



HIGH RELIABILITY

DISCOIDAL CAPACITOR SOLUTIONS

Author: Elvis Henriquez

Discuss Your Design Needs: **Link:** www.johansondielectrics.com/contact/request-a-quote/

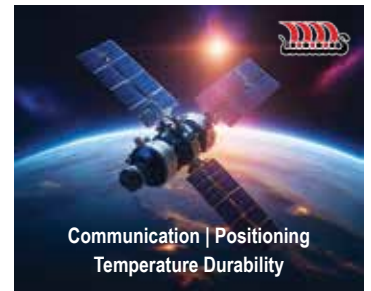
Introduction

Johanson's North American Manufactured Discoidal Capacitors are Precision Multilayer Ceramic Components engineered for use in EMI filtering across mission-critical Aerospace, Defense, Space, and Advanced Automotive Applications. These discoidals feature low ESR and ESL, non-polar multilayer construction, and are optimized for high-frequency EMI suppression in compact assemblies.

While manufacturing is performed in North America to support scalable production and ITAR compliance, all high-reliability testing is executed in the United States. Our U.S. facility is equipped to support compliance with MIL-PRF-31033 and other MIL standards, including electrical, environmental, and mechanical screening on 100% of units when required. This infrastructure ensures dependable capacitor performance under extreme operating environments, from low-Earth orbit to battlefield electronics.



Optional Coating Available
to suppress arcing and provide
enhanced surface protection.



Technical Features

- **Dielectrics:** NP0, X7R
- Screening for Hi-Rel applications
- **Capacitance Range:** 10 pF to 20 μ F
- Superior high-frequency EMI suppression
- **Terminations:** Gold over nickel, silver alloys, or custom metallization to meet soldering and bonding requirements
- **Configuration:** Circular and rectangular options, compatible with both through-hole and solderless spring-clip mounting
- **Voltage Ratings:** 50 VDC to 3000 VDC, 50 VAC to 240 VAC
- **Size Availability:** Typical outer diameters from 0.100 into 0.840 in (2.54 mm to 21.34 mm); customizable diameters and thicknesses

General questions contact:

Elvis Henriquez

Email: ehenriquez@johansondielectrics.com

High Reliability Testing Capabilities



(In-House)

JOHANSON's United States based facility in Camarillo, CA, Supports Full-Spectrum Hi-Rel Screening to comply with **MIL-PRF-31033**, **MIL-PRF-49470**, and related **QPL/MIL-STD** levels.



Electrical & Mechanical Testing

- 100% Capacitance, Dissipation Factor (DF), Insulation Resistance (IR), and Dielectric Withstanding Voltage (DWV)
- Visual inspection to MIL-STD-883 Class K or S
- Mechanical stress testing including solderability and bond pull/shear



Environmental and Stress Testing

- Thermal shock & temperature cycling (per MIL-STD-202 Method 107)
- Humidity and moisture resistance testing
- Life testing and burn-in under bias to simulate extended mission use



Analytical & Destructive Analysis

- Destructive Physical Analysis (DPA)
(For multilayer integrity and bond structure)
- Acoustic microscopy (Sonoscan) to detect voids or delamination
- SEM inspection and XRF material analysis
(For failure/root-cause investigation)



RF/Microwave Performance Characterization

- Resonant Line Measurements for ESR at frequency
- Vector Network Analyzer (VNA) Measurements

Applications

Discoidal as EMI filter Applications Includes:

Discoidal Capacitors are frequently installed into EMI filter assemblies where they function as the central element for high-attenuation feedthrough designs. Their multilayer construction and geometry enable high self-resonance frequencies while ensuring low impedance to ground—crucial for electromagnetic interference suppression.



Aerospace & Defense Systems

- **Avionics & Flight Electronics:** Suppresses EMI in aircraft control systems, navigation modules, & signal processors critical to flight safety.
- **Radar, Targeting, & Surveillance Systems:** Preserves signal clarity in radar arrays and electro-optical detection equipment.
- **Electronic Warfare & Countermeasure Modules:** Maintains functional integrity in harsh electronic combat and jamming environments.
- **Guidance & Control Electronics:** Used in missiles, drones, and precision-guided munitions to prevent signal disruption and navigation errors.

North American Owned & Manufactured

Space Applications

- **Satellite Communication Payloads:** Prevents electromagnetic interference in transponders, modems, and uplink/downlink channels.
- **Radiation-Hardened Subsystems:** Discoidal filters in hermetically sealed configurations are favored for their resilience to ionizing radiation and extreme temperatures.
- **Altitude & Orbit Control Systems (AOCS):** EMI filtering of actuator and sensor lines to ensure precise spacecraft positioning.



Automotive Systems

- **Electric Vehicle (EV) Drive Systems:** Suppresses switching noise from inverters and power modules in traction motor control.
- **Advanced Driver-Assistance Systems (ADAS):** Preserves data fidelity in radar, LiDAR, and camera interfaces amid dense electronic environments.
- **Brake-By-Wire and Anti-Lock Braking Systems (ABS):** Filters EMI in precision braking control circuits, improving system reliability and response time.



Low ESR / ESL Advantage

Ceramic Discoidals vs. Electrolytic Capacitors

For high-frequency decoupling and filtering, low equivalent series resistance (ESR) and equivalent series inductance (ESL) are critical. Our X7R discoidals (ceramic MLCCs) deliver dramatically lower ESR/ESL than electrolytic capacitors, yielding superior HF performance, lower losses, and smaller board area.

Ceramic MLCC (4.7 μ F X7R)

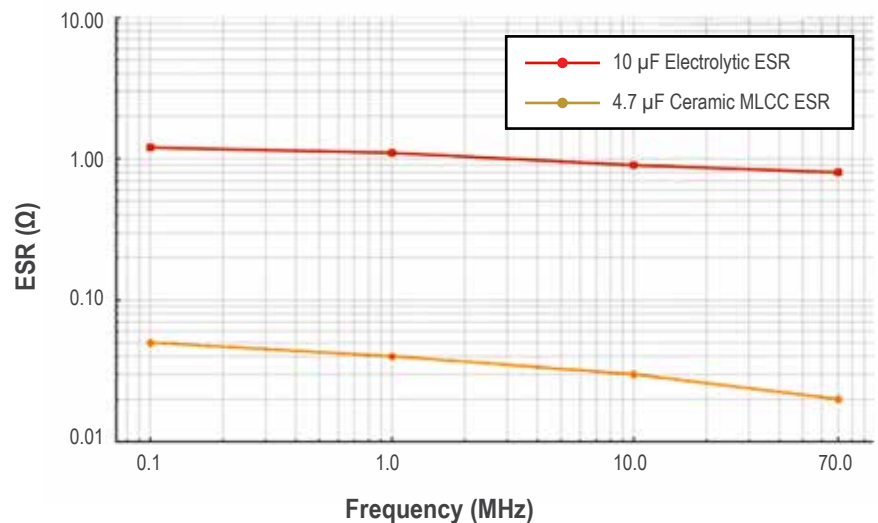
- ESR drops from $\sim 0.05 \Omega$ at 100 kHz to $\sim 0.02 \Omega$ at 70 MHz (see figure 1)
- ESL ≈ 600 pH (self-resonance ~ 3 MHz)

Electrolytic (10 μ F Tantalum / Aluminum)

- ESR remains high (1 Ω –1.2 Ω) even up to tens of MHz (see graph)
- ESL in the tens of nH, limiting decoupling above a few hundred kHz

NOTE: The chart is deliberately simplified to compare only a 4.7 μ F X7R MLCC against a

ESR vs. Frequency 4.7 μ F for Ceramic MLCC 10 μ F vs. Electrolytic Capacitors



10 μ F electrolytic capacitor, so you can clearly see the orders-of-magnitude ESR advantage of ceramics. In practice, other dielectrics (e.g., NPO) or different capacitance values would shift and further flatten the ceramic curve but are omitted here for clarity.

REFERENCE: Johanson Dielectrics, “*Tanceram MLCS for Smoothing and Decoupling Applications*”

TECHNICAL NOTE: <https://www.johansondielectrics.com/tech-notes/tanceram-tantalum-replacement-mlcs-and-esr-curves/>

Why Choose JOHANSON'S

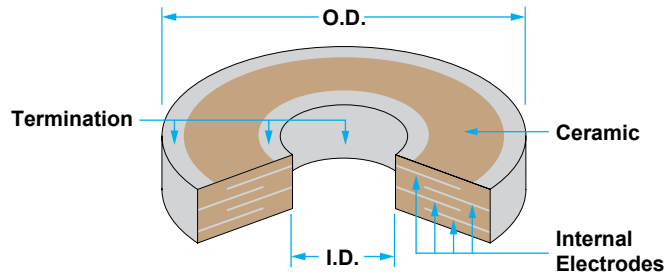
North American Manufactured Discoidal Capacitors?

- **North American manufacturing:** Ensures ITAR compliance, rapid lead times, and stable production
- **Hi-Reliability Testing and Design:** In-house MIL-PRF-31033 testing supported by decades of engineering expertise retained in the U.S.
- **Cutting-Edge Hi-Rel Equipment:** Advanced lab infrastructure enables full MIL-spec electrical, mechanical, and environmental testing under one roof
- **Military-Certified Infrastructure:** In-house testing for MIL-PRF-31033, MIL-STD-202, and MIL-C-123
- **High Capacitance Density:** Achieve large energy storage in compact formats
- **Over 60 Years of Experience:** Established expertise in ceramic capacitor designs.



CERTIFICATIONS

AS9100 | CTPAT | ITAR



Contact JOHANSON Dielectrics:

Engineers will assist you with your unique design requirements.

Additional Resources

Ask Technical Questions:

<https://www.johansondielectrics.com/contact/ask-a-question/>

Quote Request:

<https://www.johansondielectrics.com/contact/request-a-quote/>

Sample Request:

<https://www.johansondielectrics.com/contact/request-a-sample/>

Product Catalog:

<https://www.johansondielectrics.com/downloads/johanson-dielectrics-catalog/>

Discoidal Capacitors Datasheet:

<https://www.johansondielectrics.com/docs/4311/johanson-planar-capacitors.pdf>

Johanson Dielectrics, Inc.
4001 Calle Tecate • Camarillo, CA 93012
Phone: (805) 389-1166 • www.johansondielectrics.com

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