



## Product summary

# ZED-F9L module

## Sub-meter dead reckoning GNSS with integrated IMU sensors



Standard



Professional

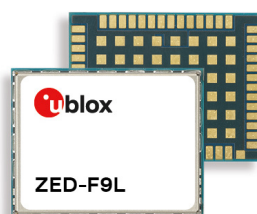


Automotive

### Reliable positioning for telematics and V2X applications for use up to 105 °C

- Fully integrated L1/L5 dead reckoning at up to 50 Hz with very low latency
- Maximum position availability with all constellations tracked simultaneously
- Multiple outputs to serve all possible architectures
- Dependable protection level output
- Advanced security thanks to top-notch spoofing and jamming algorithms
- Automotive and motorcycle dedicated motion models available

17.0 × 22.0 × 2.4 mm



### Product description

The ZED-F9L-10A module features the u-blox F9 platform, which provides continuous sub-meter-level positioning accuracy with SBAS for the most challenging automotive use cases, including motorbike applications. The receiver brings satellite availability in urban areas to a new level by simultaneous tracking of L1/L5-band signals and 6 GNSS constellations, including NavIC.

With its sophisticated built-in algorithms, the module fuses GNSS measurements, IMU data, wheel ticks, and vehicle dynamics, resulting in reliable positioning and attitude even when GNSS services are unavailable. It delivers multiple GNSS and IMU outputs in parallel to support all possible architectures, including a 50 Hz sensor-fused solution with very low latency.

The device is a self-contained solution, which provides the best possible system performance to address issues such as latency constraints, RF front-end design issues, or dead reckoning algorithm integration. This eliminates the technical risk and effort of selecting and integrating RF components and third-party libraries, like positioning engines, which helps customers optimize time to market. The u-blox position engine incorporates a dependable protection level output and advanced security features including sensor-based anti-spoofing and anti-jamming techniques. Operation up to 105 °C makes it possible to integrate the product anywhere in the car without design constraints. The ZED form factor enables an upgrade path to RTK technology with the pin-to-pin compatible ZED-F9K module. The u-blox approach dramatically reduces supply chain complexity during production.

Manufacturing partners use ISO/TS 16949 certified sites and adhere to the latest standards in the automotive industry. Qualification tests are performed as stipulated in the AEC-Q104 standard: "Failure mechanism based stress test qualification for multichip modules (MCM) in automotive applications".

ZED-F9L

	ZED-F9L
<b>Grade</b>	
Automotive	•
Professional	
Standard	
<b>GNSS</b>	
GPS / QZSS	•
GLONASS	•
Galileo	•
BeiDou	•
NavIC	•
Number of concurrent GNSS	6
Multi-band L1/L5	•
<b>Interfaces</b>	
UART	2
USB	1
SPI	1
DDC / I2C	1
<b>Features</b>	
Programmable (flash)	•
Additional SAW	•
RTC crystal	•
Oscillator	T
Timepulse	2
<b>Power supply</b>	
2.7 V – 3.6 V	•

T = TCXO



## Features

Receiver type	184-channel u-blox F9 engine GPS L1/L5, Galileo E1/E5a, GLONASS L1, BeiDou B1/B2a, QZSS L1/L5, SBAS L1	
Nav. update rate <sup>1</sup>	up to 50 Hz	
Position accuracy	< 1 m (68%)	
ADR position error	< 1% of distance travelled without GNSS	
Acquisition	Cold starts	24 s
	Aided starts	4 s
	Reacquisition	2 s
Sensitivity	Tracking & nav. <sup>1</sup>	-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

Anti-jamming	Advanced anti-jamming algorithms	
Anti-spoofing	Advanced anti-spoofing algorithms Sensor based spoofing detection	
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 / I2C	
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	

## Further information

For contact information, see [www.u-blox.com/contact-u-blox](http://www.u-blox.com/contact-u-blox).  
For more product details and ordering information, see the product data sheet.

## 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		
Module qualification according to AEC-Q104		
Manufactured and fully tested in ISO/TS 16949 certified production sites		
Uses u-blox F9 chips qualified according to AEC-Q100		

## Compatible u-blox products and services

Location services AssistNow A-GNSS service

## Support products

EVK-F9DR Easy to use evaluation board with various communication interfaces

## Product variants

ZED-F9L-10A u-blox F9 multi-band GNSS dead reckoning module, L1/L5 bands.  
Automotive grade, up to 105 °C

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