



Product Summary

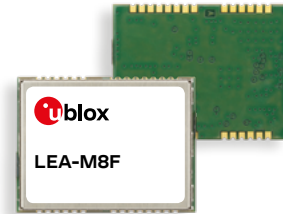
LEA-M8F module

u-blox M8 GNSS time & frequency reference module



Multi-GNSS synchronization for cost-sensitive network edge equipment

- Concurrent reception of GPS/QZSS, GLONASS, BeiDou
- Integral disciplined low phase noise 30.72 MHz system reference oscillator
- Accurate measurement and control of external oscillators
- Industry leading acquisition sensitivity and single-satellite timing
- Autonomous 100 ppb hold-over, all effects, including full operating temperature range
- Prepared for integration with external PTP, Sync-E and network listen



17.0 × 22.4 × 3.5 mm

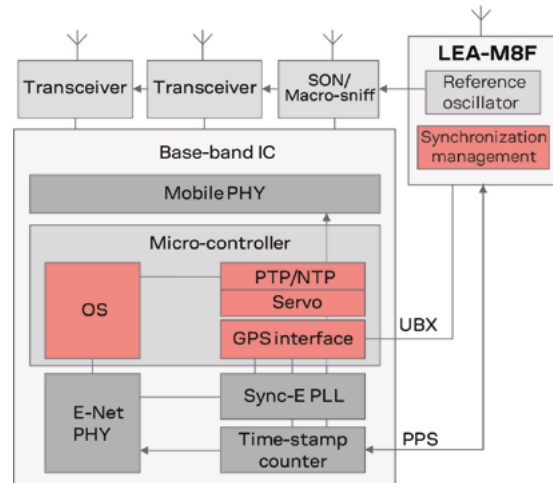
Product description

u-blox time and frequency products provide multi-GNSS synchronisation for cost-sensitive network edge equipment including Small Cell and Femto wireless base-stations. The LEA-M8F module is a fully self-contained phase and frequency reference based on GNSS, but can also be used as part of a complete timing sub-system including macro-sniff Synchronous Ethernet and packet timing.

The LEA-M8F module includes a low-noise 30.72 MHz VCTCXO meeting the master reference requirements for LTE Small Cells and provides 100 ppb autonomous hold-over across its full operating temperature range. The LEA-M8F module can also measure and control an external TCXO or OCXO for TD-LTE, LTE Advanced and other applications requiring extended hold-over. External sources of synchronization are supported through time-pulse and frequency inputs and a message interface. This allows measurements from macro-sniff, Sync-E or packet timing to be combined with measurements from GNSS. The u-blox time and frequency products include timing integrity alarms that report phase and frequency uncertainty both during normal operation and hold-over. They feature a high dynamic range radio with both analog and digital interference mitigation, supporting their inclusion as an integral part of a local area base station design.

Example application (Small Cell)

In a wireless Small Cell application, the LEA-M8F can distribute a disciplined low-phase noise 30.72 MHz reference signal directly to the RF transceivers. GNSS synchronisation is combined with network sources by an exchange of synchronisation signals, status and control messages with the base-band processor. Source selection and hold-over may be controlled by either the LEA-M8F or base-band application.



Product selector

Model	Category	GNSS	Supply	Interfaces	Features	Grade
LEA-M8F	Standard Precision GNSS High Precision GNSS Dead Reckoning Timing	GPS/QZSS GLONASS Galileo BeiDou	3.0 V - 3.6 V	UART USB SPI DDC (i°C compliant)	Programmable (Flash) Data logger Additional SAW Additional LNA RTC crystal Internal oscillator Active antenna / LNA supply Active antenna / LNA control Antenna short circuit detection / protection pin Antenna open circuit detection pin Frequency output	Standard Professional Automotive

D = Development use / P = Short circuit protection only / V = VCTCXO





Features

Receiver type	72-channel u-blox M8 engine GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS	
Accuracy	GPS 2.5 m CEP	GLONASS 4.0 m CEP
Acquisition		
Cold starts:	26 s	30 s
Aided cold starts:	2 s	8 s
Sensitivity		
Tracking:	-165 dBm	-165 dBm
Cold start (aided):	-157 dBm	-148 dBm
(autonomous):	-148 dBm	-145 dBm
Reacquisition:	-160 dBm	-157 dBm
Assistance GNSS	AssistNow Online OMA SUPL & 3GPP compliant interface	
Internal oscillator	VCTCXO	
Noise figure	On-chip LNA; Extra LNA for lowest noise figure	
Anti jamming	Active CW detection and removal; extra onboard SAW band pass filter	
Supported antennas	Active and passive	
Internal SPI Flash	For firmware update	

Features – synchronization

Frequency output	30.72 MHz disciplined	
Phase noise	10 Hz: -90 dBc/Hz 100 Hz: -120 dBc/Hz 1 kHz: -130 dBc/Hz	10 kHz: -143 dBc/Hz 100 kHz: -145 dBc/Hz 1 MHz: -149 dBc/Hz
Jitter (100 Hz - 1 MHz)	0.15 ps	
EVM (100 Hz - 1 MHz @ 2100 MHz)	< 0.2%	
Frequency control (internal oscillator)	GNSS locked: Hold-over:	5 ppb 100 ppb, 24 hr, -40 °C to +85 °C
Frequency control (external oscillator)	Resolution: Frequencies: Hold-over:	< 5 ppb 10, 13, 19.2, 20, 26, 30.72, 40 MHz Determined by external oscillator
Phase control	Clear sky: Indoor:	< 20 ns < 500 ns typ.
Time-pulse input	Resolution:	< 50 ns
Time-pulse output	Jitter:	< 2 ns
Time-pulse frequency	Jitter:	< 2 ns 0.5 Hz to 2 Hz

Electrical data

Supply voltage	3.0 V to 3.6 V
Power consumption	41 mA @ 3.3 V

Further information

For contact information, see www.u-blox.com/contact-us.

For more product details and ordering information, see the [product data sheet](#).

Package

28 pin LCC (Leadless Chip Carrier): 17.0 x 22.4 x 3.5 mm, 2.0 g

Environmental data, quality & reliability

Operating temp: -40 °C to +85 °C

RoHS compliant (lead-free)

Qualification according to ISO 16750

Manufactured in ISO/TS 16949 certified production sites

Interfaces

Serial interfaces	SPI or UART and DDC (I ² C compliant) USB v2.0 full speed (ext. voltage regulator)
Protocols	NMEA, UBX binary, RTCM
Timing interfaces	Timepulse output 2x timepulse/frequency inputs

Support products

These u-blox M8 support tools are for getting familiar with u-blox M8 positioning technology, evaluating functionality, and visualizing GNSS performance.

EVK-M8F	u-blox M8 Time & Frequency Reference Evaluation Kit, supports LEA-M8F
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Product variants

LEA-M8F	u-blox M8 Time & Frequency Reference module, Flash, VCTCXO, dual SAW, LNA
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