Release note

Topic **ZED-F9R-04B with firmware FW1.00HPS1.40**

UBXDOC-304424225-18286 C1-Public

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Contents

1 General information

The product with order code ZED-F9R-04B is delivered with the HPS 1.40 firmware. This document is also applicable to other devices capable of running this firmware.

1.1 Scope

This release note covers the changes to the HPS 1.40 firmware compared to the HPS 1.30 firmware version.

1.2 Released firmware image

Released firmware image	
File	UBX_F9R_100_HPS140.88460c971188f659adcd706f217e85b6.bin
Firmware version	EXT CORE 1.00 (f8b901) FWVER=HPS 1.40
ROM base support	ROM 1.02 - ROM BASE 0x118B2060

1.3 Related software

Version 24.10 (or later) of u-center GNSS evaluation software is recommended to be used with the released firmware. Please contact FAE if this version is not available on the official web site.

Version 23.11 (or later) of the firmware update tool supports this release.

1.4 Open-source declaration

This u-blox positioning product described in this release note, comprising the company's proprietary software, does not contain open-source software to declare.

1.5 Related documentation

[1] u-blox HPS 1.40 Interface description, UBXDOC-963802114-13138
[2] u-blox ZED-F9R Integration manual, UBX-20039643
[3] u-blox ZED-F9R-04B Data sheet, UBXDOC-963802114-12930

2 New features

When migrating from the previous version of the product, users are advised to perform re-testing in their system.

2.1 Rail and tram use case support

Vehicle behaving as rail vehicle and trams can calibrate the inertial navigation system for applications requiring a meter level of accuracy. The system must provide a wheel tick and direction signal and must be manually aligned in the vehicle. The tolerance of the mounting alignment may be set to high or low using CFG-SFIMU-IMU_MNTALG_TOLERANCE. This provides a tradeoff between faster sensor fusion calibration times versus the effort required to properly mount the system.

Compared to a system using only a GNSS receiver, this solution improves the availability of the position even when the sky view is completely obstructed. Furthermore, the system can output the heading and attitude even where it is at standstill.

2.2 SPARTN 2.0.2 with Beidou & QZSS

Secure Position Augmentation for Real Time Navigation (SPARTN) is an open standard format available at https://www.spartnformat.org/.

In addition to GPS, GLONASS and Galileo, this SPARTN release also supports corrections for BDS and QZSS.

2.3 Improved modelling for SPARTN services during high ionospheric activity

This firmware includes improvements in the ambiguity resolution algorithms that provide increased robustness and reliability during periods of high solar activity while using SPARTN correction services. This implementation is equivalent to the algorithms found in ZED-F9P-05B with the HPS1.51 firmware.

2.4 Lever arm support

In systems where the level of accuracy is comparable to the offsets between the various reference points like GNSS antenna phase center, IMU reference frame, middle of the vehicle rear axle, these offsets need to be specified generally referred to as lever arms. In previous releases of the product, the lever arms were confidential messages reserved for advanced users. These messages are now publicly available to user and supported by u-center.

2.5 Support of RTCM 3.4 corrections

When operating in the RTK mode with RTCM corrections, this firmware now supports RTCM version 3.4 messages.

2.6 Conservative Ambiguity Resolution mode

This firmware includes a new option that can be selected via CFG-NAVHPG-DGNSSMODE, value 5 (RTK_CAR), for a Conservative Ambiguity Resolution approach. When enabled, the occurrence of false RTK fixes is reduced, especially within challenging environments where disturbances such as multipath may be present. Please note that, depending on conditions, the time to ambiguity fix may be longer when the conservative mode is in use.

By default, this option is disabled. The firmware starts up with the default value 3 (RTK_FIXED)

2.7 Filtering of vibration impacting IMU

In systems where there is strong undamped mechanical vibration affecting the quality of IMU data sufficient to impact sensor fusion performance, an optional digit filter is available to partially mitigate the issue. The presence of this kind of vibration can be confirmed by observing the level of noise reported by the UBX-ESF-STATUS message.
By default, the filter is disabled. The filter is enabled by setting CFG-MOT-IMU_FILT_WINDOW to a non-zero value. For typical applications, 100 [ms] is suitable.

3 Message interface

3.1 UBX protocol

This firmware supports UBX protocol version 33.40.

3.2 NMEA protocol

NMEA version 4.11 is the default and is unchanged.

3.3 New messages

Message / Configuration item	Description / Comment
SPARTN-1X-OCB_BDS	Support for additional SPARTN input messages (BDS, QZSS)

SPARTN-1X-OCB_QZSS SPARTN-1X-HPAC_BDS SPARTN-1X-HPAC_QZSS	
UBX-ESF-RESETALG	Resets the automatic IMU-mount alignment.
CFG-SFCORE-IMU2CRP_LA_X CFG-SFCORE-IMU2CRP_LA_Y CFG-SFCORE-IMU2CRP_LA_Z	Configure IMU-to-CRP lever arms.
CFG-SFIMU-IMU2ANT_LA_X CFG-SFIMU-IMU2ANT_LA_Y CFG-SFIMU-IMU2ANT_LA_Z	Configure IMU-to-Antenna lever arms.
CFG-SFIMU-IMU_MNTALG_TOLERANCE	Set the tolerance of user-configured IMU-mount alignment angles. The default is LOW tolerance (value 0), meaning the configured angles are accurate.
CFG-SFODO-IMU2VRP_LA_X CFG-SFODO-IMU2VRP_LA_Y CFG-SFODO-IMU2VRP_LA_Z	Configure IMU-to-VRP lever arms for wheel tick or speed information input.
CFG-HW-ANT_ON_SHORT_US	Delay in microseconds between turning the antenna power supply on and enabling the antenna short circuit detection.
CFG-SEC-SPOOFDET_SIM_SIG_DIS	Disable spoofing detection of simulated signals. The default is 0 (i.e. spoofing detection is enabled).
CFG-MOT-IMU_FILT_WINDOW	Enable filtering of . The default is 0 (disabled)

3.4 Modified messages

Message / Configuration item	Description / Comment
UBX-MON-COMMS	New bitfield “outputPort” now reports the port from which this message was output from
UBX-MON-RF	Now compatible with u-center.
CFG-NAVHPG-DGNSSMODE	Value 5 is new for RTK_CAR
CFG-NAVSPG-DYNMODEL	New option RAIL (value 13), for trains and trams dynamic model
CFG-NAVSPG-WKNROLLOVER	New default value: 2349
CFG-SBAS-PRNSCANMASK	New default value: 0x000000000003ab88
CFG-SBAS-ACCEPT_NOT_IN_PRNMASK	Renamed existing configuration item CFG-SBAS-IGN_HEALTH_FROM_PRNMASK

3.5 Removed messages

Message / Configuration item	Description / Comment

3.6 Firmware changes

- Low-level system errors were corrected to output in all ports
- SPARTN keys now switch to the next one even if the “valid from ToW” (i.e. start of the week) value is zero
- Corrected an issue where PointPerfect keys incorrectly switched when the server sent messages with GLONASS timetags. This caused the key switch to happen 3 hours too early

when the PointPerfect service sent a stream with GLONASS messages. Consequently, there was a 3-hour period during which the decrypted messages were invalid.
- Corrected some NMEA messages with a missing talker ID.
- Corrected the content of UBX-MON-RF messages to be compatible with u-center.

4 Known limitations

4.1.1 Known firmware limitations

- The system signal configuration performed by CFG-SIGNAL-* immediately after startup may be ignored until the next GNSS restart. Configuring to flash is a workaround.
- NMEA GxGRS and GxGNS messages may exceed the 82-character limit to 85 characters.
- Signal configuration may be ignored if sent immediately after startup.
- NMEA GNGNS posMode field reports the same status for all GNSSs, not per GNSS.

4.1.2 Known hardware limitations

- It may not be possible to certify the USB interface according to the USB standard.
- The I2C has an issue with the setup time when used with clock stretching. It is recommended to use the fast mode.

5 Revision history

Revision	Date	Name	Comments
R01	7-Feb-2025	ANGI	First release of release note