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Advanced RF and DSP Solutions

At Abaco Systems, data acquisition is just the beginning. abaco.com | [@AbacoSys](https://twitter.com/AbacoSys)



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R&D TOOLS ADC IP FPGA SIGNAL PROCESSING DSP SDR Software FMC COMMUNICATION Training DAC



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Our Capabilities

The ability to capture still or moving images, radio transmissions and radar/sonar signals and to turn them into actionable information is growing rapidly in importance for military organizations around the world. The requirement is not only to capture increasing numbers and types of these analog phenomena, but to transmit them more quickly, to process them more speedily and to deliver intelligence more swiftly than ever before.

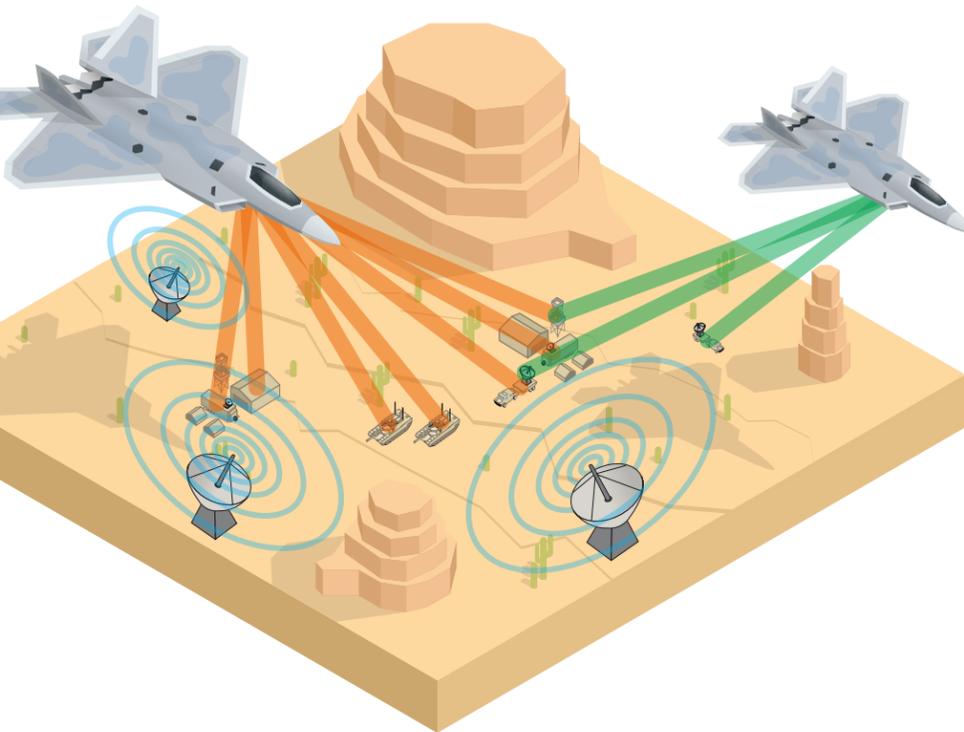
To help you achieve challenging goals, you need significant expertise and experience in analog-to-digital and digital-to-analog conversion as well as digital signal processing. Abaco Systems complements your expertise and experience; we're an acknowledged leader in the field of sensor processing with our Advanced RF and DSP products.

You can take advantage of our extensive capabilities in a broad range of applications including video compression, software defined radio, signals intelligence, situational awareness, electronic warfare and radar/sonar.

Our customers use Abaco products to capture or transmit analog signals from acoustic to radio frequencies, process high definition video for storage or transmission over a low bandwidth network, transmit high bandwidth data over large distances via optical links, or even process existing digital data via highly capable and power-efficient FPGA devices.

Maximizing your competitive advantage

Our digital signal processing capabilities are equally applicable in medical imaging, wireless communications, and test and measurement applications – in fact, any application that needs to process analog data. For prime contractors and systems integrators looking to bring unique value and to focus on solution differentiation and competitive advantage while minimizing cost, risk and time to market, Abaco offers extensive, commercial off-the-shelf (COTS) options.



Many of Abaco's RF and DSP products are available in any of five levels of ruggedization. This, together with Abaco's focus on minimizing SWaP – size, weight and power – means you can deploy our solutions with absolute confidence in harsh, constrained environments such as unmanned vehicles.

Broad product range

Abaco's product offering extends far beyond Advanced RF and DSP products; it includes mission ready systems in a range of configurations. These are pre-integrated and pre-validated, delivering a true off-the-shelf solution that you can deploy faster and at lower cost. Our single board computers are available in 3U and 6U form factors, while

our powerful, sophisticated multiprocessors for High Performance Embedded Computing (HPEC) are designed for your most demanding signal processing tasks, and are supported by Abaco's AXIS software development environment to shorten your development timescales.

Abaco, through our unique relationship with NVIDIA, is also a pioneer in the use of GPGPU – general purpose processing using graphics processing units – technology to help you deliver outstanding throughput for demanding applications.

Beyond this, you can benefit from Abaco's ability to offer the industry's most advanced graphics/video capabilities, and a broad family of secure switches and battlefield routers – providing guaranteed interoperability.

Many of Abaco's RF and DSP products are available in any of five levels of ruggedization.

APPLICATIONS



Electronic warfare/electronic countermeasures

Advanced RF and DSP technologies are at the heart of leading edge Electronic Warfare (EW) applications. Abaco delivers state-of-the-art analog interfaces with our flexible FMC products when paired with the latest FPGA streaming DSP technology from Xilinx - all built on open standard form factors such as VPX, XMC, and PCI Express to give you optimum flexibility.



Multifunctional radar

Today's sophisticated radar processing is reliant on new multi-core processors that offer outstanding performance/watt; on serial switched fabrics that offer high bandwidth board-to-board data transfers; and on software tools to maximize developer productivity. Abaco fulfills all your requirements.



Video processing

Abaco offers video compression boards that provide you with a range of scalability, latency, and SWaP specifications, with the H.264 codec providing the most effective blend of high quality video while achieving better than 95% compression rates to deliver low bandwidth, low latency, high quality video from high definition sources.



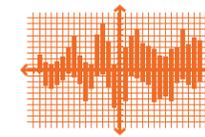
ISR (Intelligence, surveillance, reconnaissance)

High speed A/D conversion is critical for ISR applications. You can take advantage of Abaco's broad portfolio of board- and system level products that can be configured to meet your most demanding requirements. These have been integrated by many major global defense contractors into signals intelligence solutions to support ISR applications in tactical environments.



Signals intelligence

FPGA processors are at the heart of many of Abaco's sensor processing solutions, providing our customers with the computational performance and flexibility to enable them to address a broad range of demanding DSP applications in ground-, airborne- and naval applications including signals intelligence.



Spectrum monitoring

Rugged Abaco IF receivers are used in spectrum monitoring applications to detect and locate IEDs, an application that requires the repeated scanning of a wide range of frequencies.



Unmanned vehicle telemetry systems

As well as being rugged enough to withstand the rigors of combat operations, Abaco solutions are designed to minimize use of space, weight and power (SWaP) – making them ideal for deployment in harsh, constrained environments.



Radar/sonar

Our products include several powerful features which are key to acoustic applications, including simultaneous sampling across a large number of channels (including channels that span multiple cards) plus reliability/redundancy features for 24/7/365 operation. The daqNet acoustic acquisition server provides you with higher performance, higher channel density and simpler integration compared to board level solutions



Our Solutions

ELECTRONIC WARFARE



The reliance of today's Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) systems on the RF spectrum means that such systems must be prepared to meet the modern Electronic Warfare threat. Low end-to-end latency, high bandwidth and large computational resources are all key requirements of today's electronic warfare systems.

A key characteristic when you select an ADC for an EW application is the latency inherent in the interconnect from ADC and DAC to FPGA. Abaco's FMC portfolio includes a range of FMCs with high bandwidth and low latency. For example, the FMC170, with 5GSPS data rate and sub-100ns latency, is ideal for electronic warfare applications. For electronic warfare applications that are less sensitive to latency, the FMC120, with four channels of input and output at 1GSPS, is an optimum solution.

Next generation EW systems require more bandwidth and more processing capability at lower power and size. The rugged VP880 responds to this, helping customers meet

these often-conflicting requirements on an open COTS platform, and delivers the performance, flexibility and rugged reliability that enable the most demanding application challenges to be overcome.

With Xilinx® Ultrascale™ and Zynq® Ultrascale+™ technology, the VP880 delivers high density computational resources in a small 3U form factor. Having the ability to secure and to scale an EW system over time is critical to the longevity of your solution since adversaries are constantly evolving their electronic attack and defense techniques.

To help mitigate the impact of obsolescence, as well as to enable a cost-effective response to more demanding threat scenarios, the VP880 has a migration path to future FPGA devices. Customers can also leverage built-in security features like encrypted bit streams and secure boot capability to keep their IP secure. Additionally, the VP880 offers I/O flexibility through its support for Abaco's extensive range of FMC and FMC+ cards as well as third party cards.



VP880 High Performance Signal Processing

Features:

- > Choose from seven Kintex or Virtex Ultrascale FPGAs
- > Zynq Ultrascale+ MPSoC with advanced security features
- > FMC+ site for configurable I/O

VIDEO COMPRESSION/FRAME CAPTURE

Abaco offers a compelling range of video processing solutions for embedded applications in the military and aerospace market including data capture, processing, storage, compression, decompression and display capabilities.

Our focus is on providing the features that are key to your application achieving high compression ratios while maintaining visual accuracy. At the same time, our solutions target applications that require minimal SWaP such as unmanned vehicles. By combining FPGA and DSP technologies, Abaco offers extensive programmability and flexibility in order to meet your needs across a wide variety of platforms and solutions

Video Streaming Solutions

The rugged ICS-8580 video streaming XMC, for example, is highly appropriate for deployment on unmanned aerial vehicles (UAVs), such as its combination of high performance and small size and weight and low power consumption. The module is tailored to the requirements of users who design video streaming solutions, offering a range of features needed to meet the many, often conflicting, demands of unmanned vehicle video streaming applications. These demands include ultra-efficient compression, scalability, input flexibility and versatile codec settings.

The ICS-8580 can capture video inputs and archive or stream them over Ethernet, managing multiple streams and performing capture, manipulation, conversion, compression, storage, decompression and video display. It has been widely deployed in programs such as NASA's Global Hawk initiative. Featuring H.264 video codec technology, which is widely regarded as being the optimum solution (it is considered to be up to 3x as efficient as other codec solutions) it allows vital image detail to be retained while occupying the minimum possible bandwidth or storage.



ICS-8580 Rugged Video Capture, Compression, Streaming and Archiving

Features:

- > High performance H.264 encode/decode with KLV metadata
- > Dual HD channel encoding up to 1080p/1600x1200
- > Ultra low latency

At the heart of the ICS-8580 lies a combination of a versatile FPGA device coupled with powerful dual DSP signal processors, providing unparalleled compute power for your video applications.

The FPGA enables video switching, format conversions, scaling, blending and other processing functions while the dual DSP processors enable multichannel video compression and decompression for over 100x reduction in bandwidth with minimal impact on video quality.

RADAR DIGITAL SIGNAL PROCESSING

Radar systems that use digital beamforming today must be able to calculate enormous amounts of information at near real-time speeds, have high bandwidth input connections, and have customizable processing algorithms at a sufficient data rate.

Abaco FPGA cards provide you with a high degree of flexibility in selecting the right FPGA device for almost any beamforming application. For example, the 6U VPX VP868 is densely packed with computational resources and analog input or output options.

It features two Xilinx Ultrascale FPGAs, one Zynq SoC, two FMC+ sites and 36GB onboard memory, providing unprecedented performance for beamforming applications. A choice of seven Kintex or Virtex Ultrascale devices is available.



Our FMC portfolio includes a variety of high channel count, high bandwidth FMCs. The FMC168, for example, has eight 16-bit channels with a data rate of 250MSPS, making it ideal for the high bandwidth requirements of digital beamforming.



VP868 High Performance Signal Processing

Features:

- > Dual FPGAs and Zynq SoC plus a migration path to Ultrascale+ devices
- > Dual FMC+ sites for high density analog input or output
- > 36GB onboard DDR3 memory

ACOUSTIC AND SONAR



daqNet 1U Autonomous High-Speed Acoustic I/O Data Processing Solution

Features:

- > Up to 192 channels of acoustic I/O or 240 channels of digital I/O
- > Fully integrated with precise sampling synchronization across multiple servers
- > User configurable digital I/O module with immediate, external signal or time-based trigger

Abaco was one of the first companies to offer COTS products for acoustic applications that include sonar, vibration analysis and test and measurement, combining the best in analog and digital technologies.

The ICS-1620 is a 16-channel, 2.5 MHz 16-bit DAC short form factor PCI Express module designed for high end acoustic applications. Ideally suited for sonar transmit and simulation applications, it offers a higher output signal bandwidth than can be achieved with boards using traditional delta-sigma DACs. The result is a product that enables you to create high channel count and high frequency systems which previously required custom hardware – minimizing risk, cost and time to deployment.

Combining the ICS-1620 with one of the SBCs, multiprocessors, and/or chassis available from Abaco provides you with a powerful platform for sonar applications.

No less representative of Abaco's innovative sonar solutions is daqNet, which is designed for today's network-centric



environment. An autonomous high-speed acoustic data processing solution, daqNet provides data connections and control capabilities by means of a dual Gigabit Ethernet interface within a 1U form factor.

daqNet has been optimized to provide high performance, high-speed signal conversion capability for up to 192 channels of analog I/O and 240 channels of digital I/O. The redundant dual Gigabit Ethernet is easily configurable utilizing SNMP and traditional network transport protocols.

Our Products

Systems

| PRODUCT | FORM FACTOR | PROCESSOR | FPGA TYPE | I/O TYPES | COMMENTS |
|---------|-------------------|-------------------------------|---------------------------------------|-------------------------------------|-----------------|
| CRS800 | Small Form Factor | Intel Atom Quad Core 1.91 GHz | Kintex Ultrascale | Multi-channel A/D and D/A using FMC | Air, Conduction |
| VPX167 | 3U VPX | Intel Quad Core i7 | Kintex or Virtex Ultrascale | Multi-channel A/D and D/A using FMC | Conduction |
| VPX370 | 3U VPX | Intel Quad Core i7 | Kintex or Virtex Ultrascale, Kintex-7 | Multi-channel A/D and D/A using FMC | Air |

FPGA Mezzanine Cards (FMC)

| PRODUCT | FORM FACTOR | FUNCTION | # CHANNELS | DATA RATE (MSPS) | RESOLUTION (BITS) | CONNECTOR | SIGNALING | COUPLING |
|---------|-------------|---------------|------------|------------------|-------------------|-----------|-----------|----------|
| FMC120 | FMC | ADC / DAC | 4 / 4 | 1000 / 1250 | 16 / 16 | HPC | JESD204B | DC |
| FMC170 | FMC | ADC / DAC | 1 / 1 | 5000 / 5000 | 10 / 10 | HPC | LVDS | AC |
| FMC116 | FMC | ADC | 16 | 125 | 14 | HPC | LVDS | DC |
| FMC216 | FMC | DAC | 4, 8, 16 | 1250, 625, 312.5 | 16 | HPC | JESD204B | DC |
| FMC150 | FMC | ADC / DAC | 2 / 2 | 250 / 800 | 14 / 16 | LPC | LVDS | AC |
| FMC424 | FMC | Digital Comms | 2 | 40000 | - | HPC | GBT | - |

FPGA Carrier Cards

| PRODUCT | FORM FACTOR | FPGA TYPE | FMC SITES | MEMORY | COMMENTS |
|---------|-------------|---|----------------------|--|----------------------------------|
| VP880 | 3U VPX | UltraScale Kintex or Virtex, Zynq UltraScale+ MPSoC | 1x HSPC/FMC+ | 8 GB DDR4 mapped to FPGA and 2 GB DDR4 mapped to Zynq | - |
| VP868 | 6U VPX | 2x Ultrascale Kintex or Virtex | 2x HSPC FMC+ | 36 GB DDR3 SDRAM w/ ECC | Optionally 1x Virtex and 1x Zynq |
| PC821 | PCIe | Ultrascale Kintex or Virtex | 1x HSPC/FMC+, 1x HPC | 8 GB DDR4-2133 SDRAM SO-DIMM | - |
| FM780 | XMC | Virtex 7 | Optional | 2 GB DDR3 SDRAM and configurable memory options with 2 BLAST sites | FMC site takes second slot space |

Sensor Processing

| PRODUCT | FORM FACTOR | CHANNELS | FUNCTION | MAXIMUM SAMPLING/ CONVERSION FREQUENCY |
|----------|--------------|-------------------------|---------------------------------------|--|
| SPR870A | 3U VPX | 2 in, 2 out | Transceiver (analog input and output) | 1.375 GHz |
| SPR507B | XMC | 4 | Quad Serial FPDP Interface | - |
| daq8580 | Standalone | 2HD or 4SD | Video compression | 60 fps |
| ICS-8580 | XMC | 2HD or 4SD | Video compression | 60 fps |
| daqNet | 1U rackmount | 192 analog, 240 digital | Acoustic data processing | 625 kHz/ch |
| ICS-1620 | PCIe | 16 analog output | Analog output | 2.5 MHz/ch |
| ICS-1640 | PCIe | 16 analog input | Analog input | 2.5 MHz/ch |