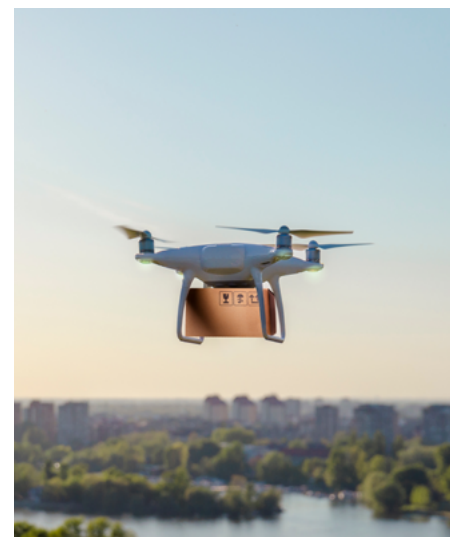


# EMI SOLUTIONS GUIDE FOR DRONE APPLICATIONS



# INTRODUCTION



As drones and UAVs become increasingly central to commercial, industrial, and defense operations, the electromagnetic environment in which they operate grows more complex. Electromagnetic interference (EMI) can compromise mission-critical systems, degrade performance, and pose safety risks. This whitepaper explores the technical, operational, and strategic importance of EMI shielding in UAVs and outlines how TE Connectivity's Performance Materials delivers advanced, integrated solutions to mitigate these challenges

EMI in UAV systems can originate from both internal and external sources. Internally, components such as electronic speed controllers (ESCs), brushless motors, switching regulators, and RF modules generate interference. Externally, ground radar, satellite links, nearby drones, and 5G towers contribute to the EMI landscape. Subsystems vulnerable to EMI include GNSS/GPS receivers, flight control units (FCUs), telemetry and video links, and sensor arrays such as LiDAR, infrared, and multispectral sensors. The consequences of EMI range from loss of control and navigation errors to data corruption, reduced mission reliability, and safety hazards, particularly in Beyond Visual Line of Sight (BVLOS) operations.

To mitigate EMI, UAV designers employ a variety of shielding strategies. These include conductive enclosures made from metal housings or metallized polymers, and connectors to prevent radiated and conducted emissions, gaskets and seals to maintain shielding integrity at joints, and coatings and tapes that serve as lightweight, flexible EMI barriers. The materials used must be lightweight to preserve flight time and payload capacity, durable to withstand vibration, UV exposure, moisture, and temperature extremes, flexible to accommodate compact and modular designs, and compliant with aerospace and military EMI standards.

Unmanned Aerial Vehicles (UAVs) integrate multiple electronic subsystems—flight control, navigation, communication, power distribution, and payload systems—that are highly susceptible to electromagnetic interference (EMI). Effective EMI shielding is critical to ensure signal integrity, operational reliability, and compliance with regulatory standards.



Application Subsystems	Connector Gasket	O Ring	Conductive Elastomer	Form in Place	Conductive Tape
Cameras and Sensors	●	●			
Flight Control System (FCS)	●				
GPS and Navigation Modules		●		●	●
Communication and Data Management	●	●			
Power Distribution Systems	●	●	●		●
Payload Systems (Camera, Sensors, LIDAR)		●	●		●
Radar System	●	●			
Motor & Actuator Systems	●				●

# EMI SHIELDING SOLUTIONS PORTFOLIO

TE Connectivity offers a comprehensive portfolio of EMI shielding solutions tailored for UAV applications. Conductive tapes and foils offer lightweight, formable EMI barriers suitable for enclosures, seams, and joints. EMI gaskets and elastomers maintain shielding at interfaces such as avionics bays and access panels. In addition to products, TE Connectivity provides engineering and integration support including

Products	Description	UAV Application
Conductive Tapes	Lightweight, formable EMI barriers	Enclosures, seams, and joints
EMI Gaskets & Elastomers	Maintain shielding at interfaces	Avionics bays, access panels

These solutions are applicable across a range of UAV use cases. Tactical ISR drones operating in contested RF environments benefit from TE’s shielded harnesses and gaskets that protect mission-critical communications and sensors. Urban delivery UAVs, which face dense EMI from 5G, Wi-Fi, and urban infrastructure, rely on lightweight conductive foils and tapes to maintain signal integrity. Agricultural drones, which experience EMI from onboard power systems affecting GNSS and telemetry, utilize Raychem tubing and shielded cables to ensure reliable data collection.

It is recommended that EMI shielding be integrated early in the UAV design cycle to avoid costly retrofits. Designers should use simulation tools to model EMI propagation and shielding effectiveness. Collaboration with suppliers like TE Connectivity is essential to co-develop optimized solutions, leveraging their global support for prototyping, testing, and certification. Lifecycle considerations should also be addressed by selecting materials that support long-term durability and maintain shielding performance over time, ensuring compatibility with UAV maintenance and modular upgrade strategies.



Product Type	Description	Features/Benefits
 <a href="#">Connector Gasket</a>	Offering a wide range of gaskets to suit many standard size connectors which require an EMI/RFI gasket with optional environmental seals or sealing. The choice of materials is vast and connector gaskets are available from virtually all of the flat sheet EMI materials.	<ul style="list-style-type: none"> <li>• Meet standard sizes, MIL-C-81511, MIL-C-5015, MIL-C-38999 and common sub D connector gaskets.</li> <li>• Standard size stops and collars in standard materials are available, other sizes and materials are available on request.</li> <li>• The compression stop also ensures additional electrical bonding between the surfaces with a very low contact resistance.</li> <li>• Surface mounted gaskets are to be used where groove mounted gaskets such as O-Rings cannot be accommodated.</li> </ul>
 <a href="#">O Ring</a>	O-Rings manufacturing methods include moulding or extruded sections that are cut to length and vulcanise jointed, these methods allow us to offer a range of solutions to meet your requirements with short delivery times. Most of our conductive elastomer profile range is available as O-Rings in all conductive silicone & fluorosilicone grades.	<ul style="list-style-type: none"> <li>• Moulding is a process that produces a jointless O-Ring making it suitable in applications where a sheer force may be applied during compression.</li> <li>• Sections other than round are often better moulded as they lay flat keeping the correct orientation of the profile.</li> <li>• Good repeatable tolerances can be achieved with moulding</li> <li>• Moulded rings are ideal where a small cross section or a very small inside diameter is required.</li> </ul>
 <a href="#">Conductive Elastomer</a>	Conductive elastomers are fully cured silicones or fluorosilicone loaded with a variety of highly conductive particles providing superior EMI/RFI shielding performance combined with excellent environmental sealing. The various conductive fillers are designed to ensure galvanic compatibility whilst providing low contact resistance between mating surfaces	<ul style="list-style-type: none"> <li>• Material options to provide required EMI performance and galvanic compatibility</li> <li>• Provide low-contact resistance between connector and enclosure</li> <li>• Highly conductive EMI/RFI gasket and environmental seal</li> <li>• Performs in wide temperature range -55°C +160°C</li> <li>• Fluorosilicone for harsh environments: Fuel oils and solvents</li> <li>• Flame retardant UL94 V-0 rating (molding grade only)</li> </ul>
 <a href="#">Fabric Over Foam</a>	Manufactured from a synthetic polyester or nylon yarn which is plated to give electrical conductivity over the surface of the fiber and then woven in a traditional way so as to produce a conductive cloth. The cloth is then slit and wrapped over a soft polyether polyurethane foam core in a range of profiles and results in an economically priced conformable conductive gasket strip suitable for many applications.	<ul style="list-style-type: none"> <li>• Low compression set</li> <li>• Excellent abrasion resistance for high cycling and wiping applications.</li> <li>• Supplied with clip on and edge mounting or with self-adhesive backing</li> <li>• Have fire resistant properties to UL94VO</li> </ul>
 <a href="#">Conductive Tape</a>	Our conductive adhesive tape offers exceptional electrical conductivity, reliable adhesion, and superior flexibility, making it ideal for a wide range of uses, from shielding and grounding to thermal management. Engineered with precision and quality, this tape ensures optimal performance and durability	<ul style="list-style-type: none"> <li>• High performance electrically conductive acrylic adhesive</li> <li>• Ensures secure shielding continuity</li> <li>• Galvanic compatibility</li> <li>• Corrosion resistant</li> </ul>

## About TE Connectivity

TE Connectivity plc (NYSE: TEL) is a global industrial technology leader creating a safer, sustainable, productive, and connected future. Our broad range of connectivity and sensor solutions enable the distribution of power, signal and data to advance next-generation transportation, energy networks, automated factories, data centers, medical technology and more. With more than 85,000 employees, including 9,000 engineers, working alongside customers in approximately 130 countries, TE ensures that EVERY CONNECTION COUNTS. Learn more at [www.te.com](http://www.te.com) and on [LinkedIn](#), [Facebook](#), [WeChat](#) and [Instagram](#).



**CLICK HERE TO VIEW OUR WHITEPAPER:  
Overcoming Galvanic Compatibility Challenges in EMI Shielding**

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