



Castle Microwave has many years of experience in providing both components and solutions for Hi-Rel and Hi-Rel Space applications.

Our expertise ranges from specialised non-military communications equipment to Hi-Spec military communications satellites.

Contact us today for more information about the product range:

+44 (0)1635 271 300 | sales@castlemicrowave.com

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Together with our industry partners, we are able to provide turnkey solutions for high-reliability requirements.

CAES PIONEERING
ADVANCED
ELECTRONICS

CAES is proud to be the waveguide supplier to ONE WEB satellites, and the cable provider to Lockheed Martin Orion space craft.

CAES's portfolio of space-qualified products includes Waveguides, Rotary Joints, Antennas, and RF Cables.

Waveguide Components

CAES designs and manufactures a full range of custom passive waveguide component products for space applications from WR650 (L-Band) to WR22 (Q-Band), and custom passive waveguide assemblies for space applications from WR650 (L-Band) to WR10 (W-Band).

Coaxial, Waveguide or Multi-Channel products are available which offer high power, low VSWR & insertion loss, and stable RF performance over rotation. Low torque & torque noise designs employing special materials & finishes for lightweight construction are also offered.

Rotary Joints



Rotary joint (Model 21922) is used in the Mars Rover

Antennas

CAES provide compact, low-profile, and light-weight flat-panel antenna designs offering a high power capability, high directive gain, and low VSWR & loss (efficiency ~98%).

RF Cables

An extensive selection of cables and connectors for Space Applications is available:

- The FA--RX Series offers very low loss and outstanding phase stability
- The FZ--RX Series adds a radiation resistant jacket
- The FN--RX Series adds an abrasion resistant jacket and enhanced shock resistance
- The FA--X Series provides greater flexibility
- The FA--RX and FN--TX Series remains stable after years of thermal stress cycles in orbit

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Ducommun's engineers have a history of working with both government/defence and commercial space applications. Because of their experience, they can offer a broad range of switching solutions for both communications link and redundancy applications.

Ducommun's RF coaxial space-qualified switches have been used in a variety of space applications where electrical performance, weight, size and reliability have been mission critical. Their expertise includes involvement in both S and K Level qualification testing and screening.



SPDT Switch Space Products

Ducommun manufactures high-quality, reliable, high-frequency SPDT switches that can operate from DC to 46 GHz with 55 dB minimum isolation. The DK series operates from DC to 40 GHz and uses a K connector. The DL series operates from DC to 46 GHz and uses a 2.4 mm connector.

Transfer Switches

Ducommun also manufactures transfer switches that can operate from DC to 46 GHz with 55 dB minimum isolation. The TK series operates from DC to 40 GHz and uses a K connector. The TL series operates DC to 46 GHz and uses a 2.4 mm connector.



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MACOM's involvement with the aerospace industry goes back to the exciting initial developments of the early 1950s, when their products were placed in the unmanned probe Pioneer IV, which successfully launched in March 1959. As the industry evolved, MACOM continued to innovate and expand its product portfolio to support the developments and requirements of the Space and Hi-Rel markets.

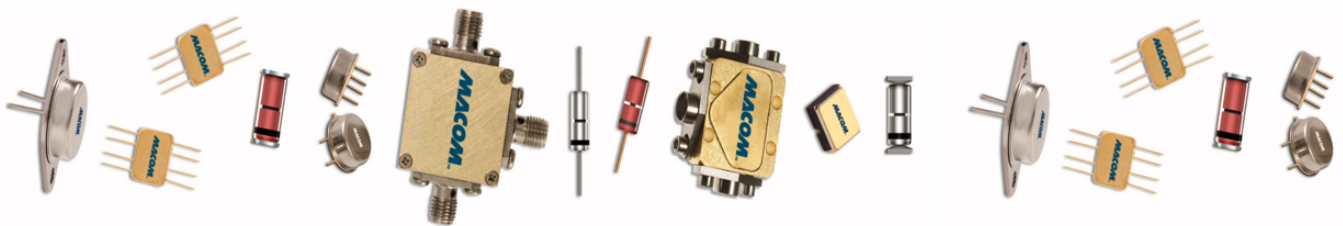
Over the years, MACOM products have travelled on hundreds of space missions. Their parts have entered the solar system on the Voyager, touched down on Mars aboard the Pathfinder, played a crucial role in the relay satellites for the manned Moon landings and were part of the space shuttle landing systems. In addition to US space programs, they've also supported the satellite business in the UK, continental Europe and India.

To fulfill the dream of providing satellite communications, services and entertainment through high bandwidth LEO satellite constellations, there will be a need for whole batches of small, essentially disposable satellites that will be replenished on a regular basis. To enable this mass deployment, Space and Hi-Rel customers will need to drive the overall cost of each satellite down to a bare minimum. The time from 'concept to launch' will likely drop steeply, and the industry will see more adoption of newer technologies like GaN and SiGe that can deliver the performance requirements at the correct cost structures and volume.

To enable this to happen, MACOM are maintaining rigid control of the entire production/procurement process, guaranteeing that quality and reliability is assured.

MACOM can supply diodes, transistors, MMICs and hybrid components to standard requirements including:

- ESA / ESCC Specifications
- MIL-PRF-38534 Performance/General Specification for Hybrid Microcircuits
- MIL-PRF-38535 Performance/General Specification for Integrated Circuits
- MIL-PRF-19500 General Specification for Semiconductor Devices
- MIL-DTL-28837 General Specification for Radio Frequency Mixer Stages
- MIL-STD-883, MIL-STD-750, MIL-STD-202 Test Methods
- MMIC products can be supplied as bare-die, plastic encapsulated, or ceramic packaged, and can be screened for MIL-PRF-38534 Class K Space and Class H Hi-Rel.



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SV Microwave is a leader in the design and manufacture of S-level qualified RF, microwave and millimeter wave coaxial connectors, cable assemblies, attenuators, terminations and signal processing components. They have been supplying high reliability space qualified products since 1960 and have vast experience in providing the more advanced level of testing that space applications require, including the need for long term record retention.

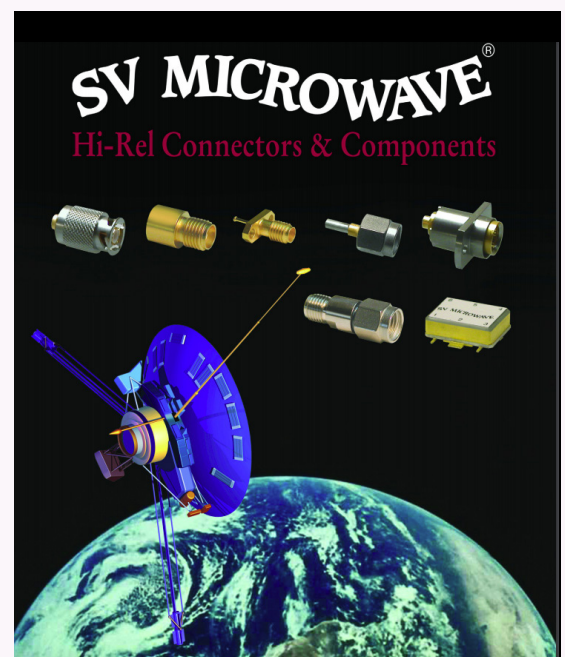
SV Microwave offers innovative solutions to satisfy customers' requirements. They have invested in a talented engineering staff, supported by state-of-the-art, high-frequency 3D RF simulation design software. Full-service laboratories perform comprehensive environmental mechanical and electrical testing. SV Microwave control virtually all processes with in-house machining, fabrication, assembly and acceptance and qualification testing. Full performance characteristics at various temperatures and altitudes are available for each product.

Capabilities assist the customer from concept through to launch and include: Qualification Test Planning, Traceability and Process Controls, Acceptance Testing for In-Process, Final and Destruct Physical Analysis. SV Microwave's products have proven themselves reliable throughout the lifetime of many missions, providing accurate performance for decades.

Qualified Products

- SMA Connectors
- SSMA Connectors
- SMC Connectors
- TNC Connectors
- High-Power Connectors/End Launchers
- BMA and Other Blindmate Connectors
- SMP Connectors
- Millimeter Wave Connectors 2.92mm, 2.4mm and 1.85mm
- Cable Assemblies* - dc to 50 GHz
- Attenuators* - dc to 50 GHz
- Terminations* - dc to 50 GHz
- Mixers
- Custom Interfaces and Configurations

* Available in all connector series



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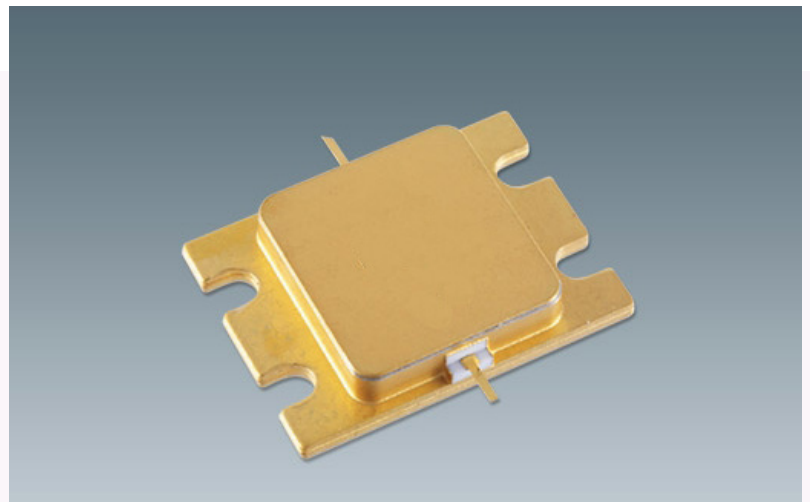
Together with our industry partners, we are able to provide turnkey solutions for high-reliability requirements.



Sumitomo Electric combines advanced technical leadership with over 30 years of design, development and manufacturing experience of satellite devices, to offer a broad range of RF products from low-noise HEMTs to high power RF components. These products undergo an extensive qualification process to ensure the highest reliability and superior technical performance required for long-term spacecraft missions.

The reputation and dependability of customers' flight hardware is the highest priority for Sumitomo Electric. Their advanced dedicated manufacturing facility for satellite products provides customers with the highly reliable and quality products needed for extended satellite missions.

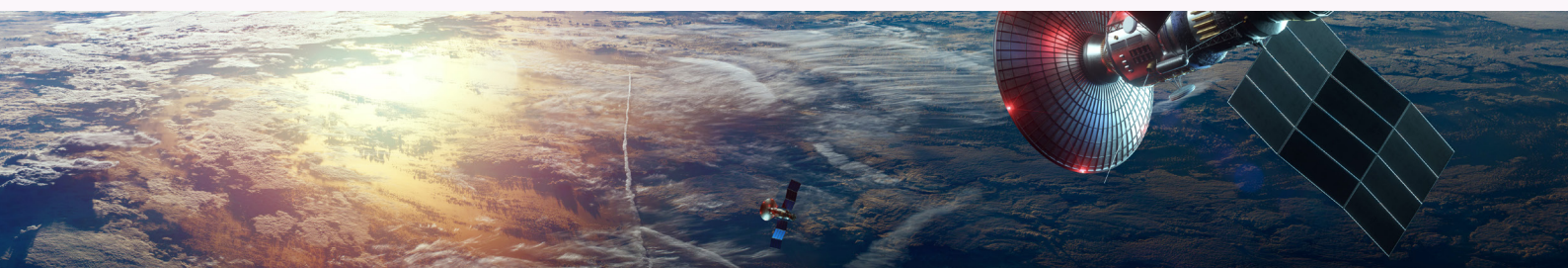
In addition to the extensive space-qualified product offering available, Sumitomo Electric provides custom MMIC designs for customers who have unique requirements. These MMIC designs include power amplifiers, low-noise amplifiers, analogue/digital attenuators, digital phase-shifters, and detectors.



A catalogue is available to provide the customer with the technical information necessary to select their product line-up. More detailed specifications are available on request.

Space qualification standards include:

- MIL-PRF-19500 General specifications for semiconductor devices
- MIL-STD-750 Test methods for semiconductor devices
- MIL-STD-883 Test methods for microelectronic devices



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Maury Microwave offers an extensive line of precision Space Qualified TVAC test cables for use in satellite communications and other space applications. Their unique designs, special materials, and plating and coating processes, enable them to produce adapters that operate with optimum performance and reliability under the extreme conditions encountered in space. Maury Space Qualified adapters are available in right angle and end launch versions and can be provided in many waveguide size and connector configurations. Weight-saving designs, custom flanges and beadless versions for harsh radiation exposure are also available, with full band or optimized narrow band performance ranges. These adapters can be qualified under Group A/B/C environmental testing, including Thermal Shock, Vibration, Operating Temperature Extremes, and EMI — all tailored to your exact specifications.



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JQL have the engineering capability to provide Space-Qualified Microstrip and Drop-In circulators and isolators.

Their experience includes:

- Space qualified Microstrip and Drop-In circulators and isolators for JPL (USA). Frequency Range from 0.9GHz to 36GHz.
- Space qualified Microstrip isolators for NT space (Japan). Frequency Range from 5GHz to 20GHz.
- Space qualified microstrip isolators for Russian Space Agency (Russia). Frequency Range from 9GHz to 30GHz.
- 4.Space qualified Microstrip isolators for RUAG Space AB (Sweden). Frequency 29GHz.



Cadence Design Systems:

- AWR Design Environment platform for Integrated high-frequency circuit, system, and EM simulation technologies and design automation
- 3D planar method-of-moments (MoM) and full 3D finite-element method (FEM) EM simulation and analysis
- Allegro PCB Editor for analysis driven design, layout, routing and real-time manufacturability checks
- Celsius Thermal Solver for a combination of FEA and CFD to provide total system analysis
- Sigrity Advanced for power integrity, signal integrity and DC analysis for signoff of IC package and PCB designs



Dassault Systemes, Simulia:

- From static to high frequency EM field simulation software
- Specialized solvers for applications including motors, circuit boards, cable harnesses and filters
- High performance optimisation and analysis with powerful post-processing and visualization tools
- Fully parametric modelling and design with complex material models
- Class-Leading antenna design and modelling tools
- Thermal Simulation

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