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STMicroelectronics Collaborates with Xilinx to Power Radiation-Hardened FPGAs using ST Space-Qualified Regulators

Geneva, Switzerland, August 25, 2021 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, announced it is collaborating with Xilinx, Inc. to build a power solution for the Xilinx Kintex® UltraScale™ XQRKU060 radiation-tolerant FPGA, leveraging QML-V qualified voltage regulators from ST's space-products portfolio.

The programmability of the Xilinx XQRKU060 revolutionizes the economics of equipment like space-research instruments and commercial satellites. The device delivers a combination of high compute density and integration that historically required an application-specific IC (ASIC), which typically involves custom design with associated engineering expenses and turnaround time. Unlike an ASIC, the XQRKU060 FPGA can be reconfigured in orbit, allowing bug fixes and updates to be applied cost-effectively at any time to protect the mission.

ST worked closely with Xilinx to design a power source that ensures reliable operation of the XQRKU060 by providing excellent fixed-point voltage accuracy as well as stability in the event of transients due to normal FPGA operation and radiation events. The solution uses ST's [RHRPMPOL01](#) rad-hard point of load 7A monolithic synchronous step-down regulator and [RHFL6000A](#) linear voltage regulator, all SEL immune and QML-V qualified. These devices meet the requirement for an input voltage up to 12V and output voltage down to 0.8V. Both exhibit high fixed-point accuracy with radiation performance that ensures high resistance to Total Ionizing Dose (TID) thereby minimizing any output-voltage drift.

With their fast-transient response, the RHRPMPOL01 and RHFL6000A maintain the regulated output in the event of large and rapid changes in current demand as the FPGA continuously activates and deactivates internal circuitry during normal operation. Their radiation hardness also resists disruption due to single-event transient (SET) radiation encountered in space.

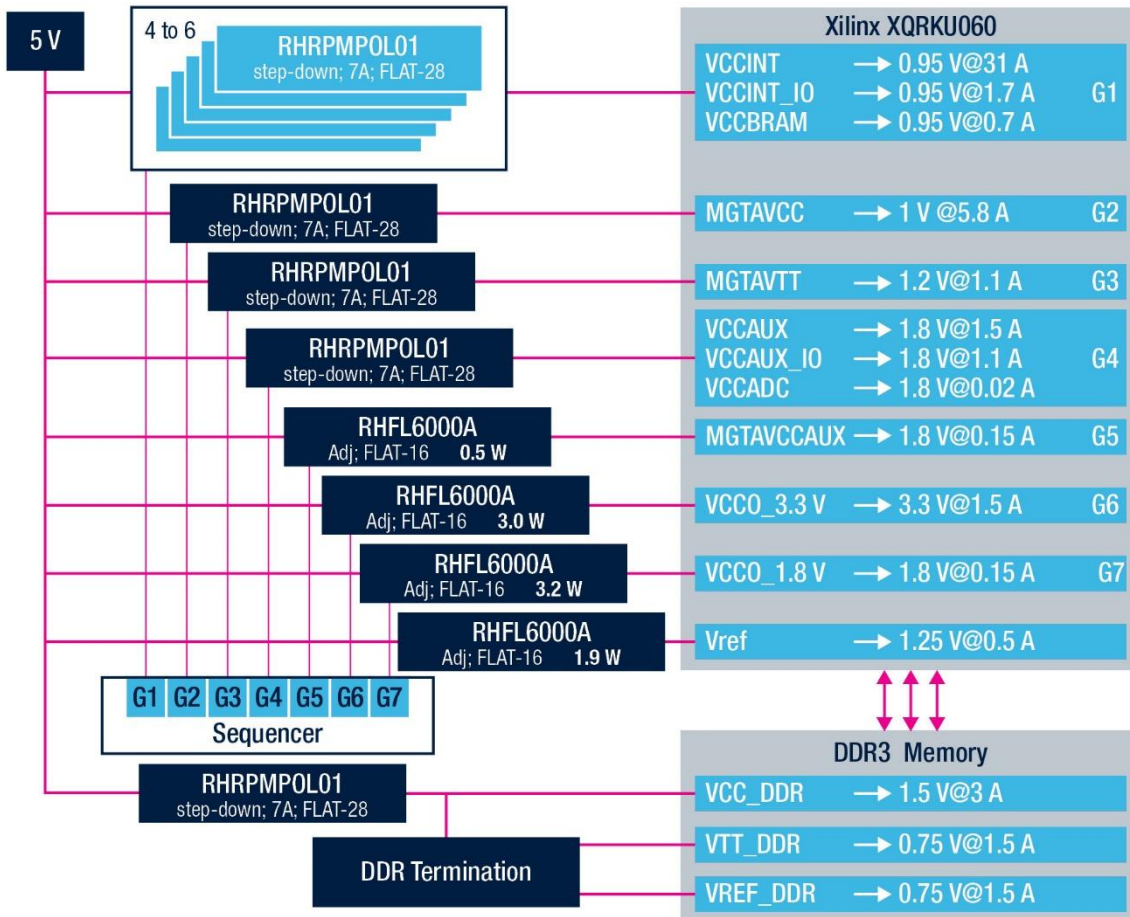
This power solution helps simplify and shorten the development time for next-generation flexible, reprogrammable space systems that leverage the Xilinx XQRKU060 FPGA to benefit from faster project completion, lower mission costs, and greater reliability and fault resilience.

The RHRPMPOL01 (SMD 5962R20208) is a complete point-of-load (PoL) converter that contains an N-channel power MOSFET, bootstrap diode, and system protection. By supporting synchronization and current sharing it can handle demanding loads such as FPGAs, as well as microprocessors and ASICs. The device is Radiation Hardness Assured (RHA) up to 100krad(Si), and Single Event Latch-up (SEL) and Single Event Snap-Back (SESB) free up to 70Mev.cm²/mq. Single-event upset (SEU) and single-event functional interruption (SEFI) are characterized at 7V operating voltage.

The RHFL6000A (SMD 5962F15216) is a low-dropout regulator with adjustable output voltage, built-in protection, and circuitry for remote sensing and external inhibit control. Dedicated internal circuitry for absorbing transients ensures SET below 3.3% of Vout at 120MeV, and the device is SEL-free up to 120Mev.cm2/mq.

Radiation reports for both ST devices are available upon request.

For more information please visit www.st.com/space.



Source	Groups	Vout(V)	Iout(A)	ST device
V _{CCINT} V _{CCINT_IO} V _{CCBRAM}	1	0.95	34	RHRPMPOL01 x5
			17.5	RHRPMPOL01 x3
MGTAV _{CC}	2	1	3 to 5.8	RHRPMPOL01
MGTAV _{TT}	3	1.2	1.1	RHRPMPOL01
V _{CCAUX} V _{CCAUX_IO} V _{CCADC}	4	1.8	2.6	RHRPMPOL01
			1.2	RHFL6000A
MGTV _{CCAUX}	5	1.8	0.15	RHFL6000A
V _{CCO_3.3V}	6	3.3	1.5	RHFL6000A
V _{CCO_1.8V}	7	1.8	1	RHFL6000A
V _{REF}		1.25	0.5	RHFL6000A
DDR3 Memory				
V _{CC_DDR}	NA	1.5	3	RHRPMPOL01
V _{TT_DDR}	NA	0.75		?
V _{REF_DDR}	NA	0.75		?

Power estimations will vary greatly with each application. Use [Xilinx Power Estimator](#) for accurate power estimations.

About STMicroelectronics

At ST, we are 46,000 creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. An independent device manufacturer, we work with more than 100,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges and opportunities, and the need to support a more sustainable world. Our technologies enable smarter mobility, more efficient power and energy management, and the wide-scale deployment of the Internet of Things and 5G technology. Further information can be found at www.st.com.

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