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Product Name	Description	Version
HAWK A1e	L1 band multi-constellation GNSS receiver with e-compass	0.2

1 Introduction

HAWK A1e is L1-band GNSS receiver designed for Pixhawk(PX4)-based platform UAV. The receiver is capable of concurrently tracking all global civil navigation systems, including GPS, GLONASS, GALILEO, BEIDOU and QZSS.

The built-in lightweight helical antenna not only enhances GNSS positioning stability, but also increases the flight time of the drone. The fast Time-To-First-Fix, GNSS convergence, superior sensitivity, low power consumption make it a better choice for Pixhawk(PX4)-based platform UAV.

2 Features

- Support GPS, GLONASS, BEIDOU, GALILEO, QZSS
- Capable of SBAS (WAAS, EGNOS, MSAS, GAGAN) and QZSS SLAS
- Support 47-channel GNSS
- Fast TTFF at low signal level
- Free hybrid ephemeris prediction to achieve faster cold start
- Default 10 Hz update rate*
- Build-in super capacitor to reserve system data for rapid satellite acquisition
- Three LED indicator for Power, PPS and Data transmit
- Integrated with iSentek IST8310 (3-axis magnetometer) e-compass chip

*Note: SBAS support 5Hz only.

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3   Application

● Unmanned aerial vehicle (UAV) positioning and navigation

Fig 3-1 System block diagram

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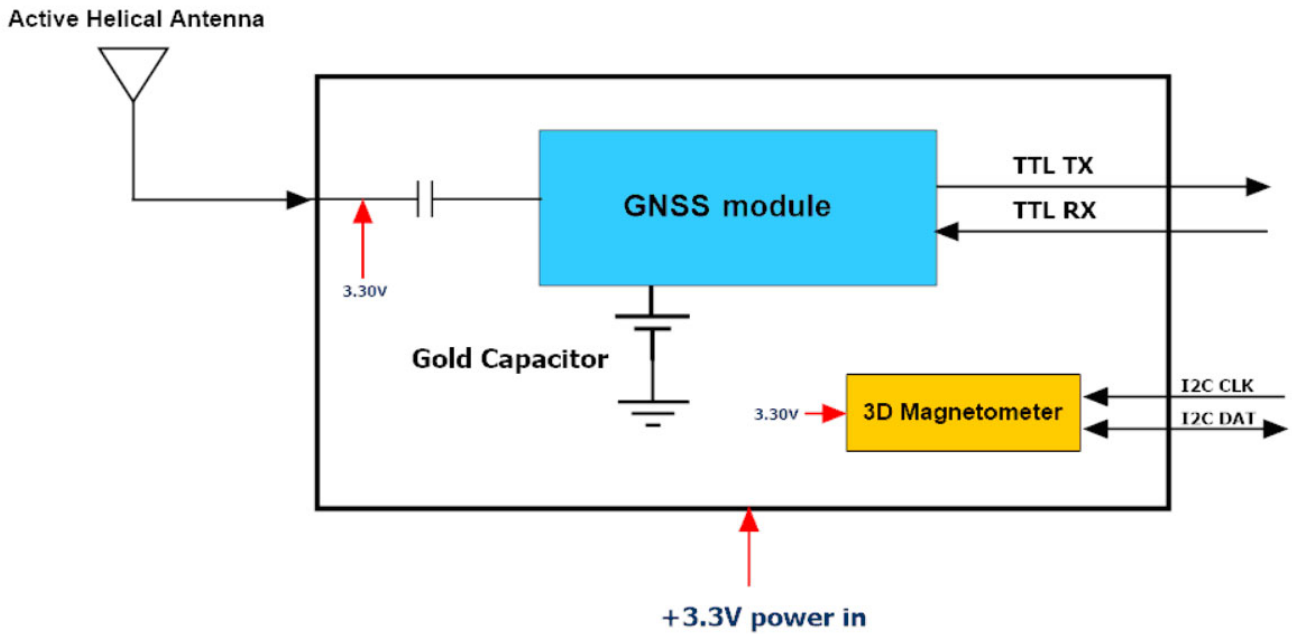Xizhi Dist., New Taipei City 22101, Taiwan
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4 Warning

- When removing the HAWK A1e cable connector, please be sure to turn off the flight control power on the airborne side first, and unplug the lithium battery (main power) plug. After confirming that the power is off, please wait 20 seconds before unplugging the Hawk cable connector.
- When the aircraft is in the "live" state, please do not unplug the HAWK product cable at will, otherwise it will easily cause electrical abnormalities or product damage.

5 Pin assignment and LED description

No	Name	Description
LED 1	TX LED	Green, GNSS data transmit indicator
LED 2	Power LED	Red, Power indicator
LED 3	PPS LED	Blue, PPS indicator

Pin No	Name	Type	Description
1	VCC	P	DC supply voltage 3.3V ~ 5.0V input
2	GNSS_RX	I/O	Receive Data Input
3	GNSS_TX	I/O	Transmit Data Output
4	GNSS_PPS	O	GNSS pulse per second, 100ms pulse width
5	NC		NC
6	NC		NC
7	I2C_CLK	I/O	Magnetometer's I2C serial clock
8	I2C_DAT	I/O	Magnetometer's I2C serial data
9	GND	P	Ground

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5.1 Cable pin assignment

NO	Pin No	Name	Type	Description
1	Red	VCC	I	Red, DC supply voltage 3.3V ~ 5.0V input
2	Green	GNSS_RX	I	Green, Receive Data Input
3	Yellow	GNSS_TX	O	Yellow, Transmit Data Output
4	White	I2C_CLK	I/O	White, Magnetometer's I2C serial clock
5	Blue	I2C_DAT	I/O	Blue, Magnetometer's I2C serial data
6	Black	GND	P	Black, Ground

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6   GNSS receiver

Frequency	GPS/QZSS: L1 C/A, L1C	
	GLONASS: L1OF	
	GALILEO: E1	
	BEIDOU: B1I, B1C	
Channels	Support 47 channels	
Update rate	10Hz default	
Acquisition Time	Hot start (Open Sky)	1s (typical)
	Cold Start (Open Sky)	28s (typical) without AGPS
PPS	100ms pulse width	
Datum	WGS-84 (default)	
Max. Altitude	< 18,000 m	
Max. Velocity	< 500 m/s	
Protocol Support	UBX	230400 bps, 8 data bits, no parity, 1 stop bits (default) 10Hz:UBX-NAV-PVT,UBX-NAV-DOP 1Hz: UBX-NAV-TIMEGPS

7 DC & Temperature characteristics

7.1 DC Electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Input voltage	Vcc	3.3	3.3	5.0	V
Input current[1]	Icc		37		mA
High Level Input Voltage	V_{IH}	0.7*Vcc		Vcc	V
Low Level Input Voltage	V_{IL}	0		0.2*Vcc	V
High Level Output Voltage	V_{OH}	Vcc-0.4			V
Low Level Output Voltage	V_{OL}			0.4	V
High Level Output Current	I_{OH}		4		mA
Low Level Output Current	I_{OL}		4		mA

Note 1: Measured when position fix (1Hz) is available, the function of self-generated ephemeris prediction is inactive.

7.2 Temperature characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Operating Temperature	Topr	-10	-	60	℃
Storage Temperature	Tstg	-10	25	60	℃

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8 Mechanical specification

9 Ordering information

Product name	Description	Remark
HAWK A1e	L1 band multi-constellation GNSS receiver with e-compass	GPS/QZSS: L1 C/A, L1C GLONASS: L1OF GALILEO: E1 BEIDOU: B1I, B1C

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10 Suggesting mounting area

11 Packing information: Receiver + Helix antenna +Connector

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Document change list

Revision 0.1
- Preliminary release on January 08, 2024.

Revision 0.2 (September 06, 2024)
- Added e-compass chip model name in section 2.