Product summary
UBX-F10 series

u-blox F10 standard precision GNSS chips

L1/L5 dual-band GNSS receiver for meter-level accuracy in urban environments

- Effective multipath mitigation to boost urban accuracy
- Protection-level technology for a real-time position accuracy estimate with 95% confidence
- Proven excellent performance, even with small antennas
- Advanced spoofing and jamming detection

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Standard

Professional

Automotive

4.0 × 4.0 × 0.55 mm

5.0 × 5.0 × 0.55 mm

Product description

The UBX-F10 chips are built on the u-blox F10 dual-band GNSS technology using L1/L5 GNSS bands, which provides solid meter-level position accuracy in urban areas.

With its proprietary dual-band multipath mitigation technology, u-blox F10 uses the best signals from the L1/L5 bands to achieve a significantly better position accuracy in urban environments than with the L1 band only. Applications like vehicle tracking and micromobility benefit significantly.

In applications where knowing the position error is crucial, the protection-level technology provides a real-time position accuracy estimate with 95% confidence.

The outstanding RF sensitivity and the firmware algorithm that favors L5 band signals in weak signal situations ensure good position accuracy even with small antennas. UBX-F10 detects jamming and spoofing events and reports them to the host, so that the system can react to such events. Advanced filtering algorithms mitigate the impact of RF interference and jamming, thus enabling the chip to operate as intended.

Separate RF input ports for each band offer the design freedom to add dedicated RF components for each band to achieve high robustness against RF interference from co-located cellular modems. UBX-F10150-KB operates with a firmware uploaded from the host or located on an external flash, which allows firmware upgrades. UBX-F10050-KB runs the firmware from ROM and is pin-compatible with the UBX-M10050-KB chip for easy migration.

UBX-F10 chips are qualified according to JEDEC JESD47 and are manufactured in IATF 16949 certified sites.

	UBX-F10050-KB	UBX-F10050-KB-RW	UBX-F10150-KB
Grade			
Automotive			
Professional	•	•	•
Standard			
GNSS			
GPS / QZSS	•	•	•
Galileo	•	•	•
BeiDou	•	•	•
NavIC	•	•	•
Bands	L1/L5/E5a/B2a	L1/L5/E5a/B2a	L1/L5/E5a/B2a
Interfaces			
UART	1	1	1
SPI	1	1	1
DDC (I2C compliant)	1	1	1
Features			
Upgradeable firmware			E
Carrier phase output		•	
RTC crystal	S	S	S
Oscillator	C/T	C/T	C/T
Antenna supervisor	S	S	S
Time pulse output	1	1	1

E = External flash required
S = Supported, may require external components
C/T = Crystal and TCXO supported

u-blox

UBX-F10 series

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Features

Receiver type	u-blox F10 engine GPS L1C/A, L5 QZSS L1C/A, L1S, L1Sb, L5 GAL E1B/C, E5a BDS B1C, B2a NavIC L5 SBAS L1C/A, BDSBAS B1C
Nav. update rate[1]	up to 10 Hz
Horizontal position accuracy [2]	1.0 m CEP (with SBAS) 1.5 m CEP (without SBAS)
Acquisition	Cold start 28 s Aided start 1 s Hot start 1 s
Sensitivity	Tracking and nav. −167 dBm Reacquisition −159 dBm Cold start −148 dBm Hot start −159 dBm

External components

Oscillator	Crystal or TCXO
RTC input (optional)	32.768 kHz
Antenna supply and supervisor	External circuit required for short and open circuit detection
Flash memory (optional) [3]	SPI interface

Tracking features

Odometer	Measures traveled distance with support for different user profiles
Protection level	Real-time position accuracy estimate with 95% confidence

Security features

Signal integrity	RF interference and jamming detection / reporting Spoofing detection and reporting
Device integrity	Receiver configuration lock by command
Secure interface	Signed UBX messages (HMAC-SHA256) JTAG debug interface disabled by default

Compatible u-blox location services

AssistNow	Achieves premium performance in challenging IoT environments

1 = The highest navigation rate can limit the number of supported constellations
2 = Depends on atmospheric conditions, GNSS antenna, multipath conditions, satellite visibility, and geometry
3 = UBX-F10150 can use the flash to upgrade firmware

Package

28-pin QFN UBX-F10050-KB: 4.0 x 4.0 x 0.55 mm UBX-F10150-KB: 5.0 x 5.0 x 0.55 mm	

Environmental data, quality, and reliability

Operating temp.	−40 °C to +85 °C
Storage temp.	−40 °C to +125 °C
MSL	3
Environmental grade	2015/863/EU RoHS-3 , Green, IEC-61249-2-21 halogen-free
Environmental testing	JEDEC JESD47
Quality management	Manufactured and fully tested in IATF 16949 certified production sites

Electrical data

Supply voltage	1.0 V to 1.8 V
Digital I/O voltage	1.8 V or 3.3 V
Power consumption	35 mW (3 GNSS)
Backup supply	1.65 V to 3.6 V

Interfaces

Serial interfaces	1 UART 1 DDC (I2C compliant) 1 SPI
Digital I/O	1 configurable time pulse 1 EXTINT interrupt input
Time pulse output	Configurable: 0.25 Hz to 10 MHz
Raw data output	Code phase data, carrier phase data
Memory	SPI interface for optional Flash
Protocols	NMEA, UBX binary

Support products

u-blox support products provide reference design, and allow efficient integration and evaluation of u-blox positioning technology.

EVK-F10	u-blox F10 GNSS evaluation kits
u-center 2	Highly intuitive software for GNSS performance evaluation

Product variants

UBX-F10050-KB	u-blox F10 GNSS chip, 28 pin QFN, GPS/GAL/BDS as default configuration
UBX-F10050-KB-RW	u-blox F10 GNSS chip, 28 pin QFN, GPS/GAL/BDS as default configuration, carrier phase raw data
UBX-F10150-KB	u-blox F10 GNSS chip, 28 pin QFN, GPS/GAL/BDS as default configuration Upgradeable firmware

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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