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Product name	Description	Version
LS23231	Dual-frequency multi-constellation GNSS RTK receiver for drone application	1.1

1 Introduction

LS23231 is a dual-frequency GNSS RTK receiver designed for Pixhawk2-based drone. The receiver is capable of concurrently tracking all global civil navigation systems, including GPS, GLONASS, GALILEO, BEIDOU and QZSS. It acquires both L1 and L5 signals at a time while providing the centimeter-level RTK positioning accuracy. The built-in lightweight helical antenna not only enhances RTK positioning stability, but also increases the flight time of the drone. The fast Time-To-First-Fix, RTK convergence, superior sensitivity, low power consumption and water proof make it a better choice for Pixhawk2-based drone.

2 Features

- Dual-frequency and multi-constellation RTK positioning solution
- Support GPS, GLONASS, GALILEO, BEIDOU and QZSS
- Capable of SBAS (WAAS, EGNOS, MSAS, GAGAN) and QZSS SLAS
- Support 135-channel GNSS
- Up to 10 Hz update rate
- Smart jammer detection and suppression
- Built-in 3-axis digital compass
- IPX7 waterproof

3 Application

- Pixhawk2-based drone

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4 GNSS specification

Frequency	GPS/QZSS: L1 C/A, L5C GLONASS: L1OF GALILEO: E1, E5a BEIDOU: B1I, B2a	
Channels	Support 135 channels	
Update rate	5Hz (default) or 10Hz	
Acquisition Time	Cold start	30s (typical)
	RTK convergence time	< 10s (typical, after 3D fix)
Position accuracy (1)	Autonomous	3m CEP
	RTK	1cm + 1ppm CEP (horizontal) 1.5cm + 1ppm CEP (vertical)
Datum	WGS-84 (default)	
Max. altitude	< 18,000 m	
Max. velocity	< 500 m/s	
Protocol support	230400 bps, 8 data bits, no parity, 1 stop bits (default)	
	Binary	UBX-NAV-PVT (5Hz), UBX-NAV-DOP (5Hz), UBX-NAV-TIMEGPS (1Hz).
	Raw data	RTCM3.3 Message type 1005, 1074, 1084, 1094, 1114, 1124

Note 1: 24hr, static, open sky.

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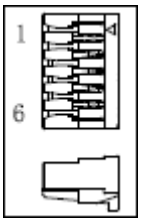
5 Software interface

Please refer to UBX binary protocol for the messages UBX-NAV-PVT, UBX-NAV-DOP and UBX-NAV-TIMEGPS.

6 Pin assignment and descriptions



Pin #	Name	Type	Description
1	VCC_5V	P	Power input (5V)
2	RX	I	Data input (3.3V TTL level)
3	TX	O	Data output (3.3V TTL level)
4	SCL	I	I^2C serial clock (3.3V) of the digital compass
5	SDA	I/O	I^2C serial data (3.3V) of the digital compass
6	GND	P	Ground

The connector is JST GH compatible that can be plugged into “GPS 2” socket of Pixhawk2 as below picture.

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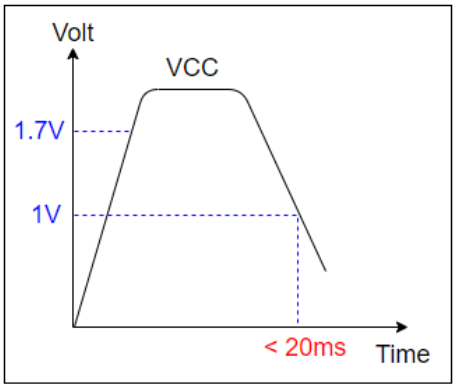
7 DC & Temperature characteristics

7.1 Power consumption

Parameter	Symbol	Min.	Typ.	Max.	Units
Input voltage (1)	VCC	4	5	5.5	V
Input current	I_{CC}		75 (2)		mA
High Level Input Voltage	V_{IH}	2.36		3.6	V
Low Level Input Voltage	V_{IL}	-0.3		0.8	V
High Level Output Voltage	V_{OH}	2.18		3.6	V
Low Level Output Voltage	V_{OL}			0.7	V

<Note>

1. When the receiver is turned on again, the power off time must be equal to or greater than 2 seconds. Besides, the input voltage from 0 to its working voltage must be a stable rising slope. Avoid powering the receiver at the same time during mechanical contact of the connector. The mechanical contact bounce may result in the following voltage waveform. This may make the receiver not work. When this happens, VCC must be re-powered to enable the receiver.



2. Measured when position fix (5Hz) is available.

7.2 Temperature characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Operating Temperature	T_{OPR}	-40	-	85	℃
Storage Temperature	T_{STG}	-40	25	85	℃

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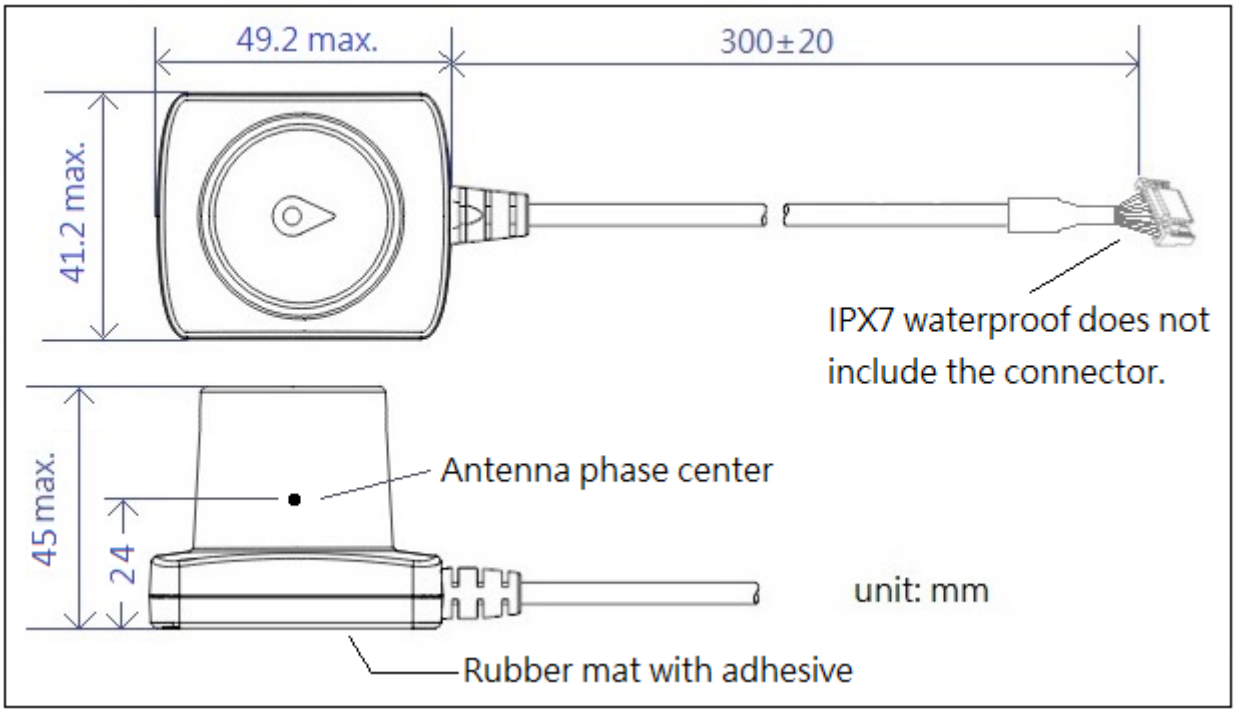
8 Mechanical specification



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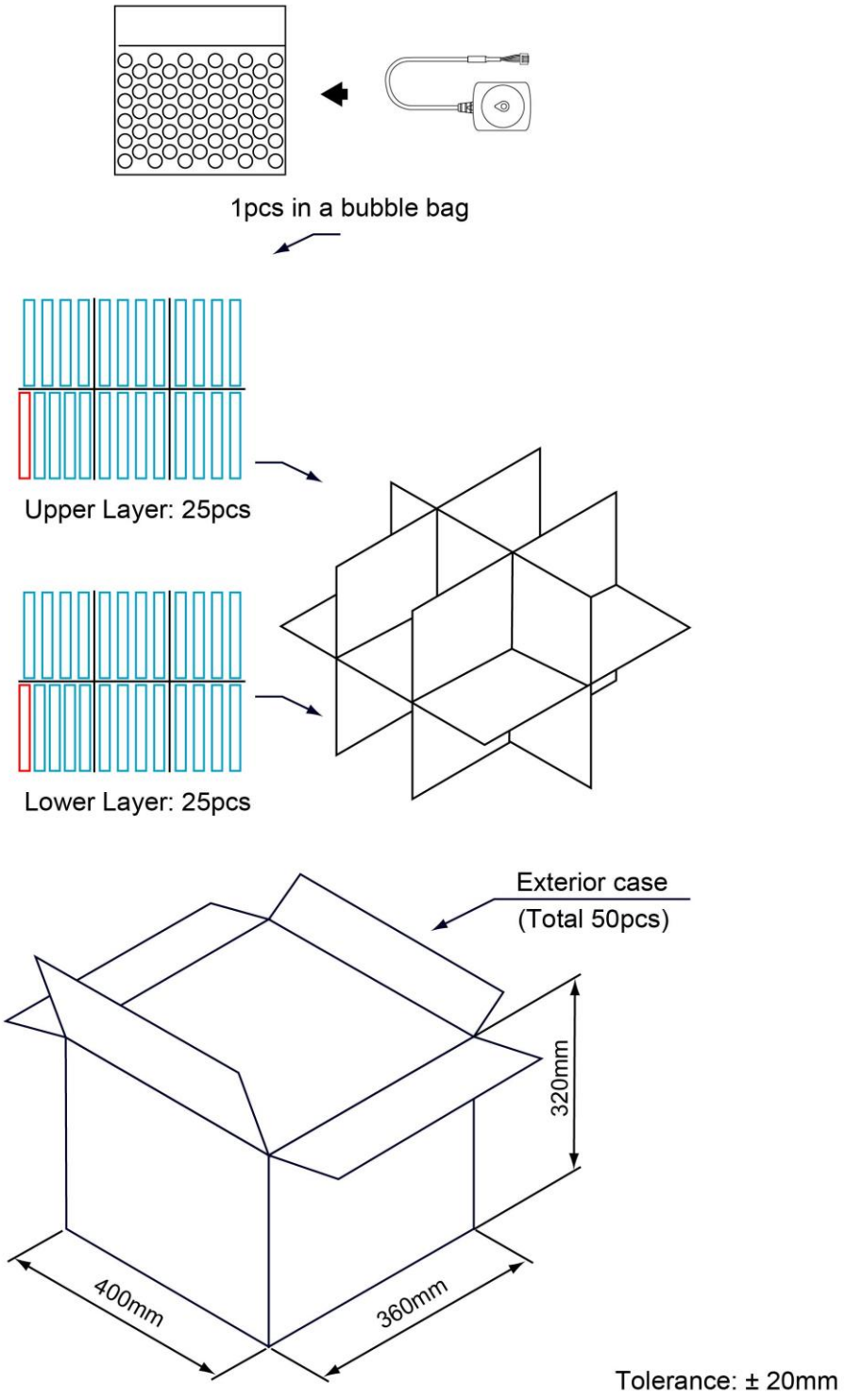
9 Packing information



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10 Ordering information

Product name	Description	Remark
LS23231	Dual-frequency multi-constellation GNSS RTK receiver for drone application	GPS/QZSS: L1 C/A, L5C GLONASS: L1OF GALILEO: E1, E5a BEIDOU: B1I, B2a

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Document change list

Revision 0.1

- Draft release on December 24, 2021.

Revision 0.2 (October 21, 2022)

- Added the product picture on page 1
- Revised the baud rate in section 4.
- Added note of input voltage in section 7.1
- Changed the height of the receiver in section 8.
- Added the antenna phase center in section 8.
- Added packing information in section 9.

Revision 0.3 (April 13, 2023)

- Changed the maximum input voltage from 6V to 5.5V in section 7.1
- Added the description of VCC in the note 1 in section 7.1

Revision 1.0 (May 17, 2023)

- Changed the cold start time from 28s to 30s in section 4
- Changed the autonomous position accuracy from 1.5m CEP to 3m CEP in section 4.

Revision 1.1 (May 26, 2023)

- Changed the packing diagram in section 9