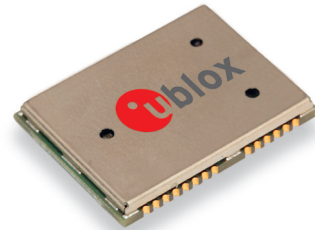# LEA-6 series

u-blox 6 GPS, QZSS, GLONASS and Galileo modules

Highlights

- Multi-constellation variants:
  - o GPS (LEA-6A/S)
  - o GPS, Galileo ready (LEA-6H)
  - o GPS/QZSS, GLONASS (LEA-6N)
- Optimized mode for low power and maximum sensitivity
- UART, USB and DDC (I²C compliant) interfaces
- Integrated antenna supervisor

LEA-6:
17.0 x 22.4 x 2.4 mm

Features

- u-blox 6 position engine:
  - o Navigate down to −162 dBm and −148 dBm coldstart
  - o Faster acquisition with AssistNow Autonomous
  - o Configurable power management
  - o Hybrid GPS/SBAS engine (WAAS, EGNOS, MSAS)
  - o Anti-jamming technology
- Simple integration with u-blox wireless modules
- A-GPS: AssistNow Online and AssistNow Offline services, OMA SUPL compliant
- Backward compatible (hardware and firmware); easy migration from LEA-5 or LEA-4 families
- LCC package for reliable and cost effective manufacturing
- Compatible with u-blox GPS Solution for Android
- Based on GNSS chips qualified according to AEC-Q100
- Manufactured in ISO/TS 16949 certified production sites
- Qualified according to ISO 16750

Product description

LEA-6 modules bring the high performance u-blox 6 position engine to the industry standard LEA form factor. u-blox 6 has been designed for low power consumption and low costs, independent of which satellite constellation is used (e.g. GLONASS, Galileo). Intelligent power management is a breakthrough for low-power applications. The versatile, standalone LEA-6 receivers combine an extensive array of features with flexible connectivity options. Their ease of integration results in fast time-to-market for a wide range of automotive and industrial applications.

LEA-6 modules work with all available satellite positioning systems: LEA-6H is ready to support the European Galileo system via a simple firmware upgrade; LEA-6N combines full feature GPS performance with the QZSS regional satellite system. LEA-6N also targets the Russian market, featuring the lowest power GLONASS functionality in the industry and is designed for ERA-GLONASS.

All LEA-6 modules are manufactured in ISO/TS 16949 certified sites. Each module is tested and inspected during production. The modules are qualified according to ISO 16750 - Environmental conditions and electrical testing for electrical and electronic equipment for road vehicles.

Product selector

Model	Type						Supply		Interfaces				Features						
	Standalone GPS	Standalone GLONASS	Standalone Galileo	QZSS	Timing & Raw Data	Dead Reckoning	1.75 V – 2.0 V	2.7 V – 3.6 V	UART	USB	SPI	DDC (I²C compliant)	Programmable (Flash) FW update	Oscillator	RTC crystal	Antenna supply and supervisor	Configuration pins	Timepulse	External interrupt / Wakeup
LEA-6N	•	•	R	•				•	•	•	•	•	•	T	O	•		1	•
LEA-6H	•	R	R					•	•	•	•	•	•	T	O	•		1	•
LEA-6S	•							•	•	•	•	•		T	O	•	1	1	•
LEA-6A	•							•	•	•	•	•		C	O	•	1	1	•

R = HW ready, firmware upgrade required.
O = Onboard RTC crystal for faster warm and hot starts.

C = Crystal / T = TCXO

Receiver performance data

Receiver type	50-channel u-blox 6 engine GPS/QZSS L1 C/A code GLONASS L1 FDMA Galileo L1 open service (with upgrade) SBAS: WAAS, EGNOS, MSAS		
Navigation update rate	up to 5 Hz (ROM version), 2 Hz (Flash)		

	GPS		GLONASS
Accuracy[1]	LEA-6H/6S/6N/6A		LEA-6N
Position	2.5 m CEP		4 m CEP
SBAS	2.0 m CEP		n.a.
Acquisition[1]	LEA-6H/6S/6N	LEA-6A	LEA-6N
Cold starts:	26 s	27 s	38 s
Aided starts[2]:	1 s	3 s.	n.a.
Hot starts:	1 s	1 s	3 s
Sensitivity[3]	LEA-6H/6S/6N	LEA-6A	LEA-6N
Tracking:	−162 dBm	−162 dBm	−158 dBm
Cold starts:	−148 dBm	−147 dBm	−138 dBm
Hot starts:	−157 dBm	−156 dBm	−153 dBm

[1] All SV @ −130 dBm
[2] Demonstrated with a good active antenna
[3] Dependent on aiding data connection speed and latency

Electrical data

Power supply	2.7 V – 3.6 V		

	GPS		GLONASS
Power consumption	LEA-6H/6S/6N	LEA-6A	LEA-6N
Continuous[4]	121 mW	114 mW	121 mW
Power Save Mode[4, 5]	36 mW	33 mW	n.a.

Backup power	1.4 V – 3.6 V, 22 µA
Antenna power	External or internal VCC_RF
Supported antennas	Active and passive
Antenna supervision	Integrated short-circuit detection and antenna shutdown, open circuit detection with minimal external circuitry

[4] @ 3.0 V.
[5] PSM @ 1 Hz.

Interfaces

Serial interfaces	1 UART 1 USB V2.0 full speed 12 Mbit/s 1 DDC (I²C compliant)	
Digital I/O	Configurable timepulse 1 EXTINT input for Wakeup 1 reset	
Serial and I/O	Voltages	2.7 V – 3.6 V
Timepulse	Configurable	0.25 Hz to 1 kHz
Protocols	NMEA, UBX binary, RTCM	

Package

28 pin LCC (Leadless Chip Carrier): 17.0 x 22.4 x 2.4 mm, 2.1 g

Pinout

LEA-6 Top View

15 GND	GND 14
16 RF_IN	GND 13
17 GND	Reserved 12
18 VCC_RF	V_BCKP 11
19 V_ANT	RESET_N 10
20 AADET_N	CFG_COM1/NC 9
21 Reserved	VCC_OUT 8
22 Reserved	GND 7
23 Reserved	VCC 6
24 VDDUSB	NC 5
25 USB_DM	RxD1 4
26 USB_DP	TxD1 3
27 EXTINT0	SCL2 2
28 TIMEPULSE	SDA2 1
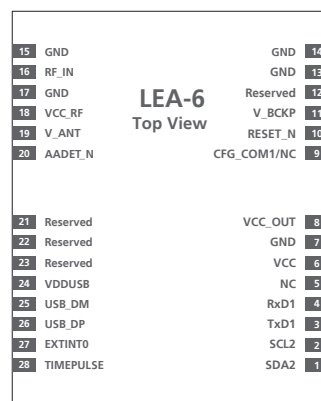
Environmental data, quality & reliability

Operating temp.	−40° C to 85° C
Storage temp.	−40° C to 85° C

RoHS compliant (lead-free)

Qualification according to ISO 16750

Manufactured in ISO/TS 16949 certified production sites

Support products

u-blox 6 Evaluation Kits:

EVK-6N:	u-blox 6 Evaluation Kit GPS/GLONASS/QZSS with TCXO, suitable for LEA-6N
EVK-6H:	u-blox 6 Evaluation Kit with TCXO, suitable for LEA-6H, LEA-6S
EVK-6P:	u-blox 6 Evaluation Kit with Crystal, suitable for LEA-6A

Ordering information

LEA-6N-0	u-blox 6 GPS/GLONASS/QZSS Module, TCXO, Flash, 17 x 22mm, 250 pcs/reel
LEA-6H-0	u-blox 6 GPS Module, TCXO, Flash, 17 x 22mm, 250 pcs/reel
LEA-6S-0	u-blox 6 GPS Module, TCXO, 17x22mm, 250 pcs/reel
LEA-6A-0	u-blox 6 GPS Module, 17x22mm, 250 pcs/reel

Available as samples and tape on reel (250 pieces)

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Specification applies to FW 7 and GLONASS FW 1.00
LEA-6N values: Objective Specification