

OMNETICS' CONNECTORS: DEEP SPACE KEY CAPABILITIES

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Space technology electronic systems have evolved to meet the needs of long range performance in extreme physical and environmental situations. From launch to deep space travel, the demands can be daunting, considering that they cannot fail, and cannot be repaired. During launch from earth, the high shock and vibrations that the craft goes through can damage somewhat standard electronic components.

Omnetics' connectors are mounted on printed circuit boards, must withstand potential sheering from the high G forces placed upon them. Since we all know that force is a product of "mass-times-acceleration", we often select connectors as well as other components to be small, lightweight and of low profile. Mounting tabs and larger solder landing pads are also used in some applications. Space oriented electronic circuits drive a number of other connector specifications. Since the electronics must not drain batteries quickly, many of the circuits are requiring very low voltages and low current flow to do their jobs. In addition, those circuits carrying digital images must carry massive amounts of images while sustaining high signal integrity to insure image quality.

To do this the Omnetics connector and cable systems are carefully match the impedance of the circuits and avoid distortion or "holes" in the image base. Some lower elevation satellites scan earth for images and process large image photos at very high frame rates, like a high speed movie camera. The differential signal process is highly dependent upon the connector and cable electronic design as well as the rugged reliability of the packaging.

Space-grade Connectors are often descendants of military grade connectors. As the new requirements are specified, connector design engineers use solid model software to modify the shells and mounting formats based on the specific application it will be used. Quick adjustment to existing designs can be done economically and fit into unique shapes and formats for the high shock, vibration and long flight durations they are needed for. Specialty materials may be needed to protect the electronics inside the space box, as outgassing of some polymers can be detrimental to the electronics. Specifications and tests are routinely used to assure the system is Space Grade! To reduce size and weight, Omnetics offers a family of "Power-Plus-Signal" Micro and Nano connectors for Space projects.

Space Equipment predicted: Public and private corporations are expanding their own businesses and that expand the market 100 fold in investments in small satellites. Launches are happening regularly now — and more of these launch vehicles are coming online and becoming operational. Companies like Spire and Black Sky Global have gathered tens of millions in venture cash from the likes of Bessemer Venture Partners, Lemnos Labs, RRE Ventures, and Vulcan Capital—investments that would've been hard to come by just a few years ago. Black Sky promises an earth imaging constellation that will deliver imagery more frequently than existing services do at a lower price point, Spaceflight Industries CEO Jason Andrews says. Spire will offer a range of data services, most notably real-time maritime tracking of ships anywhere in the world and relevant weather data.

Omnetics Connector Corporation is seeing both deep space and small sat technologies on the move. Early connectors have been supplied for many HEO (high elevation orbit) devices as well cable and connectors that are working on Mars Rover. They also serve Space EX and Cube Sat who are some of the early leaders in offering small set and controlled size payloads mounted onto other launch vehicles as well. These piggy-back space programs are blooming and now more companies are investing in their own launch with private equipment onboard. Electronic features including SATA, Higher speed digital frame-rate imaging with use of wiring such as that used in LVDS,(low voltage differential signals) dominating the new circuit electronics for cable and connectors to handle.

For lowest weight and rugged space performance, Omnetics Connector Corporation and others have released space grade Nano-D connectors These MIL-DTL-32139 Nano-miniature connectors are approved for space programs and inspected per EEE-INST-002.

Nano-D connectors at .025" pitch, are the smallest "Space Grade" connectors on the market. Compared to larger Micro-D and D-Subminiature configuration. Nano-D connectors have reduced size and weight by as much as 4x that of standard Micro-D connectors and 8x that of previous D-Sub footprints.

Better connectors, like "Space connectors at Omnetics" use unique flex-pin gold plated contacts that are polarized and shrouded by a liquid crystal polymer insulators. The pin to socket strength and "lobed" housing alignment system makes these connectors capable of over 2,000 mating cycles.

Omnetics space grade connectors are available in a number of tail terminations. Standard pre-wired connectors come in 18" and 36" lengths with 80 micro inches of silver plated 30 AWG (7-38) PTFE insulated wire. Board mount options include both Surface-mount as well as thru-hole. If you are using a flex circuit, flex tails are also available. Shell finishes include Nickel plated Aluminum, Stainless steel and Titanium. Note that Cadmium plating and materials are prohibited for Space applications. Pin and socket systems must be built and engineered to withstand the high shock and vibrational elements often associated with deep space exploration.

Key specifications for electronics in space materials must be addressed as well as test conditions and proof of Space Quality and survivability. Omnetics offers a free listing of key testing and materials specifications, such as Materials Outgassing, Shock and Vibration testing procedures, special plating requirements, and even hermetic sealing specifications and testing.