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Welcome to our first edition of Microchip's Aviation and Defense newsletter. Microchip products have been used in all major aviation platforms for many decades. As a result of our acquisition of Microsemi, Microchip has evolved to become a leading-edge systems solution provider for the most demanding aerospace applications. We offer a broad portfolio of products and capabilities that come with a proven track record of innovation, quality and reliability on aerospace platforms over the past 20 years. As a key partner for your existing and future aerospace platforms, Microchip will continue to leverage our technology and extensive capabilities in this segment to support the ever-increasing electronic content in today's aircraft.

Microchip's product portfolio has a heritage of supporting the most demanding requirements in defense microelectronics, with our strategic focus on Integrated Circuit (IC) security, reliability, availability, integrity and supply chain security. Our broad selection of products spans RF front end modules and discretes; Flash-based FPGAs; highly secure, accurate and flexible time and frequency platforms for synchronizing mission-critical electronics systems and instrumentation applications; secure memory modules; a broad security IP portfolio and more. We've leveraged our expertise and product knowledge to build applications-based solution platforms that reduce your integration risk, improve your productivity and speed your time to mission.

Over the years, our power modules have been selected for use in both commercial and military aviation applications. Our Aviation Centre of Excellence (CoE) for Integrated Power Solutions (IPS) has successfully created the first fully qualified standard Power Core Module (PCM) for flight-critical actuation systems using Silicon Carbide (SiC) technology. Microchip is investing heavily We offer solutions in the field of Wide Bandgap (WBG) SiC power electronics, which are enabling the replacement of hydraulic actuators in flight control systems with lighter electro-hydrostatic and electro-mechanical actuators for fuel savings through weight reduction.

In this newsletter we will provide important updates about new product releases, qualification and neutron testing results updates, plus provide information about the shows and events Microchip will be attending. Please forward this newsletter to your colleagues and friends who are interested in receiving important updates about our solutions.

Flights

Extending Flight Time with Low-Power FPGAs on the Airbus Zephyr

The need for small components, power efficiency and reliability is prevalent in any modern aircraft system, and even more so when it comes to Unmanned Aerial Vehicles (UAV).

Aircraft systems designers face stringent power and weight constraints that dictate the impact fuel efficiency has on flight time. Some systems, such as the Airbus Zephyr S, the leading stratospheric UAV by Airbus, is solar powered with batteries charged for overnight flight, making weight and power management key design considerations. In addition, as in any aircraft system, electronics will be subjected to harsh environments such as extreme temperatures, moisture and neutron effects.



Microchip's FPGAs address these challenges for systems such as flight control and engine control, while also interfacing sensors and supporting a higher level of system integration. PolarFire™, IGLOO®2, and ProASIC®3 families of FPGAs all offer the industry's lowest power to help with overall system efficiency by removing the need for heat sinks and extending battery life. ProASIC3 and IGLOO2 devices have an extensive heritage in a variety of commercial aviation applications including the Airbus A380 and A350.

By offering a variety of package options with small form factors, we can help minimize the size of Printed Circuit Boards (PCBs) and enclosures to reduce weight while improving fuel efficiency and, ultimately, maximizing flight time. Small size and weight were particularly important for the successful maiden flight last August of the Airbus Zephyr. This solar-powered UAV carried ProASIC3 and SmartFusion2 FPGAs on board and flew for 25 days at high altitude, which was longer than any other aircraft to date. Read more about this accomplishment in the [press release](#) issued by Airbus.

Most of our FPGA families have an extensive flight heritage in aerospace and safety-critical applications, with over 10^7 device hours. Our Flash- and SONOS-based FPGAs have zero configuration upsets, which can be induced by neutrons, providing a more elegant solution to system designers, mitigating the need for hard or soft redundancy for the configuration of the FPGA. Microchip's Flash memory cells have been shown to be immune to ground and atmospheric particle effects. At the heart of a Flash memory cell is a floating gate, located between a control gate and the MOSFET structure below, encased in good dielectric. The bit value is stored as a charge on the floating gate, with a charged gate representing a zero value for NOR Flash cells. Writing or erasing the cell requires a high voltage and milliseconds of time to either add or dissipate the charge on the floating gate.

As this application demonstrates, the technology used in our FPGAs makes them unique solutions for complex aviation challenges and the harshest environments.

For more info on Zephyr, click [here](#):

For questions, contact Julian Di Matteo, Sr. Product Marketing Engineer, Space and Aviation, FPGA Group. Julian.DiMatteo@microchip.com



Product News

Silicon Carbide Power Control and Hybrid Power Drive Modules Achieve DO-160 Qualification

Microchip recently completed DO-160 qualification on the world's first aerospace-grade, fully integrated Silicon Carbide (SiC) Power Control Module (PCM) and Hybrid Power Drive (HPD) module. The PCM510 and HPD510 modules are three-phase motor drive power modules with optional control that are excellent for aerospace electric motion control and power generation applications. To prove out reliability beyond the design specification for these harsh environments we have also completed extended HALT testing.

The [PCM](#) combines our HPD with our control/telemetry platform to create highly integrated solutions for high-reliability aerospace and defense applications. Our customers use this platform with their control and health monitoring expertise, resulting in size and weight reduction for many critical applications. The [HPD](#) includes a three-phase power stage, drive and bias circuitry and telemetry monitoring. The HPD is available in various configurations, power levels and form factors. The HPD can also be purchased separately from the PCM if needed.

To learn how Microchip is integrating technology in these platforms, download the [High-Reliability Actuation and Motor Drive Applications brochure](#).

For more information, contact **Chris Hart**, Director of Business Development, Aerospace and Defense Products. Chris.Hart@microchip.com



LX4580 Actuation System Manager AFE

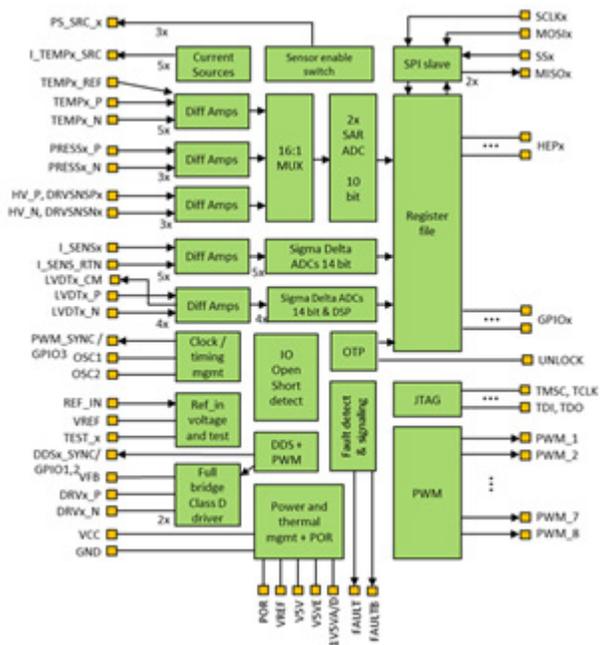
The LX4580 is a new IC targeting aviation and defense applications for actuation control and sensor monitoring. Integrated actuation control and monitoring enables lower component count for a significant reduction in mass and volume. This results in fuel savings, increased range and greater fuel and payload capacity. Power dissipation and cooling requirements are also minimized.

The LX4580 is a complete signal conditioning and Pulse-Width Modulation (PWM) driver with dual/redundant SPI/UART channels and Error Control Coding (ECC)-based communications for motor control applications.

LX4580 FEATURES:

- Dual independent/redundant Linear Variable Differential Transformer

- (LVDT)/resolver driver, PWM table and associated acquisition channels
- Eight programmable PWM channels
- Five line current acquisition channels and one line voltage acquisition channel synchronous with the eight PWM channels
- Five PT100/PT1000 driver and acquisition channels
- Three current loop pressure sensor inputs designed to measure the output current of the sensor
- Three Hall Effect Sensor (HES) hysteresis inputs
- Internal fault monitoring and signaling, short/open fault detection on all analog sense inputs
- Offered in a 144-pin plastic LQFP package



We have successfully evaluated a test chip and will be sampling the LX4580 this summer.

Please contact Dorian Johnson, HiRel Product Marketing Manager, Mixed Signal Products at dorian.johnson@microchip.com for product information.



CSAC for Defense

What is a CSAC?

Atomic clocks have enabled a world where ultra-precise timekeeping is now mandatory for communications, navigation, signal processing and many other applications critical to a modern functioning society. The [Chip Scale Atomic Clock](#) (CSAC) from Microchip delivers the accuracy and stability of an atomic clock to portable applications for the first time. The CSAC enables a new class of atomic clock applications defined by portability.



The CSAC's combination of performance parameters are uniquely suited for military conditions:

- Small size, weight, power (SwaP)
- Low acceleration sensitivity
- Low sensitivity to vibration and shock
- Quick warm up
- Maintains timing accuracy over long periods of time (holdover) with minimal power
- Options for low-phase noise and wider temperature ranges

CSAC applications include geophysical sensors, backpack IED jammers, backpack military radios, vehicle timing systems, Unmanned Aerial Vehicles (UAVs), Inertial Measurement Units (IMUs) and military GPS receivers. It offers longer battery life than previous technologies and maintains high accuracy without GPS or other external time references—all in addition to its very small size and weight. Maintaining accurate time when GPS is not available is critical to the warfighter to maintain communications, network synchronization, electronic warfare and GPS reacquisition once available. As a unique technology that enables new applications involving precision timing and positioning the CSAC has revolutionized the use of atomic clocks.

For further information, please contact Stewart Hampton, Product Line Manager, Clocks.
Stewart.Hampton@microchip.com



PolarFire FPGA Neutron Test Results Update

The radiation test campaign for our PolarFire FPGAs is ongoing. Our radiation engineers recently completed neutron testing for Single Event Latch-up (SEL), configuration upsets and Single-Event Upsets (SEU). Testing was performed on flip flops, LSRAM, uSRAM, Mathblock, PLL and DLL.

Visit the [Single Event Effects \(SEE\)](#) page on Microsemi's website to see older reports. To obtain a copy of the new test results or if you have any questions please reach out to Ken.O'Neill@microchip.com, Julian.DiMatteo@microchip.com, or aviation@microchip.com

Julian Di Matteo, Sr. Product Marketing Engineer, Space and Aviation, FPGA Group.
Julian.DiMatteo@microchip.com



DO-254 FPGA Validation Artifacts

Several DO-254 validation artifacts for SmartFusion2, IGLOO2, and PolarFire FPGAs are available in the Resources area on the [Commercial Aviation](#) page on the Microsemi website:

PolarFire Validation Artifacts:

- LSRAM
- Mathblock
- PLL and PCIe are pending

SmartFusion2 and IGLOO2 Validation Artifacts:

- eSRAM
- FDDR
- Mathblock
- MDDR
- PCIe
- CAN
- AHB

To request new validation artifacts for PolarFire FPGAs or to obtain a copy of the existing ones, please reach out to Ken.O'Neill@microchip.com, Julian.DiMatteo@microchip.com, or aviation@microchip.com

Julian Di Matteo, Sr. Product Marketing Engineer, Space and Aviation, FPGA Group.
Julian.DiMatteo@microchip.com



Shows and Events

Microsemi attended several conferences in 2018 to provide important updates on our products. We will let you know about 2019 events in future issues of this newsletter.

More Electric Aircraft (MEA) Conference, Seattle, WA, August 20-23, 2018

- More Electric Aircraft brings together relevant experts to ensure maximum knowledge transfer and professional exchange. The event includes workshops and lectures from OEMs and suppliers discussing their experiences and challenges in the field of electric and hybrid aircraft.

DO-254 User's Group Meeting, Seattle, WA, October 23-24, 2018

The DO-254 User Group is a group of industry professionals that come together to discuss and assist each other in areas of compliance for DO-254. Members include aerospace OEMs, avionics subcontractors, certification experts, tool vendors, Component manufacturers, consultants, quality engineers, and more. Microchip presented an update on validation artifacts. For information on FPGA DO-254 validation artifacts, please reach out to aviation@microchip.com

Julian Di Matteo, Sr. Product Marketing Engineer, Space and Aviation, FPGA Group.
Julian.DiMatteo@microchip.com



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Microsemi, a wholly owned subsidiary of Microchip Technology Inc.

One Enterprise, Aliso Viejo, CA 92656 USA

Within the USA: +1 (800) 713-4113 | Outside the USA: +1 (949) 380-6100

Sales: +1 (949) 380-6136 | sales.support@microsemi.com | www.microsemi.com