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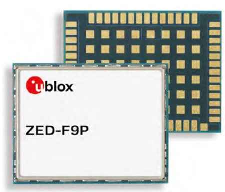
ZED-F9P

u-blox F9 high precision GNSS module

Data Sheet

Highlights

- Concurrent reception of GPS, GLONASS, Galileo and BeiDou
- Multi-band RTK with fast convergence times and reliable performance
- High update rate for highly dynamic applications
- Centimeter accuracy in a small and energy-efficient module
- Easy integration of RTK for fast time-to-market



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This document applies to the following products:

Product name	Type number	Firmware version	PCN reference
ZED-F9P	ZED-F9P-00B-00	HPG 1.00	N/A

Contents

1 Functional description

1.1 Overview

The ZED-F9P positioning module features the u-blox F9 receiver platform, which provides multi-band GNSS to high volume industrial applications. The ZED-F9P has integrated u-blox multi-band RTK technology for centimeter level accuracy. The module enables precise navigation and automation of moving machinery in industrial and consumer grade products in a compact surface mounted form factor.

1.2 Performance

Parameter	Specification	
Receiver type	Multi-band GNSS high precision receiver	
Accuracy of time pulse signal	RMS	30 ns
	99%	60 ns
Frequency of time pulse signal		0.25 Hz to 10 MHz (configurable)
Operational limits[1]	Dynamics	≤ 4 g
	Altitude	50,000m
	Velocity	500 m/s
Velocity accuracy		0.05 m/s[2]
Dynamic heading accuracy		0.3 deg [2]

GNSS		GPS+GLO+GAL +BDS	GPS+GLO+GAL	GPS+GAL	GPS+GLO	GPS+BDS	GPS
Acquisition[3]	Cold start	24 s	25 s	29 s	26 s	28 s	29 s
	Hot Start	2 s	2 s	2 s	2 s	2 s	2 s
	Aided Starts[4]	2 s	2 s	2 s	2 s	2 s	2 s
Nav. update rate	RTK	8 Hz	10 Hz	12 Hz	12 Hz	12 Hz	20 Hz
	PVT	10 Hz	12 Hz	16 Hz	25 Hz	25 Hz	25 Hz
	RAW	20 Hz	20 Hz	25 Hz	25 Hz	25 Hz	25 Hz
Convergence time[5]	RTK	< 10 s	< 10 s	< 10 s	< 10 s	< 10 s	< 30 s
Horizontal pos. accuracy	RTK[5] [6]	0.01 m + 1 ppm CEP	0.01 m + 1 ppm CEP	0.01 m + 1 ppm CEP	0.01 m + 1 ppm CEP	0.01 m + 1 ppm CEP	0.01 m + 1 ppm CEP

Table 1: ZED-F9P performance in different GNSS modes

1 Assuming Airborne 4 g platform
2 50% @ 30 m/s for dynamic operation
3 All satellites at -130 dBm
4 Dependent on the speed and latency of the aiding data connection, commanded starts.
5 Depends on atmospheric conditions, baseline length, GNSS antenna, multipath conditions, satellite visibility and geometry.
6 Measured using 1 km baseline and patch antennas with good ground planes. Does not account for possible antenna phase center offset errors. ppm limited to baselines up to 20 km.

GNSS sensitivity		GPS+GLO+GAL +BDS+QZSS
Sensitivity[7]	Tracking and Nav	-167 dBm
	Reacquisition	-160 dBm
	Cold start	-148 dBm
	Hot Start	-157 dBm

Table 2: ZED-F9P sensitivity.

1.3 Supported GNSS constellations

The ZED-F9P GNSS modules are concurrent GNSS receivers that can receive and track multiple GNSS systems. Owing to the multi-band RF front-end architecture, all four major GNSS constellations (GPS, Galileo, GLONASS and BeiDou) can be received concurrently. All satellites in view can be processed to provide an RTK navigation solution when used with correction data. The ZED-F9P receiver can be configured for concurrent GPS, GLONASS, Galileo and BeiDou plus QZSS reception. If power consumption is a key factor, then the receiver can be configured for a sub-set of GNSS constellations.

The QZSS system shares the same L1 and L2 frequency bands as GPS and can always be processed in conjunction with GPS.

To take advantage of multi-band signal reception, dedicated hardware preparation must be made during the design-in phase. See the ZED-F9P Integration Manual[1] for u-blox design recommendations.

The ZED-F9P supports the GNSS and their signals as shown in Table 3.

GPS	GLONASS	BeiDou	Galileo
L1C/A (1575.42 MHz)	L1OF (1602 MHz + k*562.5 kHz, k = –7,..., 5, 6)	B1I (1561.098 MHz)	E1-B/C (1575.42 MHz)
L2C (1227.60 MHz)	L2OF (1246 MHz + k*437.5 kHz, k = –7,..., 5, 6)	B2I (1207.140 MHz)	E5b (1207.140 MHz)

Table 3: Supported GNSS and signals on ZED-F9P

☞ BDS B2I is not enabled by default.

☞ Galileo support has been implemented according to ICD release 1.3 (December 2016) and verified with live signals now that it has reached Initial Services.

The following GNSS assistance services can be activated on ZED-F9P:

AssistNow™ Online	AssistNow™ Offline	AssistNow™ Autonomous
Supported	-	-

Table 4: Supported Assisted GNSS (A-GNSS) Services

1.4 GNSS augmentation systems

1.4.1 QZSS

The Quasi-Zenith Satellite System (QZSS) is a regional navigation satellite system that transmits additional GPS L1 C/A and L2C signals for the Pacific region covering Japan and Australia. The ZED-F9P high precision receiver is able to receive and track these signals concurrently with GPS

[7] Demonstrated with a good external LNA

L1 C/A and L2C signals signals, resulting in better availability especially under challenging signal conditions, e.g. in urban canyons.

1.4.2 Differential GNSS (DGNSS)

When operating in RTK mode, RTCM version 3 messages are required and the module supports DGNSS according to RTCM 10403.3. A ZED-F9P operating in rover mode can decode the following RTCM 3.3 messages:

Message Type	Description
RTCM 1001	L1-only GPS RTK observables
RTCM 1002	Extended L1-only GPS RTK observables
RTCM 1003	L1/L2 GPS RTK observables
RTCM 1004	Extended L1/L2 GPS RTK observables
RTCM 1005	Stationary RTK reference station ARP
RTCM 1006	Stationary RTK reference station ARP with antenna height
RTCM 1007	Antenna descriptor
RTCM 1009	L1-only GLONASS RTK observables
RTCM 1010	Extended L1-only GLONASS RTK observables
RTCM 1011	L1/L2 GLONASS RTK observables
RTCM 1012	Extended L1/L2 GLONASS RTK observables
RTCM 1033	Receiver and Antenna Description
RTCM 1074	GPS MSM4
RTCM 1075	GPS MSM5
RTCM 1077	GPS MSM7
RTCM 1084	GLONASS MSM4
RTCM 1085	GLONASS MSM5
RTCM 1087	GLONASS MSM7
RTCM 1094	Galileo MSM4
RTCM 1095	Galileo MSM5
RTCM 1097	Galileo MSM7
RTCM 1124	BeiDou MSM4
RTCM 1125	BeiDou MSM5
RTCM 1127	BeiDou MSM7
RTCM 1230	GLONASS code-phase biases

Table 5: Supported input RTCM 3.3 messages

A ZED-F9P operating as a base station can generate the following RTCM 3.3 output messages:

Message Type	Description
RTCM 1005	Stationary RTK reference station ARP
RTCM 1074	GPS MSM4
RTCM 1077	GPS MSM7
RTCM 1084	GLONASS MSM4
RTCM 1087	GLONASS MSM7
RTCM 1094	Galileo MSM4
RTCM 1097	Galileo MSM7
RTCM 1124	BeiDou MSM4
RTCM 1127	BeiDou MSM7

Message Type	Description
RTCM 1230	GLONASS code-phase biases

Table 6: Supported output RTCM 3.3 messages

1.5 Broadcast navigation data and satellite signal measurements

The ZED-F9P high precision receiver can output all the GNSS broadcast data upon reception from tracked satellites. This includes all the supported GNSS signals plus the augmentation service QZSS. The UBX-RXM-SFRBX message is used for this information. The receiver also makes available the tracked satellite signal information, i.e. raw code phase and Doppler measurements, in a form aligned to the Radio Resource LCS Protocol (RRLP) [3]. For specification of the protocols see the u-blox ZED-F9P Interface Description [2]

1.5.1 Carrier-phase measurements

The ZED-F9P modules provide raw carrier phase data for all supported signals. This is along with pseudorange, Doppler and measurement quality information. The data contained in the UBX-RXM-RAWX message follows the conventions of a multi-GNSS RINEX 3 observation file.

☞ Raw measurement data are available once the receiver has established data bit synchronization and time-of-week. For specification of the protocols, see the u-blox ZED-F9P Interface Description [2].

1.6 Protocols and interfaces

Protocol	Type
UBX	Input/output, binary, u-blox proprietary
NMEA	Input/output, ASCII
RTCM 3x	Input/output, binary

Table 7: Available Protocols

For specification of the protocols see the u-blox ZED-F9P Interface Description [2].

☞ All protocols are available on UART1, DDC (I^2C compliant) and SPI.

2 System description

2.1 Block diagram

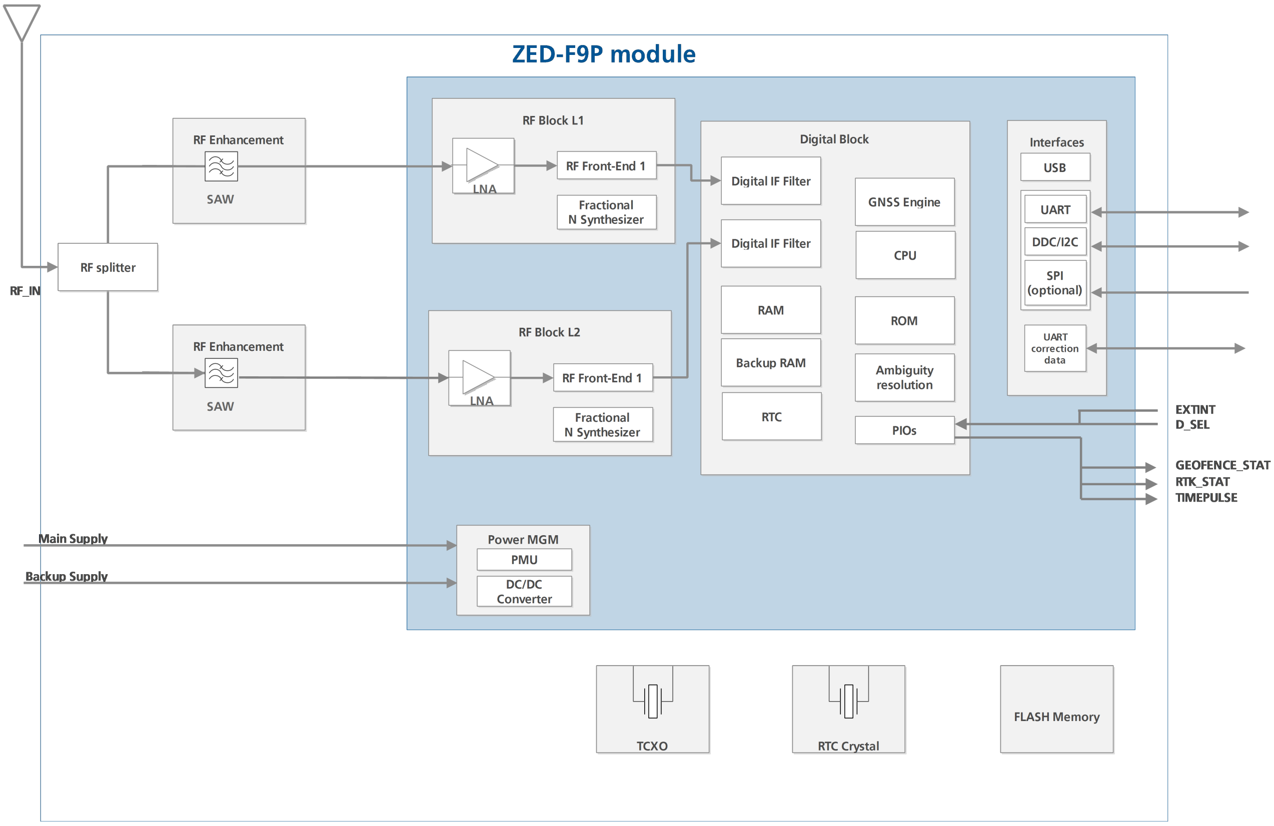


Figure 1: ZED-F9P block diagram

☞ An active antenna is mandatory with the ZED-F9P. See the ZED-F9P Integration Manual[1]

3 Pin definition

3.1 Pin assigment

The pin assignment of the ZED-F9P module is shown in Figure 2. The defined configuration of the PIOs is listed in Table 8.

For detailed information on pin functions and characteristics, see the u-blox ZED-F9P Integration Manual [1].

☞ The ZED-F9P is a LGA package with the I/O on the outside edge and central ground pads that must be soldered and connected to ground. All ground pads (central and on the edge) must be connected to ground.

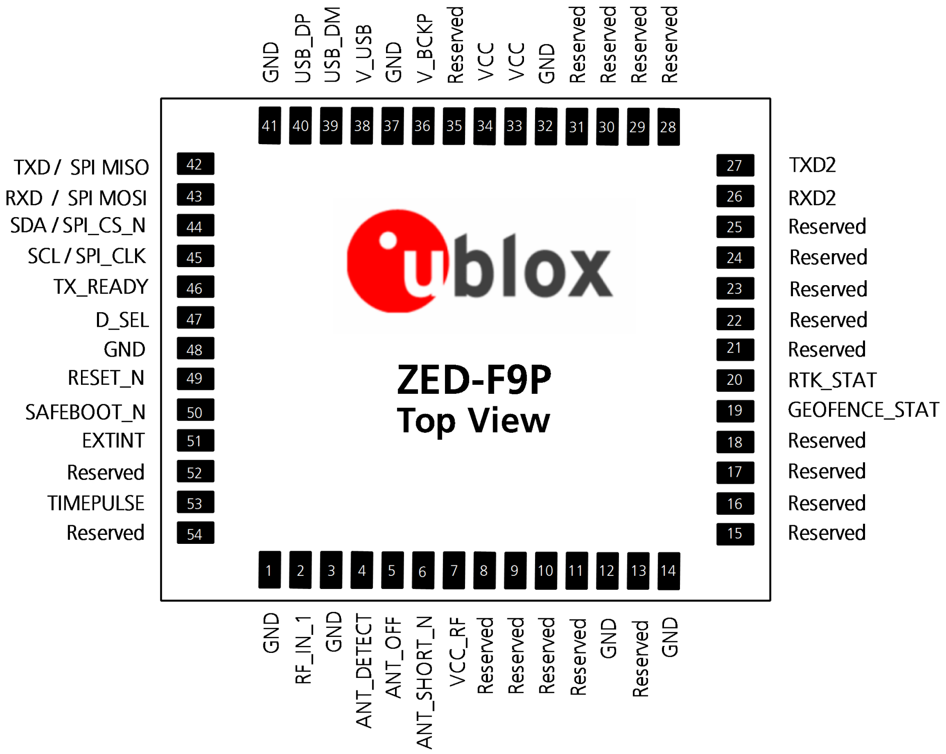


Figure 2: ZED-F9P pin assignment

Pin No	Name	I/O	Description
1	GND	-	Ground
2	RF_IN_1	I	RF input
3	GND	-	Ground
4	ANT_DETECT	I	Active antenna detect - default active high
5	ANT_OFF	O	External LNA disable - default active high
6	ANT_SHORT_N	I	Active antenna short detect - default active low.
7	VCC_RF	O	Voltage for external LNA
8	Reserved	-	Reserved
9	Reserved	-	Reserved
10	Reserved	-	Reserved

Pin No	Name	I/O	Description
11	Reserved	-	Reserved
12	GND	-	Ground
13	Reserved	-	Reserved
14	GND	-	Ground
15	Reserved	-	Reserved
16	Reserved	-	Reserved
17	Reserved	-	Reserved
18	Reserved	-	Reserved
19	GEOFENCE_STAT	O	Geofence status, user defined
20	RTK_STAT	O	RTK status 0 – Fixed, blinking – receiving RTCM data, 1 – no corrections
21	Reserved	-	Reserved
22	Reserved	-	Reserved
23	Reserved	-	Reserved
24	Reserved	-	Reserved
25	Reserved	-	Reserved
26	RXD2	I	Correction UART input
27	TXD2	O	Correction UART output
28	Reserved	-	Reserved
29	Reserved	-	Reserved
30	Reserved	-	Reserved
31	Reserved	-	Reserved
32	GND	-	Ground
33	VCC	I	Voltage supply
34	VCC	I	Voltage supply
35	Reserved	-	Reserved
36	V_BCKUP	I	Backup supply voltage
37	GND	-	Ground
38	V_USB	I	USB supply
39	USB_DM	I/O	USB data
40	USB_DP	I/O	USB data
41	GND	-	Ground
42	TXD / SPI MISO	O	Host UART output if D_SEL = 1(or open). SPI MISO if D_SEL = 0
43	RXD / SPI MOSI	I	Host UART input if D_SEL = 1(or open). SPI MOSI if D_SEL = 0
44	SDA / SPI_CS_N	I/O	DDC Data if D_SEL = 1 (or open). SPI Chip Select if D_SEL = 0
45	SCL / SPI_CLK	I/O	DDC Clock if D_SEL = 1(or open). SPI Clock if D_SEL = 0
46	TX_READY	O	TX_Buffer full and ready for TX of data
47	D_SEL	I	Interface select for pins 42-45
48	GND	-	Ground
49	RESET_N	I	RESET_N
50	SAFEBOOT_N	I	SAFEBOOT_N (for future service, updates and reconfiguration, leave OPEN)
51	EXTINT	I	External Interrupt Pin
52	Reserved	-	Reserved
53	TIMEPULSE	O	Time pulse

Pin No	Name	I/O	Description
54	Reserved	-	Reserved

Table 8: ZED-F9P pin assigment

4 Electrical specification

The limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only, and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Where application information is given, it is advisory only and does not form part of the specification.

4.1 Absolute maximum ratings

Parameter	Symbol	Condition	Min	Max	Units
Power supply voltage	VCC		-0.5	3.6	V
Backup battery voltage	V_BCKP		-0.5	3.6	V
Input pin voltage	Vin		-0.5	VCC+0.5	V
DC current through any digital I/O pin (except supplies)	Ipin			TBD	mA
VCC_RF output current	ICC_RF			100	mA
Input power at RF_IN	Prfin	source impedance = 50 Ω, continuous wave		15	dBm
Storage temperature	Tstg		-40	+85	°C

Table 9: Absolute maximum ratings

Attention Stressing the device beyond the Absolute Maximum Ratings may cause permanent damage. These are stress ratings only. The product is not protected against overvoltage or reversed voltages. If necessary, voltage spikes exceeding the power supply voltage specification, given in table above, must be limited to values within the specified boundaries by using appropriate protection diodes.

4.2 Operating conditions

All specifications are at an ambient temperature of 25°C. Extreme operating temperatures can significantly impact specification values. Applications operating near the temperature limits should be tested to ensure the specification.

Parameter	Symbol	Min	Typical	Max	Units	Condition
Power supply voltage	VCC	2.7	3.0	3.6	V	
Backup battery voltage	V_BCKP	1.65		3.6	V	
Backup battery current	I_BCKP		80		μA	
SW backup current	I_SWBCKP		1.4		mA	
Input pin voltage range	Vin	0		VCC	V	
Digital IO Pin Low level input voltage	Vil	0		0.8	V	
Digital IO Pin High level input voltage	Vih	2		VCC+0.3	V	
Digital IO Pin Low level output voltage	Vol			0.4	V	Iol = 2 mA
Digital IO Pin High level output voltage	Voh	VCC – 0.4			V	Ioh = 2 mA
VCC_RF voltage	VCC_RF		VCC - 0.1		V	
VCC_RF output current	ICC_RF			50	mA	

Parameter	Symbol	Min	Typical	Max	Units	Condition
Receiver Chain Noise Figure[8]	NFtot		9.5		dB	
Operating temperature	Topr	-40		85	°C	

Table 10: Operating conditions

☞ Operation beyond the specified operating conditions can affect device reliability.

4.3 Indicative power requirements

Table 11 lists examples of the total system supply current including RF and baseband section for a possible application.

☞ Values in Table 11 are provided for customer information only as an example of typical current requirements. Values are characterized on samples with a commanded cold start – actual power requirements can vary depending on FW version used, external circuitry, number of SVs tracked, signal strength, type and time of start, duration, and conditions of test.

Symbol	Parameter	Conditions	GPS+GLO +GAL+BDS	GPS	Unit
I_{PEAK}	Peak current	Acquisition	130	120	mA
I_{VCC}[9]	VCC current	Acquisition	90	75	mA
I_{VCC}[9]	VCC current	Tracking	85	68	mA

Table 11: Currents to calculate the indicative power requirements

All values in Table 11 are measured at 25°C ambient temperature.

8 Only valid for the GPS L1 band
9 Simulated signal

5 Communications interfaces

There are several communications interfaces including UART, SPI and I2C.

5.1 UART interface

There are two UART interfaces: UART1 and UART2. UART1 is the primary host communications interface while UART2 is dedicated for RTCM3 corrections and NMEA. No UBX protocol is supported. UART1 and UART2 operate up to and including a speed of 921600 baud. No hardware flow control on UART1 and UART2 is supported.

UART1 is enabled by default if D_SEL = 1 or open.

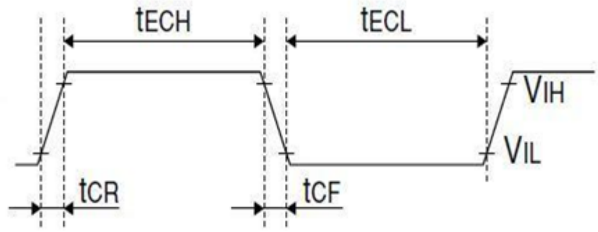


Figure 3: ZED-F9P high precision receiver UART timing specifications

Symbol	Parameter	Min	Max	Unit
VIL	LOW-level input voltage	0	0.2VCC	V
VIH	HIGH-level input voltage	0.7VCC	VCC+0.3	V
tECH	HIGH period of External data input	0	0.4	µs
tECL	Low period of External data input			µs
Ru	Baudrate	9600	921600	bps
tCR	Rise time of Data		5	ns
tCF	Fall time of Data		5	ns

Table 12: ZED-F9P UART timings and specifications

5.2 SPI interface

All the inputs have internal pull-up resistors in normal operation and can be left open if not used. All the PIOs are supplied by VCC, therefore all the voltage levels of the PIO pins are related to VCC supply voltage

The ZED-F9P high precision receiver has a SPI slave interface that can be selected by setting D_SEL = 0. The SPI slave interface is shared with UART1. The SPI pins available are: SPI_MISO (TXD), SPI_MOSI (RXD), SPI_CS_N, SPI_CLK. The SPI interface is designed to allow communication to a host CPU. The interface can be operated in slave mode only. Note that SPI is not available in the default configuration, because its pins are shared with the UART and DDC interfaces. The maximum transfer rate using SPI is 125 kB/s and the maximum SPI clock frequency is 5.5 MHz.

This section provides SPI timing values for the ZED-F9P high precision receiver slave operation. Provided values A, B, C, D and E presented visually in Figure 4 and exact values with defined load capacitance in Table 13, Table 14 and Table 15. Default SPI configuration at u-blox is CPOL = 0 and CPHA = 0.

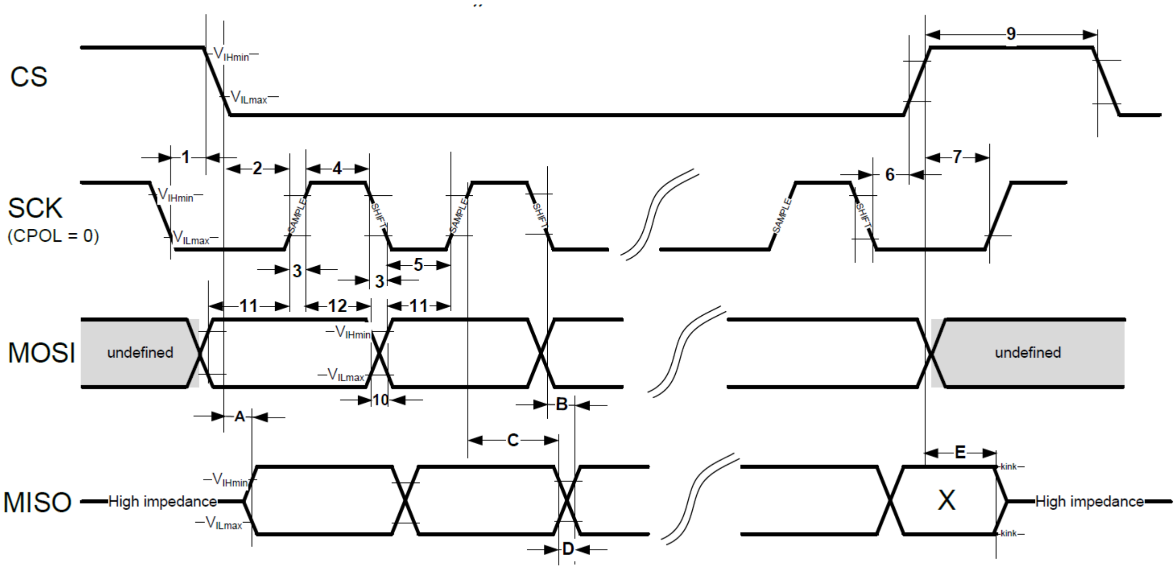


Figure 4: ZED-F9P high precision receiver SPI specification Mode 1: CPHA=0 SCK = 5.33 MHz

Timings 1 - 12 are not specified here.

Timing value @ 2 pF load	Min (ns)	Max (ns)
MISO data valid time (CS) - "A"	14	38
MISO data valid time (SCK) weak driver mode - "B"	21	38
MISO data hold time - "C"	114	130
MISO rise/fall time, weak driver mode - "D"	1	4
MISO data disable lag time - "E"	20	32

Table 13: ZED-F9P SPI timings @ 2pF load

Timing value @ 20 pF load	Min (ns)	Max (ns)
MISO data valid time (CS) - "A"	19	52
MISO data valid time (SCK) weak driver mode - "B"	25	51
MISO data hold time - "C"	117	137
MISO rise/fall time, weak driver mode - "D"	6	16
MISO data disable lag time - "E"	20	32

Table 14: ZED-F9P SPI timings @ 20pF load

Timing value @ 60 pF load	Min (ns)	Max (ns)
MISO data valid time (CS) - "A"	29	79
MISO data valid time (SCK) weak driver mode - "B"	35	78
MISO data hold time - "C"	122	152
MISO rise/fall time, weak driver mode - "D"	15	41
MISO data disable lag time - "E"	20	32

Table 15: ZED-F9P SPI timings @ 60pF load

5.3 Slave I2C interface

An I2C compliant DDC interface is available for communication with an external host CPU. The interface can be operated in slave mode only. The DDC protocol and electrical interface are fully compatible with Fast-Mode of the I2C industry standard. Since the maximum SCL clock frequency is 400 kHz, the maximum bit rate is 400 kbit/s. The interface stretches the clock when slowed down while serving interrupts, therefore the real bit rates may be slightly lower.

☞ The I2C interface is only available with the UART default mode. If the SPI interface is selected by using D_SEL = 0, the I2C interface is not available.

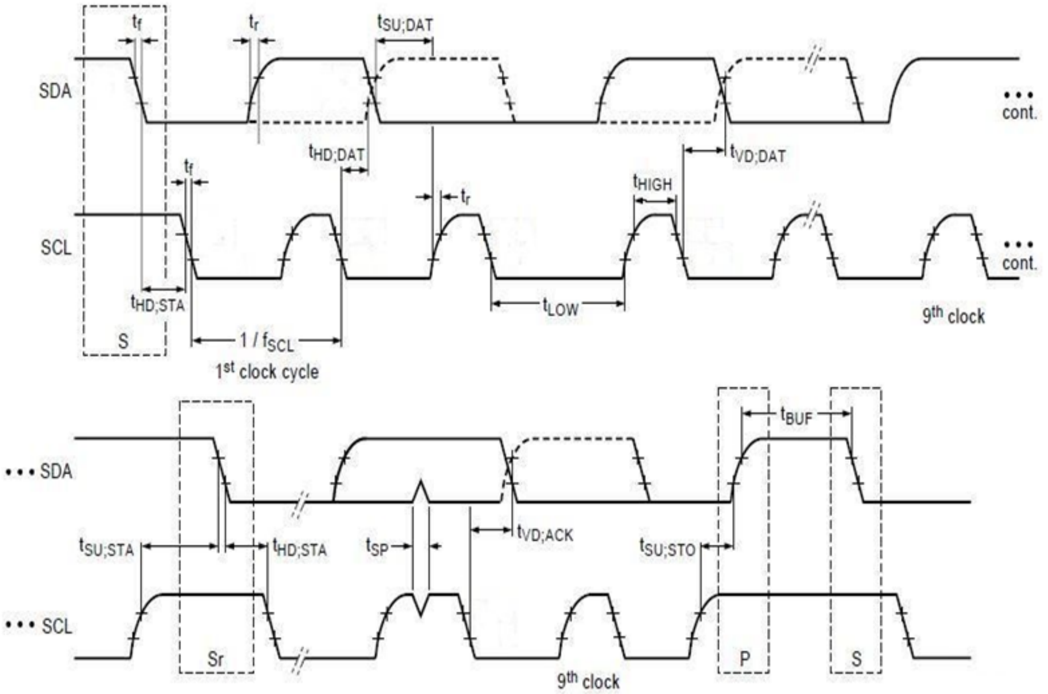


Figure 5: ZED-F9P high precision receiver I2C slave specification

Symbol	Parameter	Min	Max	Unit
VIL	LOW-level input voltage	VSS-0.3	0.3VCC	V
VIH	HIGH-level input voltage	0.7VCC	VCC+0.3	V
VOL	LOW-level output voltage		0.4	V
VOH	HIGH-level output voltage	VCC-0.4		V
fSCL	SCL clock frequency	0	400	kHz
tHD;STA	Hold time (repeated) START condition	4.0/1	-	µs
tLOW	LOW period of the SCL clock	5/2	-	µs
tHIGH	HIGH period of the SCL clock	4.0/1	-	µs
tSU;STA	Set-up time for a repeated START condition	5/1	-	µs
tHD;DAT	Data hold time	0/0	-	µs
tSU;DAT	Data set-up time	250/100		µs
tr	Rise time of both SDA and SCL signals	-	1000/300 (for C 400pF)	µs
tf	Fall time of both SDA and SCL signals	-	300/300 (for C 400pF)	µs
tSU;STO	Set-up time for STOP condition	4.0/1	-	µs
tBUF	Bus free time between a STOP and START condition	5/2	-	µs
tVD;DAT	Data valid time	-	4/1	µs
tVD;ACK	Data valid acknowledge time	-	4/1	µs
VnL	Noise margin at the LOW level	0.1VCC/0.1VCC	-	V

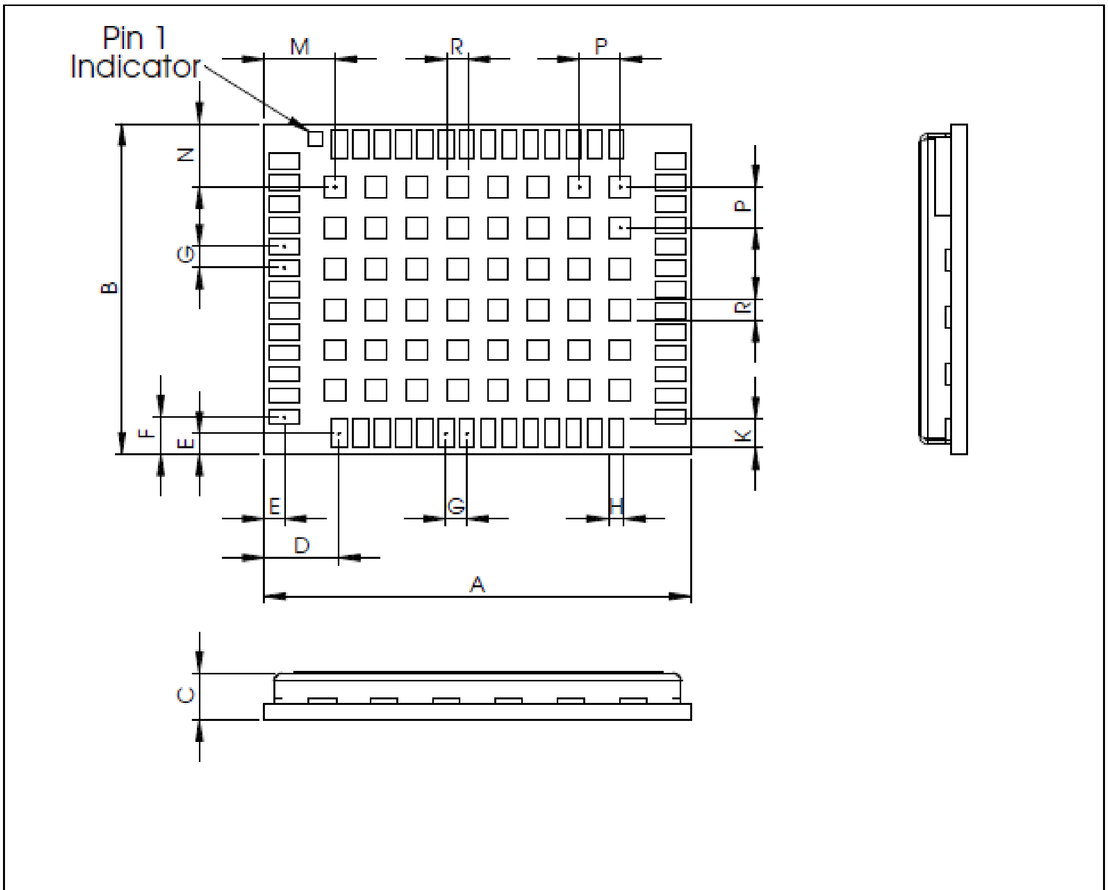
Symbol	Parameter	Min	Max	Unit
VnH	Noise margin at the HIGH level	0.2VCC/0.2VCC	-	V

Table 16: ZED-F9P I2C Slave timings and specifications

5.4 USB interface

A USB interface, which is compatible to USB version 2.0 FS (Full Speed, 12 Mbit/s), can be used for communication as an alternative to the UART. The VDD_USB pin supplies the USB interface.

6 Mechanical specification



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	21.80	22.00	22.20
B	16.80	17.00	17.20
C	2.20	2.40	2.60
D	tbd	3.85	tbd
E	tbd	1.05	tbd
F	tbd	1.90	tbd
G	tbd	1.10	tbd
H	tbd	0.80	tbd
K	tbd	1.50	tbd
M	tbd	3.65	tbd
N	tbd	3.25	tbd
P	tbd	2.10	tbd
R	tbd	1.10	tbd
Weight		2 g	

Figure 6: ZED-F9P mechanical drawing

7 Reliability tests and approvals

All u-blox modules are based on AEC-Q100 qualified GNSS chips.

Tests for product family qualifications are according to ISO 16750 "Road vehicles – environmental conditions and testing for electrical and electronic equipment", and appropriate standards.

7.1 Approvals

The product is designed to in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

Products marked with this lead-free symbol on the product label comply with the Restriction of the use of certain hazardous substances Directive (RoHS) 2015/863/EU.

Declaration of Conformity (DoC) will be available on u-blox web site after the product has reached Initial Production status.

8 Default messages

Interface	Settings
UART1 Output	38400 Baud, 8 bits, no parity bit, 1 stop bit. Configured to transmit NMEA, UBX, RTCM 3x protocols. But only the following NMEA (and no UBX) messages have been activated at start-up: **GGA, GLL, GSA, GSV, RMC, VTG, TXT**.
UART1 Input	38400 Baud, 8 bits, no parity bit, 1 stop bit. Automatically accepts the following protocols without need of explicit configuration: UBX, NMEA, RTCM 3x.
UART2 Output	38400 Baud, 8 bits, no parity bit, 1 stop bit.No host interface (UBX). Configured by default to allow RTCM 3x as an output protocol. NMEA can also be configured as a protocol.
UART2 Input	38400 Baud, 8 bits, no parity bit, 1 stop bit. No Host interface (UBX). Configured by default to allow RTCM 3x as an input protocol. NMEA can also be configured as an input protocol.
USB Output	Configured to transmit NMEA, UBX, RTCM 3x protocols, but only the following NMEA (and no UBX) messages have been activated at start-up: **GGA, GLL, GSA, GSV, RMC, VTG, TXT**.
USB Input	Automatically accepts following protocols without need of explicit configuration: UBX, NMEA, RTCM 3x.
DDC	Fully compatible with the I^2C industry standard, available for communication with an external host CPU or u-blox cellular modules, operated in slave mode only. Default messages activated as in UART1. Input/output protocols available as in UART1. Maximum bit rate 400 kb/s.
SPI	Allow communication to a host CPU, operated in slave mode only. Default messages activated as in UART1. Input/output protocols available as in UART1. SPI is not available unless the D_SEL interface is set up accordingly (see D_SEL interface).
TIMEPULSE (1 Hz Nav)	1 pulse per second, synchronized at rising edge, pulse length 100 ms

Table 17: Default messages

☞ Refer to the u-blox ZED-F9P Interface Description [2] for information about further settings.

☞ The ZED-F9P outputs NMEA 4.1 messages that includes satellite data for all GNSS bands being received. This results in many more NMEA messages being output for each navigation period. Please ensure the UART1 baud rate being used is sufficient for the set Navigation rate and the amount of GNSS signals being received.

9 Labeling and ordering information

9.1 Product labeling

The labeling of the ZED-F9P modules provides product information and revision information. For more information please contact sales.

9.2 Explanation of product codes

Three different product code formats are used. The **Product Name** is used in documentation such as this data sheet and identifies all u-blox products, independent of packaging and quality grade. The **Ordering Code** includes options and quality, while the **Type Number** includes the hardware and firmware versions. Table 18 below details these three different formats.

Format	Structure
Product Name	ZED-F9P
Ordering Code	ZED-F9P-00B
Type Number	ZED-F9P-00B-00

Table 18: Product code formats

9.3 Ordering codes

Ordering No.	Product
ZED-F9P-00B	u-blox ZED-F9P

Table 19: Product ordering codes

☞ Product changes affecting form, fit or function are documented by u-blox. For a list of Product Change Notifications (PCNs) see our website at: https://www.u-blox.com/en/product-resources.

10 Related documents

1. ZED-F9P Integration Manual, Docu. No. UBX-18010802
2. ZED-F9P Interface Description, Docu. No. UBX-18010854
3. Radio Resource LCS Protocol (RRLP), (3GPP TS 44.031 version 11.0.0 Release 11)

☞ For regular updates to u-blox documentation and to receive product change notifications please register on our homepage (http://www.u-blox.com).

11 Revision history

Revision	Date	Name	Status / Comments
R01	21-May-2018	ghun/jhak	Objective Specification
R02	18-Sep-2018	ghun	Advance Information

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