

Product name	Description	Version
LS20231	Dual-frequency multi-constellation GNSS/RTK smart antenna	1.0



1 Introduction

LS20231 is a dual-frequency GNSS/RTK receiver designed for drones and robotic platforms. It supports concurrent tracking of all global civil navigation systems, including GPS, GLONASS, GALILEO, BEIDOU, and QZSS. By simultaneously acquiring L1 and L5 signals, it delivers centimeter-level RTK positioning accuracy for high-precision navigation.

The built-in lightweight helical antenna enhances RTK positioning stability while optimizing power efficiency, ultimately extending the operational time of drones and mobile systems. With fast Time-To-First-Fix, rapid RTK convergence, superior sensitivity, and low power consumption, LS20231 is highly adaptable for seamless integration into drones, autonomous robots, and other mobile platforms. Its reliability and precision make it an ideal choice for AGV/UGV and drone applications.

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 (Option)

3 Application

- Drone
- Robot platform
- AGV/UGV platform
- Lawn mower

4 GNSS specification

Frequency	GPS/QZSS: L1 C/A, L5C GLONASS: L1OF GALILEO: E1, E5a BEIDOU: B1I, B2a	
Channels	Support 135 channels	
Update rate	1Hz(default) For Normal 5Hz (default) For Drone 10Hz	
Acquisition Time	Cold start	30s (typical)
	RTK convergence time	< 10s (typical, after 3D fix)
Position accuracy ⁽¹⁾	Autonomous	1.5m CEP (Normal) 3 m CEP (Drone)
	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). Or NMEA-0183
	Raw data	RTCM3.3 Message type 1005, 1074, 1084, 1094, 1114, 1124

Note 1: 24hr, static, open sky.

5 Software interface

Please refer to the UBX binary protocol for messages UBX-NAV-PVT, UBX-NAV-DOP, and UBX-NAV-TIMEGPS. Additionally, it supports standard NMEA-0183 sentence output, ensuring broad compatibility with various navigation and positioning systems.

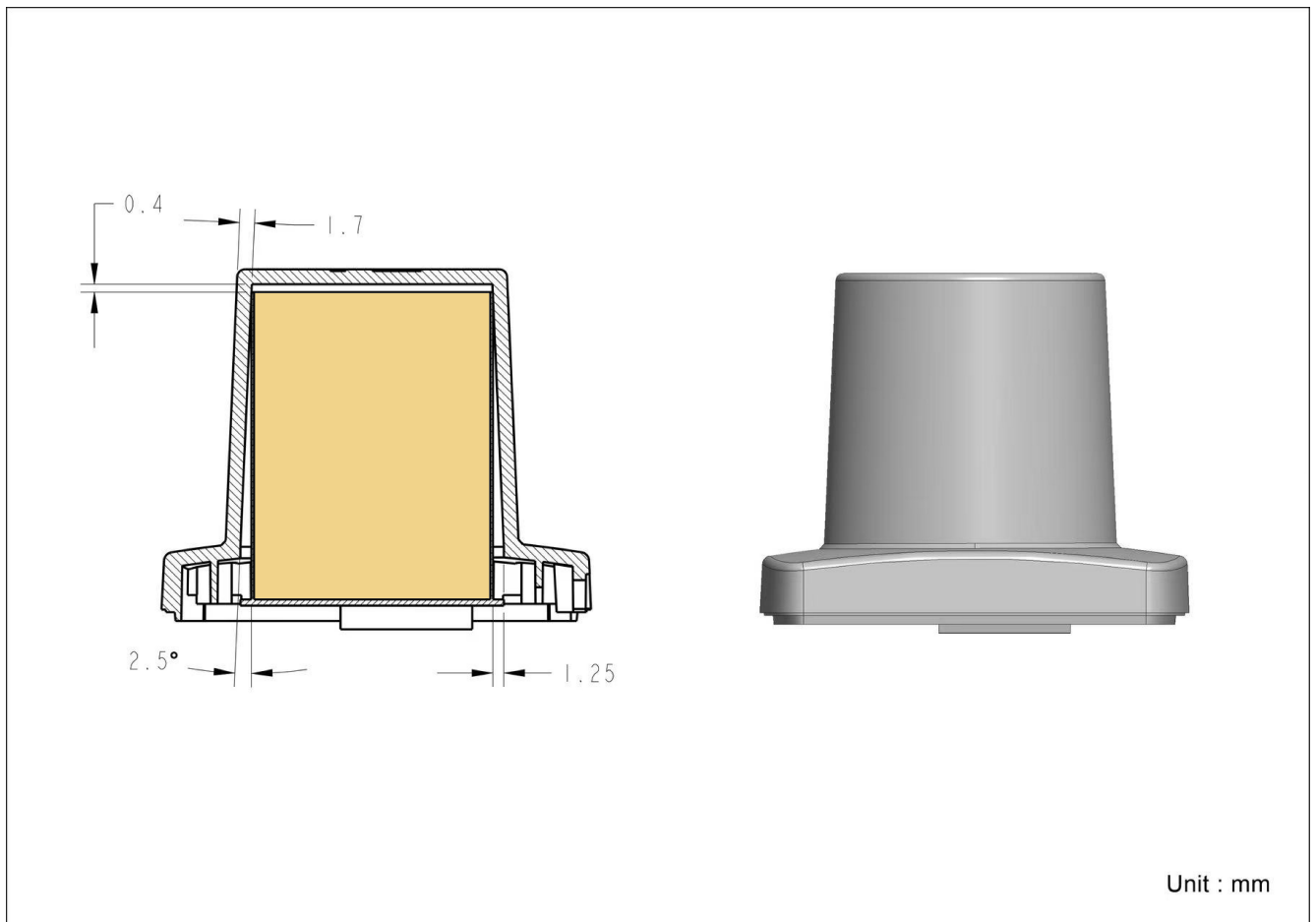
6 Pin assignment and descriptions



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	GND	P	Ground
5	NC		
6	SCL	I	I ² C serial clock (3.3V) of the digital compass
7	SDA	I/O	I ² C serial data (3.3V) of the digital compass

7 Embedded reference design note

- Please pay special attention to the spacing between the UAV casing and the antenna. If the internal space is too wide, it may negatively impact satellite signal reception and lead to poor positioning performance.
- Proper antenna design technology is crucial to ensuring optimal signal acquisition. Factors such as antenna placement, polarization, and ground plane design must be carefully considered to minimize signal attenuation and multipath effects.
- Additionally, electromagnetic interference (EMI) from onboard electronic components can further degrade signal quality. Shielding techniques, noise filtering, and strategic component layout should be implemented to reduce interference and enhance GNSS signal stability.



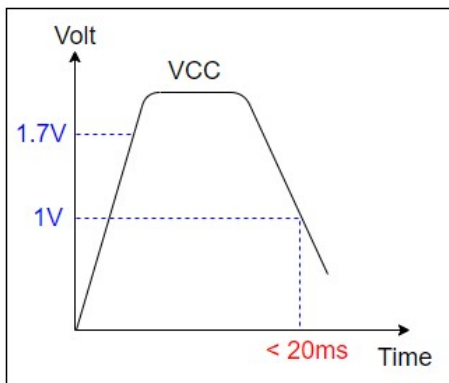
8 DC & Temperature characteristics

8.1 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>

- When the LS20231 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 LS20231 not work. When this happens, VCC must be re-powered to enable the receiver.

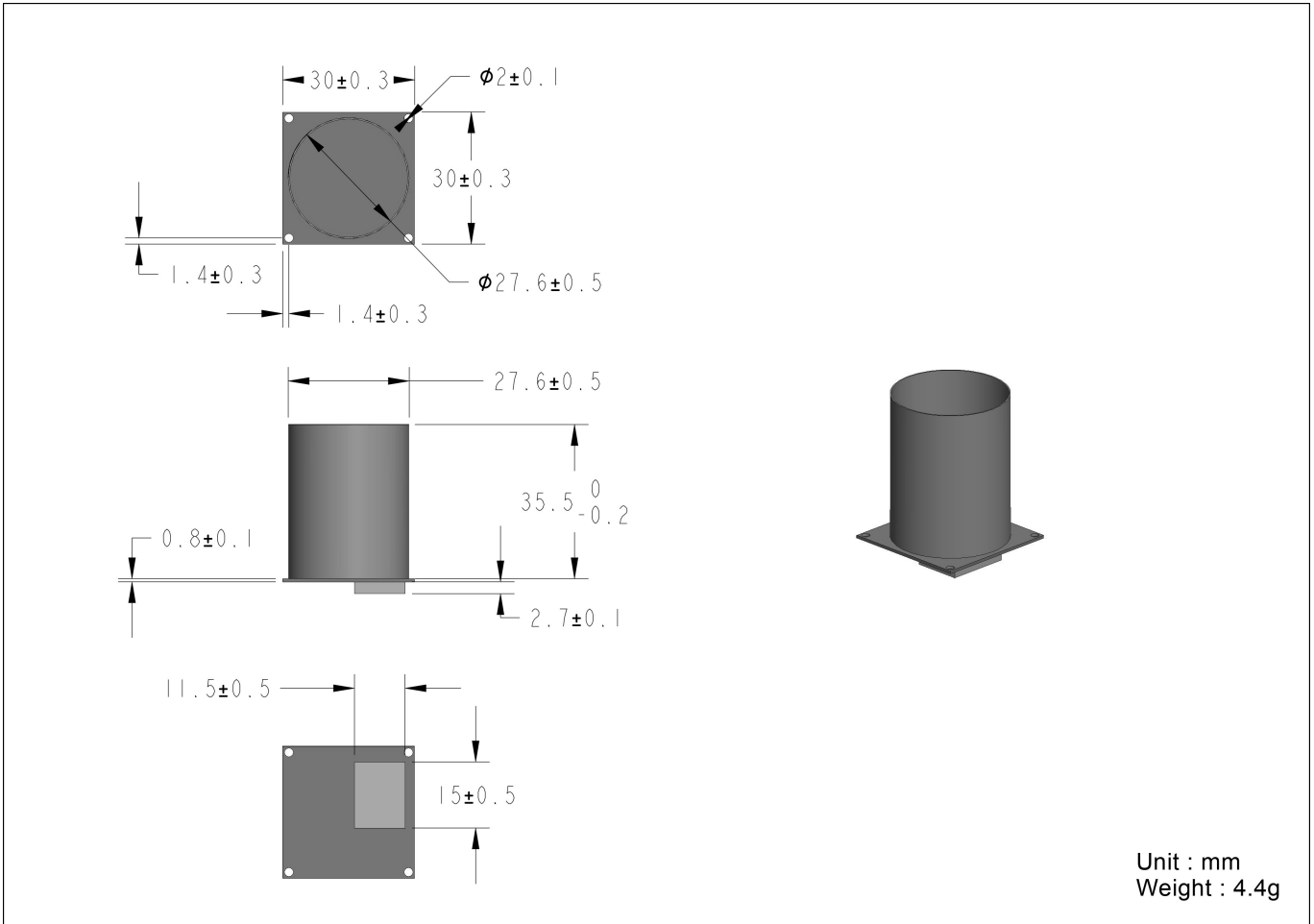


- Measured when position fix (5Hz) is available.

8.2 Temperature characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Operating Temperature	T _{OPR}	-40	-	85	°C
Storage Temperature	T _{STG}	-40	25	85	°C

9 Mechanical specification



Document change list

Revision 1.0

- First release on February 13, 2025.