

# S-A2300 | Lyra

## Radiation-Characterized Space AI GPGPU



Picture for reference

The S-A2300 Lyra stands out as the most powerful Rugged-GPGPU AI supercomputer. Ideally suited for distributed systems, it features the powerful NVIDIA Jetson AGX Orin Industrial System-on-Module for LEO space platforms.

Its Ampere GPU boasts up to 2048 CUDA cores and 64 Tensor cores, delivering up to 248 TOPS with exceptional energy efficiency for AI-based local processing right where you need it, next to your sensors. Additionally, the system includes two dedicated NVDLA (NVIDIA Deep-Learning Accelerator) engines, optimized for deep learning applications.

Despite its compact size, the S-A2300 Lyra sets the standard as the most advanced solution for AI, deep learning, and video and signal processing in next-generation short-duration spaceflight, as well as NEO and LEO satellites applications.

POWERED BY



**RuggedAI™ is Aitech**

- **SWaP Optimized Rugged AI Space System**
- **Small Form Factor**
- **NVIDIA® Jetson™ AGX Orin Industrial System-on-Module 64GB RAM with ECC**
  - ▶ Ampere™ Architecture GPU 2048 CUDA® Cores
  - ▶ 12-Core ARM® v8.2 64-bit CPU
  - ▶ AI performance: 248 TOPS (Tera Operations Per Second)
  - ▶ H.264/H.265 Hardware Encoder
- **Cold Plate Cooling**
- **NVMe SSD**
- **64 GB LPDDR5 with ECC**
- **FPGA**
  - ▶ Flexible FPGA platform supporting customer IP integration, high-performance processing, video frame grabbing and robust cybersecurity solutions.
- **I/O**
  - ▶ Gigabit Ethernet
  - ▶ Discretes
  - ▶ USB
  - ▶ DVI/HDMI Out
  - ▶ UART Serial
- **CUDA®, OpenGL, OpenGL ES, Vulkan**
- **Low Power Consumption**
- **Radiation Characterized**
- **Development Platforms Available**

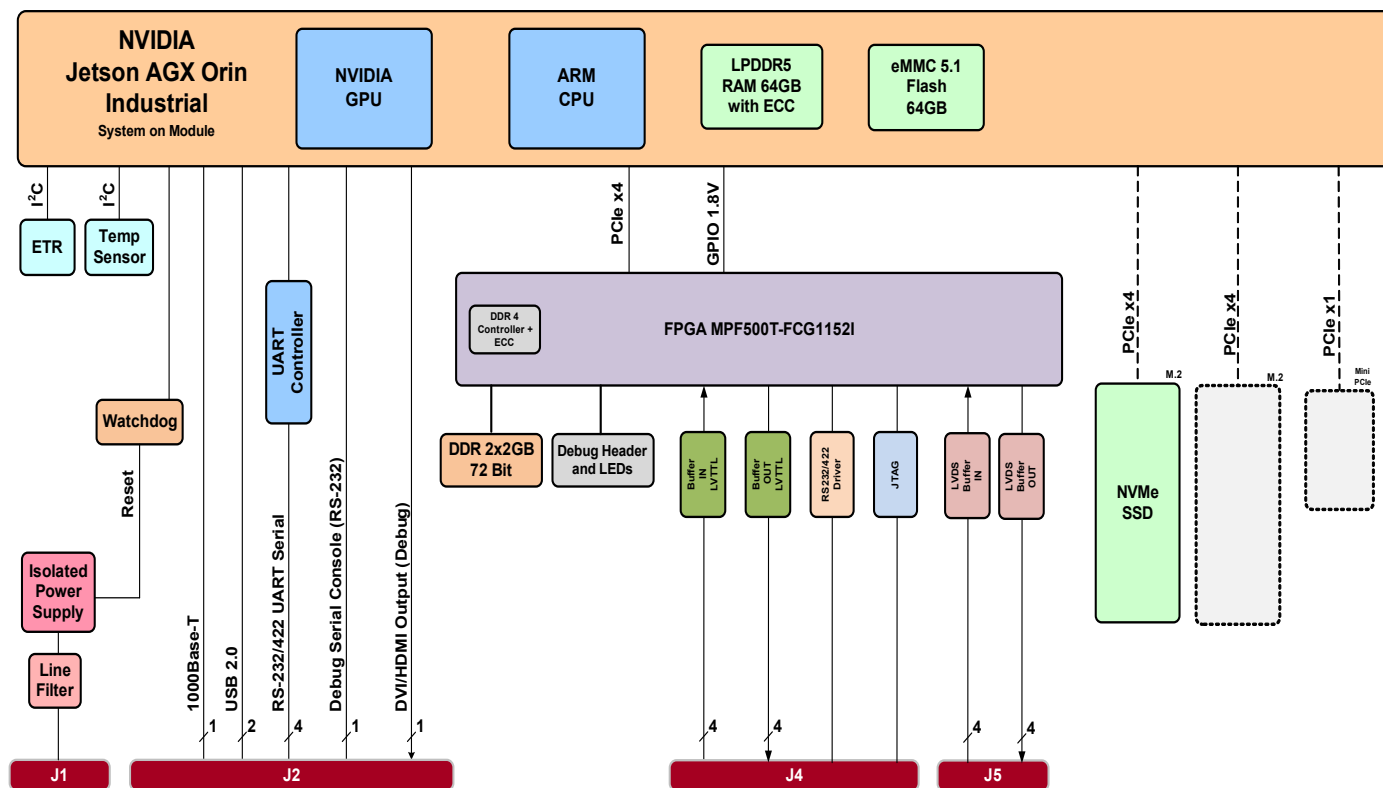
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S-A2300 Block Diagram

### System Architecture

System on Module	<ul style="list-style-type: none"><li>NVIDIA Jetson AGX Orin Industrial - 64GB RAM with ECC</li></ul>
GPU	<ul style="list-style-type: none"><li>NVIDIA Ampere GPU architecture</li><li>2048 CUDA cores</li><li>64 Tensor cores</li><li>AI performance 248 TOPS</li><li>Supports CUDA, OpenGL, OpenGL ES, Vulkan</li></ul>
CPU	<ul style="list-style-type: none"><li>ARM v8.2 (64-bit) heterogeneous multi-processing (HMP) CPU</li><li>12-core NVIDIA ARM Cortex A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3</li><li>Operates at up to 1.2GHz (depending on power mode)</li></ul>
System Resources	<ul style="list-style-type: none"><li>Multi-standard video/JPEG decoder/encoder, hardware encoding for H.264/H.265</li><li>Dynamic voltage and frequency scaling</li><li>Temperature sensors</li><li>Elapsed time recorder</li><li>Status indicator LED</li><li>Rad-hard watchdog</li></ul>

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- **FPGA (Optional)** - Flexible FPGA platform supporting customer IP integration, high-performance processing, video frame grabbing and robust cybersecurity solutions.  
The FPGA is provided as an open infrastructure for customer-developed IP core integration. It is connected to the AGX Orin via a PCIe x4 interface and is accessible from Linux through the standard PCIe framework.  
Available I/O includes:
  - 4 x LVTTTL input and output signals (100kHz)
  - 4 x GPIO interfaces (1.8V) connected to the AGX Orin SoM
  - 1 x RS-232/422 UART interface (for optional integration with customer IP)
  - JTAG signals (for programming and updating the FPGA with customer code)
  - 4 x LVDS inputs and 4 x outputs signals (1.25 GHz)

### Memory Resources

<b>RAM</b>	64 GB LPDDR5 with ECC, operates at up to 204.8GB/s (depending on power mode), 256-bit interface
<b>eMMC</b>	64 GB eMMC 5.1 (boot source)
<b>NVMe SSD</b>	Optional NVMe SSD. For standard options, see the Ordering Information section. Additional options may be available per customer request. Contact an Aitech representative for more information.

### I/O

<b>I/O Variant</b>	00
<b>Gigabit Ethernet (10/100/1000Base-T)</b>	1
<b>DVI (single-link) / HDMI Output (Debug)</b> Supports resolutions of up to 1920x1080 [60p]	1
<b>USB 2.0</b>	2
<b>Serial Ports (RS-232/422 UART)</b> Software configurable as RS-232/422	2
<b>Debug Serial Console (RS-232 UART)</b>	1
<b>Discrete I/O (Single-Ended, 1.8V to FPGA)</b>	4

### Software

<b>Operating System</b>	Linux OS pre-installed – L4T (Linux for Tegra), a lightly modified Ubuntu-based distribution
<b>Drivers</b>	Sample applications and development tools are pre-installed

### Mechanical

<b>Cooling</b>	Cold plate
<b>Dimensions (L x W x H)</b>	Preliminary: 250 mm x 95 mm x 200 mm
<b>Weight</b>	< 5 kg

### Power

<b>Input Power</b>	<ul style="list-style-type: none"><li>• Wide input voltage range: 22 – 33 V<sub>DC</sub> steady state operation</li></ul>
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	<ul style="list-style-type: none"><li>• Input reverse polarity protection</li><li>• EMI/RFI input filter</li><li>• On-board supplies isolated from external supply</li><li>• MIL-STD-704A and MIL-STD-1275D compliant (no hold-up)</li></ul>
Power Consumption	<ul style="list-style-type: none"><li>• AGX Orin Industrial SoM – 15-60W (default mode is 35W, mode ID 2)</li><li>• Users can create customized presets, specifying clocks and online cores</li><li>• The total power consumption depends on system configuration and expansion options</li></ul>

### Environmental

EM/FM	FM (Flight Model)	EM (Lab Development System)
Operating Temp.	-40 to +55 °C @ cold plate	0 to +40 °C @ ambient
Non-Operating Temp.	-40 to +85 °C	0 to +40 °C @ ambient
Vibration	GSFC-STD-7000B (14.1g)	N/A
Operating Shock	GSFC-STD-7000B (500g)	N/A
Vacuum	GSFC-STD-7000B (10 <sup>-5</sup> Torr)	N/A
Relative Humidity	95%	10-90%
Conformal Coating	Urethane (except NVIDIA Jetson SoM)	Conformal coating
Bench Handling	MIL-STD-810F, Method 516.5, Procedure VI	N/A
Total Ionizing Dose	20 krad (Si)	N/A
Single Event Effects	<ul style="list-style-type: none"><li>- 1E+10 proton/cm2 fluence (40 - 200 MeV)</li><li>- No destructive SEL</li><li>- Self-reset capability (by watchdog)</li><li>- Power cycle recovers functional interrupts (by watchdog)</li></ul>	N/A
EMI	Designed for MIL-STD-461G (CS101, RE102)	N/A

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### Ordering Information

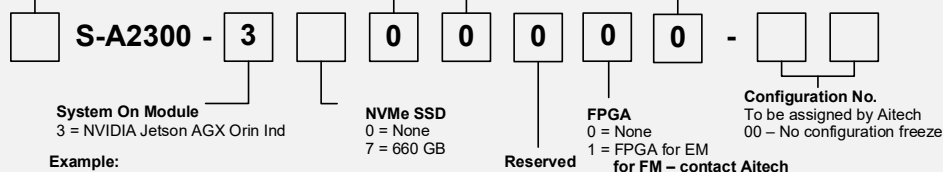
#### Ruggedization

1 = EM - Lab Development System  
3 = FM - Space Flight System

#### I/O Variant

See I/O table above

#### Reserved



#### Example:

EM - 1S-A2300-3000000-00  
FM - 3S-A2300-3000000-00

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### Optional Accessories

#### EM System

**TCA230-00-SK**

Starter kit:  
Cables and external power supply

**MCS230-1-00**

Mating connectors set

#### FM System

**TC-S-A2300-00-SK**

Starter kit:  
Electroless nickel connectors  
Cables and external power supply

**MC-S-A2300-00**

Electroless nickel mating connectors



### Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the S-A2300, as well as additional software support.



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