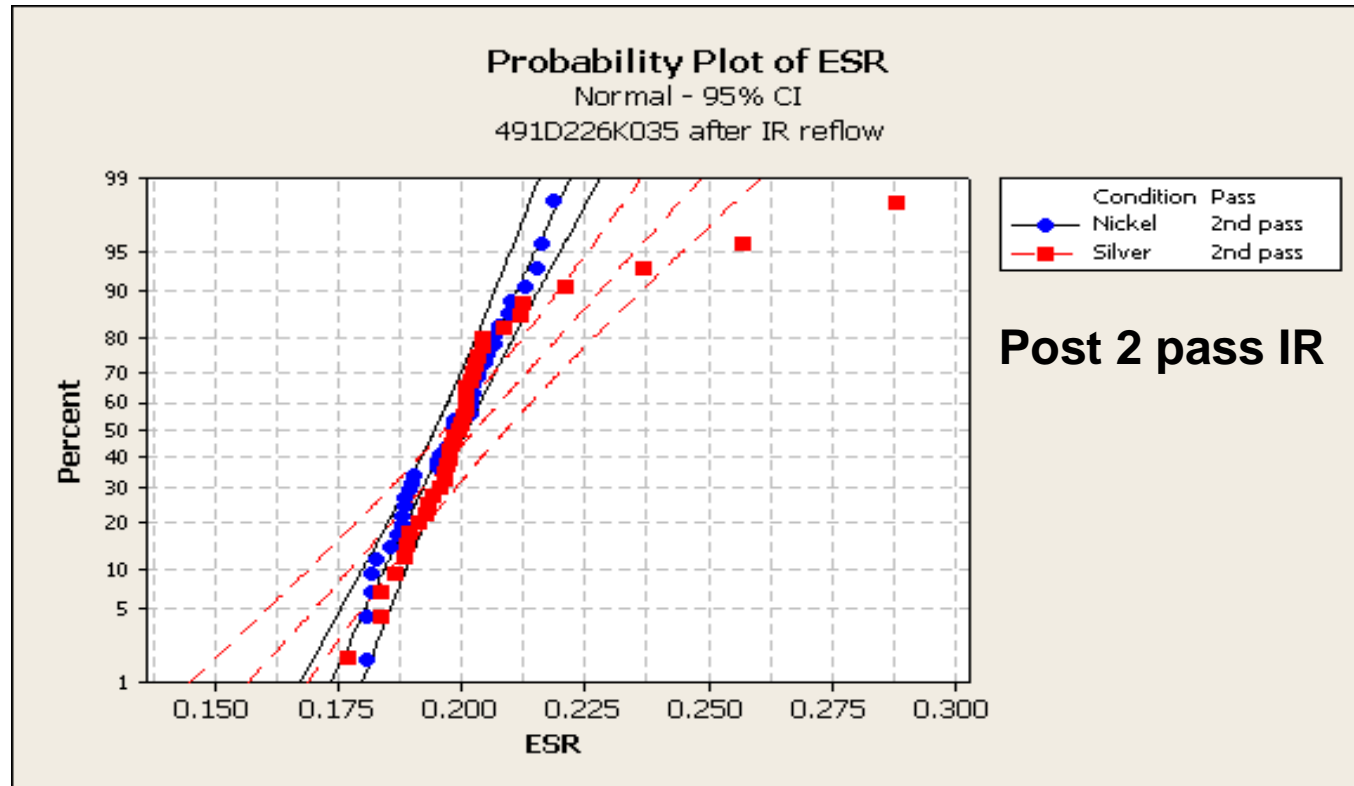
## Performance Improvements

- Stronger external shell which reduces stress on the counter-electrode layers
- ESR Stability
- Leakage improvement – due to silver migration during accelerated humidity testing
- Assurance of supply



## Electrical Improvements

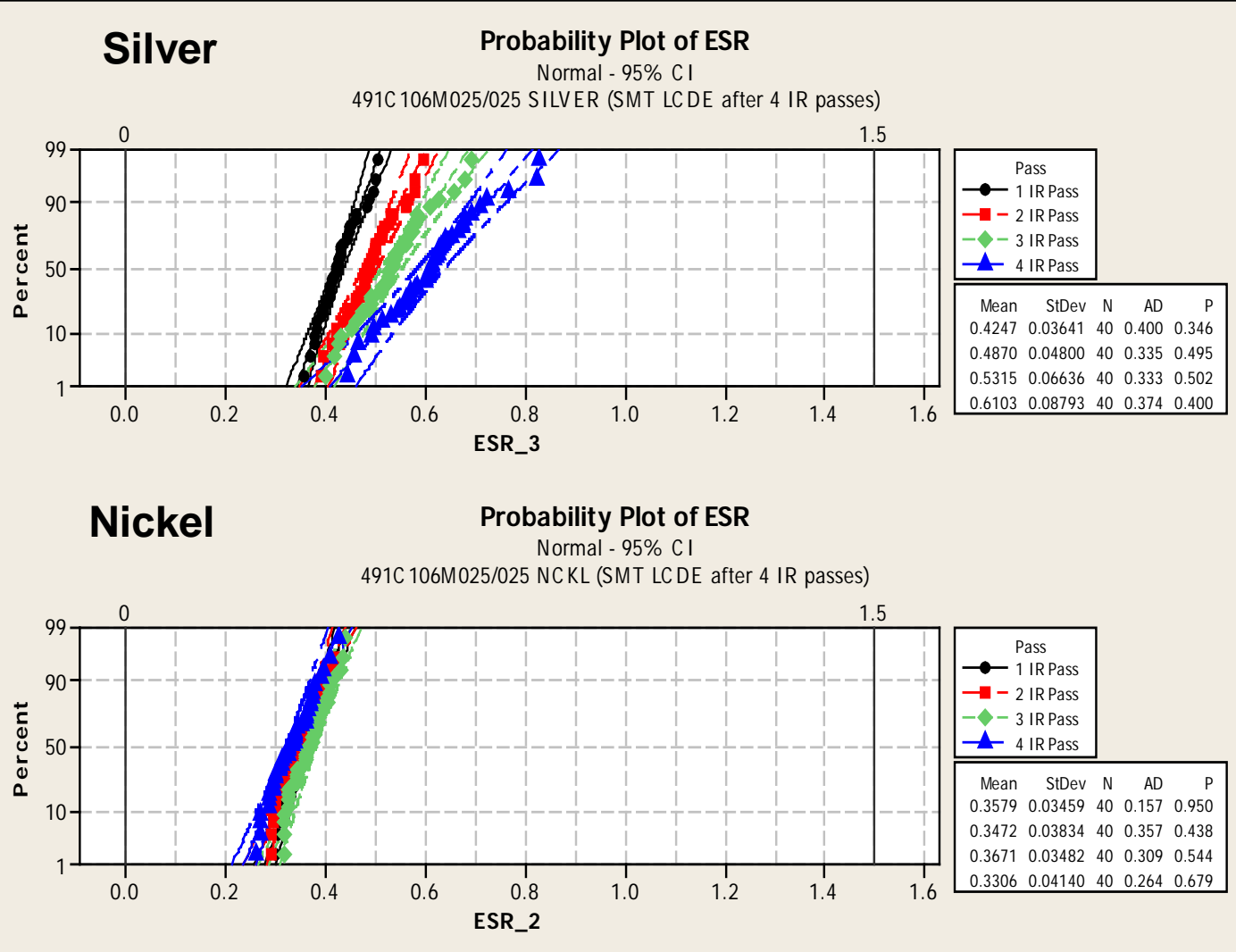
- ESR Stability – Nickel plated product exhibits improved ESR stability post multiple lead free reflow passes as noted below.



# ESR Stability – Additional Data



## Post 4 pass IR



ESR Stability after 4 IR passes:

- Ag Paint: 260 mohms increase.

- Ni Plating: no increase

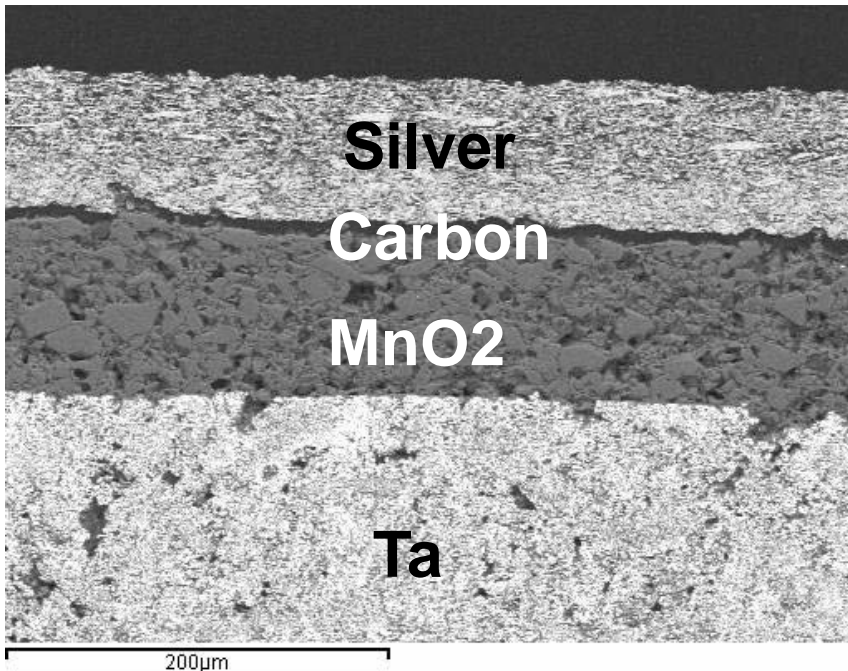




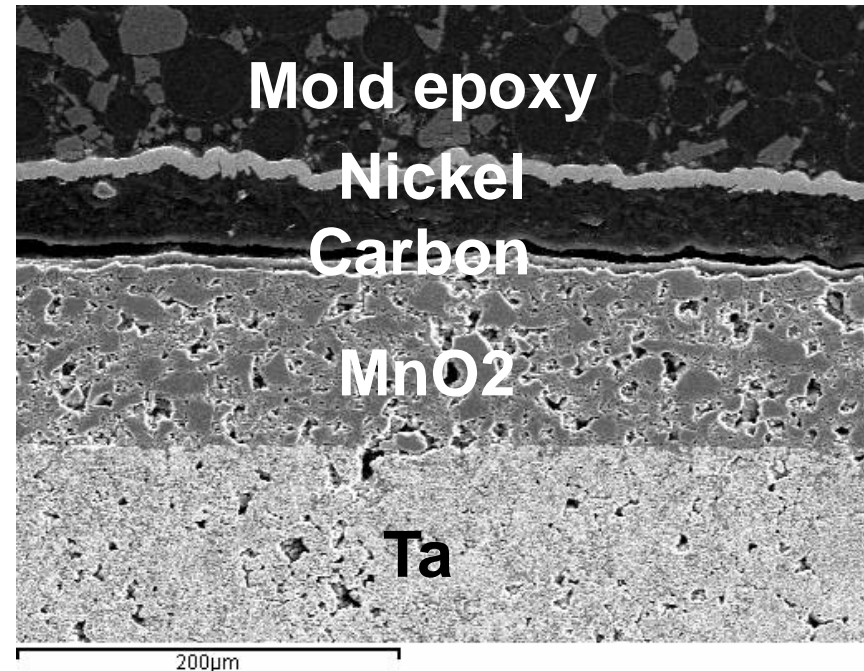
## Electrical Improvements

- Electro plated nickel results in a continuous metallic layer which prevents thermo mechanical stress from being transferred to the cathode layers. This prevents ESR shift due to delamination.

- MnO<sub>2</sub> – Silver cathode

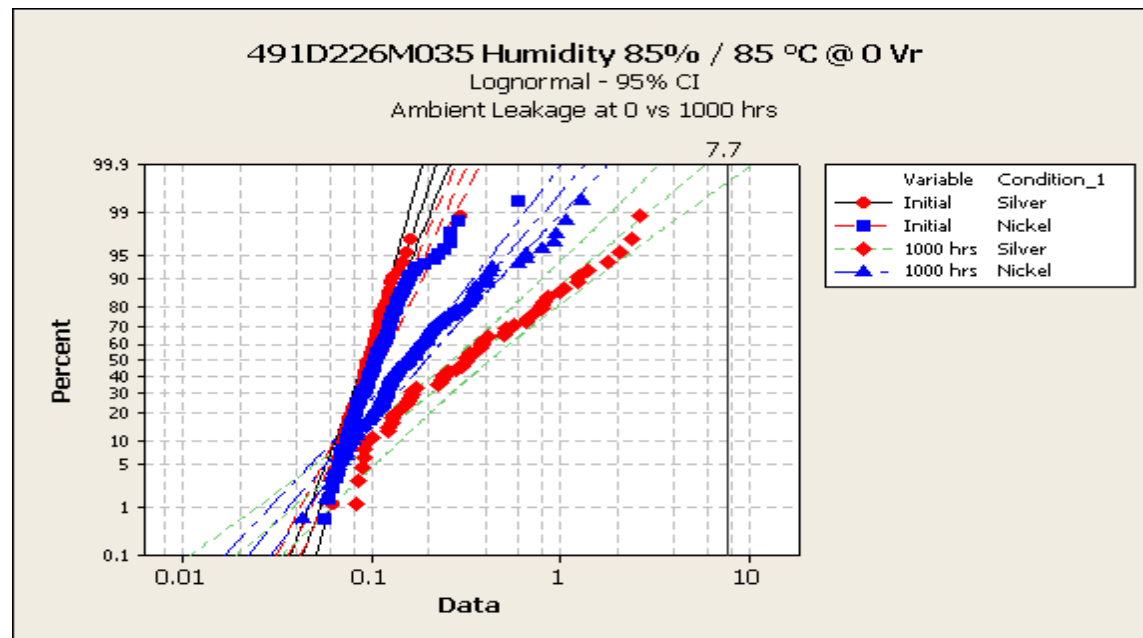


- MnO<sub>2</sub> – Nickel plated cathode



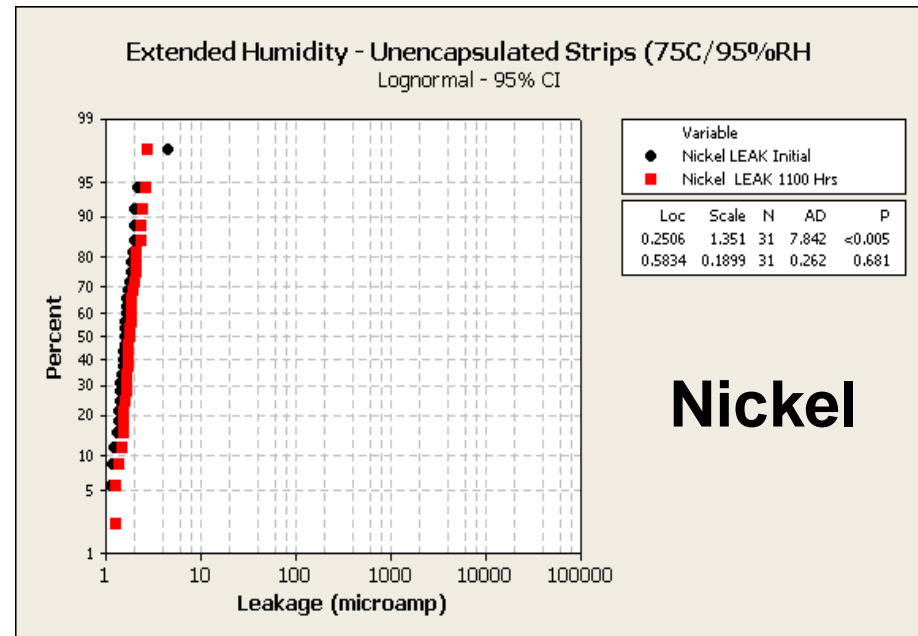
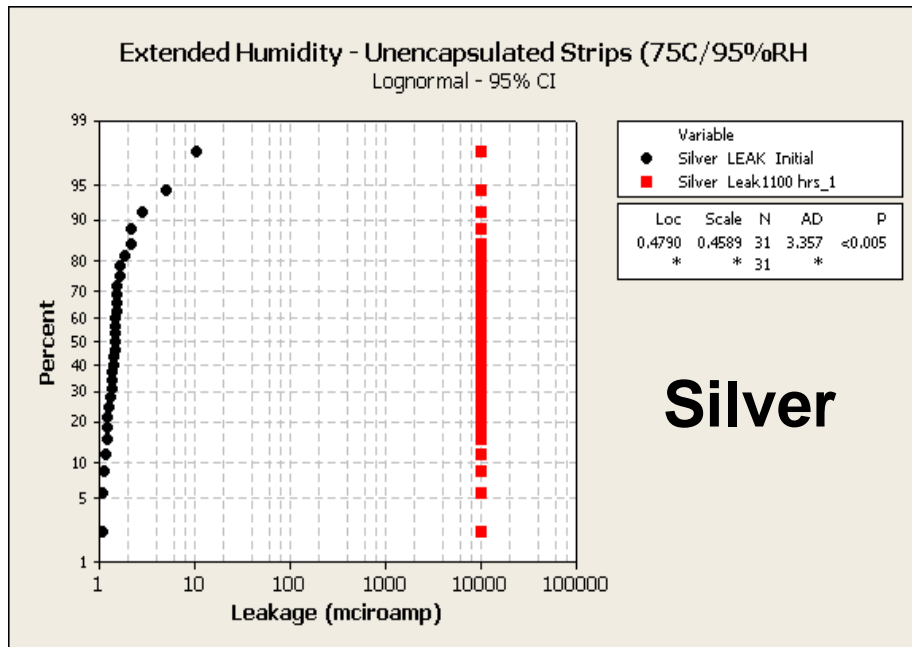
## Electrical Improvements

- DC Leakage improvement – Historically, there have been issues noted in the industry related to leakage failures caused by silver migration under high humidity conditions. Replacing the silver with nickel eliminates the source of this failure mechanism.



## Electrical Improvements

- The leakage improvement is further evidenced below with the impact of silver migration under highly accelerated humidity conditions as compared to the stability of the nickel plated product under like testing.



## Assurance of Supply

- Fluctuations in the availability of key raw materials including silver have caused scheduling issues for KEMET's manufacturing facilities. In order to assure a consistent on time supply of material required for the counter-electrode layer, electro plated nickel has been approved as an alternative material.
- The change to black epoxy will also provide a more reliable multiple source supply chain and will assist in identifying the nickel plated product during the transition phase.



## Implementation Plan (UPDATE)

The implementation of the changes will occur in 4 phases.

**Phase 1:** Starts April 2012 – Includes 6 part numbers: T491D226/035, T491D106/035, T491D227/010, T491D156/035, T491C335/035, T491C106/025.

**Phase 2:** Starts September 2012 – Includes all T491 A/B/C/D/X from Mexico.

**Phase 3:** Starts Feb 2013– Includes all remaining commercial product T491, T489, T494, T495, T496, T510 from Mexico and Evora.

**Phase 4:** Starts June 2013 – Includes all Non-standard, customer specific (Automotive) all series.



## Summary

In summary, KEMET is replacing the silver used in the manufacture of the counter-electrode of the Tantalum MnO<sub>2</sub> Surface Mount Capacitors with electro plated nickel. This change results in improved electrical stability with regard to ESR and DC leakage performance. The change from gold epoxy to black epoxy will also accompany this change to nickel.

Both changes will also further assure the supply of critical raw materials necessary in the manufacture of these products.



# KEMET Customer Change Notification

## CCN-020112-CWF



## Summary

The product number will not change for the affected series. KEMET Customer's will continue to order by the existing KEMET part number.

These changes were qualified using the AEC-Q200 testing protocol. A qualification data package is available upon request. Please contact the following KEMET personnel regarding a copy of the data package or for additional questions:

Connie Fischer  
Director of Quality TaBG  
Phone: 956-548-7212  
Email: [conniefischer@KEMET.com](mailto:conniefischer@KEMET.com)

Stanley Garrett  
Tantalum Product Manager  
Phone: 864-967-6944  
Email: [stanleygarrett@KEMET.com](mailto:stanleygarrett@KEMET.com)

