**u-blox ZED-F9P-04B-01 GNSS Module Documentation**

**Overview**

The **u-blox ZED-F9P-04B-01** is a high-precision, dual-band GNSS module designed for professional-grade positioning applications. It supports real-time kinematic (RTK) positioning and delivers centimeter-level accuracy using multi-constellation and multi-frequency tracking.

**Key Features**

* **Centimeter-Level Accuracy** using RTK and GNSS corrections
* **Multi-Constellation Support**: GPS, GLONASS, Galileo, BeiDou
* **Dual-Band Frequency Support**: L1/L2
* **RTK Moving Base Capability**: Supports both base and rover mobility
* **Concurrent Interface Availability**:
  + UART (2x)
  + USB
  + SPI
  + I2C
* **Update Rate**:
  + RTK Position: up to 18 Hz
  + Raw Data: up to 25 Hz
* **Power Supply**: 2.7V to 3.6V
* **Power Consumption**: ~75–130 mA
* **Form Factor**: 17 x 22 x 2.4 mm LGA module
* **Operating Temperature**: -40°C to +85°C

**Technical Specifications**

| **Parameter** | **Value** |
| --- | --- |
| Convergence Time (RTK) | < 10 seconds |
| Horizontal Accuracy | 0.01 m + 1 ppm |
| Vertical Accuracy | 0.01 m + 1 ppm |
| Heading Accuracy | ~0.3 – 0.4° |
| Sensitivity | -167 dBm (tracking) |
| Max Altitude | 80 km |
| Max Velocity | 500 m/s |
| Max Acceleration | 4 g |
| Timepulse Accuracy | 30 ns RMS |

**Interface Pinout Summary**

| **Interface** | **Purpose** |
| --- | --- |
| UART1 | Main communication |
| UART2 | RTCM corrections input |
| USB | Host interface |
| SPI | Alternate interface |
| I2C | Low-speed config |

**Software & Firmware**

* **u-blox u-center**: Windows software for configuration, firmware update, and monitoring
* **Firmware**: Updatable via USB or UART using u-center
* **Protocols**: Supports NMEA, UBX, RTCM3, SPARTN

**Integration Guidelines**

* Use active dual-band GNSS antennas for optimal performance
* Place module away from noise sources (e.g., switching regulators)
* Provide backup power (V\_BCKP) to maintain RTC and satellite data

**Applications**

* Surveying and Mapping
* Drones and Robotics
* Precision Agriculture
* Autonomous Navigation
* Attitude Sensing

**Resources**

* [ZED-F9P-04B Datasheet (UBX-21044850)](https://content.u-blox.com/sites/default/files/ZED-F9P-04B_DataSheet_UBX-21044850.pdf)
* [Integration Manual (UBX-18010802)](https://content.u-blox.com/sites/default/files/ZED-F9P_IntegrationManual_UBX-18010802.pdf)
* [u-center Software](https://www.u-blox.com/en/product/u-center-windows)
* [Product Page](https://www.u-blox.com/en/product/zed-f9p-module)

**Contact**

For more details, visit the official [u-blox Support Portal](https://www.u-blox.com/en/support-tools/support-resources).