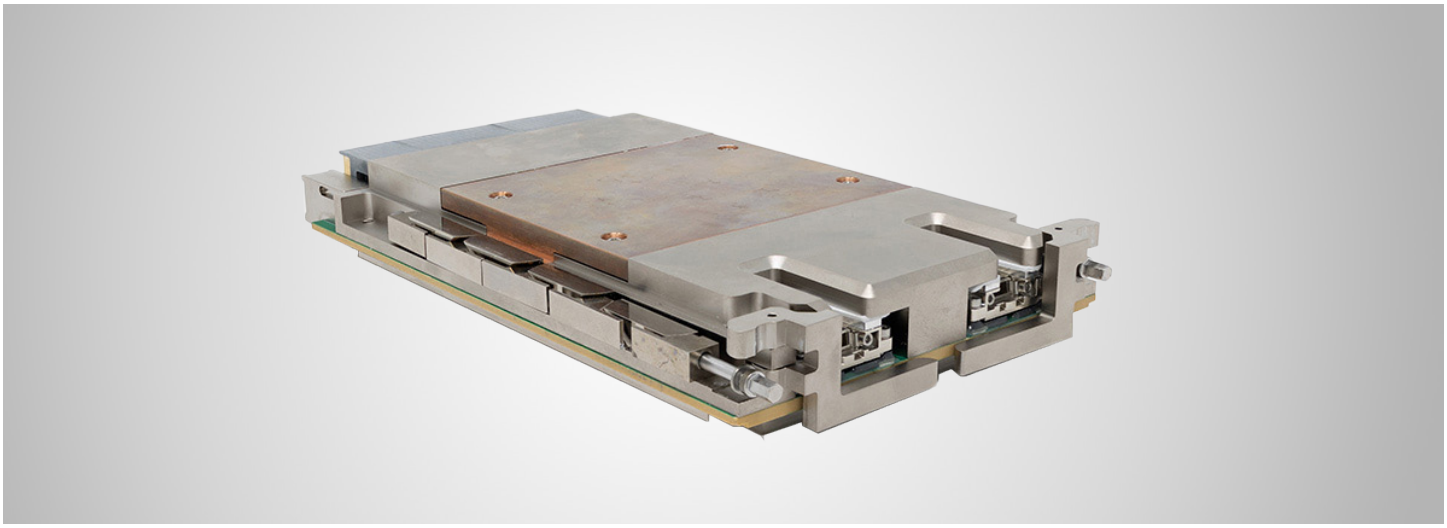
Amphenol
MILITARY HIGH SPEED

DIGITAL RF SIGNAL PROCESSOR

"CHAMELEON-CORE" SOSA-ALIGNED MODULE

PDS - 379



3U VPX High Performance FPGA Processor with High Speed and High Density Fiber Optic Ports

Chameleon-Core is an advanced, ruggedized signal processing module engineered for next-generation military and aerospace applications. Built on the high-performance Xilinx Kintex KU15P FPGA, this module delivers exceptional digital RF capabilities and unprecedented flexibility in harsh operational environments.

Designed for high-bandwidth, low-latency applications, Chameleon-Core features 24 front-panel rugged Amphenol LEAP 25G transceiver connections (with embedded clock and data recovery units), supporting robust, high-speed optical and copper data links up to 25 Gbps per channel to include ganged 100GBase-SR4 Ethernet connections. Internally, 32 high-speed SERDES lanes are routed to the VPX backplane via P1 and P2 connector locations, enabling seamless system integration and scalable multi-board architectures.

Purpose-built for mission-critical platforms, Chameleon Core combines the latest in FPGA technology with ruggedized construction, ensuring reliable operation in the most demanding military, aerospace, and defense environments. With extensive digital signal processing resources, flexible connectivity, and robust mechanical design, it is ideal for applications such as software-defined radio, electronic warfare, radar, SIGINT/COMINT, and sensor processing.

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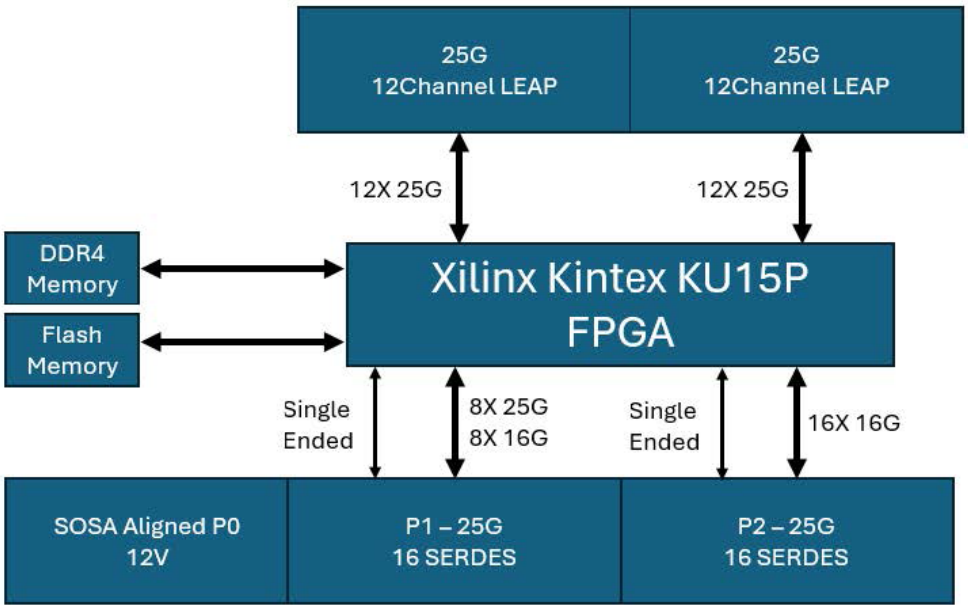
FEATURES & BENEFITS:

- 3U VPX Form Factor: Aligned to VITA 46 25Gbps standards for maximum interoperability and ruggedness. Also with optional MIL-HD2 VITA 91-aligned connectors for double density.
- Xilinx Kintex KU15P FPGA: Delivers high-throughput digital processing with abundant logic and DSP resources.
- 2X Amphenol Rugged LEAP 25G Transceivers: Front-panel I/O for direct high-speed connections to external RF, sensor, or networking equipment. Each transceiver has 12x12 25G multi-mode ports.
- 32x High-Speed SERDES Links: Backplane connectivity via VPX connectors for scalable system integration. 8X of the links are 25G while 24X are 16G capable and are set up for PCI-E connections within the FPGA.
- Rugged Construction: Designed for deployment in harsh military/aerospace environments—shock, vibration, temperature, and EMI hardened. -40-+85C operation with 12V SOSA aligned P0.
- Open Systems Architecture: VPX standard interfaces support rapid integration into both legacy and next-gen platforms. VITA 46, VITA 91.

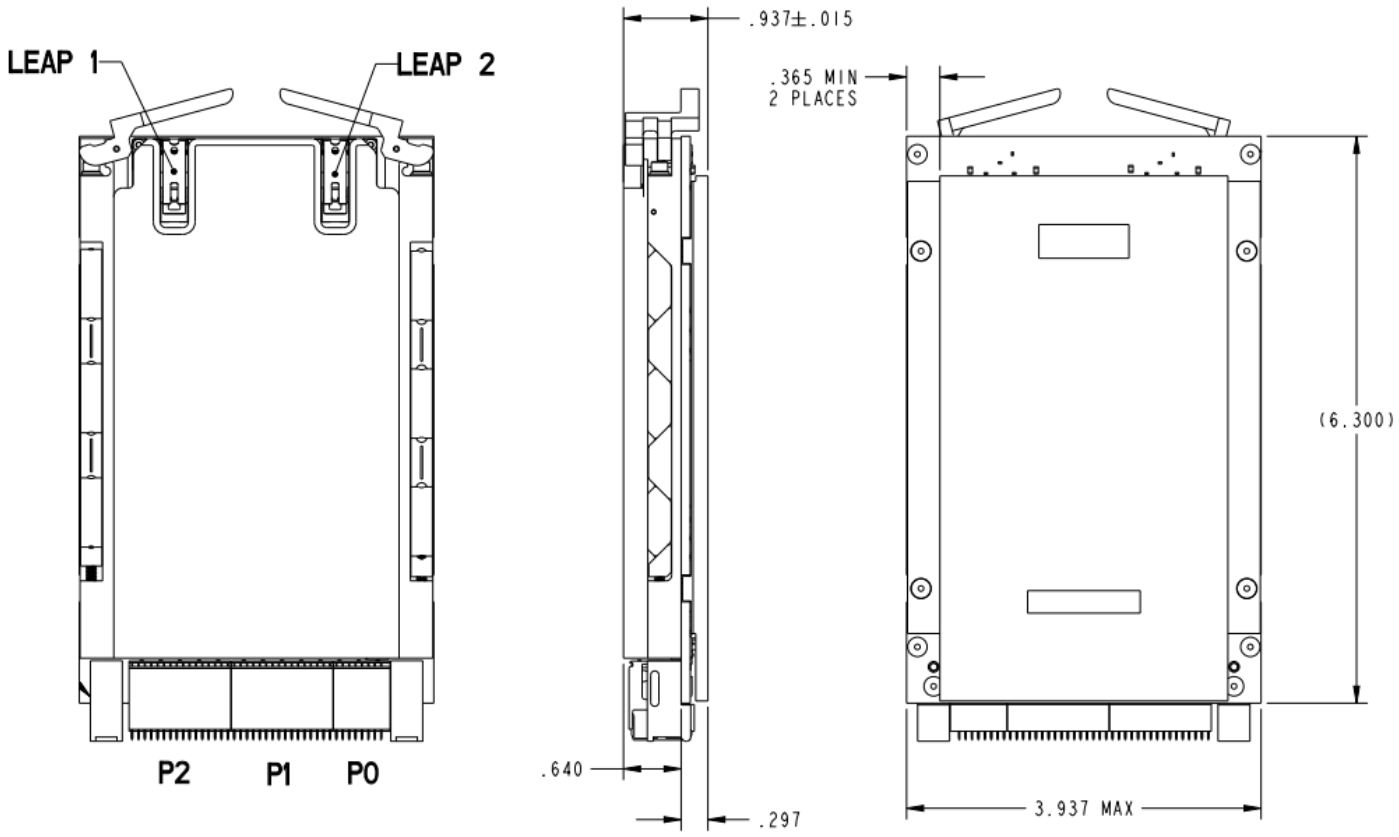
BLOCK DIAGRAM



SPECIFICATIONS

- Built around Xilinx AMD UltraScale FPGA version KU15P
- 1143K system logic cells, 1045K CLB Flip-flops, 523K CLB LUTs
- 9.8 Mb Max distributed RAM, 34.6 Mb Total Block Ram ,36 Mb UltraRam
- 11 Clock Mgmt Tiles (CMTs), 1968 DSP Slices, 5 PCIe4 Gen3x16
- 4X 150G Interlaken
- 4X 100G Ethernet w/ KR4 RS-FEC and multiple PCI-express connections
- DDR4 SDRAM
- Non-volatile memory

DRAWING AND DIMENSIONS



HOW TO ORDER

PART NUMBER	DESCRIPTION	SPEED
CF-02W300-29X	With VITA 46 backplane	25Gb

VPX DEVELOPMENT CHASSIS

To support the use of these VPX and SOSA-aligned solutions, Amphenol also offers 3U and 6U VPX Testing Chasses. “El Sharko” (3U VPX) and “The Croc” (6U VPX) are flexible bench top platforms that enable easy development, testing, and evaluation of VPX solutions.

Part Numbers:

El Sharko 3U Development Chassis: **CF-020400-604**
The Croc 6U Development Chassis: **CF-020400-606**
Conduction Cooled Rail Inserts (optional): **CF-020400-605**

Features:

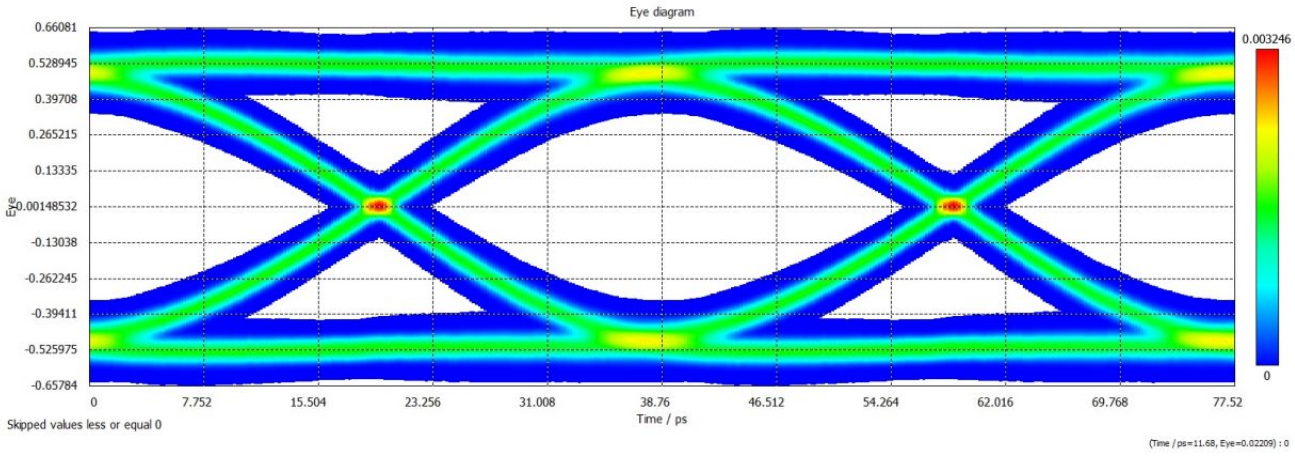
- 8 slots
- 1.2” pitch
- 12V/5V balanced power supply
- 40Gb backplane
- VITA 66 and 67 apertures for optical and RF
- PCIe Gen3 and 10GbE signal speed capability
- Air or induction cooled slot options\
- Embedded fans for cooling

VPX, EVO2, MIL-HD2 BACKPLANE CONNECTORS

The changes in technology where R-VPX connectors are used has rapidly evolved in recent years, specifically driving a demand for higher data rates from copper contact based connectors, which have typically resided in the 10 & 16 Gbps speed realm. The fastest connector in the market to date is performing to 25 Gbps, but the market demands even faster speeds. This is where Amphenol’s new EVO2 R-VPX connector is designed to dominate; as the first and only 32 Gbps+ VITA 46.30 connector available

MIL-HD2 provides developers with a readily available robust solution for tighter card pitches and chassis designs where space requirements and density are critical. These connectors are available in 3-, 4-, and 6-pair configurations. Providing the MIL embedded market with the highest count of differential pairs available today in a 3U configuration at 56Gb/s PAM 4 speeds. This series was selected by the SOSA Consortium and provides a SOSA aligned solution for next gen switch and payload card requirements enabling the MIL-embedded market to meet next gen performance levels while still meeting COTS requirements.

Eye pattern @ 25.8 Gbps



Note: PRBS-23 signal through D7E7-E7F7 pair with all surrounding pairs as active aggressors

DESIGN AND CONSTRUCTION OF BACKPLANE CONNECTORS

Amphenol Corporation is uniquely integrated to be able to provide collaborative design results, which R-VPX EVO2 development required. The expertise for this project was the same team that developed R-VPX and R-VPX EVO1, a blend of Amphenol design teams from AAO in Sidney, NY and Amphenol TCS in Nashua, NH. This team designed R-VPX EVO2 by borrowing proven characteristics from our R-VPX and R-VPX EVO1 series connectors, using high performance dielectric PCB material, reducing the surface area of the contacts in both connectors, and tirelessly tuning and testing the trace geometries for signal integrity to match impedance goals. The latter changes also reduce crosstalk between pairs. The addition of the organizer reduced the impedance in the gap at the mounting interface between the backplane connector and the backplane PCB. These changes enable the speed performance improvement in this new connector series while meeting all of the requirements of the VITA 46.30 specification and maintaining all backwards intermatability. See the next page for visual differences.

The new design resulted in three noticeable visual differences for end users: 1. The R-VPX EVO2 compliant eye size on the module (daughter card) connection region is smaller as compared to R-VPX connectors. (See Figure 1) 2. The R-VPX EVO2 compliant eye is smaller on the backplane connector compared to both R-VPX and R-VPX EVO1 connectors. (See Figure 2) 3. The R-VPX EVO2 backplane connector adds an organizer to the compliant PCB tail connection region. (This organizer remains on the interface and poses no additional steps to the customer during the installation of the connector. (See Figure 2)

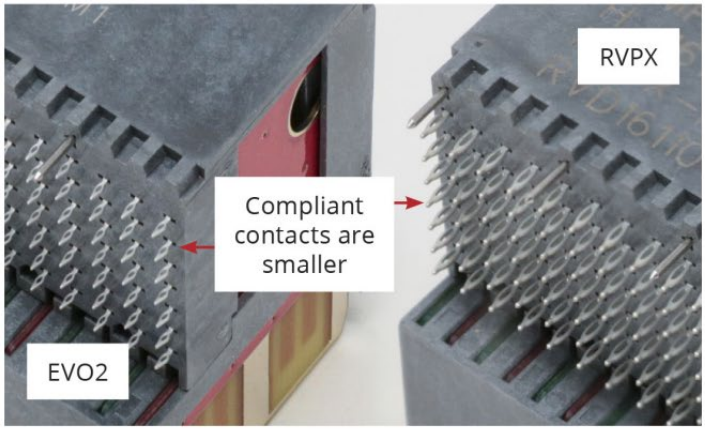


Figure 1 - Daughtercards

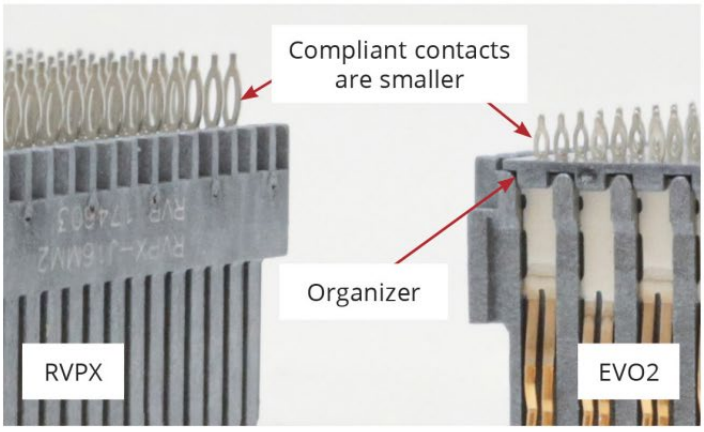


Figure 2 - Backplanes

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Amphenol Ruggedization Design

Overview

Amphenol integrated electronic products are designed and manufactured to our Ruggedization guidelines listed below. These guidelines ensure years of reliable operation in harsh environment applications where extreme operating temperatures, shock, vibration, and corrosive atmospheres are regularly experienced. Unless otherwise noted, the parts conform to the
below specifications.

Temperature:

- Opperating Temperature - thermal cycles between -40ºC and 85ºC while device is operating.
- Temperature is measured at chassis housing or card edge
- Storage temperature - thermal cycles between -55ºC and 125ºC

Humidity

- Operating Humidity - humidity cycle between 0-100% non-condensing humidity while device operating
- Storage Humidity - humidity cycle between 0-100% condensing humidity

Sealing

- Sealing can be optionally provided at the MIL-DTL-38999 interface with up to 10-5 cc/sec performance

Shock and Vibration

- Sine Vibration - 10g Peak. 5-2,000Hz
  - o Based on a sine sweep duration of 10 minutes per axis in each of three mutually perpendicular axes. May be displacement limited from 5 to 44 Hz, depending on specific test.
- Random Vibration - 0.0005 @ 5Hz, 0.1 @ 15 Hz, 0.1 @ 2,000 Hz
  - o 60 minutes per axis, in each of three mutually perpendicular axes.
- 40 G Peak Shock Cycle
  - o Three hits in each axis, both directions, 1/2 sine and terminal-leak saw tooth, total 36 hits

Fluid Susceptability

- MIL-DTL-38999 receptacle interface per EIA-364-10E

Altitude:

- -1,500 to 60,000 ft Altitude Testing w/ Rapid Depressurization

Electromagnetic Compatibility

- Designed to comply with MIL-STL-461E

Printed Circuit Board Assemblies

- Conformal Coat
- Amphenol performs Conformal Coting to both sides of printed circuit board assemblies using HUSMISEAL IB31 in accordance with IPC-610, Class 3.
- Printed Circuit Board Rigidity
- Amphenol printed circuit boards are fabricated in accordance with IPC-6012, Class 3
- Printed Circuit Board Fabrication
- Amphenol printed circuit boards acceptance criteria is in accordance with IPC-610, Class 3.

Reliability Predictions (MTBF)

Amphenol can perform Mean Time Between Failure (MTBF) reliability analysis in full compliance with MIL-HDBK-217F-1 Parts Count Prediction and MIL- HDBK-217F-1 Parts Stress Analysis Prediction. We can also perform reliability analyses in full compliance of ANSI/ VITA 51.1 if it is required or preferred over the later method

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