**[Adafruit Ultimate GPS Breakout Board V3](https://www.adafruit.com/product/746)**

Useful Specs

* 25.5mmx35mmx6.5mm
* 10 Hz Updates
* 3.3-5V DC
* 20mA navigation - MTK3339
* 25mA tracking - MTK3339
* Positional Accuracy: 1.8 m // 3 m // 5-10 m
* Velocity Accuracy: 0.1m/s
* Warm/Cold Start: 34s
* Output: 9600 baud default

Machine generated alternative text: . DGPS/WAAS/EGNOS supported
. FCC E911 compliance and AGPS support (Offline mode:
EPO valid up to 14 days)

Antenna

Built in Ceramic Patch Antenna

Supports external antenna

CR1220 Coin Battery Slot (Optional)

Keeps the RTC running

Allows warm starts

Powers red LED

Onboard LED

* FIX status indicator
* 1 blink/s while searching
* 1 blink/15s while fixed

Built in data logging (LOCUS)

Logs one update every 15s, up to 16 hours

Update contains time, date, long, lat, and altitude

This cannot be modified.

*So we need to use an external SD Module/Datalogger*

**Note:**

* Water/Moisture/Condensation
  + Casing
  + Silica Gel
* Temperature:
  + MTK339 Chip: -40 -> +85 C
  + ATmega 329p -45 -> +85 C
  + Arduino may have serial issues at extreme temperatures because of crystal
  + MicroSD Module/SD: ???
  + Energizer CR1220: -30 ->70C
  + Maxell: -20 -> 70C
  + Panasonic -30 -> 60C

**Pins**

P = Power

D = Serial Data

E = Extra Stuff

**Bold = Required**

|  |  |  |  |
| --- | --- | --- | --- |
| 3.3V | P | Power  Output | Clean 3.3V, 100mA max output |
| EN | P | Enable | External microcontroller or switch  Pulled HIGH w. 10K Resistor = GPS ON  Pulled GND = OFF  Good for low power projects where you want to turn the module off for long periods of time. You'll lose the fix which will take a long time to get back if you don't have the cell battery. |
| VBAT | P | Cell Battery Alternative | If you don't want to use the built in coin cell holder |
| FIX | E | Output | Also drives the built in LED   * 1 blink/s while searching * 1 blink/15s while fixed for 200ms   If you want an external LED |
| **TX** | D | Transmit | GPS -> Data out  3.3 V logic level |
| **RX** | D | Receive | Data to -> GPS  3.3/5 V logic level  Default 9600 Baud  Must be Checksummed NMEA sentences |
| **GND** | P |  |  |
| **VIN** | P | Power Input | 3-5V DC  Clean and Quiet Supply  Avoid switching supplies, go for a low dropout regulator instead |
| PPS | E | Pulse per Second Output | Pulses high, 3.3v once a second for 50-100ms  To sync up microcontrollers? |

Backup battery allows the GPS to not lose configurations, otherwise the board will go back to factory defaults.

Machine generated alternative text: The backup real-time-clock circuitry draws 7 uA (0.007 mA) so
a CR1220 will last 4OmAh / 0.007mA = 5,714 hours = 240 days
continuously. The backup battery is only used when there’s no
main 3V power to the GPS, so as long as it’s only used as
backup once in a while, it will last years

**Implementation Resources**

See guide from arduino wiring onwards

[Arduino Guide](https://learn.adafruit.com/adafruit-ultimate-gps/overview)

[Raspberry Pi Guide](https://learn.adafruit.com/adafruit-ultimate-gps-on-the-raspberry-pi/setting-everything-up)

[Insert Diagrams/CAD/Breadboard/PCB Layout]

**Datasheets**

[Ultimate GPS V3 Chip](https://cdn-shop.adafruit.com/datasheets/GlobalTop-FGPMMOPA6H-Datasheet-V0A.pdf)

**Programming References/Libraries**

|  |  |
| --- | --- |
| [Adafruit GPS Library](https://github.com/adafruit/Adafruit_GPS) on Github |  |
| [NMEA Sentences](http://aprs.gids.nl/nmea/) |  |
| [PTMK Complete Commands](https://cdn-shop.adafruit.com/datasheets/PMTK+command+packet-Complete-C39-A01.pdf) |  |
| [LOCUS Manual](https://cdn-shop.adafruit.com/datasheets/GTop+LOCUS+Library+User+Manual-v13.pdf) |  |

**Non Bookmarked Sites**

* [GPS Channels](http://www.gpsreview.net/gps-chipset-channels/)
* [Sparkfun Tracking Comparison](https://www.sparkfun.com/tutorials/169)
* [Proper Mounting and Accuracy | Race Cloud](http://www.racecloud.net/blog/gps-based-data-logging/)

* [Locus Logging Sample](http://arduino-tinker.blogspot.ca/2015/05/built-in-logging-one-of-nice-things.html)

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Other Stuff:

PC Tools - See Adafruit Guide Res Pg

Machine generated alternative text: . MT3339 GPS PC Tool (windows only) and the PC Tool manual
. Mini GPS tool (windows only)

[LOCUS Parser](https://learn.adafruit.com/custom/ultimate-gps-parser)