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Application Sheet

DC Storage

for Radar Transmit Pulse (T/R Modules)

Design Challenge

Radar systems engineers designing DC storage for transmit pulse radar must choose an energy storage solution that possesses low equivalent series resistance (ESR), and can endure high currents and aggressive duty cycles. The ideal capacitor solution should function effectively across a broad spectrum of operating conditions.

Our Solution

Quantic™ Evans hybrid capacitors offer an optimal solution, characterized by their exceptionally low ESR and robust capability to handle high currents and demanding duty cycles. Additionally, these capacitors exhibit remarkable performance under diverse operating conditions such as temperature fluctuations, shock, vibration, and altitude variations.

Technology Advantages

Capacitor Type	Quantity Required	Volume [in³]	Weight [g]	Hermetic
Flatpack	3	7.875	198	
Traditional Wet Tantalum	21	4.5	450	Y
Stainless Steel "Flatpack"	8	21	744	
Extended—Wet Tantalum	9	1.34	135	Y
Stainless Steel + Hermetic "Flatpack"	37	27.8	1184	Y
Quantic Evans "Hybrid"	1	1.5	145	Y

What is DC Storage for Transmit Pulse Radar? A radar system works by transmitting a series of pulses of electromagnetic energy and then receiving the reflected signals from objects in the environment. In this "transmit radar pulse", DC storage refers to the ability of the radar system to store direct current (DC) energy during the off-period of a pulse and release it during the on-period. During the off-period of each pulse the radar system may continue to consume power to maintain the transmit circuitry and to store energy for the next pulse.

DC storage can be achieved with capacitors that can be charged during the off-period of the pulse, and then discharged during the on-period to supplement the power supplied by the radar system's power source. By effectively "storing" some of the energy that would otherwise be lost during the off-period, DC storage can help to improve the overall efficiency of the radar system and reduce its power consumption. This is especially important in portable or battery-powered radar systems where power efficiency is critical to prolonging the battery life and enabling extended operation in the field.

Key Features

- SWaP-optimized; the most power-dense capacitors in the industry
- Compact size allows our capacitors to be placed close to the emitter, minimizing losses due to long wires or traces
- Designed to withstand aggressive duty cycles, and their ultra-low ESR minimizes voltage droop during the transmit pulse cycle
- Unlimited Current (limited only by internal ESR), meaning they can be discharged into a dead short repeatedly without damage
- Ultra-Low ESR
- Reliable across a wide temperature range
- Ruggedized to withstand high altitude and vibration challenges
- Hermetically sealed
- High reliability and long service life with unlimited shelf life

Supported Platforms

L-band, S-band, and X-band Radar

Naval Vessel Radar

Ground-based Radar

Unmanned Aerial Vehicles (UAVs)

Satellites

Quantic™ Evans

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