



## RUGGED TO THE CORE

### PC/104 Single Board Computers



### The REN<sup>™</sup> Story

Designed & manufactured in Australia, REN<sup>™</sup> was developed as a building block for engineers to rapidly develop applications that need to run on rugged, fully sealed hardware at the edge.

Drawing a pedigree from military specified foundations, REN<sup>™</sup> is the ultimate starting point for engineers wanting an extremely, versatile & highly capable COTS embedded solution at a fraction of the cost of its MILSPEC equivalent.

### The Evolution of REN<sup>™</sup>

REN<sup>™</sup> MINI is the 3rd generation of Unitronix's REN<sup>™</sup> series boxes. It is designed to take the VersaLogic Corporation's Embedded Processing Unit (EPU) range of processor cards. Blackbird, Eagle, Owl and Harrier being the most suitable.

REN<sup>™</sup> MINI is a very high-end processing engine with lots of options including three mini PCIe sites to host 3rd party cards. (See the relevant VersaLogic data sheets for more information).

### What is a REN<sup>™</sup> MINI?

**It's a project box with serious TRL and currently the fastest and cheapest route to a deployed system available in the world!**

REN<sup>™</sup> MINI is effectively a large heatsink for the high powered processor that allows the processing engine to be used in extremely rugged and harsh environments where the usual diecast and extruded cases just won't do the job.

REN<sup>™</sup> series are items of utility for engineers who would normally build these systems themselves, but due to a lack of project time and low quantity requirements, an off-the-shelf solution is a more viable option.

The REN<sup>™</sup> MINI is a box that is fully sealed against water, electromagnetic compatibility (EMC) and electromagnetic interference (EMI). Supplied with a blank IO plate & pre-drilled locations for PSU and SSD, it is a platform that is "rugged and ready" for engineers to develop into their required system specific to task.

### PC/104 Single Board Computers

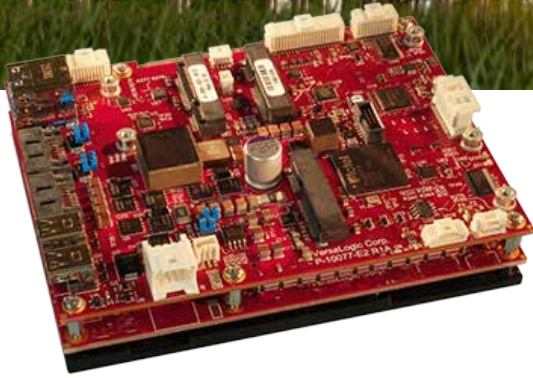
Hosting the latest EPU (Embedded Processing Units) from the VersaLogic rugged PC/104 range,

- Blackbird Skylake quad core i7 -6822EQ (or i5)
- Eagle 9th gen 6 core Xeon E-2276ML
- Owl Appolo Lake ATOM E39xx quad-core
- Harrier Appolo lake ATOM E39xx quad-core



### REN<sup>™</sup> MINI:

- Is well engineered, this is Gen 3 of the design and is tested underwater to a depth of 2 metres for 2 days.
- Is flexible in its design, any of the VersaLogic EPU range can be used, though Blackbird is the one the case is designed for. New EPU processors, when they come out, can be mated into the box and a new IO plate provided.
- Allows customers to get going immediately developing the application, no stress and worry about connectors and connections because there are none.
- Allows you to develop with the lid OFF and the IO plate OUT. Once you have the software going, you then figure out what actual signals you need to connect out of the box and how they will be arranged on the IO plate.



## What sort of Applications would run on REN™ MINI?

REN™ MINI is not a traditional industrial embedded processing computer, it is for applications that need a high powered processing engine and will need to run that processor at a high ambient (external) temperature (60°-70°C) while completely sealing itself from the environment it is in.

## The types of applications are:

AI, Field Data Analytics, Preprocessing high-end sensors, Autonomous Control Systems.

## Get developing quickly.

As soon as you receive your REN™ MINI you can remove the lid/remove the blank I/O plate and plug-in the development cable kit to be up and running, developing the application. In parallel, customers can design their own I/O plate configuration and test whilst not interfering with the application development.

## Very flexible power supply.

As standard the VersaLogic CPU cards (Blackbird, Eagle, Owl, Harrier) have a wide ranging on-board PSU and can accept 8 to 30 Volts DC, with reverse polarity protection, filtering and transient voltage suppression.

## The choice is yours.

Should a customer wish for more flexibility with the power supply the REN™ MINI lid comes pre-drilled to take VICOR DC/DC power bricks and filters in the following configurations.

Up to 2 x VICOR DC/DC V28B series + 2 x VICOR V28C Series Filters or the VICOR Brick and filter sets can be transposed with 2.5 inch SSDs.

Adding power bricks or SSDs is the end user's choice. They can provide their own or chose to have them supplied, pre-fitted and wired up from the Unitronix range.

**Note:** Isolation plates are available for power bricks and disk holding plates for the SSDs.

## Key Features

### REN™ - Rugged Embedded Node for life on the edge





- High-end computing power for applications in onerous environments where traditional air cooling will not work.
- Fully sealed case, design tested at a submerged depth of two metres underwater for two days.
- Fully EMC/EMI gasketed.
- Very rugged case milled from a solid billet of 7075 aluminium.
- Intel Core Skylake processor, quad core/dual core 2.6GHz clock rate.
- Up to 32GB DDR4 RAM.
- 2 GigE ports, one with Remote Boot.
- Trusted Platform Module onboard TPM security chip.
- Customisable I/O connector plate for bespoke cabling to the outside world.
- Choice of connectors including Unitronix pre-built connectors and cables.



# Mining



## REN™ MINI Data Sheet 2022

Make	VersaLogic™		VersaLogic™	
Model	Eagle VL-EPU-5120	Blackbird VL-EPU-4562	Owl VL-EPU-4012	Harrier VL-EPU-4012
Type	Embedded Processing Unit		Embedded Processing Unit	Embedded Processing Unit
Processor	Intel Xeon Hex-core with 4.2 GHz turbo clock rate.	Intel Core “Skylake” Up to 2.6 GHz clock rate. Quad- and dual-core options.	Intel Atom “Apollo Lake” Up to 2 GHz burst clock rate. Quad- or dual-core options	Intel Atom Apollo Lake Up to 2 GHz burst clock rate. Quad or dual-core options.
Features	<p>Error-Correcting Memory Up to 32 GB of ECC RAM</p> <p>High Performance Processor 6-core Xeon-E</p> <p>High Speed On-board Storage</p> <p>128 Gb NVMe fast read/write SSD storage</p> <p>Hyper-Threading</p> <p>On-board I/O includes; two USB 3.1 ports, four USB 2.0 ports, RS-232/422/485 serial ports, 8254 timer/counters. I2C support, and 8 digital I/O lines.</p> <p>On-board power conditioning supports nominal 12V input between 10V – 15VDC.</p> <p>Meets MIL-STD-202H specifications for shock and vibration</p> <p>Intel UHD Graphics P630 supports DirectX 12 and OpenGL 4.5, 4K hardware video acceleration</p>	<p>-40°to+85°C operating temperature models</p> <p>Trusted Platform Module (TPM) security chip Shock &amp; vibration per MIL-STD-202G.</p> <p>6th Generation Intel® Core™ “Skylake” processor -i7-6822EQ (quad core) or -i5-6442EQ (quadcore) or -i5-6300U (dual core) or -i3-6100U (dualcore)</p> <p>On-board Power Management -8 to 30 volt DC input 12 &amp; 24 24 volt system compatible-Over and reverse-voltage protection</p> <p>-RF noise filtering -Transient voltage protection</p> <p>Up to 32GB DDR4 RAM</p> <p>Two x Gigabit Ethernet Two x mini DisplayPort and LVDS video outputs</p> <p>Three x Mini PCIe Sockets Two x USB 3.0 port, Four x USB 2.0 ports</p> <p>Serial I/O ports, SATA, Digital I/O</p> <p>Analogue Inputs (8 chan.) Analogue Outputs (4 chan.) HD Audio</p> <p>COM Basic size: (95x125x37 mm)</p> <p>A complete x86 embedded computer.</p>	<p>On-board Power Conditioning(on back) Accepts 8 to 30 volts Overvoltage and reverse polarity protection. RF noise filtering.</p> <p>High-performance Video Integrated Intel HD Graphics 505/500 supports Ultra HD 4k, DirectX 12, OpenGL 4.3 &amp; H.264, MPEG-2 encoding/decoding.</p> <p>DisplayPort++ (2a) and LVDS</p> <p>Video outputs support multiple display modes including Extended Desktop and Clone.</p> <p>LVDS backlight control Network Dual GbE Ethernet interfaces.</p> <p>Autodetect10BaseT/100BaseTX/1000 BaseT with remote boot support.</p> <p>SATA (on back) SATA III port supports bootable SATA drive.</p> <p>Mini PCIe Card Sockets Dual full-sized sockets. Supports A/D, Wi-Fi modems, GPS, MIL-STD-155 3. Ethernet, flash data storage and other Mini PCIe modules.</p> <p>MicroSD Socket Supports removable microSD card solid-state drives.</p> <p>Industrial I/O One USB 3.0 port (7a) and four USB 2.0 ports.</p> <p>Support keyboard, mouse and other devices. Eight 3.3V digital I/O lines, three 8254 timer/counters and I2C support.</p> <p>Serial Communications Four RS-232/422/485 serial ports.</p> <p>Analogue Eight 12-bit analog input channels for data acquisition support.</p> <p>SPI Interface Supports SPI and SPX devices, including low cost analog and digital modules.</p>	<p>Error-correcting memory (up to 8 GB) Very small (55 x 95 x 29 mm)</p> <p>Wide Input Voltage Range (8 to 17 volts)</p> <p>Dual- or quad-core Intel® Atom™ Apollo Lake processor</p> <p>On-board Power Conditioning (on back) Accepts 8 to 17 volts (12V typical).</p> <p>High-performance Video Integrated Intel HD Graphics 505/500 supports Ultra HD 4k, DirectX 12, OpenGL 4.3 and H.264, MPEG-2 encoding/decoding.</p> <p>Display port (2a) and LVDS (2b) video outputs support multiple display modes including Extended Desktop &amp; Clone. LVDS backlight control (2c).</p> <p>Network Dual GbE Ethernet interfaces.Autodetect 10BaseT / 100 BaseTX /1000BaseT with remote boot support.</p> <p>SATA (on back) SATA III port supports bootable SATA drives.</p> <p>Mini PCIe Card Sockets Full-(5a) and half- (5b) size sockets. Supports Wi-Fi modems, GPS, MIL STD-1553, Ethernet</p> <p>Flash data storage and other mini PCIe modules.</p>
				

## What testing has been done on the REN™ Systems?

REN™ Series are 3rd generation and their design is based on previously tested systems. For this new series we will be providing what we are calling known data point testing. What this means is we will be providing engineers with test data on.

- Shock, where we will be concurrent to the CPU card shock stress test and at heat soak.
- Ambient Operating Temperature when the system is under spec.
- Vibration, where we will be concurrent to the CPU card vibration spec.
- EMC/EMI, we will provide bench test data as well as some specific test house generated data points. An engineer can then extrapolate the data to an approximation for their application.

**Note:** We can do specific testing if required.



2x SSD  
Clamp Plate Required



VersaLogic EPU



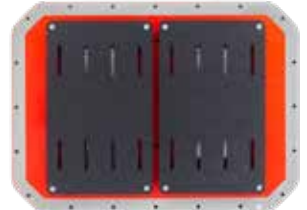
SSDs with mounting plates



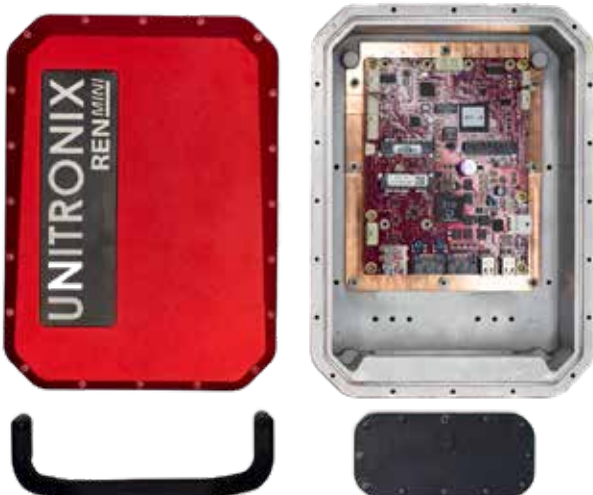
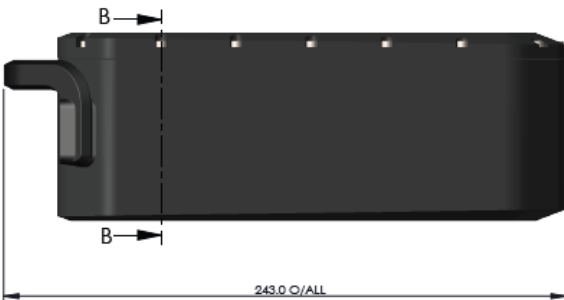
Typical development kit



Vicor power bricks



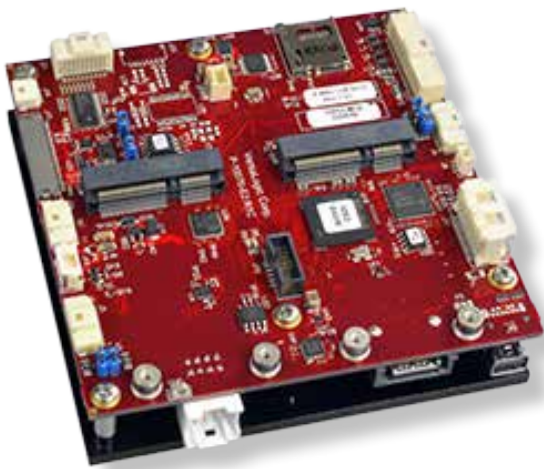
Power isolation covers



Example IO Plate with Mini Max connectors

**NB:** Some VersaLogic cards are fitted with a wide range of power supplies and do not require additional DC/DC. Where required though Unitronix can fit VICOR DC/DC supplies and filters.

**Note:** Original testing with three 38999s fitted to the IO plate with caps on.



## EMBEDDED PROCESSING UNITS (EPU)

VersaLogic's EPUs are fully assembled and tested embedded computers. Each product is a two-board set with a CPU, I/O board, and integrated heat plate. The resulting product has a footprint that is about 1/2 the size of equivalent single board designs, and is very mechanically rugged. VersaLogic's EPU products are based on industry standard form factors with regard to size and mounting-hole locations.

EPU products are designed from the outset to be rugged, reliable, compact, and flexible. They are deployed in defence, aerospace, medical and other markets.

### Advantages of EPUs

EPUs are drop-in embedded computers that are a fully assembled and tested, including CPU, I/O, BIOS and thermal solution. As off-the-shelf products, they provide a huge head start for system designers. Being based on industry standard sizes and mounting-hole locations makes them even easier to use when upgrading existing designs.

Where there's a need for rugged high performance embedded computers, VersaLogic delivers.

### Why does REN™ Mini not have fins to help cooling?

The design for REN™ series boxes is based on the assumption of no secondary cooling. The case uses thermal mass to absorb and regulate the CPU temperature for applications that would be following a pulsed processing profile. ie one where the CPU would be heavily used but not continuously.

For customers where weight is an issue or they have other requirements we can fin and pocket the case side wall.

### Cables

Unitronix can supply a set of test cables to go with REN Mini in the VersaLogic configurations. These items will be ordered separately, as some customers may only want one or two sets before building their own cable harness. As each customer will be using REN Mini for their own specific application, it is down to the customer to define their own external cable harness.

### Security

The processing board has trusted platform module (TPM 2.0) installed, Secure Key, Execute Disable Bit, Secure Boot. REN Mini can also be supplied with tamper proof screws and even screws where there is a customer unique pattern/tool for removal. In addition the use of non standard PC connectors (customer's choice) means that there is a high degree of physical security added to the system.

### ADDITIONAL INFORMATION:

Specifications are subject to change without notification. Intel is a trademark of Intel Corp. PCI Express is a registered trademark of PCI-SIG. SATA and mSATA are trademarks of the Serial ATA International Organisation. All other trademarks are the property of their respective owners.

REN™ products are designed in Australia by Unitronix. REN™ boxes are made in Australia by Unitronix. REN™ Systems are built and tested in Australia by Unitronix. For UK customers in the future we will look at designing and manufacturing new designs in UK

### Product Statement:

UNITRONIX provides an item of engineering utility of a generalised nature, COTs (commercial off-the-shelf). It is the customers responsibility to decide if this product is suitable and safe to use in the application they will be using the equipment. Customers are entirely responsible for the testing and subsequent performance of this equipment in their application. All sales are subject to Unitronix's general terms and conditions found on our about page: <https://unitronix.com.au/about/>

**Unitronix Systems  
Head Office**  
Unit 9, 37 Currans Road,  
Cooranbong,  
NSW 2265,  
Australia.

1300 245 771

**Unitronix Systems  
Brisbane Office**  
46 Carbeen Street,  
Bulimba,  
QLD 4171,  
Australia.

1300 245 771

**Unitronix Systems - UK**  
Rombourne Business Centre  
130 Aztec West,  
Bristol  
BS32 4UB  
United Kingdom

+44 1454 629679

**1300 245 771**  
unisales@unitronix.com.au  
www.unitronix.com.au

