

### Overview

**Aero**<sup>TM</sup> belongs to the class of the smallest ADS-B receivers on market and has been developed for civil and commercial Unmanned Aircraft Systems. It is especially dedicated to UAS controllers supporting the MAVLink protocol. **Aero** operates on 1090MHz and allows to track manned air traffic (equipped with ADS-B technology) in the immediate vicinity of UAS. The goal is to ensure a safe separation between manned and unmanned aircraft. **Aero** opens the way to the implementation of the Detect and Avoid algorithms, supporting the integration of UAS into the airspace.

#### **Basic features**

- ✓ Real-time aircraft tracking on 1090MHz
- ✓ Patented FPGA-In-The-Loop<sup>™</sup> technology with the capability of receiving thousands of frames per second
- ✓ Implemented MAVLink and AERO<sup>™</sup> protocol
- ✓ Designed to meet MOPS DO-260B
- ✓ High sensitive front-end with range up to 100km (300km with external 1dBi antenna)
- ✓ Small power consumption and ultra-low weight design
- ✓ Simple plug&play integration with MAVLink devices
- ✓ Programming via AT commands
- ✓ Dimension: 27.0x14.0x5.5mm

## **Technical parameters**

Parameter	Value	
Frequency	1090MHz	
Input voltage	5V	
Current consumption	70mA	
Sensitivity	-80dBm	
Max. input	+10dBm	
ESD protection	RF part only	
MAVLink (baud)	115000bps	
AERO (baud)	115000bps	
	(AT commands)	
Main connector	DF13A-6P-1.25H	
Antenna connector	U.fl	
Dimension	27.0x14.0x5.5mm	
Weight (with antenna)	2.8grams	

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Pin	Name	Function
1	+5V	Power supply (5V/70mA)
2	RX	MAVLink, Aero RXD
3	ТХ	MAVLink, AERO TXD
4	NC	Not connected
5	NC	Not connected
6	GND	Ground



bottom view

LED	Function
Green	Power supply indicator
White	Frame detection / receive indicator

# Mechanical specification

All dimensions in mm (tolerances  $\pm 0.5$ mm)



Connector	Туре	Example
Main	Installed on board	DF13A-6P-1.25H
	Mating connector	DF13-6S-1.25C
	Pins	DF13-2630SCF
Antenna	Installed on board	X.FL-R-SMT-1
	Mating connector	X.FL-2LP-04K1T-A

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## Quick start with Pixhawk2



Five steps to integrate Aero with Pixhawk2:

- 1. With the power turned off, connect Aero to Pixhawk2 using a standard telemetry cable. The following settings apply to the installation on the TELEM2 port.
- 2. Connect the USB cable between Pixhawk2 and your PC and run Mission Planner.
- 3. Connect to Pixhawk2 by clicking "Connect", then go to the "Configuration" tab.
- 4. In the menu, go to "Full Parameter Tree" and set the following parameters:
  - a. ADSB->ADSB\_ENABLE 1
  - b. SERIAL2->SERIAL2\_BAUD 115
    - ->SERIAL2\_PROTOCOL 2

ADSB					
ADSB_EMIT_TYPE	14	0:NoInfo 1:Light 2:Small 3:Large 4:HighVortexlarge 5:Heavy 6:HighlyManuv 7:Rotocraft 8:RESERVED 9:Glider 10:LightAir 11:Pa	ADSB classification for the type of vehicle emitting the transponder signal. Default value is 14 (UAV).		
ADSB_ENABLE		0:Disabled 1:Enabled	Enable ADS-B		
ADSB_ICAO_ID	0	-1 16777215	ICAO_ID unique vehicle identifaction number of this aircraft. This is a integer limited to 24bits. If set to 0 then one will be		
SERIAL2					
SERIAL2_BAUD	115	1:1200 2:2400 4:4800 9:9600 19:19200 38:38400 57:57600 111:111100 115:115200 500:500000 921:921600 1500:1500000	The baud rate of the Telem2 port. The APM2 can support all baudrates up to 115, and also can support 500. The PX4 c		
SERIAL2_PROTOCOL	2	-1:None 1:MAVLink1 2:MAVLink2 3:Frsky D 4:Frsky SPort 5:GPS 7:Alexmos Gimbal Serial 8:SToRM32 Gimbal Serial 9:Lidar 10:Fr	Control what protocol to use on the Telem2 port. Note that the Frsky options require external converter hardware. See		

Remember to send the changed settings to the controller by clicking "Write params".

5. Go to the main view. If there is air traffic in your area, you should see it on the map.



NOTE: Not all Mission Planner versions display ADS-B signals correctly. The problem was reported on the forum <u>https://github.com/ArduPilot/MissionPlanner/issues/1798.</u> The last, Mission Planner version, with correctly visualized air traffic is: 1.3.52.

# Tricks & tips

- Module installation There is a high concentration of various electronic systems on a small area at UAS. Try to keep as much separation between Aero and other devices, especially radio ones. Despite the high robustness of Aero to jamming, try to install the antenna away from other onboard systems.
- Antenna Aero is supplied with an installed antenna. It allows you to save weight, but requires installation of the module in the sky view. If you want to integrate the module into the UAS interior, you can use an adapter such as U.FL-> SMA and install an external antenna. With a correct selection of the antenna you can get a much larger range.
- **3.** MAVLink vs. AERO protocol **Aero** is based on OEM TIM-SC1b module. The default is in MAVLink protocol mode, which is a binary protocol. If you want to use the module to work with another system, it is possible to switch the protocol to **AERO**, which has the ASCII representation. Details of the module programming can be found on the page <u>www.aerobits.pl/doc/TIM-SC1.pdf</u>.