

NEO-F9P module

u-blox F9 high precision GNSS module



Standard



Professional



Automotive

Multi-band receiver delivers centimeter-level accuracy in seconds

- Concurrent reception of GPS, GLONASS, Galileo, and BeiDou
- Multi-band L1/L5 RTK with fast convergence times and reliable performance
- Centimeter accuracy in a compact and energy-efficient module
- Easy integration of RTK for fast time-to-market
- Native support for PointPerfect simplifies integration
- Small form factor

12.0 × 16.0 × 3.6 mm



Product description

The NEO-F9P positioning module features the u-blox F9 receiver platform, which provides multi-band GNSS positioning to high-volume industrial applications in a small form factor. NEO-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 NEO-F9P module is designed for easy integration and low design-in costs with minimal eBOM. Thanks to its small package size, light weight, and small power consumption it is well-suited for mass market adoption.

NEO-F9P ensures the security of positioning and navigation information by using secured interfaces and advanced jamming and spoofing and mitigation detection technologies. NEO-F9P offers support for a range of open correction services allowing each application to optimize performance according to the application's individual needs. NEO-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 also uses PPP-RTK services suitable for mass-market applications formatted as SPARTN.

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".

NEO-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 and LNA | • |
| 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

NEO-F9P module



Features

| | | |
|--------------------------------|---|--------------------------|
| Receiver type | 184-channel u-blox F9 engine GPS L1C/A L5, GLO L1OF, GAL E1B/C E5a, BDS B1I B2a, QZSS L1C/A L1S L5, SBAS L1C/A NavIC L5 | |
| 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 | 27 s |
| | Aided starts | 3 s |
| | Reacquisition | 4 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 | |
| Supported antennas | Active and passive | |

- 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 |
| Timepulse | Configurable: 0.25 Hz to 10 MHz |
| Protocols | NMEA, UBX binary, RTCM v. 3.3, SPARTN v. 2.0, CLAS as UBX-RXM-PMP |

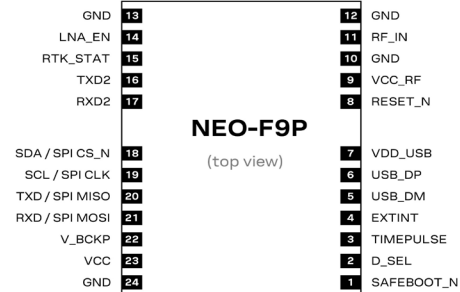
Further information

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

Package

24-pin LCC (leadless chip carrier)
12 x 16 x 3.6 mm

Pinout



Environmental data, quality, and 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 | 72 mA at 3.0 V (continuous) |
| Backup supply | 1.65 V to 3.6 V |

Compatible u-blox products and services

| | |
|-------------------|--|
| Products | NEO-D9S correction receiver NEO-D9C correction receiver |
| Location services | AssistNow A-GNSS service PointPerfect GNSS augmentation service |

Support products

Easy-to-use kits to get familiar with u-blox F9 positioning technology, evaluate functionality, and visualize GNSS performance.

| | |
|------------|---|
| EVK-F9P-16 | u-blox NEO-F9P GNSS Evaluation Kit, with active multi-band antenna (ANN-MB1). Supports NEO-F9P. |
|------------|---|

Product variants

| | |
|-------------|---|
| NEO-F9P-15B | u-blox high precision GNSS module with rover and base functionality |
|-------------|---|

Legal Notice:

u-blox or third parties may hold intellectual property rights in the products, names, logos and designs included in this document. Copying, reproduction, or modification of this document or any part thereof is only permitted with the express written permission of u-blox. Disclosure to third parties is permitted for clearly public documents only.

The information contained herein is provided "as is". No warranty of any kind, either express or implied, is made in relation to the accuracy, reliability, fitness for a particular purpose, or content of this document. This document may be revised by u-blox at any time. For most recent documents, please visit www.u-blox.com.