



Doing business with Acromag means you can count on our 60+ years of industry knowledge when choosing your supplier. A global network of sales professionals gives you local access to friendly, highly trained support specialists. At the US factory, we guarantee support with a real person within one business day.

## The Embedded I/O Experts With Over 60 Years of Experience

Established in 1957, Acromag is recognized internationally as a leading designer of high-performance analog, digital, serial and FPGA I/O solutions for PCle, VME, VPX and CompactPCI computer systems. High-density modular solutions include AcroPack®, Industry Pack, PMC/XMC, and COM Express mezzanine modules. These rugged modules and embedded computers are ideal for deployment in defense, aerospace, and scientific applications.

We believe that I/O solutions should be dependable and offer superior value. That's why all of our products are guaranteed to exceed their rated performance specifications and manufactured to AS9100 and ISO 9001 quality standards. Plus, we offer personalized support so you have complete control of your I/O.

#### **Certifications and Quality**

Acromag takes every safeguard to guarantee you dependable operation. State-of-the-art manufacturing techniques and extended burn-in cycles add an extra degree of ruggedness.

Multi-level inspections and aggressive testing further ensure you that all boards perform at or beyond rated specifications.

























## I/O Solutions for Modular Open System Architectures



#### **Single Board Computers**

Acromag processor boards are available in 3U and 6U form factors for OpenVPX and VMEbus computing systems. Powerful CPUs, high-speed memory and plenty of I/O interfaces offer an effective solution for many applications. Versions with front I/O simplify laboratory development systems while conduction-cooled models are ready for field deployment.

#### Mezzanine I/O Modules and Carrier Cards

New VITA 93 QMC and ruggedized mini-PCIe AcroPack modules are ideal for small form factor systems or to provide high-density I/O interfaces. XMC modules help expand high-speed Ethernet capacity. Dozens of modules are available to mix and match functions including A/D, D/A, discrete I/O, serial communication, and bus interfaces to meet your unique requirements.

Carrier cards for VPX, VME, CompactPCI, and PCI Express platforms host multiple mezzanine modules to facilitate adding I/O to any system.

#### **User-Configurable FPGAs**

Acromag's FPGA modules offer the ability to create custom I/O boards. Load your instruction sets or algorithms into the module's FPGA to control the I/O for simulation, communication, diagnostics, filtering, image processing, and other applications.

Select from a wider variety of solutions ranging from the AMD Zynq UltraScale+ MPSoC with integrated ARM processors and programmable logic to the cost-optimized Artix 7 FPGAs. Acromag FPGA solutions are available on XMC and AcroPack mini-PCle modules to provide greater flexibility and easier system integration.









## Custom Embedded Computing with Re-Configurable FPGAs on Off-the-Shelf Mezzanine Modules

Acromag's line of user-configurable FPGA I/O modules offer the ability to create custom I/O boards. Just download your own instruction sets into the I/O module's FPGA. You can use your own application program to control the module's analog or digital I/O channels for simulation, communication, diagnostics, image processing and other applications.

#### **Faster and Easier Development**

To help you develop custom programs, Acromag offers an Engineering Design Kit. This kit provides utilities to help you load VHDL into the FPGA and to establish DMA transfers between the FPGA and the CPU. Kits include a compiled FPGA file and example VHDL code for the local bus interface, read/writes, and change-of-state interrupts to the bus.



Shown left to right: AcroPack®, Industry Pack and XMC FPGA Modules.

FPGA	AcroPack <sup>®</sup>	IP	PMC	ХМС
Altera® Cyclone II		Х		
AMD (Xilinx)® Artix® 7	Х			Х
AMD® (Xilinx) Kintex® 7				Х
AMD® (Xilinx) Spartan® 6			х	Х
AMD® (Xilinx) Virtex® 4			х	
AMD ® (Xilinx) Virtex® 5			х	Х
AMD® (Xilinx) Zynq® Ultrascale +™	Х			Х
I/O Extension Modules			Х	Х



## New VITA 93 QMC Rugged Mezzanine I/O Modules



## Modular I/O Solutions Designed For Defense Applications

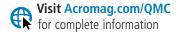
The new VITA 93 standard defines the rugged, high-performance QMC mezzanine for today's small form factor systems. Acromag's QMC modules provide high-density I/O solutions for the demands of military, aerospace, industrial, laboratory, and transportation applications.

Get dependable and versatile I/O processing. High-speed connectors deliver reliable communication between field I/O signals and the PCIe interface to your host computer without loose internal cabling. Standard heat sinks facilitate conduction cooling in fanless systems and provide stability against shock and vibration.

QMC's modular open system architecture (MOSA) ensures interoperability for faster integration and greater flexibility. Mix and match I/O functions on a variety of carrier platforms to meet your unique computing requirements. Modifications and upgrades are also much easier in the future.



I/O Support	
Analog I/O	These modules perform high-speed and high-resolution A/D and D/A conversion.
Digital I/O	These modules interface TTL, on/off, hi/lo logic levels to an embedded computer system.
Multi-function I/O	High-density modules perform both high-speed and high resolution A/D and D/A conversions, plus digital I/O and counter/timer functions.
Communications	These rugged modules offer serial communication, including TIA-232/422/485.
FPGA I/O	Coming soon. These reconfigurable FPGA modules allow for custom user defined I/O designs.
Carrier Cards	Rugged cable-free carriers for PCIe and other architectures.
Software Support	Acromag function libraries greatly simplify the interface between our I/O boards and your application program.





# I/O Mezzanine QMC, AcroPack® and Industry Pack Modules



#### **QMC Mezzanine I/O Modules**

Acromag's new VITA 93 QMC mezzanine modules are a rugged family of high-density I/O solutions designed to meet the needs of today's embedded computing systems. Built for flexibility and high performance, these modules are ideal for aerospace, defense, industrial automation, transportation, and scientific research applications. They deliver reliable signal processing in a format optimized for size, weight, power, and cost (SWaP-C) limitations.

Series	Analog I/O	Digital I/O	Comm.	FPGA
QMC200	Х			
QMC300	Х			
QMC400		X		
QMC500			Х	
QMC-AUS				Coming Soon



#### AcroPack® mPCle-based Interface I/O Boards

AcroPack® modules improve on the mini PCIe form factor by adding a down-facing connector that securely routes I/O signals through the host carrier card without any extra cabling. Carrier cards are available in Mini-ITX, PCIe, VPX, XMC and other formats. These carriers provide direct access to the field I/O signals through front-panel CHAMP connectors or the rear backplane. At only 30 x 70mm per module, up to four AcroPacks can plug into a single carrier card in any I/O combination.

Series	Analog I/O	Digital I/O	Counter/ Timers	Multi- function	Comm.	FPGA
AP200	Х					
AP300	Х					
AP400		Х	Х			
AP500					Х	
AP700				Х		
APA7						Х
APZU						Х



#### Industry Pack (IP) Mezzanine I/O Modules

Acromag Industry Pack mezzanine I/O modules deliver maximum I/O density when used with industry-standard IP carrier cards for VME, PCI, CompactPCI, or PCI Express. These plug-in Industry Pack modules give you mix-and-match flexibility and high channel density to save your valuable card slots.

Series	Analog I/O	Digital I/O	Counter/Timers	Comm.	FPGA
IP200	Х				
IP300	Х				
IP400		Х	х	Х	
IP500				Х	
IP-EP200					Х

# I/O Mezzanine XMC and PMC Modules





#### **XMC FPGA, Ethernet, and Carrier Cards**

XMC modules provide a rugged, embedded computing platform for high-speed data communication in military/defense, aerospace, and research lab systems.

Series	Multi-function	Networking	FPGA	Carrier Cards
XMC600		Х		
XMC700	X			
XMC Artix®-7			Х	
XMC Kintex®-7			х	
XMC Spartan®-6			Х	
XMC Virtex®-5			Х	
XMC Virtex®-6			Х	
XMCAP2000				X
XMC Zynq® Ultrascale+™			Х	



#### **PMC Modules for COTS Projects**

A wide variety of high-performance PMC solutions for VME, CompactPCI®, and PCI computer buses. Acromag PMC modules are well-suited for COTS projects. Many models are available for a variety of analog, digital I/O and serial functions. Our PMC modules offer an unmatched balance of performance, features, and price for the best value in PMC I/O.

Series	Analog I/O	Digital I/O	Counter/ Timers	Multi- function	Comm.	FPGA
PMC200	х					
PMC300	Х					
PMC400		Х	Х			
PMC500					Х	
PMC700				Х		
PMC Virtex® 4						Х
PMC Virtex® 5						Х
PMC Virtex® 6						Х
PMC Spartan® 6						Х



Telephone: 877-295-7092 or 248-295-0310

#### PMC and XMC Extension I/O Modules

AXM Series extension modules offer analog and digital I/O options for Acromag PMC or XMC FPGA modules. These extension modules plug into the front mezzanine on the FPGA modules.



## **OpenVPX Architecture**

#### VPX Carrier Cards and Single Board Computers-

VPX single board computers and VPX carrier cards are ideal for high-performance defense and scientific research systems requiring high-speed I/O with serial fabric interconnect technologies. VPX carrier cards provide a simple and cost-effective solution for interfacing an AcroPack®, PMC or XMC I/O modules to a VPX computer system.



#### **VPX Single Board Computers**

AcroExpress® 3U and 6U VPX processor cards with an Intel® CPU provides superior support of modern high-speed signals.

Series	Overview
VPX6600	3U module features a 7 <sup>th</sup> Gen. Intel® Xeon® E3-1505M V6 2.8GHz processor.
VPX6860	6U module features a 7 <sup>th</sup> Gen. Intel <sup>®</sup> Xeon <sup>®</sup> E3-1505M V6 2.8GHz processor.
VPX7600	3U module features an 11th Gen. Intel® Xeon® W-11000E 4.70GHz processor.



#### **VPX Carrier Cards**

These carrier cards feature a high-speed PCI Express interface making them ideal for high-performance aerospace, defense, and scientific research. Choose from air-cooled, conduction-cooled or Ruggedized Enhanced Design Implementation (REDI VITA 48).

Mezzanine	3U	6U
AcroPack <sup>®</sup>	Х	Х
PMC		Х
XMC	Х	х



I/O Support	AcroPack <sup>®</sup>	PMC	ХМС
Analog I/O	Х	Х	Х
Digital I/O	Х	Х	
Counter/Timers I/O	Х	X	
Multi-function I/O	Х	Х	Х
Serial I/O and Communications	X	Χ	
Networking I/O	X		х
FPGA I/O	X	Х	Х

#### **VPX Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.

VPX accessories include transition modules, expansion modules for mass storage, mass storage boards, and additional I/O capabilities.



## **VME Architecture**



#### VME Boards for Embedded Computing-

Acromag's line of VME boards and VME carriers provide a variety of high-performance embedded computing solutions for defense, aerospace, scientific, and research lab applications. These VMEbus SBC processor modules offer a range of CPU, I/O, memory, and hardware configurations to satisfy your unique application requirements. VME single board computers with an Intel® Core<sup>TM</sup> i7 Core Processor will extend the life of your systems with modern technology.



#### **VME Single Board Computers**

These single board computers update your legacy systems with a high-performance Intel® processor that delivers an enhanced micro-architecture, integrated graphics, and expanded memory performance.

Series	Overview
XVME6800	6U Intel® Tiger Lake-H Xeon W 8-core CPU with 32GB of high-speed DDR4 ECC DRAM. Dual PMC/XMC sites.



#### **VME Carrier Cards**

For additional flexibility and higher channel density, Acromag offers VMEbus carrier cards for standard Industry Pack (IP) mezzanine modules.

Series	I/O Access	Features
AVME9660A	Front	50-pin header connectors
AVME9668	Front	SCSI-2 connectors
AVME9670A	Rear	User-defined addressing
AVME9675A	Rear	Geographical addressing

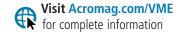


I/O Support	Industry Pack
Analog I/O	х
Digital I/O	х
Counter/Timers I/O	Х
Communications	х
FPGA I/O	Х

#### **VME Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.

VME accessories include transition modules, expansion modules for mass storage, and additional I/O capabilities.



9



#### PCI Express (PCIe) Boards for Embedded Computing-

These non-intelligent carrier cards interface AcroPack®, QMC, XMC, PMC, and Industry Pack mezzanine modules to a PCI Express bus in a PC-based embedded computer.



#### **PCI Express Carrier Cards**

These boards hold Industry Pack, AcroPack®, PMC, or XMC mezzanine modules to interface I/O signals to a PCI Express system.

Form Factor	Half Length	¾ Length	Full Length	PCIe/104
AcroPack®	Х	Х	X	X
Industry Pack			х	
PMC			Х	
QMC	Х	Х		
XMC			Х	



I/O Support	AcroPack®	Industry Pack	PMC	QMC	ХМС
Analog I/O	Х	х	Х	Х	
Digital I/O	Х	х	Х	Х	
Counter/Timers I/O	Х	Х	Х		
Multi-function I/O	Х		Х	Х	Х
Communications	Х	Х	Х	Х	
Networking I/O	Х				Х
FPGA I/O	Х	Х	Х		Х

#### **PCI Express Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.

PCIe accessories include termination products, cables, and software support to simplify system integration.



## PCI Architecture



#### PCI I/O Products-

Acromag PCI I/O boards are well-suited for COTS projects, with many models available for a variety of analog and digital I/O functions. Our PCI I/O products offer an unmatched balance of performance, features, and price for the best value.



#### **PCI I/O Modules**

These PCI I/O boards offer high-performance in a rugged design and with long product lifecycles.

I/O Modules	PCI Product
Analog	Х
Digital	х
Counter/Timers	х
Multi-function	х



#### **PCI Carrier Cards**

These cards provide a PCI interface for PMC and Industrial I/O Pack (IP) mezzanine board field I/O modules. The carrier board provides a modular approach to system assembly, since each carrier can be populated with any combination of analog input/output, digital input/output, communication, etc. Thus, the user can create a board which is customized to the application.

Form Factor	Half Length	Full Length
Industry Pack	Х	Х
PMC	Х	



I/O Support	РМС	Industry Pack
Analog I/O	Х	X
Digital I/O	X	x
Counter/Timers I/O	X	x
Multi-function I/O	Х	х
Communications	Х	х
FPGA I/O	Х	х

#### **PCI Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.

PCI accessories include termination products for PCI systems, cables, and software support.





## **Compact PCI Serial Architecture**

#### CompactPCI Serial I/O Products-

These boards hold two AcroPack® or mPICe mezzanine modules to interface I/O signals to a CompactPCI® Serial system for a wide variety of I/O signal processing tasks. AcroPacks are a family of more than 25 enhanced mini PCIe modules that perform analog I/O, digital I/O, serial communication, FPGA computing and other functions. Field I/O signals are securely routed through the carrier board from 68-pin front panel connectors to the AcroPack I/O modules eliminating loose internal cabling. A PCI Express link interfaces the I/O modules to the bus backplane. CompactPCI Serial® is a modern high-performance modular embedded computing standard that is very fast, versatile and economical. It is ideal for defense, aerospace, transportation, oil/gas, scientific, test/measurement, and manufacturing applications. CompactPCI Serial is a PICMG® open standard with proven Eurocard mechanics supported by a wide variety of vendors providing CPUs, racks, graphics, storage, communication, and other peripherals.



#### **CompactPCI Serial Carrier Cards**

These boards hold AcroPack® mezzanine modules to interface I/O signals to a CompactPCI Serial system.

Form Factor	3U
AcroPack®	Х



I/O Support	AcroPack <sup>®</sup>
Analog I/O	x
Digital I/O	х
Counter/Timers I/O	х
Communications	х
FPGA I/O	х

#### **Compact PCI Serial Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.



### **Compact PCI Architecture**



#### CompactPCI (cPCI) Boards for Embedded Computing-

Acromag CompactPCI boards provide a high-integrity design which is well-suited for COTS and military/aerospace projects for harsh environments. Many models are available for a variety of analog and digital I/O functions. These modules offer an unmatched balance of performance, features, and price for the best value in CompactPCI I/O.



#### CompactPCI I/O Modules

These boards are ideal for defense (COTS), aerospace, research labs and scientific applications. These CompactPCI boards offer a more rugged Eurocard format in a 3U size for use in a card cage enclosure with easy board insertion and removal. High channel density helps preserve the limited backplane slots.

I/O Modules	Compact PCI Product
Analog	Х
Digital	х
Counter/Timers	х
Multi-function	х



#### **CompactPCI Carrier Cards**

These boards hold Industry Pack mezzanine modules to interface I/O signals to a CompactPCI system.

Form Factor	3U	6U
Industry Pack	Х	Х



I/O Support	Industry Pack	РМС
Analog I/O	X	Х
Digital I/O	Х	Х
Counter/Timers I/O	Х	
Communications	Х	
FPGA I/O	Х	Х

#### **Compact PCI Software Support**

For connectivity with real time software application programs, Acromag offers C libraries for VxWorks®, Windows®, and Linux® operating systems. The libraries provide generic routines (source code included) to handle reads, writes, interrupts, and other functions. Demonstration programs enable the developer to quickly exercise the I/O modules before attaching the routines to the application program. This diagnostic tool can save hours of troubleshooting and debugging.

Compact PCI accessories include termination products for Compact PCI systems, cables, and software support.



www.acromag.com

## **COM Express SFF Computers**

#### Embedded Computing-

The ARCX embedded computer series offers great flexibility to meet ever-changing requirements for long-term applications with its customizable-off-the-shelf (COTS) design. AcroPack®, Mini PCIe, M.2 and mSATA slots allow the addition of specialized I/O, storage, and FPGA modules. Optional removable solid state drives allow large amounts of data storage plus quick security access. These rugged, small form factor computers are designed for a variety of industrial and defense applications.

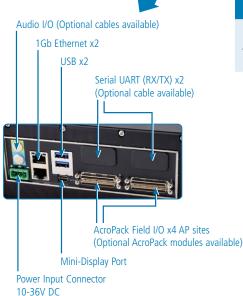


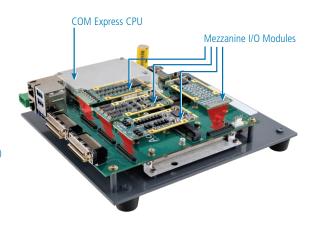
#### **ARCX Series**

#### Designed for Rugged Military and Aerospace Applications.

Thick circuit boards and advanced thermal management allow these computers to operate reliably under hostile conditions. These rugged computers can withstand extended temperatures, shock, and vibration.

Model	I/O Format	CPU Type	Processor
ARCX1100	AcroPack <sup>®</sup>	Type 10	Intel® Atom®







I/O Support	AcroPack®	PMC	ХМС
Analog I/O	х	х	
Digital I/O	Х	Х	
Counter/Timers I/O	Х	Х	
Multi-function I/O	х	Х	Х
Communications	х	Х	
Networking I/O	х		Х
FPGA I/O	Х	Х	Х



# Doing Business with Acromag is Easy



Acromag's international headquarters, located in Wixom, Michigan USA is where we design and manufacture our products. We are laser-focused on developing embedded computing solutions that provide the best long term value in the industry.

As a mid-size business with 60+ years experience, we understand the extreme environmental characteristics that the marketplace requires. Defense OEMs can count on Acromag products to meet or exceed documented specifications. We guarantee technical support within one business day should a question arise.

#### Made in the USA, Shipped Worldwide

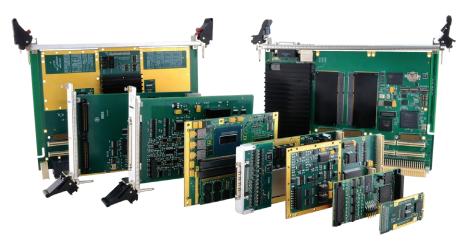
Many of our products carry globally recognized agency approvals and safety certifications.

A global network of sales representatives and distributors gives you local access to friendly, highly-trained professionals that can help you select the right products for your needs. We ship around the world from our headquarters in Wixom, Michigan. No matter where you are in the world, you can use Acromag boards.

#### **Online Ordering**

Find full documentation and pricing information online. You can get quotes and even order directly on our website.

Our mantra is "Be the People that our Customers can Depend On."





- (in) Connect with us: linkedin.com/company/acromag
- Subscribe to our channel: youtube.com/acromagio
- f Become a fan: facebook.com/acromaginc
- Follow us: @acromag















- Order online with your credit card or purchase order
- Technical support, tutorials, and application notes
- Subscribe to our monthly e-newsletter

### Other quality Acromag services and products

#### **Remote Networking**

- Ethernet
- Modbus
- Profibus

#### **Signal Conditioning**

- Isolators
- Transmitters
- Converters





Telephone: 877-295-7092 or 248-295-0310

solutions@acromag.com

www.acromag.com