

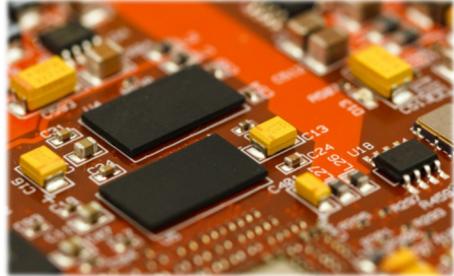
Tantalum for technology



TIC

The element **tantalum** (Ta) is a rare grey metal with unique properties. The largest tantalum application, representing some 30% of consumption, is that of tantalum capacitors, which are electronic components that are essential to anything electronic.

Tantalum capacitors are recognised for their exceptional stability and reliability in a wide range of temperatures and frequencies. They also have record breaking volumetric efficiency. Tantalum provides the capacitor of choice for high performance technologies and when failure is not an option.



Tantalum capacitors (yellow) on an electrical circuit board (Shutterstock)

What is a capacitor?

Capacitors are passive electronic components that store, filter and regulate electrical energy and current flow in circuit boards. Their key applications are to maintain a stable voltage level by decoupling a system, and to store electrical charges (potential energy) to supply fast power when needed.



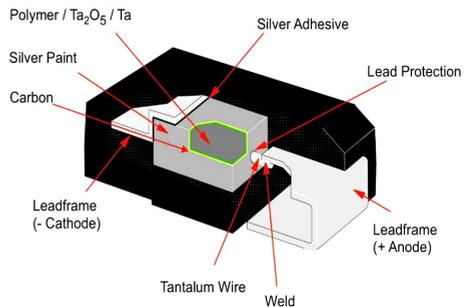
Tantalum capacitors can be very small (T.I.C.)

Capacitors are formed by separating two parallel conductive surfaces by a non-conductive dielectric material (in this case tantalum oxide, Ta_2O_5). When a voltage exists between the plates, an electric field is created in the dielectric which stores energy.

Why tantalum?

The design of the tantalum anodes (made from sintered tantalum powder) combined with the very thin Ta_2O_5 layer (just 20 - 400 nm thick) provides a large surface area packed in a very small volume.

As a result they have an exceptionally high efficiency CV/cc (where C represents capacitance and V represents applied voltage).



A typical chip tantalum capacitor (KEMET Electronics)

Applications for tantalum capacitors

Tantalum capacitors are used when high performance and/or reliability is essential, or where challenging conditions rule out less suitable substitutes:



Consumer electronics: Smart phones, laptops, tablets and other modern gadgets. Miniaturization is achieved by ultra-low profile tantalum capacitors.

Automobiles: Airbags cannot fail, tyre pressure gauges are hard to access and engine electronics operate at high temperatures; each situation demands that only the best capacitors are used.



Medical equipment: Both implanted devices and essential hospital apparatus use tantalum capacitors, helping millions of people live longer, healthier lives.

Satellites and space rockets: Where routine maintenance is impossible reliability trumps other considerations every time.



Oil and gas exploration: Downhole operating temperatures can be 175 to 200°C, with strong vibrations and shocks, but tantalum capacitors carry on regardless.

Military and aerospace: On the battlefield failure is not an option: choose tantalum capacitors.



For more information on tantalum capacitors visit www.TaNb.org.

Picture credits: Shutterstock, NASA, T.I.C.



TANTALUM-NIOBIUM

INTERNATIONAL STUDY CENTER

www.TaNb.org

The T.I.C. is the international trade body that represents the tantalum and niobium industries. We have around 90 members from over 25 countries involved with all aspects of the tantalum and niobium industry supply chain (from mining and refining through to OEMs and recycling).

OBJECTIVES

- Increase awareness and promote the remarkable properties of tantalum and niobium.
- Host the Anders Gustaf Ekeberg Tantalum Prize, an annual award that recognises excellence in tantalum research.
- Organize a general assembly (conference) in October each year for business and technical presentations. Non-members may attend.
- Publish a quarterly Bulletin newsletter for members and stakeholders.
- Collect from the members (via an independent company to ensure confidentiality) statistics on the tantalum and niobium industries.
- Address key issues facing the industry, such as legislation, supply chain due diligence, and transport of radioactive materials (NORM).

Tantalum-Niobium International Study Center (T.I.C.)

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