Product summary
ZED-F9K module

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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
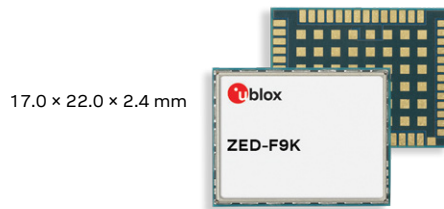
Product description

The ZED-F9K module features the u-blox F9 GNSS receiver to provide continuous decimeter-level positioning accuracy in the most challenging automotive use cases. The wide bandwidth of the multi-band receiver and its ability to simultaneously use all four GNSS constellations enables it to receive many satellite signals even in cities. This brings the highest availability of RTK solutions, everywhere and convergence time within seconds.

It is the first dead reckoning module with an integrated inertial measurement unit (IMU) capable of high precision positioning. The sophisticated built-in algorithms cleverly 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 an advanced driver assistance system (ADAS) to improve road safety, ZED-F9K is the ultimate solution.

The device is a self-contained solution, which provides the best possible system performance to address latency constraints, RF front-end design issues, RTK algorithm integration, etc. This eliminates the technical risk and effort of selecting and integrating RF components and third party libraries like positioning engines. The u-blox approach also dramatically reduces supply chain complexity during production.

ZED-F9K is ideal for innovative automotive designs with space and power limits. The module can be easily integrated into a telematics control unit (TCU), navigation system, ADAS or V2X electronic control unit (ECU). The module reaches a high navigation rate of up to 30 Hz with low latency suitable for real time applications to provide a lag-free user experience.

ZED-F9K modules are manufactured in ISO/TS 16949 certified sites and are fully tested. 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 (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

u-blox

Objective Specification

ZED-F9K 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 L2C	
Nav. update rate	up to 30 Hz	
Position accuracy	RTK	< 0.2 m + 1 ppm CEP
ADR position error	< 2% of distance travelled without GNSS	
Convergence time	RTK	< 10 s
Acquisition	Cold starts	24 s
	Aided starts	4 s
	Reacquisition	2 s
Sensitivity	Tracking & nav.[1]	-160 dBm
	Cold starts	-147 dBm
	Hot starts	-158 dBm
Built-in	TCXO, RTC, flash memory, 3D accelerometer, 3D gyroscope, diplexer, SAW filters	
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	Code and Doppler measurements and IMU data
Protocols	NMEA, UBX binary, RTCM version 3.3

Interfaces

Serial interfaces	2 UART 1 USB 1 SPI (optional) 1 DDC (I^{2}C 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 @ 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 +105 °C
Storage temp.	−40 °C to +105 °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 correction services

Product variants

ZED-F9K	u-blox F9 multi-band high precision dead reckoning, automotive grade

Further information

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

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