

C535 – Typhoon

GPGPU 3U VPX Supercomputer Board



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 **GP GPU** 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
 - ▶ DVI/HDMI Output
 - ▶ UART Serial
 - ▶ Composite Input
 - ▶ USB 2.0
 - ▶ SDI Input
 - ▶ Discretres
- CUDA®, OpenGL, OpenGL ES, EGL
- Low Power Consumption
- Development Platforms Available



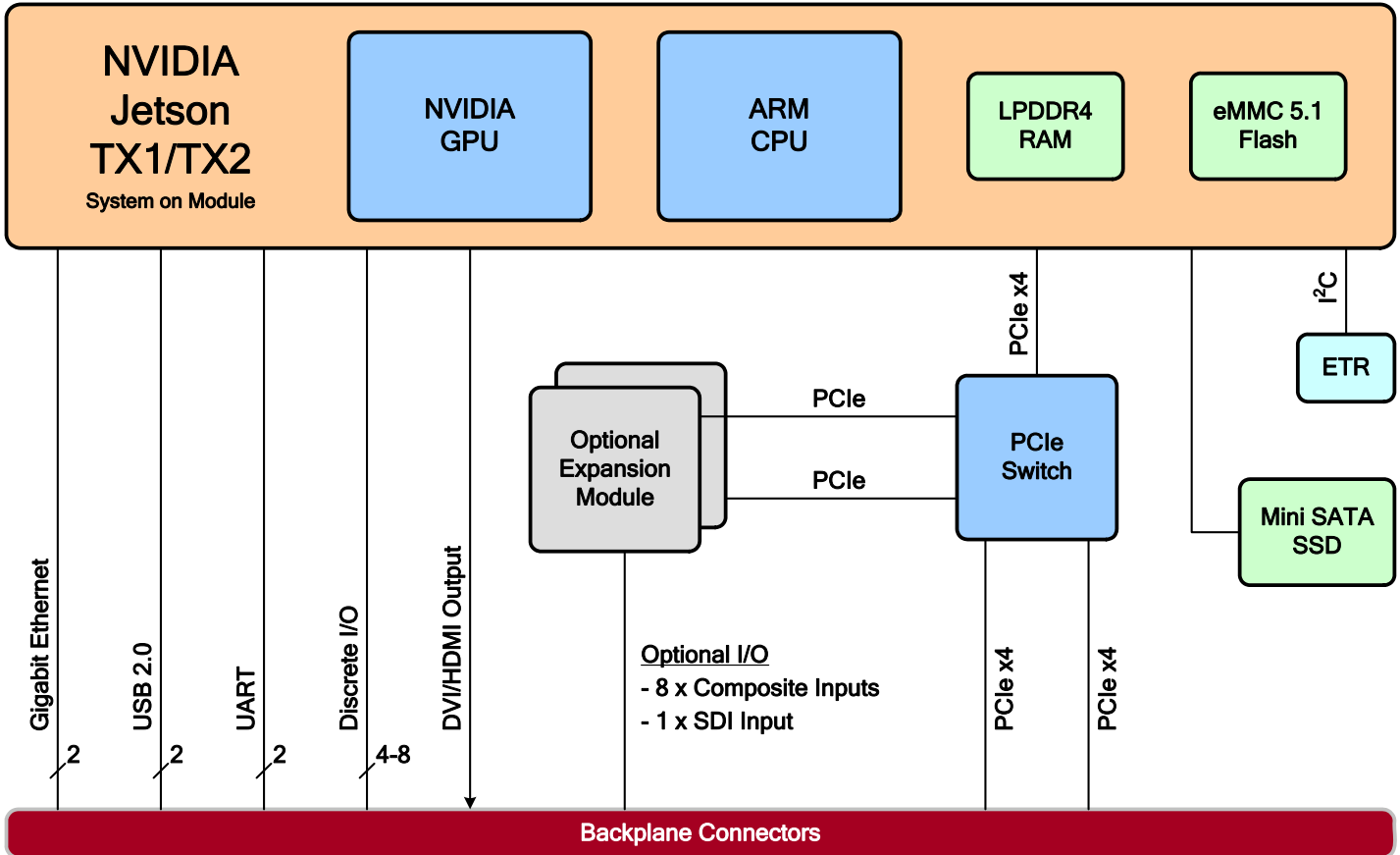
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Board Architecture

	System on Module Option	
	NVIDIA Jetson TX2	NVIDIA Jetson TX1
GPU	<ul style="list-style-type: none"> NVIDIA Pascal GPU Architecture 256 Shaders/CUDA cores > 1 TFLOPS (fp16) CUDA OpenGL OpenGL ES 	<ul style="list-style-type: none"> NVIDIA Maxwell GPU Architecture 256 Shaders/CUDA cores 1 TFLOPS (fp16) CUDA OpenGL OpenGL ES
CPU	<p>ARMv8 (64-bit) heterogeneous multi-processing (HMP) architecture with two CPU clusters (6 processor cores)</p> <ul style="list-style-type: none"> NVIDIA Denver 2 Dual-Core @ 2.0GHz, 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 	<p>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</p>
RAM	8 GB LPDDR4 @ 1866MHz, 128-bit interface	4 GB LPDDR4 @ 1600MHz, 64-bit memory interface
eMMC	32 GB eMMC 5.1 (boot source)	16 GB eMMC 5.1 (boot source)
Security	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<p>Board accommodates up to two optional I/O expansion modules. Available options include:</p> <ul style="list-style-type: none"> Composite Frame Grabber SDI Frame Grabber <p>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)</p>	
Board Resources	<ul style="list-style-type: none"> 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	<p>SLT3-PAY-2F2T</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • ≤5W idle • 8 – 10W under typical CUDA load • 17W when System on Module is fully utilized <p>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</p> <p>Total power consumption depends on configuration and expansion options</p>

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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), 0 - 100% with Urethane (Optional)	
Conformal Coating	N/A		

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

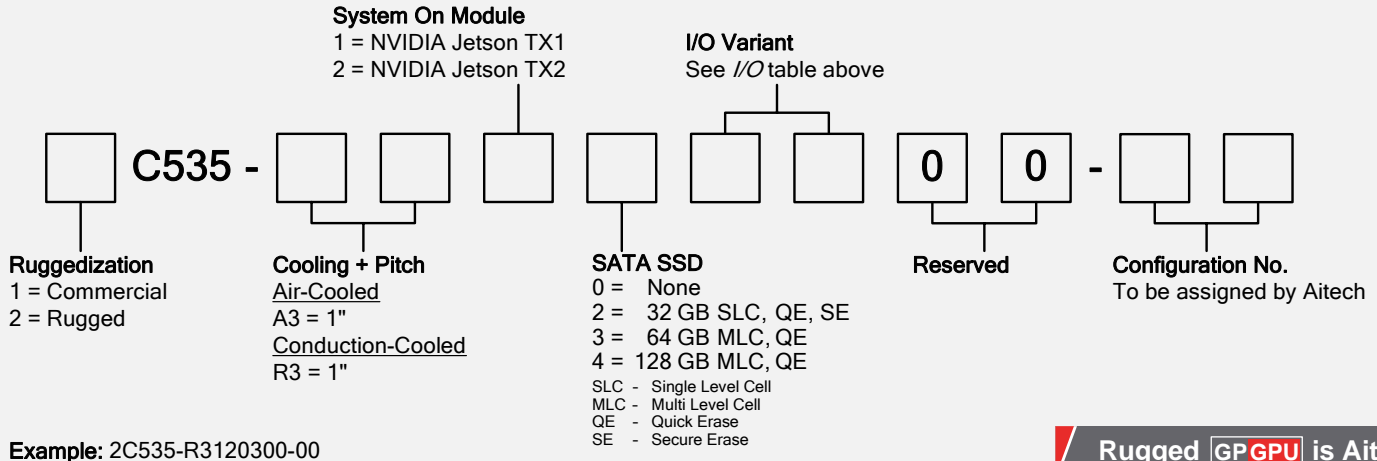
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Ordering Information



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.

Aitech Defense Systems, Inc.
Chatsworth, CA, USA
Toll Free: (888) Aitech-8 [248-3248]
Direct: +1 (818) 700-2000
Fax: +1 (818) 407-1502
Email: sales@rugged.com

www.rugged.com

Aitech Systems, Ltd.
Herzlia, Israel
Tel: +972 (9) 960-0600
Fax: +972 (9) 954-4315
Email: sales@rugged.com