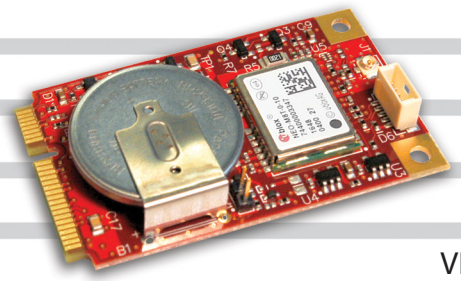
Advanced GPS Receiver

Mini PCIe Module



VL-MPEu-G3

Actual Size!

Overview

The VL-MPEu-G3 is an extremely small and rugged GPS module based on the industry-standard Mini PCIe module format. Unlike typical I/O expansion boards, Mini PCIe allows additional I/O functions to be added to a system with almost no increase in overall system / package size. Mini PCIe modules provide a simple, economical, and standardized way to add I/O functions to embedded computer products.

The "G3" GPS receiver board provides highly accurate global positioning and time-stamp information for embedded systems.

This GPS receiver delivers complete position, velocity, and time (PVT) data for use in host applications. It supports simultaneous 72-channel operation for stable satellite tracking, along with aided GPS startup for fast initial signal acquisition. Support for GPS (United States), GLONASS (Russian), Galileo (European Union), and BeiDou (China), systems provide complementary coverage to enable reliable tracking in difficult environments such as cityscapes and building canyons. Additional internal augmentation systems include Satellite-Based Augmentation System (SBAS), QZSS, IMES, and Differential GPS (D-GPS). GPS data is available in NMEA, UBX, and RTCM protocols. The GPS data is accessed via USB interface.

In addition to positioning and navigation applications, GPS/GNSS signals are widely used as high accuracy time or frequency references. They are used to synchronize remote or distributed wireless communication, as well as industrial, financial, and power-distribution equipment. The TIMEPULSE output generates a precision time reference via a pulse train synchronized with the GPS or UTC time grid. Linked to the satellites' atomic clocks, this output produces intervals configurable from 0.25 Hz to 10 MHz.

continued ▶

Highlights

- **Mini PCIe Module Format**
  Small and flexible.
- **GPS Receiver**
  Supports GPS, SBAS, QZSS, GLONASS, BeiDou, Galileo protocols. Simultaneous 72-channel operation.
- **Precision Time Reference**
  GPS / atomic clock precision pulse output.
- **Industrial Temperature**
  -40° to +85°C operation for harsh environments.
- **USB Signaling**
  Compatible with Mini PCIe cards with USB signals.
- **MIL-STD-202G**
  Qualified for high shock and vibration environments.
- **Latching Connector**
  Prevents detachment failures.
- **Class 3 Manufacturing**
  (optional)
  IPC-A-610 Class 3 for applications requiring extreme reliability.
- **5+ Year production life guarantee**

VERSALOGIC CORPORATION

Advanced GPS Receiver

Product Data Sheet | Mini PCIe Module

Overview *...continued*

The high precision time reference may be used as a low frequency time synchronization pulse or as a high frequency reference signal. By default, the time pulse signal is configured to 1 pulse per second.

The standard G3 model includes an on-board battery to retain satellite position data and support fast restart of the GPS chip. A batteryless version is also available. Connection to an external 3.0V battery is also supported.

This rugged product is designed and tested for full industrial temperature operation (-40° to +85°C). It also meets MIL-STD-202G specifications for shock and vibration. It is manufactured to IPC-A-610 Class 2 standards. Class 3 versions are available for extremely-high-reliability applications.

Product customization is available, even in low quantities. Options include conformal coating, application-specific testing, BOM revision locks, special labeling, etc.

This I/O board is compatible with a variety of popular x86 operating systems including Windows, Windows Embedded, and Linux.

As with all VersaLogic products, the G3 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 G3 provides high accuracy GPS expansion with an excellent cost of ownership. ■

Ordering Information

Model	Function	Operating Temp.
VL-MPEu-G3E	GPS receiver with backup battery.	-40° to +85°C
VL-MPEu-G3E-Z	GPS receiver, no battery.	-40° to +85°C

Accessories: Cables and Hardware

Part Number	Description
VL-CBR-0202	12" U.FL to RP-SMA female bulkhead – antenna cable.
VL-CBR-0502	12" 5-wire timing and battery cable.
VL-CBR-ANT02	GPS antenna with SMA connector – supports GPS signals.
VL-CBR-ANT03	Active antenna with SMA connector – supports GPS and GLONASS signals.
VL-HDW-108	Mini PCIe module hold-down screws (10) for use with 2.5 mm standoffs.
VL-HDW-110	Mini PCIe module hold-down screws (10) for use with 2.0 mm standoffs.

Other VersaLogic Mini PCIe Modules

Model	Function	Signaling
VL-MPEe-A1E	Analog input (12-bit resolution).	PCIe
VL-MPEe-A2E	Analog input (16-bit resolution).	PCIe
VL-MPEe-E3E	Gigabit Ethernet adapter.	PCIe
VL-MPEe-E4E	Gigabit Ethernet Over Fiber adapter.	PCIe
VL-MPEe-FW1	1394 Firewire Module, industrial temperature.	PCIe
VL-MPEe-U2E	Four Serial ports. Twelve GPIO lines.	PCIe
VL-MPEs-F1E	mSATA drive (4/16/32 GB).	SATA
VL-MPEs-S3E	SATA adapter.	SATA

Specifications

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

General		
Board Size	Mini PCIe module (full size): 30 mm x 50.95 mm x 6.32 mm (1.18 x 2 x 0.25").	
Power Requirements	3.3V @ 0.22W (supplied by the Mini PCIe socket).	
Manufacturing Standards	Standard	IPC-A-610 Class 2 modified
	Optional	IPC-A-610 Class 3 modified
Regulatory Compliance	RoHS	
Mini PCIe Signal Type	USB 2.0	

Environmental		
Operating Temperature	-40° to +85°C	
Storage Temperature	-40° to +85°C	
Altitude	Operating *	To 4,570m (15,000 ft.)
	Storage	To 12,000m (40,000 ft.)
Cooling	None (fanless)	
Airflow Requirements	None (free air)	
Thermal Shock	5°C/min. over operating temperature.	
Humidity	Less than 85%, 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 msec. duration per axis.	

Device I/O		
GPS/GLONASS	On-board GPS module.	
Receiver	Receiver Type	72-channel M8
	Protocols	GPS L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, BeiDou B1, Galileo E1B/C
	Path	2 Simultaneous RF paths
GPS Accuracy	Autonomous Position	2.5m
	Velocity	0.05 meters/second
	Heading	0.3 degrees

Device I/O (cont.)		
GLONASS Accuracy	Autonomous Position	2.0m
	Velocity	0.05 meters/second
	Heading	0.3 degrees
Maximum Navigation Update Rate	4 Hz to 10 HZ ¥	
Startup Time	Aided Start	5 second
	Hot Start	1 second
	Cold Start	29 second
Time Pulse Accuracy	Clear Sky	<= 20ns
	Indoor	<= 500ns
Timing Output	Provides a high precision output pulse train synchronized with the GPS time grid. The default time pulse signal is 1 pulse per second. Latching connector.	
	Frequency Range	0.25 Hz to 10 MHz (configurable)
	Interface	3.3V TTL
Sensitivity	Tracking	-167 dBm
	Reacquisition	-153 to -160 dBm¥
Antenna ‡	External. Compatible with active antennas only. Standard U.FL connector.	
Host Communication	Interface	Mini PCIe – USB signaling
	Protocol	NMEA, UBX, RTCM
Battery – On-board	On-board battery facilitates faster restart time	
Battery – External	Supports external 3.0V battery to facilitate faster restart time.	

Software	
Operating Systems	Compatible with most x86 operating systems including Windows, Windows Embedded, and Linux.

¥ Timing depends on protocol

* For extended altitude information contact VersaLogic Sales.

† MIL-STD-202G shock and vibe levels are used to illustrate the ruggedness of this product in general. Testing to 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.

‡ Short circuit protection

Specifications are subject to change without notification.

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