

SPACE



BRIEF

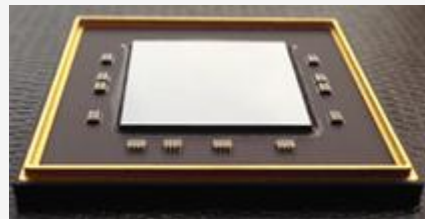
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Welcome to Microsemi's Space Brief quarterly newsletter Edition 14. Read about the latest happenings in our current issue or click on the newsletter archives to explore past editions. As a thank you to our loyal readers, we are bringing you a Christmas competition "FPGA Design Contest" where Microsemi is offering an iPad Air2 to some lucky winners! In this edition, highlights include updates on our next generation RTG4 family using a 65nm low-power flash process, as well as our companion radiation hardened analog mixed signal ASICs for telemetry and motor control. We will be announcing our Space Forum plans for 2015 and an update on all the space events Microsemi participated this past quarter. Instructions for registering to receive this quarterly space brief are included at the end of the newsletter.

**Recent Product News****RTG4™ Next Generation FPGAs for Radiation Environments**

Many readers have been following the development of the RTG4 family, Microsemi's next-generation FPGAs for radiation environments. This family of Flash-based FPGAs represents an order-of-magnitude increase in signal processing bandwidth for signal processing applications, and features radiation hardening by design to mitigate total ionizing dose (TID) and single event effects (SEE). We are pleased to report that our first wafer lots of RT4G150 FPGAs



have been received and we have commenced the silicon validation process. Several wafers have been sent for assembly and the first packaged parts have been returned to Microsemi. All the silicon tests applied so far indicate that the RT4G150 is functioning satisfactorily. At the moment, we are on track to provide first samples in early 2015.

For more information, email Ken O'Neill at [keno@microsemi.com](mailto:keno@microsemi.com) or Minh Nguyen at [minh.u.nguyen@microsemi.com](mailto:minh.u.nguyen@microsemi.com)

**Microsemi Advanced FPGA Design Contest**

Microsemi is seeking designs from customers to supplement the large database of challenging designs we use for calibration and tuning of our FPGA design tools. This work results in continuous improvement in the quality of results of the design tools, with faster place and route time, and better FPGA utilization and performance. We are requesting customers to submit designs that meet at least two of the following criteria:

- Must use between 100,000 and 150,000 flip-flops
- Must use between 100,000 and 150,000 4-input combinatorial look-up tables
- Must use between 250 and 460 18x18 multiply accumulate blocks
- Must use between 2 Mbits and 4 Mbits of memory
- Must use at least 8 lanes of SERDES



Designs may be submitted in VHDL, Verilog or a combination of both, with a basic test bench to stimulate the design and verify correct functioning of the design. Designs should not have been optimized to any specific FPGA or ASIC technology. The first five customers to send in a design that meets the criteria above will receive an **iPad Air2 (WiFi 64GB model) valued at \$599**. Microsemi will enter into Non-Disclosure Agreements with customers who intend to submit designs, if required. Designs will not be used by Microsemi for any purpose other than benchmarking and tuning Microsemi FPGA development tools. To receive more information about the contest, email Ken O'Neill at [keno@microsemi.com](mailto:keno@microsemi.com) or Minh Nguyen at [minh.u.nguyen@microsemi.com](mailto:minh.u.nguyen@microsemi.com)

### RTG4™ Lead Customer Program (LCP)

For early adopters of Microsemi's next generation RTG4 FPGAs, we are pleased to announce that a new revision of RTG4 development software has been released. Revision3 of the RTG4 LCP software includes support for the PLLs, SERDES, DDR controllers, the CG1657 package, and much more. We also have new User Guides describing the architecture and functionality of the FPGA fabric, clocking resources, SERDES, DDR, and system controller. Other packaging documents are also available. Customers can download the RTG4 software and documents from the RTG4 LCP web site.



If you need access to the LCP web site, or wish to participate in the RTG4 lead customer program, contact Ken O'Neill or Minh Nguyen by email [keno@microsemi.com](mailto:keno@microsemi.com) or [minh.u.nguyen@microsemi.com](mailto:minh.u.nguyen@microsemi.com) or send an email to RTG4 LCP email alias [RTG4\\_LCP@microsemi.com](mailto:RTG4_LCP@microsemi.com)



**Ken O'Neill**

Director of Marketing, Space and Aviation,  
SoC Products Group



**Minh U. Nguyen**

Marketing Manager, Space and Aviation,  
SoC Products Group

### Space System Manager Lead Customer Program

Microsemi's new Space System Manager (SSM) family consists of Application Specific Standard Products that integrate commonly used analog functions into a single package. These products are radiation tolerant and offer significant weight and footprint reductions to current solutions.

The first member of the SSM family is the LX7730 Telemetry Controller. The LX7730 is sampling next quarter and has the following features:

- Single-ended sensing for 64 sensors with simultaneous monitoring of 8 sensors
- Differential (Kelvin) sensing of 32 sensors
- Current demux to any input for driving passive sensors
- Voltage reference to bias bridge networks
- ADC ranging accurately measures low level voltage changes
- DAC out for level control
- 8 bi-level logic translators
- 132 pin ceramic QFP package

Next in line is the LX7720 Motor Controller with Position Sensing that is currently in development and has the following features:

- MOSFET motor drivers for 3 phase, unipolar or bipolar stepper motors
- 4 high and low side relay drivers
- Up to 4 current sensors
- Sensing for resolver or LVDT
- Detecting pulse sensors and limit switches

We have initiated the SSM Lead Customer Program (LCP) that is now open to new participants at no charge. The Lead Customer Program provides interested customers with the opportunity to participate in the product definition and get an early look at collateral material and prototypes needed to design these ICs into their satellite systems. To sign up for the SSM LCP, please send a request to [SSM\\_LCP@microsemi.com](mailto:SSM_LCP@microsemi.com).

We look forward to engaging with you on these exciting solutions for space applications. For more information, email Dorian Johnson at [Dorian.Johnson@microsemi.com](mailto:Dorian.Johnson@microsemi.com)



**Dorian Johnson**

Product Marketing Manager, Analog Mixed Signal High Reliability ICs

**Recent Product Updates and Notifications**

**Rad-Hard & Hybrid Products Update**

The Microsemi Microelectronics group has undergone many changes in the last five years to improve technology and create a more efficient operation that serves the Military & Space markets. The most significant changes occurred during 2014 when we moved the entire operation to our Lawrence facility. This move has been successfully completed with the re-certification of this group to MIL-PRF-38534, Class H & K performance levels. Enhancements to the core manufacturing process include the incorporation of Class 10K clean room facilities and state of the art automated manufacturing equipment.



In the past five years we have successfully qualified many of our products for use in a variety of Space programs. Some of these programs are classified but many are not; the latest program is a satellite designed by Max-Planck Institute called the Solar Orbiter. The Solar Orbiter is a mission dedicated to solar and helio-spheric physics. Part of this mission is to investigate:

- Solar Wind Plasma
- Magnetic field originating in the corona
- Solar eruptions

The satellite is scheduled for launch in January 2017. More information on this program can be found at <http://www.mps.mpg.de/1769624/Solar-Orbiter>



**Up-coming Changes in Export Regulations**

As many of you know, the Rad-Hard discrete products and Hybrid products are controlled by export regulations. These products in the past have been classified with State Department restrictions and regulations. These regulations control export of U.S. technology to countries outside of the United States. In the past, State Department (ITAR) licenses have been required

to ship most Rad-Hard Hybrid units. New rules have been put into place throughout 2014 that changes these requirements.

In December, 2014 all new regulations are expected to be in place. The new regulations will change the classification of the Rad-Hard & Hybrid products to Commerce. This means that all products will now fall under the jurisdiction of the U.S. Commerce department. Commerce licenses are simpler to apply for and in many cases Euro-zone countries will not require a Commerce license in order to ship product. While we still need End User Statements we believe the change in regulations will relieve our international customers of some of the paperwork burden associated with purchasing ITAR products, and that they will find the new regulations less restrictive. We will be assigning the following commodity codes to the Rad-Hard products as follows:

Commodity	Previous ECCN	New ECCN	Expected Date of Change
Hybrids: MHL, MHP Prefix, (Will not include Custom Hybrids)	State Dept	3A001	Dec '14
RH MOSFET- Gen 1	9A004	3A001	
RH MOSFET- I <sup>2</sup> MOS	N/A	9A515	
RH Bipolars	EAR99	EAR99	

**Al Ortega**  
Product Line Manager, High-Reliability Group



## Product Highlights

### Microsemi Ultra-Stable Miniaturized Oscillator

Microsemi's 9635QT Ultra-Stable-Miniature oscillator is designed to provide a high stability 10 MHz output for a variety of Aerospace applications. The potential for low-SWaP and high performance makes the 9635QT a low cost option for use in low-earth orbit (LEO) applications.

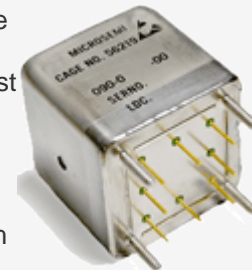
The 9635QT uses an SC-cut quartz resonator and sustaining electronics that are controlled at a precise temperature to achieve temperature-insensitive performance. Key performance features are excellent short term stability (Allan Deviation) of  $< 4e-12$  @ TAU = 1sec, phase noise  $< -125$  dBc/Hz @ 10 Hz offset and a temperature coefficient of  $< +/- 2e-8$  from -30 to +60 Deg C. In addition to high levels of performance, the 9635QT is available in a compact 1.3"x1.3"x1.3" pcb mounting configuration.

The 9635QT has electronic frequency control input and it can be phase locked to a higher stability source. If a fixed frequency is desired, the unit also has a very stable +9V DC output. A resistor divider can be connected from this DC voltage to ground to provide a fixed voltage for the EFC Input.

In addition to providing high performance at an affordable cost, the 9635QT standard 10 MHz sine wave output configuration is available "Off-The-Shelf" as short as four weeks ARO.

For more detailed information, email Ashley Pollock at [Ashley.Pollock@microsemi.com](mailto:Ashley.Pollock@microsemi.com)

**Ashley Pollock**  
Business Development Manager Space, Defense, & Avionics, Frequency & Timing Group



### Custom Power Supplies

Many customers around the world have engineers with the capability to design space grade power supplies. Yet, some companies choose to have an outside design facility, such as Microsemi Space and Power Management group, to design and manufacture their power supplies.

#### Why?

Some customers have come to regard the Space and Power Management group as their power supply partner, which is why they come back year after year.

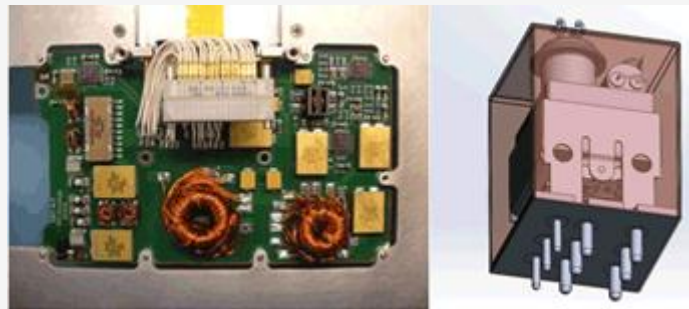
Here are some of the parameters needed to start the quoting process:

- Input Voltage range, Input current limiting? What is max input current?
- Output voltage(s) and tolerance, Output Currents (typ and max), Output voltage ripple, is sequencing required? Is output trim required? Remote sense? Soft Start? Output current limiting, step load response, short circuit protection, capacitive load, etc.
- Is there an efficiency target? What are the telemetry inputs and outputs? (Synchronization, inhibit, power good, etc.)
- What are the radiation requirements (TID, SEE, etc.)? What is the expected life of the power supply? What level parts are required? Is DPA required? Special testing, special flow?
- What are the EMI testing requirements? What are the shock and vibration levels?

We recognize you may not have all the answers; the power supply is always the last item to be fully defined. The more information you can provide the better our ROM (Rough Order of Magnitude) quote will be.

We design space power supplies from a few watts to many kilowatts; we would welcome the opportunity to become your power supply partner.

Do you have special electromechanical needs? We can build a custom relay or contactor, from an amp to several hundred amps, low voltage to high voltage.



For more detailed information, email Kent Brooten at [kent.brooten@microsemi.com](mailto:kent.brooten@microsemi.com)



**Kent Brooten**  
National Sales Manager, Power Module Group

## Microsemi's Commitment to Space

### 15,000 Microsemi Space Products Deployed on 10-year-long Rosetta Spacecraft Mission

As we track the latest exploits of the joint ESA and NASA Rosetta spacecraft featured in the press throughout 2014, we are reminded of our company's huge contribution and heritage in the space industry as a whole, but particularly in helping to further the global efforts in space exploration and scientific research missions.

Microsemi has over 15,000 products deployed on this 10-year-long Rosetta "comet chaser," which will make history by becoming the first space mission to rendezvous with a comet, the first to attempt a landing on a comet's surface and the first to follow a comet as it swings around the sun.



The Microsemi products supporting this mission include our core technologies for space including radiation hardened and radiation tolerant FPGAs, diodes, transistors and integrated circuits and are deployed in various mission critical systems on the orbiter, lander, solar panels and scientific instruments. Such deep space missions close to the solar system require the utmost in reliability and radiation hardening to ensure the electronic systems survive the full life of the mission, making Microsemi the partner of choice for these platforms.

We continue to build on our core strengths in radiation tolerant FPGAs as we prepare to launch our next generation RTG4 family next year, using a 65nm low-power flash process that is immune to changes in configuration due to radiation effects. To complement our leadership in space FPGA technology, we are positioning ourselves as a systems solution provider as we launch our companion radiation hardened analog mixed signal ASICs for telemetry and motor control in 2015, as well as expand our footprint with our high performance space qualified crystal oscillators and a full complement of power solutions for efficiency optimisation including best in

class isolated DC/DC converters, POLs, radiation hardened mosfets, small signal transistors and solar diodes.

We look forward to a new space chapter for Microsemi starting in 2015 as we launch the next wave of exciting, innovative and leading edge space technologies. For further information on the Rosetta press release visit: <http://investor.microsemi.com/2014-11-18-15-000-Microsemi-Space-Products-Deployed-on-10-year-long-Rosetta-Spacecraft-Mission#Closed>

## Space Forum 2015



As we look to the future of the space satellite industry, we see a forecast of 1,155 satellites to be launched over the next decade with \$248 billion in revenues expected from the manufacturing and launch of these satellites. Despite the cyclic nature of this industry there is continued confidence for steady growth over the next decade in the region of 4-5% CAGR. This potential for growth brings with it significant challenges for the industry in terms of the need for continued technological innovation and increasing pressure on costs.

Microsemi has proudly served the space industry for more than 5 decades and we continue to make significant investments in R&D and develop leading edge technology to help our users solve difficult technical problems and differentiate their systems. We are happy to announce we will be hosting a series of Space Forum events in 2015 where we will launch some ground breaking new space technologies. These are unique Microsemi one-day technology seminars where technical experts from Microsemi and our ecosystem partners will present information on our latest and most innovative space solutions. We will give updates on our technology roadmaps and demonstrate our extensive capability with state of the art next generation flash based Radiation Tolerant FPGAs with complementary analog mixed signal ASICs, power, timing and RF solutions for next generation space system architectures.

**The proposed Space Forum schedule is outlined below:**

LOCATIONS	DATES
Los Angeles, USA	May, 2015
Virginia, USA	May, 2015
Noordwijk, Netherlands	June, 2015
Bangalore, India	July, 2015
Ahmedabad, India	July, 2015

Watch out for our next edition of SpaceBrief in March 2015 which will be a Space Forum Special Edition where we will give full details of locations, dates, agenda and partner participation. These will be invitation only events and unfortunately there will be a limited number of places available in each location so we encourage all of our valued customers to register early.

**Siobhan Dolan Clancy**  
Vice President  
Worldwide Business Development Aerospace



## Appearances and Events

### JAXA - The 27th Microelectronics Workshop (MEWS)

Microsemi had the honour of presenting at the MEWS conference again this year in October. This is the 27th annual Microelectronics Conference hosted by Japan Aerospace Exploration Agency (JAXA). The conference was attended by more than 270 people from JAXA, NASA, European Space Agency (ESA) and all major aerospace contractors in Japan. The theme of this year's conference was Component Miniaturization and High-Density Technologies in Space Applications. The RTG4 product presentation fit in this theme perfectly. RTG4 has an innovative ceramic column grid array (CCGA) packaging design



which can accommodate larger dies, offer more I/Os while maintaining smaller footprint than ceramic quad flat pack (CQFP) and good thermal dissipation. RTG4 also provides high density and high-speed processing to meet the increasing demand of modern satellite applications.

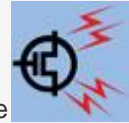
We also presented Space System Managers which is another solution to Component Miniaturization and a roadmap for our second-generation Rad-Hard MOSFET, the I2MOS. All the proceedings of the conference are posted on JAXA's MEWS website, for further information visit: <https://eepitnl.tkscl.jaxa.jp/mews/en/27th/presentation-e.htm>.

### **Radiation Hardened Electronics Technology (RHET) Meeting**

Microsemi attended the RHET 2014 conference on October 28 and 29 in Albuquerque NM, and Ken O'Neill gave a talk entitled "**Radiation Hardened FPGAs, Non Volatile Memory and Space System Managers**". The talk was attended by approximately 100 engineers, managers, and other professionals from the US space industry. Microsemi thanks Air Force Research Labs for organizing the event and Micro RDC for sponsoring the event. To obtain a copy of the Microsemi presentation, email Ken O'Neill at [keno@microsemi.com](mailto:keno@microsemi.com).

### **Microelectronics Reliability & Qualification Working Meeting (MRQW & HiRev)**

Microsemi will be participating in the next Microelectronics Reliability and Qualification Working Meeting (MRQW) scheduled on January 27 and 28, 2015, at The Aerospace Corporation in El Segundo, CA. MRQW provides a forum for the open discussion of microelectronics reliability and qualification issues for microelectronics targeted for use in space systems. The 2015 format will consist of multiple technical sessions and a keynote speaker to open the meeting. In addition to the MRQW meeting, there will be an optional HiREV Industry Day on January 29.



Click [here](#) for more information about the 2015 program.

## **Merry Christmas from the Aerospace Team**

We would like to take this opportunity to wish you and yours a very Happy and Peaceful Christmas and New Year.

Thank you for all your support in 2014 and we look forward to working with you in 2015.

**Best Wishes**

**The Aerospace Team**



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

If you enjoyed reading this Space Brief you can register to receive your own personal copy, delivered directly to your inbox. Follow this link:

<http://www.microsemi.com/soc/interact/default.aspx?p=E402>.

For more information on how Microsemi is serving the space market, access our brochure at

[Microsemi Space Solutions Brochure](#) and our space webpage at <http://www.microsemi.com/applications/space>.

If you have any feedback or content suggestions for the Space Brief Newsletter, email me at [SpaceBrief@microsemi.com](mailto:SpaceBrief@microsemi.com) or click on the “Feedback” link above. Thank you for your assistance in ensuring Space Brief continues to serve the space market and all employees.



**Sylvia Keane**

Marketing Executive, Aerospace and (Space Brief Editor-in-Chief)

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