mercury

SCFE6933
Space -qualified, rad-tolerant 6U SpaceVPX with Xilinx AMD® Versal AI ACAP

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The demand for advanced processing in orbit has never been greater and Mercury continues to ensure technical superiority and interoperability in space with the SCFE6933 — a rad-tolerant, 6U, SpaceVPX high-performance processing board ideal for LEO, MEO, GEO, and HEO satellite applications and deep-space missions. The integrated commercial parallel processing capability (Xilinx AMD's Versal AI ACAP) and inherent software programmability for multi-mission adaptability provide the real-time performance power of several processing boards in a single-board solution. These savings in power, costs and valuable system space make it ideal for SWAP-constrained environments.

FAQ

What advantages does the Versal ACAP compute platform offer?

This heterogeneous mix of Versal ACAP resources optimizes processing resources and gives designers the freedom to assign compute power to the processing engine most suitable to the task at hand, and the ability to adaptively reassign resources as required. ACAP delivers performance improvements up to 20x over today's fastest FPGA implementations and over 100x over today's fastest CPU implementations.

The 7nm Versal technology employed in the SCFE6933 provides higher density, lower power and advanced Network on Chip (NoC) technology to rapidly move data to appropriate processing resources. The NoC connects the 3 different types of engines together via a memory-mapped interface with an aggregate bandwidth of 1 Tb/s+.

What does the SCFE6933 bring the space environment?

The SCFE6933 takes the latest commercial ACAP processing technology and for the first time brings these parallel processing engines to the rad-tolerant world of space. The ability to process more sensor data at one time at the edge allows for faster data movement and greater real-time access to mission data. Pre-processing and distilling sensor data in space lowers signal saturation and optimizes signal bandwidth because you are only sending the necessary data to the ground station, providing a clearer picture of the mission environment. The onboard DDR memory offers ECC (electronic code correction) which can detect, correct, monitor, and reduce data corruption for increased data reliability.

What are the benefits of developing custom IP using the available FPGA resources?

The ability to dynamically add application-specific IP allows for mission adaptability and system longevity as one piece of hardware can work for multiple applications, platforms and missions. The customization of computing systems in orbit provides flexibility as mission objectives evolve over time. The capability to change or augment the mission, with software-defined programmability while in orbit, is crucial since there is no opportunity to upgrade or rearchitect hardware in space environments.

What are the SWaP advantages?

The primary advantage for SWaP is the heterogeneous parallel processing capability that the SCFE6933 brings to space platforms. Users can install a single SCFE6933 processing module rather than separate SBC, GPGPU and FPGA modules. This result is the combined functionality of three different types of modules into one, saving precious system space and costs.

The 7nm technology small-chip packaging employed in the SCFE6933 AI ACAP provides a high-density solution that requires less power and creates less heat versus other traditional modules equipped with traditional FPGAs and SoCs.

What is SpaceVPX and why does it matter?

SpaceVPX promises to bring similar benefits to space platforms that OpenVPX and SOSA are bringing to aerospace and defense applications. This includes easier system design and architecture, interoperability between different types of SpaceVPX COTS products, rapid technology insertion and vendor lock elimination.

What applications are this board best suited for and why?

The SCFE6933 is well suited for satellite, military communication and reconnaissance, electronic warfare, earth and space observations and navigation applications where next-generation data converter and sensor technology is employed. These types of applications require powerful processing solutions like the SCFE6933 to handle and process enormous amounts of sensor data. This board is also appropriate for SWaP-constrained applications where a combination of scalar processors, vector processors and programmable logic are required but space and power budgets won't allow for a chassis loaded with specialized processing modules.

What other portfolio products does Mercury have that are compatible for space?

The SCFE6933 joins a portfolio of products respected and relied on by the space industry. Today, this includes a broad portfolio of space-qualified LNAs, solid state PAs, filters, frequency converters, custom IMAs, high-density rad-tolerant data recorders, and high-density DDR memory.

Learn more
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