

# Embedded Computing and I/O Solutions for Harsh Environments

I/O Modules

FPGA Modules

Single Board Computers

SFF Embedded Computers

*Embedded I/O Solutions You Can Depend On.*



# Embedded I/O Solutions that you can Depend on

*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.*

## 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 PCIe, 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.

## 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.





# 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."*



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## 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® APA7-500 Series, Industry Pack IP-EP200 Series, PMC-VLX and XMC-7A

FPGA	AcroPack®	IP	PMC	XMC
Altera® Cyclone II		X		
Xilinx® Artix®-7	X			X
Xilinx® Kintex®-7				X
Xilinx® Spartan®-6			X	X
Xilinx® Virtex®-4			X	
Xilinx® Virtex®-5			X	X
Xilinx® Zynq® Ultrascale +™	X			
I/O Extension Modules			X	X

# AcroPack® mini-PCIe-based Rugged Mezzanine I/O Modules



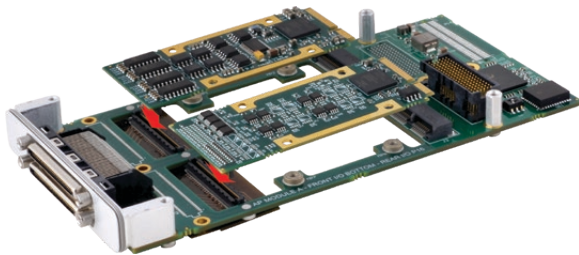
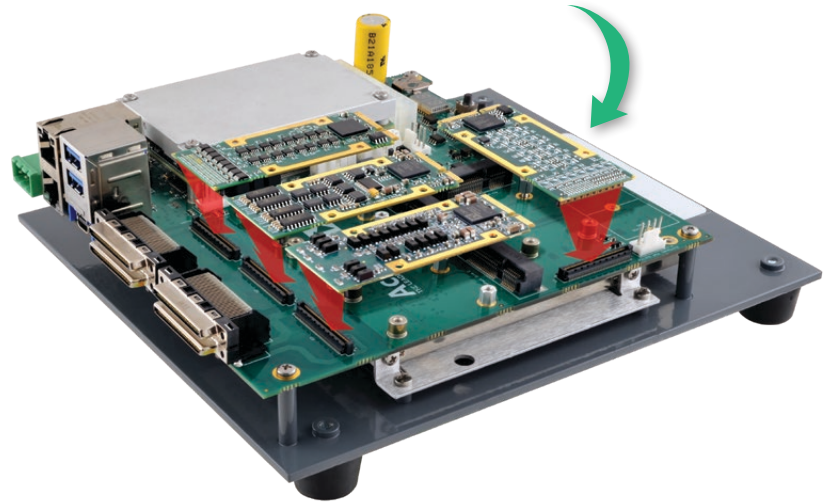
## Military Ready mPCIe-based Mezzanine Modules

The AcroPack® product line updates our popular Industry Pack I/O modules by using the mPCIe interface format. We added 19mm and a 100 pin connector to provide up to 50 isolated rear I/O signals, giving you a tremendous amount of capability on an extremely small footprint - without cabling!

Designed for COTS applications, these general-purpose I/O modules deliver high-speed and high-resolution A/D and D/A, digital I/O, counter/timers, communication (Ethernet, serial, MIL-STD-1553) and reconfigurable FPGA functions.

Whether it's server-based lab activities or ship-based test systems, contact Acromag to discuss how AcroPacks® can help you with tomorrow's applications, today.

AcroPack® modules **snap** onto AcroPack® carriers, **eliminating** messy ribbon cables.



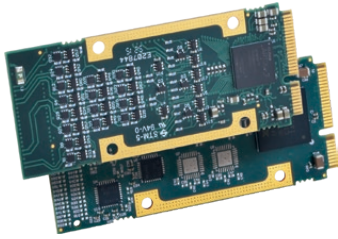
I/O Support	
Analog I/O	These modules perform high-speed and high-resolution A/D and D/A conversion.
Digital I/O	These modules interface TTL, on/off, hi/lo logic levels to an embedded computer system.
Counter/Timers I/O	These modules perform event counting, timing and frequency measurement functions.
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, CAN Bus, MIL-STD-1553, 1Gb Ethernet with optional Power over Ethernet.
FPGA I/O	These reconfigurable Xilinx FPGA modules allow for custom user defined I/O designs.
Carrier Cards	Rugged cable-free carriers for PCIe, VPX, compactPCI Serial® and Com Express systems.
Software Support	Acromag function libraries greatly simplify the interface between our I/O boards and your application program.

Visit [Acromag.com/AcroPacks](http://Acromag.com/AcroPacks) for complete information





# I/O Mezzanine AcroPack® and Industry Pack Modules



## AcroPack® mPCIe-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. More than 25 AcroPack modules are now offered for a wide variety of analog I/O, digital I/O, communication, and FPGA computing functions. Avionics, fieldbus, and other functions are coming soon.

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

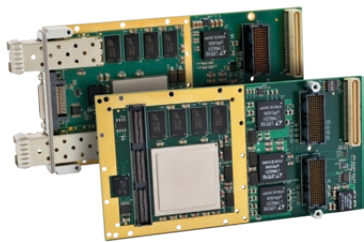


## Industry Pack Mezzanine I/O Modules

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. Combining different IP types on one carrier simplifies the design of a low-cost, custom I/O board.

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

# 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		x		
XMC700	x			
XMC Artix®-7			x	
XMC Kintex®-7			x	
XMC Spartan®-6			x	
XMC Virtex®-5			x	
XMC Virtex®-6			x	
XMCAP2000				x



## 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	x					
PMC300	x					
PMC400		x	x			
PMC500					x	
PMC700				x		
PMC Virtex®-4						x
PMC Virtex®-5						x
PMC Virtex®-6						x
PMC Spartan®-6						x

## 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.

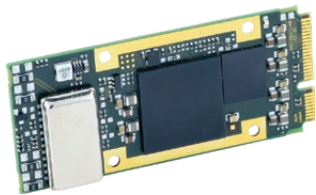
Series	Overview
VPX6600	3U module features a 6th Gen. Intel® Xeon® E3-1505M V5 2.8GHz processor. Operating temperature range of -40 to 85°C with up to 32GB of DDR4 memory, and one M.2 site.
VPX6860	6U module features a 6th Gen. Intel® Xeon® E3-1505M V5 2.8GHz processor. Operating temperature range of -40 to 85°C with up to 32GB of DDR4 memory, two M.2 sites, and optional battery-less operation. This module hosts an XMC site and an AcroPack site for customization or if required use two additional AcroPack modules in the XMC site.



### 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®	x	x
PMC	x	x
XMC	x	x




I/O Support	AcroPack®	PMC	XMC
Analog I/O	x	x	x
Digital I/O	x	x	
Counter/Timers I/O	x	x	
Multi-function I/O	x	x	x
Serial I/O and Communications	x	x	
Networking I/O	x		x
FPGA I/O	x	x	x

### 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.

 [Visit Acromag.com/VPX](http://www.acromag.com/VPX) for complete information





## 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™ 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 an Intel® processor that delivers an enhanced micro-architecture, integrated graphics, and expanded memory performance. These high-performance SBCs offer ruggedized SODIMM removable memory and expansion capabilities all with a standard 2-year warranty.

Series	Overview
XVME-6510	6U Intel® Core™ i7 air cooled processor board with up to 16 GB DDR3L ECC RAM and BIOS selectable byte swapping. Dual PMC or XMC sites.
XVME-6700	6U Intel® Celeron® 2002E air cooled processor board with up to 16 GB DDR3L ECC RAM. Dual PMC or 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	x
Digital I/O	x
Counter/Timers I/O	x
Communications	x
FPGA I/O	x

## 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.

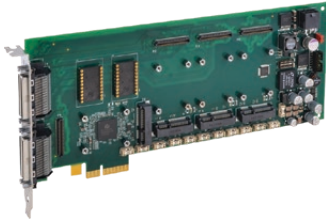
 Visit [Acromag.com/VME](http://Acromag.com/VME) for complete information



# PCI Express Architecture

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

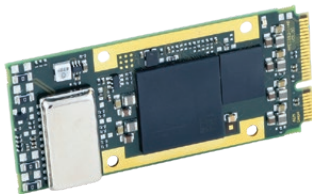
These non-intelligent carrier cards interface AcroPack®, XMC, PMC, and Industry Pack mezzanine modules to a PCI Express bus in a PC-based embedded computer.



### 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
AcroPack®	x	x	x
Industry Pack			x
PMC			x
XMC			x



I/O Support	AcroPack®	Industry Pack	PMC	XMC
Analog I/O	x	x	x	
Digital I/O	x	x	x	
Counter/Timers I/O	x	x	x	
Multi-function I/O	x		x	x
Communications	x	x	x	
Networking I/O	x			x
FPGA I/O	x	x	x	x

## 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.

 Visit [Acromag.com/PCIe](http://Acromag.com/PCIe) for complete information



## PCI I/O Products–

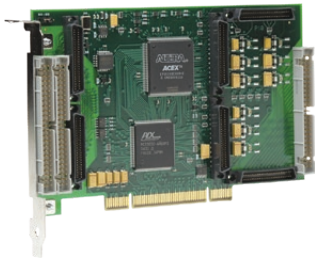
Acromag PCI I/O boards are well-suited for COTS projects, with many models available for a variety of analog and digital I/O functions. Our PCI I/O products offer an unmatched balance of performance, features, and price for the best value.



### 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	x
Digital	x
Counter/Timers	x
Multi-function	x



### 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	x	x
PMC	x	



I/O Support	PMC	Industry Pack
Analog I/O	x	x
Digital I/O	x	x
Counter/Timers I/O	x	x
Multi-function I/O	x	x
Communications	x	x
FPGA I/O	x	x

## PCI Software Support 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.

Visit [Acromag.com/PCI](http://Acromag.com/PCI) for complete information





# Compact PCI Serial Architecture

## CompactPCI Serial I/O Products–

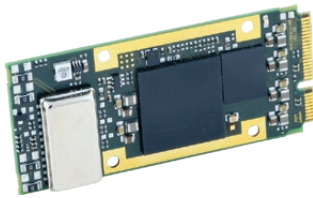
These boards hold two AcroPack® or mPICE mezzanine modules to interface I/O signals to a CompactPCI® Serial system for a wide variety of I/O signal processing tasks. AcroPacks are a family of more than 25 enhanced mini PCIe modules that perform analog I/O, digital I/O, serial communication, FPGA computing 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®	x



I/O Support	AcroPack®
Analog I/O	x
Digital I/O	x
Counter/Timers I/O	x
Communications	x
FPGA I/O	x

## 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.

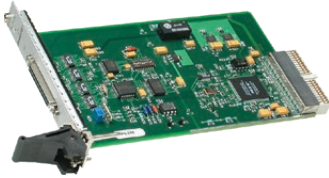
Visit [Acromag.com/cPCI-s](http://Acromag.com/cPCI-s) for complete information

# Compact PCI Architecture



## CompactPCI (cPCI) Boards for Embedded Computing–

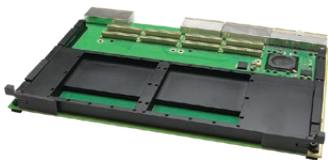
Acromag CompactPCI boards provide a high-integrity design which is well-suited for COTS and military/aerospace projects for harsh environments. Many models are available for a variety of analog and digital I/O functions. These modules offer an unmatched balance of performance, features, and price for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



### Compact PCI 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	x
Digital	x
Counter/Timers	x
Multi-function	x



### Compact PCI Carrier Cards

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

Form Factor	3U	6U
Industry Pack	x	x
PMC	x	x



I/O Support	Industry Pack	PMC
Analog I/O	x	x
Digital I/O	x	x
Counter/Timers I/O	x	
Communications	x	
FPGA I/O	x	x

## 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.

Visit [Acromag.com/cPCI](http://Acromag.com/cPCI) for complete information



# COM Express Architecture

## Rugged Type 6 COM Express Modules with Intel Core i7 or i5 CPU–

Acromag's rugged COM Express products feature advanced thermal management and shock/vibration resistance specifically designed to withstand harsher treatment from the bottom-up. Our COM Express products start with a thicker circuit board. Add extended operating temperature support, for optimal performance wherever you need it, and no internal cabling for a reliable connection every time. The COM Express product platform includes Intel®-based CPU modules and Type 6 carrier cards. Additionally, support products are available for prototyping and production such as: development systems, MIL-DTL-38999 front panels, and an assortment of cables.



### Type 6 COM Express Processors

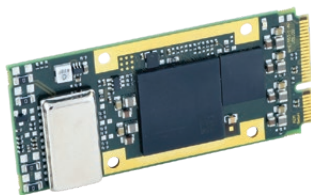
COM Express modules feature a CPU and secure removable memory for use with a carrier card to provide custom and compact I/O.

- Type 6 interconnects
- Intel® Core™ i7 or i5 CPU
- Exclusive SODIMM hold-down mechanism secures up to 16GB of removable memory

### COM Express Carrier Cards

These rugged carrier cards offer expansion capability for advanced I/O or FPGA signal processing in a very small footprint. Acromag's COM Express carrier cards employ a number of key features that are critical for successful use in the rugged environments of defense applications.

Form Factor	Type 6	Type 10
AcroPack®		x
PMC	x	
XMC	x	



I/O Support	AcroPack®	PMC	XMC
Analog I/O	x	x	
Digital I/O	x	x	
Counter/Timers I/O	x	x	
Multi-function I/O	x	x	x
Communications	x	x	
Networking I/O	x		x
FPGA I/O	x	x	x

### COM 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.

COM Express accessories include fans and cooling systems, hardware, and termination products.

 Visit [Acromag.com/COMExpress](http://Acromag.com/COMExpress) for complete information



# Rugged 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®, PMC, XMC, 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 extreme rugged Mil-aero applications.



## ARCX Series

### Designed for Rugged Military and Aerospace Applications.

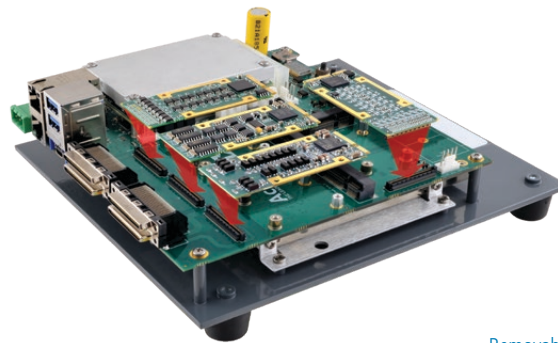
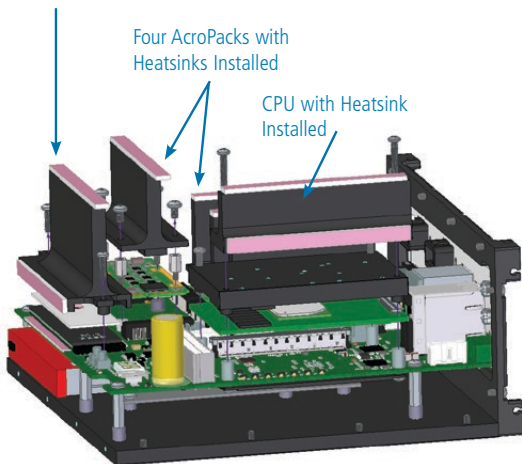
Thick circuit boards and advanced thermal management allow these computers to operate reliably under hostile conditions. These rugged computers can withstand extended temperatures. The ARCX series is shock and vibration tested to MIL-STD-810 specifications and to meet IP67 ratings for reliability.

Model	I/O Format	CPU Type	Processor
ARCX-4000	XMC/PMC	Type 6	Intel® Core™ i5 or i7
ARCX1100	AcroPack®	Type 10	Intel® Atom®

M.2 Solid State Drive with Heatsink Installed

Four AcroPacks with Heatsinks Installed

CPU with Heatsink Installed



Removable Storage Drive



Visit [Acromag.com/ARCX](http://Acromag.com/ARCX) for complete information



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AS9100   
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