

# Product Summary

## ZED-F9K



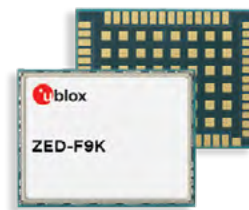
### High precision dead reckoning with integrated IMU sensors

#### Continuous lane accurate positioning under the most challenging conditions

- Decimeter level accuracy for automotive mass markets
- Ideal for ADAS, V2X and head-up displays
- Turnkey multi-band RTK solution with built-in inertial sensors
- Low latency position update rate of up to 30 Hz



17.0 × 22.0 × 2.4 mm



#### Product description

The ZED-F9K module with the u-blox F9 multi-band GNSS receiver features rapid convergence time within seconds. This mass-market component provides decimeter-level positioning with high availability, while making use of all four GNSS constellations simultaneously.

It is the first dead reckoning module with an integrated Inertial Measurement Unit (IMU) capable of high precision positioning. The sophisticated built-in algorithms fuse the IMU data, GNSS measurements, wheel ticks, and vehicle dynamics model to provide lane accurate positioning where GNSS alone would fail. The module operates under open-sky motorways, in the wooded countryside, in difficult urban environments, and even in tunnels and underground parking. In modern automotive applications, such as Advanced Driver Assistance System (ADAS) where availability can improve the safety of our roads, ZED-F9K is the ultimate solution.

The device is a turnkey solution eliminating the technical risk of integrating third party libraries, precise positioning engines, and the multi-faceted hardware engineering aspects of radio frequency design and digital design. The u-blox approach provides a transparent evaluation of the positioning solution and provides clear lines of responsibility for design support, while reducing supply chain complexity during production.

ZED-F9K is ideal for innovative automotive architecture designs with limited space and power. The module provides accurate location services to the increasing number of intelligent Electronic Control Units (ECU), such as telematics control units, navigation systems, infotainment, and V2x safety systems.

The module reaches a high navigation output rate of up to 30 Hz. The on-board processor augments fused GNSS position with additional IMU-based position estimates. Drivers experience responsive, lag-free user interfaces. ZED-F9K can output raw IMU and raw GNSS data for advanced applications. ZED-F9K 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 ISO 16750 standard: "Road vehicles – Environmental conditions and testing for electrical and electronic equipment".

ZED-F9K

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 (I <sup>2</sup> C 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



## 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 L2C	
Nav. update rate <sup>1</sup>	up to 30 Hz	
Position accuracy <sup>2</sup>	SBAS	1 m CEP
	RTK	0.2 m + 1 ppm CEP
ADR position error	< 2% of distance travelled without GNSS	
Convergence time <sup>2</sup>	RTK	< 10 s
Acquisition	Cold starts	26 s
	Aided starts	2 s
	Reacquisition	2 s
Built-in	TCXO, RTC, flash memory, 3D accelerometer, 3D gyroscope, diplexer, SAW filter	
Supported antennas	Active	

- 1 The highest navigation rate can limit the number of supported constellations.  
 2 Depends on atmospheric conditions, baseline length, multipath conditions, GNSS antenna, satellite visibility, and geometry. SBAS will be supported in ZED-F9K-01B.

## 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	Code phase and IMU data output
Protocols	NMEA, UBX binary, RTCM version 3.3

## Interfaces

Serial interfaces	2 UART 1 USB 1 SPI (optional) 1 DDC (I <sup>2</sup> C 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	85 mA @ 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
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## 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	

## Support products

C100-F9K	Easy to use evaluation board with various communication interfaces for RTCM connectivity
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## Product variants

ZED-F9K-00B	u-blox F9 multi-band high precision dead reckoning, professional grade
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## Further information

For contact information, see [www.u-blox.com/contact-us](http://www.u-blox.com/contact-us).

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

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