Tried & Tested – The High Reliability Tantalum Multi-Anode SMD

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PCB based power applications continue to be one of the major markets for high value capacitors with low ESR performance for general filtering, power conditioning or charge delivery. Electrolytic capacitors represent a major portion of this application space with tantalum dielectric types providing the greatest volumetric efficiency.

Apart from the mandatory combination of high capacitance and Low ESR, other requirements include low inductance capability, low leakage current, parametric stability over time and temperature, good frequency characteristics, environmental robustness and the option for high reliability grading. As tantalum technology continues to make improvements on all these fronts, the design that has had the greatest impact on these is the SMD multi-anode – although it has less recognition in the marketplace from traditional single anode devices.

Given the success of the programs that have adopted it, this paper will review the attributes of this device that make it a key enabling technology for all power applications.

In this paper, the design and construction methods for multianode tantalum SMD are fully explained, especially regarding how the geometry of this design approach yields lower ESR than an equivalent single anode design of an identical footprint and capacitance / voltage rating.

While the design-in requirements for multianode capacitors are actually no different from single anode styles, a number of common questions relating to their usage have arisen. These include ESR matching and current sharing between the individual capacitor elements, whether there any internal interconnection resistance differences between the elements and how to calculate the application reliability for a multianode device (and what reliability grades are available for mission-critical applications).

This construction method has been adopted by both traditional manganese dioxide electrode and conductive polymer electrode technologies, as well as niobium oxide dielectric styles, and current developments on high reliability products in these areas will also be discussed.