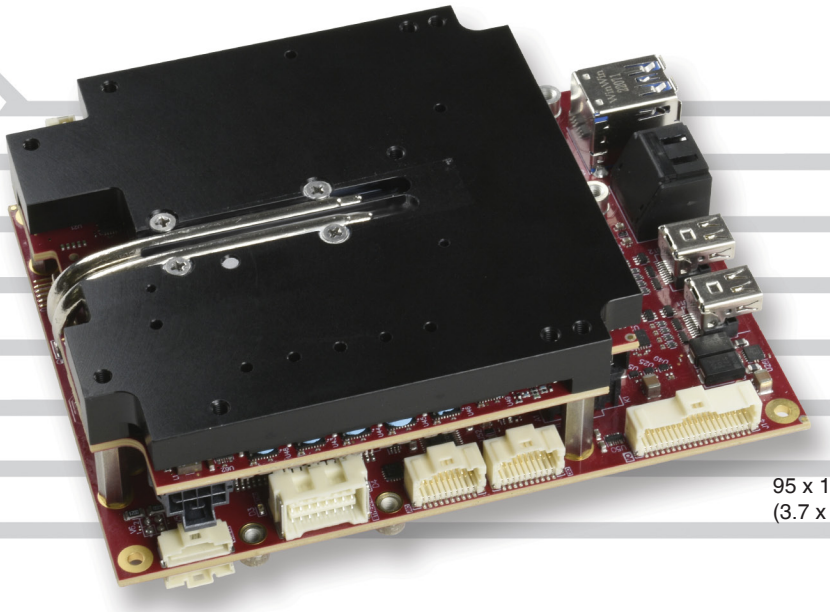
Swift

Embedded Processing Unit



95 x 125 x 41 mm
(3.7 x 4.9 x 1.6")

Overview

The Swift is a rugged embedded computer that combines a powerful processor platform with a rich selection of on-board I/O in a compact package. It includes soldered-down high-speed NVMe SSD storage and up to 32 GB of error-correcting RAM. Swift is an excellent solution when a compact, high-performance package is required in a harsh environment.

The Swift is powered by Intel®'s 9th generation "Coffee Lake Refresh" hex-core Xeon®-E processor.

On-board I/O includes two USB 3.1 ports, four USB 2.0 ports, four RS-232/422/485 serial ports, two SATA III ports, one 1GbE port, one 2.5GbE port, and two mDP++ high-performance video ports. Plug-in expansion is supported by two M.2 sockets, and a Mini PCIe socket.

In addition to operating at extended temperatures, the Swift meets MIL-STD-202H specifications for shock and vibration. Latching connectors prevent cable detachment issues in hostile environments.

VersaLogic's 10-year product life support programs ensure long-term availability. This avoids expensive upgrades and migrations from short, disposable lifecycle products.

Highlights

- **High-Performance Processor**
  6-core Xeon-E
- **High-Speed On-board Storage**
  128 Gb NVMe fast read/write
- **Error-Correcting Memory**
  Up to 32 GB ECC RAM
- **TPM 2.0 security chip**
  Lock out unauthorized access
- **On-board I/O**
  - USB 3.1 and USB 2.0
  - SATA III
  - Analog I/O, GPIO
  - COM ports (232/422/485)

VERSALOGIC CORPORATION

Features

1 Expansion

Mini PCIe Card Socket supports Wi-Fi modems, GPS, Ethernet, flash data storage, and other mini PCIe modules (**1a**).

M.2 B-Key supports 5G cellular, AI accelerators, Analog & Digital IO, SSD, Display interfaces (**1b**).

M.2 E-Key supports Wi-Fi/Bluetooth (**1c**).

2 Ethernet

One 1GbE port, one 2.5GbE port (10/100/1000/2500 auto-detect).

3 Storage

On-Board fast read/write bootable NVMe SSD self-encrypting drive. 128 GB soldered-down (**3a**).

Two SATA III on-board ports with latching connectors support bootable SATA drives. Power port for up to two SATA drives (**3b**).

M.2 B-key SSD supports NVMe or SATA drives (**3c**).

4 High-performance Video

Intel UHD Graphics P630 supports DirectX 12 and OpenGL 4.5, 4K hardware video acceleration with HEVC (10-bit), VP8, VP9, MPEG2 encoding/decoding, and VC-1 decoding. Two Mini DisplayPort outputs.

5 Industrial I/O

Two USB 3.1 ports (**5a**) and four USB 2.0 ports (**5b**) support video cameras, keyboard, mouse, and other devices.

Four RS-232/422/485 serial ports (**5c**). Three 8254 timer/counters. I2C support (**5d**).

6 Digital + Analog I/O

Twenty-four 3.3V digital I/O lines (**6a** & **6b**).

Eight multi-range analog inputs, four analog outputs (**6c**).

7 On-board Power Conditioning

10V – 15VDC input from nominal 12V power sources.

8 Thermal Solution

Built-in heat plate supports direct attachment to a thermal bulkhead or other thermal options (heat sink, heat pipe adaptor, etc.).

Intel Xeon E "Coffee Lake Refresh" Processor *(not shown)*

Hex-core, up to 4.2 GHz turbo clock rate.

RAM *(not shown)*

Up to 32 GB ECC DDR4 RAM

Trusted Platform Module *(not shown)*

On-board TPM 2.0 security chip can lock-out unauthorized hardware and software access.

Industrial Temperature Operation

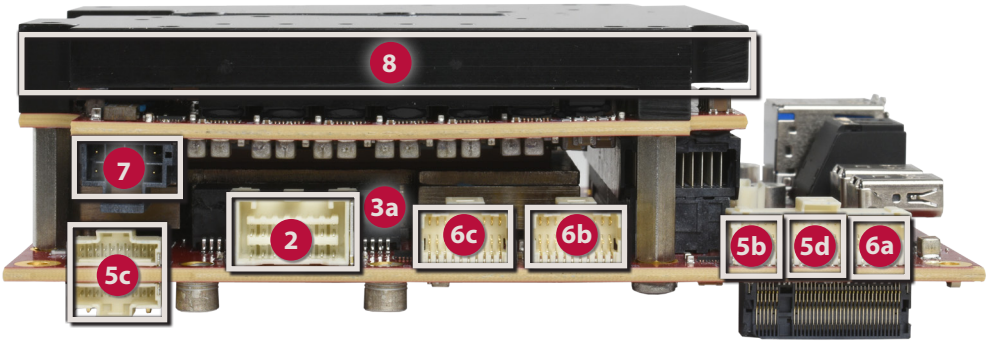
-40° to +85°C operating range for harsh environments.

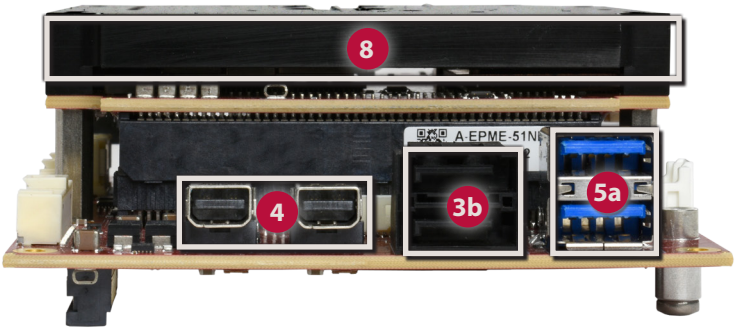
MIL-STD-202H

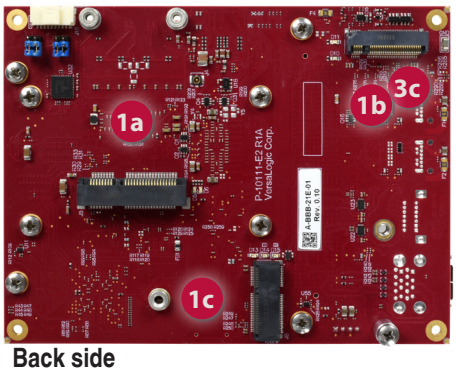
Qualified for high shock/vibration environments.

Software Support

Compatible with various popular x86 operating systems, including Windows 10/11, Windows Server 2019, Linux, and VxWorks. Supported by the VersaAPI I/O routines.







Back side

Modify Swift to Your Exact Requirements

COTS modifications are available in quantities as low as 100 pieces.

- Conformal Coating
- I/O Changes
- Custom Testing
- Custom Labeling
- BGA Underfill
- BIOS Customization
- Software and Drivers
- Revision Locks
- Custom Screening
- Larger On-board Storage
- Software Pre-load
- Etc.

Specifications

General				
Board Size	95 x 125 x 41 mm (3.7 x 4.9 x 1.6")			
Weight	476 grams (16.8 oz.)			
Processor	*Processor*	*Cores*	*Cache*	
	Intel 9th Gen "Coffee Lake Refresh" Xeon E-2276ML ECC	6	12 MB	
	Intel 64-bit instructions, Secure Key, Intel Enhanced SpeedStep® Technology, Intel Turbo Boost Technology, Intel Virtualization Technology, AES New Instructions.			
RTC Battery	Connection for 3.0V RTC backup battery. Not required for operation.			
Power Requirements (@ +12V) †	*Model*	*Idle*	*Average*	*Max.*
	EPU-5121-EDP-16x	6.2W	26.6W	47.0W
	EPU-5121-EDP-32x	6.3W	26.7W	47.0W
Input Voltage	10V – 15VDC (nominal 12V operation)			
Regulatory Compliance	RoHS (EU 2015/863), Conflict Minerals compliant.			

Environmental			
Cooling Options	Bolt-on heat plate standard. Optional heat sink, fan, heat pipe, and other thermal accessories available.		
Operating Temperature ◊	*Model*	*Heat Plate*	*Heat Sink + Fan*
	VL-EPU-5121-EDP	-40° to +85°C	-40° to +85°C
	Ranges shown assume 90% CPU utilization. For detailed thermal information and exceptions, refer to the VL-EPU-5121 Reference Manual.		
Airflow Requirements	0.5 Linear meters per second		
Storage Temperature	-40° to +85°C		
Altitude*	Operating	To 4,572m (15,000 ft.)	
	Storage	To 15,240m (50,000 ft.)	
Thermal Shock	5°C/min. over operating temperature		
Humidity	Mil-STD-202H method 103 – Humidity steady state		
Vibration, Sinusoidal Sweep ¤	MIL-STD-202H method MIL-STD-202-204, Condition A: 2g		
Vibration, Random ¤	MIL-STD-202H method MIL-STD-202-214, Condition A: 5.35g rms		
Mechanical Shock ¤	MIL-STD-202H method MIL-STD-202-213, Condition G: 20g half-sine		

Security	
TPM	Trusted Platform Module 2.0 device for hardware and software security

Memory	
System RAM	Up to 32 GB of SODIMM ECC DDR4 SDRAM

Video	
General	Intel UHD Graphics P630, generation 9.5, OpenGL 4.5, 4K support @ 60Hz
DisplayPort Interface §	Two Mini DisplayPort++ outputs. 24-bit. Up to 3840 x 2160 @ 30 Hz. 4K support at 60 Hz. Supports DisplayPort and HDMI signaling (Video and Audio outputs).

Mass Storage	
Rotating Drives / Flash / SSD ¥	Soldered-down self-encrypting 128 GB NVMe. Supports Data at Rest security functions. Optional capacities to 1 TB supported.
	Two SATA III (6Gbs) ports, with data and power. Latching connectors. Bootable.
	One Mini PCIe 6Gbs Gen3 socket with mSATA support. Bootable.
	One M.2 B-key with SATA or NVMe support. Bootable.

Network Interface	
Ethernet ‡	One AutoDetect 100Base TX/1000Base T/2500BaseT, One AutoDetect 10BaseT/100BaseTX/1000BaseT port. Latching connectors. One port with network boot option.

Device I/O	
USB ‡§	Two USB 3.1 ports and four USB 2.0 host ports
COM 1/2/3/4 Interface ‡	RS-232/422/485 selectable. 16550 compatible. RS-232 115 Kbps – RS-422/485 460 Kbps max.
Digital I/O	24 TTL I/O lines (3.3V). Independently configurable.
I2C	Single I2C interface
Counter / Timers	Three 8254 compatible Programmable Interval Timers (PITs)

Mini PCIe Card Socket	
Full size	Supports Wi-Fi modems, GPS receivers, Ethernet expansion, non-volatile flash data storage, and other plug-in modules. USB, SATA, and PCIe signaling. Auto-detect mSATA support.

M.2 Socket	
B-Key	3052 5G cellular (NVMe or SATA SSD options available), AI accelerators, Analog & Digital IO, SSD, and Display interfaces
E-Key	2230 Wi-Fi (PCIe) Bluetooth (USB)

Software	
BIOS	UEFI
Sleep Mode	ACPI 3.0. Support for S0, S3, S4, S5 states
Operating Systems	Compatible with most x86 operating systems, including Windows 10/11, Windows Server 2019, and Linux.
VersaAPI Support	Library of API calls for reading and controlling on-board devices. Visual Studio and C/C++ software development interfaces. Supported on Windows and Linux.

† Represents operation at +25°C and +12V supply running Windows 10 with DisplayPort monitor, SATA SSD, GbE, two COM in loopback, and USB keyboard/mouse, running Passmark V9 burn-in test. Typical power computed as the mean value of Idle and Maximum power specifications. Maximum power measured with 90% 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-202H shock and vibe levels are used to illustrate the ruggedness of this product in general. Testing at higher levels and/or different types of shock or vibration methods can be accommodated per the application's specific requirements. Contact a VersaLogic Sales Engineer for further information.

Ordering Information

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

Model	Processor	Cores	Speed / Boost	RAM	NVMe	Operating Temp.†	Cooling
VL-EPU-5121-EDP-16x	Xeon E-2276ML ECC	6	2.0 / 4.2 GHz	16 GB ECC	128 GB	-40° to +85°C	Heat Plate
VL-EPU-5121-EDP-32x	Xeon E-2276ML ECC	6	2.0 / 4.2 GHz	32 GB ECC	128 GB	-40° to +85°C	Heat Plate

Accessories

Part Number	Description
Cable Kit	
VL-CKR-SWIFT	Swift cable kit. Includes CBR-4005, 2004, 2005, 0812, 0818, 1604, 0407, 0702, 2033, 1014 (x2), HDW-108 and 401
VL-CBR-4005	System I/O paddleboard
VL-CBR-2004	20-pin Analog paddle board
VL-CBR-2005	20-pin DIO paddle board
VL-CBR-0812	Power cable, 10 to 15V, high-power. 8 Pin Molex Nano-fit to fork terminals. 12"
VL-CBR-0818	12" ATX 24-pin to 8-pin Molex Nano-Fit
VL-CBR-1604	Dual Ethernet cable, 16-pin Clik-Mate to 2 RJ-45 – rugged latching, 12"
VL-CBR-0407	SATA Power Cable 19.75"
VL-CBR-0702	SATA cable – rugged latching, 20"
VL-CBR-2033	Mini DisplayPort to HDMI Active Adapter
VL-CBR-1014	RS232 Dual channel cable 2xDsub (9-pin), Latching, 12"
VL-HDW-108	Mini PCIe / mSATA hardware kit (metric thread) 2.5 mm (10ea)
VL-HDW-401	Thermal Compound Paste. For attaching heat plates and sinks.
Cables	
VL-CBR-0203	2-pin Latching Battery Module, 6"
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-0901	Pico-clasp to dual SPX cable 9-pin 9"
VL-CBR-2031	Mini DisplayPort to Mini DisplayPort, 36"
VL-CBR-2032	Mini DisplayPort to VGA adapter, 6"
Audio/Video	
VL-EPH-V6SA	mDP to LVDS video converter
VL-ADR-01S	USB to Audio Adapter , -25° to +85°C
Hardware	
VL-HDW-111	Half to Full Size Mini PCIe Adapter kit. Metal adapter and screws (2)
VL-PS-ATX12-300A	ATX development power supply
Thermal Options	
VL-HDW-424	Heat sink with Fan
VL-HDW-425	Heat pipe adapter kit

Mini PCIe Modules

Part Number	Description	Form Factor
Network		
VL-MPEe-E7E	2.5 Gigabit Ethernet (PCIe signaling) +85°C	Mini PCIe
VL-MPEe-E7S	2.5 Gigabit Ethernet (PCIe signaling) +60°C	Mini PCIe
VL-MPEe-E6E	Gigabit Ethernet (PCIe signaling)	Mini PCIe
VL-MPEe-E6E-P	Gigabit Ethernet with POE+ (PCIe signaling)	Mini PCIe
VL-MPEe-E5E	Dual Gigabit Ethernet adapter (PCIe signaling)	Mini PCIe
VL-MPEe-E4E	Gigabit Ethernet over Fiber adapter (PCIe signaling)	Mini PCIe
VL-MPEe-FW1E	FireWire adapter (PCIe signaling)	Mini PCIe
VL-MPEu-C1E	Dual CAN Bus Interface (USB signaling)	Mini PCIe
Serial I/O		
VL-MPEe-U2E	Quad serial plus twelve GPIOs (PCIe signaling)	Mini PCIe
Analog & Digital I/O		
VL-MPEe-A1E	Analog input (12-bit resolution) (PCIe signaling)	Mini PCIe
VL-MPEe-A2E	Analog input (16-bit resolution) (PCIe signaling)	Mini PCIe
GPS		
VL-MPEu-G3E	Advanced GPS receiver (USB signaling)	Mini PCIe
Video		
VL-MPEe-V5E	VGA and LVDS Interface (PCIe signaling)	Mini PCIe
Solid-State Storage (flash memory)		
VL-MPEs-F1Exx	4/16/32/64/128/256 GB mSATA drive (SATA signaling)	Mini PCIe

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 the initial concept through the extended life of your program. Contact VersaLogic today to learn more.

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