Product Summary

ZED-F9P

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
- 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

Product description
The ZED-F9P positioning module features the new 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. It is well-suited for mass market adoption, thanks to its small package size, light weight, and small power consumption.

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 can be upgraded to support future SSR-type correction services suitable for mass market penetration.

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”.

Product selector

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<td>Standard Precision GNSS</td>
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<td>Timing</td>
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<td>GPS/QZSS</td>
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<td>GLONASS</td>
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<td>Galileo</td>
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<td>BeiDou</td>
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<td>Number of concurrent GNSS</td>
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<td>2.7 V – 3.6 V</td>
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<td>UART</td>
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<td>USB</td>
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<td>Programmable (Flash)</td>
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<td>DDC (I2C-compliant)</td>
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<td>RTK base station</td>
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<td>Carrier phase output</td>
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<td>Additional SAW</td>
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<td></td>
<td>Timepulse</td>
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<tr>
<td>ZED-F9P</td>
<td>✔</td>
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</tbody>
</table>
## Features

<table>
<thead>
<tr>
<th>Receiver type</th>
<th>184-channel u-blox F9 engine GPS L1C/L2C, GLO L1OF L2OF, GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/L2C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nav. update rate</td>
<td>RTK up to 20 Hz¹</td>
</tr>
<tr>
<td>Position accuracy²</td>
<td>RTK 0.01 m + 1 ppm CEP</td>
</tr>
<tr>
<td>Convergence time²</td>
<td>RTK &lt; 10 sec</td>
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<tr>
<td>Acquisition</td>
<td>Cold starts 24 s</td>
</tr>
<tr>
<td></td>
<td>Aided starts 2 s</td>
</tr>
<tr>
<td></td>
<td>Reacquisition 2 s</td>
</tr>
<tr>
<td>Tracking &amp; Nav.</td>
<td>-167 dBm</td>
</tr>
<tr>
<td>Cold starts</td>
<td>-148 dBm</td>
</tr>
<tr>
<td>Hot starts</td>
<td>-157 dBm</td>
</tr>
<tr>
<td>Reacquisition</td>
<td>-160 dBm</td>
</tr>
<tr>
<td>Assistance</td>
<td>AssistNow Online OMA SUPL &amp; 3GPP compliant</td>
</tr>
<tr>
<td>Oscillator</td>
<td>TCXO</td>
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<tr>
<td>RTC crystal</td>
<td>Built-In</td>
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<tr>
<td>Anti-jamming</td>
<td>Active CW detection and removal</td>
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<td></td>
<td>Onboard band pass filter</td>
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<tr>
<td>Anti-spoofing</td>
<td>Advanced anti-spoofing algorithms</td>
</tr>
<tr>
<td>Memory</td>
<td>Flash</td>
</tr>
<tr>
<td>Supported antennas</td>
<td>Active</td>
</tr>
</tbody>
</table>

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                                                                               |
| Timepulse              | Configurable: 0.25 Hz to 10 MHz                                                                      |
| Protocols              | NMEA, UBX binary, RTCM version 3.3                                                                   |

## Electrical data

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

## Package

<table>
<thead>
<tr>
<th>54-pin LGA (Land Grid Array)</th>
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<tbody>
<tr>
<td>17 x 22 x 2.4 mm</td>
</tr>
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</table>

## 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)       |                                                                                                    |
| ETSI-RED compliant         |                                                                                                    |
| Qualified according to ISO 16750 |                                                                                           |
| Manufactured and fully tested in ISO/TS 16949 certified production sites |                                                                                           |
| High vibration and shock resistance |                                                                                           |

## 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 | u-blox F9 high precision GNSS module with rover and base functionality |

## 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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