Product summary

ZED-F9T series

u-blox F9 high accuracy timing modules

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 GLONASS reception
- Unaffected by ionospheric errors
- Differential timing mode for highly accurate local timing
- Built-in security for highest robustness against malicious attacks

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 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 two 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, 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”.

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T = TCXO
ZED-F9T module

**Features**

- **Receiver type**: 184-channel u-blox F9 engine
- **ZED-F9T-00B**: GPS L1C/A, L2C, GAL E1B/C, E5b, QZSS L1C/A, L2C, SBAS L1C/A, WAAS, EGNOS, MSAS, GAGAN
- **ZED-F9T-10B**: GPS L1C/A, L5, GAL E1B/C, E5a, QZSS L1C/A, L5, NavIC L5, SBAS L1C/A, WAAS, EGNOS, MSAS, GAGAN

**Nav. update rate**: up to 20 Hz

**Position accuracy**: Standalone 2.0 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: -167 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

**Security**
- Secure boot
- Secure firmware update

**Memory**
- Flash

**Supported antennas**
- Active

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

**Features - Timing**

- **Timing accuracy**: <5 ns (1-sigma, clear sky, absolute mode), <2.5 ns (1-sigma, clear sky, differential mode)
- **Time pulse frequency**: 0.25 Hz – 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, GLONASS, BeiDou, Galileo, 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
- **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

**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

**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.

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