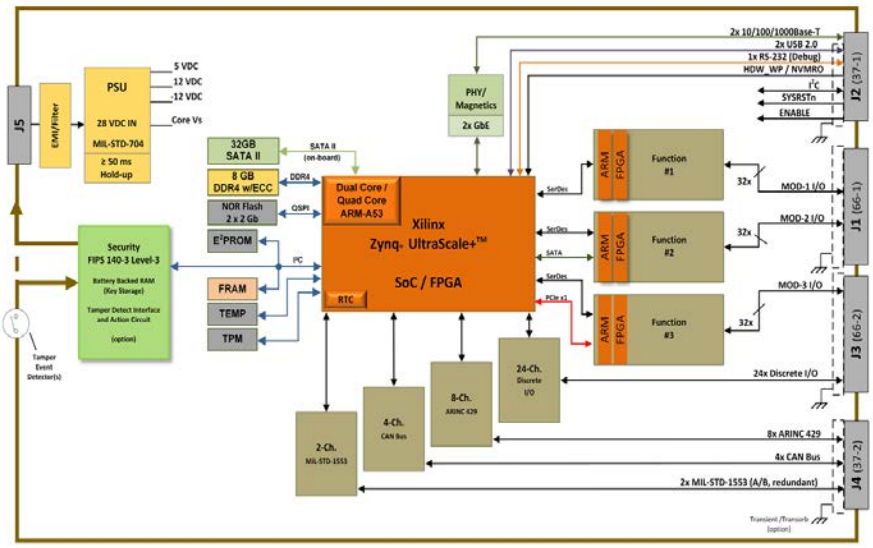
NIU3A Rugged COTS Systems

SWaP Optimized Processing and Multifunction I/O & Communications System

The NIU3A is a small, rugged, low-power, self-contained processing and multifunction I/O system preconfigured with 24-CH programmable Discrete I/O, 8-CH ARINC 429/575, 4-CH CANBus and 2-CH MIL-STD-1553 functions. The NIU3A can also be configured with up to three smart Configurable Open Systems Architecture™ (COSA®) function modules. The NIU3A boasts Dual or Quad Core ARM Cortex®-A53 processors for customer software applications and I/O and communications management. The NIU3A is configured with two 10/100/1000BASE-T (GbE) Ethernet ports and an RS-232 port for maintenance / diagnostic or configuration interface. Ideally suited for rugged on-board vehicle, marine and aircraft platforms, the NIU3A delivers off-the-shelf solutions that accelerate deployment of SWaP-optimized systems in air, land and sea applications.

The NIU3A rugged multifunction I/O and communications platform provides scalable system level solutions to field and expand digital network architectures. A dual capability module slot allows for PCIe modules that offer support for single channel, Tri-Redundant TTE / AFDX (ARINC 664 part 7) / Best Effort Ethernet (2 x 10/100/1000BASE-T) or two nodes with 3 ports/node FireWire (IEEE 1394) communications interface.



Features

- **Preconfigured Onboard I/O Functions**
  - 24-CH Discrete I/O (Enhanced Mode Optional)
  - 8-CH ARINC 429/575
  - 4-CH CAN bus; CAN2.0A/B, CAN FD, ARINC 825
  - 2-CH MIL-STD-1553
- **Supports three NAI smart I/O function modules**
  - 100+ modules to choose from
  - Customer-configurable
  - COSA® architecture
- **Minimized SWaP Footprint**
  - 7.2" x 3.2" x 5.5" (est.)(incl. connectors)
  - ~5.4 lbs. (2.44 kg)
  - 28 VDC @ ~0.930 A (est.) + Module Power
- **Xilinx Zynq® UltraScale+™ SoC with Dual/Quad-Core ARM® Cortex® -A53 MPCore™ @ 1.3 GHz****
  - 8 GB DDR4 RAM
  - 32 GB SATA Flash
- **Connectivity**
  - 2x 10/100/1000Base-T (GbE)
  - 1x RS-232 debug port
  - 2x USB 2.0
- **Power Supply Hold-up (Optional)**
  - 50+ milliseconds of Holdup time
- **Certifiable**
  - DO-178C & DO-254 DAL A (Contact Factory)
- **Cybersecurity & Anti-Tamper**
  - FIPS-140-3 Level 3 (Contact Factory)
- **Continuous Background BIT**
- **Operating System Support**
  - Xilinx PetaLinux
  - Wind River VxWorks 7.x
  - DDC-I Deos
- **Rugged applications***
  - MIL-STD-810
  - MIL-STD-461
  - Operating temp: -40°C to +71°C
  - Conduction-cooled and Convection/Air-cooled options (contact factory)
- **Ideally suited for**:
  - Nodal Access Unit (NAU)
  - Data Concentrator Unit (DCU)
  - Remote Interface Unit (RIU)
  - Health & Usage Monitoring System (HUMS)

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

**Default processor speed; may vary depending on operating/environmental/other external system variables.

Select up to 3 independent functions for your application

I/O Modules

Function	Module	Description
Analog-to-Digital	AD1	12 CH. A/D, ±10 V, Dedicated, 256 kHz (max), Sigma-Delta
	AD2	12 CH. A/D, ±100 V (max), Dedicated, 256 kHz (max), Sigma-Delta
	AD3	12 CH. A/D, ±25 mA, Dedicated, 256 kHz (max), Sigma-Delta
	AD4	16 CH. A/D, ± 10 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR
	AD5	16 CH. A/D, ± 50 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR
	AD6	16 CH. A/D, ± 100 V, Multiplexed, 500 KHz Agg / 8 Ch, SAR
	ADE	16 CH. A/D, ±10 V, Individual 16-bit SAR, 200 kHz max., Simultaneous Sampling
	ADF	16 CH. A/D, ±100 V, Individual 16-bit SAR, 200 kHz max., Simultaneous Sampling
Digital-to-Analog	DA1	12 CH. D/A, ± 10 V, 25 mA Per Channel, Current or Voltage Control
	DA2	16 CH. D/A, ± 10 V, 10 mA Per Channel, No Current Control
	DA3	4 CH. D/A, ±40 V, ±100 mA, Voltage or Current Output
	DA4	4 CH. D/A, ± 20 to ± 80, 10 mA, Voltage Control Only
	DA5	4 CH. D/A, High-Voltage/High-Current Half-Bridge (2 Channels Full-Bridge) External VCC Sourced Outputs

Function	Module	Description
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
	DF2	16 CH. 16 Channel Enhanced Differential I/O
Discrete IO - Multichannel,Programmable	DT1	24 CH. Discrete I/O, 0-60 VDC Input/Output, Max Iout 500 mA - 2 A, Source/Sink (out)
	DT2	16 CH. Discrete I/O, ±80 V Input/Output, Max Iout 600 mA, Isolated/Ch Switch (out)
	DT3	4 CH. Discrete Hi & Lo Side Switch Output @ 65V/2A (max), external individual supplied VCC & VSS per channel pair
	DT4	24 CH. Enhanced DT1
	DT5	16 CH. Enhanced DT2
Relay	RY1	4 CH. Relay, 220V/2A @ 60W/62.5VA (Max), Non Latching
	RY2	4 CH. Relay, 220V/2A @ 60W/62.5VA (Max), Latching
Digital IO - TTL,CMOS	TL1	24 CH. TTL I/O, Standard Functionality, Programmable
	TL2	24 CH. TTL I/O, Enhanced Functionality, Programmable
Variable Reluctance	VR1	8 CH. Variable Reluctance Signal Input and General-Purpose Pulse Counter, ±100 V, 100 kHz (max)

Measurement & Simulation Modules

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
	AC3	2 CH. AC Reference Source, 47 Hz - 2.5 KHz, ± 3% Acc, 28 – 115 Vrms, 6 VA (Max/Ch) Power
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
	LD2	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 1 KHz - 5 KHz Freq
	LD3	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 5 KHz - 10 KHz Freq
	LD4	4 CH. LVDT/RVDT to Digital, 2-28 Vrms Input, 2-115 Vrms Exc, 10 KHz - 20 KHz Freq

Function	Module	Description
LVDT RVDT Measurement and Simulation	LD5	4 CH. LVDT/RVDT to Digital, 28-90 Vrms Input, 2-115 Vrms Exc, 47 Hz - 1 KHz Freq
IRIG Timecode Receiver and Generator	RG1	1 CH. IRIG Timing Function Interface
Thermocouple and RTD Measurement	RT1	8 CH. Resistance Temperature Detectors (RTD), 2, 3, or 4 wire, 16 Bit Res, 16.7 Hz/Ch
	TC1	8 CH. Thermocouple, 4.17 - 470 Hz, ±100 mV A/D
	TR1	8 CH. Thermocouple (TCx) & Resistance Temperature Detectors (RTD), programmable per channel

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	FTD	1 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM, Direct Coupled
	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.		FTE	2 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		FTF	4 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Direct Coupled
	CB2	8 CH. CANBus, J1939, 16 K RX/TX Buffer, 500 kb/s Max Data Rate	MIL-STD-1760	FTJ	1 CH. MIL-STD-1760 (1553), BC, RT, BM, BM/RT, 128 KB RAM, Transformer Coupled
	CB3	8 CH. CANBus, CAN 2.0 A/B (CB1) or J1939 (CB2) protocol layer programmable per channel		FTK	2 CH. MIL-STD-1760 (1553), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled
Ethernet NIC Interface	EM1	2 CH. Dual Ethernet I/F, Intel 82850, 10/100/1000	IEEE 1394 (FireWire)	FW3	3 CH. (nodes), up to 3 ports per node, IEEE 1394b/AS5643 (Mil1394) (Firewire), S200b
Ethernet Switch	ES2	16 CH. (Ports) Ethernet Switch, 10/100/1000Base-T (GbE), Layer 2+/3 Managed	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		SC3	8 CH. (max) RS-232/422/485 Serial Communications or GPIO, Programmable, Non-isolated
	FTB	2 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled		SC5	4 CH. RS-232/422/485 communications, isolated per channel and from SYS GND
	FTC	4 CH. MIL-STD-1553 (AMC), BC, RT, BM, BM/RT, 128 KB RAM Per Channel, Transformer Coupled		SC6	4 CH. RS-232/422/485 communications, individual SYS GND provided per channel (non-isolated)

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)	FM9	1 CH. 1.92 TB SATA TLC NAND Flash, Extended Temperature Operation
	FM8	1 CH. 1 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	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)

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.