Power Matters.

Space Solutions

FPGAs

ASICs

RF Components

Diodes

Transistors

Power Converters

Power Distribution

Microsemi

Propelling Space Innovation for More than a Half Century

Launchers

Navigation and Guidance System
Electrical Power System
TT&C /C&DH System
Propulsion Control System

Satellites

Attitude and Orbit ControlSystem
Electrical Power System
TT&C /C&DH System
Communications Payload
Remote Sensing Payload
Solar Array & Power Conditioning
Active & Passive Image Payload
Solid State Recorder

Landers

Navigation and Guidance System
ElectricalPower System
TT&C /C&DH System
Science Experiment Payloads
RF Communications Subsystems
Cameras & Imagers
Motor Control Systems

Microsemi has played an important role in hundreds of space initiatives over the past 55 years and in a wide variety of space programs globally. The company's high-reliability products and solutions have been used in applications that require high levels of radiation hardness for trips to the Moon, Mars and beyond. Microsemi has always responded to the specific needs of space applications and has a long standing commitment to the space market.

With one of the industry's most comprehensive portfolios of space products, Microsemi provides radiation-hardened and radiation-tolerant solutions ranging from diodes, transistors and power converters, to FPGAs, ASICs, RF components, custom semiconductor packaging, and integrated power distribution systems. We are committed to supporting our products throughout the lifetime of our customer programs.

We continue to innovate in areas such as semiconductor materials, advanced packaging technologies, and high-density integrated circuits. Our products are qualified to the highest government, DLA, NASA and ESA standards, and their reliability has been independently verified by multiple agencies. As your supply partner for electronic systems in space, Microsemi can solve problems at all stages of design and implementation, including power conversion and distribution, radio and radar signal processing, system telemetry and control, digital logic integration, and semiconductor packaging. We invite you to explore Microsemi's solutions and engage with us to help solve your most difficult space system design challenges.

2012
Cygnus

2011
Mars Science Lab

2003
Mars Rovers

1998
Int'l. Space Station

1971
Apollo/Saturn Rover

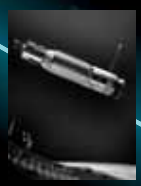
Surveyor
1966

Centaur
1962

Mercury
1962

Poseidon
1961

Polaris
1960



Agena
1960

Titan
1959

Delta
1959

Atlas
1957

MICROSEMI
55
YEARS in SPACE
1957-2012

Experience in Space

Microsemi technology has been used in major U.S. space initiatives since 1957, as well as important international space programs.

Examples of select programs are pictured

Radiation-Hardened Power Supplies

Microsemi has delivered thousands of highly reliable standard and custom radiation-hardened DC-DC power supplies to support space missions and military and commercial avionics system development programs. We offer:

- Full custom design of power supply and power distribution systems
- 50W, 28V/120V input standard modules
- DC-DC power conversion (typical inputs: 28V, 70V, 100V, and 120V)
- Outputs of 1.2V, 1.5V, 3.3V, 5V, 12V, 15V, 28V, or to custom specification
- Power outputs capabilities from 5W to over 10 kW Radiation hardness 300 kRad TID, 82 MeV SEE

RF Integrated Solutions

Microsemi has a long history of supplying RF and microwave diodes, transistors and control devices for domestic and international space applications. We offer dedicated service and provide the necessary performance, packaging and testing that is required for these demanding applications. Key features include:

- Proven reliability of silicon and gallium arsenide diodes
- Broad frequency range covering up to Ka band
- Components deployed in GPS, Galileo and TerraSAR satellites performing a wide variety of clock, navigation, telemetry, power amplification and signal control functions
- Product screening to JAN class S requirements per MIL-PRF-19500, MIL-PRF-38534, ESA ESCC 5010
- Tailored flows to individual customer specifications are available.

Our latest generation of RF microwave transistors are based on silicon carbide (SiC) and gallium nitride (GaN) wide band gap materials, enhancing system performance and reliability. These innovative devices allow manufacturers to reduced component count, size, and weight, while providing increased bandwidth and reduced operating temperature.

- Higher band gap energy, higher breakdown, higher thermal conductivity, enhanced carrier mobility
- Demonstrated TID radiation hardness level of 300 kRad per MIL-STD-750, Test Method 1019

Microsemi also provides low noise and high-power RF amplifiers, converters and transceivers, and multifunction RF transceivers through 110 GHz for high-reliability defense applications.

Radiation-Tolerant FPGAs

Microsemi's space-proven, radiation-tolerant FPGAs provide a wide range of gate counts and hardwired multiply-accumulate blocks for fast, efficient digital signal processing. They also feature QML qualification to classes Q and V, and are available in a variety of package types and sizes. Our FPGAs have survived more than 20 million device-hours of independent reliability testing, and performed flight critical functions in space systems orbiting around the Earth, Moon, Mars, Venus and the sun. They also have been used on missions to the surface of Mars, and into the furthest reaches of the solar system. Microsemi's innovations include radiation-hardening-by-design techniques that protect against single event upset (SEU) radiation effects, novel packaging technologies to enable integration of FPGAs into hybrids and multi-chip modules, and high-density ceramic column grid array packaging. Product family specifications include:

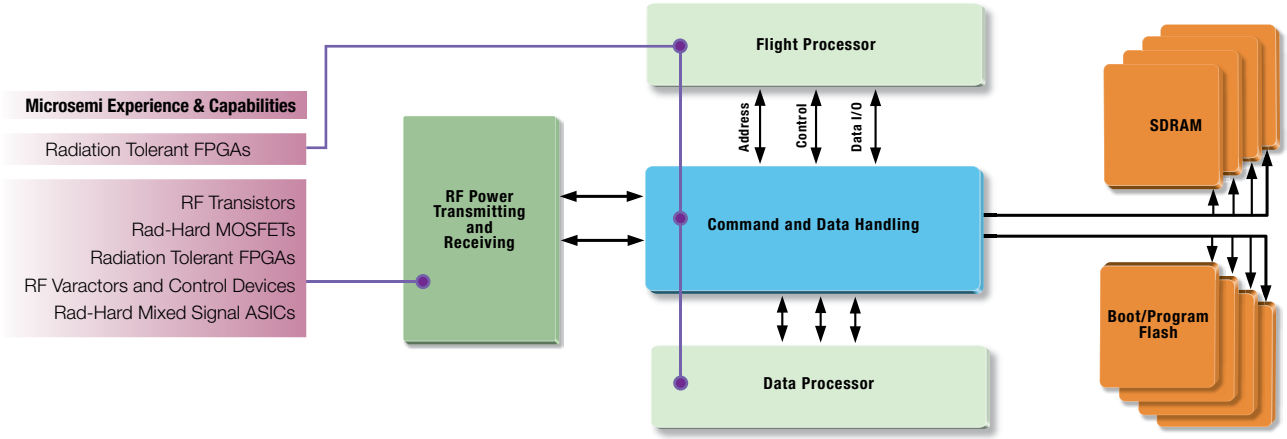
- Up to 300 kRad (Si) functional TID
- Up to 4 M system gates / 20,160 SEU-resistant flip flops
- Up to 840 I/O and up to 540 kbits user SRAM
- Reprogrammable flash or permanently-programmed anti-fuse interconnects

Rad-hard Bipolar Transistors and Diodes, and Solar Diodes

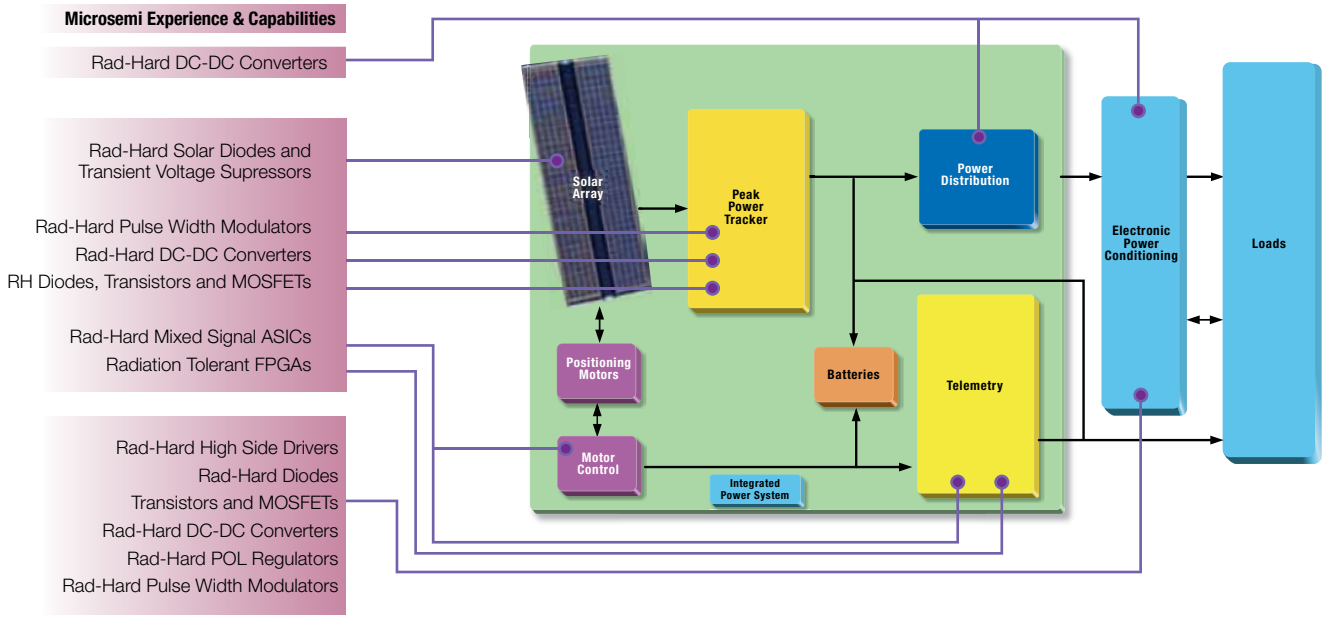
Microsemi's discrete solutions are qualified to MIL-PRF-19500, and the company has more DLA slash sheet qualifications than any other manufacturer of space-level discrete products. We were the first diode manufacturer selected by the U.S. military services as a source of supply to qualify product to the highest specified reliability level. We have expanded our offering to include a growing range of space solutions and capabilities including:

- Radiation-hardened bipolar transistors
- Radiation-qualified products (TID, ELDRS, SEE)
- Custom build-to-print capabilities
- Solar cell bypass diodes
- Radiation testing services

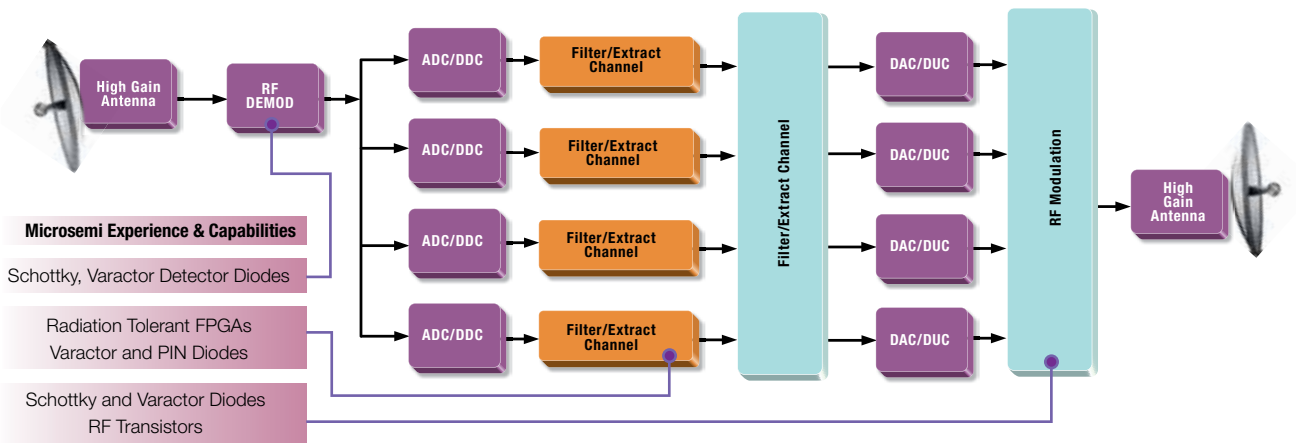
Telemetry Tracking & Control



Electrical Power System



Digital Communications Payload



Integrated Custom Products

Microsemi's integrated custom products have been used in a broad array of space systems including satellite payloads and sub-orbital rockets. Leveraging our extensive expertise in MIL-PRF-38534 class K multichip system-in-package technology, we combine radiation-tolerant and radiation-hardened silicon into space-saving, reduced-weight, class K-compliant sub-systems. Typical products have included solutions with multiple organizations of memories, gate arrays and processors in various hermetically-sealed ceramic packages.

Capabilities include:

- Flip-chip and wire-bond processes
- Standard and custom hermetic products
- Industrial and military temp ranges
- Multi-chip and monolithic packaging

Microsemi's facility in Phoenix, Arizona is Defense Microelectronics Activity (DMEA) accredited as a trusted supplier of radiation-tolerant FPGAs. This location is fully ITAR compliant and includes a DOD secure area.

Radiation-Hardened MOSFETs

Microsemi currently offers nearly 30 radiation-hardened MOSFETs qualified to Defense Logistics Agency (DLA) slash sheets 601, 603, 614, 615 and 630, and we are pursuing additional qualifications. We offer numerous customer benefits including:

- Single event effect (SEE) testing performed at Texas A&M University to 85.4MeV using Au ions
- JAN class S qualified product to 300 kRad (TID)
- Surface-mount and through-hole packages
- Voltage range from 60V to 200V
- Custom build-to-print capabilities

Hybrids for Space Applications

Microsemi designs and manufactures high-reliability micro-circuits qualified to MIL- PRF-38534 performance requirements. We produce standard and custom power conversion products including linear regulators and switching converters that are qualified for use in harsh radiation environments. We offer customers the following capabilities:

- Space qualified products to Class H & K, MIL-PRF-38534
- Radiation qualifications to 300 kRad TID
- Single-event-rated products up to LET= 82 MeV
- Custom build-to-print capabilities
- DBC, thick and thin film technologies
- Assemblies with low thermal resistance

Radiation Hardened Integrated Circuits

Microsemi has a long history of providing successful and reliable industry-standard, radiation-tolerant integrated circuits including:

- Voltage regulators and reference ICs
- PWM controllers
- Operational amplifiers
- Driver arrays

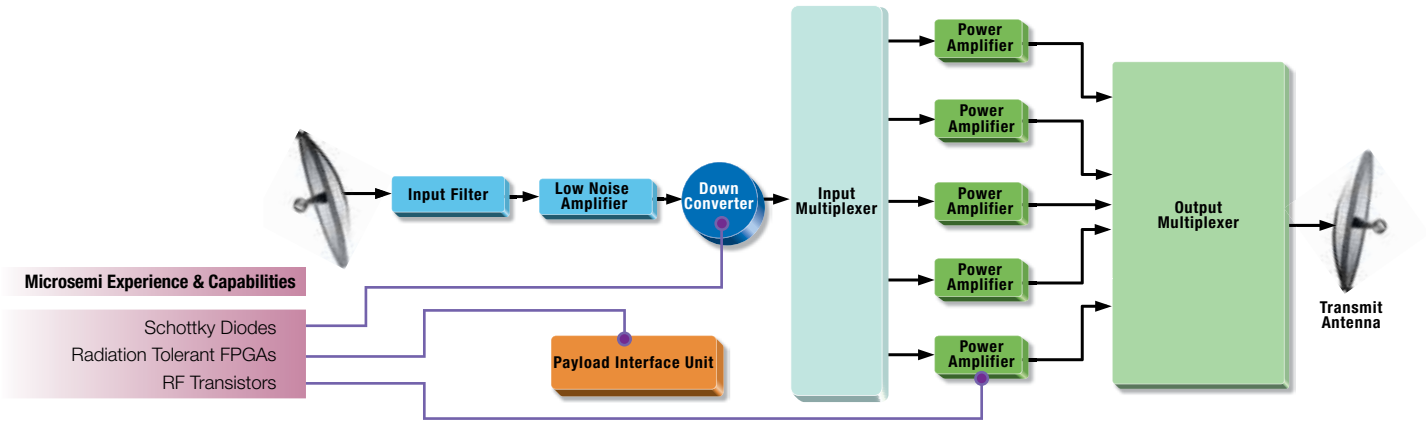
Our access to several radiation-tolerant process technologies has enabled us to offer custom sensor and driver ASIC solutions with voltages ranging up to 120V. These ASICs provide space-saving solutions for key embedded satellite functions including high-side drivers, motor control and telemetry.

Microsemi's quality and space related certifications include:

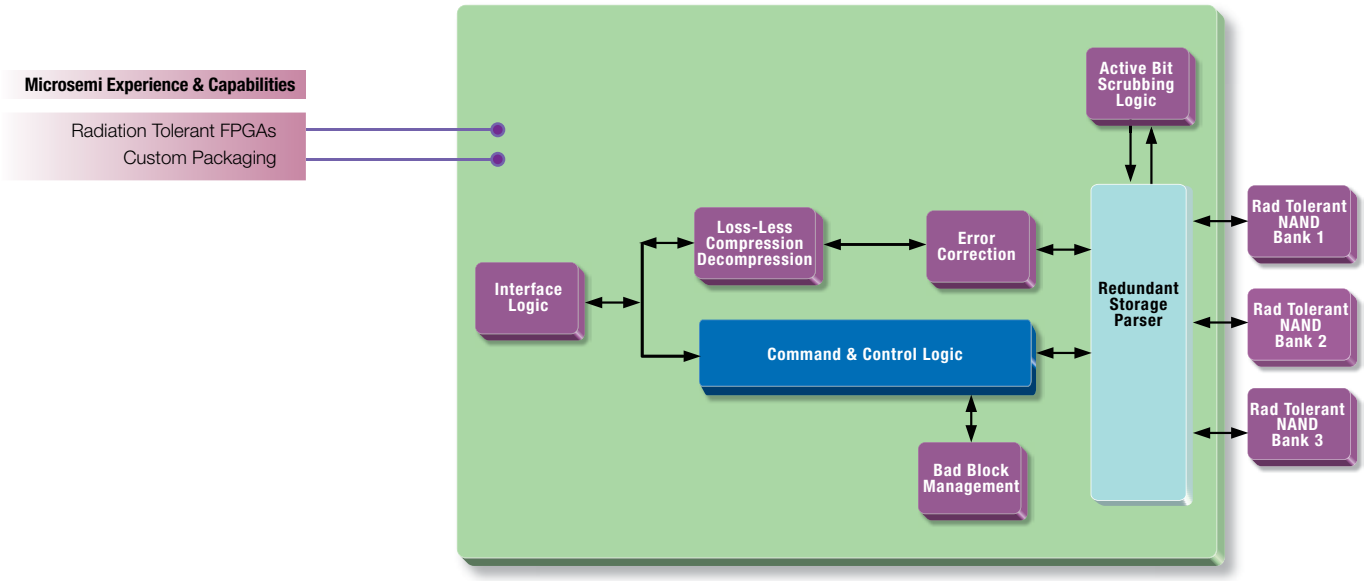
AS9100:2009 Rev B & C Certificate	ISO 9001-2008	ISO14001
QML MIL-PRF-38535	MIL-PRF-19500	MIL-PRF-38534
DOD Trusted Source	DSCC-VQ Letter	DMEA Accredited
STACK international Supplier Certification	SONY Green Partner certification	PURE Certificate

Certifications may vary depending on product and site location

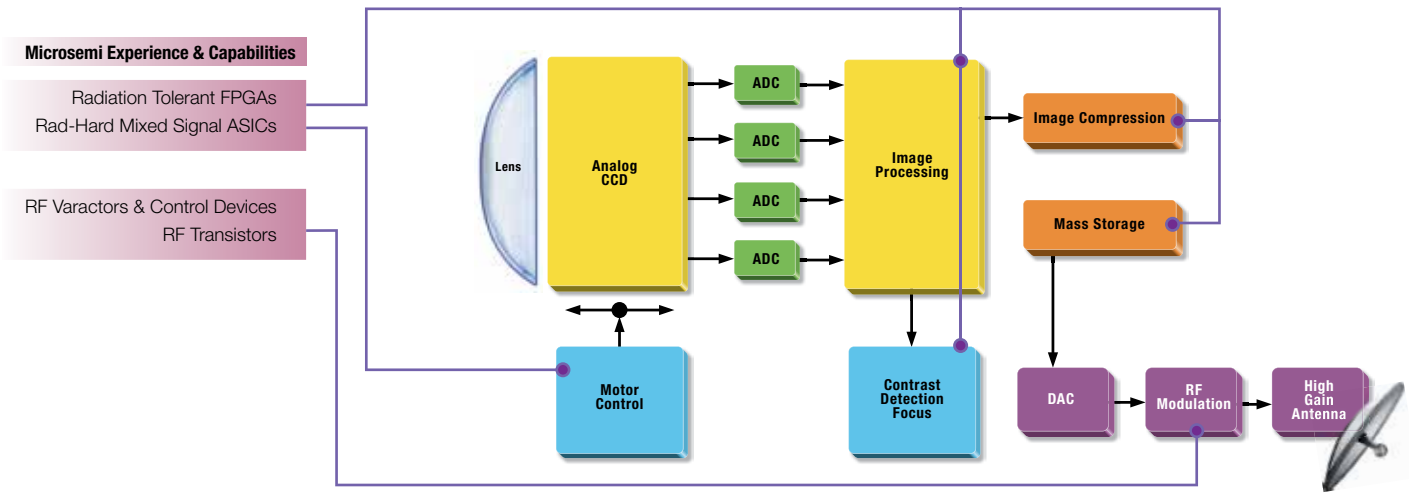
RF Communications Payload



Solid State Recorder



Imaging Payload



Learn more about Microsemi Space Products, visit www.microsemi.com
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Microsemi

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Microsemi Corporation (NASDAQ: MSCC) a comprehensive portfolio of semiconductor solutions for: aerospace, defense and security; enterprise and communications; and industrial and alternative energy markets. Products include mixed-signal ICs, SoCs, and ASICs; programmable logic solutions; power management products; timing and voice processing devices; RF solutions; discrete components; and systems.
Microsemi is headquartered in Aliso Viejo, Calif.

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