GM-U01, u-blox M10

Concurrent 4 GNSS

Smart Antenna Module

RoHS Compliant



Overview

Based on the u-blox M10 chip, GM-U01 is able to concurrently track signals from GPS, GLONASS, GALILEO, BEIDOU, QZSS, and SBAS satellites. Thanks to this capability, big number of satellites are visible, positioning becomes easy and accurate even in the typical GPS difficult environments.

GM-U01 is an all-in-one GNSS smart antenna module that includes antenna, backup battery, LED, connector, and all circuits necessary for high quality positioning in just 26x28 mm^2 small area. It supports TTL/RS232/USB options. The built-in battery could also be omitted if external backup power is preferred.

Combining high performance, low power consumption in a small dimension, the compact GM-U01 is suitable for vast number of positioning, speeding, timing applications.

Applications

- FCC AFC for Wi-Fi 6E AP
- Automatic vehicle location
- Driving recorder
- Navigation
- GPS clock and digital camera
- Child/elderly/personal locator and security system

Features

- Powered by u-blox M10 chip
- Concurrent tracking of multi-satellite navigation systems
  - GPS/GALILEO/GLONASS/BEIDOU/QZSS
  - SBAS (WAAS, EGNOS, MSAS, GAGAN)
- Augmentation support:
  - SBAS (WAAS, EGNOS, MSAS, GAGAN),
  - QZSS (L1S SLAS, Sub-meter Level Augmentation Service)
- Higher update rate option (default 1Hz), up to
  - 5 Hz for GPS+GAL+GLO+BDS B1C
  - 8 Hz for GPS+GAL+BDS B1C
  - 5 Hz for GPS+GAL+BDS B1I
  - 7 Hz for GPS+GAL+GLO
  - 10 Hz for GPS+GAL
  - 18 Hz for GPS only
- Sensitivity
  - Acquisition: -148dBm (GPS + others)
  - Tracking: -167dBm (GPS + others)
- Anti-jamming- RF interference and jamming detection and reporting
- Anti-spoofing- Spoofing detection and reporting
- Low power: 16mA (TTL) at continuous tracking
- Easy to use: built-in antenna & digital connector
- Built-in 25x25x4 (mm) patch antenna
- Backup battery support for faster position fix
- External backup power option via I/O pin is available for special application of high working temperature.
- LED for position fix indication
- Windows/Linux/Android support
- Fully EMI shielded

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- Industrial operating temperature range: -40 ~ 85℃

Technical Specifications

Receiver Performance Data+

Receiver Type	u-blox M10 engine GPS, SBAS: L1 C/A: 1575.42MHz, QZSS: L1 C/A/S: 1575.42MHz Galileo: E1 B/C: 1575.42MHz, GLONASS: L1OF:1598.0625~1605.375MHz BeiDou: B1I: 1561.098 MHz B1C: 1575.42 MHz SBAS:WAAS, EGNOS, MSAS, GAGAN
Horizontal Position Accuracy	1.5m (GPS+QZSS+SBAS) (CEP, 50% 24hr static, -130dBm, >6 SVs for each GNSS system)
Velocity Accuracy	0.05 m/s (speed) <0.3° (heading) (50%@30m/s)
Time Pulse Signal Accuracy	30ns (RMS) <60ns (99%)
Time Pulse Frequency	0.25 Hz ~ 10 MHz configurable
Time To First Fix Hot start Cold start	Autonomous, (50% -130dBm) 1 s 28 s: GPS+GAL 23s: GPS+GAL+GLO 27s: GPS+GAL+BDS B1I (default) 28s: GPS+GAL+BDS B1C 23s: GPS+GAL+GLO+BDS B1C
Sensitivity (Autonomous)	GPS+GAL or +more -148dBm (acquisition) -167dBm (tracking)
Max. Navigation. Update Rate	5 Hz for GPS+GAL+BDS B1C 5 Hz for GPS+GAL+BDS B1I 7 Hz for GPS+GAL+GLO 10 Hz for GPS+GAL 18 Hz for GPS only Default 1Hz
Max. Altitude	80,000 m
Max. Velocity	500 m/s
Protocol Support	UART: N,8,1; bauds 4800, 9600, 19200, 38400 (default), 57600, 115200, 230400, 460800, 921600 bps; NMEA versions 2.1, 2.3, 4.0, 4.10, and 4.11 (default) UBX (u-blox proprietary) GGA, GLL, GSA, GSV, RMC, VTG, TXT
Augmentation Support	SBAS(WAAS, EGNOS, MSAS, GAGAN) QZSS(L1S SLAS)
RTCM	Supported in the future
Dynamics	<4g

+: According to GNSS IC spec

Electrical Data

Power Supply	3.3 ~ 5.5 V
Power Consumption Acquisition/Tracking	(29 GNSS SVs fixed for tracking) USB: 59/56 mA RS232: 22/19 mA TTL: 19/16 mA
Backup power	3.3 V
TTL I/O	V_{IH}: ≥ 2.25V, V_{IL}: ≤ 0.63V V_{OH}: ≥ 2.9V, V_{OL}: ≤ 0.4V
Protocols	NMEA, u-blox proprietary

Environmental Data

Operating temperature	-40 ~ 85℃ except battery: -20~60℃
Storage temperature	-40 ~ 85℃except

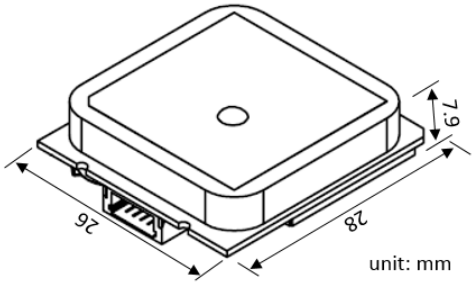
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	battery: -20~60℃
Vibration	5Hz to 500Hz, 5g
Shock	Half sine 30g/11ms

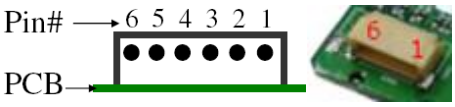
Others

Dimension	26*28*7.9 mm^3
Weight	12.4 g: GM-U01T 12.6 g: GM-U01U

Mechanical Data



6-pin Interface, pitch 1.0mm



GM-U01R/Q

Pin	Name	Function	I/O
1	GND	Ground	Input
2	VCC	Power supply	Input
3	TX-RS232	Serial data output	Output
4	RX-RS232	Serial data input	Input
5[!]	1PPS-RS232 [&] (VBAT)	Pulse Per Second signal (default) (External backup power, optional) Leave this pin open if it is not used.	Output (Input)
6	PWR_CTRL	Power control, internally pull high. High/open: ON, low: OFF Leave this pin open if it is not used.	Input

GM-U01T/S

Pin	Name	Function	I/O
1	GND	Ground	Input
2	VCC	Power supply	Input
3	TXD-TTL	Serial data output	Output
4	RXD-TTL	Serial data input	Input
5[!]	1PPS-TTL (VBAT)	Pulse Per Second signal (default) (External backup power, optional) Leave this pin open if it is not used.	Output (Input)
6	PWR_CTRL	Power control, internally pull high. High/open: ON, low: OFF Leave this pin open if it is not used.	Input

GM-U01P

Pin	Name	Function	I/O
1	GND	Ground	Input
2	VCC	Power supply	Input
3	TX-RS232	Serial data output	Output
4	RX-RS232	Serial data input	Input
5[!]	1PPS-TTL	Pulse Per Second signal (default)	Output
6	PWR_CTRL	Power control, internally pull high. High/open: ON, low: OFF Leave this pin open if it is not used.	Input

GM-U01U/W/V

Pin	Name	Function	I/O
1	GND	Ground	Input
2	VCC	Power supply	Input
3	D+	USB D+	Output
4	D-	USB D-	Input
5[!]	- (VBAT)	- (External backup power, optional)	- (Input)
6	-	-	-

[&] Please be noted that the RS232 line transceiver would introduce 0.3us pulse skew to the PPS signal of RS232 model.

[!] Pin 5 is by default PPS. For VBAT, specify from sub-model Q/S/V when ordering.

The GM-U01W makes PPS events visible to a compatible USB host system; they appear as DCD state changes to the PL2303 driver. Time precision will be limited by the USB polling interval, usually 0.5millisecond

Ordering Information, GM-U01X

Built-in backup battery

Where X=	R/P	T	U/W
RS232	Y	-	-
TTL	-	Y	-
USB	-	-	Y

External backup power via option of pin VBAT:

Where X=	Q	S	V
RS232	Y	-	-
TTL	-	Y	-
USB	-	-	Y

* Models other than R/T/U require MOQ.

*This document is subject to change without notice.

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