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Welcome to this edition of Microsemi's Space Brief quarterly newsletter Edition 20, featuring news about our Satellite Motor Drive Solution including the Dual Output SA50 DC-DC Power Convertor, the LX7720 Motor Drive Controller, the RTG4 FPGA, and the newly released LX7730 Telemetry Controller.

We will highlight the upcoming space events Microsemi will attend, and look forward to seeing you there.

We hope you find our newsletter useful and encourage you to share this edition with your colleagues. Instructions on how to subscribe to our quarterly Space Brief are included at the end of the newsletter.

Microsemi's Commitment to Space

Space Forum 2017

As part of our on-going commitment to the space industry, Microsemi recently concluded our Space Forum 2017 events, scheduled across four different locations spanning North America (on-line), Europe, and India. These Space Forums are hosted in each global region every two years and have attracted senior management, program managers, system-level architects, hardware and software engineers, and component and quality

engineering. The program was very comprehensive, showcasing focus products from our space product portfolio as well as sharing our technology roadmaps.

We featured a motor drive solution showcasing several devices, including the Dual Output SA50 DC-DC Power Convertor, the LX7720 Motor Drive Controller, the RTG4 FPGA, and the newly released LX7730 Telemetry Controller.

The dual output SA50 (SA50-50-5R5-12T) DC-DC power converter demonstrated Microsemi's capability to power the LX7720 Radiation Tolerant Motor Controller and the RTG4 field programmable gate array (FPGA) from a standard satellite bus rail of 120 V.

The three LX7720 motor controllers were directly powered by the SA50 and were used to provide a live demonstration of multi-motor control using a graphical user interface (GUI) through a local laptop where each motor was controlled through the GUI separately.

The LX7730 Telemetry Controller sensed the pressure, temperature, magnetic field, and distance with the RTG4 retrieving these sensor values that were visibly displayed on screen.

Thank you again to our partners who reinforced the message of an extensive Microsemi ecosystem with their own videos and live demonstrations and adding to the value for all those in attendance.

For more information and to download the Space Forum presentations, please visit https://www.microsemi.com/spaceforum/space-forum#agenda or email Sylvia.Keane@microsemi.com

Product Updates

RTG4 CQ352 Samples Available Now
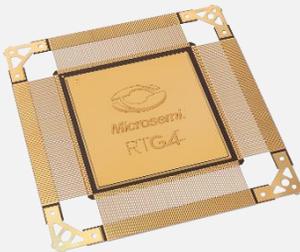
The ceramic quad flat pack (CQFP) package with 352 pins was recently introduced for RTG4 FPGAs family to provide a more cost-effective integration than higher pin count packages. The CQFP is the industry-standard package for space applications with well-established board integration and inspection procedures. The first RTG4 CQ352 engineering samples are now available in ES form, which is tested to room temperature, and MS form, which is tested across the full military temperature.

The RTG4 device in the CQ352 package features four embedded SpaceWire clocks and data recovery circuits, and 4 high-speed serialization/deserialization (SERDES) transceivers. This can be used for either native EPCS or PCIE protocols while maintaining the same count of LUTs, flip-flops, DSP math blocks, and SRAM blocks as the existing ceramic column grid array (CCGA) package with 1657 pins. The updated CQ352 pinout is now available here. An update to RTG4 CQ352 pinout is also available in the Libero SoC v11.8 SP1 software tool set, allowing customers to design with the latest package pin assignments. Customers are recommended to download the latest version of the Libero SoC software.

The RTG4 CQ352 samples are available now under the following part numbers: RT4G150-CQ352ES and RT4G150-CQ352MS. The B-flow space flight units are expected to be available in July 2018.

To learn more about the RTG4 device in CQ352 package, please visit the recently-updated RTG4 Product Brief.

For more information on RT FPGAs, please contact minh.u.nguyen@microsemi.com

Minh U. Nguyen
Marketing Manager, Space FPGAs, SoC Products Group

LX7730 Telemetry Controller Passes Qualification for V and Q Flows
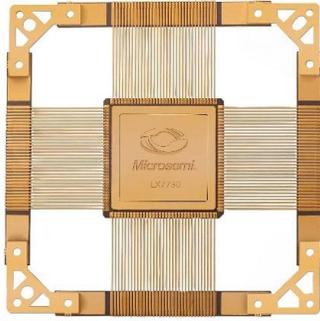
The LX7730 Radiation Tolerant Telemetry Controller has successfully completed qualification requirements for both Class Q and Class V flows. Both versions are now in production and are available as the LX7730MFQ-EQ and the LX7730MFQ-EV, respectively.

These qualifications are vital to securing design-ins to space programs because they are a requirement of MIL-PRF-38535, the performance-based specification document defining general requirements, as well as the quality assurance and reliability requirements for the manufacture of ICs for high-reliability applications. Successfully completing these qualifications is mandatory for a manufacturer to be listed on the Qualified Manufacturers List (QML) by the DLA. Microsemi is currently seeking listings for both QML-Q and QML-V flows.

Please visit the product page at Rad-Tolerant Telemetry Controller IC

For more information, contact Dorian Johnson at Dorian.Johnson@microsemi.com

Dorian Johnson
Product Marketing Manager, Analog Mixed Signal High-Reliability ICs

Product Updates and Notifications

RTG4 Product Change Notifications

The Product Change Notifications (PCN) 17026 for RTG4 FPGA family were recently released. The PCN includes the following topics:
PCN17026.1 LVDS DC Voltage Specification
PCN17026.2 Power-up and Power-down Sequence Requirement Changes
PCN17026.3 Cold-sparing Supply Termination
PCN17026.4 Updated Register Timing When Using SET Filter
PCN17026.5 Timing Data Adjustments for a Subset of Fabric to Custom Block Interconnect
PCN17026.6 SpaceWire Recovered Data Rate

These topics are presented with a description of change, and the action required for users.

The complete PCN 17026 can be downloaded here.

Space News

SA50 Product Overview—Space Power Supply Demonstrated at Space Forum 2017

The SA50 series of radiation-hardened isolated DC-DC converters are highly configurable SMT power modules with significant flight heritage. They are available in 120 V and 28 V input (with internal filter) standard versions and can be customized for other bus voltages. Standard modules are available in single, dual, and triple output versions.

The modules have 50 W of output power capability, which will dynamically distribute amongst the loads due to the inherent cross regulation characteristic utilizing patented load sharing techniques. Accuracy is excellent at less than 1% over temperature and radiation. Efficiency for a 5 V, ±15 V triple version is >86% at full load.

Additional features of the SA50 series include: internal reference, remote sense, inhibit, remote adjust, full NASA outgassing compliance, and an isolated sync input. It is also possible to configure multiple device outputs (up to 5) in parallel and cascade connections to achieve different output combinations.

Performance levels available for development and mission requirement levels are: P= Prototype; T= SEE Tolerant, TID Hard; H= SEE Hard, TID Hard.

Full-design analysis support is available including: mechanical, thermal, WCA, FEMA, EMI, and radiation effects.

Please visit the product page at Rad-Hard Isolated DC to DC Converters

For more information, contact Chris Hart at Chris.Hart@microsemi.com with any questions.

Chris Hart
Aerospace Director, Discrete Products Group (DPG)

Appearances and Events

SEE Symposium and MAPLD
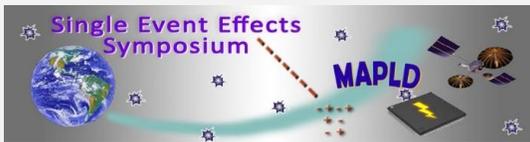
Microsemi participated in the Single Event Effects (SEE) Symposium and the Military and Aerospace Programmable Logic Devices (MAPLD) Workshop in San Diego, California, on May 22-25, 2017.

We presented the following papers: "Neutron and Heavy Ion SEE testing of Microsemi SmartFusion2 FPGA" presented by Nadia Rezzak, "Single Event Induced VT Shift in Flash Cells of Flash-Based FPGA" presented by J. J. Wang, and "Single Event Effects Hardening and Testing on Mixed Signal Telemetry LX7730 Controller" presented by Kathy Zhang.

Copies of the conference papers may be obtained from the Microsemi Space Marketing team: ken.oneill@microsemi.com, minh.u.nguyen@microsemi.com and dorian.johnson@microsemi.com

Microsemi LX7730 Telemetry Controller and RTG4 FPGAs at the 2017 Nuclear and Space Radiation Effects Conference (NSREC)

This year's NSREC conference took place in New Orleans on July 17–21. Engineers and scientists from Microsemi presented two papers describing new test results on two of Microsemi's latest radiation-tolerant products—the LX7730, the first radiation-hardened fully integrated telemetry controller; and the RTG4 radiation tolerant FPGAs.

The results presented on the LX7730 Spacecraft Telemetry Manager included Total Ionizing Dose (TID) testing, Enhanced Low Dose Rate Sensitivity (ELDRS) testing, and heavy-ion Single Event Effects testing. The TID performance at 100 krad and ELDRS performance at 50 krad of the different blocks of this highly integrated device is consistent with the pre-radiation results. The design is single-event latch-up (SEL) immune up to 87 MeV.cm^2/mg and 125 °C (fluence of 1e8 particles/cm^2). In addition, the LX7730 shows strong performance under the beam up to 83 MeV.cm^2/mg of all evaluated blocks including the internally regulated currents and voltages as well as the complete telemetry chain.

The RTG4 FPGAs were subjected to a study of the combined effects of dynamic high-temperature burn-in and total dose exposure. In the test, RTG4 FPGAs were operated at junction temperatures in excess of 125 °C for 3,000 hours, followed by a 100 krad TID test. The testing demonstrated that long-term high-temperature operation had minimal effect on the ability of the RTG4 FPGAs to withstand 100 krad total dose exposure.

For a copy of the LX7730 paper, please contact dorian.johnson@microsemi.com
For a copy of the RTG4 paper, please contact minh.u.nguyen@microsemi.com

Next year's conference will be at the Hilton Waikoloa Village in Hawaii, July 16–20, 2018. We look forward to seeing all our customers there!

Ken O'Neill
Director of Marketing, Space and Aviation, SoC Products Group

Radiation Effects on Components and Systems (RADECS)

Microsemi will be participating in the RADECS conference and exhibition in Geneva, Switzerland on October 2–6, 2017. The conference will feature a technical program consisting of technical sessions of contributed papers describing the latest observations in radiation effects, short courses on radiation effects, a radiation effects data workshop, and an industrial exhibit.

Microsemi will be exhibiting in the common booth area.

For more information, visit http://radecs2017.com/Radecs2017/index.php

Space Tech Expo

Microsemi will be participating in the Space Tech Expo on October 24–26, 2017 in Bremen, Germany. In its second year, Space Tech Expo Europe will be returning to Bremen—a center of space excellence. The exhibition is Europe's premier B2B Space engineering event for spacecraft, satellite, launch vehicle, and space related technologies. It draws attendance from thousands of industry leaders, decision makers, engineers and the supply chain for civil, military, and commercial space. Microsemi representatives, will be available during exhibition hours to provide information on Microsemi's solutions, stop by and visit us at Booth A61. For more information, visit http://www.spacetechexpo.eu/.

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For more information on how Microsemi is serving the space market, access our brochure at Microsemi Space Solutions Brochure and our space webpage at www.microsemi.com/applications/space.

If you have any feedback or content suggestions for the Space Brief Newsletter, send an email to SpaceBrief@microsemi.com or click on the "Feedback" link. Thank you for your assistance in ensuring the Space Brief continues to serve the space market and all employees.

Sylvia Keane
Senior Marketing and Communications Specialist (DPG) and Space Brief Editor-in-Chief