# NIU1A Rugged COTS Systems
Nano Interface Unit

Configure with one I/O or communication function module—
Over 100 different modules to choose from

NIU1A contains an integrated power supply, one function module slot, and an optional ARM® Cortex®-A9 processor. This small, low-power unit is ideally suited for rugged military, industrial, and commercial applications. It delivers off-the-shelf solutions that accelerate deployment of SWaP-optimized systems — *in less time, with NO NRE.*

The NIU1A includes BSP and SSK support for Wind River® Linux and VxWorks®, and for Xilinx® PetaLinux (w/optional ARM Processor). In addition, SSKs are supplied with source code and board-specific library I/O APIs to facilitate system integration.
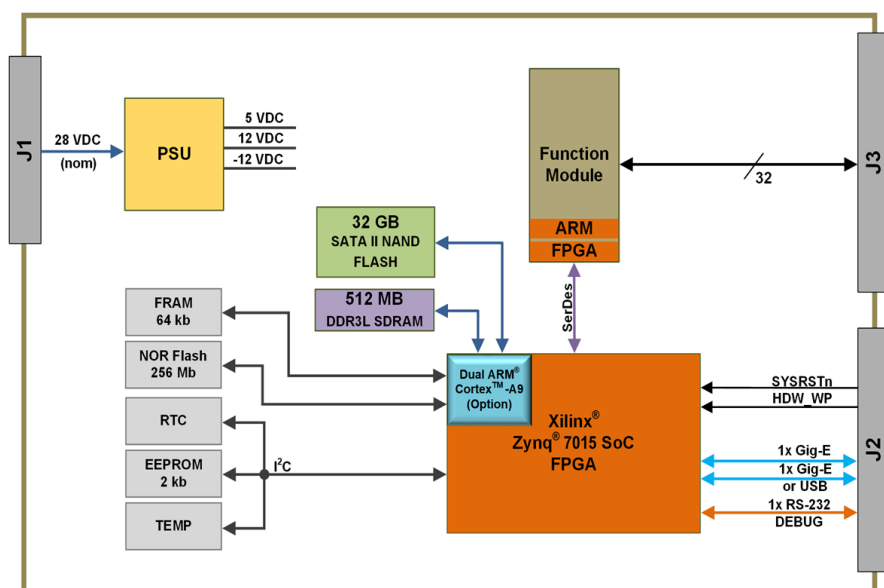
Features

- **Supports one NAI smart I/O function module**
  - 100+ modules to choose from
  - Customer-configurable
  - COSA® architecture
- **Minimized SWaP Footprint**
  - 6.8" x 1.6" x 2.5" (incl. connectors)
  - ~1.2 lbs. (544 g)
  - 28 VDC Input
  - <5 W MB power dissipation

- **Optional ARM® Cortex® - A9 Dual Core 800MHz Processor**
- **512 MB DDR3 SDRAM**
- **32 GB (max) SATA II NAND Flash**
- **Connectivity**
  - 2x 10/100/1000 Base-T Ethernet or 1x 10/100/1000 Base-T Ethernet and USB
  - 1x RS-232
- **Continuous Background BIT**

- **VICTORY Interface Services (Contact factory)**
- **Operating System Support**
  - Xilinx PetaLinux
  - Wind River® Linux
  - VxWorks®
- **Commercial and Rugged applications***
  - MIL-STD-704F
  - MIL-STD-461
  - Operating temp: -40°C to +71°C

*Designed to meet. Characterizations pending. EMI/EMC requires shielded cables and proper grounding practices.

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Select 1 independent function for your application

I/O Modules					
Function	Module	Description	Function	Module	Description
Analog-to-Digital	AD1	12 CH. A/D, ±10 V, Dedicated, 256 kHz (max), Sigma-Delta	Digital IO - Differential Transceiver	DF1	16 CH. Differential I/O, Input: -10 V to +10 V (422), -7 V to +12 V (485) Output: -.25 V to +5 V
	AD2	12 CH. A/D, ±100 V (max), Dedicated, 256 kHz (max), Sigma-Delta		DF2	16 CH. 16 Channel Enhanced Differential I/O
	AD3	12 CH. A/D, ±25 mA, Dedicated, 256 kHz (max), Sigma-Delta	Discrete IO - Multichannel, Programmable	DT1	24 CH. Discrete I/O, 0-60 VDC Input/Output, Max Iout 500 mA - 2 A, Source/Sink (out)
	AD4	16 CH. A/D, ± 10 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR		DT2	16 CH. Discrete I/O, ±80 V Input/Output, Max Iout 600 mA, Isolated/Ch Switch (out)
	AD5	16 CH. A/D, ± 50 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR		DT3	4 CH. Discrete Hi & Lo Side Switch Output @ 65V/2A (max), external individual supplied VCC & VSS per channel pair
	AD6	16 CH. A/D, ± 100 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR		DT4	24 CH. Enhanced DT1
	ADE	16 CH. A/D, ±10 V, Individual 16-bit SAR, 200 kHz max., Simultaneous Sampling		DT5	16 CH. Enhanced DT2
	ADF	16 CH. A/D, ±100 V, Individual 16-bit SAR, 200 kHz max., Simultaneous Sampling	Relay	RY1	4 CH. Relay, 220V/2A @ 60W/62.5VA (Max), Non Latching
Digital-to-Analog	DA1	12 CH. D/A, ± 10 V, 25 mA Per Channel, Current or Voltage Control		RY2	4 CH. Relay, 220V/2A @ 60W/62.5VA (Max), Latching
	DA2	16 CH. D/A, ± 10 V, 10 mA Per Channel, No Current Control	Digital IO - TTL/CMOS	TL1	24 CH. TTL I/O, Standard Functionality, Programmable
	DA3	4 CH. D/A, ±40 V, ±100 mA, Voltage or Current Output		TL2	24 CH. TTL I/O, Enhanced Functionality, Programmable
	DA4	4 CH. D/A, ± 20 to ± 80, 10 mA, Voltage Control Only	Variable Reluctance	VR1	8 CH. Variable Reluctance Signal Input and General-Purpose Pulse Counter, ±100 V, 100 kHz (max)
	DA5	4 CH. D/A, High-Voltage/High-Current Half-Bridge (2 Channels Full-Bridge) External VCC Sourced Outputs			

Measurement & Simulation Modules					
Function	Module	Description	Function	Module	Description
AC Reference	AC2	2 CH. AC Reference Source, 47 Hz - 20 KHz, ± 3% Acc, 2 – 28 Vrms, 6 VA (Max/Ch) Power	LVDT RVDT Measurement and Simulation	LD4	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 10 KHz - 20 KHz Freq
	AC3	2 CH. AC Reference Source, 47 Hz - 2.5 KHz, ± 3% Acc, 28 – 115 Vrms, 6 VA (Max/Ch) Power		LD5	4 CH. LVDT/RVDT to Digital, 28-90 Vrms Input, 2-115 Vrms Exc, 47 Hz - 1 KHz Freq
LVDT RVDT Measurement and Simulation	LD1	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 47 Hz -1 KHz Freq	Thermocouple and RTD Measurement	RT1	8 CH. Resistance Temperature Detectors (RTD), 2, 3, or 4 wire, 16 Bit Res, 16.7 Hz/Ch
	LD2	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 1 KHz - 5 KHz Freq		TC1	8 CH. Thermocouple, 4.17 - 470 Hz, ±100 mV A/D
	LD3	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 5 KHz - 10 KHz Freq	Strain Gauge Measurement	SG1	4 CH. Strain Gauge, 4.7 Hz - 4.8 KHz, Measurement, Conventional 4-Arm Bridge

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Communication Modules								
Function	Module	Description		Function	Module	Description		
ARINC Communications	AR1	12 CH. ARINC 429, 100 KHz or 12.5 KHz, RX/TX, 256 Word Tx/Rx Buffer		MIL-STD-1553B	FTE	2 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Direct Coupled		
ARINC Communications	AR2	1 CH. ARINC 568 (CH-1, RX & TX) & 1 Channel ARINC 579 (CH-2, Programmable RX or TX), 1024-Word TX & RX Buffers per Ch.		MIL-STD-1553B	FTF	4 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Direct Coupled		
CANBus Communications	CB1	8 CH. CANBus, CAN 2.0 A/B, 16 K RX/TX Buffer, 1 Mb/s Max Data Rate		MIL-STD-1760	FTJ	1 CH. MIL-STD-1760 (1553), BC, RT, BM, BM/RT, 128 KB RAM, Transformer Coupled		
CANBus Communications	CB2	8 CH. CANBus, J1939, 16 K RX/TX Buffer, 500 kb/s Max Data Rate		MIL-STD-1760	FTK	2 CH. MIL-STD-1760 (1553), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled		
CANBus Communications	CB3	8 CH. CANBus, CAN 2.0 A/B (CB1) or J1939 (CB2) protocol layer programmable per channel		Serial Communications	SC1	4 CH. Serial, RS-232/422/423 (MIL-STD-188C)/485, Non Isolated		
MIL-STD-1553B	FTA	1 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM, Transformer Coupled		Serial Communications	SC3	8 CH. (max) RS-232/422/485 Serial Communications or GPIO, Programmable, Non-isolated		
MIL-STD-1553B	FTB	2 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled		Serial Communications	SC5	4 CH. RS-232/422/485 communications, isolated per channel and from SYS GND		
MIL-STD-1553B	FTC	4 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled		Serial Communications	SC6	4 CH. RS-232/422/485 communications, individual SYS GND provided per channel (non-isolated)		
MIL-STD-1553B	FTD	1 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM, Direct Coupled						

Storage							
Function	Module	Description		Function	Module	Description	
SATA Solid State Drive (SSD)	FM2	1 CH. 480 GB MLC SATA Flash, extended temp -40°C to 85°C operation		SATA Solid State Drive (SSD)	FM8	1 CH. 1 TB SATA TLC NAND Flash, Extended Temperature Operation	
SATA Solid State Drive (SSD)	FM7	1 CH. 1 TB SATA Flash, 3D NAND MLC, 0-70 °C operation		SATA Solid State Drive (SSD)	FM9	1 CH. 1.92 TB SATA TLC NAND Flash, Extended Temperature Operation	

Combination Modules							
Function	Module	Description		Function	Module	Description	
Combo	CM5	2 CH. Dual-redundant MIL-STD-1553 & 8 Channel ARINC 429/575, 100 KHz or 12.5 KHz, RX or TX, 256 Word Tx/Rx Buffer		Combo	CME	8 CH. ±10V A/D (ADE-type) & 8 Channels ±10V D/A (DA2-type), Combination	
Combo	CM8	2 CH. Dual-redundant MIL-STD-1553 & 12 Channel Discrete I/O, 0-60 VDC Input/Output, Max Iout 500 mA - 2 A, Source/Sink (out)					

Board Support Package and Software Support

The NIU1A includes BSP and SDK support for Wind River® VxWorks® / Linux and Xilinx® PetaLinux tools. In addition, software support kits are supplied, with source code and board-specific library I/O APIs, to facilitate system integration. Each I/O function has dedicated processing, unburdening the SBC from unnecessary data management overhead.

Background Built-In-Test (BIT)

BIT continuously monitors the status of all I/O during normal operations and is totally transparent to the user. SBC resources are not consumed while executing BIT routines. This simplifies maintenance, assures operational readiness, reduces life-cycle costs and— keeps your systems mission ready.

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Architected for Versatility

NAI's Configurable Open Systems Architecture™ (COSA®) offers a choice of over 100 smart I/O, communications, or Ethernet switch functions, providing the highest packaging density and greatest flexibility of ruggedized embedded product solutions in the industry. Preexisting, fully-tested functions can be combined in an unlimited number of ways quickly and easily.

One-Source Efficiencies

Eliminate man-months of integration with a configured, field-proven system from NAI. Specification to deployment is a seamless experience as all design, state-of-the-art manufacturing, assembly and test are performed - by one trusted source. All facilities are located within the U.S. and optimized for high-mix/low volume production runs and extended lifecycle support.

Product Lifecycle Management

From design to production and beyond, NAI's product lifecycle management strategy ensures the long-term availability of COTS products through configuration management, technology refresh and obsolescence component purchase and storage.

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