

Release note

Topic	u-blox M10 ROM 5.00 Release Notes
	UBX-20050981 C1-Public
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1 General information

1.1 Scope

This release note applies to u-blox M10 ROM firmware SPG 5.00.

This document covers the changes in the firmware compared u-blox M8 SPG 3.01.

1.2 Related documentation

- [1] u-blox 8/M8 firmware v. 3.01 for standard precision GNSS, Release notes, [UBX-16000319](#)
- [2] u-blox M10 FW5.00 Interface description, [UBX-20048810](#)

2 Released firmware image

2.1 ROM firmware

Released firmware image for u-blox M10

Firmware version	ROM SPG 5.00 (0dbd69)
Protocol version	PROTVR=34.00

2.2 Released software

2.2.1 u-center

The u-center GNSS evaluation software will be provided by u-blox Field Application Engineers together with a product sample delivery.

3 Changed and improved features

3.1 Improved startup sensitivity and TTFF

The cold start acquisition sensitivity improved for Galileo / BeiDou (3 dB) and GLONASS (2 dB) over M8 receivers. Hot start sensitivity improved by 3 to 4 dB as well.

The TTFF figures at reference signal level improved for Galileo (-7 s), BeiDou (-4 s) and GLONASS (-3 s).

Please refer to the data sheet for details.

3.2 QZSS L1S support

The receiver can use corrections provided via the QZSS L1S signal.

Users of the receiver can access the Disaster and Crisis Management report by enabling UBX-RXM-SFRBX and parsing it themselves. There is no dedicated output message for this purpose.

3.3 BDSBAS L1 C/A support

The receiver is prepared to use corrections for GPS L1 C/A provided via BDSBAS L1 signal. These satellites are not enabled by default so the customer will need to do this explicitly. The functionality however has not been verified before release.

3.4 RF spectrum view

Customers can use the UBX-MON-SPAN message to analyze their design and find interference signals via a simple spectrum analyzer implementation.

3.5 AssistNow Offline and Autonomous

The Offline and Autonomous variants of the u-blox AssistNow services now work alongside each other. The receiver intelligently selects the most reliable source of orbit prediction, eliminating the need for the host to predict access to network and select which system to enable in advance.

Assist Autonomous is disabled by default.

3.6 Authentication of data output

The receiver can authenticate all output data using asymmetric key-based cryptographic signatures. Users need to provide a private/public key pair for this communication.

3.7 Location batching

The firmware supports storage of navigation solutions for up to 5 minutes within the receiver even without an external flash. This could be used to reduce system power consumption by allowing the application processor to stay in low-power mode for an extended time.

3.8 Altitude limit

The maximum altitude supported by this product has been increased to 80.000 m.

3.9 Configurable internal LNA

The internal LNA of the u-blox M10 chip can be configured in 3 steps (bypass, low gain, full gain) to adjust to the external antenna setup and to reduce the power consumption.

3.10 NMEA protocol

Support of standard deviation of semi-major axis of error ellipse, standard deviation of semi-minor axis of error ellipse, and orientation of semi-major axis of error ellipse in NMEA GST message (stdMajor, stdMinor and orient).

Display "P90" as used datum in NMEA DTM sentence when PZ90 is selected by the user.

3.11 Boot screen and version string

The boot screen has changed in two ways:

1. A unique chip ID (the same that is available by polling UBX-SEC-UNIQID) is output automatically as part of the boot screen.
2. The version string has changed slightly. Where previously the user would have seen "ROM CORE 5.00", we now output "ROM SPG 5.00". The content of the fwVer field in UBX-MON-VER has changed in the same way.

4 Dropped or reduced features compared to u-blox M8 FW3.01

The following features are reduced compared to u-blox M8 standard precision firmware.

- Power save modes are not supported.
- The geofence feature is not supported.
- The data logger feature is not supported.
- DGNS: Processing of RTCM differential correction messages is not supported.
- QZSS IMES: IMES is not supported.
- Raw measurement output functionality was not verified before release. Output of UBX-RXM-MEASX can be enabled, but the data quality may vary.

5 Message interface

5.1 NMEA protocol

Four NMEA standards are supported. The default NMEA version is 4.10. Alternatively, versions 4.0, 2.3, and 2.1 can be enabled. The details on the NMEA talker identifier can be found in the Interface description [1].

5.1.1 New NMEA messages

Message	Audience	Description / Comment
NMEA-Standard-RLM	PUB	Return link message

5.1.2 Modified NMEA messages

This table contains a list of messages that have been modified compared to messages also available in protocol version 18.00.

Message	Audience	Description / Comment
NMEA-Standard-GAQ	PUB	It is now possible to poll a standard message if the current Talker ID is GA.
NMEA-Standard-DTM	PUB	The message now supports the display of PZ90 datum (as P90).
NMEA-Standard-GST	PUB	Support the output of the error ellipse as defined by its semi-major and semi-minor axis as well as its orientation.
NMEA-Standard-GSV	PUB	Various implementation errors fixed, e.g. null fields, range of azimuth angle [0..359], etc.
NMEA-Standard-GRS	PUB	Various implementation errors fixed, e.g. null fields, residual ordering.
NMEA-Standard-VLW	PUB	The fields that were only introduced in NMEA version 4.00 have been removed from this message for version 2.30.

5.2 UBX protocol

This firmware supports UBX protocol version 34.00.

5.2.1 New UBX messages

Message	Audience	Description / Comment
UBX-CFG-VALDEL	PUB	Part of the new configuration interface
UBX-CFG-VALGET	PUB	Part of the new configuration interface
UBX-CFG-VALSET	PUB	Part of the new configuration interface

UBX-CFG-MSG-UBX_NAV_NMI_PORT	PUB	Output rate of the UBX-NAV-NMI message per port
UBX-LOG-BATCH	PUB	Data batching output data
UBX-LOG-RETRIEVEBATCH	PUB	Data batching request for retrieval
UBX-MON-BATCH	PUB	Data batching state monitoring
UBX-MON-HW3	PUB	Replaces and extends part of UBX-MON-HW and UBX-MON-HW2 functionality
UBX-MON-RF	PUB	Replaces and extends part of UBX-MON-HW and UBX-MON-HW2 functionality
UBX-MON-SPAN	PUB	Crude spectrum analyzer functionality
UBX-NAV-SAT	PUB	Replaces UBX-NAV-SVINFO, contains satellite information but does not contain signal-specific information
UBX-NAV-SIG	PUB	Replaces UBX-NAV-SVINFO, contains signal-specific information
UBX-NAV-TIMEQZSS	PUB	QZSS time information, QZSS time is estimated when QZSS L1S is used in navigation
UBX-SEC-SESSID	PUB	Session ID for message authentication when locking configuration

5.2.2 Modified UBX messages

This table contains a list of messages that have been modified compared to messages also available in protocol version 18.

Message	Audience	Description / Comment
UBX-TIM-TP	PUB	Added "qErrInvalid" flag to indicate when quantization error is not provided
UBX-MON-HW	PUB	Extended content to better fit the generation 10 hardware, but it is still considered deprecated (UBX-MON-RF and UBX-MON-HW3 should be used instead)
UBX-SEC-UNIQID	PUB	Unique chip identifier; the size of the identifier increased to 6 bytes

5.2.3 Removed UBX messages

Message	Audience	Description / Comment
UBX-AID-*	PUB	GPS assistance data; use UBX-MGA-* instead
UBX-NAV-SVINFO	PUB	Use UBX-NAV-SAT or UBX-NAV-SIG instead
UBX-NAV-SOL	PUB	Use UBX-NAV-PVT instead
UBX-RXM-IMES	PUB	IMES is not supported in this firmware
UBX-RXM-SVSI	PUB	Use UBX-NAV-ORB instead
UBX-CFG-GEOFENCE	PUB	Geofence feature is not supported in this firmware
UBX-CFG-LOGFILTER	PUB	Data logger feature is not supported in this firmware
UBX-CFG-USB	PUB	USB (functionality not available in the hardware)
UBX-LOG-CREATE	PUB	Data logger feature is not supported in this firmware
UBX-LOG-ERASE	PUB	Data logger feature is not supported in this firmware
UBX-LOG-FINDTIME	PUB	Data logger feature is not supported in this firmware

UBX-LOG-INFO	PUB	Data logger feature is not supported in this firmware
UBX-LOG-RETRIEVE	PUB	Data logger feature is not supported in this firmware
UBX-LOG-RETRIEVEPOS	PUB	Data logger feature is not supported in this firmware
UBX-LOG-RETRIEVEPOSEXTRA	PUB	Data logger feature is not supported in this firmware
UBX-LOG-RETRIEVESTRING	PUB	Data logger feature is not supported in this firmware
UBX-LOG-STRING	PUB	Data logger feature is not supported in this firmware
UBX-NAV-GEOFENCE	PUB	Geofence feature is not supported in this firmware

5.2.4 Deprecated messages

Support for the following configuration messages will be dropped in the next firmware releases, and they are only present in the current release to make transition to using only UBX-CFG-VALGET, UBX-CFG-VALSET and UBX-CFG-VALDEL easier.

Message	Audience	Description/Comment
UBX-CFG-ANT	PUB	Antenna supervisor
UBX-CFG-BATCH	PUB	Data batching
UBX-CFG-CFG	PUB	Command for saving/loading/reverting configuration
UBX-CFG-DAT	PUB	Datum
UBX-CFG-GNSS	PUB	GNSS signal configuration
UBX-CFG-INF	PUB	Text information output
UBX-CFG-ITFM	PUB	Interference monitor
UBX-CFG-MSG	PUB	Message output rate
UBX-CFG-NAV5	PUB	Navigation
UBX-CFG-NAVX5	PUB	Navigation
UBX-CFG-NMEA	PUB	NMEA version and extensions
UBX-CFG-ODO	PUB	Odometer
UBX-CFG-PM2	PUB	Power save modes
UBX-CFG-PMS	PUB	Power save modes
UBX-CFG-PRT	PUB	Serial interface ports
UBX-CFG-PWR	PUB	Command to enter backup modes;
UBX-CFG-RATE	PUB	Measurement and navigation rate
UBX-CFG-RINV	PUB	Remote inventory
UBX-CFG-RXM	PUB	Power save mode and sensitivity
UBX-CFG-SBAS	PUB	SBAS
UBX-CFG-TP5	PUB	Time pulse

5.3 RTCM protocol

The firmware does not support any version of the RTCM standard for differential GNSS services.

6 Known limitations

- UBX-CFG-CFG support is not completely backwards-compatible. This message has a variant in which the user does not specify which non-volatile medium they want to use as storage device or as a source of loaded configuration. This variant does not save configuration in flash memory.

Workaround: use the message variant that specifies the storage medium, or use the UBX-CFG-VALSET message.

- DC-coupled TCXOs are fully supported by this firmware. From a concept point of view, crystal oscillators are supported as well, but they have not been fully tested with this firmware. Customers are encouraged to contact u-blox support if they intend a design with a crystal oscillator.
- QZSS satellites are labeled incorrectly as GPS satellites in NMEA 4.10 GxGSV sentences when “extended SV numbering” is enabled.
- Fill level indicator of data batching cannot be mapped to GPIO 5.

Workaround: Map it to another pin.

- In some situations, if Galileo is enabled along another GNSS, only few Galileo satellites are available for the first few minutes after startup. This may result in a degradation of positioning accuracy after startup and missed Return Link Messages (RLM).

Mitigation: Use GNSS assistance service (online or offline), use Galileo-only configuration if RLM is the primary concern, enable BeiDou or GLONASS reception if power budget allows.

- When configured to not use BeiDou or GLONASS (default setting), the receiver may acquire and track imaginary GPS L1C/A signals in the absence of real signals. This may lead to very inaccurate position output during signal outage or after a hot start if signals are not available. The problem is present in case of a passive antenna setup and if the internal LNA is configured to normal or low gain mode.

Workaround/mitigation: Use an active antenna setup / external LNA or enable BeiDou or GLONASS.

- Software backup mode followed by disconnecting V_CORE (V_IO still connected) may cause a lockup of the receiver.

Workaround: When using software backup, disconnect V_CORE and V_IO to power off the receiver.

- When entering software backup mode, the receiver may wake up immediately, if the UART Rx pin is enabled as a wakeup source even if no RX data has been received.

Workaround: use another wakeup source (GPIO5, EXTINT).

- If a receiver runs for ~49 days without reset, in default configuration, power consumption may increase by a significant amount, probably around 20%.

Workaround: Perform hot start via hardware or command at a suitable time before the 49th day (but avoid “GNSS only” restarts by command).

- In rare cases after startup, the receiver will output valid position, but then for 1-3 (mostly 1) epochs fails to output a position. After that the receiver will resume normal operation again. This has only been observed for aided cold starts.
- In some cases the receiver may report a failure to store SBAS data via the error message “SBAS alc X” where X is a number. There is no performance degradation and customers can ignore the error message.
- The data batching feature may not work after restarting the receiver, or enabling/disabling the feature. Currently no workaround is available.
- I2C interface cannot be disabled in runtime via CFG-I2C-ENABLED. If this is attempted, an exception is thrown and the receiver restarts. Workaround: Use UBX-CFG-VALSET to change the configuration on a non-volatile layer only, and then restart the receiver to apply the changes.
- Some devices may show poor performance with strong signals (40 dBm or better CN0) in the default “balanced” power mode. This degradation can be visible as loss of signals at the same time or reporting signals weaker than they really are. Workaround: Change to “full power” mode (mode 0) in UBX-CFG-PMS.