

# Raptor

## Embedded Processing Unit



80 x 95 x 36 mm  
(3.2 x 3.8 x 1.4")

## Overview

The Raptor is an extremely small, powerful, and rugged SWaP-optimized embedded computer. Slightly larger than a deck of playing cards, Raptor features Intel®'s 13th generation processor options, along with up to 64 GB soldered-down error-correcting memory, and three M.2 expansion sockets. Raptor is an excellent solution for applications requiring ultra-compact size, high-performance, and operation in a harsh environment.

The Raptor is powered by Intel's 13th generation CPU family. Models are available with a 10-core i5, or a 5-core U300E processor.

The on-board I/O includes two USB 4 Type-C, two USB 3.2 Type-A ports, and two 2.5 Gb Ethernet TSN ports. Additionally, Raptor includes two COM ports supporting RS-232, RS-422, and RS-485 standards. Three displays are supported: one mDP++ high-performance video port and two USB 4 DP Type-C ports. Three M.2 M key sockets (2x 2242, 1x 2280) support plug-in expansion.

Raptor operates at industrial temperatures (-40° to +85°C), meets MIL-STD-202H specifications for shock and vibration, and is rated for high altitude use (up to 50,000 ft.). Latching connectors prevent cable detachment issues in high-vibration environments.

VersaLogic's 10-year product life support programs ensure long-term availability. This avoids expensive upgrades and migrations from short lifecycle products.

## Highlights **PRELIMINARY**

- **High-performance Intel 13th Gen processor options**
  - 10-core i5
  - 5-core U300E
- **Ultra-compact**
  - 80 x 95 mm
- **Highly secure**
  - TPM 2.0
  - Removable storage
  - AES-256 Encryption
- **Error-correcting memory**
  - Up to 64 GB IB ECC memory
- **Plug-in expansion**
  - Three M.2 sockets
- **On-board I/O**
  - USB 4, USB 3.2, USB 2.0
  - 2.5 Gigabit Ethernet
  - COM ports (232/422/485)

# Features **PRELIMINARY**

## 1 Expansion

1x M.2 2280 M key socket (1a).

2x M.2 2242 M key sockets (1b).

Supports M key and B+M key cards, including: NVMe SSD, AI Accelerator, CAN BUS, ADC, Ethernet, Analog & Digital I/O, Display interfaces.

## 2 Ethernet

Two 2.5 GbE TSN ports 100/1000/2500 auto-detect (2).

## 3 Storage

M.2 M key SSD supports NVMe (3).

## 4 High-performance Video

Intel Iris® Xe Graphics for the i5 processor.

Intel UHD Graphics for the U300E processor.

OpenGL 4.6, DirectX 12.1 and 4.6, 8K hardware video acceleration with HEVC (15-25-bit), VP9, and MPEG2 encoding/decoding.

Three display ports: 1x Mini DisplayPort (4a), 2x USB4 DP Type-C ports (4b).

## 5 Industrial I/O

Two USB4 Type-C ports support video displays and other devices (5a).

Two USB 3.2 and up to eight USB 2.0 ports support cameras, keyboard, mouse, and other devices (5b).

Two COM RS-232/422/485 ports (5c), GPIOs (5d), I2C (5e).

## 6 Digital I/O

GPIO: Eight 3.3V CMOS I/O lines. (6)

## 7 On-board Power Conditioning

10V – 15VDC input (7) from nominal 12V power sources.

## 8 Thermal Solution

Built-in heat plate (8) supports direct attachment to a thermal bulkhead or other thermal options (heat sink, heat pipe adaptor, etc.).

## Intel 13th Generation Core Processor (depending on model)

10-core i5, up to 4.6 GHz turbo clock rate.

5-core U300E, up to 4.3 GHz turbo clock rate.

## RAM (not shown)

Up to 64 GB soldered-on LPDDR5. IB ECC or non-ECC, depending on model.

## Trusted Platform Module (not shown)

On-board TPM 2.0 security chip can lock out unauthorized hardware and software access.

## Ultra-Compact Size

80 x 95 mm.

## Industrial Temperature Operation

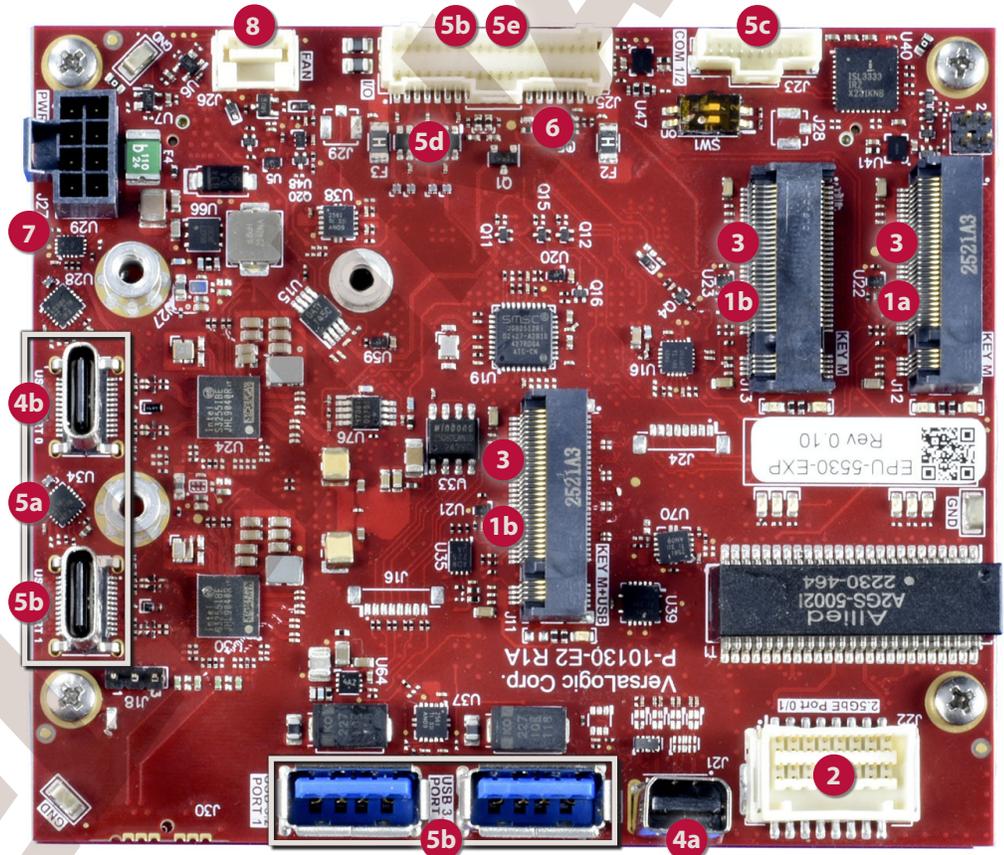
-40° to +85°C operating range for harsh environments.

## MIL-STD-202H

Qualified for high shock/vibration environments.

## Software Support

Compatible with various popular x86 operating systems, including Windows 11 64-bit (latest version), Linux 64-bit (latest version), Real-Time Linux.



COTS modifications are available in quantities as low as 100 pieces.

- Conformal Coating
- Connector Changes
- I/O Changes
- Custom Testing
- Custom Labeling
- BGA Underfill
- BIOS Modifications
- Software and Drivers
- Revision Locks
- Custom Screening
- Software Pre-load
- Etc.

## Specifications **PRELIMINARY**

<b>General</b>				
<b>Board Size</b>	80 x 95 x 36 mm (3.2 x 3.8 x 1.4")			
<b>Weight</b>	265 grams (9.4 oz.)			
<b>Processor</b>	<i>Processor</i>	<i>Cores</i>	<i>Cache</i>	
	Intel 13th Generation 10-core i5-1345URE	10	12 MB	
	Intel 13th Generation 5-core U300E	5	8 MB	
	Intel 64-bit instructions, Secure Key, Intel Enhanced Speed Shift Technology, Intel Deep Learning Boost Technology, Intel Virtualization Technology, AES New Instructions.			
<b>RTC Battery</b>	Connection for 3.0V RTC backup battery. Not required for operation.			
<b>Power Requirements (@ +12V) †</b>	<i>Model</i>	<i>Idle</i>	<i>Average</i>	<i>Max.</i>
	VL-EPU-5530-EAP-16	TBD	TBD	TBD
	VL-EPU-5530-EBP-32x	TBD	TBD	TBD
	VL-EPU-5530-EBP-64x	TBD	TBD	TBD
<b>Input Voltage</b>	10V – 15V (nominal 12V operation)			
<b>Regulatory Compliance</b>	RoHS, Conflict Minerals compliant.			
<b>Environmental</b>				
<b>Cooling Options</b>	Bolt-on heat plate standard. Optional fan, heat pipe, and other thermal accessories available.			
<b>Operating Temperature</b> †	<i>Model</i>	<i>Temperature Range</i>		
	VL-EPU-5530-EAP	-40° to +85°C		
	VL-EPU-5530-EBP	-40° to +85°C		
	Ranges shown assume 90% CPU utilization. For detailed thermal information, refer to the VL-EPU-5530 Reference Manual.			
<b>Airflow Requirements</b>	0.5 Linear meters per second			
<b>Storage Temperature</b>	-40° to +85°C			
<b>Altitude*</b>	Operating	To 15,240m (50,000 ft.)		
	Storage	To 15,240m (50,000 ft.)		
<b>Thermal Shock</b>	5°C/min. over operating temperature			
<b>Humidity</b>	Mil-STD-202H method 103 – Humidity steady state			
<b>Vibration, Sinusoidal Sweep</b> †	MIL-STD-202H method MIL-STD-202-204, Condition A: 2g			
<b>Vibration, Random</b> †	MIL-STD-202H method MIL-STD-202-214, Condition A: 5.35g rms			
<b>Mechanical Shock</b> †	MIL-STD-202H method MIL-STD-202-213, Condition G: 20g half-sine			
<b>Security</b>				
<b>TPM</b>	Trusted Platform Module 2.0 device for hardware and software security			
<b>Memory</b>				
<b>System RAM</b>	Up to 64 GB soldered-on LPDDR5, IB ECC or non-ECC depending on model.			
<b>Video</b>				
<b>General</b>	Intel Iris Xe Graphics for i5 processor, OpenGL4.6, 8K support at 60Hz. Intel UHD Graphics for U300E processor, OpenGL4.6, 8K support at 60Hz.			
<b>DisplayPort Interface</b> §	One Mini DisplayPort++ output. 24-bit. Up to 7680 x 4320 @ 60 Hz. 8K support at 60 Hz. Supports DisplayPort and HDMI signaling (Video and Audio outputs).			
<b>USB Display interface</b>	Two USB 4 DP Type-C ports. 24-bit. Up to 7680 x 4320 @ 60 Hz. 8K support at 60 Hz.			

<b>Mass Storage</b>	
<b>Rotating Drives / Flash / SSD</b> ‡	Three M.2 M key sockets with NVMe support. Bootable.
<b>Network Interface</b>	
<b>Ethernet Controller</b>	Two Intel I226-IT
<b>Ethernet</b> ‡	Two AutoDetect 2.5 Gigabit TSN Ethernet 100Base TX/1000Base T/2500BaseT. One port with network boot option.
<b>Device I/O</b>	
<b>USB</b> ‡§	Two USB 4 Type-C ports, two USB 3.2 Type-A ports, and eight USB 2.0 ports.
<b>COM 1/2 Interface</b> ‡	RS-232/422/485 selectable. 16550 compatible. RS-232 115 Kbps – RS-422/485 460 Kbps max.
<b>Digital I/O</b>	8
<b>I2C</b>	Single I2C interface
<b>M.2 Socket</b>	
<b>M Key</b>	Three Sockets: 2x 2242, 1x 2280.  Supports NVMe SSD, AI Accelerator, CAN BUS, ADC, Ethernet, Analog & Digital IO, Display interfaces.
<b>Software</b>	
<b>BIOS</b>	UEFI
<b>Sleep Mode</b>	ACPI 3.0. Support for S0, S3, S4, S5 states
<b>Operating Systems</b>	Compatible with most x86 operating systems, including Windows 10/11 64-bit (latest version), Linux 64-bit (latest version), Linux RTOS
<b>VersaAPI Support</b>	Library of API calls for reading and controlling on-board devices. Visual Studio and C/C++ software development interfaces. Supported on Windows and Linux.

† Represents operation at +25°C and +12V supply running Windows 11 with DisplayPort monitor, NVME SSD, GbE, two COM in loopback, and USB keyboard/mouse, running Passmark V9 burn-in test. Typical power computed as the mean value of Idle and Maximum power specifications. Maximum power measured with 90% CPU utilization.

‡ Derate -1.1°C per 305m (1,000 ft.) above 2,300m (7,500 ft.)

\* Extended altitude specifications available upon request

‡ TVS protected port (enhanced ESD protection)

§ Power pins on this port are overload-protected

‡ Bootable storage device capability

‡ MIL-STD-202H shock and vibrate levels are used to illustrate the ruggedness of this product in general. Testing at higher levels and/or different types of shock or vibration methods can be accommodated per the application's specific requirements. Contact a VersaLogic Sales Engineer for further information.

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## Ordering Information **PRELIMINARY**

Call VersaLogic Sales at (503) 747-2261 for more information!

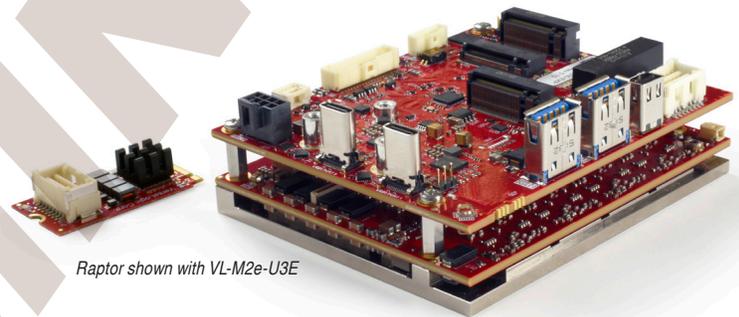
Model	Processor	Cores	Speed/Boost	RAM	Operating Temp.†	Cooling
VL-EPU-5530-EAP-16	U300E	5	1.1/4.3 GHz	16 GB	-40° to +85°C	Heat Plate
VL-EPU-5530-EBP-32x	i5-1345URE	10	1.4/4.6 GHz	32 GB ECC	-40° to +85°C	Heat Plate
VL-EPU-5530-EBP-64x	i5-1345URE	10	1.4/4.6 GHz	64 GB ECC	-40° to +85°C	Heat Plate

## Accessories **PRELIMINARY**

Part Number	Description
<b>Cable Kit</b>	
VL-CKR-RAPTOR	Raptor cable kit. Includes CBR-4005, 0812, 1604, 2033, 1014, HDW-401, & HDW-117
VL-CBR-4005	System I/O paddleboard
VL-CBR-0812	Power cable, 10 to 15V, high-power. 8 Pin Molex Nano-fit to fork terminals. 12"
VL-CBR-1604	Dual Ethernet cable, 16-pin Clik-Mate to 2 RJ-45 – rugged latching, 12"
VL-CBR-2033	Mini DisplayPort to HDMI Active Adapter
VL-CBR-1014	RS232 Dual channel cable 2xDsub (9-pin), Latching, 12"
VL-HDW-401	Thermal Compound Paste. For attaching heat plates and sinks.
VL-HDW-117	M.2 Metal (M3 x 4mm) Screw kit
<b>Cables and Adapters</b>	
VL-CBR-2031	Mini DisplayPort to Mini DisplayPort, 36"
VL-CBR-2032	Mini DisplayPort to VGA adapter, 6"
<b>Audio/Video</b>	
VL-EPH-V6SA	mDP to LVDS video converter
VL-ADR-01S	USB to Audio Adapter, -25° to +85°C
<b>Hardware</b>	
VL-PS-ATX12-300A	ATX development power supply
VL-HDW-426	Optional Mounting Plate
<b>Thermal Options</b>	
VL-HDW-427	Heat Pipe adapter kit
VL-HDW-428	Heat Sink & Fan for development

## M.2 Modules **PRELIMINARY**

Part Number	Description	Form Factor
<b>Network</b>		
VL-M2e-E12E	Gigabit Ethernet	M.2 B+M key 2242
VL-M2e-E11E	Dual Gigabit Ethernet	M.2 B+M key 2280
<b>Serial I/O</b>		
VL-M2e-U3E	Dual serial ports plus twelve GPIOs	M.2 B+M key 2242
<b>Storage (NVMe M.2)</b>		
VL-F30-240EBN	240 GB NVMe SSD, M.2 2280, M key PCIe, ET	M.2 B+M key 2280



Raptor shown with VL-M2e-U3E

### Take the Risk out of Embedded Computing

Whether it's selecting the optimum solution for your application, providing expert support during development, or on-time delivery of defect-free products, VersaLogic is here to make sure your project goes smoothly from the initial concept through the extended life of your program. Contact VersaLogic today to learn more.

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