



- A complete x86 embedded computer!
- Intel® Atom™ E6x0T processor
- Industrial temp. (-40° to +85°C)
- Wide input voltage (8V–17V)
- Extremely small
- Mini PCIe expansion socket
- Trusted Platform Module (optional)

## Highlights

### Embedded Processing Unit

A complete embedded computer in an extremely small/rugged format.

### Intel Atom E6x0T Processor

1.6 GHz performance. Low power consumption.

### Industrial Temperature Operation

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

### MIL-STD-202G

Qualified for high shock/vibration environments.

### Fanless Operation

No moving parts required for CPU cooling.

### Wide Input Voltage Range

Accepts 8 to 17 volts (12V typ.).

### High-performance Video

Graphics core supports MPEG-4/H.264 and MPEG-2 encoding and decoding.

### Network

Gigabit Ethernet (GbE) with remote boot support.

### RAM

Up to 2 GB soldered-on DDR2 RAM.

### SATA

Supports SATA hard drives and mSATA flash storage options.

### Mini PCIe Card Socket

Supports Wi-Fi modems, GPS, MIL-STD-1553, Ethernet, solid-state storage, and other plug-in devices.

### Device I/O

Four serial ports, four USB ports, Intel High-Definition Audio.

### Trusted Platform Module (optional)

On-board security option defends against attacks from unauthorized hardware and software.



## Overview

The Falcon 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 Falcon is the embedded industry's smallest, lightest, ultra-rugged embedded x86 computer. This embedded computer, equipped with an Intel Atom E6x0T processor, is designed to withstand extreme temperature, impact, and vibration.

## Details

Driven by an Intel Atom E6x0T processor, the Falcon provides a lot of performance, lower power consumption (9–11W typical), and a very compact package. The Falcon provides compatibility with a broad range of standard x86 application development tools for reduced development time.

The integrated Intel GMA600 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.

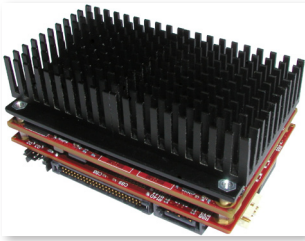
Industry-standard system interfaces include Gigabit Ethernet with network boot capability, four USB 2.0 ports, four serial ports, and Intel High-Definition Audio (HDA). A SATA 3 Gb/s interface supports high-capacity storage. Dual microSD sockets and a Mini PCIe socket with mSATA support provide flexible 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. The Falcon supports an optional Trusted Platform Module (TPM) for applications that require enhanced hardware-level security functions.

Designed and tested for industrial temperature (-40° to +85°C) operation, the rugged Falcon 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. Heat sink or heat plate versions provide fanless heat dissipation. Falcon is manufactured to IPC-A-610 Class 2 (modified) standards. For extremely-high-reliability applications, IPC-A-610 Class 3 versions are available.

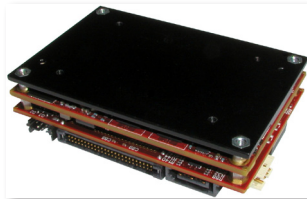
A wide input voltage range of 8 to 17 volts (12V typ.) simplifies system power supply requirements. It is fully compatible with 12V automotive applications.

Falcon 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 a Trusted Platform Module, conformal coating, BGA underfill, IPC Class 3 assembly, BIOS/splash screen configuration, application specific testing, BOM revision locks, labeling, etc.



Heat sink models



Heat plate models

## Ordering Information

| Model             | Processor  | Speed   | RAM  | Main I/O Connector | Cooling    |
|-------------------|------------|---------|------|--------------------|------------|
| VL-EPU-2610-EBPN  | Atom E640T | 1.0 GHz | 1 GB | Non-latching       | Heat plate |
| VL-EPU-2610-ECPN  | Atom E680T | 1.6 GHz | 1 GB | Non-latching       | Heat plate |
| VL-EPU-2610-EDPN  | Atom E680T | 1.6 GHz | 2 GB | Non-latching       | Heat plate |
| VL-EPU-2610-EBKN  | Atom E640T | 1.0 GHz | 1 GB | Non-latching       | Heat sink  |
| VL-EPU-2610-ECKN  | Atom E680T | 1.6 GHz | 1 GB | Non-latching       | Heat sink  |
| VL-EPU-2610-EDKN  | Atom E680T | 1.6 GHz | 2 GB | Non-latching       | Heat sink  |
| VL-EPU-2610-EBPL□ | Atom E640T | 1.0 GHz | 1 GB | Rugged latching    | Heat plate |
| VL-EPU-2610-ECPL□ | Atom E680T | 1.6 GHz | 1 GB | Rugged latching    | Heat plate |
| VL-EPU-2610-EBKL□ | Atom E640T | 1.0 GHz | 1 GB | Rugged latching    | Heat sink  |
| VL-EPU-2610-ECKL□ | Atom E680T | 1.6 GHz | 1 GB | Rugged latching    | Heat sink  |

□ Special order

## Accessories

| Part Number                               | Description                                                                                                       |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Cables</b>                             |                                                                                                                   |
| VL-CKR-FALC-N                             | Falcon cable kit. Includes VL-CBR-0701, 0804, 0807, 2014, 2015, and 5013.                                         |
| VL-CKR-FALC-L                             | Falcon cable kit – rugged latching. Includes VL-CBR-0702, 0804, 0807, 2014, 2015, and 5014.                       |
| VL-CBR-0804                               | 12" Ethernet cable - rugged latching                                                                              |
| VL-CBR-0807                               | 12" power adapter cable. ATX12 to Falcon.                                                                         |
| VL-CBR-2014                               | LVDS to VGA adapter board                                                                                         |
| VL-CBR-2015                               | 20" 24-bit LVDS cable (Hirose)                                                                                    |
| VL-CBR-2016                               | 20" 18-bit LVDS cable (JAE)                                                                                       |
| VL-CBR-5013                               | System I/O paddleboard                                                                                            |
| VL-CBR-5014                               | System I/O paddleboard – rugged latching                                                                          |
| VL-CBR-0201                               | 12" Wi-Fi antenna interface cable                                                                                 |
| VL-CBR-0701                               | 20" SATA cable                                                                                                    |
| VL-CBR-0702                               | 20" SATA cable - rugged latching                                                                                  |
| <b>Solid-State Storage (flash memory)</b> |                                                                                                                   |
| VL-F29-xxxx                               | mSATA module (SATA), industrial temp.                                                                             |
| VL-F41-xxxx                               | microSD card (SDIO), SLC, industrial temp.                                                                        |
| <b>Rotating Drives</b>                    |                                                                                                                   |
| VL-HDS35-xxx                              | 3.5" hard drive (SATA)                                                                                            |
| <b>Mini PCIe Expansion Cards</b>          |                                                                                                                   |
| VL-WD10-CBN                               | 802.11g/n Wi-Fi transceiver module                                                                                |
| <b>Hardware</b>                           |                                                                                                                   |
| VL-HDW-107                                | Mini PCIe/mSATA hardware kit (metric thread)                                                                      |
| VL-HDW-405                                | Secondary mounting plate. Simplifies installation in many situations. Attaches to heat sink or heat plate models. |
| VL-PS-ATX12-300A                          | ATX development power supply                                                                                      |
| <b>Miscellaneous</b>                      |                                                                                                                   |
| VL-CBR-ANT01                              | 802.11n Wi-Fi antenna                                                                                             |
| VL-HDW-401                                | Thermal compound paste                                                                                            |

§ 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

\* Extended altitude specifications available upon request

¥ 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 a VersaLogic Sales Engineer for further information.

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## Specifications

|                         |                                                                                |                                                                                                                                                                                       |                                                            |         |         |              |
|-------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------|---------|--------------|
| General                 | Size                                                                           | Heat plate models: 55 x 84 x 22 mm (2.17 x 3.31 x 0.87")<br>Heat sink models: 55 x 84 x 38.5 mm (2.17 x 3.31 x 1.51")                                                                 |                                                            |         |         |              |
|                         | Processor                                                                      | Intel Atom E6x0T platform. 512K 8-way L2 cache.<br>Intel Hyper-Threading Technology (HT), Virtualization Technology (VT).                                                             |                                                            |         |         |              |
|                         | Chipset                                                                        | Intel EG20T Platform Controller Hub (PCH)                                                                                                                                             |                                                            |         |         |              |
|                         | Battery                                                                        | Connection for 3.0V RTC backup battery                                                                                                                                                |                                                            |         |         |              |
|                         | Power Requirements<br>(@ +12V) §                                               | Model                                                                                                                                                                                 | Idle                                                       | Typical | Max.    | S3           |
|                         |                                                                                | VL-EPU-2610-EBxx                                                                                                                                                                      | 8.2W                                                       | 9.0W    | 9.8W    | 3.4W         |
|                         |                                                                                | VL-EPU-2610-ECxx                                                                                                                                                                      | 9.7W                                                       | 10.6W   | 11.6W   | 3.4W         |
|                         |                                                                                | VL-EPU-2610-EDxx                                                                                                                                                                      | 9.7W                                                       | 10.6W   | 11.6W   | 3.4W         |
|                         | Input Voltage                                                                  | 8V–17V (nominal 12V operation)                                                                                                                                                        |                                                            |         |         |              |
|                         | System Reset & Hardware Monitors                                               | All voltage rails monitored. Watchdog timer with programmable timeout (1 µS to 10 min.). Push-button sleep, reset, and power.                                                         |                                                            |         |         |              |
| Manufacturing Standards | Standard                                                                       | IPC-A-610 Class 2 modified                                                                                                                                                            |                                                            |         |         |              |
|                         | Custom                                                                         | IPC-A-610 Class 3 modified                                                                                                                                                            |                                                            |         |         |              |
| Regulatory Compliance   | RoHS compliant                                                                 |                                                                                                                                                                                       |                                                            |         |         |              |
| Environmental           | Operating Temperature                                                          | -40° to +85°C. Derate -1.1°C per 305m (1,000 ft.) above 2,300m (7,500 ft.).*                                                                                                          |                                                            |         |         |              |
|                         | Storage Temperature                                                            | -40° to +85°C                                                                                                                                                                         |                                                            |         |         |              |
|                         | Cooling                                                                        | Fanless. Heat sink or bolt-down heat plate.                                                                                                                                           |                                                            |         |         |              |
|                         | Airflow Requirements                                                           | Model                                                                                                                                                                                 | Temp. Range                                                |         | Airflow |              |
|                         |                                                                                | Heat plate models                                                                                                                                                                     | -40° to +85°C<br><i>Heat plate must be kept below 90°C</i> |         |         | Zero airflow |
|                         |                                                                                | Heat sink models                                                                                                                                                                      | -40° to +60°C<br>+60° to +85°C                             |         |         |              |
|                         |                                                                                |                                                                                                                                                                                       |                                                            |         |         | 300 LFM      |
|                         | Altitude*                                                                      | Operating                                                                                                                                                                             | To 15,000 ft. (4,570m)                                     |         |         |              |
|                         |                                                                                | Storage                                                                                                                                                                               | To 40,000 ft. (12,000m)                                    |         |         |              |
|                         | 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 (optional)                                                                 | Optional support for Intel Trusted Platform Module 1.2 devices. Temperature limitation to 70°C max.                                                                                   |                                                            |         |         |              |
| Memory                  | System RAM                                                                     | Standard                                                                                                                                                                              | 1 GB or 2 GB                                               |         |         |              |
|                         |                                                                                | Special Order                                                                                                                                                                         | 512 MB                                                     |         |         |              |
|                         |                                                                                | Soldered-on DDR2 SDRAM. 800 MT/s.                                                                                                                                                     |                                                            |         |         |              |
| Video                   | General                                                                        | Intel GMA600 high-performance graphics core. Advanced 2D/3D graphics. Hardware-accelerated video encode and decode.                                                                   |                                                            |         |         |              |
|                         | VRAM                                                                           | Up to 256 MB + 384 MB shared DRAM                                                                                                                                                     |                                                            |         |         |              |
|                         | OEM Flat Panel Interface                                                       | Single-channel LVDS interface. 18/24-bit. Up to 1280 x 768 (60 Hz).                                                                                                                   |                                                            |         |         |              |
| Mass Storage            | Rotating Drive ‡                                                               | One SATA 3 Gb/s port. Latching SATA connector.                                                                                                                                        |                                                            |         |         |              |
|                         | Flash/SSD ‡                                                                    | Two microSD sockets. Support up to 32 GB each.<br>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                                                                          | RS-232/422 selectable. 16C550 compatible. 1 Mbps max. Handshake lines.                                                                                                                |                                                            |         |         |              |
|                         | COM 2/3/4                                                                      | RS-232/422 selectable. 16C550 compatible. 1 Mbps max.                                                                                                                                 |                                                            |         |         |              |
|                         | GPIO                                                                           | Four user I/O lines. Independently configurable.                                                                                                                                      |                                                            |         |         |              |
|                         | Audio                                                                          | Intel High-Definition Audio (HDA) CODEC                                                                                                                                               |                                                            |         |         |              |
| 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. |                                                            |         |         |              |
| 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                                                                                    |                                                            |         |         |              |