ZED-F9P module

u-blox F9 high precision GNSS module

Multi-band receiver delivers centimeter-level accuracy in seconds
- Concurrent reception of GPS, GLONASS, Galileo and BeiDou
- Multi-band RTK with fast convergence times and reliable performance
- Centimeter-level accuracy in a small and energy-efficient module
- Easy integration of RTK for fast time-to-market
- Open SSR formats including SPARTN and Compact SSR for efficient delivery

Product description

The ZED-F9P positioning module integrates multi-band GNSS and real time kinematics (RTK) technology in a compact form factor, to deliver centimeter-level accuracies in seconds for the industrial navigation and robotics markets.

ZED-F9P concurrently uses GNSS signals from all four GNSS constellations (GPS, GLONASS, Galileo, and BeiDou). GNSS signals from multiple frequency bands (L1/L2/L5) combined with RTK technology enables fast convergence times and reliable performance for scalable applications, including robotic lawnmowers, unmanned autonomous vehicles (UAV), and semi-automated or fully automated machinery.

With its high update rate and low power consumption levels, the ZED-F9P module is ideal for highly dynamic applications such as UAVs. ZED-F9P ensures the security of positioning and navigation information by using secure interfaces and advanced jamming and spoofing detection technologies. The receiver enables easy integration and helps product developers quickly bring their ideas to the market.

ZED-F9P offers support for a range of correction services allowing each application to optimize performance according to the application’s unique set of needs. ZED-F9P comes with built-in support for standard RTCM corrections, supporting centimeter-level navigation from local base stations or from virtual reference stations (VRS) in a Network RTK setup. The module supports SPARTN format SSR-type correction services suitable for mass market applications.

u-blox modules are manufactured in ISO/TS 16949 certified sites and are fully tested on a system level. Qualification tests are performed as stipulated in the ISO16750 standard: “Road vehicles – Environmental conditions and testing for electrical and electronic equipment”.

<table>
<thead>
<tr>
<th>Grade</th>
<th>ZED-F9P</th>
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<tbody>
<tr>
<td>Automotive</td>
<td></td>
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<tr>
<td>Professional</td>
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<tr>
<td>Standard</td>
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<table>
<thead>
<tr>
<th>GNSS</th>
<th>ZED-F9P</th>
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<tbody>
<tr>
<td>GPS + QZSS / SBAS</td>
<td>•</td>
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<tr>
<td>GLONASS</td>
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<td>Galileo</td>
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<td>BeiDou</td>
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<tr>
<td>Number of concurrent GNSS</td>
<td>4</td>
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<tr>
<td>Multi-band</td>
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<table>
<thead>
<tr>
<th>Interfaces</th>
<th>ZED-F9P</th>
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<tbody>
<tr>
<td>UART</td>
<td>2</td>
</tr>
<tr>
<td>USB</td>
<td>1</td>
</tr>
<tr>
<td>SPI</td>
<td></td>
</tr>
<tr>
<td>DDC (I2C compliant)</td>
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<table>
<thead>
<tr>
<th>Features</th>
<th>ZED-F9P</th>
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<tbody>
<tr>
<td>Programmable (flash)</td>
<td>•</td>
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<tr>
<td>Data logging</td>
<td></td>
</tr>
<tr>
<td>Carrier phase output</td>
<td></td>
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<tr>
<td>Additional SAW</td>
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<tr>
<td>RTC crystal</td>
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<tr>
<td>Oscillator</td>
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<tr>
<td>RTK rover</td>
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<tr>
<td>RTK base station</td>
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<tr>
<td>Moving base</td>
<td></td>
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<tr>
<td>Survey-in and fixed mode</td>
<td>•</td>
</tr>
<tr>
<td>Timepulse</td>
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<thead>
<tr>
<th>Power supply</th>
<th>ZED-F9P</th>
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<tbody>
<tr>
<td>2.7 V – 3.6 V</td>
<td>•</td>
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UBX-17005151 - R12
ZED-F9P module

Features

- **Receiver type**: 184-channel u-blox F9 engine
- **Nav. update rate**: RTK up to 20 Hz
- **Position accuracy**: RTK 0.01 m + 1 ppm CEP
- **Convergence time**: RTK < 10 sec
- **Acquisition**
  - Cold starts: 24 s
  - Aided starts: 2 s
  - Reacquisition: 2 s
- **Sensitivity**
  - Tracking & Navigation: -167 dBm
  - Cold starts: -148 dBm
  - Hot starts: -167 dBm
  - Reacquisition: -160 dBm
- **Assistance**
  - AssistNow Online
  - OMA SUPL & 3GPP compliant
- **Oscillator**: TCXO
- **RTC crystal**: Built-in
- **Anti-jamming**: Active CW detection and removal
- **Anti-spoofing**: Advanced anti-spoofing algorithms
- **Memory**: Flash
- **Moving base**: For attitude sensing and heading applications
- **Supported antennas**: Active

1. The highest navigation rate can limit the number of supported constellations.
2. Depends on atmospheric conditions, baseline length, GNSS antenna, multipath conditions, satellite visibility, and geometry

Interfaces

- **Serial interfaces**: 2 UART, 1 SPI, 1 USB, 1 DDC (I2C compliant)
- **Digital I/O**: Configurable timepulse
- **EXTINT input for wakeup**: RTK fix status
- **GEOFENCE status**: Configurable: 0.25 Hz to 10 MHz
- **Protocols**: NMEA, UBX binary, RTCM v. 3.3, SPARTN v. 2.0

Package

- **54-pin LGA (land grid array)**
- **Dimensions**: 17 x 22 x 2.4 mm

Environmental data, quality & reliability

- **Operating temp.**: -40 °C to +85 °C
- **Storage temp.**: -40 °C to +85 °C
- **Vibration**: MIL-STD-810G (Category 24, 7.7g RMS)
- **RoHS compliant**: (2015/863/EU)
- **EU Radio Equipment Directive compliant**: 2014/53/EU
- **Quality according to ISO 16750**
- **Manufactured and fully tested in ISO/TS 16949 certified production sites**

Electrical data

- **Supply voltage**: 2.7 V to 3.6 V
- **Power consumption**: 68 mA at 3.0 V (continuous)
- **Backup supply**: 1.65 V to 3.6 V

Related u-blox products and services

- **Products**: NEO-D9S correction receiver
- **Location services**: AssistNow A-GNSS service
  - PointPerfect GNSS augmentation service

Support products

- **u-blox support products provide reference design, and allow efficient integration and evaluation of u-blox positioning technology**
- **C099-F9P**: u-blox ZED-F9P application board, with ODIN-W2 for connectivity. Includes multi-band antenna (ANN-MB). One board per package.

Product variants

- **ZED-F9P-02B**: u-blox high precision GNSS module with SBAS support
- **ZED-F9P-04B**: u-blox high precision GNSS module with SPARTN and CLAS support

Further information

For contact information, see www.u-blox.com/contact-us.
For more product details and ordering information, see the product data sheet.

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