Product summary

ZED-F9R module

u-blox F9 high precision dead reckoning module

Standard

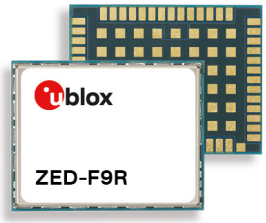
Professional

Automotive

High precision GNSS positioning in challenging environments

- Multi-band GNSS receiver delivers centimeter-level accuracy
- Fully integrated solution for fast time-to-market
- Dynamic models for slow-moving service robots and electric scooters
- Open SSR formats including SPARTN and Compact SSR for efficient delivery

17.0 × 22.0 × 2.4 mm



Product description

The ZED-F9R positioning module features the u-blox F9 receiver platform providing a reliable multi-band GNSS sensor fusion solution for industrial applications in a compact form factor. The wide bandwidth allows reception of many satellites simultaneously, resulting in high availability of RTK solutions and quick convergence time.

This high-performance sensor fusion module has an integrated inertial measurement unit (IMU) for RTK positioning. The sophisticated built-in algorithms fuse the IMU data, GNSS measurements, wheel ticks, correction data, and a vehicle dynamics model to provide optimal positioning accuracy where GNSS alone would fail.

The module operates under open sky, in the wooded countryside, in difficult multipath environments, and even in covered areas. Designed for industrial applications like agricultural machinery or heavy trucks, ZED-F9R is the ultimate solution for a data-driven economy where control and position availability are key to success. Low-speed ground robotics are also supported by allowing low-speed calibration. Specialized dynamic models optimize performance for different classes of wheeled vehicles.

The device is a turnkey self-contained solution. This eliminates the technical risk and effort of selecting and integrating RF components and third-party libraries such as precise positioning engines. ZED-F9R offers support for a range of correction services allowing each application to optimize performance according to the application's unique needs. ZED-F9R comes with built-in support for RTCM or SPARTN-formatted corrections, enabling high precision navigation using internet or satellite data.

The ZED-F9R modules use GNSS chips qualified according to AEC-Q100 and are manufactured in ISO/TS 16949 certified sites. Qualification tests are performed as stipulated in the ISO16750 standard: “Road vehicles – Environmental conditions and testing for electrical and electronic equipment”. The ZED-F9R professional grade module adheres to industrial standard quality specifications and production flow.

	ZED-F9R
Grade	
Automotive	
Professional	•
Standard	
GNSS	
GPS / QZSS	•
GLONASS	•
Galileo	•
BeiDou	•
Number of concurrent GNSS	4
Multi-band	•
Interfaces	
UART	2
USB	1
SPI	1
DDC (I2C compliant)	1
Features	
Programmable (flash)	•
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

ZED-F9R module

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	
Nav. update rate	Up to 30 Hz	
Position accuracy	RTK	< 0.01 m + 1 ppm CEP
ADR position error	< 2% of distance traveled without GNSS	
Convergence time	RTK	<10 s
Acquisition	Cold starts Aided starts Reacquisition	24 s 4 s 2 s
Built-in	TCXO, RTC, flash memory, 3D accelerometer, 3D gyroscope, diplexer, SAW filters	
Sensitivity	Tracking & nav. [1] Cold starts Hot starts	-160 dBm -147 dBm -158 dBm
Supported antennas	Active	

1 Limited by firmware for best DR performance

Software features

Assistance	AssistNow Online OMA SUPL & 3GPP compliant
Anti-jamming	Active CW detection and removal Onboard band pass filter
Anti-spoofing	Advanced anti-spoofing algorithms
Raw data	Carrier phase, Code phase, Pseudoranges, IMU data output
Protocols	NMEA, UBX binary, RTCM v. 3.3, SPARTN 2.0

Interfaces

Serial interfaces	2 UART 1 USB 1 SPI (optional) 1 DDC (I2C compliant)
Digital I/O	Configurable timepulse
Timepulse	Configurable: 0.25 Hz to 10 MHz

Electrical data

Supply voltage	2.7 V to 3.6 V
Power consumption	85 mA at 3.0 V (continuous)
Backup supply	1.65 V to 3.6 V

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 (lead-free, 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

Uses u-blox F9 chips qualified according to AEC-Q100

Related 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

C102-F9R	Easy to use evaluation board with various communication interfaces

Product versions

ZED-F9R-01B	u-blox F9 dual-band GNSS module with high precision sensor fusion, SBAS, and SLAS.
ZED-F9R-02B	u-blox F9 dual-band GNSS module with high precision sensor fusion, SBAS, and SLAS. Supports slow-moving service robotics and e-scooters.
ZED-F9R-03B	u-blox F9 dual-band GNSS module with high precision sensor fusion, SBAS, and SLAS. Supports SPARTN 2.0 and QZSS CLAS.

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.