Polymer Tantalum Capacitors
Frequently Asked Questions (FAQs)

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- Are polymer tantalum capacitors susceptible to vibration?
- How many reflows are allowed for polymer tantalum capacitors?
- How does the capacitance of polymer tantalum capacitors change with voltage and temperature?
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- Are high-voltage polymer tantalum capacitors reliable?
- Why do polymer tantalum capacitors have much lower ESR than their MnO_2 counterparts?
- What is the common failure mode of polymer tantalum capacitors?

Q: Do polymer tantalum capacitors have issues with out-gassing?

A: Polymer tantalum capacitors are thoroughly dried and vacuum sealed in aluminum foil bags so there will be no out-gassing when the parts are used properly. However, polymer tantalum caps are rated Moisture Sensitivity Level 3 (MSL 3) and they will slowly absorb moisture once unsealed and exposed to the environment. Out-gassing may occur during reflow mounting if the parts are handled in violation of MSL 3 required practices.

Q: Are polymer tantalum capacitors susceptible to vibration?

A: No. Polymer caps are solid-constructed.
They have no inner parts that can move and they are not affected by shock or vibration.

Q: How many reflows are allowed for polymer tantalum capacitors?

A: Three reflows are allowed in accordance with the published specifications in the datasheet. In general, every reflow generates thermal mechanical stress that adversely affects electrical properties such as ESR and DCL. The more reflows, the greater the impact.

Q: How does the capacitance of polymer tantalum capacitors change with voltage and temperature?

A: Unlike ceramic and aluminum capacitors, the capacitance of polymer tantalum capacitors is virtually unchanged with voltage load, and virtually unchanged with temperature within the operation range.

Q: How does the ESR of polymer tantalum capacitors change with voltage and temperature?

A: The ESR of polymer capacitors is virtually unchanged with voltage load, and virtually unchanged with temperature.

Q: How does the ESR and capacitance of polymer tantalum capacitors change during longterm endurance tests?

A: ESR tends to drift upward slowly over time while capacitance tends to drift lower, eventually reaching a plateau within the specifications published in the datasheet.

Q: How do polymer tantalum capacitors behave under elevated temperature without a voltage load?

A: Unlike aluminum polymer caps that show increased DCL, polymer tantalum capacitors have stable properties under elevated temperatures without a voltage load. This can be attributed to the much higher stability of the tantalum dielectric compared to aluminum polymer. Also, polymer caps have a solid electrolyte, so they don't have the "dry-out" issue associated with wet aluminum caps that use a liquid electrolyte.

Q: How do polymer tantalum capacitors perform in endurance tests in humid environments?

A: Typical performance specifications for Vishay's polymer tantalum capacitors include performance at 60 ºC / 90 % RH for 1000 h. Some special grades are specified up to 85 °C / 85 % RH.

Q: What is the operation temperature range of polymer tantalum capacitors?

A: Polymer tantalum capacitors are designed to operate at up to 105 °C in longterm applications. Some special grades can operate at up to 125 °C.

Q: Why do polymer tantalum capacitors have higher DCL spec limits vs. their MnO_2 counterparts?

A: The polymer tantalum capacitors have higher initial DCL due to their polymer cathode construction. However, the higher DCL after reflow tends to be reduced significantly when a voltage is applied, as the result of self-healing.

Q: Are polymer tantalum capacitors more tolerant to voltage surges and spikes than their MnO_2 counterparts?

A: Yes. It is established that polymer tantalum capacitors need only a 10 % voltage de-rating (or 20 % at higher voltages) vs. a 50 % de-rating for MnO_2 counterparts to ensure a good safety margin in applications. Refer to vPolyTan™ datasheets for recommended voltage derating.

Q: Are high-voltage polymer tantalum capacitors reliable?

A: Yes. Extensive tests and simulations conclude that high-voltage polymer tantalum capacitors are very reliable.

Q: Why do polymer tantalum capacitors have much lower ESR than their MnO_2 counterparts?

A: The conductive polymer used as the cathode material is orders of magnitude more conductive than MnO_2.

Q: What is the common failure mode of polymer tantalum capacitors?

A: The common failure mode is high DCL or short.