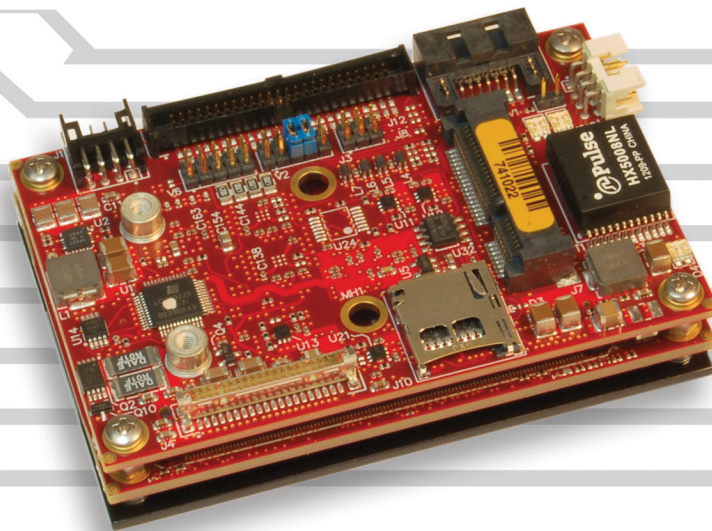# Hawk

Embedded Processing Unit

Actual Size

55 x 84 x 22 mm

(2.17 x 3.31 x 0.87")

Overview

The Hawk is an extremely small and rugged embedded computer. It has been engineered and tested to meet the Military and Medical industries' evolving requirements to develop smaller, lighter, and lower power embedded systems while adhering to stringent regulatory standards. Roughly the size of a credit card and less than one inch thick, the Hawk is the embedded industry's smallest, lightest, ultra-rugged embedded x86 computer. This embedded computer, equipped with an Intel Atom E38xx "Bay Trail" processor, is designed to withstand extreme temperature, impact, and vibration.

Available in single, dual, and quad core versions, the Hawk provides extreme performance for its size, moderate power consumption (5.4 to 6.8W typical), and a very compact package. The Hawk provides compatibility with a broad range of standard x86 application development tools for reduced development time.

The integrated Intel Gen-7 graphics core provides hardware-accelerated MPEG-4/H.264 and MPEG-2 video encoding and decoding. A standard LVDS output supports flat panel displays. An optional adapter converts the LVDS output to VGA.

Highlights

- A complete x86 embedded computer
- -40° to +85°C Operating Temperature
- Extremely small (55 x 84 x 22 mm)
- Shock & vibration per MIL-STD-202G
- 4th Generation Intel® Atom™ processor ("Bay Trail")
    - E3845 (quad core) or
    - E3827 (dual core) or
    - E3815 (single core)
- Up to 4 GB DDR3L soldered-on RAM
- Gigabit Ethernet
- LVDS video output
- Mini PCIe Socket / with mSATA support
- USB 2.0 ports
- Serial I/O
- SATA
- Wide Input Voltage Range - 8 to 17 volts
- Fanless operation
- Customization available in quantities as low as 100 pcs.

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C O R P O R A T I O N

Overview *...continued*

Industry-standard system interfaces include Gigabit Ethernet with network boot capability, four USB 2.0 ports, two serial ports, and Intel High-Definition Audio (HDA). A SATA 3 Gb/s interface supports high-capacity storage. On-board eMMC Flash, a microSD socket and a Mini PCIe socket with mSATA support provide flexible solid-state drive (SSD) options. The Mini PCIe socket also accommodates plug-in Wi-Fi modems, GPS receivers, MIL-STD-1553, Ethernet, Firewire, and other mini cards.

Designed and tested for industrial temperature

(-40º to +85ºC) operation, the rugged Hawk also meets MIL-STD-202G specifications for shock and vibration. Soldered-on RAM and latching SATA, Ethernet, power, and main I/O connectors provide additional ruggedization for use in extremely harsh environments.

A wide input voltage range of 8 to 17 volts (12V typ.) simplifies system power supply requirements. It is fully compatible with 12V automotive applications.

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

Product customization is available, even in low quantities. Options include conformal coating, BGA underfill, BIOS / splash screen configuration, application specific testing, BOM revision locks, custom labeling, etc.
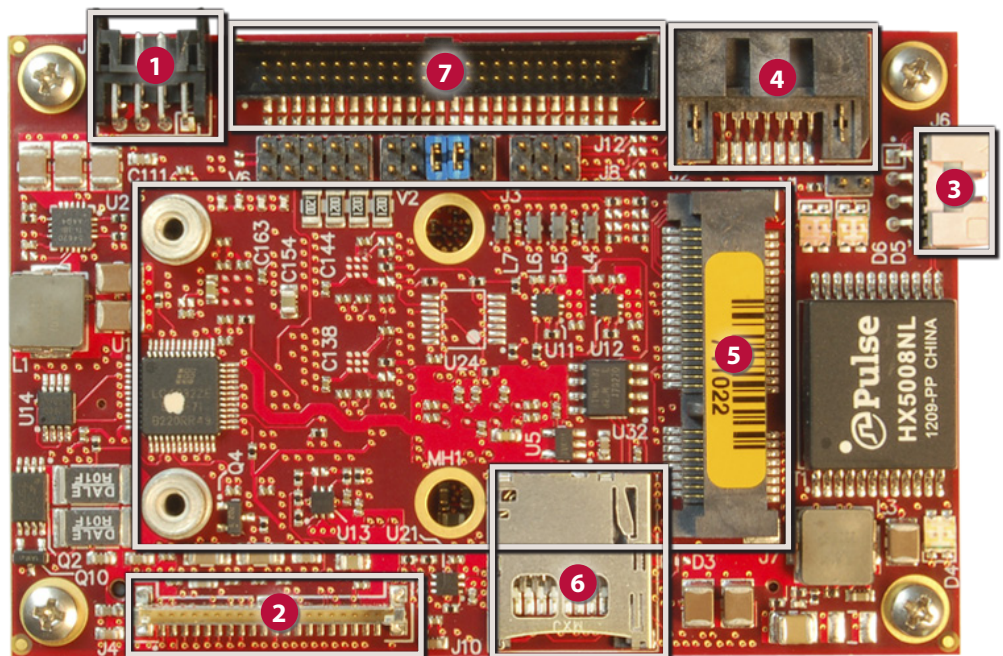
As with all VersaLogic products, the Hawk is backed by a five-year warranty, 5+ year off-the-shelf availability guarantee, and expert US-based technical support. Product Life Extension options support availability through the year 2025. ∎

Features

● **Intel Atom "Bay Trail" Processor**
(not shown)
Up to 1.9 GHz clock rate. Quad, dual or single core options. Low power consumption.

● **Embedded Processing Unit**
A complete embedded computer in an extremely small/rugged format.

● **Fanless Operation**
No moving parts required for CPU cooling in most configurations.

● **RAM** *(not shown)*
Up to 4 GB soldered-down DDR3L RAM.

● **FLASH** *(not shown)*
Up to 8 GB of on-board eMMC flash storage.

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

● **MIL-STD-202G**
Qualified for high shock / vibration environments.

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

1 **Wide Input Voltage Range**
Accepts 8 to 17 volts (12V typ.).

2 **High-performance Video**
Integrated Intel Gen 7 graphics core supports DirectX 11, OpenGL 4.0, and H.264, MPEG-2 encoding/decoding. LVDS video output.

3 **Network**
Gigabit Ethernet (GbE) with remote boot support.

4 **SATA**
3 Gb/s SATA port supports bootable SATA hard drive.

5 **Mini PCIe Card Socket**
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 **MicroSD Socket**
Supports removable microSD card solid-state drives.

7 **Device I/O**
Dual RS-232/422 serial ports and Intel High Definition Audio (HDA) compatible.

Specifications

General	
Board Size	Heat plate models: 55 x 84 x 22 mm (2.17 x 3.31 x 0.87")
Weight	102 grams (3.6 oz.)
Processor	Intel Atom E38xx platform. 512K 8-way L2 cache per core. Intel 64-bit instructions, Virtualization Technology (VT), and new AES instructions.
Battery	Connection for 3.0V RTC backup battery

Power Requirements (@ +12V) §	Model	Idle	Typical	Max.	S3
	VL-EPU-3310-EAP	5.2W	6.1W	7.0W	0.9W
	VL-EPU-3310-EBP	5.5W	6.8W	8.2W	0.9W
	VL-EPU-3310-EDP	5.9W	7.4W	8.8W	0.9W

Input Voltage	8V–17V (nominal 12V operation)
System Reset & Hardware Monitors	All voltage rails monitored. Watchdog timer with programmable timeout. Push-button sleep, reset, and power.
Regulatory Compliance	RoHS (2011/65/EU)

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
	All models	-40° to +85°C	-40° to +85°C	-40° to +85°C

	Ranges shown assume 90% CPU utilization. For detailed thermal information, refer to the VL-EPU-3310 Reference Manual. ** Heat plate must be kept below 90°C
Airflow Requirements	Refer to the VL-EPU-3310 Reference Manual for detailed airflow requirements
Storage Temperature	-40° to +85°C
Cooling	Fanless heat plate with optional heat sink, fan, heat pipe, and other accessories available

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

Memory	
System RAM	2 GB or 4 GB of soldered-on DDR3L SDRAM. 1333 MT/s.

Video	
General	Integrated high-performance video. Intel Gen-7 graphics core with 4 Execution Units and Turbo Boost. Supports DirectX 11, OpenGL 4.0, VP8, MPEG2, H.264, and VC1.
VRAM	Up to 224 MB shared DRAM
OEM Flat Panel Interface	Single-channel LVDS interface. 18/24-bit. Up to 1024 x 768 (60 Hz).

Mass Storage	
Rotating Drive ‡	One SATA 3 Gb/s port. Latching SATA connector.
Flash / Solid-State Drives ‡	On-board eMMC MLC Flash drive. 0 to 8 GB
	One microSD socket. Supports up to 32 GB cards
	Mini PCIe socket with mSATA support

Network Interface	
Ethernet †	One autodetect 10BaseT/100BaseTX/1000BaseT port. Latching connector. Network boot option.

Device I/O	
USB ‡	Four USB 2.0 host ports
COM 1 / 2	RS-232/422 selectable. 16C550 compatible. 1 Mbps max.

Other I/O	
Mini PCIe Card Socket	Supports Wi-Fi modems, GPS receivers, MIL-STD-1553, Ethernet channels, non-volatile flash data storage, and other plug-in modules (full or half size). USB, SATA, and PCIe signaling. Autodetect mSATA support.

Software	
BIOS	AMI Aptio UEFI BIOS with OEM enhancements. Field reprogrammable.
Sleep Mode	ACPI 3.0. Support for S3 suspend state.
Operating Systems	Compatible with most x86 operating systems including Windows, Windows Embedded, Linux, and VxWorks

§ Represents operation at +25°C and +12V supply running Windows 7 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.

† IEEE 1588 Precision Time Protocol (PTP) compatible

‡ Bootable storage device capability

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

* Extended altitude specifications available upon request

¥ MIL-STD-202G shock and vibe 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 Atom are trademarks of Intel Corp. microSD is a trademark of SD-3C, LLC. All other trademarks are the property of their respective owners.

Tailor Hawk to Your Exact Requirements

Customization options are available in quantities as low as 100 pieces.

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

VERSALOGIC CORPORATION

Ordering Information

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

Model	Processor	Cores	Speed	RAM	eMMC Flash	Cooling
VL-EPU-3310-EAP	Atom E3815	1	1.46 GHz	2 GB	None	Heat plate
VL-EPU-3310-EBP	Atom E3827	2	1.75 GHz	2 GB	4 GB	Heat plate
VL-EPU-3310-EDP	Atom E3845	4	1.91 GHz	4 GB	8 GB	Heat plate

Accessories

Part Number	Description
Cable Kit	
VL-CKR-HAWK	Hawk cable kit. Includes VL-CBR-0702, 0804, 0807, 2014, 2015, 5016, and HDW-401.
VL-CBR-5016	System I/O paddleboard
VL-CBR-0702	SATA cable – rugged latching 20"
VL-CBR-0804	Ethernet cable – rugged latching 12"
VL-CBR-0807	Power adapter cable. ATX12 to Hawk. 12"
VL-CBR-2014	LVDS to VGA adapter board
VL-CBR-2015	24-bit LVDS cable (Hirose) 20"
VL-HDW-401	Thermal compound paste. For heat sink attachment.
Cables	
VL-CBR-0401	ATX to SATA power cable, 6.25"
VL-CBR-0701	SATA cable 20"
VL-CBR-2016	18-bit LVDS cable (JAE) 20"
VL-CBR-2031	miniDisplayPort to MiniDisplayPort 36"
Solid-State Storage (flash memory)	
VL-F41-xxxx	microSD card (SDIO), SLC, industrial temp.
Rotating Drives	
VL-HDS35-xxx	3.5" hard drive (SATA)
Hardware	
VL-PS-ATX12-300A	ATX development power supply
VL-HDW-108	Mini PCIe / mSATA hardware kit (metric thread) 2.5 mm
Thermal Options	
VL-HDW-406	Passive Heat Sink. Mounts to product's heat plate.
VL-HDW-411	12V Cooling fan for use with HDW-406 heat sink.
VL-HDW-408	Heat Pipe Connector Plate. Mounts to product's heat plate.
VL-HDW-405	Secondary mounting plate. – Flat. 75 x 84 mm. Simplifies installation in many situations. Attaches to heat plate on standard product.

Mini PCIe Modules

Part Number	Description	Form Factor
Network		
VL-MPEe-W2E	Wi-Fi 802.11 a/b/g/n	Mini PCIe
VL-MPEe-E3E	Gigabit Ethernet adapter	Mini PCIe
Serial I/O		
VL-MPEe-U2E	Quad serial plus twelve GPIOs	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
GPS		
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) (SATA)	Mini PCIe
Adapters		
VL-MPEs-S3E	SATA adapter	Mini PCIe
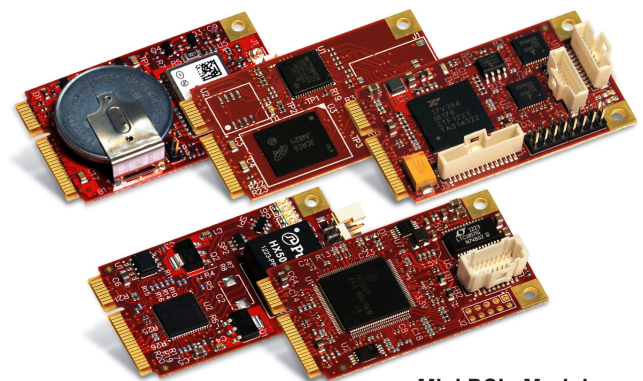
Mini PCIe Modules

Take the Risk out of Embedded Computing

Whether it's selecting the optimum solution for your application, lending expertise 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 us today to learn more.

ISO 9001:2015 Certified