


North Atlantic Industries

Configurable Open Systems Architecture Selection Guide

Smart Function Modules

I/O & SBC Boards

Rugged COTS Systems

Rugged Power Supplies

Test & Measurement

Proven - Innovative Solutions with Leading I/O Densities

For over 50 years, North Atlantic Industries (NAI) has provided industry leaders in defense, commercial aerospace and industrial markets with high-performance, rugged embedded electronics for some of the world's most demanding sense & response-intensive applications.

We accelerate our clients' time-to-mission with a unique approach based on a Configurable Open Systems Architecture™ (COSA®) that delivers unmatched flexibility, leading I/O densities and innovative custom, rugged solutions from standard COTS products.

Located in Bohemia, NY with 60,000 sq. feet of manufacturing facilities, all of our products are 100% designed and manufactured in the USA.

Vertically Integrated for One Source Efficiencies

We understand your need to out-pace the competition.

NAI's vertically integrated design, manufacturing and verification capabilities have been built with the intense focus of an organization that defines every action and investment based on our ability to Accelerate Your Time-to-Mission™.

We deliver a seamless specification to deployment experience, single-source accountability and long lifecycle support with the following:

Deep Engineering Capabilities in Systems, Hardware, Software, Test and Quality

State-of-the-Art Printed Circuit Assembly Through Final Integration & Test

Rigorous Functional Testing & Verification

In House Ruggedization & Qualification

Strict Material Control

Technology Insertion, Long Lifecycle Support & Configuration Management Services

Accelerate Your Time-to-Mission

Accelerate your time-to-mission with COSA® – our massively Configurable Open Systems Architecture. COSA is the most modular, agile and rugged portfolio of embedded I/O modules, boards, systems and power supplies of its kind, engineered to work together.

Modular

Select from a variety of form factors and board types and over 70 function-specific I/O, Communications, Measurement & Simulation Smart Function Modules – to meet your exact requirements with less SWaP, and little or no NRE.

Agile

Working with a highly Configurable Open Systems Architecture allows you to reuse IP and sub-systems to get to market faster, rapidly scale solutions and adapt to changing requirements and specifications.

Rugged

Built for the most demanding air, land and sea applications. Count on best-in-class design, manufacturing, and test resources to deliver embedded solutions that can withstand extremes of temperature, vibration, shock, and corrosive conditions.

Cyber Security

North Atlantic Industries takes the dangers presented by cyber threats seriously and is working hard to protect our systems against these threats. From secure boot, that verifies the code using US government approved cryptographic and integrity verification techniques, to approved cryptographic algorithms and communication protocols, your system is protected from first power on to protecting the mission requirements or application software.

Certifiable Solutions

Many of NAI's core technologies are now DO-254 and DO-178C ready. NAI can outline a path to certification, based on your platform's requirements.

Configurable Open Systems Architecture

Our Configurable Open Systems Architecture™ (COSA®) combines the best of both worlds – custom solutions from COTS products.

Leverage our rich portfolio of fully tested modules, boards, systems and power supplies to quickly and easily meet a wide range of complex and time-critical mission processing requirements. COSA delivers a distributed, intelligent, software-driven architecture that allows you to rethink the way you engineer power-critical and I/O-intensive mission systems.

Configure a Board or System to Your Requirements With Ease

NAI's library of over 70 pre-integrated, field-proven Smart Function Modules form the foundation for our Configurable Architecture.

Covering a wide variety of I/O, Communications, Measurement and Simulation requirements, this deep library of modules drives our ability to meet virtually any complex I/O requirement off-the-shelf, without the need for NRE.

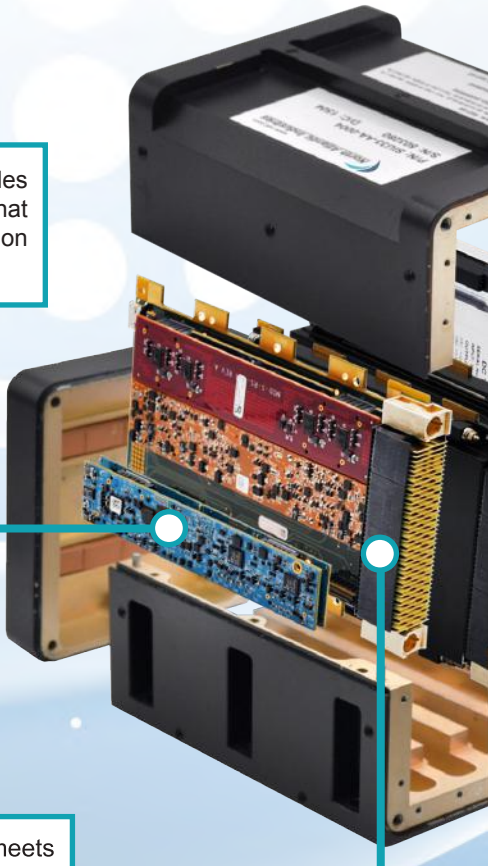
Smart Function Modules are placed in a mix-and-match fashion onto rugged 3U or 6U Boards (with or without processing) which can then be integrated, along with a power supply, to create a standalone Rugged System.

Available Rugged System chassis are scalable to support a single function or up to 60 functions for distributed, networked and high-density centralized systems. (See pages 11-12 for details).

Your IP & Application

+

2 Select 3-6 Smart Function Modules (based on 3U or 6U form factor) that deliver the functionality your application requires.



1 Select an I/O Board or SBC that meets your form factor & Operating System needs.

Deliver More I/O Capability & Intelligence in a Smaller Footprint

Programmability, intelligence and self-monitoring capabilities built into each smart module reduce, or eliminate, the processing load on the SBC and deliver more capabilities at the edges of your application.

Distributed I/O with Single API Programmability

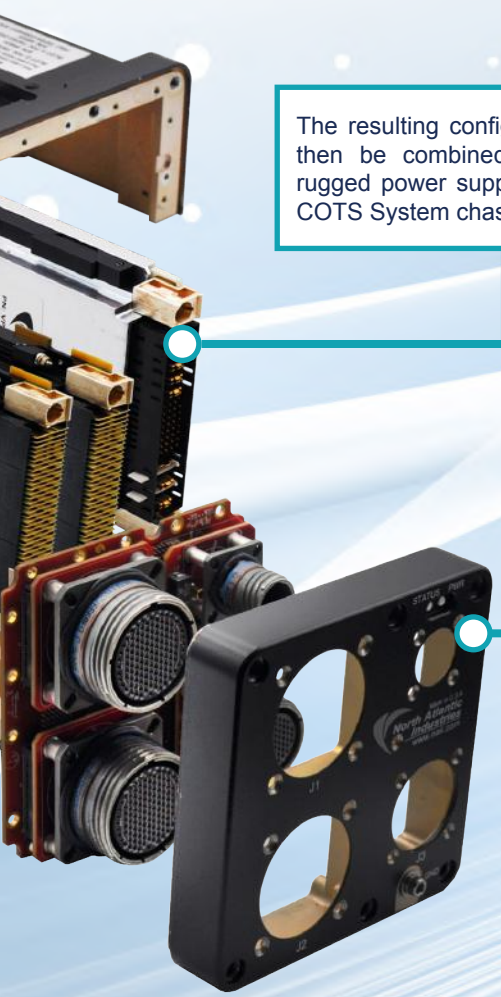
Single API Programmability and our free software libraries drive faster integration of your application to rapidly create configurable mission systems.

Optimized SWaP

Unmatched I/O densities drive SWaP-optimized solutions.

Elimination of Non-Recurring Engineering Charges

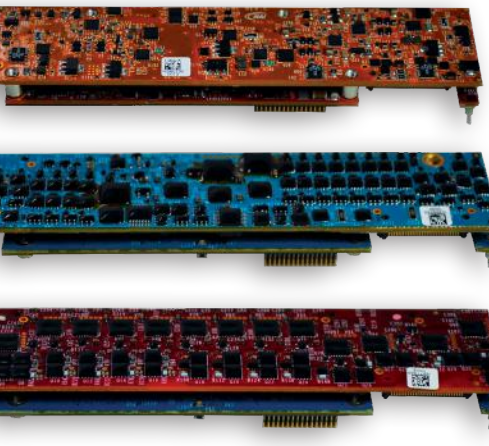
Pre-integrated, modular solutions from COTS products typically eliminates the need for Non-Recurring Engineering charges.



3 The resulting configured board(s) can then be combined with one of our rugged power supplies into a Rugged COTS System chassis of your choice.

5 Embedded FPGAs, SoCs and free software libraries drive faster integration of your IP to rapidly create configurable mission systems – while reducing or eliminating SBC overhead.

4 Easily update board configuration or swap functional capabilities if requirements change. A wide range of Rugged Chassis are available.



Pre-Integrated Smart Function Modules

NAI's library of over 70 pre-integrated smart function modules provides the most configurable and highest density I/O solutions in the industry meeting virtually any I/O requirement.

All modules have dedicated ARM and FPGA intelligence that support customer configurability, programmability, health monitoring and user application capabilities. This puts more I/O capability into the modules themselves and drives time and cost out of your design, development and qualification schedules.

Use these independent modules to configure a Multifunction I/O, Single Board Computer or Rugged System that meets your requirements.

See chart below for information on our most commonly selected modules. View complete list and detailed specs on all at www.naii.com/products

I/O

Function	Module	Description
A/D Converter	AD1	12 A/D Channels (±1.25 to ±10.0 VDC FSR); 24-bit Sigma-Delta
	AD2	12 A/D Channels (±12.5 to ±100.0 VDC FSR); 24-bit Sigma-Delta
	AD3	12 A/D Channels (±25 mA FSR); 24-bit Sigma-Delta
	AD4	16 A/D Channels (±1.25 to ±10.0 VDC FS or ±25 mA); 16-bit SAR, 8 Channels x 2 A/D multiplexed
	AD5	16 A/D Channels (±6.25 to ±50.0 VDC FS); 16-bit SAR, 8 Channels x 2 A/D multiplexed
	AD6	16 A/D Channels (±12.5 to ±100.0 VDC FS); 16-bit SAR, 8 Channels x 2 A/D multiplexed
	ADE	16 A/D Channels (±10 VDC); 16-bit SAR per channel
	ADF	16 A/D Channels (±100 VDC); 16-bit SAR per channel
	ADG	16 A/D Channels (±25 mA); 16-bit SAR per channel
	ADH	8 A/D Channels (±100 VDC); Individual SAR (ADF-type) +8 Channel A/D, High Current with external shunt (details to follow)
D/A Converter	DA1	12 D/A Output Channels (±10 VDC or ± 25 mA)
	DA2	16 D/A Output Channels (± 10 VDC @ 10 mA max. / Channels)
	DA3	4 (high-current) D/A Output Channels (±40 VDC or ± 100 mA)
	DA4	4 (high-voltage) D/A Output Channels (±20 to ± 80 VDC @ ±10 mA max. / Channels)
	DA5	2 (very high current) D/A Output Channels (+65 VDC (from external applied source) @ ±2 A max.)

Function	Module	Description
I/O Discrete	DT1	24 Channels, Discrete I/O (0 to 60 VDC, 500 mA / Channels)
	DT2	16 Channels, Discrete/Switch I/O (±80 V, 625 mA / Channels)
	DT3	4 Channels, Discrete/Switch I/O (±100 V, 3 A / Channels)
	DT4	Enhanced 24 Channels, Discrete I/O (0 to 60 VDC, 500 mA / Channels)
	DT5	Enhanced, 16 Channels, Discrete/Switch I/O (±80 V, 625 mA / Channels)
	DT6	Enhanced 4 Channels, Discrete/Switch I/O (± 100 V, 3 A / Channels)
I/O TTL/CMOS	TL1	Serial, CDI Repeat-Back, TTL level data stream
	TL2	Enhanced Serial, CDI Repeat-Back, TTL level data stream
I/O Differential	DF1	16 Differential I/O Multi-Mode Transceiver Channels
	DF2	Enhanced 16 Differential I/O Multi-Mode Transceiver Channels
Relay	RY1	4 Channels Relay, Non-latching
	RY2	4 Channels Relay, latching

Measurement / Simulation

Function	Module	Description
AC Reference	AC1	1 Channel, 2-115 Vrms, 47 Hz - 20 kHz (max. range), programmable
	AC2	2 Channels, 2-28 Vrms, 47 Hz -20 kHz (max. range), programmable
	AC3	1 Channel, 28-115 Vrms, 47 Hz - 2.5 kHz (max. range), programmable
L(R)VDT/D (Meas.)	LD1	4 Channels, LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 47 Hz - 1 Hz Freq
	LD2	4 Channels, LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 1 kHz - 5 kHz Freq
	LD3	4 Channels, LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 5 kHz - 10 kHz Freq
	LD4	4 Channels, LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 10 kHz - 20 kHz Freq
	LD5	4 Channels, LVDT/RVDT to Digital, 28-90 Vrms Input, 2-115 Vrms Exc, 47 Hz - 1 kHz Freq

Function	Module	Description
SYN(RSL)/D (Meas.)	SDx	Synchro/Resolver to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 47 Hz -1 kHz Freq
D/SYN(RSL) (Sim.)	DSx	D/S(R) (Module DS*, DR*) - SYN, RSL; three, two or one channel(s) @ 0.5 VA, 1.5 VA or 3.0 VA
Thermocouple (Meas.)	TC1	8 Channels Thermocouple, LV A/D
	TR1	8_RTD (2,3 or 4 wire) or Thermocouple (multi-type), Programmable per Channel
RTD (Meas.)	RT1	Eight Channel RTD Measurement
GPS	GP1	Multi-channel (satellite) GPS & IRIG Tx & Tx, 2x wide module Javad TR2 high-performance
	GP2	Multi-channel (satellite) GPS & IRIG Tx & Tx, 1x wide module uBlox Neo
IRIG	RG1	IRIG Tx & Tx, digital & analog w/ master timer function
Starin Gage	SG1	4 Channels Strain Gage Measurement

Communications

Function	Module	Description
ARINC Communications	AR1	12 Channels ARINC 429/575 Communications
	AR2	2 Channels ARINC 568/579 Communications
CANBus	CB1	8 Channels CANBus, CAN 2.0 A/B Protocol
	CB2	8 Channels CANBus, J1939 Protocol
	CB3	8 Channels CANBus, CAN 2.0 A/B Protocol or J1939 Protocol
Ethernet Switch	EM1	Dual Port Ethernet NIC, Intel 82850, 10/100/1000, PCIe module interface to processor (local or off-board host)
	ES2	Managed Ethernet Switch with L2/L3 Layer support and Fiber Optic option.
MIL-STD-1553	FT1, FT2, FT3	1-4 Channels, MIL-STD-1553, Dual Redundant, Transformer Coupled
	FT4, FT5, FT6	1-4 Channels, MIL-STD-1553, Dual Redundant, Direct Coupled
	FTA, FTB, FTC	1-4 Channels, MIL-STD-1553, Dual Redundant, Transformer Coupled, Assisted Mode Capable
	FTD, FTE, FTF	1-4 Channels, MIL-STD-1553, Dual Redundant, Direct Coupled, Assisted Mode Capable

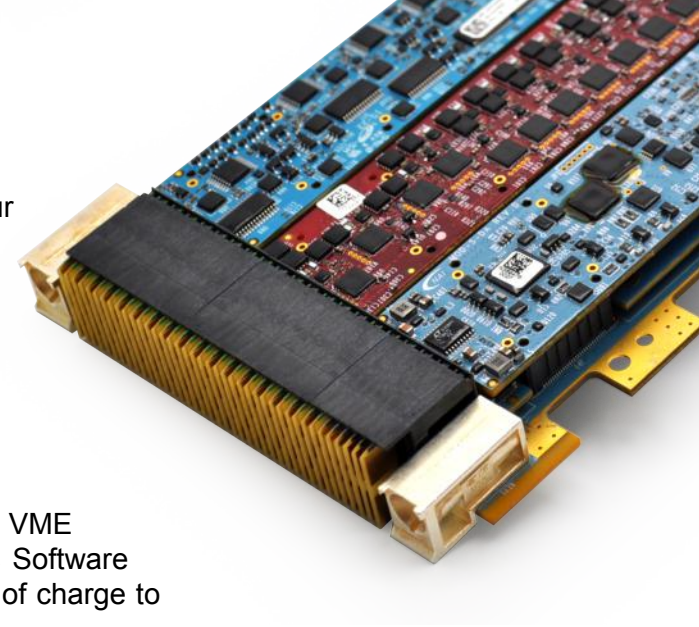
Function	Module	Description
MIL-STD-1760	FTJ	1 Channel, MIL-STD-1553/1760 Communications Interface
	FTK	2 Channels, MIL-STD-1553/1760 Communications Interface
Serial Communication	SC1	4 Channels Serial Communications, multi-mode programmable, non-isolated
	SC2	4 Channels Serial Communications, multi-mode programmable, isolated
	SC3	8 Channels Serial Communications, programmable RS-232/422/485 non-isolated
	SC7	4 Channels Serial Communications, multi-mode programmable, non-isolated
Time-Triggered Ethernet	TE2	Time-Triggered Ethernet / ARINC 664 Part 7 (AFDX®) / IEEE 802.3 Ethernet Deterministic Communications

Combination and Specialty Modules

Function	Module	Description
Combination	CM2	8 Channels 100 kHz or 12.5 kHz, RX/TX, 256 Word Tx/Rx Buffer & 12 Channels Discrete I/O
	CM4	12 Channels Discrete (DT1-type) & programmable 2 Channels SC1-type (w/Sync) or 4 Channels SC3-type (w/Async)
	CM5	2 Channels MIL-STD-1553, 8 Channels ARINC 429/575
	CM8	2 Channels MIL-STD-1553B communications and 12 Channels of discrete I/O
	CME	8 Channels D/A ± 10 VDC @ 10 mA max. / Channels; A/D ±10 VDC 16-bit SAR per channel
	CMF	8 Channles D/A ± 10 VDC @ 10 mA max. / Channels; A/D ±100 VDC 16-bit SAR per channel
	CMG	8 Channels D/A ± 10 VDC @ 10 mA max. / Channels; A/D ±25 mA 16-bit SAR per channel

Function	Module	Description
Flash	FM1	240 GB SSD Flash Module, SATA II, MLC, -40° C to +85° C
	FM2	480 GB SSD Flash Module, SATA II, MLC, -40° C to +85° C
	FM4	128 GB SSD Flash Module, SATA II, SLC, -40° C to +85° C
	FM5	256 GB SSD Flash Module, SATA II, SLC, -40° C to +85° C
	FM7	1 TB SSD Flash Module, SATA II, TLC, 0° C to +70° C
	FM8	1 TB SSD Flash Module, SATA II, TLC, -40° C to +85° C
	FM9	2 TB SSD Flash Module, SATA II, TLC, -40° C to +85° C

Multifunction I/O Boards



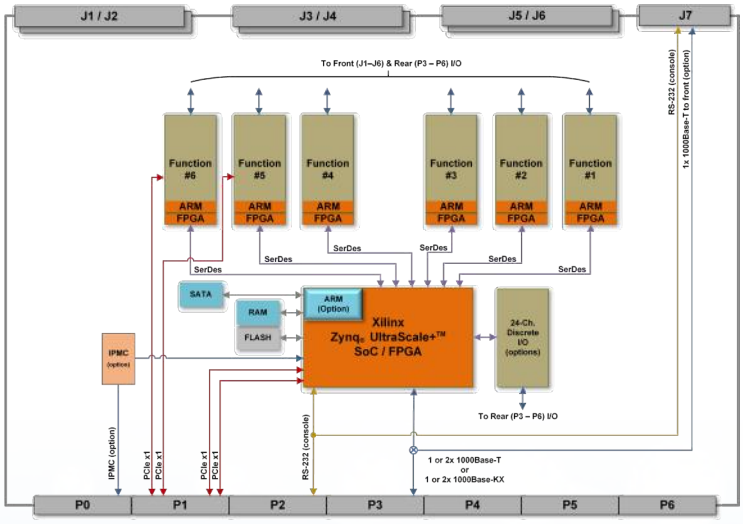
Capable of hosting 3 or 6 independent I/O function modules of your choice, NAI's rugged 3U and 6U boards offer industry leading I/O densities and are offered with and without SBC processing.

Leveraging the modularity of COSA, your ability to configure a board that meets your exact I/O and connectivity requirements with exceptional levels of performance and power efficiency has never been easier.

Monitor, manage and control I/O via Ethernet, OpenVPX, cPCI, VME or PCI/PCIe depending on the bus architecture required. NAI's Software Support Kit & Board-Specific I/O Library APIs are provided free of charge to facilitate integration.

Configurable Multifunction I/O Boards

We will integrate your choice of board and I/O functions (see list pg. 5-6) to quickly meet your specific requirements and deliver a configured, custom board without NRE.



* 67G6 6U OpenVPX Multifunction I/O Board Block Diagram.

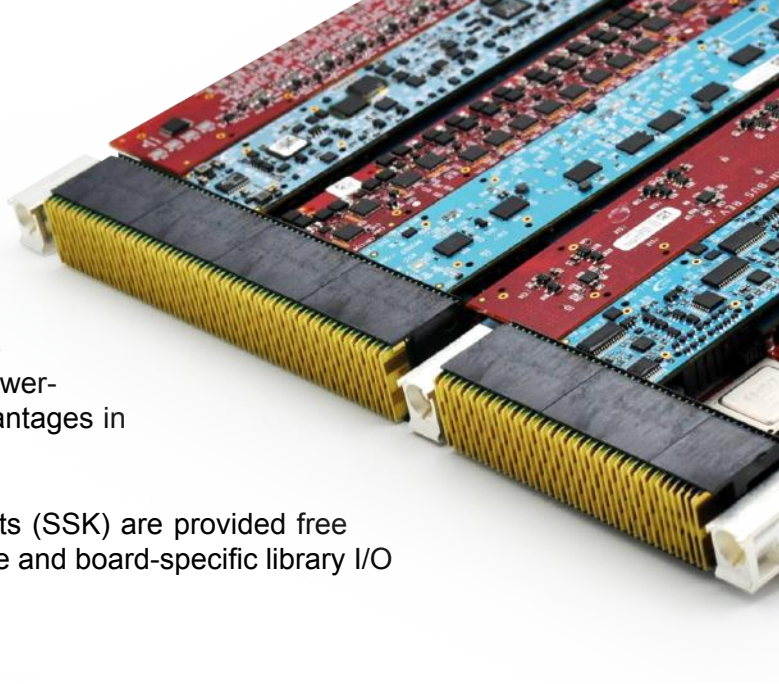
Typical Board Features

- Support for 3-6 independent, Smart Function Modules (based on 3U or 6U form factor)
- Background Built-In-Test (BIT) continually checks and reports on the health of each channel
- Independent x1 SerDes interface
- Operating Temperatures:
  - Rugged Models: -40° C to +85° C
  - Commercial Models: 0° C to 70° C
- Connections via front and/or rear I/O
- Configure hardware registers with single API call as required

Multifunction I/O Boards					
Form Factor	**Model**	**Board Architecture**	**Function Slots**	**Ethernet Capable**	**Features / Options**
3U OpenVPX	68G5	Xilinx 7015 ARM® Cortex®-A9	3	2x 1000Base-T or -KX	1 x1 PCIe, 1x RS-232 (debug-console), IPMC
6U OpenVPX	67G6	Xilinx UltraScale+ ARM® Cortex®-A53	6	2x 1000Base-T or -KX	2 x1 PCIe for motherboard communications, 2 x1 PCIe for direct module communications, 24x
3U cPCI	75G5	Xilinx 7015 ARM® Cortex®-A9	3	2x 1000Base-T	PCI, 1x I²C 1x RS-232 (debug-console)
6U VME	64G5	2x Xilinx 7015 ARM® Cortex®-A9	6	2x 1000Base-T	VME64x (bus master or slave), 1x RS-232 (debug-console)
PCI/PCIe	79G5	Xilinx 7015 ARM® Cortex®-A9	3	N/A	Single slot, full height, half-size PCIe 1 x1 PCIe, 1x RS-232 (debug-console)

Visit www.naii.com/products for a complete listing of available boards and specification detail.

Single Board Computers



Specifically designed for harsh environments in a range of demanding, embedded computing applications, NAI offers a comprehensive line of rugged Single Board Computers (SBCs) specifically designed for SWaP-constrained environments. These Commercial Off-the-Shelf SBCs are based on the latest Intel®, NXP® (Power-PC) and ARM® processors – each delivering unique advantages in deployed applications.

Board Support Packages (BSP) and Software Support Kits (SSK) are provided free of charge. In addition, SSKs are supplied with source code and board-specific library I/O APIs to facilitate system integration.

Configurable Single Board Computers

NAI's modular 3U and 6U rugged Single Board Computers can be configured with up to six NAI smart function modules (see list pg. 5-6) to deliver the highest packaging density and greatest flexibility in the industry.

Operating Systems:

- Windows® Embedded Standard 7 OS
- Wind River® VxWorks®
- Xilinx® PetaLinux
- Red Hat Linux®
- Wind River Linux®
- DDC-I Deos™

Single Board Computers					
Form Factor	**Model**	**Processor**	**Function Slots**	**SDRAM / On-board NVM SATA Flash**	**Features / Options**
3U OpenVPX	68ARM1	Xilinx 7015 ARM® Cortex®-A9	3	512 MB DDR3 / 32 GB	4 x1 PCIe, 1x SATA II (external), 2x 1000Base-T or -KX, 1x USB 2.0, 1x RS-232 (debug-console), IPMC
	68ARM2	Xilinx UltraScale+ ARM® Cortex®-A53	3	4 GB DDR4 w/ECC / 32 GB	6 x1 PCIe, 1x I²C or SATA II (external), 8x TTL (or 6x TTL & I2C), 2x 1000Base-T or -KX, 2x USB 2.0, 1x RS-232 (debug-console), IPMC
	68PPC2	NXP® QorIQ® T2080	2	8 GB DDR3 / 32 GB	4 x1 & 1 x4 PCIe, 1x I²C or SATA II (external), 4x TTL, 2x 1000Base-T or -KX, 2x USB 3.0, 1x RS-232 (debug-console), IPMC
	68INT4	Xeon ES-1505L	2	16 GB DDR4 w/ECC / 32 GB	4 x1 & 1 x4 PCIe, 1x PCIe (module slot), SATA II (external), 1x HDMI, 2x 1000Base-T or -KX, 1x USB 3.0, 1x RS-232 (debug-console), IPMC
6U OpenVPX	67PPC2	NXP® QorIQ® T2080	6	8 GB DDR3L w/ECC / 32 GB	Up to 8x PCIe, 1x I²C, SATA II (external), 4x TTL, 2x 1000Base-T or -KX, 2x USB 3.0, 1x RS-232 (debug-console), IPMC
3U cPCI	75INT2	Intel® Core™ i7	2	8 GB DDR3L / 32 GB	cPCI (master or slave), 2x 1000Base-T, VGA/ Video, 2x USB 2.0, 1x I²C, 1x RS-232 (debug-console)
	75PPC1	NXP® QorIQ® P2041	2	8 GB DDR3L / 32 GB	cPCI (master or slave), 1x I²C, SATA II (onboard), 8x TTL, 2x 1000Base-T, 1x USB 2.0, 1x RS-232 (debug-console)
	75ARM1	Xilinx 7015 ARM® Cortex®-A9	3	512 MB DDR3 / 32 GB	cPCI (master or slave), 2x 1000Base-T, 2x USB 2.0, 1x I²C, 1x RS-232 (debug-console)
6U VME	64ARM1	Xilinx 7015 ARM® Cortex®-A9	6	512 MB DDR3 / 32 GB	VME64x (master or slave), 1x I²C, 2x 1000Base-T, 1x USB 2.0, 1x RS-232 (debug-console)

Visit www.naii.com/products for a complete listing of available boards and specification detail.

Rugged Power Supplies for Harsh Environments

NAI delivers the ideal power supply solution with robust construction and high reliability that addresses the needs of the most demanding rugged applications.

VPX Power Supplies AC/DC

NAI's 6U VPX power supply products are compliant with the requirements of VITA 62. These high-power, high-density, low-profile VPX power supplies accept either an AC, 3 Phase or a +270 VDC input, and are available in configurations up to 1,400 W. These power supplies include I²C communication and Current Share. VPX-56 Series power supplies support VITA 46.0 and VITA 65 systems with an off-the-shelf solution that mechanically fits within the single slot (1.0" pitch) envelope. These rugged designs meet VITA 47 environmental requirements.

VPX Power Supplies DC/DC

NAI's 3U VPX power supply products are compliant with the requirements of VITA 62. These high-power, high-density, low-profile VPX power supplies accept either a +28 VDC or a high power, +270 VDC input, and are available in configurations up to 750 W. These power supplies include I²C communication and Current Share. VPX-55 Series power supplies support VITA 46.0 and VITA 65 systems with an off-the-shelf solution that mechanically fits within the single slot (0.8" or 1.0" pitch) envelope. These rugged designs meet VITA 47 environmental requirements.

DC/DC Holdup & Power Conditioning Units

3U holdup and power conditioning units from NAI protect downstream DC/DC converters from MIL-STD-704 and MIL-STD-1275 transients, low voltage conditions and power interruptions, providing up to 50ms holdup time at full power. They meet a standard 3U form factor. In addition, reverse polarity protection, input discrete signaling, AUX output and Built-In-Test (BIT) are standard.

High Power LRU Power Supplies

These standalone EMI compliant power supplies from NAI convert three-phase AC, MIL-STD-704 power into a single DC output, with power up to 2,000 Watts steady state. They provide system level EMI compliance per MIL-STD-461 (CE102, CS101, CS114, CS115, CS116, RE102, RS103). Built-In-Test (BIT), Current Share, Overtemp monitor and INHIBIT are standard features. Optional RS-485 command and control provides four fault isolated groups of outputs.

3U cPCI and Power Bricks

NAI also offers 3U DC/DC Converters that plug directly into a 3U cPCI chassis; providing standard outputs and signaling per PICMG 2.11. Also offered are small footprint power supply bricks; available in configurations of up to 3 outputs, with output power up to 500 W. These accept AC, +28 VDC or +270 VDC Inputs.

Features

- Full line VITA 62 Compliant, VPX products
- Built-In-Test (BIT), Status signaling and temperature monitoring
- User programmability
- Current Share
- I²C Communication
- Intelligent communication interfaces
- Input configurations of AC, +28 VDC and +270 VDC
- Component derating design per NAVMAT Guidelines
- Output Power up to 2,000 Watts
- Conduction-cooled COTS designs built to withstand harsh environments
- Integrated EMI filtering per MIL-STD-461
- Input protection per MIL-STD-704, MIL-STD-1399 and MIL-STD-1275
- Environmental compliance per MIL-STD-810, DO-160 and VITA 47

VPX AC/DC, DC/DC Power Supply

DC/DC Holdup/Power Conditioning Unit

High Power LRU Power Supply

Brick Power Supply

Rugged Power Supplies							
Platform	**Type**	**Model**	**Form Factor**	**Input**	**Wattage**	**# Of Outputs**	**Features**
VPX 3U Wedgelock Cooled	DC/DC Converter	68PS1	3U	+28 VDC	400	6	VITA 62, Option for “High Power” +12 V, optional adjustable AUX voltage, Holdup, Temp. Monitoring, I²C, BIT, EMI Filter, MIL-STD-1275
		VPX55H-3			500		VITA 62, Temp. Monitoring, I²C, BIT, Current Share, EMI Filter
		VPX55H2-3			725		VITA 62, Temp. Monitoring, I²C, BIT, Current Share, EMI Filter, Option for “High Power” +12 VDC, Synchronization
		VPX57-31		+270 VDC	400		VITA 62, Temp. Monitoring, I²C, BIT
		VPX57H2-3			750		VITA 62, Temp. Monitoring, I²C, BIT, Current Share, EMI Filter, Option for “High Power” +12 VDC, Synchronization
VPX 6U Wedgelock Cooled	AC/DC Power Supply	VPX56H-6	6U	3Ø AC, +270 VDC	1,000	5	VITA 62, Temp. Monitoring, I²C, BIT, Current Share, EMI Filter
		VPX56H2-6			1,400		VITA 62, Temp. Monitoring, I²C, BIT, Current Share, EMI Filter, Option for “High Power” +12 VDC, Synchronization
VPX 3U Wedgelock Cooled	DC Holdup Unit	VPX55-3HU	3U	+28 VDC	400	2	VITA 62, Temp. Monitoring, I²C, BIT, EMI Filter, Aux Output
		VPX55-BEHU		+12 VDC	500		VITA 62, Temp. Monitoring, I²C, BIT, Aux Output. Companion for VPX55H series
	DC/AC Inverter	44KS5-01	3U VPX	+28 VDC	75 VA	1	VITA 62, Temp. Monitoring, I²C, BIT, EMI Filter
		44KS1-01	Brick		60 VA		BIT
cPCI Wedgelock Cooled	DC/DC	55KQ2	3U	+28 VDC	60	4	PICMIG 2.11 Compatible
		55LQ3			100		
		75PS4			150		

Standalone and Brick Power Supplies						
Platform	**Model**	**Input**	**Wattage**	**# Of Outputs**	**Voltage Output**	**Features**
High Power LRU Power Systems Conduction Cooled	56XS1	3Ø AC	2,000	Single	24 VDC, 28 VDC, 48 VDC	EMI Filter, Input Transient Protection, Current Share, Remote Error Sensing, BIT
	56WS4		1,500		28 VDC	
	56XS2		1,000		+270 VDC	
	56WS2		1,500		28 VDC	EMI Filter, Input Transient Protection, Remote Error Sensing
AC/DC Brick Baseplate Cooled [1]	56***	Multiple AC or 270 VDC	25 to 500 Watts	Single and Triple	+5 VDC~, + 28 VDC	TTL On/Off, EMI Filter, Input Transient Protection, Current Share Available on Select Models
DC/DC Brick Baseplate Cooled [1]	55***	+28 VDC	25 to 100 Watts	Single and Triple		

[1] Ranges provided for this series of products. Visit www.naii.com/products for a complete listing of available power supplies.

Configurable Rugged COTS Systems

NAI's family of highly configurable rugged COTS systems enable you to combine our smart function modules, boards, power supplies and software into the rugged chassis of choice. Add your unique application and deliver a system that meets your specific requirements quickly and with little or no NRE.

These systems can be configured with or without an SBC, and are designed to operate reliably in extreme temperature, shock, vibration & EMI environments.

How Configurable are NAI's Configurable Systems?

Available system chassis range from support for a single function module in the NIU1A (up to 24 channels) all the way to high-density systems supporting up to 10 motherboards and 60 smart modules (up to 1,440 channels) and can support both centralized and distributed processing.

What are the chances that our portfolio will satisfy your exact requirements off-the-shelf? Just take a look at the number of possible configurations across our standard system offering! (based on a library of over 70 available pre-integrated function modules)

Rugged Systems	Dimensions w/ Connectors (w x h x d)	Weight / lbs. (fully populated)	Function Module Slots	Board Slots	Possible Configurations*2
NIU1A	6.8" x 1.5" x 2.5"	< 1.2	Single	N/A	70+
NIU2A	7.0" x 3.0" x 2.5"	< 2.75	Dual	N/A	2,415
SIU31	4.71" x 2.35" x 8.71"	< 5.0	3	1	62,196
SIU33	4.71" x 4.78" x 8.71"	< 10.0	9	3	> 97 Billion
SIU6	11.75" x 3.35" x 8.65"	< 14.0	12	2	> 18.3 Trillion
SIU35	**7.13" x 4.76" x 8.71"**	**< 15.0**	**15**	**5**	**> 1.4 Quadrillion*1**
SIU36	7.13" x 4.71" x 8.91"	< 15.0	18	6	> 54 Quadrillion
SIU610	12.74" x 7.62" x 12.58"	< 54.0	60	10	> 558 Quintillion

*1 1.4 Quadrillion is not enough? NAI system capabilities can support up to 558 quintillion with a custom solution such as the SIU610. Contact NAI for more details.

*2 Possible Configurations as calculated by: $C(n,r) = \frac{n!}{(n-r)!r!}$

n objects taken r at a time

Handle Unplanned Specification Changes With Ease

COSA's modularity and agility make your ability to quickly adapt to unplanned design changes a breeze.

Add or change modules, boards or systems to meet your new requirements, in the same or smaller footprint. These changes can be quickly made at the factory, keeping your program timeline intact while continuing to avoid NRE charges.

Application Ready Systems

NAI's Application Ready Systems provide customers with pre-configured, pre-validated, rugged military embedded solutions that can be deployed as soon as your application is ready.

Designed for a variety of defense and commercial aerospace applications, our suite of application-ready systems are Intel® Core™ i7, NXP® (Power PC), or ARM® processor-based and are ruggedized to withstand -40º C to +71º C and qualified to MIL-STD-1275D & MIL-STD-704A with 50 ms holdup (power supply); MIL-STD-461F and MIL-STD-810G.

Select From:

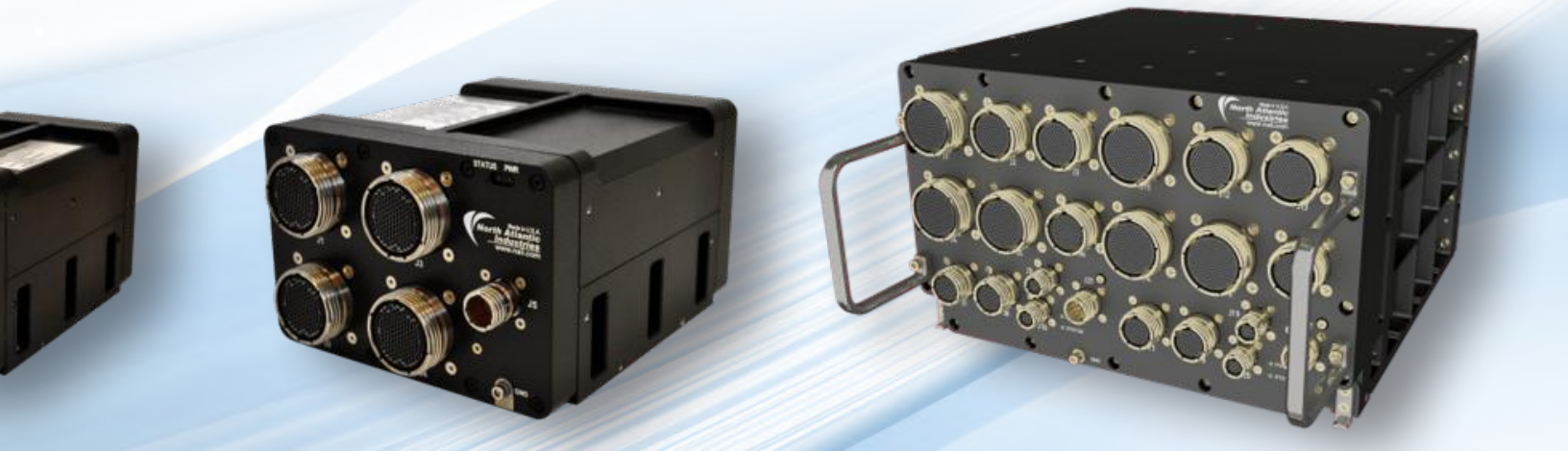
Data Acquisition

Control & Targeting

Vehicle Management

Integrated Vehicle Health Monitoring

Visit www.naii.com/products for a complete list of available systems and their specifications. Modifications are easily made at the factory if these application-ready solutions do not fully satisfy requirements.



Custom and Specialized Solutions

Networking Solutions

NAI's rugged, compact Ethernet switches provide big performance in a small footprint.

Managed Ethernet Switch

The NIU2A-ES2 is a small, low-power, self-contained, Layer 3, fully managed switch that provides up to 16 10/100/1000Base-T Gigabit Ethernet ports and 4 optional 10 Gigabit 850 nm multimode fiber-optic ports. Additionally, there is one Gigabit Ethernet and one RS-232 port for maintenance / configuration interface.

This switch supports Open Systems Interconnection (OSI) model data link (L2) and network (L3) layer, quality of service (QoS) and cybersecurity features including Internet Protocol Security (IPSec), Internet Key Exchange (IKE (v1, v2)) and Denial-of-Service (DOS) attack defense.

Video

Built around the proven high-performance and power efficient AMD Radeon E9171 GPU, the 68GP2 base-board incorporates a high-processing graphics capability Xilinx MPSoC with hard Quad Core-A53 processors for video capture and format conversions, which provides two channels of video processing from analog, HD-SDI & HDMI video sources, and transfers this video data directly to processor or GPU memory.

On the output side, the board provides 3 HDMI or DisplayPort ports directly and converts two streams from the GPU into HD-SDI or analog outputs. This combination of functionality provides for extremely low latency capture, graphics generation and overlay, display output conversions as well as provides compressed H.264/265 digital video output via SATA port (for flight recorder or archival purposes).

Available video input/output formats include:

- Digital: 3G, HD or SD-SDI (2-In, 2-Out) / HDMI (In) & HDMI/DP (3-Out)
- Analog: RS-170 VESA or STANAG 3550 (2-In, 2-Out)
- Motor Drive Boards: Full Bridge, 3 phase brushless adjustable motor voltage, HALL, encoder and resolver position feedback

Customized Solutions

Leveraging the COSA portfolio to address unique I/O function integration challenges, NAI offers primary or single-function I/O boards with custom layouts and footprints for specific, single-purpose applications that require:

- Higher current capacity
- Higher grounding requirements
- OpenVPX, VME, cPCI or custom platforms
- Convection or Conduction Cooled

While not limited to these, examples include:

- 3U VPX, Next-Gen Integrated 28-65 VDC PSU and Single Channel PWM Servo Drive
- 3U cPCI Synchro/Resolver LVDT/RVDT Simulation Board with 4 channels
- 6U VME, Next-Gen Dual Channel PWM Servo Drive

Minimum Volume Requirements Apply. Contact the factory at +1 631-567-1100 to discuss your specific requirements.

Test & Measurement

NAI offers air cooled, commercial grade boards for production automated test & simulation as well as a portfolio of field-proven, high-precision instruments to support a range of applications including:

- Signal processing validation
- Prototype test & development
- Systems & control monitoring
- Calibration of navigation control, fire control, LVDT/RVDT simulation & test systems

Providing the ultimate in accuracy, speed, and repeatability, NAI's simulation & measurement instruments have become the industry standard for use in defense, commercial aerospace and industrial applications.

The embedded T&M circuit cards are available in 3U and 6U cPCI/VME/VPX and PCI/PCIe form factors. All Instrument models are available as rack mount or benchtop units and are self-calibrating. Easy to use high-resolution touch screens and programmable display options are standard across all models.

Air Cooled, Commercial Grade Boards

Most of NAI's COTS boards are available as either conduction or air-cooled models. Commercial grade, air-cooled models have an operating temperature range of 0° C to +70° C. More ruggedized versions available if required. Contact factory for additional details.

Angle Position Indicator - 8810A

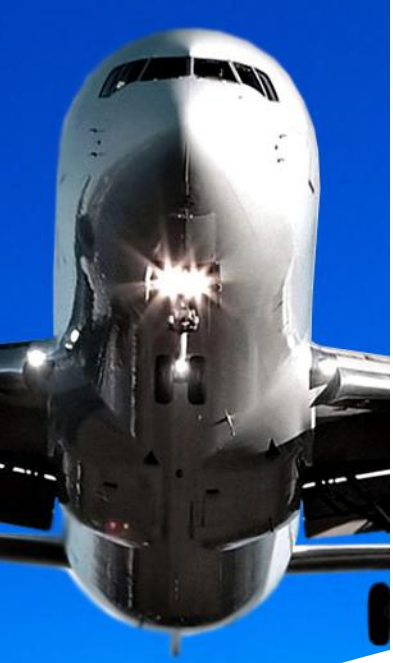
- Resolution: 0.0001°
- Accuracy: Up to ±0.0015°
- Two Isolated Input Channels
- Single or Two-Speed Measurements: Programmable Ratio from 2 to 255
- Three display modes: 0-360°, ±180° or degrees, minutes & seconds

Synchro/Resolver Simulator - 5330A

- Resolution: 0.001°
- Accuracy: up to ±0.003°
- One or Two Output Channels (Up to 6 VA per channel)
- Single or Two-Speed Simulation: Programmable Ratio from 2 to 255
- Two display modes: 0-360° and ±180°

Phase Angle Voltmeter - 2250A

- Two Galvanic Isolated Input Channels (Signal and Reference)
- Measures: Total, Fundamental, Harmonic, In-Phase, Quadrature, Frequency, THD, Ratio, Gain and LVDT/RVDT
- High Accuracy: 1 uV Nulling Sensitivity / Resolution: 0.00001°
- Frequency: Up to 1 MHz / Voltage: Up to 500 Vrms




Smarter, Smaller, Faster Solutions for Air, Land & Sea

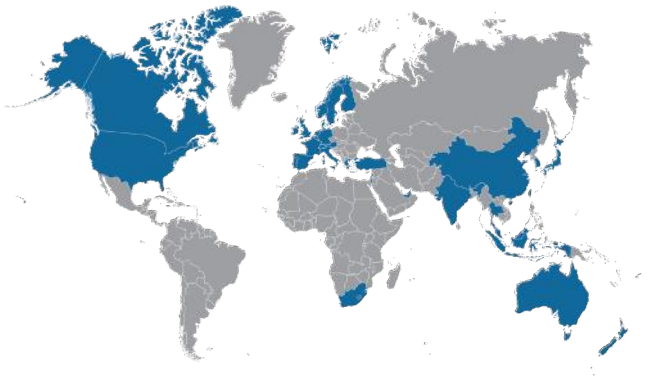
NAI's COSA® Architecture is helping some of the world's largest defense, commercial aerospace and industrial companies meet complex I/O & power requirements with high-density, COTS-based solutions in less space, with lower power requirements, no NRE and faster timelines than is possible with alternative solutions.

Quality

Our products use open standards, innovative designs and tight quality control to deliver reliability that reduces program risk and accelerates your time to mission. NAI's quality systems are certified to AS9100 Rev. D and ISO9001:2015 standards plus Federal Aviation Regulations FAR 21 & FAR 45.15

Support You Can Count On

NAI's network of 33 sales offices covering 35 countries support customers and programs on a global basis. Our technical sales and application engineers bring decades of experience in helping customers design and develop high-performance systems for mission critical applications. Call on us any time to discuss your requirements, investigate design options or troubleshoot a technical issue.



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