A178 – Thunder

Rugged GPGPU Fanless AI Supercomputer

The A178 Thunder is the smallest and most powerful Rugged-GPGPU AI supercomputer, ideally suited for distributed systems, available with the powerful NVIDIA Jetson AGX Xavier System-on-Module.

Its Volta GPU with 512 CUDA cores and 64 Tensor cores reaches 32 TOPS INT8 and 11 TFLOPS FP16 at a remarkable level of energy efficiency, providing all the power needed for AI-based local processing right where you need it, next to your sensors. Two dedicated NVDLA (NVIDIA Deep-Learning Accelerator) engines provide an interface for deep learning applications.

With its compact size, the A178 Thunder is the most advanced solution for AI, deep learning, and video and signal processing for the next generation of autonomous vehicles, surveillance and targeting systems, EW systems, and many other applications.

POWERED BY NVIDIA

Rugged GPGPU is Aitech

- **SWaP Optimized Rugged AI Supercomputer**
- **Ultra Small Form Factor**
- **NVIDIA® Jetson™ AGX Xavier System-on-Module**
  - Volta™ Architecture GPU w/512 CUDA® Cores
  - 8-Core ARM v8.2 64-bit CPU
  - 32 TOPS (Tera Operations Per Second)
  - H.264/H.265 Hardware Encoder
  - Best Available Performance per Watt – 1067 GOPS/W INT8 and 366 GFLOPS/W FP16
- **NVMe SSD w/Quick Erase and Secure Erase**
- **Removable Micro SD Card**
- **32 GB LPDDR4x**
- **Video Capture**
  - SDI (SD/HD)
    4 channels available simultaneously
  - Composite (RS-170A [NTSC]/PAL)
    8 channels available simultaneously
- **I/O**
  - Gigabit Ethernet
  - 10G Ethernet
  - USB 3.0 & 2.0
  - Discretes
  - DVI/HDMI Out
  - DisplayPort Out
  - CANbus
  - UART Serial
- **CUDA®, OpenGL, OpenGL ES, Vulkan**
- **Low Power Consumption**
- **Environmentally Sealed (IP67)**

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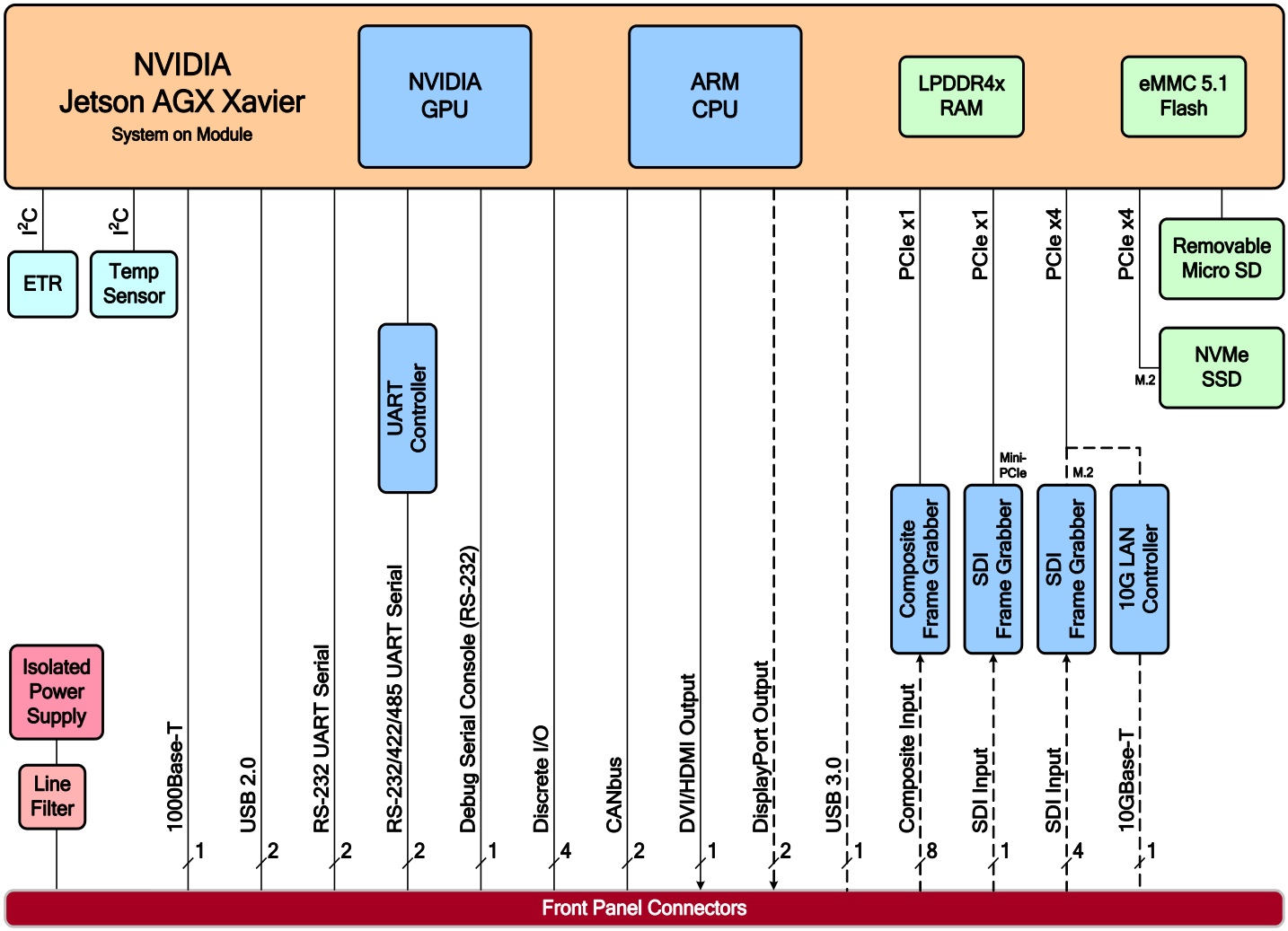

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Aitech

System Architecture

System on Module	NVIDIA Jetson AGX Xavier
GPU	• NVIDIA Volta GPU Architecture • 512 CUDA cores • 32 TOPS INT8 (Tera Operations Per Second for Integer 8-bit) • 11 TFLOPS FP16 (Tera Floating Point Operations Per Second for FP 16-bit) • CUDA • OpenGL • OpenGL ES • Vulkan
CPU	ARMv8.2 (64-bit) heterogeneous multi-processing (HMP) CPU • 4 x dual-core CPU clusters (8 total NVIDIA Carmel processor cores) • 128 KB L1 instruction cache and 64 KB L1 data cache per core, 2 MB L2 cache per cluster, 4 MB L3 cache shared by all clusters • Operates at up to 2.26 GHz (depends on power mode)
Expansion Options	Main board accommodates up to three optional expansion modules (via factory configuration), such as: • Optional I/O expansion modules (for example: SDI Frame Grabber – standard I/O expansion module options are determined by system I/O Variant) • Optional NVMe SSD Additional I/O expansion module options and NVMe SSD options may be available per customer request, contact an Aitech representative for more info
System Resources	• Multi-standard Video/JPEG Decoder/Encoder, HW Encoding for H.264/H.265 • Dynamic voltage and frequency scaling • Temperature Sensors • Elapsed Time Recorder • Status Indicator LED

Memory Resources

RAM	32 GB LPDDR4x, operates at up to 2133 MHz (depends on power mode), 256-bit interface
eMMC	32 GB eMMC 5.1 (boot source)
NVMe SSD	Optional NVMe SSD with Quick Erase and Secure Erase (standard options are listed in *Ordering Information* below, additional options may be available per customer request, contact an Aitech representative for more info)
Removable Micro SD Card	Optional removable Micro SD card (standard options are listed in *Ordering Information* below, additional options may be available per customer request, contact an Aitech representative for more info)

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I/O

	I/O Variant			
	00	01	02	03
Composite Input RS-170A (NTSC)/PAL, supports simultaneous capture of all channels at full frame rates	–	8	8	–
SDI Input 480/60i, 576/50i, 720/60p, 1080/60i, 1080/30p, supports simultaneous capture of all channels at full frame rates	–	–	4	1
DisplayPort Output Supports resolutions up to 4K (3840x2160)	–			2
USB 3.0	–			1
10G Ethernet (10GBASE-T)	–			1
Gigabit Ethernet (10/100/1000Base-T)	1			
DVI (single-link) / HDMI Output Supports resolutions up to 1920x1080 [60p]	1			
USB 2.0	2			
Serial Ports (RS-232 UART)	2			
Serial Ports (RS-232/422/485 UART) Software configurable as RS-232/422/485	2			
Debug Serial Console (RS-232 UART)	1			
Discrete I/O (Single-Ended)	4			
CANbus	2			

Software

- Linux OS pre-installed – L4T (Linux for Tegra), a lightly modified Ubuntu-based distribution
- Video capture drivers and sample applications pre-installed, in variants equipped with optional frame grabber(s)

Mechanical

Dimensions (L x W x H)	216 mm x 82 mm x 172.5 mm [8.5" x 3.23" x 6.8"]
Weight	< 2.5 kg [5.5 lbs.]

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Power

Input Power	• Wide input voltage range: 11 – 34 V_{DC} steady state operation • Input reverse polarity protection • EMI/RFI input filter • On-board supplies isolated from external supply • MIL-STD-704 and MIL-STD-1275 compliant (no hold-up)
Power Consumption	• Three main different power preset modes for the NVIDIA AGX Xavier: ▪ 10 W ▪ 15 W (default) ▪ 30 W (4 sub modes) • Users can create custom presets, specifying clocks and online cores • Total power consumption depends on system configuration and expansion options

Environmental

Operating Temp.	**Min.**	-40 °C
	Max.	+55 °C
Non-Operating Temp.		-55 to +105 °C
Vibration		V2 per VITA 47
Operating Shock		OS2 per VITA 47
Altitude		-1,500 to +60,000 ft. (1)
Relative Humidity		0 – 100%
Ingress Protection		IP67 (2)
Rain		MIL-STD-810F, Method 506.4, Procedure III
Dust		MIL-STD-810F, Method 510.4, Procedure I & II
Salt Fog		MIL-STD-810F, Method 509.4
Bench Handling		MIL-STD-810F, Method 516.5, Procedure VI
Fungus		Fungus Resistant
EMI/RFI		Designed for MIL-STD-461

Notes: (1) Depending on temperature and system power dissipation
(2) With appropriate connections to system I/O and power connectors

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Ordering Information

Ruggedization
2 = Rugged

I/O Variant
See *I/O* table above

Reserved

A178 - [ ] [ ] [ ] [ ] [ ] 0 - [ ] [ ]

System On Module
1 = NVIDIA Jetson AGX Xavier

NVMe SSD
0 = None
7 = 1 TB, QE, SE
QE: Quick Erase; SE: Secure Erase

Micro SD Card
0 = None
3 = 64 GB

Configuration No.
To be assigned by Aitech

Example: 2A178-170200-00

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Optional Accessories

TCA178-00-SK	Starter Kit for I/O Variants 00, 01, and 02: External Power Supply, J1 Power Cable, J2 I/O Cable with Standard I/O Connectors
TCA178-00-SK-HS	Starter Kit for I/O Variant 03: External Power Supply, J1 Power Cable, J2 and J3 I/O Cables with Standard I/O Connectors
MCS178-1-00	Mating Connectors for I/O Variants 00, 01, and 02: J1 (Power) and J2 (I/O)
MCS178-3-00	Mating Connectors for I/O Variant 03: J1 (Power), J2 (I/O), and J3 (I/O)

Development Platform

Development platforms (optional) include:

- EV178 – A178 Evaluation System
- I/O Cables and Power Supply
- Software installed/configured by Aitech – latest available OS release, development tools, CUDA examples

Contact your Aitech representative for additional information

Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the A178 and additional software support.