Overview

The SandCat is a low-power dual-core single board computer (SBC) with an industry-standard PC/104-Plus expansion interface. This combination makes it easy to upgrade existing PC/104 systems to Intel's long-life Bay Trail processor, while preserving plug-in expansion to existing specialty I/O boards. The board also contains on-board I/O interfaces, including USB, a mini PCIe expansion socket, and digital I/O ports.

The SandCat is driven by a low power E3825 dual-core Bay Trail processor with a clock rate of 1.33 GHz. Based on the industry-standard PC/104™ format (4.2 x 3.8 inches), the SandCat includes legacy ISA and PCI connectors to interface directly with PC/104-Plus expansion boards.

Like other VersaLogic products, the SandCat is designed and validated for operation in unforgiving environments and designed for long term availability (10+ year typical product lifecycle).

Highlights

- PC/104-Plus expansion site (ISA + PCI)
- Intel® Bay Trail dual-core processor
- Up to 8 GB RAM
- Gigabit Ethernet
- DisplayPort video
- Mini PCIe Socket
- USB 2.0 ports
- Fanless with integrated heat sink
- -40° to +85°C Operating temperature
- Shock and vibration per MIL-STD-202G
- Serial I/O
- SATA
- Digital I/O (8 lines)
- VersaAPI software support
- Customization available in quantities as low as 100 pcs.
Features

1. **Intel Bay Trail Processor**
   1.33 GHz clock rate dual-core processor.
   Low power consumption.

2. **High-performance Video**

3. **RAM (on back side)**
   Up to 8 GB DDR3L socketed memory (one SO-DIMM).

4. **Network**
   Ethernet interface, autodetect 10BaseT / 100BaseTX / 1000BaseT with remote boot support.

5. **Industrial I/O**
   Dual RS-232/422/485 serial ports (5a); four USB 2.0 ports support keyboard, mouse, and other devices; three 8254 timer/counters, I2C, and audio support (5b).

6. **Digital I/O**
   Eight 3.3V digital I/O lines.

7. **SATA**
   3 Gb/s SATA port. Supports rotating or solid-state SATA drive.

8. **Mini PCIe socket**
   Supports Wi-Fi modems, GPS receivers, flash data storage with auto-detect mSATA flash storage support, and other mini PCIe modules.

9. **Main Power Input**
   5V Input ±5%.

10. **PC/104 Expansion (on back side)**
   Legacy PCI connector, stack-down.

11. **PC/104 Expansion (on back side)**
   Legacy ISA connector, stack-down.

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

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

- **PC/104 Form Factor**
  Industry-standard PC/104-Plus expansion.

Tailor SandCat to Your Exact Requirements

Modified COTS options are available in quantities as low as 100 pieces.

- Conformal Coating
- Custom Cabling
- Connector & I/O Changes
- Custom Labeling
- Custom Testing
- BGA Underfill
- BIOS Modifications
- Software and Drivers
- Revision Locks
- Custom Screening
- Storage device installation
- Software pre-load
- Etc.
### Specifications

#### General
- **Board Size**: PC/104 Compliant: 108 x 96 mm (4.23 x 3.77”)
- **Weight**: 108 grams (3.79 oz.)
- **Processor**: Intel Bay Trail Atom E3825 (dual core). 512K L2 cache per core. Supports Intel 64-bit instructions, AES Instructions, Execute Disable Bit, and Virtualization Technology.
- **Battery**: Connector for external 3.0V RTC backup battery.
- **Power Requirements (+5V)**:
  - Model: VL-EPM-39EBK
  - Idle: 4.6W
  - Typical: 5.3W
  - Max.: 6.0W
- **Input Voltage**: 5V ± 5%
- **System Reset and Hardware Monitors**: Major voltage rails monitored. Watchdog timer with programmable timeout. CPU temperature monitoring. Push-button reset and power.
- **Stackable Buses**: PC/104-Plus format. Legacy ISA and PCI connectors.
- **Regulatory Compliance**: RoHS (EU 2015/863), Conflict Minerals compliant.

#### Environmental
- **Cooling Options**: Heat sink.
- **Operating Temperature**: -40° to +85°C
- **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**: One SO-DIMM socket. Up to 8 GB DDR3L (1.35V) SDRAM.
- **Memory Speed**: 1067 MHz

#### Video
- **General**: Integrated high-performance video. Intel Gen-7 graphics core with four Execution Units and Turbo Boost. Supports DirectX 11, OpenGL 4.0, VP8, MPEG2, H.264, VC1, Flash and WMF support.
- **Hardware Based Format**:
  - **Decode**: H.264, MPEG2, MVC, VC-1, WMV9, VP8, MJPEG
  - **Encode**: H.264, MPEG2
- **DisplayPort Interface**: Support DisplayPort Standard Version 1.1 Mini DisplayPort++ output supports DisplayPort and HDMI signaling (Video and Audio outputs), 24-bit. Up to 2560 x 1600.
- **VRAM**: Up to 224 MB shared DRAM

#### Mass Storage
- **Rotating Drive / Flash / Solid-State Drives**: Single SATA (Revision 2.0) port. Latching connector. mSATA modules (SATA signaling, bootable).

#### Network Interface
- **Ethernet**: One autodetect 10BaseT/100BaseTX/1000BaseT port. On-board status LEDs and external LED header. IEEE 1588 Precision Time Protocol (PTP) slave compatible. Latching headers.
- **Network Boot Option**: Via on-board BIOS extension
- **Device I/O**:
  - **USB†**: Four USB 2.0 host ports.
  - **COM 1/2 ‡**: RS-232/422/485 selectable. 16C550 compatible. 460 Kbps.
  - **Digital I/O**: Eight TTL I/O lines (3.3V). Independently configurable.
  - **I2C**: Single I2C interface (3.3V)
  - **Audio**: Via DisplayPort++ interface or optional VL-ADR-01 audio interface.

#### Other I/O
- **Mini PCIe/Socket**: Full-length Mini PCIe socket. Supports Wi-Fi modems, GPS receivers, non-volatile flash data storage with auto-detect mSATA support, and other plug-in modules.

#### Software
- **BIOS**: Phoenix Technologies UEFI BIOS. Field reprogrammable. Support for USB keyboard/mouse and USB boot.
- **VersaAPI**: VersaLogic Application Programming Interface to support on-board I/O devices.
- **Sleep Mode**: ACPI 3.0. Support for S3 and S4 suspend states and C1 processor state.
- **Operating Systems**: Compatible with most x86 operating systems including Windows, Windows Embedded, Linux, VxWorks, and QNX.

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† Represents operation at +25°C with +5V supply running Windows 10. Typical power computed as the mean value of Idle and Maximum power specifications. Maximum power is measured with 95% CPU utilization.
‡ Derate -1.1°C per 305m (1,000 ft.) above 2,300m (7,500 ft.)
* For extended altitude information contact VersaLogic Sales
‡ 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 notice. Intel and Atom are trademarks of Intel Corp. PC/104 and PC/104-Plus are trademarks of the PC/104 Consortium. PCI Express is a registered trademark of PCI-SIG. SATA and mSATA are trademarks of the Serial ATA International Organization. SPX is a trademark of VersaLogic Corp. 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>DDR Max Speed</th>
<th>Operating Temp.</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-EPM-39EBK</td>
<td>Atom E3825</td>
<td>Dual</td>
<td>1.33 GHz</td>
<td>1067 MHz</td>
<td>-40° to +85°C</td>
<td>Heat Sink</td>
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Accessories

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>VL-CBR-0401</td>
<td>Power cable, ATX to SATA, 6.25&quot;</td>
</tr>
<tr>
<td>VL-CBR-0503</td>
<td>USB 2.0 Male A to Male Micro-B Cable, 0.5 m</td>
</tr>
<tr>
<td>VL-CBR-0701</td>
<td>SATA cable, 19.75&quot;</td>
</tr>
<tr>
<td>VL-CBR-2031</td>
<td>36” miniDisplayPort to miniDisplayPort</td>
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<tr>
<td>VL-CBR-2033</td>
<td>MiniDisplayPort to HDMI Active Adapter, required DP, 6”</td>
</tr>
<tr>
<td>VL-CBR-2034</td>
<td>6” 20-pin (F) ATX to 24-pin (M) ATX adapter cable. (use with PS-ATX12-300A)</td>
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Cables

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-MM9-xxEBN</td>
<td>DRAM 2/4/8 GB, PC3-12800 SODIMM DDR3L module (1.35v), industrial temperature</td>
</tr>
<tr>
<td>VL-MM9-xxSBN</td>
<td>DRAM 2/4/8 GB, PC3-12800 SODIMM DDR3L module (1.35v), standard temperature</td>
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Drivers

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<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>VL-HDS35-XXX</td>
<td>3.5” rotating hard drive (SATA)</td>
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Audio

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>VL-ADR-01S</td>
<td>USB to Audio Adapter, -25° to +85°C</td>
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Development

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>VL-PS200-ATX</td>
<td>200W ATX-style development power supply (20+4+4-pin ATX connector)</td>
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<tr>
<td>VL-PS-ATX12-300A</td>
<td>ATX development power supply (requires VL-CBR-2034)</td>
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</table>

Hardware

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<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>VL-HDW-105</td>
<td>0.6” standoff package (metric thread)</td>
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<tr>
<td>VL-HDW-108</td>
<td>Mini PCIe Module / mSATA hardware kit (metric thread) 2.5 mm</td>
</tr>
<tr>
<td>VL-HDW-111</td>
<td>Half to Full Size MiniPCIe Adapter kit. Metal adapter and 2x screws</td>
</tr>
<tr>
<td>VL-HDW-112</td>
<td>PC104 (ISA) Spacer</td>
</tr>
<tr>
<td>VL-HDW-113</td>
<td>PC104 (PCI) Spacer</td>
</tr>
<tr>
<td>VL-HDW-115</td>
<td>PC104 (blank) Spacer</td>
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<tr>
<td>VL-HDW-203</td>
<td>PC104 extractor tool (metal)</td>
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</tbody>
</table>

Miscellaneous

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-EPH-V6</td>
<td>Display Port to Dual Channel LVDS converter</td>
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</tbody>
</table>

Expansion Modules

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Form Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-MPEe-E3E</td>
<td>Gigabit Ethernet Adapter, (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEe-E4E</td>
<td>Gigabit Ethernet Over Fiber Optic media (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEe-E5E</td>
<td>Dual Gigabit Ethernet Adapter, (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEe-FW1E</td>
<td>1394 Firewire Module, (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEu-U2E</td>
<td>Quad serial plus twelve GPIOs</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEe-A1E</td>
<td>Analog Input Module, x8 channels, (12-bit resolution), (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEe-A2E</td>
<td>Analog Input Module, x8 channels (16-bit resolution), (PCIe signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEu-G2E</td>
<td>GPS Receiver, industrial temperature (USB signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEu-G3E</td>
<td>Precision GPS Receiver, industrial temperature (USB signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-MPEs-F1Exx</td>
<td>4/16/32 GB mSATA drive, industrial temperature (SATA signaling)</td>
<td>Mini PCIe</td>
</tr>
<tr>
<td>VL-EPH-V6</td>
<td>Display Port to Dual Channel LVDS converter</td>
<td>Mini PCIe</td>
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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.