# Product summary
# ZED-F9P module

## u-blox F9 high precision GNSS module

**P**

**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
- High update rate for highly dynamic applications
- Centimeter accuracy in a small and energy-efficient module
- Easy integration of RTK for fast time-to-market

17.0 × 22.0 × 2.4 mm
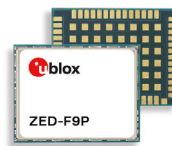
## Product description

The ZED-F9P positioning module features the u-blox F9 receiver platform, which provides multi-band GNSS to high-volume industrial applications in a compact form factor.

ZED-F9P is a multi-band GNSS module with integrated u-blox multi-band RTK technology for centimeter-level accuracy. The module enables precise navigation and automation of moving industrial machinery by means of a small, surface-mounted module.

The ZED-F9P module is designed for easy integration and low design-in costs with minimal e-BOM. Thanks to its small package size, light weight, and small power consumption it is well-suited for mass market adoption.

ZED-F9P ensures the security of positioning and navigation information by using secure interfaces and advanced jamming and spoofing detection technologies.

ZED-F9P offers support for a range of correction services allowing each application to optimize performance according to the application's individual need. 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".

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

T = TCXO

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**P**

## Features

| | | |
|---|---|---|
| Receiver type | 184-channel u-blox F9 engine GPS L1C/A L2C, GLO L1OF L2OF, GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/A L1S L2C, SBAS L1C/A | |
| Nav. update rate | RTK | up to 20 Hz[1] |
| Position accuracy[2] | RTK | 0.01 m + 1 ppm CEP |
| Convergence time[2] | RTK | < 10 sec |
| Acquisition | Cold starts | 24 s |
| | Aided starts | 2 s |
| | Reacquisition | 2 s |
| Sensitivity | Tracking & Nav. | -167 dBm |
| | Cold starts | -148 dBm |
| | Hot starts | -157 dBm |
| | Reacquisition | -160 dBm |
| Assistance | AssistNow Online OMA SUPL & 3GPP compliant | |
| Oscillator | TCXO | |
| RTC crystal | Built-in | |
| Anti-jamming | Active CW detection and removal Onboard band pass filter | |
| 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 |
| Timepulse | Configurable: 0.25 Hz to 10 MHz |
| Protocols | NMEA, UBX binary, RTCM v. 3.3, SPARTN v. 1.8 |

## Package

54-pin LGA (land grid array)
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 |
| RoHS compliant (2015/863/EU) | |
| Green (halogen-free) | |
| EU Radio Equipment Directive compliant 2014/53/EU | |
| Qualification according to ISO 16750 | |
| Manufactured and fully tested in ISO/TS 16949 certified production sites | |
| High vibration and shock resistance | |

## Electrical data

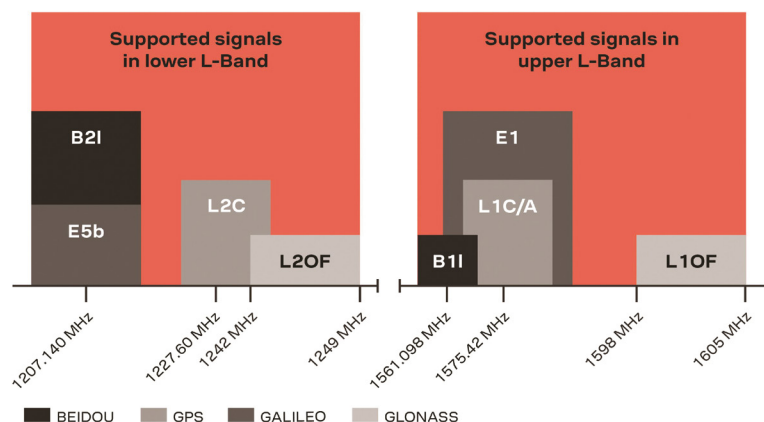| | |
|---|---|
| Supply voltage | 2.7 V to 3.6 V |
| Power consumption | 68 mA at 3.0 V (continuous) |
| Backup supply | 1.65 V to 3.6 V |

## 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-01B | u-blox high precision GNSS module with rover and base functionality |
| ZED-F9P-02B | u-blox high precision GNSS module adding SBAS |



**Supported signals in lower L-Band**

B2I, E5b — 1207.140 MHz; L2C — 1227.60 MHz; L2OF — 1242 MHz, 1249 MHz

**Supported signals in upper L-Band**

B1I — 1561.098 MHz; E1, L1C/A — 1575.42 MHz; L1OF — 1598 MHz, 1605 MHz

BEIDOU    GPS    GALILEO    GLONASS

## Further information

For contact information, see www.u-blox.com/contact-us.

For more product details and ordering information, see the product data sheet.