Mixed-Signal Solutions for Space
Leading Space Innovation for Sixty Years

Extensive Space Heritage
Microchip has been developing space solutions for almost six decades and has played an important role in a wide variety of space programs globally. The company has a proven track record for innovation, quality, and reliability, and continues to build on that legacy with an impressive portfolio of industry-leading new products and technology innovations.

A Partner for the Long Run
Microchip’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. Microchip has always responded to the specific needs of space applications and has a longstanding commitment to the space market.

Broad Solutions Portfolio
With one of the industry’s most comprehensive space products portfolios, Microchip provides radiation-hardened and radiation-tolerant solutions including high-performance FPGAs, precise frequency and timing solutions with space-grade oscillators, mixed-signal ICs, isolated DC–DC converter modules, custom power supplies, hybrid solutions, MOSFETs, diodes, transistors, RF components and custom solutions. We are committed to supporting our products throughout the lifetime of our customer’s programs.

Continuous Innovation
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, Microchip 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 Microchip’s solutions and engage with us to help solve your most difficult space system design challenges.

Satellites
- Attitude and orbit control systems
- Electrical power systems
- TT&C/C&DH systems
- Communications payload
- Remote sensing payload
- Solar array and power conditioning
- Active and passive image payload
- Solid state recorders

Launchers
- Navigation and guidance systems
- Electrical power systems
- TT&C/C&DH systems
- Propulsion control systems

Landers
- Navigation and guidance systems
- Electrical power systems
- TT&C/C&DH systems
- Science experiment payloads
- RF communications subsystems
- Cameras and imagers
- Motor control systems
Space System Manager Integrated Circuits

Microchip continues to build on expertise in space with breakthrough additions to our radiation-tolerant IC portfolio. Our new Space System Manager (SSM) family integrates commonly used mixed-signal satellite functions into a single space-saving IC. The SSM IC interfaces with a microcontroller or an FPGA to offer a complete application-specific solution that allows you to achieve aggressive weight and space requirements while increasing reliability.

LX7720: Radiation-Tolerant Position Sensing and Motor Controller

As the industry’s first highly integrated radiation-tolerant position sensing and motor control integrated circuit, the LX7720 significantly reduces weight and board space relative to conventional discrete implementations, offering a unique solution for satellite manufacturers sensitive to area and weight challenges.

Features

- Radiation tolerant by design
- Four half-bridge N-channel MOSFET drivers
- Four floating differential current sensors
- Pulse modulated resolver transformer driver
- Three differential resolver sense inputs
- Six bi-level logic inputs
- Fault detection
- 132 pin ceramic quad flatpack
- Radiation tolerant: 100 krad TID, 50 krad ELDRS, single event effects

Applications

- Motor driver servo control
- Linear actuator servo control
- Stepper, BLDC, PMSM motor drivers

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LX7720MFQ-ES</td>
<td>Engineering samples.</td>
</tr>
<tr>
<td>LX7720MFQ-EQ</td>
<td>Built per QML-Q flow. This will convert to LX7720MFQ-Q once QML certification is achieved and parts will also be orderable by SMD number.</td>
</tr>
<tr>
<td>LX7720MFQ-EV</td>
<td>Built per QML-V flow. This will convert to LX7720MFQ-V once QML certification is achieved and parts will also be orderable by SMD number.</td>
</tr>
<tr>
<td>LX7720-DB</td>
<td>Daughterboard available to work with company's RTG4™ FPGA Development Kit.</td>
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**LX7730: Radiation-Tolerant Telemetry Controller IC**

Microchip’s LX7730 offers space system architects and designers the highest level of integration for telemetry applications available today to address their increasing needs and requirements. The LX7730 integrates the required functions in satellite telemetry systems such as sensor monitoring, attitude, and payload control, and interfaces with radiation-tolerant FPGAs such as those offered in Microchip’s portfolio of FPGA solutions.

**Features**

- Radiation tolerant by design
- QML certified to Q and V flows
- 64-channel MUX
- Break-before-make switching
- 13 ksps 12-bit ADC
- 3% precision adjustable current source
- 1% precision 5.00 V source
- Threshold monitoring
- 8x bi-level logic
- 10-bit DAC
- Supports parallel or dual SPI interface
- 132 pin ceramic quad flatpack
- Radiation tolerant: 100 krad TID, 50 krad ELDRS, single event effects

**Applications**

- Spacecraft health monitoring
- Attitude control
- Payload equipment

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**Part Number** | **Description**
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LX7730MFQ-ES | Engineering samples (using production silicon).
LX7730MFQ-Q | QML-Q certified
5962-1721901QXC | 
LX7730MFQ-V | QML-V certified.
5962-1721901VXC | 
LX7730-EVB | Evaluation board: allows user to exercise LX7730 features when coupled with USB to serial interface.
Application software provided. Includes cable assembly.
LX7730-DB | Daughterboard available to work with RTG4™ FPGA Development Kit.
Space System Manager Applications

Our Space System Managers offer space-saving solutions in many satellite applications, including those shown.

Attitude and Orbit Control

Telemetry Tracking and Control
Space System Manager Development Tools
Various evaluation boards and daughterboards are available to support development using the space system manager products. Please refer to the product pages on our website for associated user guides and support material.

RTG4 Development Kit With LX7730 Daughterboard
Allows you to connect the LX7730 to the RTG4 FPGA development kit and evaluate key functions.

LX7730 Evaluation Board
Allows you to exercise LX7730 features when coupled with a USB-to-serial interface. Application software is provided and includes cable assembly.

RTG4 Development Kit With LX7720 Daughterboard
Allows you to connect the LX7720 to the RTG4 FPGA development kit and evaluate key functions.

The RTG4 development kit provides you with an evaluation and development platform for applications such as data transmission, serial connectivity, bus interface and high-speed designs using RTG4 radiation-tolerant high-density high-performance FPGAs. The development board features a RT4G150 device offering more than 150,000 logic elements in a ceramic package with 1,657 pins.

Additional tools are being developed to provide reference designs with other Microchip microcontroller and FPGA products. Please check with us for recent updates.
AAHS298B Radiation-Tolerant 8-Channel Source Driver

The AAHS298B source driver includes eight non-inverting channels and can be used to provide an interface from TTL level, 5 V, or 12V logic systems to relays, stepper and servo motors, solenoids, and other loads. Each output is capable of sourcing 700 milliamps (mA) with a withstand voltage of 50 V across the full military operating range, allowing manufacturers to develop more compact solutions. It includes an internal thermal shutdown feature to protect against over-current and soft-start occurrences.

Features

- Radiation tolerant by design
- 700mA output source current
- Zero quiescent off current
- Full channel isolation to prevent fault propagation
- Internal ground clamp diodes
- 75V output breakdown voltage
- TTL, 5V and 12V logic compatible
- Internal thermal shutdown
- Radiation tolerant to 100 krad(Si) total dose, 50 krad (Si) ELDRS
- -55°C to +125°C temperature range
- Available in 20-pin ceramic SOIC with formed and flat leads
- QML listed with SMD 5962-15231

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<td>Engineering Samples</td>
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<tr>
<td>AAHS298B-S-S20B-S SMD 5962-1523101VXC</td>
<td>20 pin CSOIC with formed leads, QML-V certified</td>
</tr>
<tr>
<td>AAHS298B-S-S20B-B SMD 5962-1523101QXC</td>
<td>20 pin CSOIC with formed leads QML-Q certified</td>
</tr>
<tr>
<td>AAHS298B-07-4020A-V SMD 5962-1523101VYC</td>
<td>20 pin CSOIC with flat leads QML-V certified</td>
</tr>
<tr>
<td>AAHS298B-06-4020A-Q SMD 5962-1523101QYC</td>
<td>20 pin CSOIC with flat leads QML-Q certified</td>
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LX7710 Radiation-Tolerant 8-Pair Diode Array

The LX7710 offers eight series-connected diode pairs, providing redundant protection should one fail in a short circuit event, ensuring reliability even in harsh space environments. The diodes within the integrated circuit are electrostatic discharge (ESD) protected and offer a minimum of 125 V breakdown voltage and can handle up to 700 mA of continuous current. The LX7710 is designed for power OR-ing, redundant power sourcing, aerospace satellite manufacturing, and military power electronics control applications.

Features

- Radiation tolerant by design
- 125V minimum breakdown voltage even if one diode in any string happens to fail (redundant)
- 700mA current capability per diode
- Low leakage current
- ESD protected
- Rad-tolerant to a minimum 100 krad(Si) TID and SEL immunity to a minimum of 87 MeV cm²/mg
- -55°C to +125°C temperature range
  - 20-pin ceramic SOIC with formed leads
  - QML listed with SMD 5962-1621001

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<tr>
<td>LX7710MDWC-ES</td>
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<tr>
<td>LX7710MDWC-Q</td>
<td>QML-Q certified</td>
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<tr>
<td>SMD 5962-1621001QXC</td>
<td>QML-Q certified</td>
</tr>
<tr>
<td>LX7710MDWC-V</td>
<td>QML-V certified</td>
</tr>
<tr>
<td>SMD 5962-1621001VXC</td>
<td>QML-V certified</td>
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LX7712: Power Line Protection IC/Latchable Current Limiter

Features
- Radiation tolerant by design
- Internal 5A PMOS switch and diode
- 120V rated
- LCL or FCL configurable
- ON, OFF, and STATUS pins
- Programmable UVLO and STATUS
- Parallel-able for higher currents
- Current limit and monitor
- Current slew rate limit
- Chip temp monitor
- 48-lead hermetic HTF flatpack package – 19 mm x 19 mm
- Radiation tolerant: 100 krad TID, 50 krad ELDRS, SEL free–87 Mev-cm²/mg
- ESA Standards
  - ECSS-E-HB-20-20A
  - ECSS-E-ST-20-20C
- Sampling now

References
- Switch and Loss Less Current Sense
- Current Limit Setting and Monitor
- Optional On/Off Slew Rate Limit
- LCL Timing and Shutdown
- Maximum Temp Detect
- Level Control
LX7714: RT Satellite Power Bus Controller/Quad Resettable Fuse and Relay Replacement

Features
- Radiation tolerant by design
- Internal 2.5A maximum rated power switch
- Four resettable fuse + relay blocks/package
- Switches voltage up to 45 VDC
- Low switch voltage drop
- Self-resettable for protection from faults
- Hiccup mode to enable healing from shorts
- Efficient current sharing when paralleled
- Internal output voltage rise time control
- Differential TTL input On/Off control
- Power On, Off, and Hiccup Mode status
- Thermal shutdown for secondary protection
- Low resistance 28-pin ceramic flat package
- Radiation tolerant: 100 krad TID, 50 krad ELDRS, SEL free–87MeV·cm²/mg
- Sampling CQ3 2019
Mixed-Signal Integrated Custom Space Solutions

Microchip has 25 years of custom ASIC development experience, with expertise in space and aviation applications, and over 15 years of flight heritage for mixed signal IC custom solutions. We offer fully custom designs, from specification to production, including mixed-signal solutions integrating complex analog functions with limited logic circuitry (up to 100k gates), ICs designed for challenging operating conditions, radiation tolerance by design for 100 krad TID minimum, SEL/SEU immunity, with cold-sparing on I/Os for redundant applications or extreme temperature environments (225 °C), and with screening to MIL-PRF requirements (Class Q, Class V, or as specified by customer).

As your supply partner for electronic systems in space, Microchip can solve problems at all stages of design and implementation. We invite you to explore Microchip’s solutions and engage with us to help solve your most difficult space system design challenges and develop roadmaps for standard products in the future.

Flight Heritage

Our mixed-signal solutions for space have growing flight heritage. For our newest family members, flight heritage has oftentimes been established with custom ICs that share similar functional blocks built with the same fabrication processes and utilizing the same manufacturing flows and facilities.

Radiation Data

Our space products are subjected to the radiation exposure that can occur in satellite applications. Our standard exposures are:
• Total dose to a minimum of 100 krad
• ELDRS to a minimum of 50 krad
• Single event effects, including SEL and SEU

Radiation test results are listed on the associated product pages on our website. In some cases, we perform testing to higher tolerance levels. Please contact your local sales office for these options.
Support
Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. For more information, please visit www.microchip.com:

- Technical Support: www.microchip.com/support
- Evaluation samples of any Microchip device: www.microchip.com/sample
- Knowledge base and peer help: www.microchip.com/forums
- Sales and Global Distribution: www.microchip.com/sales

Training
If additional training interests you, Microchip offers several resources including in-depth technical training and reference material, self-paced tutorials and significant online resources.

- Overview of Technical Training Resources: www.microchip.com/training
- MASTERS Conferences: www.microchip.com/masters
- Developer Help Website: www.microchip.com/developerhelp
- Technical Training Centers: www.microchip.com/seminars