

# SPACE



# BRIEF

**Edition 4 - March 2012**



## From The Editors

Happy Spring and welcome to Microsemi's Space Newsletter. This edition brings you the latest news on Microsemi's comprehensive range of components and systems for space applications – from discrete transistors, point-of-load power converters, and hybrids, to FPGAs, ASICs and power management systems for space use. We hope you find the content useful, and we request that you pass the newsletter to your colleagues who are not already on our mailing list. Instructions for registering to receive this quarterly newsletter are included at the end.

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## RT PRoASIC3 FPGAs in CQ256 Package Software Now Available

The first ceramic quad flat pack (CQFP) package of the RT ProASIC3 FPGAs family, CQ256, was introduced to provide a more cost-effective integration than higher pin count packages. CQFP is also the industry-standard package for space applications. The RT ProASIC3 devices in CQ256 packages are now available in the Libero SoC v10.0 software tool set, so customers can start to design with this new device package combination. Customers are recommended to download the latest version of Libero SoC software, which can be found here: <http://www.microsemi.com/soc/download/software/liberosoc/default.aspx>

RT ProASIC3 is the first reprogrammable flash FPGA of its kind to offer flexibility, reprogrammability, and require no

additional mitigation for radiation-induced configuration upsets. For more information, refer to the RT ProASIC3 datasheet: [http://www.microsemi.com/soc/documents/RTPA3\\_DS.pdf](http://www.microsemi.com/soc/documents/RTPA3_DS.pdf)

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## Enhanced EV Screening Flow for RTSX-SU FPGAs

Microsemi has recently enhanced the EV screening flow, which is the equivalent of MIL-PRF-38535 QML Class V test flow without the official certification, for RTSX-SU FPGAs. To assure reliability of the RTSX-SU bimetallic wire bonds, we now perform a bake at 300°C for an hour on two sample units at wire bond setup. This enhancement shows Microsemi's commitment to provide space customers with the highest quality and reliability products. For more information on the enhanced EV screening flow, refer to the recently-updated RTSX-SU datasheet:

[http://www.microsemi.com/soc/documents/RTSXSU\\_DS.pdf](http://www.microsemi.com/soc/documents/RTSXSU_DS.pdf)

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## QML Class V Status Update for RTAX-S/SL FPGAs

In November 2011, the RTAX-S/SL FPGA family received QML Class V qualification from certifying authorities comprised of Defense Logistics Agency (DLA), NASA and Aerospace Corporation. QML Class V is the highest standard in the industry for space integrated circuits. Microsemi QML Class V FPGAs offer many benefits to space customers such as a 2000-hour life test on each wafer lot and Destructive Physical Analysis (DPA) on each assembly lot. Customers can eliminate additional life tests and DPA saving significant cost and mitigating schedule risk. Customers can now order the RTAX-S/SL FPGAs under QML Class V by referring to the Standard Military Drawings on the DLA website.

<http://www.dscc.dla.mil/Programs/Smcr/PnSearchResults.aspx?field=Source&operation=Contains&value=ACTEL>

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## RTAX-S/SL/DSP Reliability Update

As of January 2012, Aerospace Corporation has completed the long-term reliability test on Industrial-temp AX2000 FPGAs, which are the commercial equivalent of RTAX-S/SL space FPGAs. AX FPGAs use the same CMOS structures, anti-fuse, materials, processing, dimensions and programming as RTAX-S/SL space FPGAs. More than 26 million device hours were accumulated with no anti-fuse failures. The reliability tests were a mixture of high temperature operating life (HTOL), low temperature operating life (LTOL) and temperature cycle where the longest running boards went through more than 38,000 hours HTOL. There was a one-time zero failure related to SRAM that would be caught during normal MIL-STD-883 B screening that all Microsemi space-flight FPGAs are subject to. In addition to the large amount of reliability data that Microsemi has collected on RTAX-S/SL and its commercial equivalent, the Aerospace data has once again proven the robustness and high reliability of Microsemi RTAX-S/SL FPGAs. With the recent QML Class V qualification, Microsemi is truly the provider of the highest quality and reliability FPGAs for space.

Microsemi reliability data can be found in the Reliability Report, latest version of which can be found here:

[http://www.microsemi.com/soc/documents/ORT\\_Report.pdf](http://www.microsemi.com/soc/documents/ORT_Report.pdf). The aerospace data will be incorporated into the next version of this Reliability Report.

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## Recent Customer Notifications on Microsemi FPGAs

One product change notification and two customer notifications have recently been published to Microsemi space customers of record. GIDEP advisories have also been published on these topics. You can view the notifications at the following location:

<http://www.microsemi.com/soc/support/notifications/default.aspx>

Product change notifications are posted at the top of the page, which is where you will find the RTAX-S/SL/DSP notification, [PCN113](#).

Customer notifications are published on the lower part of the page, scroll down to find the three recent notifications on RTSX-SU and RTAX-S/SL/DSP, [CN1201](#), [CN1103 Addendum A](#). There is also a [link](#) where you may register to receive future notifications and product updates.

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## FPGAs Technical Articles

These articles are published to assist customers with technical support and guidance when designing Microsemi space FPGAs:

- "How to implement a Power On Reset (POR) circuit for RT ProASIC3"  
The techniques, which are described in the following link, are applicable for space-flight RT ProASIC3 FPGAs

as well as other commercial flash-based FPGAs.

[http://www.microsemi.com/soc/documents/LPF\\_AC380\\_AN.pdf](http://www.microsemi.com/soc/documents/LPF_AC380_AN.pdf)

- "How to make valid Hot-swap/Cold-spare selection in Libero software for RTAX-S/SL/DSP and AX FPGAs"  
<http://www.microsemi.com/soc/kb/article.aspx?id=KI8873>
- "How to configure V-pump power supply for RTAX-S/SL/DSP and AX FPGAs"  
<http://www.microsemi.com/soc/kb/article.aspx?id=SL5595>

## **Gallium Nitride products in Development at the High Reliability Group (HRG)**

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It is commonly known that Gallium Nitride (GaN) field effect transistors (FETs) have superior performance characteristics over the conventional Silicon MOSFET. GaN FETs have shown significant advantages in conductivity and switching losses when used in standard power supply applications. These advantages will allow the designer to significantly reduce power losses and potentially reduce size and weight. The low parasitic capacitance of the GaN FET could also result in higher switching frequency operation resulting in higher efficiencies, higher power density and smaller packages. These are significant advantages when designing for Space applications.

Engineers in our Lawrence, MA facility are currently developing high reliability, enhancement-mode GaN products for use in space applications. In addition to the features above, Microsemi GaN FETs also have a demonstrated ability to operate reliably under harsh environmental conditions, such as high temperature and high radiation conditions. Preliminary testing has shown superior radiation tolerance to total ionizing dose (TID) and heavy ion testing using gold (Au) ions. Test results may be seen at the the GOMACTech-12 conference ([www.gomactech.net](http://www.gomactech.net)). Initial products will have a range of 40V to 200V and Rds(on) values of 8 mΩ to 100mΩ. Products will be packaged in conventional and custom surface mount and leaded packages. Special surface mount packages (such as U4A) will be used to take advantage of the low parasitic capacitance features of the parts.

Microsemi GaN FETs have the following features:

- Extremely low Rds(on) values to 4 mΩ
- Low gate charge, typically < 10% of standard Silicon MOSFET's
- High current capability (150A peak at 40V)
- Smaller die sizes that lead to smaller packages compared to standard Silicon MOSFET's (typically 40% - 50% smaller)
- Demonstrated radiation tolerance to TID and single event exposures
- Enhancement operation provides the user with a simpler drive approach
- Logic- Level gate that provides a fully enhanced turn-on at 4.5V

Product availability will start in 2012 with the release of sample quantities starting in March with parts in TO-257 and U4 packages. Additional packages will be released during the 2012 calendar year. Qualification to MIL- PRF- 19500 is targeted for 2013. For more information please e-mail: [al.ortega@microsemi.com](mailto:al.ortega@microsemi.com).

## **Microsemi Completes AS9100:2009 Rev C Certification**

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Quality and certification are cornerstones of Microsemi's reputation for high reliability products. Customers demand and deserve excellence and Microsemi continues to take on the challenge and completion of certification processes for many facilities and manufacturing lines. Most recently, our Folsom, CA RFIS facility met the rigorous requirements for AS9100 Rev C standards. This includes increased focus on program and risk management, intensive supply chain management controls, and facility-wide continuous improvement activities that include on-time delivery and product conformity measurement processes. To view a complete list of facilities and certifications see:

<http://www.microsemi.com/en/company/quality>

## **Wide band gap transistors prove to be very efficient in radiation implementations**

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Microsemi has introduced a line of wide band gap transistors for use in RF and microwave power amplifier and switching applications. Wide band gap semiconductors have inherently low sensitivity to ionizing radiation making it a suitable material for space applications. SiC and GaN transistors provide increased power density, higher operating voltages and higher temperature operation over conventional silicon transistors with resultant smaller, more efficient and more reliable devices for satellite environments. Standard SiC SIT (static induction transistor) devices utilizing a 1 um gate length structure are available for VHF, UHF and L-Band applications. Standard GaN on SiC HEMT devices using a 0.5 um gate length geometry are available for L, S and C-Band applications. Devices are internally matched and housed in industry standard ceramic packages.

Microsemi has a 30-plus year history of supporting domestic and international space applications with RF and microwave diodes, transistors and control devices. 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. For more information or to order wide band gap transistors see:

<http://www.microsemi.com/en/products/parametric-search/10319/10660>

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## **Rad Hard DC/DC converter sales continue to prove market demand – further products in development**

Microsemi PMG is pleased to report that after the introduction of our SA50-120 radiation hardened DC/DC converter to the space community, we have seen a lot of enthusiasm and inquiries from our customers. The converters introduced in December are high reliability 120volt, 50 watt single, dual and triple output offering options that meet space systems rigorous requirements. It's a standard product targeted at satellites with greater than 5 kilowatts of operating power. Microsemi continues with development efforts on standard rad-hard space DC/DC modules to expand our offering and will have more exciting news to report very soon on additional types of standard modules.

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## **Microsemi participates in multiple Technology Conferences**

In February, Microsemi presented at two major technology conferences. Goldman Sach's Technology and Internet Conference 2012 on February 15, 2012 and Morgan Stanley's Technology, Media & Telecom Conference 2012 on February 29, 2012. It's an privilege to be asked to present at these prestigious conferences and Microsemi is honored to participate. For more information, please see webcasts on our website at:

<http://investor.microsemi.com/events.cfm>

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## **Upcoming Appearances and Events**

### **HEART**

Microsemi will be participating in the Hardened Electronics and Radiation Technology (HEART) Conference and Exhibition in Monterey, CA, March 13 – 16, 2012. HEART provides a professional forum specifically for classified or sensitive research and development investigations. The concentration is on research and development in space radiation, nuclear, electro-magnetics and solid-state physics. Representatives will be available during exhibition hours at the Microsemi booth to provide information across the wide array of Microsemi products. For further information see:

<http://www.heart-conference.org>

### **Space Parts Working Group – April 24 – 25, 2012**

Later in April is the annual Space Parts Working Group (SPWG) and is sponsored by The Aerospace Corporation in cooperation with the Space and Missile Systems Center. SPWG is an unclassified, international forum for disseminating information to the aerospace industry and for resolving problems with high-reliability electronic piece parts for space applications. Microsemi will be presenting their latest product roadmap and new product introductions to suppliers, manufacturers and government agencies. For further information see:

<http://www.cvent.com/events/2012-space-parts-working-group/event-summary-c3942b74e0e94cb28c6691506b48e1e3.aspx>

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## **New Space Forum Schedule Announced**

In response to global customer demand, Microsemi has expanded its highly valued, invitation-only Space Forum program for 2012-2013. These innovative, interactive Forums address key industry challenges and highlight Microsemi's proven solutions including space-flight FPGAs, mixed signal ASICS, RF and power management components, and system capabilities. The one-day, technical presentations will also include new product updates, technology roadmap information, and statistical reliability data.

Microsemi Space Forum Schedule:

December 4th , 2012 – Los Angeles, California

Spring 2013 – North America – Microsemi wants our Space Forums to give our customers the most valuable

information, in a timely manner at a place that is convenient. Help us define a location for a Spring 2013 event by choosing the most convenient city to gain your participation. Click on the city where you would like to see a Space Forum:

- [Washington DC/MD](#)
- [Philadelphia](#)
- [Orlando/Tampa](#)
- [Denver](#)

May 2013 - Noordwijk, Netherlands

May 2013 – Moscow, Russia) July 2013 - Bangalore & Ahmedabad, India

October 2013 –Tokyo, Japan

### **Register to Receive Microsemi Space Brief**

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