

# EnsembleSeries™ DCM6111

Configurable, low-latency, coherent 6U OpenVPX Rx/Tx module



- Designed for System Security Engineering (SSE)
- Multi-channel, highly configurable Rx/Tx module
- Coherent and spectrally pure for EW applications
- Kintex® UltraScale™ FPGA processing power
- Low-latency ADC and DAC performance
- Multi-channel/Multi-card synchronization
- Built-in IPMI controller

Mercury's EnsembleSeries™ DCM6111 is a versatile OpenVPX FPGA-based, Rx/Tx module designed for agile system integration and optimized to support system security engineering (SSE). This digital transceiver/processor includes Kintex® UltraScale™ FPGA processing power, low-latency ADC/DAC performance and is ideal for operating in harsh environments. For a complete EW solution, the DCM6111 can be integrated with Mercury's ultra-wideband microwave transceivers; such as the RFM3101.

Mercury's BuiltSECURE™ technology was developed 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.

**BuiltSECURE™**

## Specifications

### OpenVPX Packaging

OpenVPX (VITA 65) encompasses: VITA 46.0, 46.3, 46.4, 46.6, 46.11 and VITA 48.1, 48.2 (REDI)

### Data Planes

PCIe  
VITA 49.1

### Backplane Interface

VITA 65.0 SLT6-PAY-4F102U2T-10.2.1 Slot Profile

### Processor

Kintex Ultrascale KU115 FPGA  
16,560 DSP slices  
PCIe Gen3 x8 to P1  
MGT x8 to P1

### Memory

16 GB DDR4 (512M x 16)  
36 MB QDR4 (4M x36)

### ADC

2 12-bit ADCs up to 2.5 GSPS

### DAC

2 12-bit DACs up to 3GSPS

### Configurable Options

Front I/O or Vita 76 rear I/O  
Air-cooled or Conduction-cooled

### Security

System Security Engineering Ready

### Other

Integrated IPMI controller  
Manufactured in an AS9100D facility

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.



ACQUIRE



DIGITIZE



PROCESS



STORAGE



EXPLOIT



DISSEMINATE

## Low-latency ADC/DAC Performance

Mercury's low-latency ADC/DAC products are developed to support EW applications that require real-time IF digitization and processing in harsh environments. Dual interleaving ADC channels offer sampling rates up to 2.5 GSPS and two LVDS-based DACs, each up to 2.5 GSPS, are available to return the high-speed digital streams back to analog. Each of these DACs have convenient, user-selectable output modes to provide multi-nyquist signal projection.

Optimized for EW systems, these highly configurable Rx/Tx modules deliver excellent spectral purity and efficiency, coherent multi-channel functionality and exceptional LPOI (low probability of intercept) signal detection capability. The customizable architecture can support a variety of applications including DRFM systems, beamforming, and SIGINT.

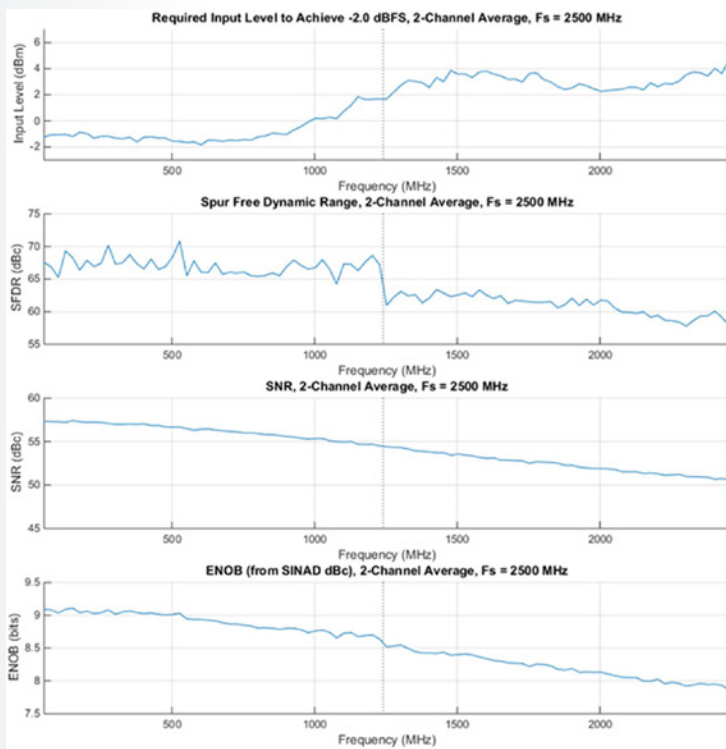
## Advanced FPGA Functionality

Each 2.5GSPS digitized stream is passed down to Xilinx Kintex UltraScale KU115 FPGAs, each with 4GB of external DDR4 memory with an additional 18MB of QDR4 SRAM. Behind these FMC-site ingesting KU115 FPGAs lies a third Xilinx Kintex UltraScale KU115 FPGA with 8GB of external DDR4 memory along with a Xilinx Zynq UltraScale+ ZU9EG with 2GB of external DDR4 memory; offering further data processing and control prowess.

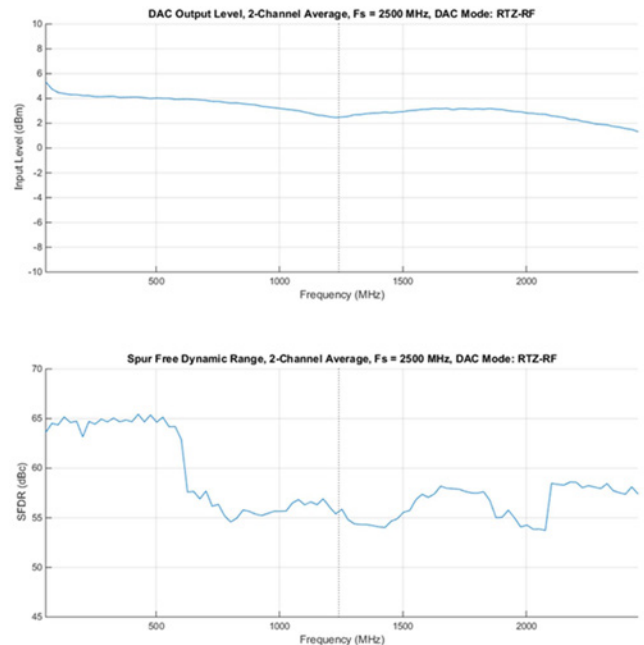
Mercury's digital Rx/Tx modules are built around our EchoCore® FPGA IP to provide basic infrastructure functionality right out of the box. EchoCore IP allows customers to focus on their application while building upon the groundwork provided.

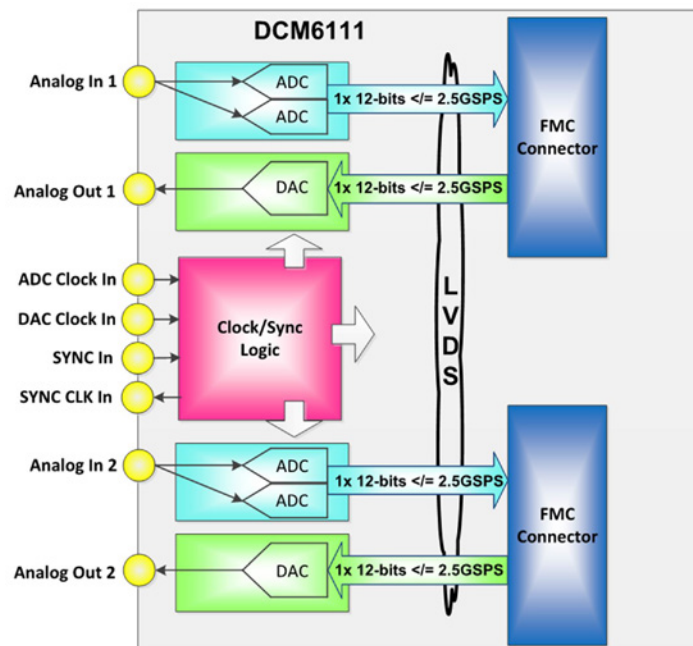
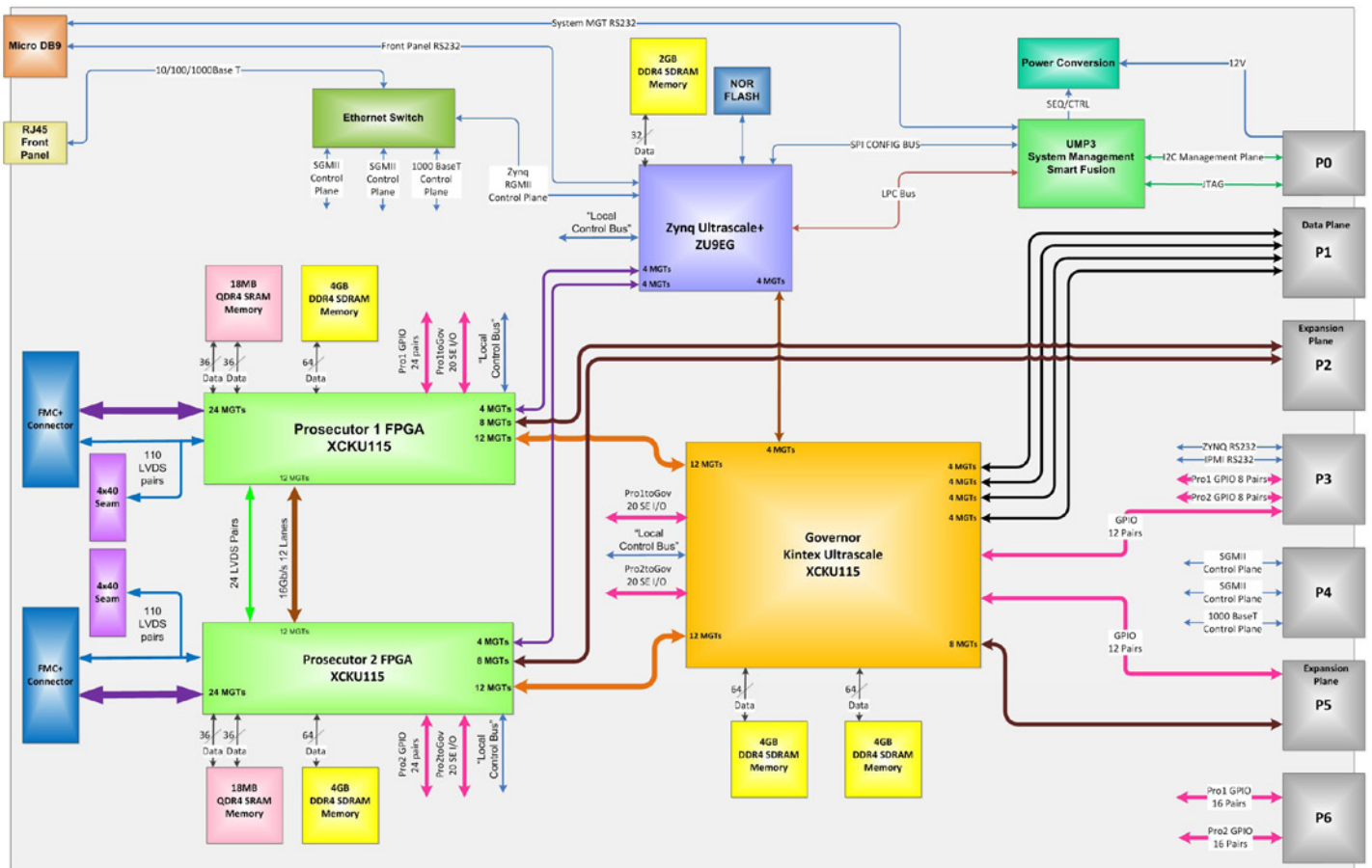
Mercury uses a simple AXI4-Stream interface for the data plane with AXI4-Stream switches for routing data within the FPGA and to external interfaces, such as PCIe. Our customers can choose their tool of choice, such as parameterizable Xilinx IPs, HLS, or RTL to generate signal processing algorithms.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

### ADC Performance



### DAC Performance





DCM6111 functional block diagram

## 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	-25°C to +55°C (at air intake)	-40°C to +71°C (at module edge)	-40°C to +55°C (at air intake)	-40°C to +71°C
	Storage	-55°C to +85°C	-55°C to +125°C	-55°C to +125°C	-55°C to +125°C
	Max Rate of Change	5°C/min	10°C/min	10°C/min	10°C/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 71°C

\*\*\* 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 10°C/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.

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INNOVATION THAT MATTERS™

**CORPORATE HEADQUARTERS**

50 Minuteman Road • Andover, MA 01810 USA  
(978) 967-1401 • (866) 627-6951 • Fax (978) 256-3599

**EUROPE MERCURY SYSTEMS, LTD**

Unit 1 - Easter Park, Benyon Road, Silchester, Reading  
RG7 2PQ United Kingdom  
+ 44 0 1189 702050 • Fax + 44 0 1189 702321

