C535 – Typhoon

GPGPU 3U VPX Supercomputer Board

Aitech
Embedded Computing *without* Compromise

The new C535 Typhoon is ideally suited to add revolutionary GPGPU supercomputer capabilities to any 3U VPX system.

Combining the CPU and the GPGPU on a single board, the C535 replaces separate SBC + GPGPU boards, with drastically reduced power consumption.

The C535 Typhoon opens up a world of new possibilities with enhanced video and signal processing capabilities for the next generation of autonomous vehicles, avionics and flight systems, surveillance and targeting systems, EW systems, and many other applications.

Rugged GPGPU is Aitech

- **Rugged 3U VPX HPEC Board – SBC with on-board GPGPU**
- **NVIDIA® Jetson™ TX1/TX2 Options**
  - **TX1 – Maxwell™ GPU w/256 CUDA® cores, ARM® Cortex® A57 Quad-Core CPU, 4 GB LPDDR4, 16 GB eMMC**
  - **TX2 – Pascal™ GPU w/256 CUDA® cores, NVIDIA Denver 2 Dual-Core ARM® CPU + Cortex® A57 Quad-Core ARM® CPU, 8 GB LPDDR4, 32 GB eMMC**
  - **1 TFLOPS**
  - **H.264/H.265 HW Encoder**
  - **Best Available Performance per Watt – 60 GFLOPS/W**
- **SATA SSD with Quick Erase & Secure Erase**
- **OpenVPX Compliant**
- **Video Capture**
  - **SDI (SD/HD) w/dedicated H.264 encoder**
  - **Composite (RS-170A [NTSC]/PAL), 8 channels available simultaneously**
- **I/O**
  - **Gigabit Ethernet**
  - **UART Serial**
  - **USB 2.0**
  - **Discretes**
  - **DVI/HDMI Output**
  - **Composite Input**
  - **SDI Input**
- **CUDA®, OpenGL, OpenGL ES, EGL**
- **Low Power Consumption**
- **Development Platforms Available**

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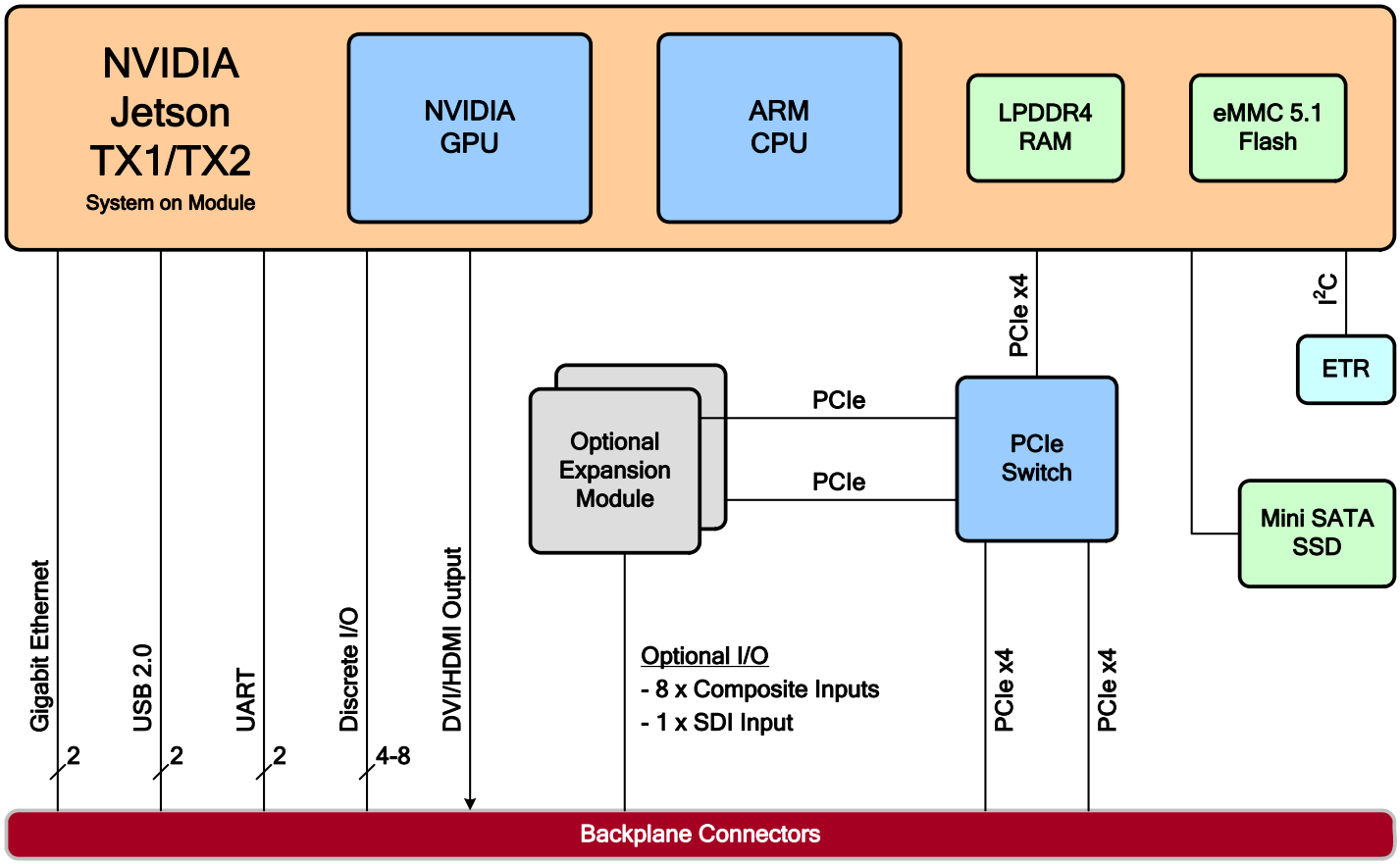

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Board Architecture

	System on Module Option	
	NVIDIA Jetson TX2	**NVIDIA Jetson TX1**
GPU	• NVIDIA Pascal GPU Architecture • 256 Shaders/CUDA cores • > 1 TFLOPS (fp16) • CUDA • OpenGL • OpenGL ES	• NVIDIA Maxwell GPU Architecture • 256 Shaders/CUDA cores • 1 TFLOPS (fp16) • CUDA • OpenGL • OpenGL ES
CPU	ARMv8 (64-bit) heterogeneous multi-processing (HMP) architecture with two CPU clusters (6 processor cores) • NVIDIA Denver 2 Dual-Core @ 2.0 GHz, 128 KB L1 instruction cache + 64 KB L1 data cache per core, 2 MB L2 Unified Cache • ARM® Cortex® A57 Quad-Core @ 2.0 GHz, 48 KB L1 instruction cache + 32 KB L1 data cache per core, 2 MB L2 Unified Cache	ARM® Cortex® A57 Quad-Core CPU @ 1.73 GHz, 48 KB L1 instruction cache + 32 KB L1 data cache per core, 2 MB L2 Unified Cache
RAM	8 GB LPDDR4 @ 1866 MHz, 128-bit interface	4 GB LPDDR4 @ 1600 MHz, 64-bit memory interface
eMMC	32 GB eMMC 5.1 (boot source)	16 GB eMMC 5.1 (boot source)
Security	• HW acceleration for AES 128/192/256 encryption and decryption • HW acceleration for AES CMAC, SHA-1, SHA-256, SHA-384, and SHA-512 algorithms • 2048-bit RSA HW • HW Random Number Generator (RNG) SP800-90	• HW acceleration for AES 128/192/256 encryption and decryption • HW acceleration for AES CMAC, SHA-1, and SHA-256 algorithms • 2048-bit RSA HW • HW Random Number Generator (RNG) SP800-90
SATA SSD	Optional Mini SATA SSD with SLC/MLC Flash, Quick Erase, and Secure Erase options (additional options may be available per customer request, contact an Aitech representative for more info)	
Expansion Options	Board accommodates up to two optional I/O expansion modules. Available options include: • Composite Frame Grabber • SDI Frame Grabber Included expansion modules are determined by I/O Variant, see the *I/O* section below for details (additional options may be available per customer request, contact an Aitech representative for more info)	
Board Resources	• Multi-standard Video/JPEG Decoder/Encoder, HW Encoding for H.264/H.265 • Dynamic voltage and frequency scaling • Temperature Sensors • Elapsed Time Recorder	
OpenVPX (VITA 65) Slot Profile	SLT3-PAY-2F2T • Payload board • Two Fat Pipes (PCIe x4 ports) • Two Thin Pipes (1000Base-T ports)	

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I/O

		I/O Variant			
		00	**01**	**02**	**03**
Expansion Card Options	**Composite Frame Grabber**	–	✓	–	✓
	SDI Frame Grabber	–	–	✓	✓
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, dedicated H.264 encoder		–	–	1	1
DVI (single-link) / HDMI Output		1			
USB 2.0		2			
Gigabit Ethernet (10/100/1000Base-T)		2			
Serial Ports (RS-232 UART)		2			
Discrete I/O (Single-Ended)		8 (w/TX1) or 4 (w/TX2)			

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

	Form Factor & Dimensions (1)	**Weight**
Air-Cooled	3U VPX REDI per ANSI/VITA 48.1	< 1000 g (2.2 lbs)
Conduction-Cooled	3U VPX REDI per ANSI/VITA 48.2	< 1000 g (2.2 lbs)

Notes: (1) Pitch per ordering information

Power

Input Power	Powered by standard VPX backplane connector power supplies
Power Consumption	• ≤ 5 W idle • 8 – 10 W under typical CUDA load • 17 W when System on Module is fully utilized Both System on Module options (TX1 and TX2) have similar maximum power consumption, but the TX2 is more efficient, providing higher performance than the TX1 at a given level of power consumption Total power consumption depends on configuration and expansion options

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Environmental

Specs per VITA 47	Air-Cooled		Conduction-Cooled
	Commercial	**Rugged**	**Rugged**
Operating Temp.	AC1 (0 to +55°C) (1)	AC3 (-40 to +70°C) (1)	CC3 (-40 to +70°C) (2)
Non-Operating Temp.	C1 (-40 to +85°C)	C3 (-50 to +100°C)	C3 (-50 to +100°C)
Vibration	V1	V2	V3
Operating Shock	OS1	OS1	OS2
Altitude	15,000 ft.	35,000 ft.	35,000 ft.
Relative Humidity (3)	0 - 90%	0 - 95% with Acrylic (Standard),	
Conformal Coating	N/A	0 - 100% with Urethane (Optional)	

Notes:
(1) Operating ambient air temperature (with sufficient airflow)
(2) Operating card edge temperature
(3) Non-condensing

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Ordering Information

C535 - ☐ ☐ ☐ ☐ ☐ ☐ 0 0 - ☐ ☐

Ruggedization
1 = Commercial
2 = Rugged

Cooling + Pitch
Air-Cooled
A3 = 1"
Conduction-Cooled
R3 = 1"

System On Module
1 = NVIDIA Jetson TX1
2 = NVIDIA Jetson TX2

SATA SSD
0 = None
2 = 32 GB SLC, QE, SE
3 = 64 GB MLC, QE
4 = 128 GB MLC, QE

SLC - Single Level Cell
MLC - Multi Level Cell
QE - Quick Erase
SE - Secure Erase

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

Reserved

Configuration No.
To be assigned by Aitech

Example: 2C535-R3120300-00

Rugged GPGPU is Aitech

Optional Accessories

TM535	Rear Transition Module (RTM) providing convenient access to C535 I/O interfaces via standard connectors. Supports both air and conduction-cooled C535 when installed in a compatible system. See the TM535 datasheet for more information.

Development Platform

Development platforms are available as an option, which include:

- EV535 – C535 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 C535 and additional software support.