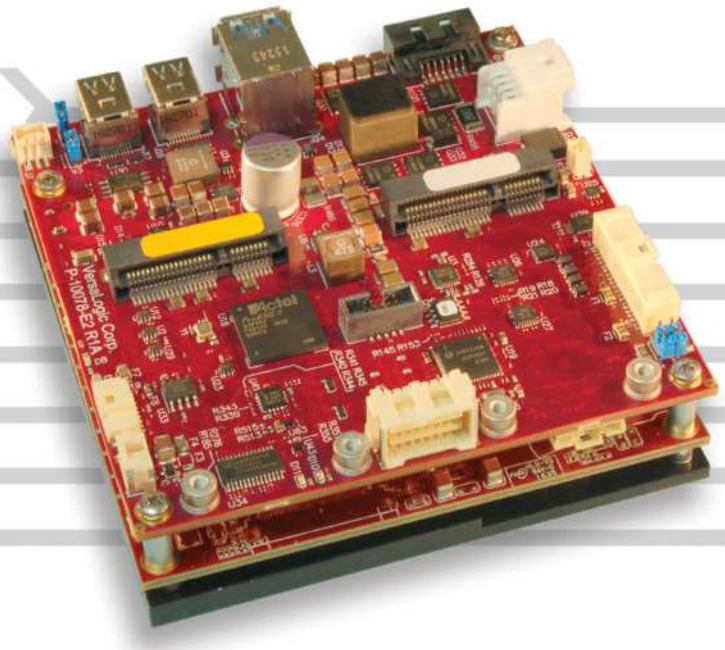
Condor

Embedded Processing Unit



95 x 95 x 37 mm
(3.7 x 3.7 x 1.5")

Overview

The Condor is a compact, high-performance, embedded computer. It has been engineered and tested to meet evolving requirements for smaller, lighter, and lower power embedded systems while adhering to stringent regulatory standards. Designed around the COM "compact" form factor, the Condor is a member of the VersaLogic "EPU" family of ultra-rugged embedded computers, designed to withstand extreme temperature, impact, and vibration.

The Condor's on-board TPM security chip can lock out unauthorized hardware and software access. It provides a secure "Root of Trust." Additional security is provided through built-in AES (Advanced Encryption Standard) instructions.

The Condor features high-performance Skylake processors with dual-core CPUs and Hyper-Threading logic, allowing up to 4 simultaneous threads to be executed. Even with its outstanding performance and I/O features, the Condor's typical power consumption is 11 to 16 watts, depending on the model. The Condor provides compatibility with a broad range of standard x86 application development tools for reduced development time.

Condor's on-board Power Management Unit greatly simplifies system power supply requirements. It features a wide input voltage

continued ▸

Highlights

- -40° to +85°C operating temperature models
- TPM (Trusted Platform Module) security chip
- Shock and vibration per MIL-STD-202G
- 6th Generation Intel® Core™ "Skylake" processor
  - i7-6600U (dual core) or
  - i5-6300U (dual core) or
  - i3-6100U (dual core)
- On-board Power Management
  - 8 to 30 volt DC input (12 and 24 volt system compatible)
  - Over- and reverse-voltage protection
  - RF noise filtering
  - Transient voltage protection
- A complete x86 embedded computer
- COM Compact size: (95 x 95 x 37 mm)
- Up to 32 GB DDR4 RAM
- Two Gigabit Ethernet
- Two mini DisplayPort and LVDS video outputs
- Two Mini PCIe Sockets
- Two USB 3.0 ports, four USB 2.0 ports
- Serial I/O ports, SATA, Digital I/O
- Customization available
- VersaAPI software support

VERSALOGIC CORPORATION

Overview *...continued*

range of 8 to 30 volts so it is fully compatible with 12 or 24V vehicle applications. It also includes reverse voltage protection, over voltage protection, RF noise filtering, and transient voltage protection, to provide enhanced durability and reliability in the field.

Designed and tested for industrial temperature (-40° to +85°C) operation, the rugged Condor also meets MIL-STD-202G specifications for shock and vibration. Latching SATA, Ethernet, power, and main I/O connectors provide additional ruggedization for use in harsh environments.

Condor is compatible with a variety of popular x86 operating systems including Windows, Windows Embedded, Linux, and VxWorks.

Modified COTS versions of this product are available, even in low OEM quantities. Modifications include conformal coating, BIOS / splash screen configuration, application specific testing, BOM revision locks, custom labeling, etc. ■

Features

1 On-board Power Management
Accepts 8 to 30 volts DC, and provides OVP, reverse polarity protection, RF noise filtering, and transient voltage suppression.

2 High-performance Video
Integrated Intel HD 520 Graphics Gen 9 core supports DirectX 12, OpenGL 4.4, and H.264, MPEG-2 encoding/decoding. Two Mini DisplayPorts (2a) and one dual-channel LVDS video output (2b). LVDS backlight control.

3 Network
Two Gigabit Ethernet (GbE). One port with remote boot support.

4 SATA
6 Gb/s SATA port. Supports rotating or solid state SATA drives.

5 Mini PCIe Card Sockets
Two full-sized sockets. Supports Wi-Fi modems, GPS, MIL-STD-1553, Ethernet, flash data storage with auto-detect mSATA flash storage support, and other mini PCIe modules.

6 Industrial I/O
Two USB 3.0 ports (6a) and four USB 2.0 ports (6b) support keyboard, mouse, and other devices.
Two RS-232/422/485 serial ports (6c), three 8254 timer/counters, and I2C support.

7 SPI Interface
Supports SPI and SPX devices, including low cost analog and digital modules.

Intel Core "Skylake" Processor *(not shown)*
Dual-core, up to 2.6 GHz clock rate.

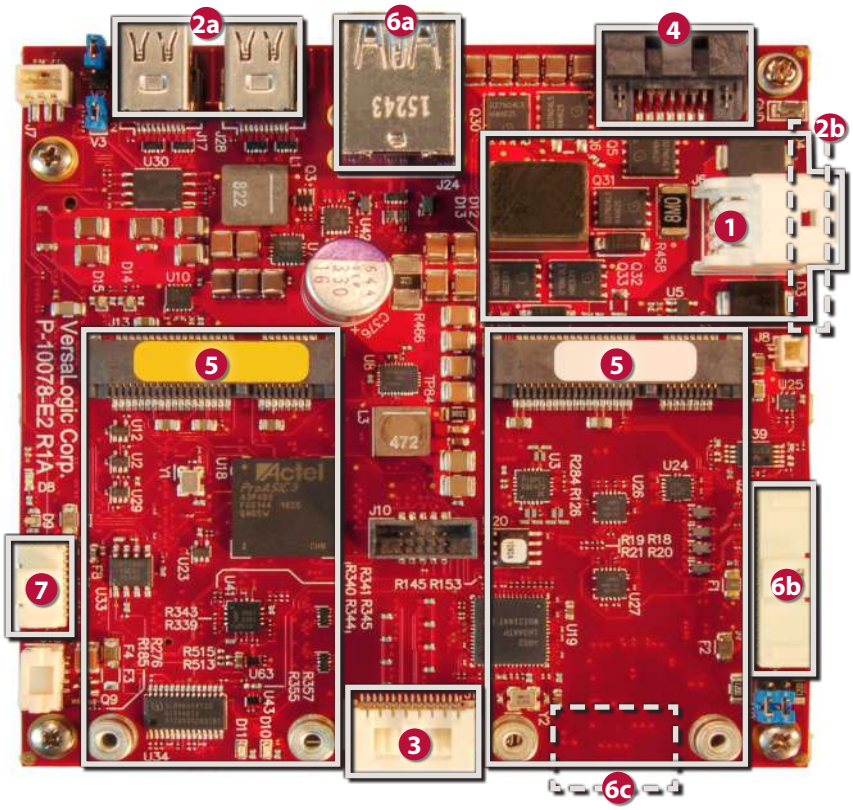
Trusted Platform Module *(not shown)*
On-board TPM 2.0 security chip can lock out unauthorized hardware and software.

RAM *(not shown)*
Up to 32 GB DDR4 RAM.

Industrial Temperature Operation
-40° to +85°C operation for harsh environments.

MIL-STD-202G
Qualified for high shock and vibration environments.

Software Support
Compatible with a variety of popular x86 operating systems including Windows, Linux, and VxWorks.



Tailor Condor to Your Exact Requirements

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

- Conformal Coating
- Custom Cabling
- Connector & I/O Changes
- Custom Testing
- Custom Labeling
- BIOS Modifications
- Software and Drivers
- Environmental Screening
- Revision Locks
- Application-Specific Testing
- And more –

Specifications

General	
Board Size	95 x 95 x 37 mm (3.74 x 3.74 x 1.45"). COM Compact mounting holes.
Weight	312 grams (11.0 oz.)
Processor	Intel Skylake 6th Gen platform. 8 MB SmartCache. 64-bit instructions, Hyper-Threading, Virtualization Technology (VT), SpeedStep Technology, and AES instructions.
Battery	Connection for 3.0V RTC backup battery
Power Requirements (@ +12V) †	*Model* / *Idle* / *Typical* / *Max.* VL-EPU-4460-EAP-08: 7.2W / 10.9W / 14.6W VL-EPU-4460-EBP-16: 7.8W / 13.6W / 19.3W VL-EPU-4460-ECP-16: 7.9W / 15.9W / 23.8W
Input Voltage	8V – 30VDC
Input Protections	Over-voltage protection. Self resetting when input falls to a safe level. Reverse voltage input protection to -30V. RF noise filtering (900 MHz, 2.5/5 GHz) - Minimum of 30 dB RF attenuation above 100 MHz. Transient voltage protection (inductive kickback / lightning) clamp at ~+60V / -40V - MSL level 1, per J-STD-020, LF maximum peak of 260°C.
System Reset & Hardware Monitors	All voltage rails monitored. Watchdog timer with programmable timeout. Push-button sleep, reset, and power.
Regulatory Compliance	RoHS (EU 2015/863), Conflict Minerals compliant.

Environmental				
Thermal Management	Bolt-on heat plate standard. Optional heat sink, fan, heat pipe, and other thermal accessories available.			
Operating Temperature ◊	*Model*	*Heat Plate***	*Heat Sink*	*Heat Sink + Fan*
	EPU-4460-Exx	-40°C to +85°C	-40°C to +70°C	-40°C to +85°C
	Ranges shown assume 90% CPU utilization. For detailed thermal information and exceptions, refer to the VL-EPU-4460 Reference Manual. **Heat plate must be kept below 90°C			
Airflow Requirements	Refer to the VL-EPU-4460 Reference Manual for detailed airflow requirements.			
Storage Temperature	-40° to +85°C			
Altitude	Operating*	To 4,570m (15,000 ft.)		
	Storage	To 12,000m (40,000 ft.)		
Thermal Shock	5°C/min. over operating temperature			
Humidity	Less than 95%, noncondensing			
Vibration, Sinusoidal Sweep ¤	MIL-STD-202G, Method 204, Modified Condition A: 2g constant acceleration from 5 to 500 Hz, 20 min. per axis			
Vibration, Random ¤	MIL-STD-202G, Method 214A, Condition A: 5.35g rms, 5 min. per axis			
Mechanical Shock ¤	MIL-STD-202G, Method 213B, Condition G: 20g half-sine, 11 ms duration per axis			

Security	
TPM	Intel Trusted Platform Module 2.0 device.

† Represents operation at +25°C and +12V supply running Windows 10 with LVDS display, SATA, GbE, COM, and USB keyboard/mouse. Typical power computed as the mean value of Idle and Maximum power specifications. Maximum power measured with 95% CPU utilization.
◊ Derate -1.1°C per 305m (1,000 ft.) above 2,300m (7,500 ft.)
* Extended altitude specifications available upon request
¶ Models with RAM above 16GB (up to 32GB) are available on custom configured versions. Contact VersaLogic Sales for more information.
‡ TVS protected port (enhanced ESD protection)
§ Power pins on this port are overload protected
¥ Bootable storage device capability
¤ MIL-STD-202G shock and vibration levels are used to illustrate the extreme ruggedness of this product in general. Testing at higher levels and/or different types of shock or vibration methods can be accommodated per the specific requirements of the application. Contact VersaLogic Sales for further information.

Specifications are subject to change without notification. Intel and Core are trademarks of Intel Corp. All other trademarks are the property of their respective owners.

Memory	
System RAM	Up to 32 GB DDR4 SDRAM ¶

Video	
General	Integrated high-performance video. Intel HD 520 Gen-9 compute architecture, 24 execution units, and GPU Turbo Boost. Supports 3 independent displays. Supports DirectX 12, OpenGL 4.4, OpenCL 2.0.
Hardware Based Acceleration	Decode and Encode of JPEG, MJPEG, MPEG2, AVC, MVC, HEVC 8-bit, VC-1, VP8, VP9
DisplayPort Interface §	Two Mini DisplayPort++ outputs. 24-bit. Up to 4096 x 2160 at 60 Hz.. Supports DisplayPort and HDMI signaling (Video and Audio outputs).
OEM Flat Panel Interface	Dual-channel LVDS interface. 18/24-bit. Up to 1920 x 1200. Backlight control signals.

Mass Storage	
Rotating Drive ¥	SATA 6 Gb/s port. Latching SATA connector.
Flash / SSD ¥	Mini PCIe socket with mSATA support

Network Interface	
Ethernet ‡	Two autodetect 10BaseT / 100BaseTX / 1000BaseT ports. Latching connector. One port with network boot-option.

Device I/O	
USB § ‡	Two USB 3.0 / 2.0 ports and four USB 2.0 host ports
COM Interface ‡	Two RS-232/422/485 selectable. 16C550 compatible. 1 Mbps max.
Digital I/O	Eight TTL I/O Lines 3.3V. Independently configurable.
I2C	Single I2C interface
Counter/Timers	Three 8254 compatible Programmable Interval Timers (PITs).
VersaLogic SPI Interface	Supports SPI and SPX devices. Supports up to two SPX modules.

Mini PCIe Card Socket	
Full size Socket #1	Supports Wi-Fi modems, GPS receivers, MIL-STD-1553, Ethernet channels, non-volatile flash data storage, and other plug-in modules. PCIe, USB, and SATA signaling . Autodetect mSATA support.
Full size Socket #2	PCIe and USB 2.0 signaling

Software	
BIOS	AMI Aptio UEFI BIOS with OEM enhancements. Field reprogrammable
Sleep Mode	ACPI 4.0. Support for S3 suspend to RAM, and S4 hibernate states.
Operating Systems	Compatible with most x86 operating systems including Windows, Linux, and VxWorks

Ordering Information

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

Model	Operating Temperature †	Processor	Cores	Memory	CPU Clock/Turbo Speed	Graphics Base Clock / Maximum Dynamic Speed	Graphics Core	Cooling
VL-EPU-4460-EAP-08	-40° to +85°C	i3-6100U	Dual	8 GB	2.3 GHz / NA	300 MHz / 1.0 GHz	HD 520	Heat plate
VL-EPU-4460-EBP-16	-40° to +85°C	i5-6300U	Dual	16 GB	2.4 / 3.0 GHz	300 MHz / 1.0 GHz	HD 520	Heat plate
VL-EPU-4460-ECP-16	-40° to +85°C	i7-6600U	Dual	16 GB	2.6 / 3.4 GHz	300 MHz / 1.05 GHz	HD 520	Heat plate

† Heat plate must be kept below 90°C

Accessories

Part Number	Description
Cable Kit	
VL-CKR-CONDOR	Condor Evaluation cable kit. Includes VL-CBR-4005, 1014, 0702, 1604, 2032, 0809, HDW-401, and 108.
VL-CBR-4005	System I/O paddleboard
VL-CBR-0702	SATA cable – rugged latching, 20"
VL-CBR-1604	Dual Ethernet cable, 16-pin Clik-Mate to 2 RJ-45 – rugged latching, 12"
VL-CBR-2032	miniDisplayPort to VGA adapter, 6"
VL-CBR-0809	Power adapter cable, 12V medium-power. ATX12 to Condor. 12"
VL-CBR-1014	RS232 Dual channel cable 2xDsub (9-pin), Latching, 12"
VL-HDW-401	Thermal compound paste. For heat sink attachment.
VL-HDW-108	Mini PCIe/mSATA hardware kit (metric thread) 2.5 mm (10ea)
Cables	
VL-CBR-0203	2-pin Latching Battery Module, 6"
VL-CBR-0401	ATX to SATA power cable, 6.25"
VL-CBR-0404	LED Back Light, 3-pin Pico-Clasp / 4-pin IDE Power to 6-pin 12V, 500mm
VL-CBR-0503	USB 2.0 Male A to Male Micro-B Cable, 0.5 m
VL-CBR-0901	Pico-Clasp to Dual SPX Cable, 9-pin. 9"
VL-CBR-2014	LVDS to VGA adapter board
VL-CBR-2031	miniDisplayPort to miniDisplayPort, 36"
VL-CBR-2033	miniDisplayPort to HDMI active adapter, 6"
VL-CBR-3001	20" 2-Ch LVDS 30-pin JAE to 30-pin JAE, RoHS
VL-CBR-3002	20" 1-Ch LVDS 30-pin JAE to 1.25mm 20-pin Hirose, RoHS
VL-CBR-3003	20" 1-Ch LVDS 30-pin JAE to 20-pin JAE, RoHS
Hardware	
VL-PS-ATX12-300A	ATX development power supply
VL-HDW-111	Half- to Full-Size Mini PCIe Adapter kit. Metal adapter and screws (2)
Thermal Options	
VL-HDW-416	Passive Heat Sink. Mounts to heat plate on standard product 95 x 95 x 15 mm
VL-HDW-415	12V Cooling fan for optional use with HDW-416 heat sink.
Audio	
VL-ADR-01S	USB to Audio Adapter -25° to +85°C

Expansion Modules

Part Number	Description	Form Factor
Network		
VL-MPEe-E4E	Ethernet over Fiber Expansion (PCIe signaling)	Mini PCIe
VL-MPEe-E5E	Dual Gigabit Ethernet adapter (PCIe signaling)	Mini PCIe
VL-MPEe-E6E	Gigabit Ethernet adapter (PCIe signaling)	Mini PCIe
VL-MPEe-E6E-P	Gigabit Ethernet with POE+ adapter (PCIe signaling)	Mini PCIe
VL-MPEe-FW1E	FireWire adapter	Mini PCIe
VL-MPEu-C1E	Dual CAN BUS Interface (USB signaling)	Mini PCIe
Serial I/O		
VL-MPEe-U2E	Four Serial ports. Twelve GPIO lines.	Mini PCIe
Analog & Digital I/O		
VL-MPEe-A1E	Analog input (12-bit resolution)	Mini PCIe
VL-MPEe-A2E	Analog input (16-bit resolution)	Mini PCIe
VL-SPX-1	Analog Input Module 8-Channels	SPX
VL-SPX-2	Digital I/O Module 16-lines	SPX
VL-SPX-4	Analog Output Module 4-channels 12-bit	SPX
VL-SPX-5	Solid State Switch Module 8-channel	SPX
GPS		
VL-MPEu-G3E	Advanced GPS receiver	Mini PCIe
VL-MPEu-G2E	GPS receiver	Mini PCIe
Video		
VL-MPEe-V5E	VGA and LVDS Interface	Mini PCIe
Solid-State Storage (flash memory)		
VL-MPEs-F1Exx	mSATA module (4/16/32 GB)	Mini PCIe
Adapters		
VL-MPEs-S3E	SATA adapter	Mini PCIe



Mini PCIe Modules

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 initial concept through the extended life of your program. Contact VersaLogic today to learn more.

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11/02/20