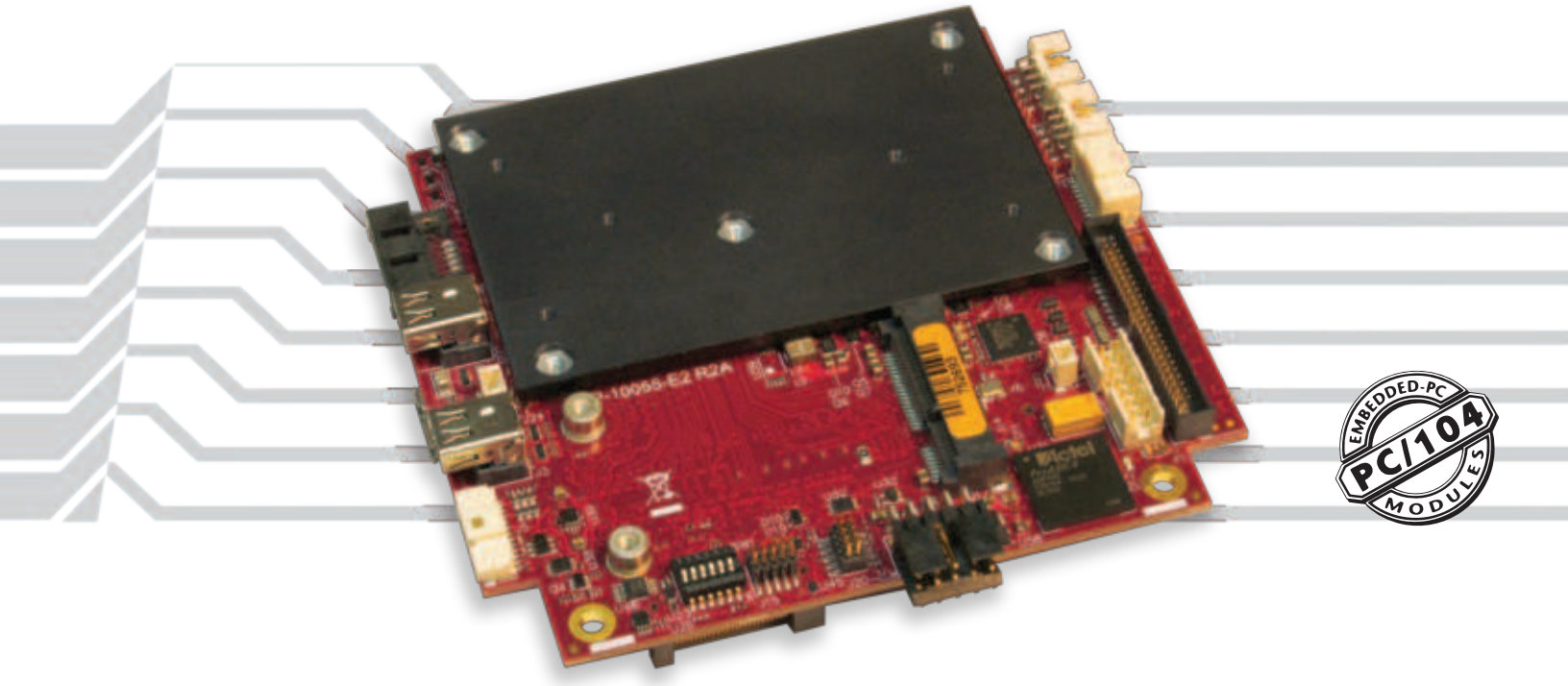
Bengal

PC/104 Format Single Board Computer



Overview

The Bengal is a low-power / high-performance single board computer (SBC) with a full complement of on-board I/O. Driven by the low power Intel® 22nm Silvermont microarchitecture, the Bengal provides up to 1.9 GHz of performance with quad, dual, and single-core processor options. Based on the industry-standard PC/104 format (4.23 x 3.77 inches), this SBC is an excellent solution for size, weight and power (SWaP) constrained applications.

Bengal is built on the new "PCI/104-Express OneBank" format. Compatible with the PCI/104-Express format, it includes a legacy PCI connector, and a single bank high-speed PCIe connector. This provides flexible system expansion, while leaving more on-board space available for product features. The single bank connector is mechanically and electrically compatible with the existing PCI/104-Express Type 1 and Type 2 modules.

As with all VersaLogic products, the Bengal is designed to support OEM applications where high reliability and long-term availability are required. From application design-in support, to its 5+ year production life guarantee, the Bengal provides a durable embedded computer solution with an excellent cost of ownership.

Highlights

- -40° to +85°C Operating Temperature
- Shock & vibration per MIL-STD-202G
- PCI/104-Express OneBank™ form factor
- 4th Generation Intel® Atom™ processor ("Bay Trail")
  - E3845 (quad core) or
  - E3826 (dual core) or
  - E3815 (single core)
- Trusted Platform Module (TPM) security chip
- Up to 8GB SO-DIMM RAM
- Gigabit Ethernet (2 ports)
- VGA and dual mini DisplayPorts
- Mini PCIe Socket / with mSATA support
- USB 3.0 and USB 2.0 ports
- Serial I/O
- SATA
- Digital I/O (18 lines)
- Fanless versions
- VersaAPI programming support
- Customization available in quantities as low as 100 pcs.

VERSALOGIC CORPORATION

Features

1 Intel Atom "Bay Trail" Processor
Up to 1.9 GHz clock rate. Quad, dual or single core options. Low power consumption.

2 High-performance Video
Integrated Intel Gen 7 graphics core supports DirectX 11, OpenGL 4.0, and H.264, MPEG-2 encoding/decoding.
Analog and Dual mini DisplayPort video outputs; both outputs support multiple display modes including Extended Desktop and Clone.

3 Trusted Platform Module *(on back side)*
On-board TPM security chip can lock out unauthorized hardware and software.

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

5 Network
Dual Ethernet interfaces, autodetect 10BaseT / 100BaseTX / 1000BaseT with remote boot support.

6 Industrial I/O
One USB 3.0 port and five USB 2.0 ports support keyboard, mouse, and other devices. Dual RS-232/422/485 serial ports, three 8254 timer/counters, I2C, PWM output, and audio support.

7 Digital I/O
Eighteen 3.3V digital I/O lines.

8 SATA
3 Gb/s SATA port supports bootable SATA hard drive.

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

10 SPI Interface
Supports SPI and SPX devices, including low cost analog and digital modules

11 Main Power Input
5V Input ±5%

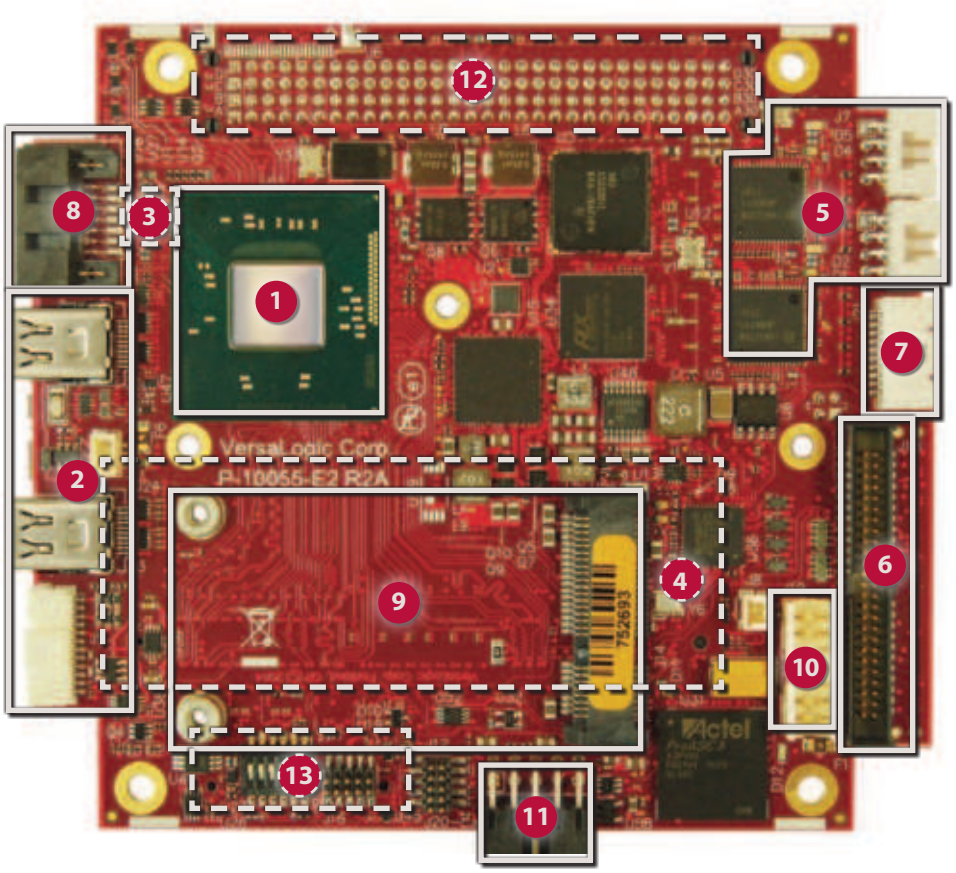
12 Stackable Expansion *(on back side)*
Legacy stack-down PCI connector.

13 Stackable Expansion *(on back side)*
High speed stack-down PCI/104-Express One Bank connector

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

PC/104™ Form Factor
Industry-standard PCI/104-Express OneBank™ expansion.

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



Tailor Bengal 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
- Custom Screening
- Application-Specific Testing
- And more –

Bengal

PC/104 Format Single Board Computer

Specifications

General	
Board Size	PC/104 Compliant: 108 mm x 96 mm (4.23" x 3.77")
Processor	Intel 4th Generation Atom E3845 (quad core), E3826 (dual core), or E3815 (single 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-EPMe-30EAP	5.5W	6.7W	7.0W
	VL-EPMe-30EBP	6.5W	7.0W	7.5W
	VL-EPMe-30ECP	7.5W	8.7W	10.0W

Input Voltage	5V ± 5%
System Reset & Hardware Monitors	Major voltage rails monitored. Watchdog timer with programmable timeout. CPU temperature and fan speed monitoring. Push-button reset and power.
Stackable Buses	PCI/104-Express OneBank format including: Legacy PCI connector and high speed OneBank connector (supports two PCIe x1 lanes)
RoHS	RoHS (EU 2015/863)

Environmental				
Cooling Options	Bolt-on heat plate standard. Optional Heat sink, Heat sink with fan, heat pipe, and other adaptors available.			
Operating Temperature ◊	*Model*	*Heat Plate***	*Heat Sink*	*Heat Sink + Fan*
	All Models	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
	Ranges shown assume 90% CPU utilization. For detailed thermal information, refer to the VL-EPMe-30 Reference Manual. **Heat plate must be kept below 90°C			
Airflow Requirements	Refer to the VL-EPMe-30 Reference Manual for detailed airflow requirements.			
Storage Temperature	-40° to +85°C			
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 minutes per axis			
Vibration, Random ¤	MIL-STD-202G, Method 214A, Condition A: 5.35g rms, 5 minutes per axis			
Mechanical Shock ¤	MIL-STD-202G, Method 213B, Condition G: 20g half-sine, 11 ms duration per axis			

Security	
TPM	Support for Intel Trusted Platform Module 1.2 device. Atmel - AT97SC3204-U2MA-20

† Represents operation at +25°C with +5V supply running Windows 7. 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 Dept.

‡ 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 notification. Intel and Atom are trademarks of Intel Corp. PC/104, PCI/104-Express and PCIe/104 OneBank 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. All other trademarks are the property of their respective owners.

Memory	
System RAM	One SO-DIMM socket. Up to 8 GB DDR3L (1.35V) SDRAM.
Memory Speed	1066 MHz or 1333 MHz, CPU dependent

Video		
General	Integrated high-performance video. Intel Gen-7 graphics core with 4 Execution Units and Turbo Boost. Supports 2 independent displays. Supports DirectX 11, OpenGL 4.0, VP8, MPEG2, H.264, VC1, 2 HD streams (1080p@30fps), Flash and WMP support.	
	Hardware Based	*Format*
	Decode	H.264, MPEG2,, MPEG4, MVC, VC-1, WMV9, VP8, MJPEG
	Encode	H.264, MPEG2, MVC
	Analog and dual mini DisplayPort video interfaces support Extended Desktop, Clone, and Twin display modes. Optional video adapter card converts DisplayPort output to LVDS for flat panel operation.	
VRAM	Up to 224 MB shared DRAM	
Desktop Display Interface ‡	Standard analog output (VGA). 24-bit. Up to 2560 x 1600 (60 Hz).	
DisplayPort Interface §	Support DisplayPort Standard Version 1.1 Mini DisplayPort and Mini DisplayPort++ outputs. 24-bit. Up to 2560 x 1600. Mini DisplayPort++ supports DisplayPort and HDMI signaling (Video and Audio outputs).	

Mass Storage	
Rotating Drive ¥	Single SATA (Revision 2.0) port. Latching SATA connector.
Flash / SSD ¥	mSATA modules (SATA signaling, bootable)

Network Interface	
Ethernet‡	Two autodetect 10BaseT/100BaseTX/1000BaseT ports. 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‡§	Five USB 2.0 host ports and a single USB 3.0 host port.
COM 1 / 2 Interface ‡	RS-232/422/485 selectable. 16C550 compatible. 460 Kbps.
Digital I/O	Sixteen TTL I/O lines (3.3V). Independently configurable. Two General Purpose I/O lines (3.3V)
I2C	Single I2C interface (3.3V)
Audio	DisplayPort and HDMI interfaces, or use optional part VL-ADR-01 Audio interface.
Counter/Timers	Three 8254 compatible Programmable Interval Timers (PITs).

Other I/O	
Mini PCIe / Socket	Full-size Mini PCIe socket. Supports Wi-Fi modems, GPS receivers, non-volatile flash data storage with auto-detect mSATA support, and other plug-in modules.
SPI Interface	Supports SPI and SPX devices. Supports up to four SPX 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.

Ordering Information

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

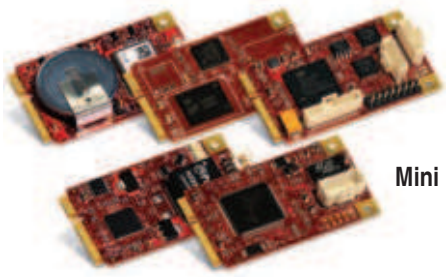
Model	Processor	Cores	Speed	DDR Max Speed	Graphics Frequency (Normal/Turbo)	Operating Temp.	Cooling	Trusted Platform Module	Conformal Coating
VL-EPMe-30EAP	Atom E3815	Single	1.46 GHz	1066 MHz	400 MHz / none	-40° to +85°C	Heat Plate	Yes	None
VL-EPMe-30EBP	Atom E3826	Dual	1.46 GHz	1066 MHz	533 MHz/ 667 MHz	-40° to +85°C	Heat Plate	Yes	None
VL-EPMe-30EBPA	Atom E3826	Dual	1.46 GHz	1066 MHz	533 MHz/ 667 MHz	-40° to +85°C	Heat Plate	Yes	Acrylic
VL-EPMe-30ECP	Atom E3845	Quad	1.91 GHz	1333 MHz	542 MHz/ 792 MHz	-40° to +85°C	Heat Plate	Yes	None

Accessories

Part Number	Description
Cable Kit	
VL-CKR-BENGAL	Development cable kit . Includes VL-CBR-5015, 2005, 1008, 1204, 0804 (x2), 0702, 1015, and VL-HDW-105.
VL-CBR-5015	System I/O paddleboard
VL-CBR-2005	12" 1mm 20-pin DIO cable and paddleboard
VL-CBR-1008	12" ATX power adapter cable
VL-CBR-1204	12" VGA Interface Cable, 12-pin PicoClasp Cable to 15-pin VGA
VL-CBR-0804	12" Ethernet cable (Qty. 2)
VL-CBR-0702	20" SATA cable – latching
VL-CBR-1015	1 m USB 3.0 Micro A plug to 3.0 Micro B plug
VL-HDW-105	0.6" standoff package, metric thread
Thermal Options	
VL-HDW-401	Thermal Compound Paste. For attaching heat plates and sinks.
VL-HDW-406	Passive Heat Sink to mount on product heat plate.
VL-HDW-407	Cooling fan for HDW-406 passive heat sink.
VL-HDW-408	Heat Pipe system to mount on product heat plate.
Cables	
VL-CBR-0401	6.25" ATX to SATA power cable
VL-CBR-0503	0.5 m USB 2.0 Male A to Male Micro-B Cable
VL-CBR-0701	19.75" SATA cable (non-latching)
VL-CBR-1206	18" 12-pin Pico-Clasp / 15-pin VGA, RoHS
VL-CBR-1401	Cable assembly for (2) SPX modules
VL-CBR-1402	Cable assembly for (4) SPX modules
VL-CBR-2031	36" miniDisplayPort to MiniDisplayPort
VL-CBR-2033	miniDisplayPort to HDMI Active Adapter, 6" (Commercial Temp.)
VL-CBR-2034	6" 20-pin (F) ATX to 24-pin (M) ATX adapter cable (use with PS-ATX12-300A)
Development	
VL-PS200-ATX	200W ATX-style power supply (20+4+4-pin ATX connector)
VL-DEV-USB-VV1	VersaViewer: A real-time viewer for embedded hardware developers
VL-PS-ATX12-300A	ATX development power supply (requires VL-CBR-2034)
Audio	
VL-ADR-01S	USB to Audio Adapter, -25° to +85°C
Memory	
VL-MM9-xxEBN	DDR3 PC3-12800 SO-DIMM memory module (1.35v)
Hardware	
VL-HDW-108	Mini PCIe Module / mSATA hardware kit (metric thread) 2.5 mm
VL-HDW-114	PC104 (PCIe) Spacer
VL-HDW-115	PC104 (blank) Spacer
Miscellaneous	
VL-HDW-111	Half to Full Size MiniPCIe Adapter kit. Metal adapter and screws (2)
VL-HDW-203	PC/104 extractor tool (metal)
VL-EPH-V6	Display Port to Dual Channel LVDS converter

Expansion Modules

Part Number	Description	Form Factor
Network		
VL-MPEe-E7E	2.5 Gigabit Ethernet (PCIe signaling) ET	Mini PCIe
VL-MPEe-E7S	2.5 Gigabit Ethernet (PCIe signaling) ST	Mini PCIe
VL-MPEe-E4E	Gigabit Ethernet Over Fiber Optic media	Mini PCIe
Serial I/O		
VL-MPEe-U2E	Quad serial plus twelve GPIOs	Mini PCIe
Analog & Digital I/O		
VL-MPEe-A1E	Analog input (12-bit resolution)	Mini PCIe
VL-MPEe-A2E	Analog input (16-bit resolution)	Mini PCIe
VL-SPX-1	Analog Input Module 8-Channels	SPX
VL-SPX-2	Digital I/O Module 16-lines	SPX
VL-SPX-4	Analog Output Module 4-channels 12-bit	SPX
VL-SPX-5	Solid State Switch Module 8-channel	SPX
GPS		
VL-MPEu-G2E	GPS receiver	Mini PCIe
VL-MPEu-G3E	Precision GPS Receiver, industrial temperature	Mini PCIe
Solid-State Storage (flash memory)		
VL-MPEs-F1Exx	mSATA module (4/16/32 GB) (SATA)	Mini PCIe
Adapters		
VL-MPEs-S3E	SATA adapter	Mini PCIe
VL-EPMp-P2E	Dual Mini PCIe adapter	PCI-104



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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