Product summary

ZED-F9T series

u-blox F9 high accuracy timing modules

Standard

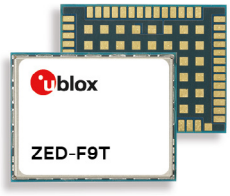
Professional

Automotive

Multi-band GNSS receiver with nanosecond-level timing accuracy

- Meets the most stringent 5G timing requirements
- Ideal for global deployments due to GPS, BeiDou, Galileo, and NavIC reception
- Unaffected by ionospheric errors
- Differential timing mode for highly accurate local timing
- Built-in security, including Galileo OSNMA, for highest robustness against malicious attacks

17.0 × 22.0 × 2.4 mm



Product description

ZED-F9T timing modules provide nanosecond-level timing accuracy to the most demanding infrastructure applications.

ZED-F9T is designed to meet the most stringent timing synchronization requirements in 5G mobile networks on a global scale. By significantly reducing the time error of the primary source of cellular network synchronization, the ZED-F9T module will help operators maximize the performance of their networks and so optimize the return on their investment in 5G communications.

The module's multi-band capability reduces the timing error under clear skies to less than 5 ns without the need of an external GNSS correction service. To further improve accuracy locally, the ZED-F9T features a differential timing mode, which exchanges correction data with other neighboring GNSS timing receivers via a communication network.

Multi-band access to all four global satellite constellations strengthens the receiver's capability for delivering more reliable performance. To maximize GNSS signal support and design flexibility, the ZED-F9T module is available as three pin-compatible band versions, supporting L1/L2/E5b and L1/L5/E5a configurations.

ZED-F9T includes advanced security features such as secure boot, secure interfaces, Galileo OSNMA, and T-RAIM to provide the highest level timing integrity.

The module has a single RF input for all the GNSS bands and dual SAW filters for exceptional signal selectivity and out-of-band attenuation.

u-blox modules use GNSS chips qualified according to AEC-Q100, are manufactured in ISO/TS 16949 certified sites, and are fully tested on a system level. Qualification tests are performed as stipulated in the ISO16750 standard: "Road vehicles – Environmental conditions and testing for electrical and electronic equipment".

	ZED-F9T-00B	ZED-F9T-10B	ZED-F9T-20B
Grade			
Automotive			
Professional	•	•	•
Standard			
GNSS			
GPS / QZSS	•	•	•
GLONASS	•	•	
Galileo	•	•	•
BeiDou	•	•	•
NavIC		•	•
Multi-band	L1/L2/E5b	L1/L5/E5a	L1/L2/E5b and L1/L5/E5a
Interfaces			
UART	2	2	2
USB	1	1	1
SPI	1	1	1
DDC (I2C compliant)	1	1	1
Features			
Programmable (Flash)	•	•	•
Galileo OSNMA			•
Carrier phase output	•	•	•
Additional SAW	•	•	•
RTC crystal	•	•	•
Oscillator	T	T	T
Survey-in and fixed mode	•	•	•
Time pulse output	2	2	2
Time mark input	2	2	2
Power supply			
2.7 V – 3.6 V	•	•	•

T = TCXO

ZED-F9T module

Features

Receiver type	184-channel u-blox F9 engine ZED-F9T-00B: GPS L1C/A, L2C — QZSS L1C/A, L2C GAL E1B/C, E5b — BDS B1I, B1C, B2I GLO L1OF, L2OF SBAS L1C/A: WAAS, EGNOS, MSAS, GAGAN ZED-F9T-10B: GPS L1C/A, L5 — QZSS L1C/A, L5 GAL E1B/C, E5a — BDS B1I, B1C, B2a NavIC L5 — GLO L1OF SBAS L1C/A: WAAS, EGNOS, MSAS, GAGAN ZED-F9T-20B: GPS L1C/A, L2C, L5 — QZSS L1C/A, L2C, L5 GAL E1B/C, E5b, E5a — BDS B1I, B1C, B2a, B2I NavIC L5 SBAS L1C/A: WAAS, EGNOS, MSAS, GAGAN
Nav. update rate[1]	up to 20 Hz
Position accuracy[2]	Standalone 1.5 m CEP
Acquisition	Cold starts 26 s Aided starts 2 s Reacquisition 1 s
Sensitivity	Tracking and Nav. -167 dBm Reacquisition -160 dBm Hot starts -157 dBm Cold starts -148 dBm
Assistance	AssistNow Online OMA SUPL and 3GPP compliant
Oscillator	TCXO
RTC crystal	Built-in
Anti-jamming	Active CW detection and removal Dual onboard band pass filters
Anti-spoofing	Advanced anti-spoofing algorithms Galileo OSNMA
Security	Secure boot Secure firmware update
Memory	Flash
Supported antennas	Active

Features - Timing

Timing accuracy	<5 ns (1-sigma, clear sky, absolute mode) <2.5 ns (1-sigma, clear sky, differential mode)
Time pulse frequency	0.25Hz – 25 MHz
Time pulse jitter	±4 ns
Time mark resolution	8 ns
Integrity reports	T-RAIM active, phase uncertainty Time pulse rate/duty-cycle, inter-constellation biases
Survey-in period	Configurable

Features - Raw data

Measurement data	Carrier phase, code phase and pseudo-range, Doppler on all signals
Message data	GPS, BeiDou, Galileo, GLONASS, NavIC, QZSS, SBAS

Package

54-pin LGA (Land Grid Array)
17.0 x 22.0 x 2.4 mm

Environmental data, quality and reliability

Operating temp.	−40 °C to +85 °C
Storage temp.	−40 °C to +85 °C
RoHS compliant (lead-free)	
ETSI-RED compliant	
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	
High vibration and shock resistance	

Electrical data

Supply voltage	2.7 V to 3.6 V
Power consumption	68 mA @ 3.0 V (continuous)
Backup supply	1.65 V to 3.6 V

Interfaces

Serial interfaces	1 USB 2 UART 1 SPI 1 DDC (I2C compliant)
Protocols	NMEA, UBX binary, RTCM version 3.3
Time pulse output	2
Time mark input	2

Support products

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

RCB-F9T	u-blox F9 multi-band GNSS timing board
EVK-F9T	u-blox F9 GNSS timing evaluation kit
ANN-MB	L1/L2 multi-band active GNSS antenna
ANN-MB1	L1/L5 multi-band active GNSS antenna
ANN-MB2	All-band high precision GNSS antenna

Product variants

ZED-F9T-00B	u-blox F9 high accuracy timing module, with L1/L2/E5b bands
ZED-F9T-10B	u-blox F9 high accuracy timing module, with L1/L5/E5a bands
ZED-F9T-20B	u-blox F9 high accuracy timing module, with L1/L2/E5b and L1/L5/E5a bands

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

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.