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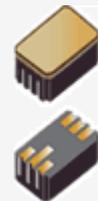
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Welcome to Microsemi's Space Brief quarterly newsletter. In this edition, highlights include Microsemi announcing a new family of MSR/MVR Radiation Hard, ELDRS Rated, NPN/PNP BI-Polar Junction Transistor Family, our recent product notifications and an update on the events Microsemi is attending and organizing throughout the year. We hope you find our newsletter useful and encourage you to pass this edition to your colleagues. Instructions for registering to receive this quarterly space brief are included at the end of the newsletter.

Recent Product News

Microsemi Announces a New Family of MSR/MVR Radiation Hard, ELDRS Rated, NPN/PNP BI-Polar Junction Transistor Family

Microsemi is releasing a family of Radiation Hardness Assured (RHA)-Enhanced Low Dose Rate Susceptibility (ELDRS) validated bi-polar junction transistor devices. The MVR/MSR series products are guaranteed to full compliance of MIL-PRF-19500 specification requirements, with acceptance testing to 0.1 Rad(s)/sec 1000 Gy(Si)/100 krad(Si) level. The family meets or exceeds ESCC 22900 specifications (general specifications) for radiation performance requirements.



The MVR series is constructed and screened to a JANTXV (R) performance level, with radiation test method 1019 wafer lot acceptance conducted on all die lots. The MVR family is specifically targeted for Level 2: Earth Science, observation and commercial space application missions of one-to-five year duration.

The MSR series is Space level constructed and screened to a JANS (R) performance level, with radiation test method 1019 wafer lot acceptance conducted on all die lots. The MSR family is specifically targeted for Level 1: Critical Space Applications, having a five year or greater mission life expectancy.

Both families are fully compliant to GSFC EEE-INST-002 reliability, screening and radiation hardness assurance requirements for space flight mission projects.

These products eliminate costly man-power, documentation and test verification while ensuring enhanced low dose rate validation on bi-polar devices not currently mandated within MIL-PRF-19500 Group D, Subgroup 2 inspection criteria. Various packages and devices initiating with popular: 2N2222A, 2N2907A, 2N3700, 2N2369A, 2N4236, 2N3810, and 2N3811.

MVR2N2222ALD=

2N2222A (L)

D PIND

Radiation Reliability Level

MSR* – 100K Rads (Si)
MVR* – 100K Rads (Si)

Long-Leaded

JEDEC type number

The production release of these products is on-going throughout the 2014 calendar year. All current available bi-polar junction transistor package styles are available. For more information, email Jim Larrauri at Jim.Larrauri@microsemi.com.



Jim Larrauri

Director of Business Development, High-Reliability Group

Recent Product Updates and Notifications

Microsemi Introduces Space Qualified CSAC (Chip Scale Atomic Clock) Timing Module

Microsemi will be announcing the release in April 2014 of a space-qualified version of the revolutionary CSAC timing module for applications with moderate levels of radiation, such as those for LEO orbits. CSAC is a Cesium-based atomic clock that has reduced power consumption by a factor of greater than 50 (<125 mW), and size (16 cm³) in comparison to conventional atomic clocks. In addition, CSAC has the ability to be steered by a one Pulse per Second (PPS) signal and provides ten MHz and one PPS outputs along with the time of day (TOD) through RS-232 communication. Qualification is accomplished by a sample test from each production lot of devices including 30 krad (Si) of TID exposure, thermal and thermal vacuum testing and vibration.



Atomic clocks provide intrinsic accuracy, $<1 \times 10^{-10}$, and stability compared to crystal oscillators; while CSAC consumes more than ten times less power than available ovenized crystal oscillators.

CSAC is a commercial product developed by Microsemi, originally under contract from DARPA, and currently in high-volume production. Radiation hardness of the standard CSAC is provided by replacement of the internal components susceptible to radiation and increased shielding. Enhanced reliability is provided by established environmental stress screening and testing consistent with space products.

Microsemi's Beverly facility has been delivering high reliability quartz oscillators and atomic clocks for space applications for more than 40 years, including programs such as GPS and SBIRS. For more information, email Peter Cash at Peter.Cash@microsemi.com.



Peter Cash

Director of Space, Defense and Avionics, Government Programs Group

Sample Availability of Microsemi's New Radiation Tolerant IC Family Continues to Grow!

We continue our launch of Microsemi's SGR family of radiation tolerant high reliability Linear Voltage Regulators, PWM Controllers and Interface ICs. Samples may now be ordered for our SGR137, SGR117, SGR1825C, SGR1845 and SGR1846 products. These are form-fit-function equivalents to the SG products with the added feature of guaranteed performance after radiation exposure to Total Ionizing Dose (TID), Enhanced Low Dose Rate Sensitivity (ELDRS), and Single Event Latch-up (SEL) conditions. All devices will be QML-V certified and we are happy to announce that the DLA has scheduled the QML-V audit of our Garden Grove facility for Q2 2014. Prior to this certification, this product will be screened to Microsemi's internal flow which is equivalent to the QML-V flow.

For more information on SG linear ICs, email Dorian.Johnson@microsemi.com or contact a local Microsemi sales representative by going to <http://www.microsemi.com/products/0>.



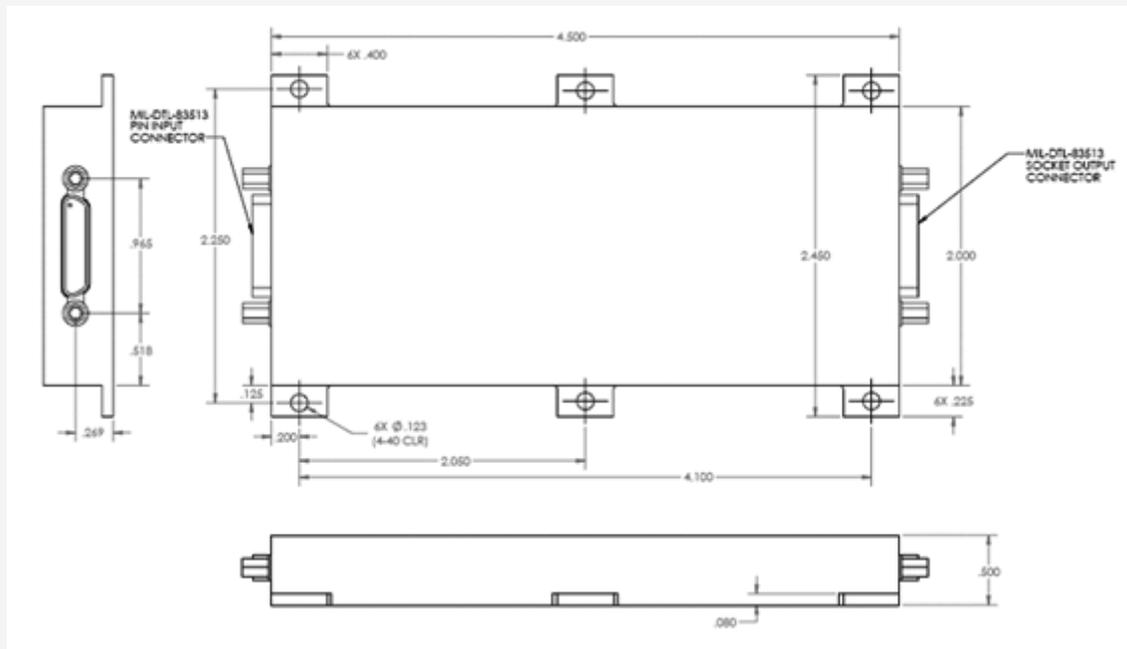
Dorian Johnson

Senior Product Marketing Engineer, AMSG Hi-Rel Products

DC-to-DC Converters - From Standards-to-Systems

As Microsemi's line of Standard SA50 series 50W DC-DC Converters gain popularity in space power sub-bus applications, customers are able to leverage Power Management Group's renowned heritage in Custom Space power design to define 'added value' solutions to power distribution requirements. These subsystem products are typically engineered with 20 weeks lead time and modest NRE costs.

For example, a customer wanted to combine an EMI filter and a 28 VIN DC-DC Converter into a single package using their preferred connectors. The application called for non-standard output voltages. The PMG team in La Mirada, CA., accommodated these modifications by packaging standard sub-assemblies into the assembly (shown below) for a very affordable NRE. The result being, the customer gets a module that exactly meets their needs, with no concerns in sourcing for years to come. If a standard off-the-shelf module from Microsemi meets your needs, we will quote you an affordable semi-custom, added value solution. For more information, email Kent Brooten at Kent.Brooten@microsemi.com.



Kent Brooten

National Sales Manager, Power Module Group



Special Feature

In our last edition of Space Brief, we looked at introducing a new customer perspective section to our newsletter. This was widely received in the space market and after a large response; we have decided to extend this feature to our partner companies. We would like to thank Helion Technology for contributing to this issue of Space Brief. If you are interested in contributing to our newsletter or writing an article contact SpaceBrief@microsemi.com.

AES Encryption Cores for RTAX™-S and RT ProASIC3® Radiation Tolerant FPGAs

Helion Technology innovate once again, with a range of unique 'RAM-less' AES encryption IP cores aimed squarely at Rad-Hardened Space applications. Clearly, there are many challenges faced by engineers designing hardware for use in space applications, and the IP core supplier can only help with a few aspects of the design. The main aspect that can be addressed is in making the IP much easier to harden against radiation. With encryption becoming a basic requirement in many communications applications, this was an area we decided to focus on to help our many Space customers.

Most existing AES encryption implementations use RAM at their heart, to implement the complex lookup functions which form the algorithm. While this is fine in a typical commercial application, it introduces headaches when Rad-Hardening is a requirement. Protection against SEUs needs to be added right into the critical path of the AES engine, increasing its area and slowing its operation. A simple answer might be to replace the RAM with a logic-based lookup, but this is typically resource hungry and very slow—certainly a lot slower than the protected RAM version, and is the reason why most cores today use the RAM. So, until recently this was the dilemma our customers faced—there was no easy way to get fast operation and SEU robustness in a practical footprint.

Helion used all its fifteen years of experience in making AES engines, to produce a hand-optimized solution that uses no RAM, yet still supports high data rates without excessive logic utilization. Encryption throughputs in excess of 500 Mbps can be supported now in less than 6000 logic tiles in a Microsemi RTAX device, and no RAM. This is enabling our customers to support their latest requirements, as well as implement other functionality without having to migrate to multiple devices. For more information on this and other Helion encryption solutions, visit http://heliontech.com/aes_space.htm.

Helion Technology



Upcoming Appearances and Events

Satellite Conference

Microsemi will be participating in the Satellite conference and exhibition at the Walter E. Washington Convention Center in Washington D.C. on March 11-13, 2014. Satellite is the premier event in satellite communications that delivers the latest products, services and applications for satellite-enabled communications with more than 350 market leading companies. Microsemi representatives, including Rich Foster, Ashley Pollock, Kent Brooten and Doug Estrich, will be available during exhibition hours to provide information on Microsemi's wide array of products. Stop by and visit us at Booth 6092. For further information, visit <http://satellite2014.com/>.



31st Annual HEART Technical Interchange Meeting

Microsemi will be participating in the Hardened Electronics and Radiation Technology (HEART) conference in Huntsville, Alabama on March 18-21, 2014. HEART provides a professional forum specifically for classified research and development investigations. The concentration is on research and development in space radiation and solid-state physics. Microsemi representatives, including Minh U. Nguyen, Jim Larrauri and Kent Brooten, will be available during exhibition hours to provide information on Microsemi's solutions. Stop by and visit us at Booth 26. For further information, visit <http://www.heart-conference.org/>.



39th Annual GOMACTech Conference

Microsemi will be speaking in the GOMACTech conference in Charleston, SC on March 31-April 3, 2014. GOMACTech is the pre-eminent conference for the review of developments in microelectronic devices, circuits and applications for government systems. Microsemi will be presenting a joint paper with our partner, Efficient Power Conversion (EPC), titled 'Radiation Tolerant Enhancement Mode Gallium Nitride FETs for High Frequency DC-DC Conversion'. In this paper, we present results characterizing a newly released family of enhancement mode GaN HEMT transistors, designed for higher frequency operation. During lunch on Wednesday April 2, Amr El-Ashmawi, VP of World Wide Strategic Marketing, will be presenting on the role of Integrated Circuit manufacturers, specifically FPGA suppliers,



to ensure the integrity and availability required to become a trusted supplier for mission critical functions. For further information, visit <http://www.gomactech.net/2014/index.html>.

SPWG - Space Parts Working Group

Later in April (22-23) is the annual Space Parts Working Group (SPWG). It is sponsored by The Aerospace Corporation in cooperation with the U.S. Air Force Space and Missile Systems Center and the National Reconnaissance Office. In its 43rd year, 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 our new product introductions to suppliers, manufacturers and government agencies and we will also be having our sponsored luncheon again this year during the Space Parts Working Group event. For further information, visit <http://www.cvent.com/events/2014-space-parts-working-group/custom-21-50472b2a31c6490ea33ae2f9c884e5b2.aspx>.



30th Space Symposium

Microsemi will be participating in the 30th Space Symposium in the Broadmoor Hotel in Colorado Springs, Colorado on May 19-22, 2014. The Space Symposium has become widely known as the premier U.S. space policy and program forum and as the must attend opportunity for information on and interaction among all sectors of space. Attendees will be represented from all sectors of the space community from multiple space agencies, commercial space businesses and associated subcontractors; military, national security and intelligence organizations. Come visit our Microsemi booth where our representatives can give you more information on our products. For further information, visit <http://www.spacesymposium.org/>.



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<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 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)