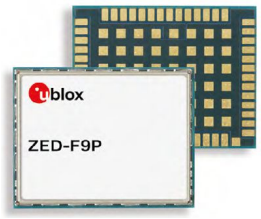
ZED-F9P FW 1.00 HPG 1.30

ZED-F9P

Release Note



Abstract
This document contains general information, interface changes and firmware changes (features, improvements), along with known limitations for ZED-F9P FW 1.00 HPG 1.30.

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Document information

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Contents

1 General information

1.1 Scope

This Release Note applies to ZED-F9P with Firmware 1.00 HPG 1.30.

The document covers the changes in the ZED-F9P firmware compared to firmware version FW 1.00 HPG 1.13. Please refer to u-blox ZED-F9P Release Note FW 1.00 HPG 1.13 for a full description.

1.2 Released firmware image

File	UBX_F9_100_HPG_130_ZED_F9P.aa1ce2137147f95bbde5532f1b495848.bin
Firmware version	EXT CORE 1.00 (9acf11) FWVER=HPG 1.30
ROM base support	ROM 1.02 - ROM BASE 0x118B2060 ROM 1.01 - ROM BASE 0xDD3FE36C ROM 0.40 - ROM BASE 0xCAAF619C

Table 1: Released firmware image for u-blox ZED-F9P

1.3 Related software

It is recommended to use u-center GNSS evaluation software version 21.12 (or later) with the released product.

1.4 Related documents

[1] HPG 1.30 Interface description, UBX-21046737
[2] ZED-F9P-04B Data sheet, UBX-21044850
[3] ZED-F9P Integration manual, UBX-18010802
[4] ZED-F9P Release note FW 1.00 HPG 1.13, UBX-20019211

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2 New features

2.1 SPARTN 2.0.1

ZED-F9P supports SPARTN formatted corrections to enable SPARTN 2.0.1 support.

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

A service provider using SPARTN formatted corrections can enable high precision positioning applications with the ZED-F9P. Compared to RTCM, which is used primarily for OSR, SPARTN has a complete set of messages suitable for SSR models without the use of vendor specific messages. The use of SSR in the foundation allows services to be efficiently delivered over a broadcast medium such as L-band satellite signal or cellular networks. This allows a product to be deployed anywhere on a continent with a single service provider.

This release of SPARTN supports corrections for GPS, GLONASS and Galileo.

2.2 SPARTN over L-band

ZED-F9P supports SPARTN corrections as broadcasted by L-band satellites.

☞ Receiving the SPARTN correction stream requires a NEO-D9S who then must pass the correction stream to ZED-F9P in the form of UBX-RXM-PMP messages.

2.3 SPARTN source selection

ZED-F9P supports multiple SPARTN correction stream sources. It can support a SPARTN correction stream received over the internet (SPARTN IP stream) or over L-band satellites (SPARTN L-band stream). Only one source can be configured to be used at a time by ZED-F9P.

2.4 PointPerfect encrypted SPARTN support

ZED-F9P supports on-device decryption of encrypted PointPerfect SPARTN correction streams. PointPerfect is a correction service available from u-blox that can provide SPARTN correction streams over the internet or over L-band satellites.

☞ Due to keying changes associated with the PointPerfect correction service, ZED-F9P on-device decryption is compatible with SPARTN 2.0 streams and not SPARTN 1.8 streams

2.5 CLAS CSSR

ZED-F9P supports CLAS (Centimeter Level Augmentation Service); an augmentation service broadcasted by the Japanese regional satellites system, QZSS. This free service is intended for mass market applications, such as surveying, heavy machinery used in precision construction, and precision agriculture.

☞ The CLAS augmentation service is broadcasted by a QZSS L6 signal which is not part of the frequency range covered by ZED-F9P. As such, ZED-F9P does not support receiving, demodulating and decoding of the QZSS L6 signal. This is supported by NEO-D9C which then must pass the correction stream to ZED-F9P in the form of UBX-RXM-QZSSL6 messages. This enables the ZED-F9P to directly use these messages and extract the compact SSR (cSSR) formatted corrections in order to use them directly without further processing or reformatting by an intermediary.

☞ At the time of this release note, a CLAS solution with ZED-F9P augments GPS L1C/A L2C, QZSS L1 C/A L2C, and Galileo E1B/C

2.6 High-precision GNSS position protection level

ZED-F9P reports a high-precision GNSS position protection level (HPG PL) with a Target Misleading Information Risk (TMIR) of 5 [%MI/epoch], in other words a 5% probability of having misleading information per epoch.

☞ ZED-F9P currently supports only position protection level output. It does not support velocity and time protection level output.

☞ The confidence level of the protection level is validated against specific operating conditions. In the case of ZED-F9P it has been validated for RTK operation with RTCM input correction streams.

2.7 Secondary output

A complete set of messages based on a navigation solution computed as a GNSS standalone receiver is available at the same update rate as the primary output. These messages are available both in NMEA and UBX protocols.

These messages can be configured to restrict the use to only GPS satellites which have integrity monitoring messages. The resulting secondary output messages can be used as a check against potential software faults in the correction service or RTK software in the system. The secondary output is also a useful tool during development.

By default, the secondary output is disabled.

2.8 Additional BeiDou satellites

Additional BeiDou satellites (Space Vehicles ID 37 to 63) are supported. This includes BeiDou geostationary satellites with Space Vehicles ID 59 to 63. The use of all BeiDou geostationary satellites (Space Vehicles ID 1 to 5 and 59 to 63) can be enabled using the CFG-BDS-USE_GEO_PRN configuration item and may lead to improved accuracy. Default configuration is false.

2.9 UBX protocol on UART2

ZED-F9P adds support for the UBX protocol as an input/output protocol on the UART2 interface.

☞ Not all UBX functionality is available on UART2. UART2 should not be used as the sole interface.

2.10 Configuration lockdown

A security mechanism where malicious host software is prevented from unintentional corruption of the receiver configuration.

3 Message interface

3.1 UBX

ZED-F9P FW 1.00 HPG 1.30 supports UBX protocol version 27.30.

3.2 NMEA

ZED-F9P FW 1.00 HPG 1.30 supports up to NMEA protocol version 4.11.

Five NMEA standards are supported. The default NMEA version is 4.11, and, alternatively, versions 4.10, 4.0, 2.3, and 2.1 can be enabled.

3.3 RTCM

ZED-F9P FW 1.00 HPG 1.30 supports up to RTCM3 standard version 3.3.

3.4 SPARTN

ZED-F9P FW 1.00 HPG 1.30 supports up to SPARTN protocol version 2.0.1.

3.5 Interface changes

3.5.1 New

Message / Configuration item	Description / Comment
SPARTN-1X-OCB_GPS SPARTN-1X-OCB_GLO SPARTN-1X-OCB_GAL SPARTN-1X-HPAC_GPS SPARTN-1X-HPAC_GLO SPARTN-1X-HPAC_GAL SPARTN-1X-GAD	SPARTN input messages supported
CFG-I2CINPROT-SPARTN CFG-SPIINPROT-SPARTN CFG-UART1INPROT-SPARTN CFG-UART2INPROT-SPARTN CFG-USBINPROT-SPARTN	Enable/disable SPARTN protocol input support on all interfaces (default: SPARTN input support enabled)
CFG-SPARTN-USE_SOURCE	Select SPARTN input source to be used; can be IP stream containing SPARTN format messages or L-band stream containing UBX-RXM-PMP format messages (default: IP)
UBX-RXM-SPARTN	Message to report the SPARTN input status. Message output rate configurable with new CFG-MSGOUT-UBX_RXM_SPARTN-* configuration items.
UBX-RXM-COR	Differential correction input status. Reported for all parsed correction input and can be used instead of UBX-RXM-RTCM and UBX-RXM-SPARTN. Message output rate configurable with new CFG-MSGOUT-UBX_RXM_COR_* configuration items.
UBX-RXM-PMP	Point to Multipoint (LBAND) message. Input support for SPARTN corrections as broadcasted by L-band satellites. UBX-RXM-PMP output requires a NEO-D9S.
UBX-RXM-SPARTNKEY	Poll or transfer dynamic SPARTN keys to be used for decrypting input SPARTN format messages
UBX-RXM-QZSSL6	QZSS L6 message. Input support for QZSS L6 messages containing a CLAS CSSR correction stream. UBX-RXM-QZSSL6 output requires a NEO-D9C.

Message / Configuration item	Description / Comment
CFG-NAV2-* CFG-NAV2-OUT_ENABLED CFG-NAV2-SBAS_USE_INTEGRITY	Configuration group CFG-NAV2 with configuration items for secondary output setup (default: secondary output disabled)
UBX-NAV2-CLOCK UBX-NAV2-COV UBX-NAV2-DOP UBX-NAV2-EOE UBX-NAV2-ODO UBX-NAV2-POSECEF UBX-NAV2-POSLLH UBX-NAV2-PVT UBX-NAV2-SAT UBX-NAV2-SBAS UBX-NAV2-SIG UBX-NAV2-SLAS UBX-NAV2-STATUS UBX-NAV2-SVIN UBX-NAV2-TIMEBDS UBX-NAV2-TIMEGAL UBX-NAV2-TIMEGLO UBX-NAV2-TIMEGPS UBX-NAV2-TIMELS UBX-NAV2-TIMEQZSS UBX-NAV2-TIMEUTC UBX-NAV2-VELECEF UBX-NAV2-VELNED	Secondary output (NAV2) messages in UBX format. Message output rate configurable with new CFG-MSGOUT-UBX_NAV2-* configuration items.
NMEA-NAV2-ID-GGA NMEA-NAV2-ID-GLL NMEA-NAV2-ID-GNS NMEA-NAV2-ID-GSA NMEA-NAV2-ID-RMC NMEA-NAV2-ID-VTG NMEA-NAV2-ID-ZDA	Secondary output (NAV2) messages in NMEA format. Available if configured NMEA version is NMEA 4.0 or later. Message output rate configurable with new CFG-MSGOUT-NMEA_NAV2_ID_* configuration items.
CFG-SEC-CFG_LOCK CFG-SEC-CFG_LOCK_UNLOCKGRP1 CFG-SEC-CFG_LOCK_UNLOCKGRP2	Configuration items for setting up the configuration lockdown (default: configuration lockdown disabled)
UBX-NAV-COV	Outputs covariance matrices for the position and velocity solutions. Message output rate configurable with new CFG-MSGOUT-UBX_NAV_COV_* configuration items.
UBX-NAV-PL	Protection level information. Message output rate configurable with new CFG-MSGOUT-UBX_NAV_PL_* configuration items.
CFG-NAVSPG-PL_ENA	Enable/disable protection level computing (default: protection level computing enabled)
CFG-QZSS-SLAS_MAX_BASELINE	Maximum baseline distance to closest GMS for applying SLAS corrections (default: 200 km)
CFG-TP-DRSTR_TP1	Drive strength setting of TP1 pin

Message / Configuration item	Description / Comment
UBX-MON-SYS	Current system performance information. Message output rate configurable with new CFG-MSGOUT-UBX_MON_SYS_* configuration items.

3.5.2 Modified

Message / Configuration item	Description / Comment
CFG-NMEA-PROTVER	New default value: NMEA protocol version 4.11 configured by default Previous default value: NMEA protocol version 4.10
CFG-SBAS-PRNSCANMASK	Default value changed from 0x0000000000072bc8 to 0x0000000000072b88 and does not include PRN126
CFG-BDS-USE_GEO_PRN	Configuration item name changed from CFG-BDS-USE_PRN_1_TO_5 to CFG-BDS-USE_GEO_PRN. Configuration item key ID remains the same.
UBX-NAV-PVT	New field lastCorrectionAge that reports the age of the most recently received differential correction
UBX-NAV-SBAS	New flag integrityUsed
UBX-NAV-SIG UBX-NAV-SAT	New correction sources SPARTN and CLAS reported
UBX-MON-COMMS	New protocol SPARTN reported

3.5.3 Removed

Message / Configuration item	Description / Comment
-	-

4 Improvements

- Improved USB interface robustness; changed USB behavior at startup where a USB bus detached startup state is simulated at startup for 1 sec
- Receiver can tolerate RTCM input correction streams ending with an RTCM MT MSM 1131-1137 (NavIC)
- Improved I2C interface robustness
- Galileo time aiding via UBX-MGA-INI-TIME_GNSS is now possible
- Ignore RTCM messages for unhealthy satellites
- GPS L2C signal tracking improvements under challenging conditions
- NMEA 4.11 now reports signal IDs in hex format as specified in the standard
- RTK_STAT pin level correctly indicates RTK status and NMEA-GGA correction age is not empty, when receiving/using SBAS/SLAS corrections in parallel with RTCM corrections
- Correct fix type reported and correct RTK fix status reported, when SBAS integrity data are applied
- Odometer distance traveled does not update, when the position accuracy exceeds the maximum threshold configured in CFG-ODO-ODOMAXPOSACC
- RTCM correction streams containing messages with millisecond-ambiguous corrections (RTCM MT 1001, 1003, 1009, 1011, MSM1 to MSM3) no longer result in bad RTK performance
- Improved handling of highly eccentric Galileo orbits
- Receivers configured without GPS no longer experience a slower time to first fix at startup (warm/hot/aided startup) when certain conditions were met
- BeiDou Space Vehicles 38 to 63 are now correctly reported in UBX-NAV-SBAS and NMEA-PUBX03 messages
- The single-byte SVID for BeiDou Space Vehicles 6 to 37 is now correctly reported in UBX-NAV-SBAS and NMEA-PUBX-SVSTATUS messages
- Improved handling of Galileo SISA values
- Improved start-up robustness against unexpected system restarts
- Receiver recovers gracefully after entering software backup mode or sleep mode
- Satellite Vehicle information no longer reported twice in consecutive NMEA-GxGSV messages. This would occur when the latter message contained info on untracked SV (i.e. when Cn0 was 0).
- Enabling the low pass velocity filter (CFG-ODO-OUTLPVEL) no longer triggers ERROR messages
- Improved start-up robustness in rare cases where the receiver would drop for 1 to 3 epochs into a 'no fix' solution from a 'fix ok' solution
- Improved SBAS Message Type 1 content handling when containing invalid data
- UBX-MON-RF no longer reports the same value (0) for the blockId field in all its repeated blocks
- Configuring the CFG-RATE-NAV configuration item with the unsupported value 128 no longer causes a system restart
- Improved L2 tracking performance when receiver configured with GPS and GLONASS only

5 Known limitations

- A receiver moving at very slow speed (less than 10 cm/s) does not update the heading information in UBX-NAV-PVT. The velocity vectors can be used reliably.
- Geofence status pin must not be re-assigned to another pin
- If the receiver is configured to output RTCM messages on several ports, the ports must have the same RTCM configuration, otherwise the MSM multiple message bit might not be set correctly
- Time pulse can only be synced to GNSS. Configuration items and relevant flag cannot be set to false (CFG-TP-SYNC_GNSS_TP1, UBX-CFG-TP5)
- If the receiver is configured to GLONASS only operation, it cannot get a PPP-RTK fix when using SPARTN corrections
- Static hold mode is unreliable at navigation rates larger than 1 Hz
- Incorrect SBAS pseudo range value corresponding to 4 ms shift may be reported in UBX-RXM-SFRBX messages. This can be detected by monitoring the halfCyc flag in UBX-RXM-RAWX.
- Lower navigation rate achievable compared to previous firmware; performance figures available in related Data sheet document
- When QZSS L1S is enabled, it can be observed that QZSS L1C/A reports 'Half cycle invalid' in UBX-RXM-RAWX
- UART2 may report different UBX-INF-ERROR messages than the ones reported on the other interfaces