Release Notes

Topic :	**GPS/GLONASS/QZSS Firmware 1.01 for u-blox 7**	
	UBX-13003009 1	Public
Author :	uple	
Date :	Sept. 04, 2013	

1 General Information

1.1 Released firmware images

Flash image for u-blox 7 chipset

File: **FW101_EXT_G70.42ec35ce38d201fd723f2c8b49b6a537.bin**

ID String: **EXT CORE 1.01 (59843) Jul 04 2013 18:25:33**

Supports ROM base: 1.00 (full support)

1.2 Released documentation

u-blox 7 Receiver Description including Protocol Specification:

File	Audience	Content
GPS.G7-SW-12001-A	Public	u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS) – for modules
GPS.G7-SW-12002-A	Confidential/ NDA required	u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS) – for chips

1.3 Released software tools

1.3.1 u-center

u-center, version 7.02 supports all messages of firmware versions 1.00 and 1.01 are supported.

1.3.2 FW update utility

The FW update utility version 1.5.1.0 supports u-blox 7.

1.3.3 USB DRIVER

USB CDC-ACM driver for Windows 7, Vista, XP, 2000: Version 1.2.0.6

USB Sensor driver for Windows 7 and 8: Version 2.1.0.2.

1.4 Identification

1.4.1 USB identification

Product ID: "01A7"

Version Nr: "01.00"

Driver String (flash): "u-blox 7 GPS/GNSS Receiver"

1.5 Reference documents

[1] UBX-G7020 Hardware Integration Manual, Docu. No. GPS.G7-HW-10003

[2] u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS), Docu. No. GPS.G7-SW-12001

[3] UBX-G7020 Data Sheet, Docu. No. GPS.G7-HW-10002

2 New Features

below gives an overview of the features available with this firmware when GLONASS mode is activated or not. When GLONASS is activated, many of the standard GPS features are **not** available.

For further documentation and detailed description, refer to the *u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS)* .

Feature	GLONASS not enabled	GLONASS enabled
GNSS	GPS, SBAS, QZSS	GLONASS
Time pulse	Supported	Supported un-calibrated
Power Save Mode	Supported (GPS/QZSS)	Not available
AssistNow online	Supported (GPS)	Time & position only
AssistNow offline	Supported (GPS)	Not available
AssistNow autonomous	Supported (GPS)	Not available
Weak signal tracking	Supported (GPS/QZSS)	Supported
RTCM	Supported (GPS)	Not available
Interference suppression	Supported	Supported
Logging	Supported	Supported

Table 1: Features available with or without GLONASS enabled

2.1 Multi GNSS configuration

u-blox 7 positioning chips feature multi GNSS capabilities

- GPS
- QZSS
- GLONASS
- SBAS Support (WAAS,EGNOS,MSAS)

For a full list of specifications, refer to the *UBX-G7020 Data Sheet* and to the *u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS)* .

u-blox 7 positioning chips are hardware ready for Galileo and BeiDou, when these systems become operational. This will require a firmware update.

2.2 Logging

When an SQI flash is present, major parameters of the position data (PVT) can be logged by the receiver and stored on the flash. Logged data can be retrieved later via any communication interface. Data Logging is also supported when using Continuous and PSM modes (including PSM on/off).

u-blox 7 positioning chips support a variety of SQI flash products. For detailed information refer to the *UBX-G7020 Hardware Integration Manual*.

2.3 Save on Shutdown

The Save on Shutdown feature (SOS) allows saving all Battery Backed RAM (BBR) data to an external Flash memory upon a user command prior to powering off. The receiver automatically restores the BBR from the saved data on startup.

2.4 Single Crystal feature: Main oscillator used as RTC

By using the main oscillator as an RTC u-blox 7 can operate without an RTC crystal. In this mode, power consumption in backup mode will be higher and the measured RTC frequency will be 26 kHz, not the standard 32 kHz.

2.5 Storage of permanent configuration

u-blox 7 provides a new feature (**eFuse**) which allows limited user configuration parameters to be stored permanently on-chip. Several key configuration parameters have to be stored at production time in order for the chip to run properly. These parameters will be active for both ROM based and Flash based designs.

For an overview of the available parameters that can be saved in the eFuse, see the *UBX-G7020 Hardware Integration Manual* .

3 Differences if using GLONASS or QZSS

If GLONASS mode is enabled, some protocol message output fields have a slightly different meaning compared with when GLONASS is not enabled, or as in u-blox 6. describes the differences of these messages.

Feature	GLONASS not enabled	GLONASS enabled	Messages affected
Reference time week-number / time-of-week	GPS time	GPS time (derived from GLONASS)	UBX-NAV-SOL UBX-NAV-GPSTIME
Time pulse: Reference time	GPS time or UTC	GPS time (derived from GLONASS) or UTC	UBX-TIM-TP UBX-TIM-TM2
NMEA Talker ID	$GP	$GL	NMEA

Table 2: Protocol message output fields affected by GLONASS mode

3.1 Satellite system reference time

When navigating using GLONASS the receiver converts GLONASS time to GPS time for output in some UBX messages. For the NMEA protocol this conversion is not needed, as the messages contain only UTC time, which can be easily derived from GLONASS time.

3.2 Coordinate frames

All coordinate frame message outputs in NMEA and UBX are related to WGS84, regardless of the GNSS used.

3.3 NMEA talker identifiers

When operating in GLONASS mode the receiver uses the talker identifier GL, by default, instead of the GP identifier usually used in GPS mode. This can be overridden using the UBX-CFG-NMEA message.

3.4 NMEA/UBX Satellite Identifiers (GLONASS and QZSS)

In NMEA or UBX protocols the satellite ID (svId) numbers are used to identify various satellites. For details of new satellite id's and their interpretation refer to the detailed description in the *u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS)*.

4 Improvements and changes

This chapter describes some of the major improvements and changes in GPS/GLONASS/QZSS firmware 1.01 compared to earlier u-blox firmware versions.

4.1 One single external Flash image

u-blox 7 receivers with ROM 1.0 support on-chip Low Level Configuration, hence only just one Flash image is released. For detailed information refer to the *UBX-G7020 Hardware Integration Manual*.

4.2 Power Save Mode

Performance improvement of the Power Save Mode (PSM) has been implemented in order to reach even lower power consumption while maintaining excellent positioning performance.

u-blox 7 features various configurations for Power Save Mode. For a full description of this new enhanced feature, refer to the u-blox 7 Receiver Description including Protocol Specification (GPS/GNSS) and the *UBX-G7020 Hardware Integration Manual* [1].

Jamming immunity when in PSM cyclic operation has been further improved and cross correlation mitigation algorithms were added to cyclic operation.

4.3 AssistNow Autonomous

AssistNow Autonomous can provide better satellite position predictions by using two broadcast ephemerides. Generally this requires the receiver to be on at least 24 hours in order to download two suitable (i.e. separated by 24 hours) ephemerides. At higher latitudes it may be able to obtain a suitable second ephemeris after 12 hours for some satellites. The calculation speed, both for orbit determination, and more importantly, for orbit prediction (i.e. TTFF) has been improved greatly. AssistNow Autonomous now requires the availability of correct UTC parameters (leap seconds) in addition to absolute time.

4.4 Max. Performance Mode and Eco Mode merged to Continuous Mode

The Maximum Performance and Eco modes known from previous u-blox 6 GPS receivers have been merged into a single Continuous Mode, incorporating capabilities of both previous modes. Both of the previous configuration settings now map to Continuous mode for backwards compatibility.

4.5 Faster CW detection

Strong CW interferers are detected much faster, usually within 2 s.

4.6 Signal tracking improvements

The signal phase lock sensitivity in GPS mode has been improved when signal strength is below 30 dBHz. Tracking reliability is therefore generally improved in difficult situations such as strong temperature fluctuation, unstable clocks or extremely high receiver mobility.

4.7 Support of small crystals

The handling of ESR changes in crystals, which occurs when very small crystals are exposed to large temperature drift, has been improved.

4.8 Flash handling

The handling of Flash sectors used for configuration data storage and for data logging has been improved.

5 Known Limitations

5.1 Features not supported

The following features or commands are no longer supported or have been replaced. u-blox has taken utmost care to ensure no impact on function or performance by this change. Use of such features may lead to unspecified behavior by the u-blox 7 receiver.

5.1.1 FW7.03 and FW6.02 protocol messages (not supported in FW 1.01)

Message	Remark
UBX-CFG-TP	This has been replaced with the more versatile CFG-TP5 which allows for two separate time pulses and more parameters to set their function.
UBX-CFG-PM	This has been replaced with CFG-PM2 which allows for a more extended Power management configuration.
UBX-CFG-FXN	This has been replaced by CFG-PM2.
UBX-CFG-TMODE	This has been replaced by CGF-TMODE2.
NMEA-PUBX05	Not available in this firmware.
NMEA-PUBX06	Not available in this firmware.
UBX-RXM-PT	This has been replaced by CFG-PT.

Table : FW7.03 and FW6.02 protocol messages (not supported in FW 1.00)

5.2 Known issues

5.2.1 AssistNow Online in GLONASS mode

When the receiver is in GLONASS mode AssistNow Online will only provide time and position aiding. No external GLONASS orbit data will be available.

5.2.2 Use of AID-DATA is deprecated

When using the AID-DATA command, it is possible that not all expected messages are output due to buffer constraints. Using AID-DATA is not advised. It is recommended to poll the various AID class messages individually.

5.2.3 Time pulse pin pulled high in SW backup

When the receiver goes to software backup, the time pulse pin is erroneously pulled high instead of driven low. This will result in higher power consumption, for example in Power Save Mode during an off time, depending on the hardware design.

5.2.4 Wrong RTC measurements

During one 10 s period every 4 hours the RTC may be incorrectly calculated, resulting in a wrong time being reported if a Hotstart is performed during this window. This is corrected shortly afterwards. This issue can be observed during PSM on/off operation.

5.2.5 Switching off DC/DC may cause reset

If the recommendations in the Hardware Integration Manual are not strictly adhered to, the receiver might be unintentionally reset when switching DC/DC off, e.g. during power save mode when using on/off mode.

5.2.6 CN0 may be unstable in GLONASS mode

In GLONASS mode the CN0 of the satellites can occasionally fluctuate. Position accuracy performance in GLONASS mode may be degraded if this occurs.

5.2.7 Extended POST will fail if firmware patched

If certain types of patches need to be applied to ROM, then the extended POST may fail.

5.2.8 Spurious time pulses at start

Occasionally there may be spurious time pulses at receiver start up before the system has completely booted.

5.2.9 Receiver restarts during leap second (GLONASS mode only)

Since the behavior of GLONASS signals during leap seconds is not well defined, the receiver will restart itself if running in GLONASS mode when a leap second occurs.

5.2.10 Current consumption in SW backup too high

Any PIO connected to ground in a hardware design will result in increased power consumption in software backup mode because the PIOs have an internal pull-up.

5.2.11 Uncontrolled PIO state during SW backup

Control of pin state in software backup is not supported. IF configuration pins are used and connected to ground, additional current consumption is to be expected during SW backup. For detailed information refer to the *UBX-G7020 Hardware Integration Manual* .

5.2.12 AssistNow offline and AssistNow Autonomous are exclusive

AssistNow offline and AssistNow autonomous cannot be used concurrently. Using both at the same time may lead to unpredictable behavior.

6 Change log

Date of change	Firmware	Modifications
Sep. 20, 2012	1.00	Initial release
Sep. 04, 2013	1.01	Section 1 updated for FW version 1.01 Added sections 4.7 and 4.8