



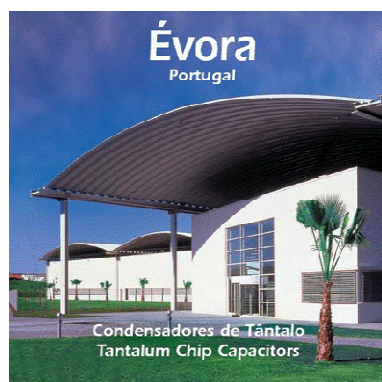
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Polymer Tantalum Capacitor (very low ESR)

Introduction

KEMET Electronics Portugal, SA is a 100% subsidiary company from the US Company KEMET Corporation, which was officially formed in 12th February 1997. The company produces Tantalum Capacitors Surface Mounted Devices with MnO₂ and Polymer counter-electrodes.



Historical the plant is located in Évora, south of Portugal and had the official opening at 4th September 1998. Until 1st October 1999 was

denominated as Siemens Matsushita and was in continuous scale up with 4 complete lines of standard MnO₂ counter-electrode ramping up. The denomination changed to EPCOS in 1999 with an extension in place, adding more 2 production lines.

In April 2006 KEMET Corporation acquired EPCOS Tantalum Business Division and the denomination change to the actual KEMET Electronics Portugal, SA. In the same year the new polymer counter electrode technology was introduced in mass production.

Based on KEMET Corporation strategic decision, in 2009, KEMET Electronics Portugal SA, started to be the footprint baseline for the Military/Space and Medical segments grows in Europe. New products qualification processes were kick-off and are under execution adding to Telecom and Automotive an extended Portfolio.

Following the market trend and latest technology innovations, ESA and KEMET have started on 1st March 2012 a project to development Ta SMD polymer technology counter electrode up to 50V rated voltage.

Development Project Summary

Solid Tantalum SMD Capacitors



One of the main KEMET's products is the solid tantalum capacitors that are manufactures all over the world with different technologies. At this moment, KEMET's Évora plant provides two of them: MnO₂ and Conductive Polymer cathodes.

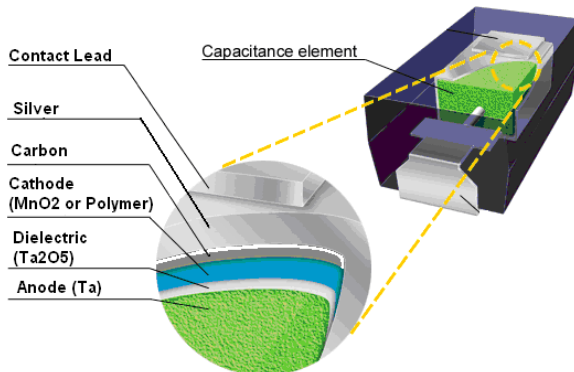
The existing range capability with conductive polymer cathodes is limited up to 16V rated voltage and to terrestrial applications.

The project target is to develop an European space grade application product, with polymer counter electrode and rated voltage up to 50V.

Surface mount technology tantalum capacitors are increasingly being used in new circuit designs because of their volumetric efficiency, basic reliability and process compatibility.

The steady-state and dynamic reliability of a tantalum capacitor are influenced by several factors under the control of the circuit design engineer. These factors are voltage de-rating, ripple current and voltage conditions, maximum operating temperature and circuit impedance. The solid nature of the tantalum capacitors construction, is also of interest due to no wear out mechanism by drying.

The electrical characteristics of a Tantalum capacitor are determined by its structure: capacitance, leakage current, impedance/ESR and dissipation factor. Those characteristics are very dependent on the capacitors designs and materials.



During the project initial phase a comprehensive and detailed Evaluation Test Plan, applied to the existing range, will allow the characterization of failure mode mechanisms and to define the major solutions

to achieve 50V rated capacitor suitable for space applications.

Those weakness and degradation modes are expected to be cover by:

- Anode design process improvements;
- Changes in raw materials and counter-electrode polymerization process;
- Dielectric build up improvements based in high resistivity electrolytes;
- Changes in raw materials and processes of conductive layers to optimize interface between assembly lead-frames and polymer counter-electrode.

An extended range of rated voltage, to cover the 33uF25V, 15uF35V and the 10uF50V will be manufactured and a 2nd Evaluation Test Plan will validate the improvements introduced.

In the end of the development project a ESCC Qualification Road Map for the 50V extended rated voltage industrialization will be reported.