

UBX-M9140-KA-DR

u-blox M9 dead reckoning GNSS chip

Continuous accurate navigation under all signal conditions

- Additional GNSS-only output besides dead reckoning position
- Low latency position output for ultimate control up to 50 Hz
- Fully integrated solution for fast time-to-market
- Resilience to loss of speed data by UDR fallback mode



Standard



Professional



Automotive

5.00 × 5.00 × 0.59 mm



Product description

UBX-M9140-KA-DR is a robust u-blox M9 single-band GNSS chip, which provides exceptional sensitivity and acquisition times for all L1 GNSS systems. The u-blox M9 standard precision GNSS platform, delivering meter-level accuracy, succeeds the well-known u-blox M8 product range.

The sophisticated built-in algorithms fuse IMU data, GNSS measurements, wheel ticks, and vehicle dynamics to provide optimal positioning accuracy where GNSS alone would fail. A GNSS-only second output is also available, along with the dead reckoning solution, to support a variety of third-party applications.

The chip supports concurrent reception of four GNSS constellations, increasing the availability of satellite measurements. The high number of visible satellites enables the receiver to select the best signals. This maximizes the position accuracy, in particular under challenging conditions such as in deep urban canyons.

The chip offers good performance even in difficult multipath environments such as tunnels or underground parking garages. UBX-M9140-KA-DR is the ultimate solution for modern automotive applications where control and position availability are keys to success.

In addition to RF-based jamming and spoofing detection, UBX-M9140-KA-DR implements sensor-based spoofing detection and is designed to inform applications about possible security attacks.

UBX-M9140-KA-DR is qualified according to AEC-Q100 and is manufactured in ISO/TS 16949 certified sites.

UBX-M9140-KA-DR

Grade	
Automotive	•
Professional	
Standard	
GNSS	
GPS / QZSS	•
GLONASS	•
Galileo	•
BeiDou	•
Number of concurrent GNSS	4
Single-band	•
Interfaces	
UART	1
USB	1
SPI	1
I2C compliant	1
Features	
Dual output	•
RTC crystal	•
Oscillator	T
Sensor-based spoofing detection	•
Low-latency sensor data	100 Hz
Position and attitude	50 Hz
Timepulse	1
Power supply	
1.8 V – 3.6 V	•

T = TCXO



Product performance

Receiver type	92-channel u-blox M9 engine GPS L1 C/A, QZSS L1 C/A/S, GLONASS L1 OF, BeiDou B1I, Galileo E1B/C SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN	
Nav. update rate ¹	up to 50 Hz (4 concurrent GNSS)	
Position accuracy	1.5 m CEP (with SBAS) 2.0 m CEP (without SBAS)	
ADR position error	<2% of distance traveled without GNSS	
Acquisition	Cold start	24 s
	Aided start	3 s
	Reacquisition	2 s
Sensitivity	Tracking & nav.	-159 dBm ²
	Reacquisition	-158 dBm
	Cold start	-147 dBm
	Hot start	-159 dBm

- 1 The highest navigation rate can limit the number of supported constellations.
2 Limited by firmware for best DR performance.

Tracking features

Geofencing	Up to 4 circular areas; GPIO for waking up the host CPU
Sensor raw data	IMU sensor data at 100 Hz

Security features

Signal integrity	RF interference and jamming detection and reporting Active GNSS in-band filtering Spoofing detection and reporting (consistency checks based on GNSS and sensors)
Device integrity	Secure boot or firmware downloaded from host or flash Receiver configuration lock by command
Secure interface	Signed UBX messages (SHA-256) JTAG debug interface disabled by default

Interfaces

Serial	1 UART 1 USB 1 SPI (optional) 1 I2C
Digital I/O	1 configurable timepulse, 2 EXTINT interrupt inputs 3 PIO for antenna supervision
Timepulse	Configurable: 0.25 Hz to 10 MHz
Protocols	NMEA 4.11, UBX binary
Raw data output	Code phase and carrier phase raw data

Package

40 pin QFN: 5.00 x 5.00 x 0.59 mm

Environmental data, quality & reliability

Operating temp.	-40 °C to +105 °C
Storage temp.	-40 °C to +125 °C
Environmental grade	RoHS compliant (lead free) 2015/863/EU
EMC	2014/53/EU RED
Environmental testing	AEC-Q100
Quality management	Manufactured and fully tested in ISO/TS 16949 certified production sites AEC-Q004 Zero ppm strategy (UBX-M9140-KA)

Electrical data

Supply voltage	1.8 V to 3.6 V
Power consumption	32 mA at 3.0 V (4 GNSS continuous) 29 mA at 3.0 V (2 GNSS continuous) 23 mA at 3.0 V (1 GNSS continuous)
Backup supply	1.65 V to 3.6 V

External components

Oscillator	TCXO
RTC input	32.768 kHz (optional)
Antenna supply and supervisor circuit detection	External circuit required for short and open
Flash memory	SPI minimum 16 MBit
DC/DC converter	Built-in external component required

Services

Assisted GNSS	AssistNow Live Orbits
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Support products

EVK-M9DR	u-blox M9 evaluation kit with I/O interface, supports ADR and UDR operation modes
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Product variants

UBX-M9140-KA-DR	u-blox M9 GNSS IC 3D dead reckoning, up to +105 °C operating temperature, automotive grade
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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.

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