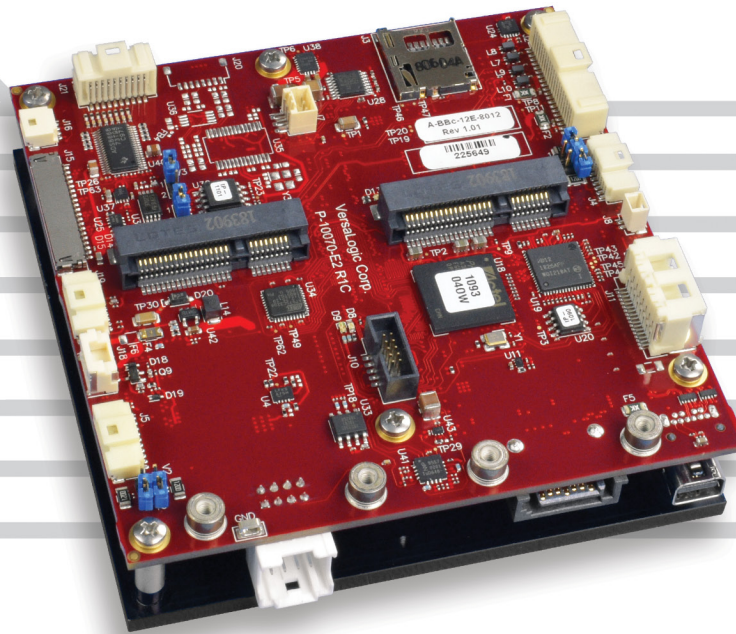


Owl

Embedded Processing Unit



95 x 95 x 29 mm
(3.7 x 3.7 x 1.14")

Overview

The Owl is a small, rugged board-level embedded computer. Approximately four inches square and one inch thick, the Owl is a member of VersaLogic's ultra-rugged x86 computer family. Equipped with a powerful dual- or quad-core Intel "Apollo Lake" processor, and soldered-on ECC RAM, the Owl is designed to withstand extreme temperature, impact, and vibration.

Up to 8 GB of soldered-on Error Correcting Code (ECC) memory is available for high-reliability applications. ECC memory is beneficial in environments where single bit memory errors may occur, such as cosmic ray interactions which increase dramatically with altitude.

A TPM 2.0 chip supports hardware-based security.

On-board I/O includes dual Gigabit Ethernet, USB 3.0 and 2.0 ports, serial ports, and analog inputs. SATA interface, eMMC Flash options, and a microSD socket provide a range of data storage options. Dual Mini PCIe sockets accommodate a wide range of plug-in accessory cards.

The on-board power conditioning supports an input of 8 to 30 volts to simplify system power supply requirements. The Owl is fully compatible with 12 or 24V vehicle applications. Over Voltage Protection and Reverse Voltage Protection are included to enhance reliability in the field.

For hostile environments, the Owl is designed and tested for full industrial temperature operation (-40° to +85°C) and meets MIL-STD-202H specifications for shock and vibration.

VersaLogic's 10+ year product life support programs ensure long-term availability. This avoids expensive upgrades, redesigns, and migrations that come from shorter lifecycle products.

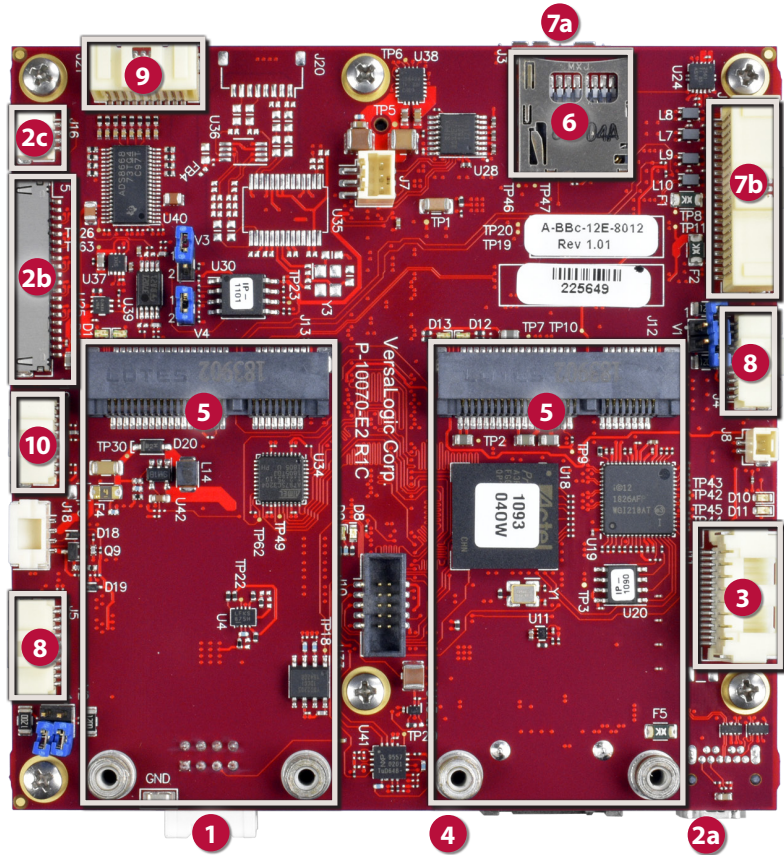
Highlights

- Error-correcting RAM. Up to 8 GB
- -40° to +85°C Operating Temperature
- Intel® Atom™ Apollo Lake processor
 - Dual core or quad core
- TPM 2.0 security
- COMe compact size (95 x 95 x 29 mm)
- On-board power conditioning. 8 to 30 volt input

Features

- 1 On-board Power Conditioning** *(on back)*
Accepts 8 to 30 volts DC. Overvoltage and reverse polarity protection. RF noise filtering.
- 2 High-performance Video**
Integrated Intel HD Graphics 505/500 supports Ultra HD 4k, DirectX 12, OpenGL 4.3, and H.264, MPEG-2 encoding/decoding. DisplayPort++ (2a) and LVDS (2b) video outputs support multiple display modes including Extended Desktop and Clone. LVDS backlight control (2c).
- 3 Network**
Dual GbE Ethernet interfaces. Autodetect 10BaseT/100BaseTX/1000BaseT with remote boot support.
- 4 SATA** *(on back)*
SATA III port supports bootable SATA drive.
- 5 Mini PCIe Card Sockets**
Dual full-sized sockets. Supports A/D, Wi-Fi modems, GPS, MIL-STD-1553, Ethernet, flash data storage, and other Mini PCIe modules.
- 6 MicroSD Socket**
Supports removable microSD card solid-state drives.
- 7 Industrial I/O**
One USB 3.0 port (7a) and four USB 2.0 ports (7b) support keyboard, mouse, and other devices. Eight 3.3V digital I/O lines, three 8254 timer/counters, and I2C support (7b).
- 8 Serial Communications**
Four RS-232/422/485 serial ports.
- 9 Analog**
Eight 12-bit analog input channels for data acquisition support.
- 10 SPI Interface**
Supports SPI and SPX devices, including low cost analog and digital modules.

- Intel Atom “Apollo Lake” Processor**
Up to 2 GHz burst clock rate. Quad- or dual-core options. Low power consumption.
- Embedded Processing Unit**
The assembled and tested 2-board set creates a complete embedded computer in an extremely small and rugged format.
- Fanless Operation**
No moving parts required for CPU cooling in most configurations.
- RAM**
Up to 8 GB error-correcting soldered-down RAM enhances system reliability.
- Flash**
Up to 32 GB of on-board eMMC non-volatile memory.
- Industrial Temperature Operation**
-40° to +85°C operation for harsh environments.
- MIL-STD-202H**
Qualified for high shock/vibration environments.
- Software Support**
Compatible with a variety of popular x86 operating systems including Windows, Windows Embedded, Linux, and VxWorks. Supported by the VersaAPI I/O routines.



Modify Owl to Your Exact Requirements

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

- On-board RAM Size
- Connector & I/O Changes
- Revision Locks
- Non-ECC memory
- Custom Testing
- Custom Screening
- On-board Flash Storage Size
- Custom Labeling
- Application-Specific Testing
- Conformal Coating
- BGA Underfill
- Etc.
- Custom Cabling
- BIOS Modifications
- Software and Drivers

Specifications

| General | | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|-------------|-----------|
| Board Size | 95 x 95 x 29 mm (3.74 x 3.74 x 1.14") COM Express Compact form factor | | | | |
| Weight | 200 grams (7.05 oz.) | | | | |
| Processor | Intel Atom E39xx platform. 2 MB L2 cache. Intel 64-bit instructions, Virtualization Technology (VT), AES New Instructions, Secure Boot, Secure Key, and Execute Disable Bit | | | | |
| Battery | Connection for 3.0V RTC backup battery. Battery not required for operation. | | | | |
| Power Requirements (@ +12V) † | <i>Model</i> | <i>Idle</i> | <i>Typical</i> | <i>Max.</i> | <i>S3</i> |
| | EPU-4012-EAP-02X-08 | 6.5 W | 8.1 W | 9.6 W | 1.4 W |
| | EPU-4012-EDP-08X-32 | 7.0 W | 10.1 W | 13.2 W | 1.4 W |
| Input Voltage | 8V – 30V DC | | | | |
| Input Protection | Over-voltage protection. Self-resetting when input falls to a safe level. Reverse voltage input protection to -30V. RF noise filtering. Transient voltage protection (inductive kickback / lightning). | | | | |
| System Reset & Hardware Monitors | Voltage rail monitoring. 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 (included). Optional heat sink, fan, heat pipe, and other thermal accessories available. | | | |
| Operating Temperature ◊ | <i>Model</i> | <i>HeatPlate**</i> | <i>HeatSink</i> | <i>HeatSink + Fan</i> |
| | 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-4012 Reference Manual. ** Heat plate must be kept below 90°C | | | |
| Airflow Requirements | 0.5 linear m/s typical. Refer to the VL-EPU-4012 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 | Mil-STD-202H method 103 – Humidity steady state | | | |
| Vibration, Sinusoidal Sweep ◻ | MIL-STD-202H method MIL-STD-202-204, Condition A: 2g | | | |
| Vibration, Random ◻ | MIL-STD-202H method MIL-STD-202-214, Condition A: 5.35g rms | | | |
| Mechanical Shock ◻ | MIL-STD-202H method MIL-STD-202-213, Condition G: 20g half-sine | | | |

| Security | |
|------------|----------------------------------------------------------|
| TPM | Trusted Platform Module 2.0 device for hardware security |

| Memory | |
|-------------------|---------------------------------------------|
| System RAM | 2 GB or 8 GB of soldered-on ECC DDR3L SDRAM |

| Video | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General | Integrated high-performance video. Intel HD Graphics 505 with 18 Execution Units (EPU-4012-EDP) or Intel Graphics 500 with 12 Execution Units (EPU-4012-EAP). Turbo Boost. Supports DirectX 12, OpenGL 4.4, Quick Sync Video, Clear Video HD Technology, Clear Video Technology, VP8, VP9, MPEG2, H.264, H.265, and VC1. |
| VRAM | Up to 2 GB shared DRAM |
| DisplayPort Interface § | Mini DisplayPort++ output. 24-bit. Up to 4096 x 2160 @ 60 Hz. Supports DisplayPort and HDMI signaling (Video and Audio outputs). |
| OEM Flat Panel Interface | Single-channel LVDS interface. 18/24-bit. Up to 1200 x 800 (60 Hz). Backlight control signals. |

| Mass Storage | |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rotating Drives / Flash / SSD ¥ | <ul style="list-style-type: none"> One SATA III port. Latching connector. On-board eMMC MLC Flash drive. 8 or 32 GB. One microSD socket. 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 ‡§ | One USB 3.0 / 2.0 port and four USB 2.0 host ports. |
| COM Interface ‡ | Four RS-232/422/485 selectable. 16C550 compatible. RS-232 115 Kbps – RS-422/485 460 Kbps max. |
| Digital I/O | Eight TTL I/O Lines 3.3V. Independently configurable. |
| Analog Input | Eight channels. 12-bit. Single-ended. 500 Ksps. Independently configurable +/- 0.64V to +/- 10.24V high input impedance inputs. |
| 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 | |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------|
| General | Supports Wi-Fi modems, GPS receivers, MIL-STD-1553, Ethernet channels, non-volatile flash data storage, and other plug-in modules. |
| Socket #1 | Full size. USB, SATA, and PCIe signaling. Autodetect mSATA support. |
| Socket #2 | Full size. PCIe and USB 2.0 signaling. |

| Software | |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BIOS | Phoenix SecureCore Technology™ UEFI BIOS with OEM enhancements. Field reprogrammable. |
| Sleep Mode | ACPI 3.0. Supports S3 and S4 suspend states. |
| Operating Systems | Compatible with most x86 operating systems including Windows, Windows Embedded, Linux, and VxWorks. |
| VersaAPI Support | 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 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 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 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 a VersaLogic Sales Engineer 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.

Ordering Information

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

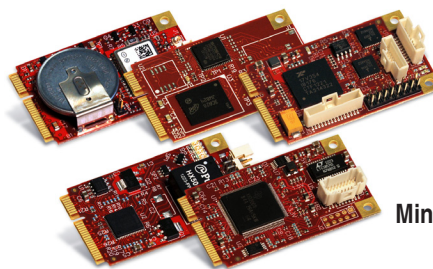
| Model | Processor | Cores | Speed/Boost | RAM | eMMC Flash | Cooling |
|------------------------|------------|-------|-------------|----------|------------|------------|
| VL-EPU-4012-EAP-02X-08 | Atom E3930 | 2 | 1.3/1.8 GHz | 2 GB ECC | 8 GB | Heat Plate |
| VL-EPU-4012-EDP-08X-32 | Atom E3950 | 4 | 1.6/2.0 GHz | 8 GB ECC | 32 GB | Heat Plate |

Accessories

| Part Number | Description |
|-------------------------------------------|------------------------------------------------------------------------------------------------------|
| Cable Kit | |
| VL-CKR-BB12 | Raven/Owl cable kit. Includes VL-CBR-0702, 1014 (x2), 1604, 2004, 2032, 0809, 4005, 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-2004 | I/O screw terminal paddleboard, and cable, Latching, 12" |
| VL-CBR-2032 | miniDisplayPort to VGA adapter, 6" |
| VL-CBR-0809 | Power adapter cable, ATX 12V to 8 pin 12V medium-power. 12" |
| VL-CBR-1014 x2 | RS-232 Dual channel cable 2xDsub (9-pin), Latching, 12" |
| VL-HDW-108 | Mini PCIe/mSATA hardware kit (metric thread) 2.5 mm (10ea) |
| VL-HDW-401 | Thermal compound paste. For heat sink attachment. |
| Cables | |
| VL-CBR-0203 | 2-pin Latching Battery Module, 6" |
| VL-CBR-0401 | ATX to SATA power cable, 6.25" |
| VL-CBR-0503 | USB 2.0 Male A to Male Micro-B Cable, 0.5 m |
| VL-CBR-0701 | SATA cable, 20" |
| VL-CBR-1015 | USB 3.0 Cable, Micro-A plug to Micro-B plug, 1 m, RoHS |
| VL-CBR-2014 | LVDS to VGA adapter board |
| VL-CBR-2015 | 24-bit LVDS 1mm Hirose Cable, 20" |
| VL-CBR-2016 | 18-bit LVDS cable (JAE), 20" |
| VL-CBR-2017 | LVDS 24-bit 1.25 mm Hirose Cable, 20" |
| VL-CBR-0404 | LED Back Light, 3-pin Pico-Clasp / 4-pin IDE Power to 6-pin 12V, 0.5 m |
| VL-CBR-2031 | miniDisplayPort to MiniDisplayPort, 36" |
| VL-CBR-2033 | miniDisplayPort to HDMI Active Adapter, 6" |
| Audio | |
| VL-ADR-01S | USB to Audio Adapter, -25° to +85°C |
| Solid-State Storage (flash memory) | |
| VL-F41-xxxx | microSD card (SDIO), SLC, industrial temp. |
| 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 10.5 mm |
| VL-HDW-415 | 12V Cooling fan for optional use with HDW-416 heat sink. |
| VL-HDW-408 | Heat Pipe Connector Plate. Mounts to heat plate on standard product. |

Mini PCIe Modules

| Part Number | Description | Form Factor |
|-------------------------------------------|------------------------------------------------------|-------------|
| Network | | |
| VL-MPEe-E3E | Dual Gigabit Ethernet adapter (PCIe signaling) | Mini PCIe |
| VL-MPEe-E4E | Gigabit Ethernet over Fiber adapter (PCIe signaling) | Mini PCIe |
| VL-MPEe-E5E | Gigabit Ethernet adapter (PCIe signaling) | Mini PCIe |
| VL-MPEe-E6E | Gigabit Ethernet (PCIe signaling) | Mini PCIe |
| VL-MPEe-E6E-P | Gigabit Ethernet with POE+ (PCIe signaling) | Mini PCIe |
| VL-MPEe-FW1E | FireWire adapter (PCIe signaling) | Mini PCIe |
| VL-MPEu-C1E | Dual CAN Bus Interface (USB signaling) | Mini PCIe |
| Serial I/O | | |
| VL-MPEe-U2E | Quad serial plus twelve GPIOs (PCIe signaling) | Mini PCIe |
| Analog & Digital I/O | | |
| VL-MPEe-A1E | Analog input (12-bit resolution) (PCIe signaling) | Mini PCIe |
| VL-MPEe-A2E | Analog input (16-bit resolution) (PCIe signaling) | Mini PCIe |
| GPS | | |
| VL-MPEu-G2E | GPS receiver (USB signaling) | Mini PCIe |
| VL-MPEu-G3E | Advanced GPS receiver (USB signaling) | Mini PCIe |
| Video | | |
| VL-MPEe-V5E | VGA and LVDS Interface (PCIe signaling) | Mini PCIe |
| Solid-State Storage (flash memory) | | |
| VL-MPEs-F1Exx | 4/16/32 GB mSATA drive (SATA signaling) | Mini PCIe |
| Adapters | | |
| VL-MPEs-S3E | SATA adapter (SATA signaling) | 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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