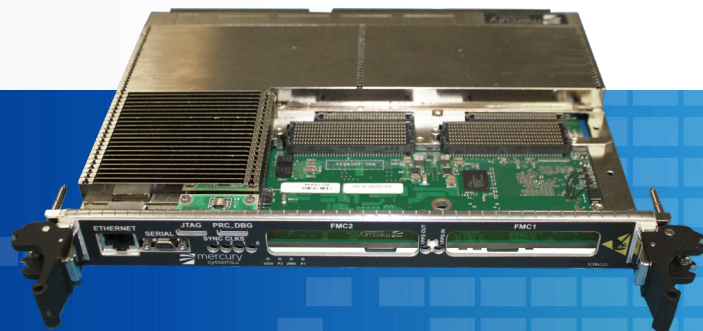*Ensemble*Series™ SCFE6110

Configurable, low-latency, OpenVPX™ FPGA processing module

- **Designed for System Security Engineering (SSE)**
- **Multi-channel, highly configurable FMC carrier**
- **Kintex® UltraScale™ FPGA processing power**
- **Built-in IPMI controller**
- **OpenVPX compliant for easy integration**
- **High Reliability Design**

Mercury's EnsembleSeries™ SCFE6110 is a versatile OpenVPX FPGA processing module designed for agile system integration and optimized to support system security engineering (SSE). This rugged processing module includes Kintex® UltraScale™ FPGA processing power and is ideal for operating in harsh environments. Two FMC ANSI/VITA 57.4 sites are available for maximum customization. For a complete EW solution, the SCFE6110 can be integrated with Mercury Systems' IF mezzanine cards and ultra-wideband microwave transceivers; such as the RFM3101.

Mercury's BuiltSECURE™ technology was developed

Built*SECURE*™

to counter nation-state reverse engineering using advanced SSE principles. BuiltSECURE is built-in SSE that enables turn-key or personalized security solutions to be quickly configured. The extensive nature of Mercury's BuiltSECURE SSE delivers system-wide security that evolves over time, enabling future-proofing of your current investment. As countermeasures are developed to offset the emerging threats of tomorrow, Mercury's security framework keeps pace, maintaining system-wide integrity.

Specifications

Physical

Single Slot 6U OpenVPX form factor
OpenVPX interface compliant with ANSI/VITA 65-2010 (R2013)

Mercury Systems is a leading commercial provider of secure sensor and safety-critical processing subsystems. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs.

FMC sites

Two FMC ANSI/VITA 57.4 sites
Support single and double width FMC cards

Backplane Interface

VITA 65.0 SLT6-PAY-4F1Q2U2T-10.2.1 Slot Profile

FPGA processors

Two Xilinx Kintex UltraScale KU115 Prosecutors
One Xilinx Kintex UltraScale KU115 Governor
One Xilinx Zynq UltraScale+ ZU9 System Processor
    Embedded PetaLinux Board Support Package
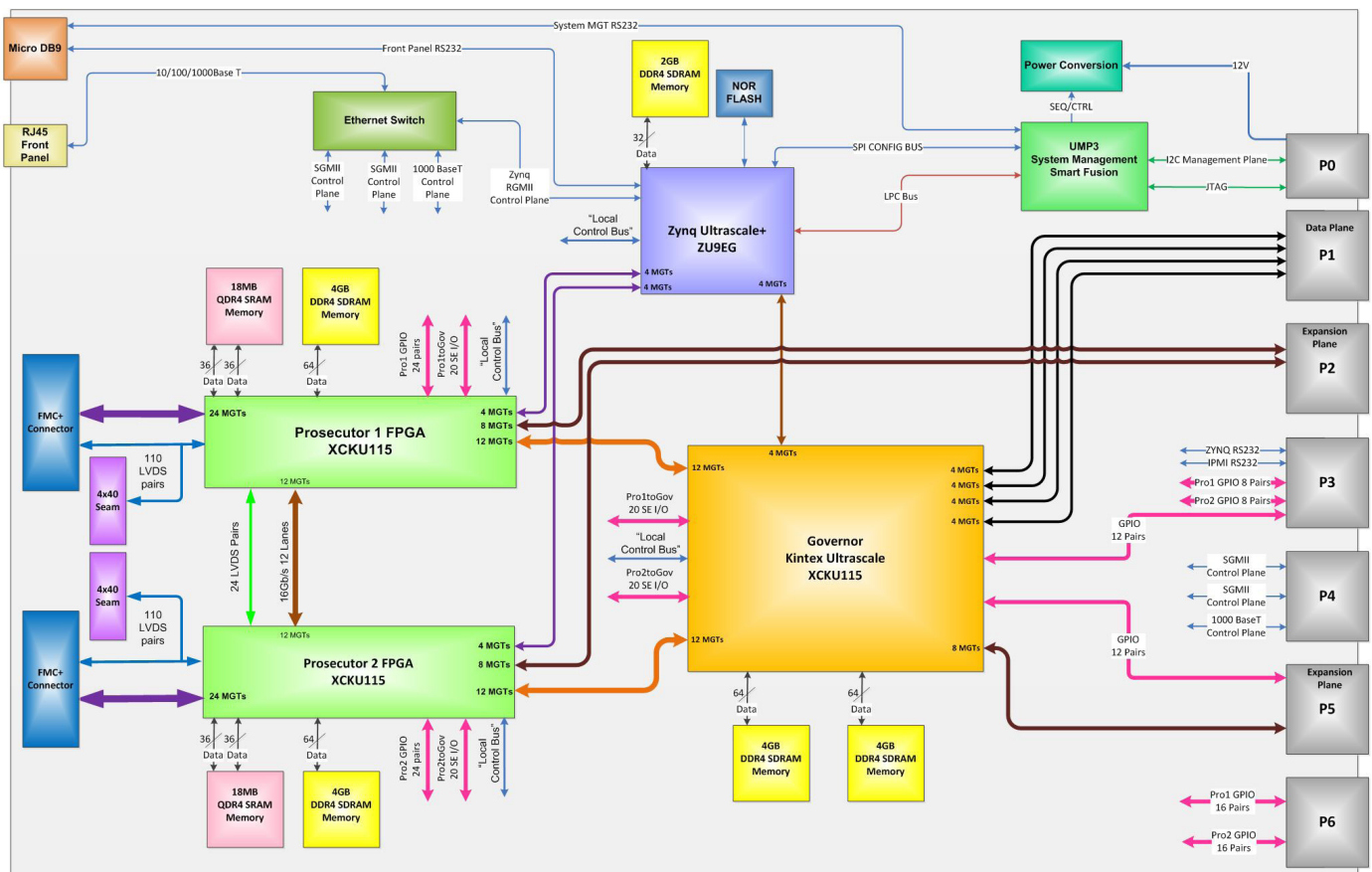
Memory

Four 4GB banks DDR4 SDRAM
    One per Prosecutor FPGA (512MX64)
Two 4GB banks DDR4 SDRAM
    Both connected to Governor FPGA (512MX64)
One 2GB bank DDR4 SDRAM
    Connected to System FPGA
Two 18MB banks QDR4 SRAM.
    One per Prosecutor FPGA
Secure FPGA configuration

Other

Vita 46.11 IPMI controller
Sensor interface to monitor temperature, voltage
Power sequencing
Secure JTAG
Manufactured in an AS9100D facility
Advanced FPGA Functionality

ACQUIRE   DIGITIZE   PROCESS   STORAGE   STORAGE   DISSEMINATE

SCFE6110 functional block diagram

Advanced FPGA Functionality

Mercury's processing modules are built around our EchoCore® FPGA IP to provide basic infrastructure functionality right out of the box. Mercury facilitates the re-use of common IP across FPGAs to optimize time-to-market and reduce development time. EchoCore IP allows customers to focus on their application while building upon the groundwork provided.

Mercury simplifies application integration by providing a standard control plane interface using AXI4-Lite control plane connectivity. Mercury uses a simple AXI4-Stream interface for our data plane with AXI4-Stream switches for routing data within the FPGA and to external interfaces, such as PCIe. Our customers can choose their tool of choice, such as parameterizable Xilinx IPs, HLS, or RTL to generate signal processing algorithms. The cores are then instantiated into a reserved user block and compiled into the FPGAs.

Environmental

VITA - Standard Product Environmental Qualification Levels				
		Air-cooled	**Conduction-cooled**	**Air Flow-By**	**Liquid Flow-By**

Rugged Level		Rugged L1*	Rugged L3**	Rugged L4*	Rugged L7***
Temperature	Operating	-25ºC to +55ºC (at air intake)	-40ºC to +71ºC (at module edge)	-40ºC to +55ºC (at air intake)	-40ºC to +71ºC
	Storage	-55ºC to +85ºC	-55ºC to +125ºC	-55ºC to +125ºC	-55ºC to +125ºC
	Max Rate of Change	5ºC/min	10ºC/min	10ºC/min	10ºC/min
Humidity	Operating*	5-95%, non-condensing	5-95%, non-condensing	5-95%, non-condensing	5-95%, 100% condensing
	Storage	5-95%, non-condensing	100% condensing	100% condensing	5-95%, non-condensing
Altitude	Operating*	0-30,000ft	0-70,000ft	0-70,000ft	0-70,000ft
	Storage	0-50,000ft	0-70,000ft	0-70,000ft	0-70,000ft
Vibration	Random	0.04 g2/Hz; 20-2000 Hz, 1 hr/axis	0.1 g2/Hz; 5-2000 Hz, 1 hr/axis	0.1 g2/Hz; 5-2000 Hz, 1 hr/axis	0.1 g2/Hz; 5-2000 Hz, 1 hr/axis
	Sine	N/A	10G peak; 5-2000 Hz, 1 hr/axis	10G peak; 5-2000 Hz, 1 hr/axis	10G peak; 5-2000 Hz, 1 hr/axis
	Shock	z-axis: 50g; x and y-axes: 80g; (11ms, 1/2-sine pulse, 3 positive, 3 negative)			
Salt/Fog		Contact Factory	10% NaCl		
VITA 47		Contact Factory			

* Customer must maintain required cfm level. Consult factory for the required flow rates.

** Card edge should be maintained below 71ºC

*** Dependant upon flow rate and coolant

Storage Temperature is defined per MIL-STD-810F, Method 502.4, para 4.5.2, where the product under non-operational test is brought to an initial high temperature cycle to remove moisture. Then the unit under non-operational test will be brought to the low storage temperature. The low temperature test is maintained for 2 hours. The product is then brought to the high storage temperature and is maintained for 2 hours. The product is then brought back to ambient temperature. All temperature transitions are at a maximum rate of 10ºC/min. One cold/hot cycle constitutes the complete non-operational storage temperature test. This assumes that the board level products are individually packaged in accordance with ASTM-D-3951 approved storage containers. These tests are not performed in Mercury shipping containers, but in an unrestrained condition. Please consult the factory if you would like additional test details.

All products manufactured by Mercury meet elements of the following specifications: MIL-STD-454, MIL-STD-883, MIL-HDBK-217F, and MIL-I-46058 or IPC-CC-830, and various IPC standards. Mercury's inspection system has been certified in accordance with MIL-I-45208A.

Application Notes

Multiple generations of this product family protect our nation's warfighters by providing the signal processing functionality that enables systems to nimbly respond to emerging threats. Examples include:

- Wideband search using full sample-rate FFTs and threshold detection processing

- Channelizers and multiple independent/coherent digital down/up converter channels with integrated filtering, gain balancing, high precision receive time tagging and transmit scheduling, VITA 49.2 signal data and context packet generation and reception / depacketizing

- Non-coherent and low latency coherent EA technique generation

- Communications modem functions

Instantaneous Bandwidths (IBW) in excess of 1 GHz have been implemented and transferred, as well as multiple simultaneous down-converted signal streams of over 100 MHz IBW.

Mercury delivers a full suite of software libraries to facilitate quick customer application development via an application programming interface (API). The product is pre-loaded with diagnostic application software to fully exercise the product capabilities, such as packing and checking of interface links, verifying external memory and monitoring system health. The SCFE6110 Zynq subsystem is loaded with embedded Linux to allow customization of system management and control. A Linux board support package (BSP) as well as a full set of source code is distributed with the product.

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