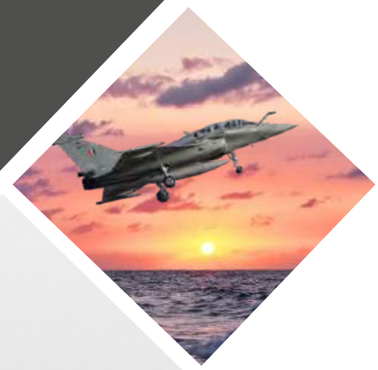
MISTRAL

Engineering the Intelligent Edge



AEROSPACE AND DEFENSE

Delivering Excellence in Systems Engineering and Embedded Design for Over Three Decades

Pioneering Aerospace & Defense Engineering Since 1997

We deliver cutting-edge solutions and services, empowering Aerospace and Defense organizations to build advanced, mission-critical systems with unparalleled precision and reliability.

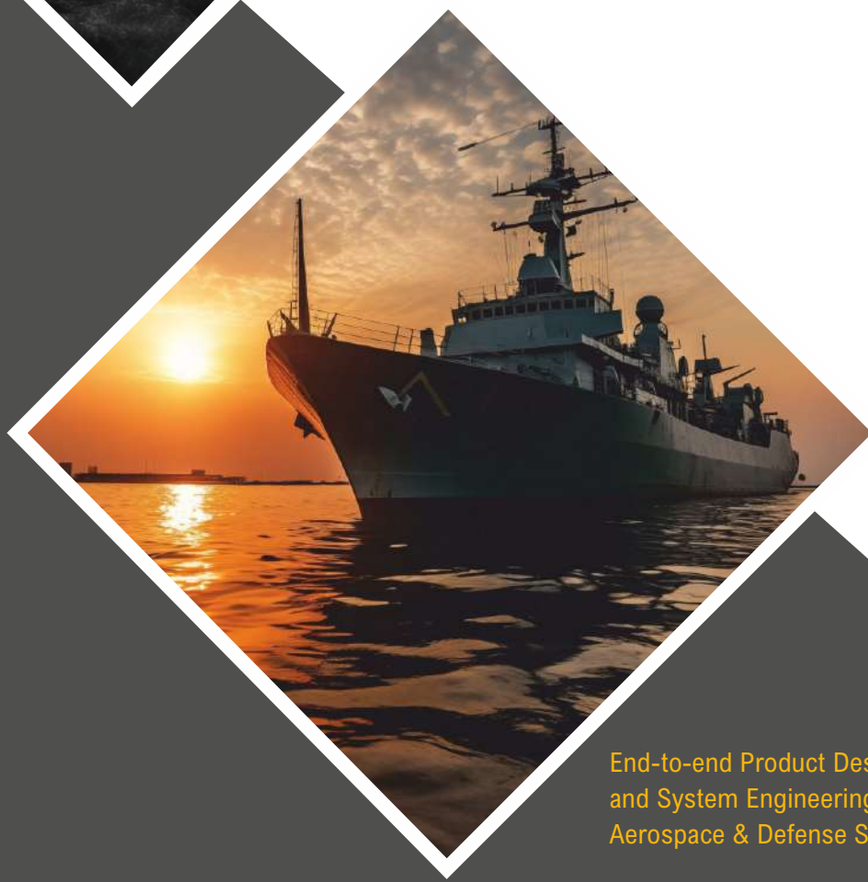
150+
Systems Deployed

600+
R & D Engineers

20+
Mission Critical Designs

03
Defense ToTs

WE ARE EVERYWHERE: AIR. LAND. WATER



We are the partner of choice for leading Aerospace and Defense organisations, helping to build complex systems and subsystems for a wide variety of demanding applications.

- OVERVIEW
- SERVICES
- COTS SOLUTIONS
- RADAR SYSTEMS
- SONAR SYSTEMS
- NAVAL SYSTEMS
- AIRBORNE SYSTEMS
- ELECTRONIC WARFARE SYSTEMS
- TELEMETRY MODULES
- RF SYSTEMS

End-to-end Product Design, Build to Spec and System Engineering Services for Aerospace & Defense Sub-systems

Overview

Mistral, a subsidiary of AXISCADES Technologies Limited, is an ISO 9001:2015 and AS9100D-certified technology design and systems engineering company delivering comprehensive solutions for product design and application development. With a strong focus on Aerospace & Defense and Deep-tech Applications, we serve diverse industries, including Automotive, Industrial, Consumer Electronics, Healthcare, Semiconductor, and Hyperscalers.

Our capabilities span hardware board design, embedded software development, VLSI design, system integration, and custom turnkey solutions tailored to meet mission-critical requirements.

Expertise in Aerospace and Defense Systems

Mistral provides fully customized design and development solutions for aerospace and defense subsystems. We specialize in architecting, designing, and deploying solutions that integrate multi-vendor COTS products, custom software,

board design, and FPGA design, all qualified to MIL standards. These subsystems address a variety of critical applications including Radar and Electronic Warfare, Avionics and Telemetry, Naval, Sonar and Automated Test Benches, etc.

From evaluating customer needs to delivering optimal solutions, Mistral's expertise lies in combining diverse, custom-designed hardware, software and off-the-shelf products with bespoke solutions to meet precise application requirements.

Advantages We Offer

Low-risk, High-performance Systems - Backed by decades of experience in defense electronics and a structured approach to system engineering.

Certifications & Compliance - Certified by CEMILAC for design, testing, and validation of defense electronics, our designs comply with standards like JSS55555, MIL-STD-810F/G, MIL-STD-461F/G, MIL-STD-704, MIL-STD-1399, MIL-HDBK-217and ARINC653 for safety-critical systems, among others.

Indigenous Development - Collaborating closely with India's leading defense R&D organizations, Mistral has contributed to the development of many indigenous systems deployed by Indian defense forces.

Cost-Effective, Reliable COTS Integration

Mistral offers high-reliability COTS products, saving cost and time by leveraging technology partner IPs. These products are seamlessly integrated with custom hardware and software to create complete turnkey solutions tailored to specific applications.

Production Services

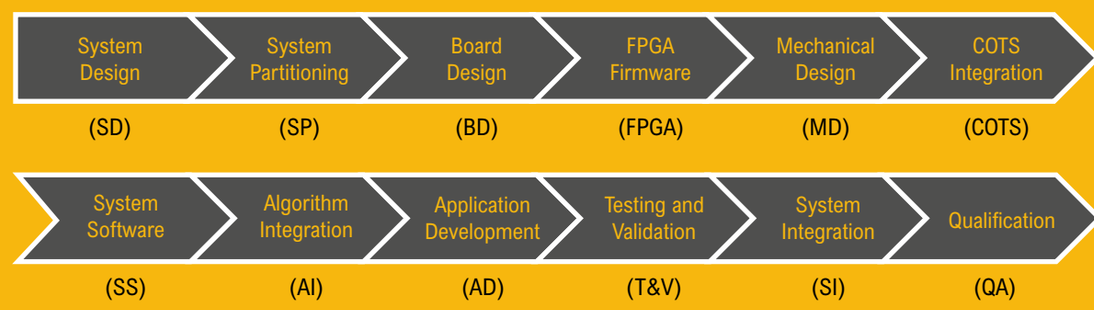
In addition to design and development, Mistral provides build-to-print services for defense and aerospace applications using customer-supplied designs. Our partnership with leading manufacturing houses enables us to provide end-to-end production services, including fabrication, assembly, cabling, and system integration for defense and aerospace subsystems.

Why Choose Mistral?

Mistral's commitment to engineering excellence, compliance to rigorous standards, and a focus on innovation has established its reputation as a trusted partner for leading organizations in the Aerospace and Defense sectors. By combining proven engineering practices with an extensive vendor ecosystem, Mistral consistently delivers solutions that redefine reliability, performance, and cost-efficiency for mission-critical applications.

System Engineering Process Flow

The diagram below depicts the process flow of a typical system engineering project at Mistral



Services

Mistral is actively involved in various aerospace and defense projects and has provided sub-systems for Radar, Sonar, Electronic Warfare, Surveillance, Command and Control, Airborne and Naval applications.

System Engineering

Complete, comprehensive customized system engineering services for building aerospace and defense sub-systems that include architecting, designing, building and deploying customized solutions integrating multi-vendor COTS modules, custom software development, board and FPGA design followed by test, validation and environmental qualification.

- System Architecture and Design
- Sourcing COTS Products
- Custom Software & Hardware Sub-systems Development
- Application Development
- System Integration, Test and Validation
- EMI/EMC and Environmental Qualification
- Training and Support
- Product Sustenance

Complete product design and system engineering solutions from concept to deployment, for a wide range of Aerospace and Defense applications.

Software Development

Complete turnkey services for System Software development. From low-level firmware to embedded applications.

- OS Platforms: VxWorks, Linux, Integrity, RTEMS, ROS, Android, iOS, DeOS etc.
- System Software
- Audio and Video
- Cloud, Mobile and IoT Apps
- Radar & Signal Processing Algorithms
- UI/UX, HMI Applications

Hardware Design Services

PCB layout and analysis, analog design, digital design, power optimization, FPGA design, RF and wireless design for cost effective, compact, faster and reliable hardware.

- Architecture: TI and ADI DSPs, PowerQUICC, QorIQ, Intel, ARM, Zync, PowerPC, NXP, Qualcomm etc.
- Board Design Services
- VPX/VME Air-cooled, Conduction-cooled, Liquid-cooled Chassis Designs
- Industrial and Rugged Designs
- High-speed Digital Designs
- Mixed Signal Design
- Power Supply Design

PCB Layout and Analysis

High-speed, digital and mixed-signal HDI PCB layouts for VME, VPX, cPCI, PCIe, XMC bus architectures.

- Library Management
- Custom PCB Design
- Signal Integrity Analysis
- Thermal Analysis
- Structural Analysis
- DFM/DFT
- Manufacturing Support

RF Design Services

- Transceivers based on UHF, VHF, HF, MF
- Wide-band RADARS
- Phased Array RADARS in L, S, C, X, Ku and Ka Bands
- GPS Receivers, Radar Target Simulators etc., with RF Interfaces
- Low to Medium power RF Transmitters
- RF Antenna Design & Integration
- Advanced Receivers
- Amplifiers and Tracking Transponders (on-board): S & C band tracking transponders (GaN-based power amplifier)

FPGA Design Services

Digital signal processing on current generation high-density, high-performance FPGAs.

- Xilinx, Intel (Altera), Actel, Quicklogic and Lattice FPGAs
- Logic Design
- Video Capture and Co-processing
- DSP Algorithm
- Verification & Validation
- ASIC Prototyping, Silicon and IP Validation, Memory Pattern Testing
- Expertise on Networking and Routing, Storage, Video, NIC/Off-Chip Peripheral Protocols
- DO-254 Compliant Designs

Quality Assurance Services

AS9100D and CEMILAC certified Quality Assurance services catering to DO-178B/C, DO-254 and DO-160 standards for Defense and Aerospace applications.

- Verification and Validation Services
- DO-178B/C, DO-254, DO-160 Testing
- FCC/CE Certification Testing

Production Support

Complete production services from fabrication, assembly, mechanical, cabling & system integration for manufacturing defense, aerospace and industrial sub-systems.

- Material Management
- Production Run
- Packaging
- Testing and Diagnostics
- Support and Documentation

Product Lifecycle Support

Product lifecycle & product sustenance support extending to several years.

- Product Support
- Product Maintenance
- Product Enhancement
- Obsolescence Management
- Inventory Management.

Qualification Services

Mistral Specializes in Design and Development of Rugged Embedded Computing and Communication Sub-systems for Military, Aerospace, and Defense Applications. Mistral Provides Customized Industrial Design Housing Capable of Withstanding and Operating in Extreme Conditions of Temperature, Humidity, Shock, Vibration and Corrosive/ Abrasive Atmosphere.

Our designs have Undergone Rigorous Environmental Stress Screening (ESS) and Qualification Tests as per Procedures Evolved from MII-spec documents like:

- MIL-STD-810F/G : Environmental Test Methods and Engineering Guidelines
- JSS 55555 : Environmental Test Methods for Electronics and Electrical Equipment
- MIL-STD-454 : Standard General Requirements for Electronic Equipment
- BS 3G-100 : Specification for General Requirements for Electronic Equipment
- MIL-STD-704F/G : Specifications for Test Methods for Aircraft Power Supply
- MIL-STD-461F/G : Specification for EMI/EMC Testing
- DO-178B/C : Specification for Software Considerations in Safety-critical Airborne Systems
- DO-254 : Design Assurance Guidance for Airborne Electronic Hardware

Environmental and Qualification Tests:

- Power Burn-in
- Random Vibration
- Thermal Cycling
- High/Low Temperature Storage cum Operation
- Low-pressure (Altitude)
- Humidity Test
- Driving Rain and Drip Test
- Fungus Test
- Saltfog Test
- Fluid Contamination Test
- Dust Test
- Shock
- Acceleration Test
- Bench Handling
- Transit Drop Test
- Power Supply, Insulation & Bonding Test
- EMI/EMC Test.

COTS SOLUTIONS

Our strategic alliance with leading technology companies help us provide world-class COTS solutions for Indian Aerospace and Defence Market.

COTS BOARDS

High Performance air and conduction-cooled DO-254/ DO-178C safety-certifiable COTS Boards built around NXP/ Intel/Xilinx processors and FPGAs

- DO-254 / DO-178 Safety Certifiable
  - QorIQ, ARM and Intel based SBCs
  - 3U OpenVPX Graphics cards
  - ARINC 429, MIL-STD-1553 and I/O cards
- Single Board Computers
  - Type: 3U/6U Rugged, high performance SBCs
  - VPX, OpenVPX, XMC, VME form-factors
  - NXP/Intel/ARM processors
- Signal Processing Engines
  - 3U/6U
  - VPX, OpenVPX, VME form-factors
  - Xilinx/Intel FPGAs and GPGPU processors
- FPGA Engines
  - 3U/6U
  - VPX, OpenVPX, VME form-factors
  - AMD, Intel, Lattice FPGA designs
- GPU Engines
  - 3U/6U
  - VPX, OpenVPX, VME form-factors
  - Nvidia, AMD, Intel, Qualcomm based GPU designs
- I/O Boards
  - 3U/6U
  - VPX, OpenVPX, PMC, XMC, FMC, VME form-factors
  - FPGAs based I/O cards
  - High-speed ADC/DACs, Digital I/Os, sFPDP and clock generators
  - MIL-STD-1553, ARINC429
- Rugged Graphics and Video
  - 3U/6U Rugged Graphics cards
  - VPX, OpenVPX, XMC, PMC form-factors
  - High-performance, multi-input, multi-output
  - Supports RGB, SDI, PAL, NTSC, DVI, DP, STANAG, ARINC818 or high-resolution computer video
- Switches/Routers
  - 3U/6U Gigabit Ethernet, 10GbE Switches & Routers
  - 40G Ethernet/InfiniBand Fabric and Hybrid Switches
  - VPX, OpenVPX, PMC, XMC, VME form-factors
- Backplanes
  - 3U/6U backplanes
  - PCIe Gen3 compliant
  - Customized VPX, OpenVPX, VME form-factors with IPC Class 3, Group A certification
  - Supports legacy boards and the latest VPX/OpenVPX boards.

COTS SYSTEMS

- Small form-factor systems
  - SWaP-Optimized / Multi-platform Modular Mission Computers
  - Powered by Intel Processors and NVIDIA GPGPU
  - Ideal for harsh, demanding environment
- Data Recorders & Video Management Systems
  - Multi-channel sFPDP, 1GbE and 10GbE recorders
  - Small form-factor, rugged Dual-channel HD/SD-SDI Video Recorders
  - Video Management Solution for airborne and ground platforms
- Display Systems
  - On-screen VMS control and built-in video processing
  - Multi-function rugged LCD display with touchscreen option
  - From 10.54” to 21.5”
- Switches
  - Ultra-small form-factor, rugged, Gigabit Ethernet Switches
  - Cisco IOS®- managed L2/L3 embedded Ethernet switches
  - Ideal for harsh military, aerospace and industrial applications.

COTS SOFTWARE

➤ Operating Systems

- **Wind River VxWorks Cert Platform:** An RTOS platform for safety-critical applications that require DO-178C, IEC 61508, ISO 26262, IEC 62304, or certification evidence in the avionics, industrial automation, transportation, and medical device industries.
- **Wind River VxWorks 653:** An integrated modular avionics (IMA) platform enabling workload consolidation of safety-critical and less critical applications.
- **Wind River® Linux:** Wind River® Linux enables you to develop, deploy, and operate robust, reliable, and secure embedded solutions running on a purpose-built Linux operating system.
- **VxWorks:** The World's Leading Real-time Operating System for the Intelligent Edge.

➤ Development Tools

- **GNAT Pro (Enterprise):** Complete development environment for producing critical software systems where reliability, efficiency and maintainability are essential.
- **Wind River Diab Compiler:** A highly optimizing compiler toolchain to build fast and tight code for safety-certified use cases.
- **ANSYS Scade One:** A model-based solution for developing embedded applicative software, enabling a seamless Model-Based Systems Engineering (MBSE) process
- **ANSYS Twin Builder:** An open solution that allows engineers to create simulation-based digital twins with Hybrid Analytics.
- **ANSYS SPEOS:** Predicts the illumination and optical performance of systems to save on prototyping time and costs while improving product's efficiency.
- **ANSYS SCADE Suite:** Model-based development environment for reliable embedded software, with linkage to requirements management, model-based design, verification, qualifiable/certified code generation capabilities and interoperability with other development tools and platforms.
- **ANSYS SCADE Solutions for ARINC 661:** Helps prototype and design ARINC 661 compliant systems, embedded Cockpit Display Systems (CDS) and User Applications (UA).
- **ANSYS SCADE Lifecycle:** Systems and Software Lifecycle Management software features requirements traceability via Application Lifecycle Management (ALM) tools, traceability from models, configuration and change management, and automatic documentation generation.
- **ANSYS SCADE Display:** Design robust embedded displays for human machine interfaces with native support for the OpenGL® SC1 & SC2 (Safety Critical) and ES1 & ES2 (Embedded system) standards

➤ Middleware

- **Connext Secure:** Ensure system integrity with real-time optimized authentication, encryption and access control
- **Connext Professional:** Software framework designed to meet the demanding connectivity requirements of smart-world systems
- **Connext Micro:** The first software framework for resource-constrained real-world applications
- **Connext Cert:** The first safety-certifiable software framework for safety and mission-critical real-world systems.

➤ Safety-critical Tools

- **ANSYS medini analyze:** Ansys medini analyze implements key safety analysis methods (HAZOP, HARA, FHA, FTA, FME(C)A, FMEDA, etc.) in one integrated tool. It supports the efficient and consistent execution of the analysis activities that are required by safety standards.

OUR PARTNERS

Ansys WNDRVR rti AdaCore CURTISS-WRIGHT ELMA Your Solution Partner

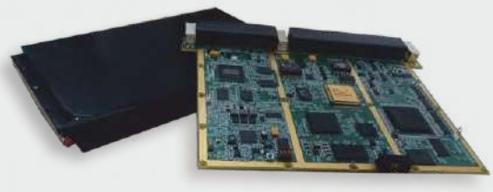
3U-VPX SBC based on Freescale QorIQ

- QorIQ T2080 processor 4x 64- bit PA, with up to 4GB of SDRAM with ECC
- 256MB of NOR flash memory, 16GB eMMC NAND Flash
- Two 10/100/1000 BASE-T Ethernet interfaces & Four 1000BASE-X interfaces
- IFC (memory bus) and GPIO connectivity between processor and FPGA
- PCIe fabric ports (one x4 and two x1) on the VPX P1 connector mapped as per VITA 65
- One x4 PCIe Gen2 interface to the XMC site as per VITA 42.3
- Conduction-cooled
- Two 10/100/1000 BASE-T Ethernet interfaces & Four 1000BASE-X interfaces
- IFC (memory bus) and GPIO connectivitybetween processor and FPGA
- Permanent Alternate Boot Site (PABS) for backup boot capability
- PCIe fabric ports (one x4 and two x1)on the VPX P1 connector mappedas per VITA 65
- VxWorks 7.BSP & U-Boot
- Complies with MIL-810-F
- Operating Temperature: -40^{0}C to +85^{0}C.

3U-VPX SBC based on Freescale QorIQ

- Freescale QorIQ T1042 processor
- 4x e5500 cores built on PowerPC architecture
- 64-bit DDR3L / DDR4 SDRAM up to 1600MT/s
- Two 10/100/1000 BASE-T Ethernet interfaces
- Four PCI Express 2.0 controllers
- IFC (memory bus) and GPIO connectivity between processor and FPGA
- Two x4 PCIe links from PCIe Switch to Backplane
- Two RS232 interface, One RS422 interface, USB 2.0 interface, I2C
- Conduction-cooled
- Complies with MIL-810-F
- Linux / VxWorks 7 BSP
- Operating Temperature: -40^{0}C to +85^{0}C.

ATOM based Single Board Computer



- Intel Atom E38xx series Processor with speed up to 1.0GHz
- DDR3L memory interface to processor with total capacity of 2GB and Max 1333 (MT/s) Data Rate
- Four x1 lane PCIe interface to communicate with FPGA, Ethernet Controller and to VPX connector
- 8GB SATA SSD device
- One Gigabit Ethernet controller which supports MII (10/100 BASE), GMII or RGMII (1000 BASE) interfaces
- Two USB2.0 Host Port, One USB device port, Two UART's
- I2C bus interface connected to Processor SMBUS interface
- FPGA interfaced to Intel Atom processor through LPC and PCI interface
- 128MB, 16bit flash through dedicated local bus to store the configuration data
- An ARINC429 interface (3 Tx and 8 Rx)
- Dual redundant 1553B channel
- Six UART (RS422) lines from FPGA terminated on VPX backplane connector through RS422 transceivers
- UEFI Boot Loader - UDK2010 based Boot loader
- VxWorks 7.0.
- Operating Temperature: -40^{0}C to +85^{0}C.

6U VPX Agilex-based Processing Module

- Engineered for mission-critical signal processing
- 6U VPX Intel Agilex- F series FPGA card
- Quad Core ARM CORTEX-A53 Processor
- 4 F-Tiles for General purpose Transceivers
- 1G Ethernet, 24 Channels of 10G Ethernet
- 2GB DDR4 Memory organized in Fly-By Topology
- 5x2GB of DDR4s for EMIF, 32GB eMMC Flash for Boot config
- High-Speed PCIe: x16 PCIe (Gen 3) interface
- 2x RS232, 1x RS422 Transceiver, 7x RS422 Receiver, 47x RS422 Transmitter, 1x RS485 Transceiv-er, I2C
- Power Consumption: <100W
- Supports remote updates for easy field maintenance
- Supports Linux OS
- Operating Temperature: -40^{0}C to +85^{0}C.

VPX3U-AGRW027/014 Processing Cards

- Engineered for EW, SIGINT and Aerospace Signal Processing
- 3U-VPX SOSA Aligned Processing Card
- Industry-leading performance with 64 GSps Direct RF processing
- Built around the Intel Agilex 9 Direct RF-series FPGA (AGRW027)
- Integrated 4/8-Channel* ADC & DAC
- Transceiver rates up to 58 Gbps
- Integrated high-fidelity wideband and medium-band data converters
- Transceiver rates up to 58 Gbps for ultra-low latency and high data throughput
- Supports high-speed, high-channel density processing requirements
- 2x 1G, 2x 10G, 1x 40G Ethernet Ports
- Supports VITA 66/67 for RF backplane connectivity
- Full Board Support Package for efficient application development
- VHDL flow compatible with High-level synthesis
- Intel Quartus Prime Pro 24.1
- Air, Air-Flow-Through and Conduction-cooled variants
- Operating Temperature: -55^{0}C to +105^{0}C.

*4 Channel variant: VPX3U-AGRW014Processing Card

3U-VPX Data Processing Engine VPX3U-RFSoC-G3-CH8

- Zynq UltraScale+ RFSoC - Integrated ADC, DAC, programmable logic and processing subsys-tems
- 8-channel 14-Bit ADC @ >5.0GSPS*
- 8-channel 14-Bit DAC @ 10.0GSPS*
- Two 64-bit 8GB DDR4
- LVDS connections to RFSoC for custom I/O
- Optional VITA-66.4 optical interface for backplane gigabit serial communication
- Dual 10/40 GigE interface supporting data transfers up to 25 GB/s
- Compatible with several VITA standards
- Air-cooled/conduction-cooled configurations
- MIL-STD-810G, MIL-STD-461E Compliance
- Open-source Linux BSP for software development
- 2 x NanoRF 10 port connector option in conduction-cooled for ADC/DAC/CLK/TRIG
- 2 x 4-lane bidirectional optical interface via FireFly Gen2 (optional) - 100G Ethernet or Aurora independent
- 8x PCIe Gen3, 1x Gigabit Ethernet, 2x 100G Ethernet optical,8x LVDS GPIO
- Operating Temperature: -40^{0}C to +70^{0}C

*4 Channel Variant available.

Intel Arria 10 6U Processing Card

- Intel Arria10 SoC,1.5Ghz frequency
- Dual core ARM cortex-A9 HPS core
- 64 bits with ECC (DDR4 and DDR3) at 2400 MT/s
- 4Gb of DDR4 SDRAM at 2400MT/s
- 1GB of NOR flash memory for AS configuration
- 4x SPI,5x I2C, and 2x UART controllers
- 2x RS232, 2x RS422, I2C, FMC connector, Debug Header
- 48 Full duplex transceiver (17.4Gbps)
- 10/100BASE-T Ethernet interface to Radar controller
- Ping Pong Memory for corner turning and reordering of data
- QSPI flash for Active Serial configuration and JTAG configuration
- VITA 57 Standard FMC connector for High-speed signals
- GPIO's for interfacing between Radar Controllers
- Intel Quartus Prime Tool 22.2
- Operating Temperature: -40^{0}C to +65^{0}C.

3U-VPX AMD Radeon E8860 Graphics Processor Card

- AMD E8860 GPU, with 2GB Dedicated Video Memory
- 1GB of DDR3L SDRAM, 1GB of Serial NOR flash
- H.264 codec for accelerated video encode and decode
- Xilinx Artix 7 with x4 PCIe Support
- PCIe fabric ports (one x4) on the VPX P1 connector mapped as per VITA 65
- One x4 PCIe Gen2 interface to the XMC site as per VITA 42.3
- 2x PAL input, 2x STANAG input, 2x ARINC input
- 1x LVDS Output, 1x STANAG Output,1x PAL Output
- 6 X DVI Output (optional)
- Serial port: One RS232 interface
- Complies with MIL-STD-810F
- Conduction-cooled
- CoreAVI drivers available for OpenGL
- Operating Temperature: -40^{0}C to +85^{0}C.

RADAR SYSTEMS

PT X-band Radar

- Portable X-band surveillance Radar for Underwater Vehicle for ISR operations
- Real-time Detection and Tracking of Sea Surface Targets

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Operates in X-band
- X-band cylindrical slotted waveguide antenna array
- Scan rate of 7.5 RPM
- Minimum range of 300m
- Max detection range of 5Kms @5m2 RCS target
- Range Resolution of 7.5m
- Instrumented Range of 10Km
- Size: Φ300mm x Height: 300mm
- High pressure rated radome withstanding 45 bar pressure
- Weighs less than 30kg
- Power: 140W @28V DC
- 360^0 Azimuth Coverage
- Conduction-cooled mono-block chassis
- Light weight compact Exciter and 2 Quad channel Receive modules
- Low power Signal and Data processor Engine built around Intel Agliex FPGA
- MIL-STD-461G, JSS55555
- Operating Temperature: -10^0C to $+55^0$C.

Through Wall Radar

- Detects and locates static or moving targets
- Portable device with up to 20m detection range
- MIL-STD-810F and IP65 compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Operates in Ku Band
- Provides real-time 2D/3D imaging
- Remote wireless display up to 100m
- Penetrates through concrete, reinforced concrete, brick, mortar, wood and stone walls
- Field of View: 800 in both azimuth and elevation
- Display: LCD panel displaying target position
- Doppler: Heartbeat, respiration detection
- Operating Temperature: -20^0C to $+55^0$C.

Handheld Ground Penetrating Radar

- Rapid determination of the presence and location of metallic and non-metallic mines, IEDs
- Records intelligence gathered for post analysis and de-briefing
- Works in all type of soil conditions

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- GPS logging and mapping
- Detection depth - Anti-personnel Mine: 20cm, Anti-tank Mine: 30cm,
- IED: 50 cm based on size
- Depth Resolution of 2 cm
- Sweep Speed of 0.3 - 1.0 m/sec
- Rugged 5” Sunlight Readable Display
- Inbuilt buzzer/speaker and headphone for audio alarm
- Data Logging - 40 Hours continuous operation
- 32GB of internal data storage
- Rechargeable Li-Ion batteries with up to 6 hours of continuous operation
- Adjustable telescopic wand of 1.6 m length
- Complies with Radiation Hazard Safety, JSS55555 and IP65 Standards
- Weighs < 5 Kg including batteries
- Operating Temperature: -20^{0}C to +55^{0}C.

Exciter and Multi-channel Receiver

- 48-channel Naval Subsystem for Active Phased Array Radar
- Detects Intermediate range Ballistic Missiles
- JSS55555 compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Operates in S-band (3.1 – 3.5 GHz)
- Generates a low-power S-band transmit drive waveform, RXCAL, and BITE signal
- Xilinx FPGA based twelve quad-channel- 48 Rx channels of RF signal
- Converts RF to IF signal and digitizes the IF for digital Down Conversion
- Six 8-channel Digital Receiver (DRX)
- BITE Distribution module (passive) receives and distributes RF BITE signal to all 12 ARX modules
- Waveform generator & Timing (WFGN&T) module and I/O Distribution (IOD) module
- Power Supply I/P: 330V DC
- Liquid-cooled system
- MIL-STD-461G complaint, JSS55555 qualified
- Operating Temperature: -20^{0}C to 55^{0}C.

Multi-channel Receiver Hardware

- 96-channel ground-based Radar system
- Detects intermediate range ballistic missiles
- JSS55555, MIL-STD-461G complaint air-cooled system

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Operates in S-band
- Two 48-Channel Exciter & Multi-channel Receiver Units (Air-cooled)
  - Low-level Radar pulse generator for multi-channel receivers (Rx)
  - 12 quad-channel ARX, six 8-channel DRX, Waveform Generator, I/O card, Frequency Synthesizer and Up-converter, Distribution & Clock Module and PSU
- Four Front End Receiver Units (Conduction-cooled)
  - 24 Channel Front-end receiver, performs low noise amplification and band pass filtering
- Bi-static Bite Unit (Conduction-cooled)
  - Synthesizes S-band RF BITE waveforms
  - Derive all the internal clock and LO signals
  - Consists of WFGN, FSUC and Clock Module
- Cal Unit (Conduction-cooled)
  - Distributes RXCAL signal
  - 16 Antenna CAL channels
- Clock Distribution Unit (Conduction-cooled)
  - Power Level, Input: 10MHz; Output: 120MHz
  - Distributes the external PPS to two EMCR-A Units
- Power Supply: 28V DC
- Operating Temperature: -20^{0}C to +55^{0}C.

Exciter Receiver Unit

- 48-channel ground-based Radar System
- Detects intermediate range ballistic missiles
- MIL-STD-461G complaint, liquid-cooled system

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Generates a low-power L-band transmit drive waveform, RXCAL and BITE signal
- Receives 48 channels of RF signal and converts to IF signals using Analog Receiver Modules
- DRX Module digitizes the IF and perform digital Down Conversion
- Kintex UltraScale based system consists of
  - 12 quad-channel Analog Receiver modules
  - Six 8-channel digital Receiver modules
  - BITE Distribution module (passive)
  - Waveform generator & Timing (WFGN&T) module
  - I/O Distribution module
  - 6U VPX conduction cooled COTS SBC - Quad core T2080 processor
- Liquid-cooled system
- Power Supply I/P: 28V DC
- MIL-STD-461G complaint, JSS55555 qualified
- VxWorks RTOS
- Operating Temperature: -20^{0}C to +55^{0}C.

Radar Controller and Processing Unit

- Qualified Control Unit for Phased Array Radars
- Provides resources for Radar SP, RC, RDP and Wide-band data recording
- MIL-STD-461F and MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- System includes Radar Signal Processing, Radar Controller, Radar Data Processing LRUs
- 6U VPX 64x Signal Processor LRU with Quad Dual Core PowerPC DSP Boards, Fire Blade Ethernet and sFPDP XMCs
- 6U VME 64x Radar Controller and Data Processing LRU with
  - 6U VME with 9th Gen Intel SBCs
  - 6U VME Radar controller with Quad PowerPC DSP, User programmable FPGA Engine
  - 6U VME GPS Receiver (IRNSS, GPS, GLONASS)
  - 6U I/O Level translation card
- MIL-STD-461F & MIL-STD-810F compliant
- VxWorks RTOS & Linux
- Liquid-cooled System
- Operating Temperature: -20^{0}C to +55^{0}C

Radar Processing Unit (RPU)

- Conduction-cooled LRU for ground mobile
- MIL-STD-461E and JSS 55555 compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Transceiver card
- Intel FPGA based Digital Beam Formation Signal Processor
- Intel Xeon Processor card
- VPX6 Ethernet Switch
- VPX6 GPS Receiver
- Custom 6U VPX Backplane
- 6U VPX IO Panel
- Power supply with input power of 330 VDC
- Connector Interface Panel with Optical and Electrical Interfaces
- Conduction/Liquid-cooled 6U VPX Mechanical Enclosure
- Runs Linux OS
- Operating Temperature: -25^{0}C to +55^{0}C.

Programmable Signal and Data Processing Unit

- Sub-systems of a vehicle mounted Multi-antenna Radar
- Intel i7 and NVIDIA GPGPU based system
- MIL-STD-461F & MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Executes Radar SP algorithms including Pre-processing, Detection and Post-processing
- ➤ Rugged, Air-cooled 14-slot VPX chassis
  - Customized high-speed 10-slot VPX backplane with SRIO, 10GbE and PCIe interfaces
  - Quad PowerPC to process input data and enable communication over SRIO
  - Intel SBCs for inter-board communication over 10G Ethernet
  - GPGPU for Radar data processing
  - sFPDP to capture Radar data for processing
  - 10G Fiber optic for communication across system
  - DisplayPort (DP) implemented on backplane to facilitate high-res graphics
  - Multiple high-capacity SATA modules for data recording and replay
- ➤ Health Monitoring Unit
- ➤ 2KW PSU
- ➤ Multi OS operation (Windows and Linux)
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

Signal and Data Processing Rack

- Hybrid (VPX and VME) SDP system for Low-level Transportable Radar
- MIL-STD-461F & MIL-STD-810F compliant
- Rugged air-cooled enclosure

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Signal Processing System
  - VPX system comprising of Quad Dual Core PowerPC Engines, Quad sFPDP XMC Modules, Switch Blade and Recorder Blade
- ➤ Radar Data Processing System
  - VME system consisting of Intel SBC, PowerPC DSP Engine, Quad sFPDP PMC modules, FPGA PMC, Switch Blade and Gigabit Ethernet PMC
- ➤ Rugged Storage
  - 3.6 TB SATA disks array
  - Fiber channel interface for data recording
- ➤ Fiber optic based sFPDP sensor data acquisition
- ➤ Ultra-high-speed Serial Fabric implementation (SRIO and PCIe)
- ➤ Rugged Wide Band Recorder
- ➤ Operating Temperature: -40^{0}C to +71^{0}C.

Signal Data Processor

- Signal Data Processing System for Phased Array Radar
- Liquid-cooled System
- MIL-STD-461F & MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ 6-slot VPX chassis
  - Four conduction-cooled VPX based Quad PowerPC 8640D boards
  - Two sFPDP XMC cards
  - Conduction-cooled VPX based Managed Ethernet switch
  - Flash disk (SSD) for data storage
  - Custom, conduction-cooled 1kw Power supply
- ➤ Rugged solid-state Data Recorder for analysis
  - sFPDP interface supporting 240Mbps data rates
  - 2TB storage capability
  - Record and replay functionalities
- ➤ VxWorks RTOS
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

Front-end Processing Unit

- Provides signal processing, signal translation and target tracking
- MIL-STD-461F and MIL-STD-810F compliant
- VxWorks RTOS

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ 6U VPX and VME Hybrid System
  - PowerPC8640D and PowerPC 7447/48 based Quad PPC Boards
  - 10 VPX/VME Slots
  - FPGA PMC/XMC with fibre optic
  - sFPDP Implementation for Radar Data Input
  - Customized I/O translation card for external Interface
  - Customized GPS Interface board
  - HMU for monitoring temperature
  - I/O panel PCB for routing I/Os
  - Fibre-optic communication
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

Cloud Radar Receiver

- Ka-band Cloud Radar Receiver and Up-converter System
- Polarimetric Pulsed Radar
- MIL-STD-461E, JSS55555

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Transmitter upconverter (Upconverts input frequency of 120MHz to Ka band)
- Transmitter Gain Control and Output Power Monitoring
- Receiver Downconverter (Down-converts received Ka band signals to 120MHz)
- Dual channel Receivers Gain Control with dynamic range of 110dB
- Noise figure of <5dB
- OCXO for reference signal for S-Band LO and X-band LO sources
- Xilinx FPGA based Controller
- FPGA Firmware for IO configuration and monitoring and control of various modules
- RF Modules configuration through SPI, I2C, UART, JTAG, and GPIO interfaces
- Ethernet PHY Transceiver with RJ45 connector
- Power Supply: +28V DC
- LabVIEW based GUI
- Operating Temperature: -10^{0}C to +55^{0}C.

Command & Control Unit

- Designed for Fire Control Radar
- 3U VPX based C4I Computer
- MIL-STD-461F and MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 3U VPX based system
  - DUAL Redundant Configuration
  - New-gen Intel XEON Processor
  - AMD E8860 GPU with H.264 video compression/ decompression
  - SATA Flash
  - USB Hub implementation bringing out multiple USB ports over IO Panel from each section
  - USB Mux implementation to switch between sections
  - USB Audio implementation
  - Audio Codec implementation
- Operating Temperature: -20^{0}C to +55^{0}C.

Digital Receiver System

- Digital Receiver System for Tracking Radar
- Algorithm implementation on VxWorks/PPC and FPGA

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 19” VPX rack mountable chassis
  - VPX PowerPC and FPGA Engine
  - 2x quad channel FMC Data Acquisition Module
  - 19” rack-mountable Gigabit Ethernet switch
- VxWorks modules implemented on PowerPC
  - Signal processing
  - Calibration
  - Target detection
  - Client interface
  - Inter-node communication
- Windows GUI on Qt framework for OWS (Operator Work Station)
- Algorithms implemented on FPGA
  - DDC
  - Pulse compression
  - CFAR
  - Doppler processing.
- Operating Temperature: -0^{0}C to+55^{0}C.

Signal Processing and Display System

- Integrated hardware for Radar SP, RC, Display and Control Console for Tracking Radar
- First New-gen Intel XEON based system
- Small form-factor design

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- VPX based 3U system
- FPGA Engine with 8 channel 250 MSPS ADC
- High-density Analog and Digital Input/Output Modules
- ENDAT 2.2 version Eight Channel Module
- Customized Backplane
- Pluggable Dual redundant Power supply unit
- RedHat Linux Drivers with Qt application
- Operating Temperature: -20^{0}C to+55^{0}C.

SONAR SYSTEMS

Integrated Combat Suite System

- Front End processing System of a Sonar
- Designed to withstand 55 bar pressure

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ICS has following subsystems
  - BAS
  - EFAS
  - IS
  - MOAS
  - UWT
  - ONA
- Each Sub system consists
  - Preamp
  - Signal Conditioning Card
  - Front End Controller Card (FEC)
  - Power Supply Card
- FEC Card is built around Artix7 Series FPGA from Xilinx to acquire data from Signal Conditioning Card, packetizes and send through Ethernet to processing system
- LabVIEW GUI to display waveforms captured by ICS System
- Underwater enclosure designed to withstand 55 bar
- Operating Temperature: -20^{0}C to +55^{0}C.

Under Water Acoustic Imaging System

- High-resolution, High Frequency Sonar system
- System for underwater acoustic imaging
- MIL-STD-461F and MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Up to 48 Channel Transmitter and 96 Channel Receiver
- Consists of Air-tight Underwater mechanical enclosure with
  - Power Supply modules
  - Pulsar Power Amplifier based on Xilinx FPGA
  - Linear Power Amplifier
  - Controller Card based on Xilinx FPGA
  - Preamplifier Card
- The system is designed to work at up to 100m depth
- NI Labview based GUI
- Operating Temperature: -20^{0}C to +55^{0}C.

High Endurance Autonomous Unmanned Vehicle

- High-resolution, high-frequency Sonar systems
- Used for underwater acoustic imaging

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Include 2 subsystems
  - Multi Beam Echoer and Side Scan Sonar
- Multi Beam Echoer (MBE)
  - 24 Channel Transmitter and a 96 Channel Receiver
  - 500 kHz operation with 25.6 MSPS sampling rate
  - Pulsar Power Amplifier based on Xilinx Artix®7 FPGA
  - Controller Card built around Xilinx Artix®7 FPGA with 12 ADCs
  - Preamplifier Card & Power Supply Modules
- Side Scan Sonar (SSS)
  - 4 Channel Transmitter and 80 Channel Receiver
  - 500 kHz operation with 25.6 MSPS sampling rateS
  - Controller Card built around Xilinx Artix®7 FPGA with 12 ADCs
  - GaN-based Power Amplifier built using Xilinx Artix®7 FPGA
  - Preamplifier Card & Power Supply Modules
- MIL-STD-2164, MIL-STD-461 Compliant
- Air-tight underwater mechanical enclosure that can withstand 30 Bar pressure
- LabVIEW GUI to display waveforms
- Operating Temperature: -20^{0}C to +55^{0}C.

Diver Detection System

- Data acquisition system for diver detection
- Portable and light-weight system
- MIL-STD-461E and JSS55555 compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- FPGA based system
- 128-channel simultaneous sampling
- Transmitter and front-end receiver
- High-frequency Sonar with extended detection radius: 500 mts
- Gigabit Ethernet for data transfer
- Conduction-cooled system
- Xilkernel OS
- Operating Temperature: -20^{0}C to +55^{0}C.

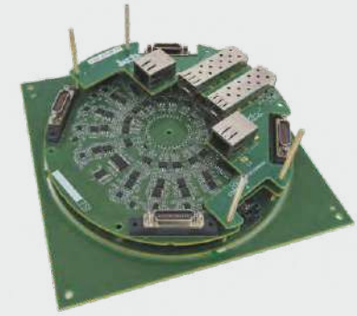
High-speed Data Acquisition System

- Portable system designed for Lab use
- Conduction-cooled system

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- FPGA based 6U conduction-cooled system with in-built Power supply
  - Supports up to 128 channels with simultaneous sampling
  - Sampling rate of up to 10 MS/s
  - Supports configurable input Range (+/- 500mV to +/- 5V)
  - Supports Single ended and differential input
  - Supports AC and DC coupling input
  - Features Internal and External Trigger
  - 10Gb host interface
  - NI Labview based GUI with a Multiview option of up to 8 Displays in PC with 2 Channels in each display
- Xilkernel OS
- Operating Temperature: -20^{0}C to +55^{0}C.

Front-end Processing for Sonar



- Modularized 32-channel Front-end Processing system
- Interfaces to 32 Hydrophone sensors

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Virtex-7 Series FPGA
  - In-built Microblaze architecture for system control
- 60dB Low Noise pre-amplifier
- Programmable Gain Amplifier
- 24Bit Precision Sigma Delta ADC and Sampling rate can be varied up to 1Msps
- Clock Synchronization
- Phase synchronized ADC sampling
- Gigabit Ethernet and optical data interface
- Health Monitoring
- Operating Temperature: -20^{0}C to +55^{0}C.

Multi-channel Data Acquisition and Processing

- Multi-channel data acquisition and processing system for Naval applications
- High-channel count Sonar interface
- MIL-STD-810E and MIL-STD-461E compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Highly configurable, conduction-cooled system
  - Programmable sampling rate
  - Programmable channel numbers
  - Ethernet packet transmission
- ➤ 128-channel acoustic data acquisition using 24-bit Delta Sigma ADC
- ➤ Dedicated slots for each ADC module to accommodate pre-amplifiers and filters
- ➤ FPGA based scheme for multi-system synchronization
  - 64MB on-board memory support
- ➤ High-speed serial link protocol for data communication between ADC and Controller modules
- ➤ Dual Redundant Gigabit Ethernet
- ➤ Dedicated management port for system configuration and health monitoring
- ➤ DDC and DUC for high frequency signals
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

Sonar Processing System

- Front-end Processor for Sonar
- Air-cooled system
- JSS55555, MIL-STD-461F & MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Multi-channel real-time data acquisition
- ➤ Rugged Naval Console comprising of
  - PowerPC and FPGA Engines
  - Four VME based ADCs & DACs
  - Quad Pre-amplifier modules
  - Sixteen Tx-Rx Modules
  - Dual Gigabit Ethernet port
  - Dedicated management port for system configuration and health monitoring
  - Custom built 200W power supply
  - Operating Temperature: -20^{0}C to +55^{0}C.

NAVAL SYSTEMS

Proud Object Detection System

- Detect Proud Mine-like targets on sea surface

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ PODS include Four subsystems
  - Integrated electronics with enclosure for SSS
  - Integrated electronics with enclosure for FBLS
  - Tow Cable Interface Module (TCIM) (Dry-end and Wet-end)
  - Integrated electronics for compact Gap Filler Sonar (GFS)
- ➤ SSS, FBLS and GFS consists of
  - Preamplifier
  - Power Amplifier
  - Xilinx Artix-7 FPGA based Transmitter card
  - Kintex UltraScale FPGA based Data Acquisition card
  - Power Supply Unit
- ➤ LabVIEW GUI to display waveforms captured by Sonar receiver
- ➤ RTL codes (Vivado) processes and transmits the captured waveforms
- ➤ Enclosure is designed to operate at a depth of 150 meters and withstands a pressure 15 Bar
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

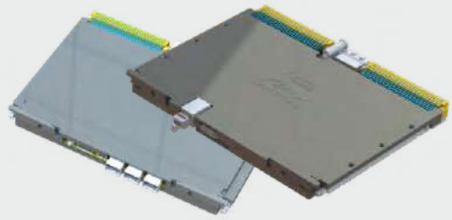
HMI for Optronics System

- High-reliability, Modular design
- Custom designed carrier card supporting both XMC & PMC form factors
- MIL-STD-1553B Interface card

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Powerful multi-function image processing console
- ➤ Intuitive, user-friendly UI application supporting video capture, recording, video switching and annotation
- ➤ 6U VPX Intel Core i7 SBC
- ➤ XMC GPGPU Graphics Card
- ➤ 4 Channel Gigabit Ethernet Interface
- ➤ 8 Channel RS232/RS422/RS485 programmable serial interface
- ➤ Dual Channel HD Video Recorder
- ➤ HD Video Distribution Unit
- ➤ Embedded application on RHEL using Qt in C++ for interfacing and controlling various Optronics subsystems
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

High Frequency Front End System



- Narrow-band and Wide-band HFFES subsystems
- Conduction-cooled system
- VME 6U system

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ HFFES system consists of
  - Front End Controller Card
  - 32CH Narrow Band or Wide Band SC Card
  - Backplane
  - Power Supply Card
- ➤ Acquires 384 channel analog signal from the array of sonar hydrophone transducers, Transmits the digitized data to remote system through fiber optics link for further signal Processing
- ➤ 32 channel Signal Conditioning Card built around Xilinx Artix7 FPGA
- ➤ Front End Controller (FEC) Card receives digital data from multiple Signal Conditioning cards and sends it to host system via optical interface
- ➤ FEC Card also built around Kintex7 Series FPGA
- ➤ Power Supply of 200VDC
- ➤ 14 Slot VME Backplane
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

System Interface Unit

- Designed for Naval Application
- Rugged, small form-factor and conduction-cooled system
- MIL-STD-461F & MIL-STD-810F compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Designed to perform data exchange functions with the external system
- ➤ Monoblock construction
- ➤ 3U VPX backplane fitted with Intel Xeon SBC, FPGA I/O card and customized relay card
- ➤ In-built navigation sensor
- ➤ Ethernet, PCIe and serial interfaces
- ➤ RHEL Linux OS
- ➤ Operating Temperature: -20^{0}C to +55^{0}C.

AIRBORNE SYSTEMS

Dal-A Certifiable Auto Pilot and Mission Computer

- DO-178C and DO-254 Level A safety certifiable airborne LRU
- Small form-factor, SWaP optimized LRU
- Rugged 6 slot 3U ¾ ATR Chassis

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Integrated Modular Avionics (IMA) Architecture using VxWorks 653
- 3U-VPX Conduction Cooled T2080 Processor Card
- AMD E8860 Graphics and Video Capture Module
- I/O Card with MIL1553, A429, RS-232, RS-422/485 Serial I/O, Analog interfaces
- 20 Port Ethernet Switch
- Custom-built 1TB SSD SATA Card, I/O Panel with MIL-38999 Circular Connectors
- Custom-built Dual redundant power supplies
- DAL-A Certifiable VxWorks 653 BSP for T2080 based SBC
- DAL-A Certifiable VxWorks 653 v3.x Device Drivers for 3U-VPX Graphics, I/O Card and Video Capture Card
- Operating Temperature: -40^{0}C to +55^{0}C.

Integrated Avionics Flight Control Computer

- IMA Architecture using VxWorks 653
- DO-160G, DO-178B and DO-254 Level A safety certifiable

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Rugged, 5-slot ¾ ATR forced conduction-cooled
- 3U, VITA 46 small form-factor design
- Built to meet ARINC 404A standards
- Sensor I/O Interfaces: CAN, ARINC717, ARINC429 Tx and Rx, Synchros, Current Drives, Discrete Tx (Gound/Open and 28/Open), Discrete Rx (Gound /Open and 28/Open), Potentiometers, Pressure sensors, RTD, Thermocouple, LVDT, Tacho etc.
- DO-160G compliant
- Operating temperature: -40^{0}C to +85^{0}C.

Integrated Avionics Display Computer

- Forced Conduction-cooled display driving Unit for Civil Aircraft cockpits
- ARINC-404A standard 3U VPX Enclosure
- Meets DO-160G standard

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- ➤ Tray mounted and Hard Mounted Variants
- ➤ Powered by DO-254 Certifiable 3U-VPX NXP T2080 Processor Card (VPX3-152 SBC)
- ➤ DO-254 Safety-Certifiable AMD E8860 Graphics Module VPX3-717
- ➤ 3U-VPX form-factor
- ➤ MIL-STD Connectors
- ➤ Custom designed enclosure
- ➤ GUI
- ➤ OS: VxWorks 653
- ➤ Operating Temp: -20^{0}C to +55^{0}C.

Airborne Radar Signal Processing System

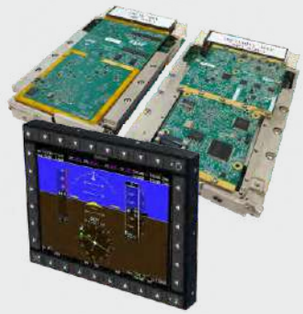
- High-end Airborne Radar Signal Processing System CEMILAC Certified
- Designed to meet Airborne standards

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- ➤ Convection-cooled VPX-VME (Hybrid) system
  - 8-slot hybrid backplane
  - Quad PowerPC DSP
  - PowerPC SBC
  - Quad sFPDP PMC
  - PMC Graphics
- ➤ Dual 8-port Ethernet Switch
- ➤ Fiber optic based sFPDP sensor data acquisition
- ➤ Multi-node processing (18 PowerPC 8641Nodes)
- ➤ Ultra-high-speed Serial Fabric implementation (SRIO)
- ➤ Multi-function display interface
- ➤ VxWorks RTOS
- ➤ Operating Temperature: -40^{0}C to +55^{0}C.

Video & Graphics Generation System



- Provides highest computing density in a 3U-VPX form-factor
- MIL-STD-810F, MIL-STD-704D, MIL-STD-461E, MIL-STD-1553B standards
- DO-254 and DO-178C Safety Certifiable

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- XMC Video card built around Artix-7 200T FPGA
- Provides Video I/Os such as ARINC video interface, RGSB and PAL
- 3U-VPX SBC based on Freescale QorIQ
  - Freescale QorIQ T2080 processor with up to 8GB of SDRAM with ECC
  - IFC (memory bus) and GPIO connectivity between processor and FPGA
  - One x4 to Backplane to interface with Graphics Card
  - Three 10/100/1000 BASE-T Ethernet interfaces
  - VxWorks 7 BSP
- 3U VPX AMD Radeon E8860 Graphics Processor Card
  - AMD E8860 GPU, with 2GB Dedicated Video Memory
  - PCIe fabric ports (one x4) on the VPX P1 connector mapped as per VITA 65
  - One x4 PCIe Gen2 interface to the XMC site as per VITA 42.3
  - CoreAVI drivers available for OpenGL
  - Conduction-cooled
- Built to meet MIL-STD 810F, MIL-STD-704D and MIL-STD-461E, MIL-STD-1553B
- Operating Temperature: -40^{0}C to +85^{0}C.

Exciter Receiver Processor

- Designed for Manned and Unmanned Aircraft
- Modular architecture for diverse computational requirements
- Operates in Ku-band

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Rugged convection-conduction cooled chassis with 3U VPX based Digital and Mistral designed RF boards
- RF Front End with Limiter & high-power Circulator and frontend Low Noise Amplifier interfacing antenna Transmitter and Receiver
- Exciter Receiver and Processing Unit built around Intel Xeon D based 3U-VPX Processor
- MIL-STD-1553B XMC Card and Serial FPDP XMC Card
- Xilinx Kintex Ultrascale based Digital Receiver (DRX) Module
- Synthesizer Module
- Timing & Waveform generator Module
- Hybrid backplane providing power and signal interconnectivity for both digital and RF boards
- Altitude range of up to 31,500 feet AMSL
- Runs VxWorks 7
- Operating Temperature: -40^{0}C to +70^{0}C.

Modular Data Processing Unit

- Airborne Data Processing Unit
- MIL-STD-461F, MIL-STD-810G, MIL-HDBK-217
- Conduction-cooled ¾ ATR Chassis

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Intel Atom E3930 Processor
- 4GBDDR3L SDRAM with ECC
- ¾ standard ATR chassis
- ARINC-429 with 24 independent Tx and 48 independent Rx channels
- MIL-STD-1553B module with six multiplexed channels
- High-speed Ethernet and FDE interface
- Discrete I/O module
- ARINC-404, MIL-C-38999 Circular, RS-422 Connectors
- Power supply with 27V Input Voltage
- Vxworks RTOS
- Operating Temperature: -40^{0}C to 71^{0}C.

Rugged Processing Unit

- Rugged Conduction-cooled, Compact Airborne Design
- MIL-STD-461 E/F compliance

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Intel Xeon 9th Generation or above
- 32 GB DDR4 with ECC
- 3U-VPX Chassis with four 3U-VPX cards and 3U-VPX power supply
- Conduction-cooled, Compact Design
- 2x10 GigE, 2x1 GigE, 2x RS232/RS422/RS485, 2x USB 3.0, 4x GPIO, 1x HDMI
- 1x XMC, 1x SATA 6 Gbps, mPCIe Gen3
- Mil-Grade High-speed High-density connectors
- MIL-STD-704D compliant 28V DC Power Supply
- Processor board and Operating system specific Built-in-Test Libraries
- Supports RHEL, VxWorks 7, Windows
- Operating Temperature: -40^{0}C to +70^{0}C.

Communication channels, Acquisition and Processing (CAP) Module

- Fetch the data or send data from/to the avionics systems
- MIL-STD-810F, MIL-STD-704D and MIL-STD-461E standards

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 3U VPX 20-port Conduction-cooled Ethernet Interface Switch
- Consists of SBC Card with XMC site, XMC Card and Backplane
- SBC card built around NXP T2080 processor
- Four AltiVec-enabled 64-bit E6500 cores, and integrates XMC and 10/100/1000BASE-T
- Carrier card designed with XMC site
  - MIL1553B, ARINC 429 Interfaces for video streaming, mass storage, additional I/O
- Runs VxWorks 7.0 on SBC
- 10/100/1000BASE-T interfaces
- MIL-1553B, ARINC-429 Interfaces
- Conform to MIL-STD-810F, MIL-STD-704D and MIL-STD-461E
- Operating Temperature: -40^{0}C to +85^{0}C.

Remote Interface Unit

- Highly miniaturized, modular, fly-worthy device
- Highly accurate altitude readings for military aircrafts in dense civil airspace
- MIL-STD-461C/E & MIL-STD-810G compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 32-bit Power Architecture CPU
- Provides High-accuracy air pressure data over Avionic bus MIL-STD-1553
- Supports Analog and Digital Pressure transducer interfaces (Frequency and RS485)
- Watch dog monitoring
- System Reset generation
- Power monitoring
- Processor health monitoring
- System Fail communication to Host System
- Weight: <1 kg
- Dimensions: 130mm x 102mm x 50mm
- Operating Temperature: -20^{0}C to +72^{0}C.

Flight Control & Display Unit

- Designed for a Pilotless aircraft
- DO-254 and DO-178B certified
- ARINC653 safety-critical certification

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- 3U Conduction-cooled Chassis
- MODE 1: PowerPC SBC + I/O Card with MIL-1553B and ARINC429
- MODE 2: Intel SBC with Graphics Card & Ethernet Switch
  - 3U VPX SATA Flash Card
  - 3U I/O Card having 16 CH ADC & DAC
  - IO Panel PCB with MIL-38999 Connectors
  - Load Sharing Power Supply
  - 500+ I/O Signals
- Weight: <12Kgs
- VxWorks-653 Safety Certified Operating System
  - Software Specification for Space and Time Partitioning in Safety Critical Avionics
- Operating Temperature: -40^{0}C to +55^{0}C.

Digital Signal Processing Line Replacement Unit

- Subsystem for Radar SP, RC and recording
- MIL-HDBK2164, MIL-STD-461F & MIL-STD-810F compliant
- Custom Hybrid Backplane (VME and VPX)

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Xilinx Virtex-5 and Virtex-6 processing engine
- High-speed Gigabit Ethernet
- RF input and output through SMA connectors
- Inter-board communication through 3.125Gbps SRIO/AURORA protocols
- RS232 and RS422 Serial Ports on front panel for communication and debugging
- Single-channel sFPDP high-speed Fiber Optical Module
- 16 SMA connectors for RF Input and Output
- Multiple operating systems - Xilkernal & Linux
- Operating Temperature: -40^{0}C to +55^{0}C.

Mission Computer Simulator

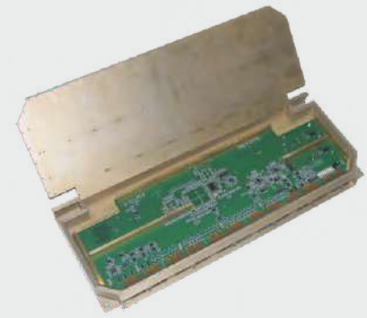
- Surveillance and Target Detection & Tracking Simulator
- DO-178B Level C certifiable
- MIL-STD-810G, MIL-STD-704D, MIL-STD-2164 and MIL-STD-461G compliant

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- 6-core, Intel Xeon processor-based hardware with video recording
- Base Frequency: 1.9GHz
- ARINC-818 controller for video acquisition
- MIL-1553 and Serial Controller for command communication
- 12-inch TFT/LCD HMI Display (1024x768)
- Video Graphics Card with 2GB graphics memory and ARINC-818 video input
- Record (raw and encoded) and replay software
- Safety of Flight Test (SOFT) Qualification
- SSD Storage: 512GB; Video: 4TB
- Power Supply: 115V ~AC, 28V DC
- AL 6061 T6 Chassis with MIL-D-38999 connectors
- IP65 class mechanical enclosure and keyboard
- Linux – RHEL OS
- Operating Temperature: -20^{0}C to +55^{0}C.

Active Antenna Array Unit Controller



- Controller system for Electronically Scanned Antenna Arrays
- DO-178B Level C process for software development
- CEMILAC and DGQA certified

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Distributed computing in software and FPGA for beam steering application
  - PowerPC controller module running VxWorks
  - Power and signal backplanes for interfacing controller module and antenna arrays
  - On-board FPGA to control the interfaces for PR and SSR modules
- Interfaces for culmination and calibration of antenna elements
- Built-in-Test (BIT) for continuous health monitoring and fault analysis
- Independent Verification and Validation
- Controls the antenna beam forming unit
- Controls beam controller unit and mono-pulse comparator unit
- Monitors the health status of the multi output power supply
- Operating Temperature: -40^{0}C to +85^{0}C.

ELECTRONIC WARFARE

Advanced DF System

- Custom variants for Airborne and Shipborne environments
- CEMILAC Certified
- DO-178B Level C based Algorithm Development

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Dual Virtex-6 FPGA Engines
- ➤ FMC ADC modules
- ➤ Five channels of phase coherent signal acquisition
- ➤ Wideband DDC implemented in FPGA
- ➤ VPX system consisting of
  - FPGA DSP Engine
  - PowerPC 8640D processor
  - Quad 16-bit ADC FMC modules
  - Clock distribution
  - Ethernet distribution
- ➤ 28V DC or 230 AC Power input options
- ➤ MIL-STD-810E and MIL-STD-461E compliant
- ➤ VxWorks RTOS
- ➤ Operating Temperature: -40^{0}C to +70^{0}C.

UAV DF

- DF Processing Unit for UAV applications
- CEMILAC approved LRU
- Low weight and low power

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Suitable for operation at 32500Ft above sea level
- ➤ Rugged design with IP67 sealing
- ➤ Two channel IF input
- ➤ One PPS interface for GPS synchronization
- ➤ Gigabit Ethernet for Clients interface
- ➤ Customized DF algorithm implementation
- ➤ Customized Qt Client interface
- ➤ VxWorks RTOS
- ➤ Operating Temperature: -40^{0}C to +55^{0}C.

DF Processor LRU for Comint Applications

- High-compute Processing System
- Light-weight Magnesium Alloy (AZ91D) chassis
- MIL-STD-461F

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Xilinx Virtex-6 FPGA based embedded high-performance digital signal and image processing system (CW Champ Fx3)
- AltiVec™-enabled dual-core Freescale™ Power Archtiecture™ MPC8640D processor
- Rugged, high-performance 6U OpenVPX Intel Core i7 Broadwell Single Board Computer (VPX-1959)
- Rugged 6U OpenVPX™ Chassis
- Operational band of 30 MHz to 6 Ghz
- Light Weight solution <15kg with better tensile strength over Aluminum Alloy
- Lower thermal conductivity, 72W/MK
- High scan rates of 20 GHz/s with accuracy of 0.1 degrees
- Supports Frequency scan, Bearing estimation, LPI detection, Location fixing
- Windows based User Interface
- VxWorks RTOS
- Operating Temperature: -40^{0}C to +55^{0}C.

Direction Finding System

- High-end DF System
- MIL-STD-461F and MIL-STD-810F Compliant
- DO-178B Level C compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 5-channel system for Airborne Surveillance and Naval Platforms
- Advanced system for position data computation in VHF/UHF frequency range
- Bearing estimation of detected signals
- Location fixing of selected signals
- Five types of DF System clients
  - Manifold collection client, DF client, Maintenance mode client, Location Fixing client, DF System testing client
- Client collects data from DS and displays using Windows GUI on user request
- VxWorks RTOS
- Operating Temperature: -40^{0}C to +55^{0}C.

Wide Band Acquisition Card

- Conduction-cooled 6U VPX form-factor card
- High-speed, signal fidelity and on-board real-time data processing

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Dual high-speed, high-density Arria-10 FPGAs
- 8 Nos of 12-bit JESD204B compliant ADCs
- Programmable JESD204B compliant clocking section
- 4 lane PCIe connection from each FPGA to VPX backplane
- Gigabit Ethernet, RS232 and RS422 serial links from each FPGA to backplane
- 2GB of DDR4 per FPGA and 64GB of NAND flash per FPGA for recording acquired data
- Hard Reset Control through firmware or external reset; soft reset through software
- High-speed 4 lane Serdes interconnection between FPGAs
- 3-slot 6U VPX backplane offering 10 Gbps performance
- 2x Ethernet PHY Transceivers with RJ45 connector
- 2x PCIe X4 Slot connectors from each VPX slot
- MIL-STD-461F and MIL-STD-810F Compliant
- Supports VxWorks 6.9 OS
- Operating Temperature: -40^{0}C to +71^{0}C.

Radar Jamming System

- Qualified for Aerospace application
- DO-254 and DO-178B certified
- Hybrid system architecture for RF & Digital modules

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Supports multi-channel signal acquisition upto 18GHz, waveform Generation and signal reconstruction
- 15-slot, 3U VPX liquid cooled system
  - QorIQ Quad core SBC running VxWorks for communication and control
  - Multiple Virtex7 FPGA based SBC for data acquisition and processing
  - 100MHz OCXO module clock stability
  - Operates at 115V 3-phase, 400Hz aircraft power supply
- Supports GigE, MIL-STD-1553B, ARINC-429 and USB interfaces
- VxWorks RTOS
- Operating Temperature: -40^{0}C to +55^{0}C.

Electronic Control Unit

- Monitors and controls the operations of an Airborne Liquid Cooling System (ALCS)
- DO-254 and DO-178B certified
- MIL-STD-461F

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Microcontroller based programmable system
- Receives and processes data from sensors in ALCS
- Bridges between ALCS and external EW controller
- Consists of Digital Control module, Power & Relay module
- **Analog Signals:** Coolant temperature, RAM air temperature, Turbine outlet temperature, Pump motor winding temperature, Coolant Pressure, Liquid Level, 115 V 3-Phase 400Hz (for phase sequence measurement
- **Digital Signals:** Pump, Fan RPM Sensor, Cooling unit OPEN/GND command, Valve full open/close sensors, ATP/OFP Selection Signal, Reset Signal
- **Control Signals:** Cooling Fan motor control, Cooling pump control signal, RAM AIR Heater control, Actuator & Solenoid valve control signal, 2-way RS422 serial communication signal to EW Controller and Host PC, JTAG Interface for debugging and programming
- Power Supply: 115V, 400Hz 3-phase AC
- Conduction-cooled system
- MIL-STD-461F, MIL-STD-810G, MIL-STD-704F
- Operating Temperature: -40^{0}C to +71^{0}C.

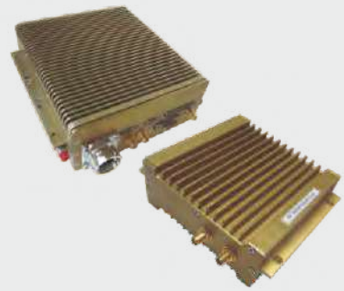
Digital Receiver

- Quad Channel Digital Receiver (QCDRx) LRU for EW applications
- Conduction/Convection-cooled

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Carries out high-speed real-time data acquisition, IF processing and pulse detection to generate Pulse Descriptive Words (PWDs)
- Based on Xilinx Kintex Ultrascale FPGA & TI ADC modules
- High-speed digital processing configuration
- Wide-band Data Acquisition and Processing Card
- External interfaces like Optical Media Link, 24 LVDS, JTAG, RS232, RS422, 1G Ethernet, 1 PPS
- 3U VPX module
- 230V AC input
- Operating Temperature: -40^{0}C to +55^{0}C.

Digital RF Memory



- New generation DRFM Platform
- Platform for RTS and ECM
- Modular design comprising of three subsystems

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- RF Front-end
  - IQ Demodulator / Modulator - RF (1.5GHz to 2.5GHz) to IF (from DC to 500MHz)
  - Amplitude imbalance of ±2dB for the entire band for loop-back
- IF processor
  - Dual channel high-speed ADC and DAC
  - Dual 8-bit ADC to receive 500 MHz IQ data
  - Two 14-bit DAC capable of sending 1.2GHz IQ data
- Digital Processor
  - Dual Virtex5 with 32MB high-speed QDR-II SRAMs
  - 600MHz high-performance Blackfin DSP Engine
  - Ethernet for host interface and 64 GPIO lines for custom user interface
- Operating Temperature: -40^{0}C to +55^{0}C.

Ku Band Signal Data Recorder

- Designed for EW applications
- Narrow band Microwave signal data recorder
- Conduction-cooled design

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Conduction-cooled design for rugged military application
- High-performance DSP and FPGA for Signal Processing
- Intercept RF range up to 20GHz with 1GHz bandwidth
- Stored data retrieval through Ethernet interface for analysis
- GPS assisted data recording
- Operating Temperature: -40^{0}C to +55^{0}C.

Communication Interface Unit

- Manages communications between Interrogator, Radar Controller and Encoder in IFF Radar
- IP65, MIL-HDBK2164, MIL-STD-810F and MIL-STD-461E compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Conduction-cooled unit using aluminum alloy 6082
  - GPS receiver operated at L1 frequency
  - FPGA with embedded PowerPC
  - On-board 100 MHz Oscillator
  - 12 LVTTL I/O signals
  - Configurable RS422 transceivers
  - Health monitoring capability
- Dimensions: 300 x 255 x 180.5 mm
- Weight < 5kg
- Operating Temperature: -40^{0}C to +55^{0}C.

Electronics Support Measurement Processor

- High-end Hybrid Signal Processing System
- Conduction Cooled system for Airborne Applications

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 6U VPX chassis custom backplane and Conduction-cooled enclosure
- Dual Virtex 5 FPGA and Dual core PowerPC Engine
- 256GB solid state XMC Flash Module with secure erase facility
- Optimized IPC\DSP Libraries
- HDK for FPGA with Optimized IP cores
- Customized VPX based Virtex5 Tester card to simulate sub-system
- VxWorks RTOS
- Operating Temperature: -40^{0}C to +55^{0}C.

TELEMETRY SOLUTIONS

Telemetry Solutions

- Analyzes flight parameters in airborne applications
- Conforms to IRIG 106 Class 2 specifications
- MIL-STD-461E, MIL-STD-810G, MIL-704C compliant

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Flight parameter acquisition
- Flexible and scalable multi-channel acquisition
- Supports multiplexed sampling of 100+ channels
  - Analog, Discrete, 1553B, Electrical and digital sensors
- FPGA based solution for high product reliability
- Built-in Linearization for RTD and Thermocouple channels
- GUI to configure all programmable parameters
- MIL-Grade enclosure
- Operating Temperature: -40^{0}C to +70^{0}C.

UAV Video Telemetry

- UAV mounted camera with airborne transmitter and ground station receiver
- MIL-STD-810F, MIL-STD-461D/MIL-STD-462D compliant

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- Dual stream digital raw video interface to FPGA
- Digital Processor for video encode and decode
- Metadata capture
- RF link
- Video bit-stream processed by SoC
  - RTP stream over Ethernet link to remote station
  - Decoded for local display over SDI
- Recording to SATA HDD
- 65% weight reduction over existing system
- Conduction-cooled system
- Operating Temperature: -40^{0}C to +70^{0}C.

Miniature Telemetry Encoder

- Designed for hi-g shock environment
- Analyzes flight parameters in airborne applications
- MIL-STD-461E compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Integration of Analog signal conditioning, PCME encoder, S-band transmitter and battery pack
- ➤ Houses eleven channel MEM sensor
- ➤ Built-in-Linearization for RTD and Thermocouple channels
- ➤ GUI to configure all programmable parameters
- ➤ Programmable delay power on time, duration: 5 sec to 90 min
- ➤ Flexible and scalable multi-channel acquisition
- ➤ Bi-phase data is programmable up to 5 Mbps
- ➤ Operating Temperature: -40^{0}C to +70^{0}C.

Integrated Telemetry System

- Designed for hi-g shock environment
- Analyzes flight parameters in airborne applications
- MIL-STD-461E, MIL-810G, MIL-704C compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Flexible and scalable multi-channel acquisition
- ➤ Small form-factor - PCM encoder and S-band transmitter
- ➤ Supports AES128 and AES256
- ➤ Integration of Analog signal conditioning, PCME encoder, S-band transmitter and battery pack
- ➤ 101 channels consist of 1553B, discrete channels, Electrical channels and sensor channels
- ➤ Built-in-Linearization technique for RTD, Thermocouple channels
- ➤ Programmable delay power on time, Duration: 5 sec to 90 min
- ➤ Operating Temperature: -40^{0}C to +70^{0}C.

RF SYSTEMS

L-band Transceiver (LTR) Systems

- High-speed Communication System with integrated RF
- D0-178C Level C and DO-254 certified
- MIL-STD-461G and MIL-STD-704F certified

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- High-speed Baseband Processing Card based LTR systems
- Intel Stratix 10/Arria 10 based 3U-VPX Baseband Processing card
- High-speed RF ADC & DAC, and RF transceivers
- DC-DC converter card - 28V DC input, 5V, 15V and 28V output
- Tx/Rx filters: Attenuation: 55 dBc; Impedence: 50 Ohm; Max Power: 1W
- L-band Automatic Gain Control (AGC) to maintain a suitable signal amplitude at its output
- SRFE for SLTR (service link) Gain: 60dB; Noise: 4dB
- 4x TSE Ethernet, 3x RS422, 3x RS232, JTAG & other I/Os
- Al Alloy 6061 T6 3U-VPX based Mechanical Enclosure
- Power Supply: 28V DC, 15V DC and 5V DC
- BSP for application development
- Operating Temperature: -40^{0}C to +85^{0}C.

S-band Transmit-Receive Multi Module

- TRMM for S-band Phased Array RADARs
- MIL-STD-461E and MIL-STD-810D compliant Compact Modules with GaN technology
- Qualified for Airborne applications

SD SP BD FPGA MD COTS

SS AI AD T&V SI QA

- High-power 100W modules
- Receiver Performance
  - 30dB Gain
  - Noise figure less than 3dB
- Beam Steering using Phase shifter and Attenuators
- Digital Output power control (Transmit) while maintaining the PA in saturation
- Windows based GUI Software
- Size: 238mm x 358mm x 25mm
- Weight: 2.5kg
- Operating Temperature: -40^{0}C to +71^{0}C.

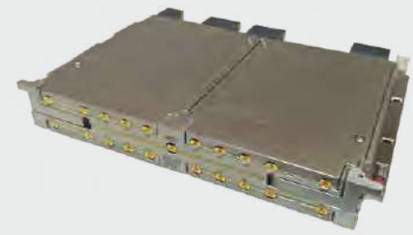
C-band Synthesizer

- Generates and up converts a pulse compressed baseband to C-band
- MIL-STD-461E and MIL-STD-810E Compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- Provides a stable clock for C-band Radar system using DDS (Direct Digital Synthesis)
- Sitara ARM Cortex-A8 processor module
- FPGA based Digital waveform generator capable of generating Radar waveforms at IF level
- 16-bit one GSPS DAC for converting digital waveform into analog waveform
- 28V input power connector
- The various oscillators synthesized are:
  - STAMO (5.4 to 5.9 GHz)
  - LO2 (4.14 to 4.59 GHz)
  - LO1 (1200 Mhz)
  - DDS Module Clock (50 Mhz)
  - Transmit Waveform
  - Master Clock (50 Mhz)
  - Wave Form Generator Module (60 MHz LFM)
  - COHO (60 Mhz)
- Operating Temperature: -40^{0}C to +85^{0}C.

RF Acquisition Module (RFAM)



- Electronic Countermeasure System (ECM) for Airborne applications
- MIL-STD-461F and MIL-STD-810F compliant
- Conduction-cooled system

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- 6U VPX with one Intel Cyclone V FPGA for digital control
- Channelizes RF with 1-6GHz bandwidth into sub-bands for further processing and analysis in receiver unit
- Supports 4 antenna inputs and 16 RF outputs
- 50dB isolation between RF channels
- Programmable attenuation control and RF path switching
- Operating Temperature: -40^{0}C to +85^{0}C.

Test Automation for Tx/Rx Module

- Test automation for a RF Transmit/Receive modules
- Automated generation of test reports

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Test Suite and Test Framework
- ➤ Supports frequency range from 1GHz to 24GHz
- ➤ Supports 7+-channels and 40+ frequency spots which can be customized to any number of channels and frequency spots.
- ➤ Measures Transmit power, Rise Time, Fall Time, Pulse Width, Droop for Transmit signals
- ➤ Measures Transmitter Gain, Phase Shift, Input Return Loss, Output Return Loss (Tx S parameters)
- ➤ Measures Tx Harmonics Rejection, Tx Spurious Rejection, P1dB (Compression Point)
- ➤ Receiver Gain, phase shift, Input Return Loss, Output Return Loss (Rx S-parameters)
- ➤ Receiver Noise Figure measurement
- ➤ Power Efficiency Measurement
- ➤ Band Pass Filter Characteristics
- ➤ Test automation for Raw Data collection and calibration of DUT as well as instruments
- ➤ Instrument calibration data is also automatically attached to test reports.
- ➤ Easy-to-use Python based UI/UX
- ➤ Operating Temperature: 0^0C to $+55^0$C.

3U Wideband RF Unit

- Airborne Radar Jamming System with Wideband Exciter Receiver and Radar Target Simulator
- Liquid-cooling system
- MIL-STD-704 E, MIL-STD-461E compliant

SD SP BD FPGA MD COTS
SS AI AD T&V SI QA

- ➤ Built around Xilinx ZynqUltraScale+ RFSoCGen 3 based RFSOC card
- ➤ Xilinx Virtex 7 based SBC, Digital Input Output card (XC7A50T-1FGG484I)
- ➤ Xilinx Kintex Ultrascale based Data Acquisition Module (DAM)
- ➤ OCXO module, Power supply module
- ➤ Hybrid Motherboard, Inbuilt Dual Channel Down/Up convertor
- ➤ Gbit Ethernet, sFPDP, MIL-STD-15538, ARINC429
- ➤ Linux, VxWorks Support
- ➤ Transmits waveform, reception and down-conversion of signals to baseband and capture, modulate and replay the signal
- ➤ 3U Mechanical chassis
- ➤ Digital and RF modules in the range of 0.5 - 40GHz
- ➤ Operating Temperature: -40^0C to $+85^0$C.

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