

M2-ZED-F9T series



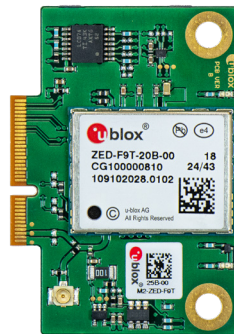
u-blox F9 high accuracy timing cards

Multi-band GNSS timing card with nanosecond-level timing accuracy

- Compact pluggable M.2 card based on u-blox ZED-F9T-20B
- Supports both L1/L2/E5b and L1/L5/E5a operation in single SKU
- Meets the most stringent 5G timing requirements
- Unaffected by ionospheric errors
- Built-in security, including Galileo OSNMA, for highest robustness against malicious attacks



30.5 × 43.4 × 3.3 mm



Product description

The M2-ZED-F9T GNSS timing card combines the state-of-the-art performance of u-blox ZED-F9T timing module with the flexibility and ease of use of a pluggable M.2 card. The card supports all features of the ZED-F9T-20B and additionally provides on-board antenna supervisor circuitry for easy integration.

M2-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 M2-ZED-F9T card will help operators maximize the performance of their networks and so optimize the return on their investment in 5G communications.

Multi-band access to global and local satellite constellations strengthens the receiver's capability for delivering more reliable performance. To maximize GNSS signal support and design flexibility, M2-ZED-F9T supports both L1/L2/E5b and L1/L5/E5a configurations via simple software command. Thanks to this flexibility, users can start with L1/L2/E5b signal configuration today and have the ability to easily switch to L1/L5/E5a when GPS L5 becomes healthy and fully operational.

ZED-F9T includes advanced security features such as secure boot, secure interfaces, Galileo OSNMA, and T-RAIM to provide the highest level timing integrity. Built-in jamming and spoofing detectors and spectrum analyzers offer powerful tools for the users to monitor the RF environment for any potential threats.

u-blox timing cards 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".

	M2-ZED-F9T-20B	M2-ZED-F9T-25B
Grade		
Automotive		
Professional	•	•
Standard		
GNSS		
GPS / QZSS	•	•
Galileo	•	•
BeiDou	•	•
NavIC	•	•
Multi-band	L1/L2/E5b and L1/L5/E5a	L1/L2/E5b and L1/L5/E5a
Interfaces		
UART	1	1
USB	1	1
SPI	1	1
I2C	1	1
Features		
Galileo OSNMA	•	•
Carrier phase output	•	•
Programmable (Flash)	•	•
Additional SAW	•	•
RTC crystal	•	•
Oscillator	T	T
Survey-in and fixed mode	•	•
Time pulse output	2	2
Time mark input	2	2
Antenna connection	M.2	U.FL
Antenna supervisor	•	•
Power supply		
2.7 V – 3.6 V	•	•

T = TCXO

M2-ZED-F9T timing card



Features

Receiver type	184-channel u-blox F9 engine 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, NavIC, QZSS, SBAS

Package

30.5 x 43.4 mm receiver card with M.2 key E connector.

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
	1 UART
	1 SPI
	1 I2C
Protocols	NMEA, UBX binary, RTCM version 3.4
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.

EVK-F9T	u-blox F9 GNSS timing evaluation kit
ANN-MB2	All-band high precision GNSS antenna

Product variants

M2-ZED-F9T-20B	u-blox F9 high accuracy timing card, with L1/L2/E5b and L1/L5/E5a bands and Galileo OSNMA. Antenna connection through the M.2 connector.
M2-ZED-F9T-25B	u-blox F9 high accuracy timing card, with L1/L2/E5b and L1/L5/E5a bands and Galileo OSNMA. Antenna connection through an on-board U.FL connector.

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.

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