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Application Sheet

Electric Propulsion

Design Challenge

Engineers designing electric propulsion systems must carefully select an energy storage solution that exhibits high power density, ultra-low ESR, resilience to harsh space conditions, and the capacity to sustain a high repetition rate in order to meet the power demands of the thruster system.



Our Solution

Quantic™ Evans "space-grade" capacitors are the most power dense capacitors in the industry and can meet the power demands of a thruster system while sustaining a high repetition rate. They provide significant savings of space, weight, and power when compared to traditional capacitor technologies such as tantalum solid or aluminum polymer. The hermetically sealed design allows for operation in the vacuum of space and the tantalum case gives our capacitors their designation as RAD-hard. Rugged construction makes them well suited to handle extreme shock and vibration environments.

Technology Advantages

Quantic™ Evans capacitors are often preferred over aluminum-polymer and solid-tantalum capacitors because they are lighter and smaller. Additionally, solid-tantalum capacitors carry a risk of catastrophic failure (i.e., fire).

Electric Propulsion is a class of space propulsion that uses electrical power to accelerate a propellant. Unlike chemical propulsion systems, electric propulsion requires very little mass to accelerate a spacecraft, and is only limited in energy by the available electrical power on board the spacecraft. Electric propulsion is suitable for low-thrust, long-duration applications on board spacecrafts. Electric propulsion systems also give a spacecraft the ability to maintain or change its orbit, avoid collisions, and execute end-of-life deorbiting. Electric propulsion systems are well suited for all mission needs for satellites weighing from 5 kg to 1,000 kg.

A **Thruster** is the spacecraft propulsion device used for orbital station-keeping, attitude control, or low-thrust, long-duration acceleration.

Key Features

- SWaP-optimized; the most power-dense in the industry
- Meets power demands while sustaining high repetition rates
- Ultra-low ESR; can store and discharge energy quickly
- Leakage Current (DCL) ensures that stored energy is not lost over time
- Reliable across wide temperature range
- Ruggedized to withstand high altitude, extreme shock and vibration
- Hermetically sealed—RAD hard
- High reliability and long service life with unlimited shelf life
- Routinely screened and qualified to NASA IEEE-INST-002; approved by ESA
- Lead-free and RoHS compliant available

Supported Platforms

Ion Thrusters

Vacuum Arc Thruster

Hall Effect Thrusters

Pulsed Plasma Thrusters

Quantic™ Evans



Download Our Whitepaper
"Specifying a Capacitor
for Space-Based Applications"

About Quantic Evans—Quantic Evans, a Quantic® Electronics company since 2020, is an AS9100/ISO 9001 certified developer and manufacturer of high-reliability, power dense capacitors. Its products provide superior size, weight, power, and reliability, enabling customers to develop next-generation electronic systems for aerospace, defense, and industrial applications.

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"Psyche's Hall Thruster" by NASA/JPL-Caltech