

## KEMET's T525 Series Creates +125°C Tantalum-Polymer

Tantalum capacitors operating at +125°C are quite common with the earlier MnO<sub>2</sub> cathode systems, but the newer polymer systems were initially released as +105°C devices.

### Conductive Polymer Cathodes

The benefit of this system over the MnO<sub>2</sub> technology can be summed up in one term: ESR. The equivalent or effective series resistance (ESR) of the tantalum electrolytic capacitors are dominated by the resistivity of the cathode system. The MnO<sub>2</sub> system has a resistivity of 2 to 10 ohm-cm, whereas the resistivity of the conductive polymer is lower by 2 to 3 orders of magnitude. The difference in ESRs is not reflected in this large of a differential because the application of the polymer is much thinner than the MnO<sub>2</sub>; but the polymer devices still create ESRs that are fractional compared to the MnO<sub>2</sub>.

### Early +125°C Life Testing

What we observed in the testing at +125°C was that 2% to 5% of the pieces in some batches had ESR that would increase by multiples over the initial limits, while the remaining parts were extremely stable over long periods of time. In other batches, this small percentage of fallout was non-existent. At the same time, none of these failures were observed in the testing at +105°C.

### Controls, Process, Materials

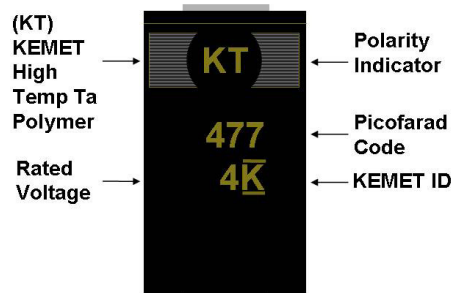
In reviewing the failed parts from these batches we could determine specific elements that were fairly consistent in the failed pieces. Through the implementation of additional controls, designs and materials, we were able to create batches of the polymer tantalums that did not show any degradation of the ESR throughout the high temperature testing.

### Environmental Concerns

With the introduction of this new product, we were able to include some changes to this product that have been raised concerning bromine based fire retardants in the mold compound, as well as lead (solder) coating of the leadframes. The new mold compound being introduced with this series is free of all bromine and still meets the UL94 VO non-flammability specifications.

The product is being released with 100% tin coating on the leadframe, eliminating the lead in

### Component Marking



the solder coated. Though, the solder coated will still be available by special order.

### Component Marking

The component will be in a black, epoxy molded case. Laser scribing on the surface will designate the device as “KT” (the high temperature version of the “KO”) with the value, voltage and KEMET designating mark.

### Voltage Derating

As with any tantalum-pentoxide dielectric, there is a temperature and recommended derating of this capacitor (as there is with all tantalum SMD). The rated voltage of this part applies to the temperature range from -55°C up to +85°C. From +85°C through +125°C, the rated voltage is specified for temperature from 100% at +85°C to 2/3 of listed voltage at +125°C, and linearly interpolated in between. The recommended application voltage for the MnO<sub>2</sub> cathode devices is to use these devices at no more than 50% (50% derating) of rated voltage, while the polymer cathode devices are recommended for no more than 80% of rated voltage (20% derating). These recommended derating must be applied in addition to the temperature derating as in the following chart.

### Temperature/Voltage Derating

