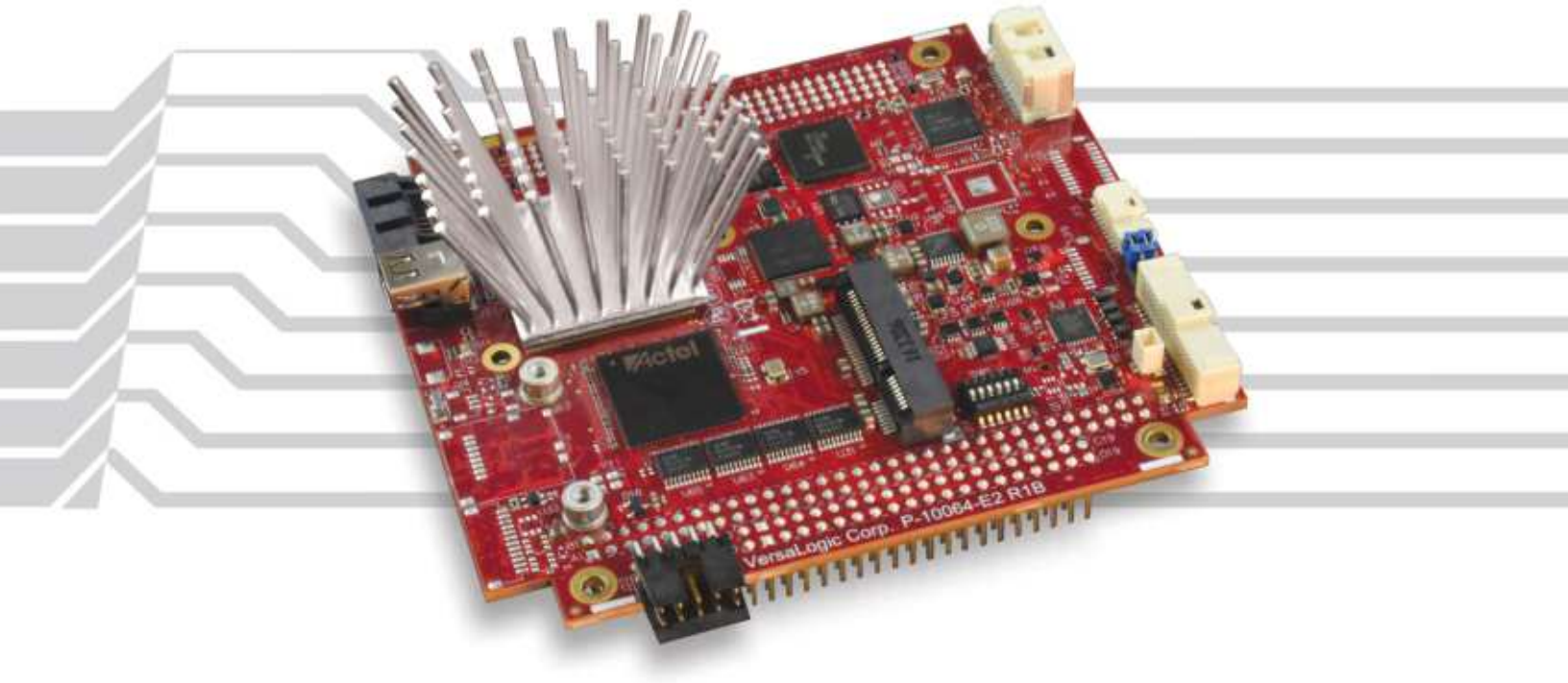
SandCat

PC/104-*Plus* Single Board Computer



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.

VERSALOGIC CORPORATION

Features

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

2 High-performance Video
Integrated Intel Gen 7 graphics core supports DirectX 11, OpenGL 4, and H.264, MPEG-2 encoding/decoding. Mini DisplayPort video output.

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%.

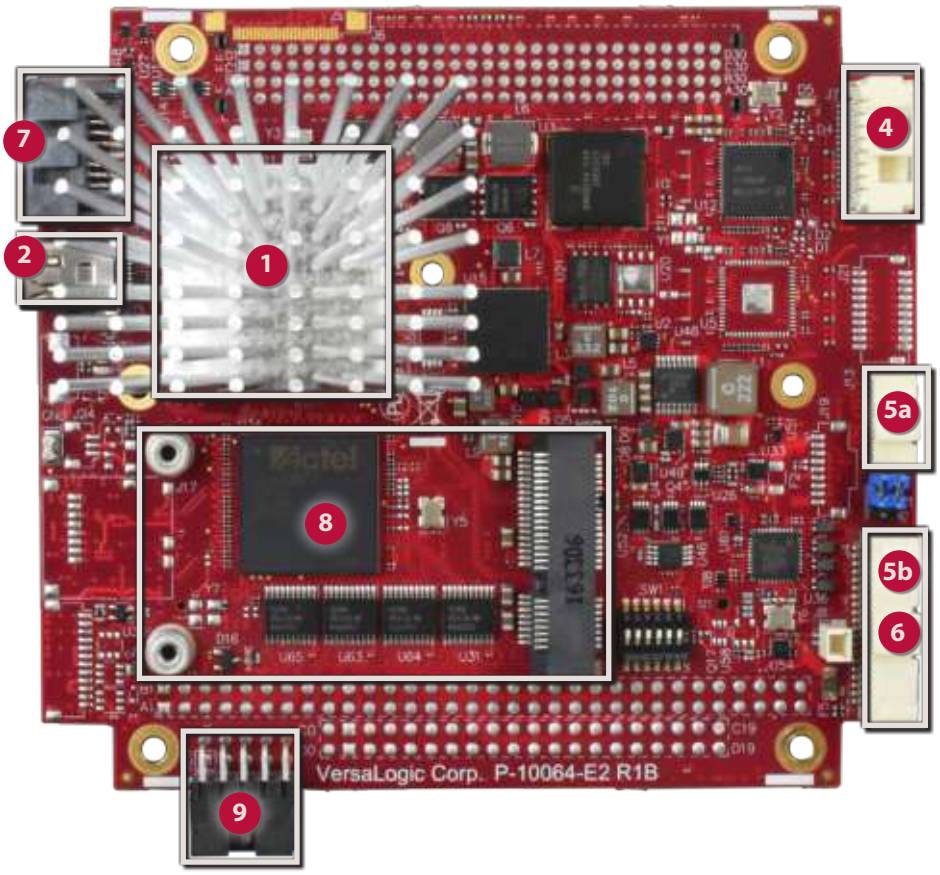
10 PC/104 Expansion *(on back side)*
Legacy PCI connector, stack-down.

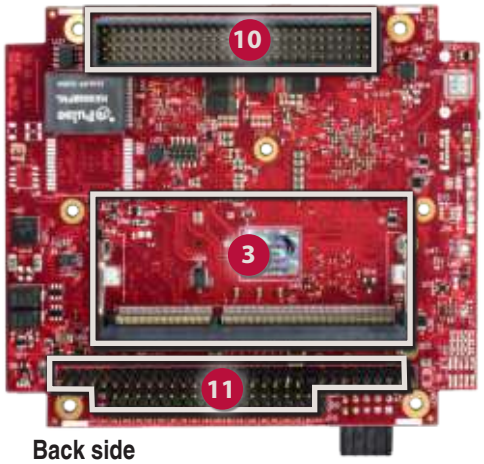
11 PC/104 Expansion *(on back side)*
Legacy ISA connector, stack-down.

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

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

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





Back side

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 Testing
- Custom Labeling
- 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"). 42 mm (1.66") tall with stock heat sink.
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* / *Idle* / *Typical* / *Max.* VL-EPM-39EBK / 4.6W / 5.3W / 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 ◊	*Model* / *Heat Sink* VL-EPM-39EBK / -40° to +85°C Range shown assumes 90% CPU utilization. For detailed thermal information, refer to the VL-EPM-39 Reference Manual.	
Airflow Requirements	Refer to the VL-EPM-39 Reference Manual for detailed airflow requirements.	
Storage Temperature	-40° to +85°C	
Altitude	Operating*	To 4,570 m (15,000 ft.)
	Storage	To 12,000 m (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	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 WMP support.	
	Hardware Based	*Format*
	Decode	H.264, MPEG2, MVC, VC-1, WMV9, VP8, MJPEG
	Encode	H.264, MPEG2
	Mini DisplayPort video interface. Optional adapter card converts DisplayPort output to LVDS for flat panel operation.	
VRAM	Up to 224 MB shared DRAM	
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.	

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.

† 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.

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Ordering Information

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

Model	Processor	Cores	Speed	DDR Max Speed	Operating Temp.	Cooling
VL-EPM-39EBK	Atom E3825	Dual	1.33 GHz	1067 MHz	-40° to +85°C	Heat Sink

Accessories

Part Number	Description
Cable Kit	
VL-CKR-SANDCAT	EPM-39 SandCat Eval. Cable kit. Includes VL-CBR-4005, 1008, 1605, 0702, 1014, 2032, and VL-HDW-105.
VL-CBR-4005	System I/O Paddleboard
VL-CBR-1008	ATX power adapter cable, 10-pin . 12"
VL-CBR-1605	Single Ethernet adapter cable, 12"
VL-CBR-0702	SATA cable, latching, 12"
VL-CBR-1014	RS232 two channel cable 2x Dsub (9-pin), latching, 12"
VL-HDW-105	Standoff package, 0.6", Metric thread
VL-CBR-2032	MiniDisplayPort to VGA adapter, 6"
Cables	
VL-CBR-0401	Power cable, ATX to SATA, 6.25"
VL-CBR-0503	USB 2.0 Male A to Male Micro-B Cable, 0.5 m
VL-CBR-0701	SATA cable, 19.75"
VL-CBR-2031	36" miniDisplayPort to miniDisplayPort
VL-CBR-2033	MiniDisplayPort to HDMI Active Adapter, required DP, 6"
VL-CBR-2034	6" 20-pin (F) ATX to 24-pin (M) ATX adapter cable. (use with PS-ATX12-300A)
Memory	
VL-MM9-xxEBN	DRAM 2/4/8 GB, PC3-12800 SODIMM DDR3L module (1.35v), industrial temperature
VL-MM9-xxSBN	DRAM 2/4/8 GB, PC3-12800 SODIMM DDR3L module (1.35v), standard temperature
Drives	
VL-HDS35-XXX	3.5" rotating hard drive (SATA)
Audio	
VL-ADR-01S	USB to Audio Adapter, -25° to +85°C
Development	
VL-PS200-ATX	200W ATX-style development power supply (20+4+4-pin ATX connector)
VL-PS-ATX12-300A	ATX development power supply (requires VL-CBR-2034)
Hardware	
VL-HDW-105	0.6" standoff package (metric thread)
VL-HDW-108	Mini PCIe Module / mSATA hardware kit (metric thread) 2.5 mm
VL-HDW-111	Half to Full Size MiniPCIe Adapter kit. Metal adapter and 2x screws
VL-HDW-112	PC104 (ISA) Spacer
VL-HDW-113	PC104 (PCI) Spacer
VL-HDW-115	PC104 (blank) Spacer
VL-HDW-203	PC/104 extractor tool (metal)
Miscellaneous	
VL-EPH-V6	Display Port to Dual Channel LVDS converter

Expansion Modules

Part Number	Description	Form Factor
Network		
VL-MPEe-E3E	Gigabit Ethernet Adapter, (PCIe signaling)	Mini PCIe
VL-MPEe-E4E	Gigabit Ethernet Over Fiber Optic media (PCIe signaling)	Mini PCIe
VL-MPEe-E5E	Dual Gigabit Ethernet Adapter, (PCIe signaling)	Mini PCIe
VL-MPEe-FW1E	1394 Firewire Module, (PCIe signaling)	Mini PCIe
Serial I/O		
VL-MPEe-U2E	Quad serial plus twelve GPIOs	Mini PCIe
Analog & Digital I/O		
VL-MPEe-A1E	Analog Input Module, x8 channels, (12-bit resolution), (PCIe signaling)	Mini PCIe
VL-MPEe-A2E	Analog Input Module, x8 channels (16-bit resolution), (PCIe signaling)	Mini PCIe
GPS		
VL-MPEu-G2E	GPS Receiver, industrial temperature (USB signaling)	Mini PCIe
VL-MPEu-G3E	Precision GPS Receiver, industrial temperature (USB signaling)	Mini PCIe
Solid-State Storage (flash memory)		
VL-MPEs-F1Exx	4/16/32/64/128/256 GB mSATA drive, industrial temperature (SATA signaling)	Mini PCIe
Adapters		
VL-EPM-P2E	PC/104-Plus Mini PCIe socket x2 adapter, industrial temperature	PC/104
VL-MPEs-S3E	SATA Adapter, industrial temperature (SATA signaling)	Mini PCIe
VL-MPEe-V5E	VGA/LVDS Interface (PCIe 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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