TR-1F
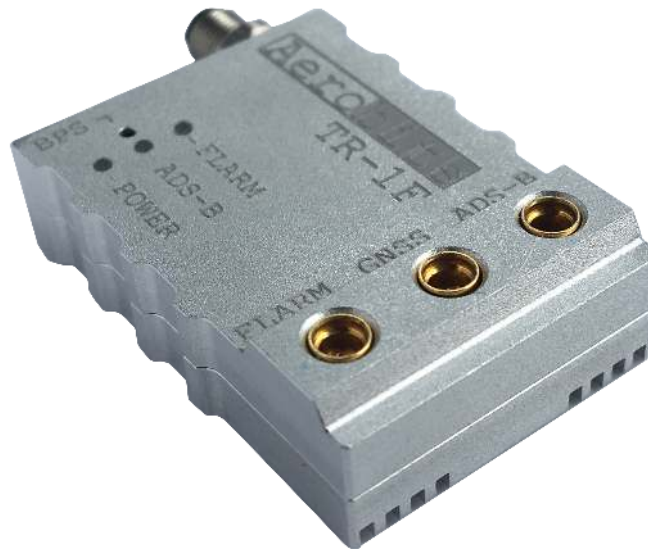## 0.25/0.5/1 Watt ADS-B and FLARM Transceiver

OVERVIEW

TR1F belongs to the generation of the smallest transceivers on market and supports two technologies: ADS-B and FLARM. It has been developed to support civil and commercial Unmanned Aircraft Systems as well as General Aviation. The device operates on 1090MHz and 868 MHz and allows to receive and transmit ADSB and FALRM data with defined 0.25, 0.5 or 1 Watt output power for ADS-B and 0,025W for FALRM. The transceiver does not require external devices to operate. It is equipped with a high quality multiGNSS receiver and a pressure sensor. The aluminium housing and ESD protection guarantee high resistance of the device to work in difficult conditions. TR1F opens the way to the safe integration of UAS into non-segregated airspace, implementation of the Detect and Avoid algorithms and reduce separation between airspace users.

NOTICE: The device to operate on FLARM frequency requires FLARM UAS licence. The licence can be obtained with the device from Aerobits upon purchase.

WARNING

ICAO addresses are used to provide a unique identity normally allocated to an individual aircraft or registration.
Please do not use random ICAO!
Address becomes a part of the aircraft's Certificate of Registration and MUST be given by Civil Aviation Authority and registered in aircraft database.

BASIC FEATURES

- Real-time aircraft tracking on 1090MHz and 868 MHz

- Patented FPGAInTheLoop TM technology with the capability of receiving thousands of frames per second

- Integrated GNSS source and pressure sensor

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- Configurable 0.25/0.5/1 Watt RF output power for ADS-B

- Licensed FLARM transceiver (0.025 Watt output power)

- Implemented MAVLink and AERO TM protocol

- Low-power consumption and low weight design

- Simple plug&play integration

- Programming via AT commands

- Designed to meet MOPS DO-260B (except the output power)

- Dimension: 35.0x25.0x8.5mm

TECHNICAL PARAMETERS

Parameter	Value
Frequency	ADS-B - 1090MHz, FLARM - 868 MHz (jumping depending on region between xxx-xxx)
Input voltage	5V
Current consumption	180mA
Sensitivity	-80dBm
RF Output power	Configurable +30dBm, +27dBm, +24dBm
ESD protection	All lines
MAVLink (baud)	115200bps
AERO (baud)	115200bps (AT commands)
Main connector	PXMBNI05RPM04APC
Antenna connector	2x MMCX
Dimension	35.0x25.0x8.5mm
Weight (without cables and antennas)	14grams

Table 1: Technical parameters.

ELECTRICAL SPECIFICATION

Pin	Wire colour	Name	Function
1	Red	+5V	Power supply (5V/70mA)
2	Green	TX	Data from device to host
3	White	RX	Data from host to device
4	Black	GND	Ground

Table 2: Electrical parameters
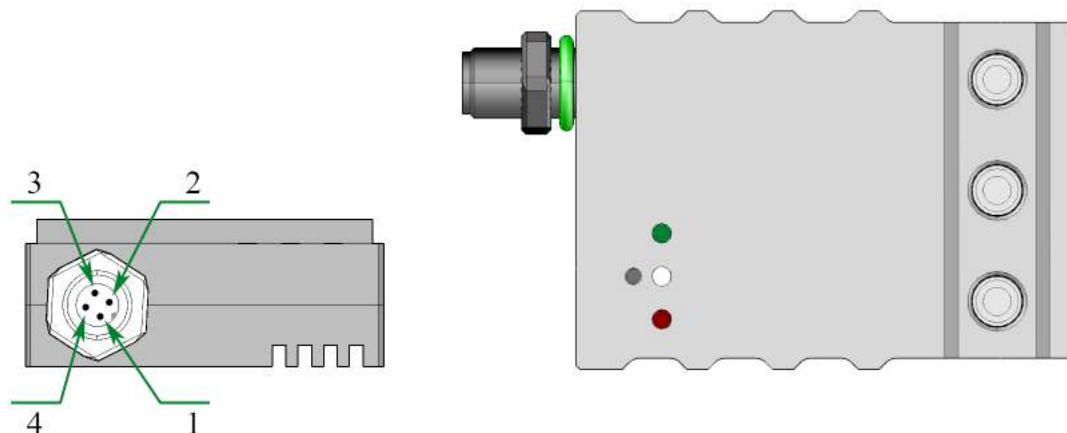
Figure 1: Module overview

LED	Function
Green	Power supply indicator
White	Frame detection / receive indicator
Red	ADS-B OUT indicator 1. OFF – Disabled 2. Blink – Wait for FIX 3. ON – Active

Table 3: LED indicators

MECHANICAL SPECIFICATION

All dimensions in mm (tolerances ±0.1mm)

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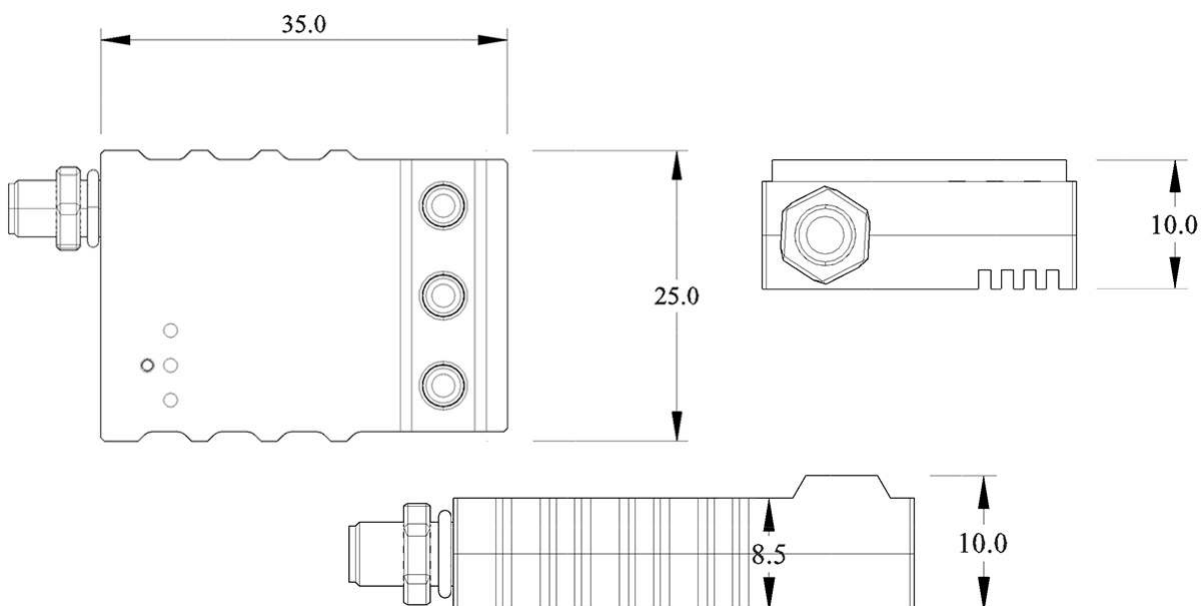
Connector	Type	Example
Main	Installed on board	BULGIN, PXMBNI05RPM04APC
	Mating connector	BULGIN, PXPPVC05FBF04ACL010PVC
Antenna	Installed on board	MOLEX, 73415-1061
	Mating connector	MOLEX, 73366-0010

Table 4: Mechanical parameters

QUICK START WITH TR-1F

TR-1F is a stand-alone device and in the simplest case of its operation requires only a power supply. However during the first start-up, you must configure the device. That can be performed in the few steps described below. First install the antennas using the MCX-> SMA adapters included in the kit. Also connect the configuration cable that will help you set the device parameters. The following figure shows the installation method.
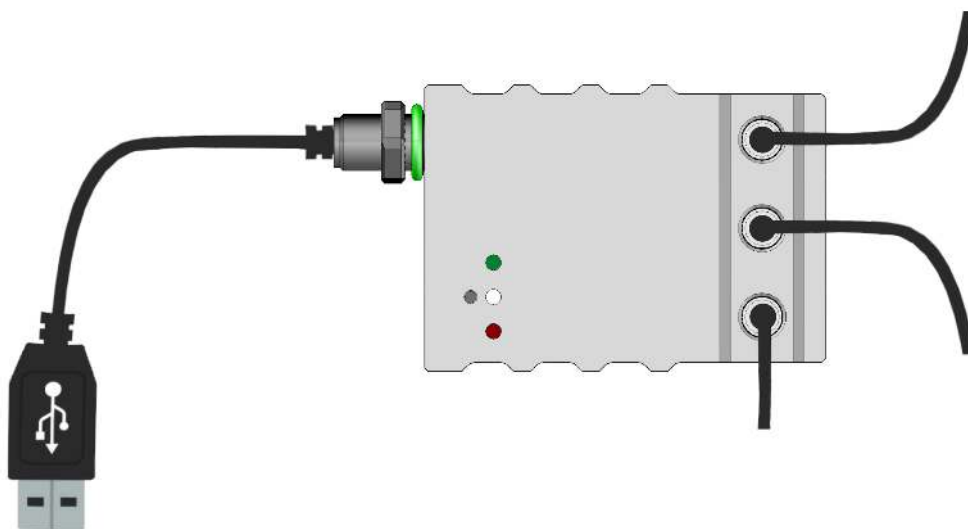

Figure 2: Combination overview

1. Connect the device to the PC. The converter is supplied with the FTDI chip. In this case, the installation of the controller takes place automatically.

2. Download the latest Micro ADS-B software from www.aerobits.pl. Install Micro ADS-B on your Windows computer. If the device is connected to a PC, it should be found automatically after clicking the "Connect" button. The connection window should look similar to the one in the picture.
Select the device found and press "OK".

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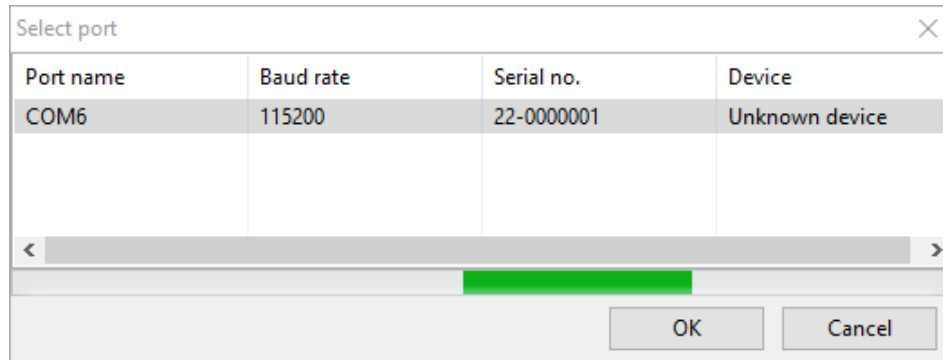
Figure 3: Port select window

3. Press "Settings" to enter the parameterization mode of the module. After setting the parameters, press the "Ok" button to save the settings. TR-1F is ready to work.
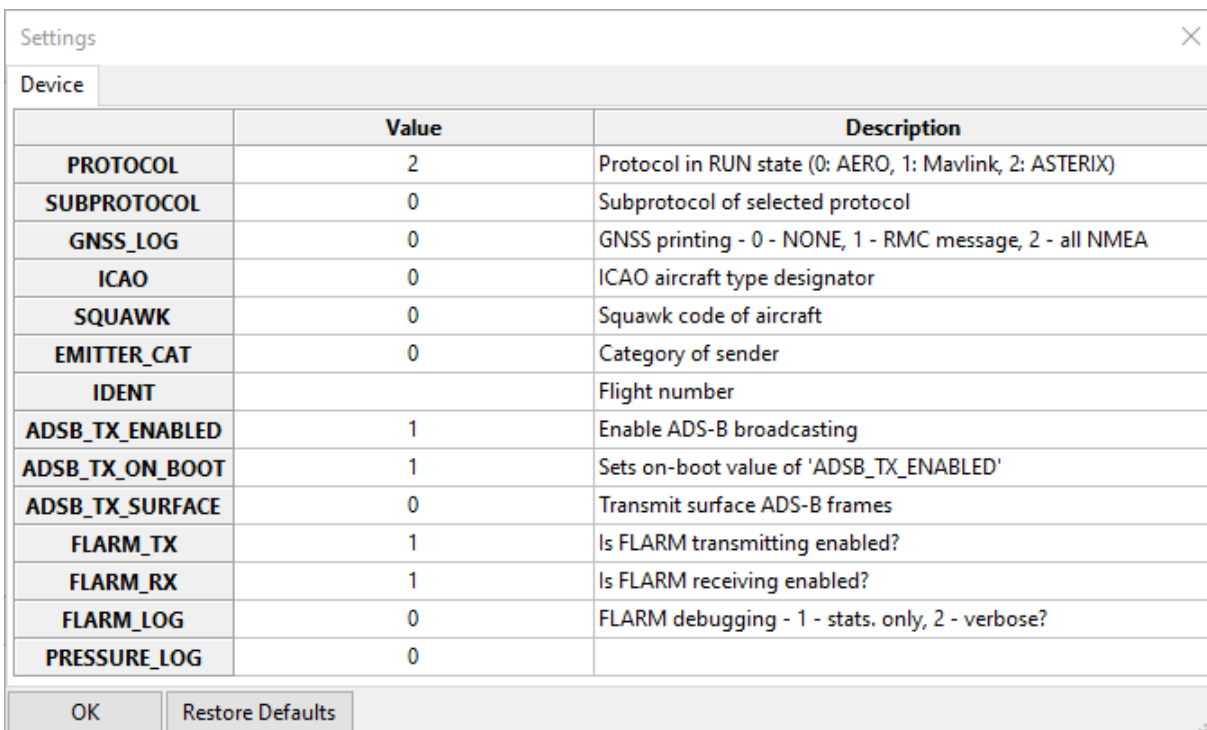

	Value	Description
PROTOCOL	2	Protocol in RUN state (0: AERO, 1: Mavlink, 2: ASTERIX)
SUBPROTOCOL	0	Subprotocol of selected protocol
GNSS_LOG	0	GNSS printing - 0 - NONE, 1 - RMC message, 2 - all NMEA
ICAO	0	ICAO aircraft type designator
SQUAWK	0	Squawk code of aircraft
EMITTER_CAT	0	Category of sender
IDENT		Flight number
ADSB_TX_ENABLED	1	Enable ADS-B broadcasting
ADSB_TX_ON_BOOT	1	Sets on-boot value of 'ADSB_TX_ENABLED'
ADSB_TX_SURFACE	0	Transmit surface ADS-B frames
FLARM_TX	1	Is FLARM transmitting enabled?
FLARM_RX	1	Is FLARM receiving enabled?
FLARM_LOG	0	FLARM debugging - 1 - stats. only, 2 - verbose?
PRESSURE_LOG	0	

Figure 4: Settings window

GENERAL INFORMATION

1. Module installation – There is a high concentration of various electronic systems on a small area at UAS. Try to keep as much separation between TR-1F and other devices, especially radio ones. Despite the high robustness of TR-1F to jamming, try to install the antenna away from other on-board systems.

2. AERO vs. MAVLink protocol – TR1F is based on OEM TTSF1a module. The default is in AERO protocol mode, which is an ASCII protocol. If you want to use the module to work with MAVLink system, it is possible to switch the protocol to MAVLink, which has the binary representation. Details of the module programming can be found on the website.

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1 REVISION HISTORY

Date	Revision	Changes
09-March-20	1	Initial release.

Table 5: Document revision history.

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