Overview

The Osprey is an extremely small and rugged embedded computer. It has been engineered and tested to meet the Military and Medical industries’ needs for smaller, lighter, and lower power embedded systems while adhering to stringent regulatory standards. Slightly larger in size than a credit card and one inch thick, the Osprey is a member of the VersaLogic family of the industry’s smallest, lightest, ultra-rugged embedded x86 computers. This embedded computer, equipped with an Intel Atom E38xx “Bay Trail” processor, is designed to withstand extreme temperature, impact, and vibration. Advanced features include USB 3.0, dual Mini PCIe sockets, and a DisplayPort++ video output.

Available in single-, dual-, and quad-core versions, the Osprey provides extreme performance for its size, moderate power consumption (6 to 7W typical), and a very compact package. The Osprey 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. DisplayPort++ and standard LVDS video outputs support multiple display modes including Extended Desktop and Clone. An optional adapter converts the LVDS output to VGA.

continued

Highlights

- -40°C to +85°C Operating Temperature
- Shock & vibration per MIL-STD-202G
- 4th Generation Intel® Atom™ processor (“Bay Trail”) 
  - E3845 (quad core) or
  - E3827 (dual core) or
  - E3815 (single core)
- A complete x86 embedded computer
- Extremely small (55 x 95 x 27 mm)
- Wide Input Voltage Range - 8 to 17 volts
- Up to 4 GB DDR3L soldered-on RAM
- Dual Gigabit Ethernet
- DisplayPort++ and LVDS video output
- Full Size Mini PCIe Socket / with mSATA support
- Half Size Mini PCIe Socket
- USB 3.0 port, USB 2.0 ports
- Serial I/O ports
- SATA
- eMMC Flash - up to 8 GB
- MicroSD card socket
- VersaAPI software support
Overview …continued

Industry-standard system interfaces include dual Gigabit Ethernet with network boot capability, a USB 3.0 port, four USB 2.0 ports, and two serial ports. 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. A second Mini PCIe socket also accommodates plug-in A/D, Wi-Fi modems, GPS receivers, MIL-STD-1553, Ethernet, Firewire, and other mini cards.

Designed and tested for industrial temperature (-40° to +85°C) operation, the rugged Osprey 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.) greatly simplifies system power supply requirements. It is fully compatible with 12V automotive applications.

Osprey 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.

Features

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

2. **High-performance Video**
   - Integrated Intel Gen 7 graphics core supports DirectX 11, OpenGL 4, and H.264, MPEG-2 encoding/decoding. LVDS *(2a)* and DisplayPort++ *(2b)* video outputs; both outputs support multiple display modes including Extended Desktop and Clone. *(2c).*

3. **Network**
   - Dual Ethernet interfaces, autodetect 10BaseT / 100BaseTX / 1000BaseT. One port with remote boot support.

4. **SATA** *(on back)*
   - 3 Gb/s SATA port supports bootable SATA hard drive.

5. **Mini PCIe Card Sockets**
   - Full-(5a) and half-(5b) 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. **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.

8. **Serial Communications**
   - Dual RS-232/422/485 serial ports.

- **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.
## Specifications

### General
- **Board Size**: 55 x 95 x 27.5 mm (2.17 x 3.74 x 1.08"
- **Weight**: 140 grams (4.93 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)**
<table>
<thead>
<tr>
<th>Model</th>
<th>Idle</th>
<th>Typical</th>
<th>Max</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-EPU-3311-EAP</td>
<td>5.3W</td>
<td>5.9W</td>
<td>6.5W</td>
<td>1.2W</td>
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<tr>
<td>VL-EPU-3311-EBP</td>
<td>5.8W</td>
<td>6.8W</td>
<td>7.7W</td>
<td>1.2W</td>
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<td>VL-EPU-3311-EDP</td>
<td>6.1W</td>
<td>7.3W</td>
<td>8.5W</td>
<td>1.2W</td>
</tr>
</tbody>
</table>
- **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**: All models -40° to +85°C
- **Airflow Requirements**: Refer to the VL-EPU-3311 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
- **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
- **VRAM**: Up to 224 MB shared DRAM
- **DisplayPort Interface**: Mini DisplayPort++ output. 24-bit. Up to 2560 x 1600. Supports DisplayPort and HDMI signaling (Video and Audio outputs).
- **OE 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**: One board eMMC MLC Flash drive. 0 to 8 GB
- **Mini PClE Card Socket**: One miniPCIe socket with mSATA support

### Network Interface
- **Ethernet**: Two autodetect 10BaseT/100BaseTX/1000BaseT ports. Latching connector. One port with network boot option.
- **Device I/O**: One USB 3.0 / 2.0 port and four USB 2.0 host ports
- **Digital I/O**: Eight TTL I/O Lines 3.3V. Independently configurable.
- **i2C**: Single i2C interface

### 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

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### Tailor Osprey 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 –**

† 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.

‡ 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-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.
## Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Processor</th>
<th>Cores</th>
<th>Speed</th>
<th>RAM</th>
<th>eMMC Flash</th>
<th>Cooling</th>
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<tbody>
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<td>Atom E3815</td>
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<td>Heat plate</td>
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<tr>
<td>VL-EPU-3311-EBP</td>
<td>Atom E3827</td>
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<td>2 GB</td>
<td>4 GB</td>
<td>Heat plate</td>
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<tr>
<td>VL-EPU-3311-EDP</td>
<td>Atom E3845</td>
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<td>4 GB</td>
<td>8 GB</td>
<td>Heat plate</td>
</tr>
</tbody>
</table>

### Osprey Mini PCIe Modules

- **Part Number**: VL-MPEe-E5E  
  **Description**: Dual Gigabit Ethernet adapter  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-E4E  
  **Description**: Gigabit Ethernet over Fiber adapter  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-E3E  
  **Description**: Gigabit Ethernet adapter  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-FW1E  
  **Description**: FireWire adapter  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-U2E  
  **Description**: Quad serial plus twelve GPIOs  
  **Form Factor**: Mini PCIe

### Serial I/O

- **Part Number**: VL-MPEe-A1E  
  **Description**: Analog input (12-bit resolution)  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-A2E  
  **Description**: Analog input (16-bit resolution)  
  **Form Factor**: Mini PCIe

### GPS

- **Part Number**: VL-MPEu-G2E  
  **Description**: GPS receiver  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEu-G3E  
  **Description**: Advanced GPS receiver  
  **Form Factor**: Mini PCIe

### Video

- **Part Number**: VL-MPEe-V5E  
  **Description**: VGA and LVDS Interface  
  **Form Factor**: Mini PCIe

- **Part Number**: VL-MPEe-VSE  
  **Description**: mSATA module (4G/16/32 GB) (SATA)  
  **Form Factor**: Mini PCIe

### Accessories

**Part Number** | **Description** | **Form Factor**
--- | --- | ---
VL-CBR-4005  | System I/O paddleboard  |  
VL-CBR-0702  | SATA cable – rugged latching, 20°  |  
VL-CBR-1604  | Dual Ethernet cable, 16-pin Click-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 Osprey, 12”  |  
VL-CBR-1014  | RS-232 Dual channel cable 2xSub (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 (10 ea)  |  
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 Micro A plug to 3.0 Micro B plug, 1 m  |  
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 adapter, requires DP++ port, 6”  |  
VL-ADR-01S  | USB to Audio Adapter, -25° to +85°C  |  
VL-F41-xxxx  | microSD card (SDIO), SLC, industrial temp.  |  
VL-PS-ATX12-300A  | ATX development power supply  |  
VL-HDW-411  | 12V Cooling fan for optional use with HDW-406 heat sink.  |  
VL-HDW-405  | Mounting Adaptor Plate - Flat, 75 x 84 mm. Simplifies installation in many situations. Attaches to heat plate on standard product.  |  
VL-HDW-408  | Heat Pipe Connector Plate. Mounts to heat plate on standard product.  |  

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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.