RFD TXMOD

User Manual

PRJ-TXM-MAN-001

Table of contents

1 Introduction

1.1 Product Description

The RFD TXMOD, or TXMOD, has been designed to work in conjunction with the Taranis X9D Radio Control Transmitter from FrSky and other compatible controllers. The RFD TXMOD transmits the PPM stream from the controller to the vehicle via the RF Design long range telemetry modems while also receiving telemetry data from the aircraft. The telemetry data can be broadcast to a computer or smart device by the TXMOD's built in Wi-Fi module.
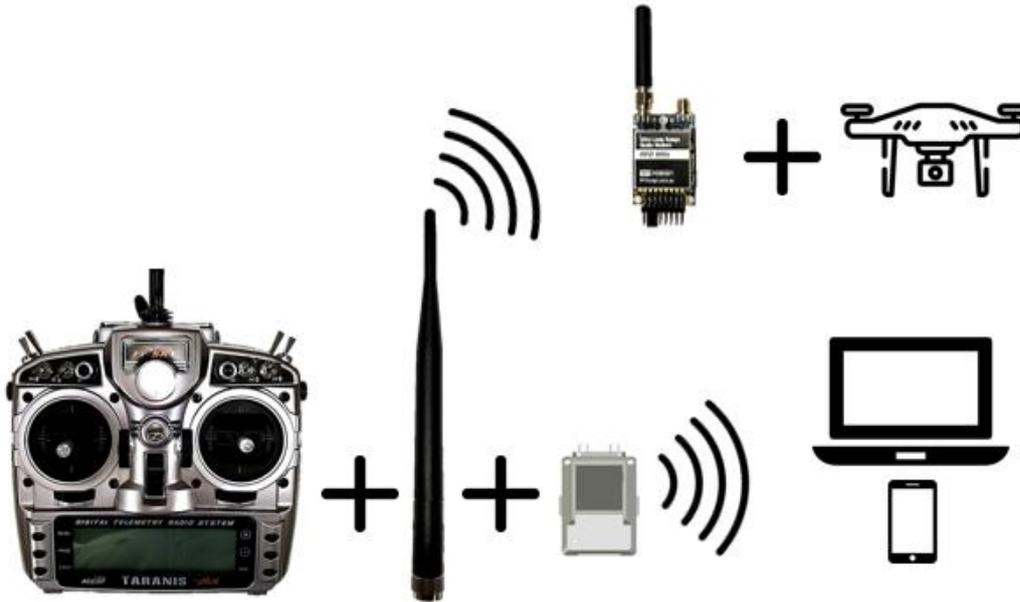This manual covers both TXMOD versions currently available, TXMOD and TXMOD v2.0.

Figure 1 - Typical Application Diagram.
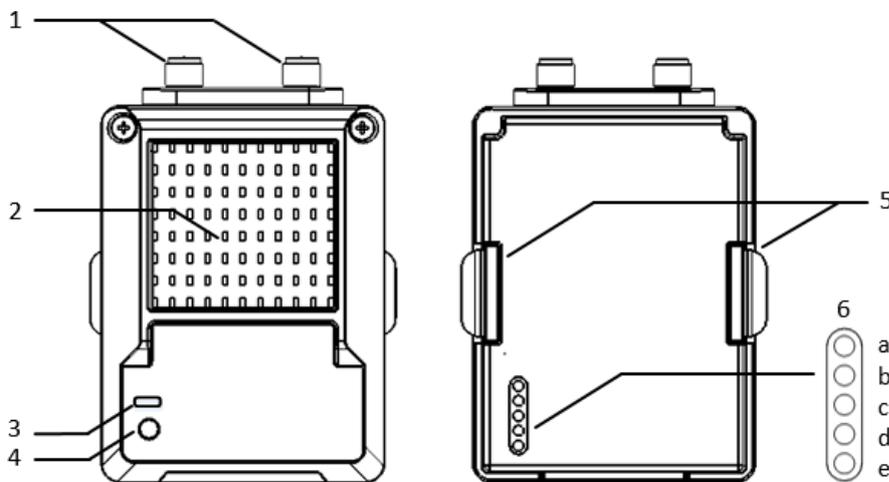
1.2 Getting to know the product

Figure 2 - TXMOD top (left) and bottom (right) views

Table 1 - TXMOD Description

#		Description /Note		
1	**Antenna connectors**	For information about antenna selection refer to section 5 in this document or to the RFD 900x Modem datasheet linked in section 7.		
2	**Heat sink**	The heatsink, visible through the top cover, is required for proper operation and should not be covered while the unit is in use.		
3	**Status LEDs**	Red	Blinks slowly a few times - establishing link to a Wi-Fi client. Blinks rapidly for some time - flashing the modem firmware (using 'spiffs.bin' file explained in 3.2.2e) Solid - device initialisation has completed	
		Green *	Blinking – RFD modem looking for a link Solid – RFD modem bound to another modem	
4	**Button**	Press 5 times within 5 seconds to reset all Wi-Fi settings to default values. (Red LED will turn off, blink 3 times and go solid after resetting default Wi-Fi settings)		
5	**Tabs**	Mechanical clips to lock the TXMOD into the radio control socket.		
6	**RC and TXMOD Interface. **	a	PPM	Sends RC data into TXMOD.
		b	+6 V	6V supply positive terminal (not used by the module)
		c	+Bat	Positive battery terminal (supply for the module) ***
		d	GND	Ground
		e	S.PORT****	Sends Passthrough messages converted from MavLink

 * Green LED will be enabled after 'First Run Wizard' explained in section section 3.2.2 0.

 ** Interface between RC and TXMOD is done through a female 0.1" pitch connector.

 *** See Table 2 below for module supply ratings and section 6.1 for the relation between battery voltage and current draw with different battery types.

 **** This pin is only connected on TXMOD V2

Table 2 - TXMOD Supply Ratings

Parameter	Minimum	Maximum	Units
Supply Voltage (+Bat relative to GND)	+5	+18	V
Operating Current Draw	N/A	1.2*	A

 *Rating for TXMOD with RFD modem set for maximum 1W transmit power measured at 5V supply.

2 RC – TXMOD Compatibility

The TXMOD has been designed to fit into the rear expansion bay of an FrSky Taranis X9D Plus. It may be compatible with other transmitters however the determination of this is the user's responsibility. Check that the dimensions of the slot and the pin configuration of the connector at the back of your RC match those specified for the TXMOD. For detailed information on the TXMOD dimensions refer to section 6.5 and pinout details can be found in Table 1 above.
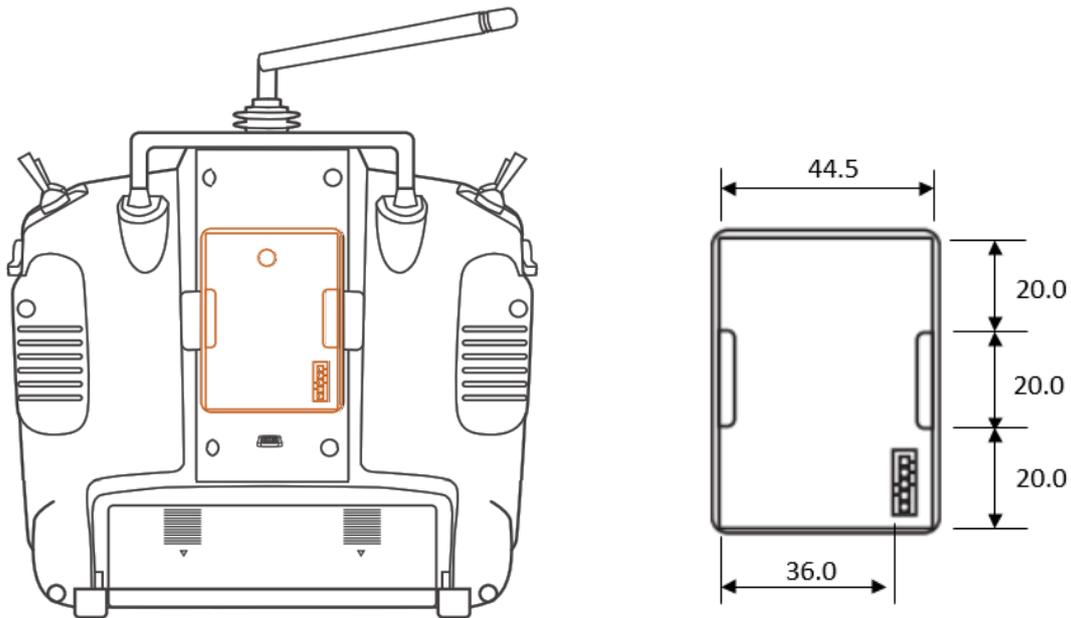

Figure 3 - RC External RF module slot dimensions.

3   Getting Started

The RFD TXMOD setup has five elements.

3.1   Radio Controller (RC) configuration
3.2   TXMOD Wi-Fi access configuration
3.3   TXMOD RFD900x Radio Configuration
3.4   Vehicle (paired) RFD 900x modem configuration
3.5   Ground Control Station (GCS) configuration

3.1   Radio Controller Configuration

a) Enable PPM mode on radio controller

This guide is based on TARANIS X9D PLUS radio controller (RC). Specific instructions on activating the required mode on other RCs should be sort in the relevant device manufacture's manual. Please check the transmitter for RFD TXMOD compatibility and ensure it supports the same interface.

- Switch on the RC and choose the vehicle you intend to operate.
- Navigate to the *Model Setup* sub-menu
- Scroll down until you find the *External RF* configuration section, as shown in figure 4.
- Choose "Mode PPM" to enable external PPM stream for the TXMOD.
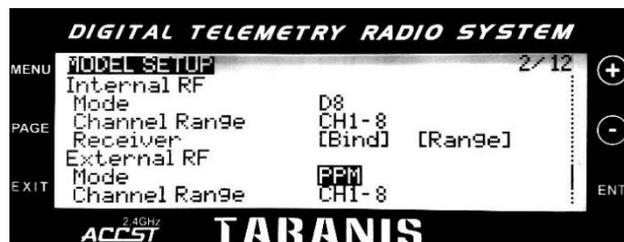

Figure 4 - PPM mode configuration on TARANIS X9D PLUS RC.

3.2   TXMOD Configuration

- With the RC switched off, remove the rear protective cover from the radio controller and insert the TXMOD.
- Ensure the TXMOD is inserted fully into the opening and the two tabs have locked in place.
- Switch on and observe the TXMOD's LEDs. The red LED will blink and then go solid during the power up sequence, as per the descriptions in Table 1, and the green LED will indicate the state of the modem link with the modem on the aircraft. Note: The green LED functionality will only be enabled after the 'First Run Wizard', see section 0, is completed; before that it will remain off.

The configuration interface webpage and the communication settings for both the Wi-Fi and the RFD telemetry links are described throughout this section.
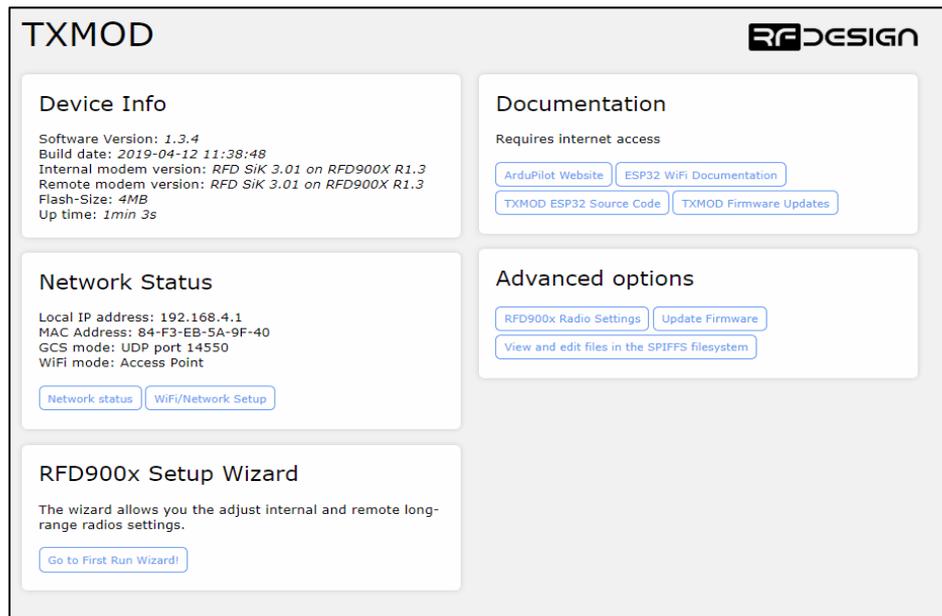
3.2.1   Configuration Webpage

Figure 6 - Configuration home page

The configuration home page provides basic information on the RF Design TXMOD, such as the software versions, MAC and IP addresses and links to the various configuration pages. The default address is http://192.168.4.1/ . This interface allows the user to configure both the Wi-Fi and the long-range communication settings. Follow the steps described in the following section.

3.2.2   Wi-Fi Configuration

An active Wi-Fi connection is needed to configure the TXMOD. On first power up, the TXMOD will default to access point mode, with SSID of the format **'TXMOD-XX-XX-XX'**, where the XX are unique hexadecimal characters relating to the unit MAC address.

a) Connect to TXMOD Access Point
- Use your computer or smart device to search for and connect to the access point Wi-Fi network generated by the TXMOD (use '**txmod123**' as default password for versions below 1.4, and no password required if 1.4.1 and above). Note: It may be necessary to disable mobile data, on tablets and phones, to force the browser to use the TXMOD network.
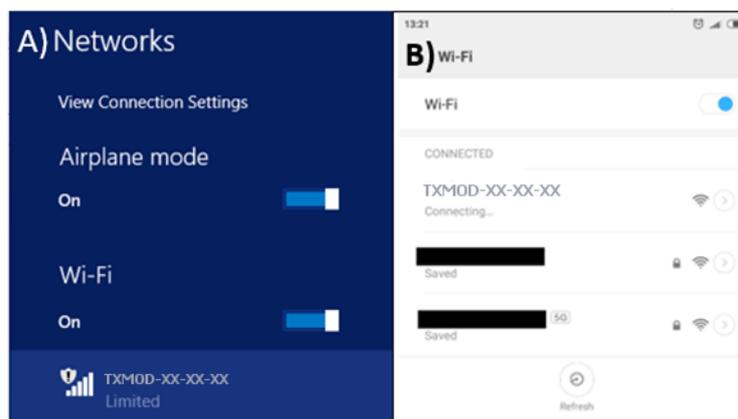

Figure 7 - Network settings. A) Windows 8.1. B) Android.

b) First Run Wizard

- Point your preferred browser to the TXMOD IP address (by default http://192.168.4.1/) to access the configuration homepage of figure 6. Alternatively, it can be accessed by the URL http://TXMOD-XX-XX-XX.local where the X's are the same as the X's in the access point network name. Note: This second option will require the installation of some support software for correct operation, for detail please see section 3.2.2 d).
- On the home page, see figure 6, click on 'Go to First Run Wizard!' button to access the wizard shown in figure 8 which will guide you, step by step, to configure your module.
- Power up the remote modem. Note: If the remote RFD900x modem was supplied in kit with the TXMOD both modems should already have the correct firmware. If not or if TXMOD firmware has changed due to an update, refer to section 3.3 for a guide on how to update the remote modem firmware version. The version is displayed on the 'Device Info' section of the homepage interface of figure 6 under 'Internal modem version:'.
- The modems should lock, indicated by solid green LED on the vehicle modem, if no link is established, green LED blinking, reset both modems to default settings. If there is an ongoing issue try resetting the TXMOD by pressing the button on the TXMOD 5 times rapidly, after it has rebooted the wizard can be restarted.
- Follow the wizard steps

Once the wizard is successfully completed, your device is ready to be used and further configuration is optional.
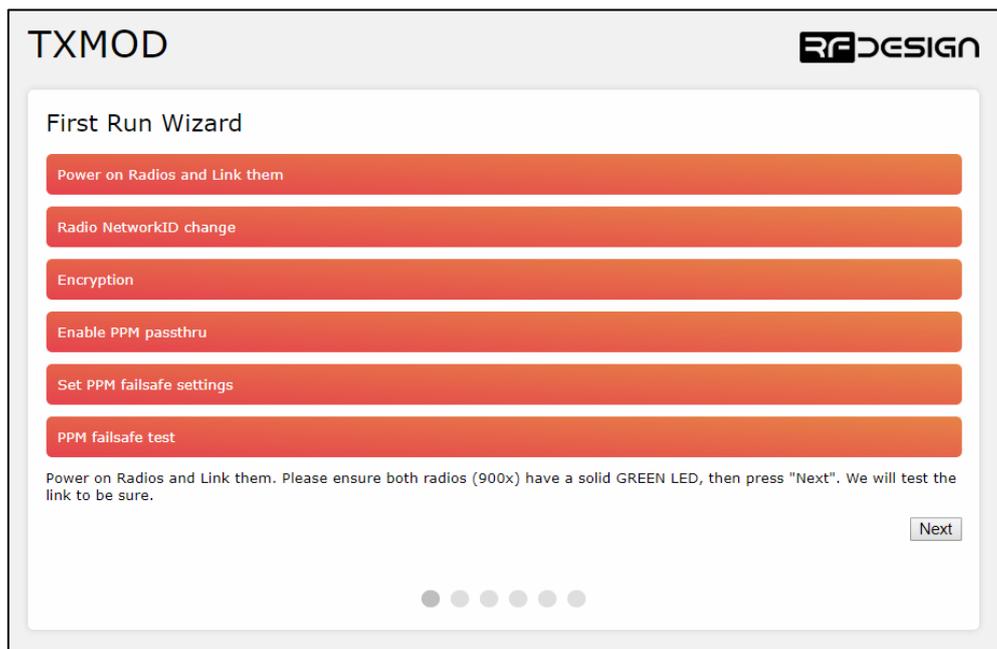

Figure 8 - First run wizard

c) Change Network Settings

- Open a web browser and enter the module's IP address by default in AP mode http://192.168.4.1/
- Click on 'Wi-Fi/Network Setup' or 'General settings' – depending on what firmware version you are using, to access the Wi-Fi setup interface of figure 9.
- Change the desired settings and press save.

- Finalise the changes by power cycling the TXMOD. Note: Changes to the network settings may require a change to the Wi-Fi connection that you use in order to connect, e.g. selecting the new Wi-Fi name, or forcing the system to forget an old network password.
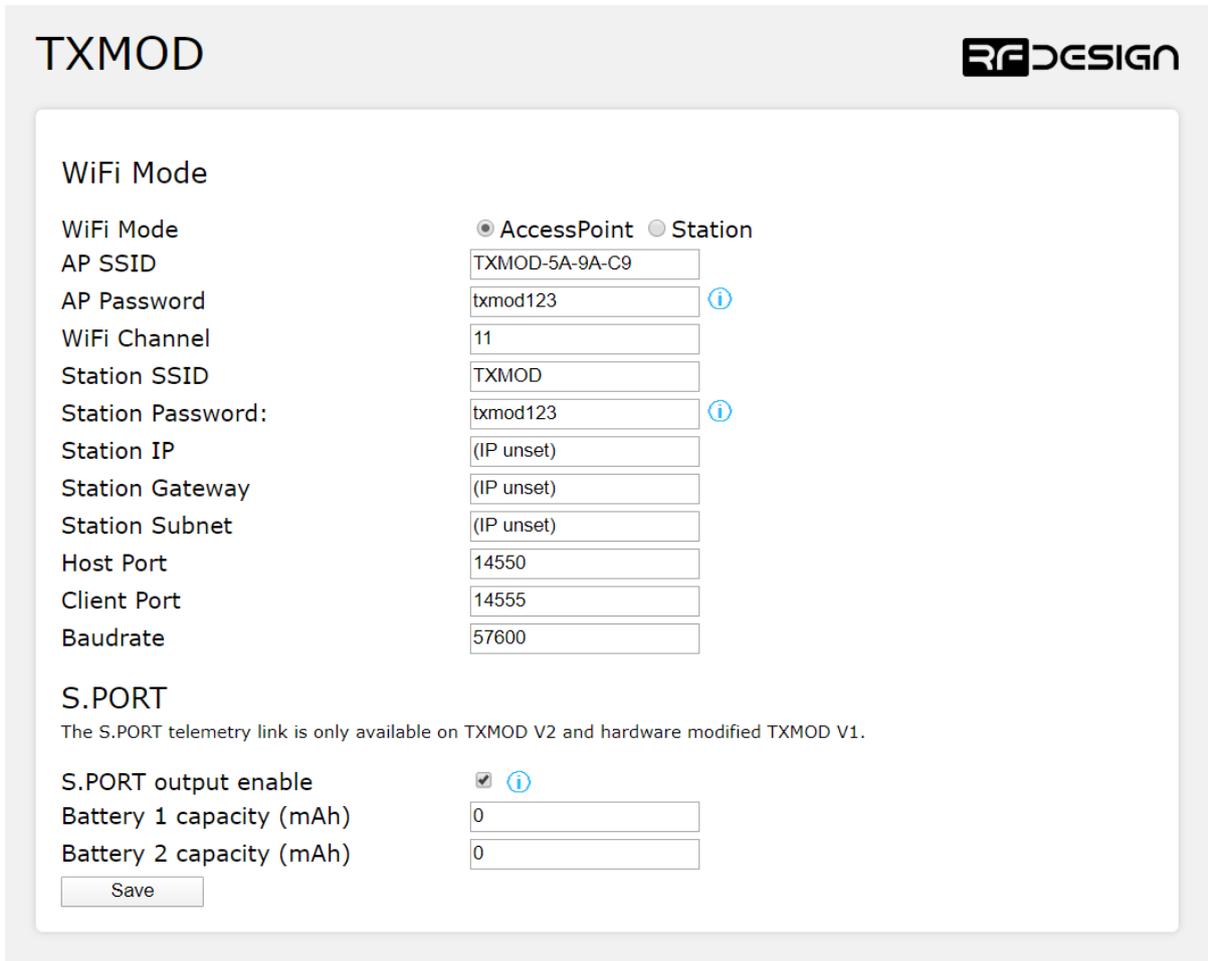

Figure 9 -WiFi settings configuration page on firmware version 1.4. Some of the options will not be available on older firmware versions.

Table 3 – WiFi Settings/General settings parameters description

Parameter	Description
Wi-Fi mode	This sets the module to act as an access point (default) or as a station on an existing access point, such as a home network.
AP SSID	Is the SSID used for creating the Access Point (AP).
AP Password	This is the password that will be used for the access point. It must be a minimum of 8 character long.
Wi-Fi Channel	Allows the user to set the channel as per the Wi-Fi 802.11 standard definitions this can be used as needed to prevent interference or meet the requirements of the network that the module is joining. The default is channel 11. The most commonly used channel set is 1, 6 and 11.
StationSSID	The SSID of the network that the TXMOD should attempt to join.
Station Password	The password of the network that the TXMOD should attempt to join.

Parameter	Description
Station IP	The static IP address to assign the TXMOD when joining the network. (**Note** this may require appropriate settings to be made on the network router. Once assigned as a station the landing page for the TXMOD settings becomes the Station IP address that was assigned.)
Station Gateway	The Gateway IP address of the network that the TXMOD should attempt to join.
Station Subnet	The Subnet Mask of the network that the TXMOD should attempt to join as a station.
Host Port	This is the UDP host port number. This is the port that you will direct a connection to in UDP mode
Client Port	This is the UDP client port number.
Baudrate	Baud rate of the serial link with the modem. It must match the modem serial speed setting to allow the two to communicate.
S.PORT output enable	You might enable S.PORT passthrough if your hardware supports it. This allows the Mavlink telemetry data to be converted and displayed on compatible RC transmitter. You can modify the original TXMOD hardware to enable that feature or use the TXMOD2 that supports it out-of-the-box.
Battery 1 capacity	This parameter is used to set the battery 1 capacity to be displayed in your RC transmitter screen if the S.PORT output is enabled.
Battery 2 capacity	This parameter is used to set the battery 2 capacity to be displayed in your RC transmitter screen if the S.PORT output is enabled.

d) TXMOD as a station

Using the TXMOD on an existing Wi-Fi network, e.g. to provide telemetry data to a GCS while still allowing access to the internet, for example to download maps, can be done a couple of ways

Basic users

Supporting software requirements:

For Windows and Linux users this will require the installation of a support software like Bonjour Services from Apple for Windows (https://support.apple.com/kb/DL999?locale=en_US) and Avahi for Linux. Windows users may also need to use Chrome (or Chrome based) browser as this has good support for the Apple software.

Procedure:

Once the supporting software is installed.

- Connect to the TXMOD in default AP mode go to Wi-Fi settings

- Choose 'Station' in 'Wi-Fi Mode', set the correct SSID (in StationSSID) and password of the network in "Station Password", leave "Station IP", "Station Gateway" and "Station Subnet Mask" as 0.0.0.0 then press "Save"

- Finally reboot the device.

You can connect the to the Wi-Fi network with the TXMOD on it then open the browser and enter the following address http://TXMOD-XX-XX-XX.local where the X's are the same as the X's in the access point network name. If you cannot access using the URL, you will have to log into your router

and find what IP was assigned to the TXMOD. You will be able to access the TXMOD interface by typing the IP in a web browser.

Advanced users

The module must be set up by:

- Choosing 'Station' in 'Wi-Fi Mode'
- Setting the correct SSID (in StationSSID) and password of the network in "Station Password".
- Find the Gateway and Subnet mask of the network then to write the appropriate values in 'Station Gateway', 'Station Subnet'. Network information such as the Subnet Mask and Gateway address can be found on a network connected device. For instance, in windows launch a command prompt, type *'ipconfig'* and press enter. Information similar to figure 10 will be shown. In Linux based devices typing *'ifconfig' to the terminal should give similar results.*

Note: Assigning the 'Station IP' will require that a static IP is set on the DHCP server, normally the network router, this is to ensure the device will be at a known address on the network. This new address will replace the default 192.168.4.1 of access point mode.

Figure 10 – Command Prompt.

Default Gateway ->'Station Gateway'

Subnet Mask ->'Station Subnet'

e) Firmware Update:

Updating the TXMOD requires two different files; the 'firmware.bin' and the 'spiffs.bin' files.

- Download files. Follow the links in section 7
- On the browser configuration landing page shown in figure 6, select 'Update Firmware' and follow the on-screen commands to flash them onto the device.
- The firmware.bin should be uploaded first
- Second upload the spiffs.bin. **These files must not be uploaded and flashed simultaneously.**
- Power-cycle the device, this will automatically update firmware on the RFD900x modem if required.

Figure 11 TXMOD update page

f) Wi-Fi Troubleshooting:

In some cases, user connection settings may prevent devices from accessing the Wi-Fi addresses.

Some basic troubleshooting:

- Remove the existing network settings from the device memory
- Reset the wireless adaptor
- Turn off mobile data and disconnect other networking devices such as LAN cables.
- In other cases, OS tools such as the Windows Network Diagnostics may help.
- If you forget your settings or the device is not available on the network, it is possible to reset the TXMOD to its default Wi-Fi settings.
- Pressing the button 5 times rapidly while the device is powered up to initiate a factory reset of the TXMOD and the internal modem.
- Set up the device again as per earlier instructions.

3.2.3 TXMOD Internal RFD900x Modem settings

The TXMOD has an RFD900x series modem internally pre-configured with factory parameters, see figure 12. A description of this parameters can be found in *Table 4* - **RFD900x parameters**. For further information regarding the internal modem refer to the *RFD900x Peer to Peer Firmware* and *RFDesign Modem 900x Datasheet* documents using the links in section 7.

Table 4 - RFD900x parameters from RFD900x Peer-to-peer V3.X User Manual V1.3.pdf

Reg #	S Register Description	Default Value	Maximum Value	Minimum Value	Must be the same at both ends of the link?
S0	**FORMAT** This is for EEPROM version, it should not be changed. It is set by the firmware	Firmware dependant	N/A	N/A	No
S1	**SERIAL_SPEED** Serial speed in 'one-byte form'. Accepted values are 1, 2, 4, 9, 19, 38, 57, 115, 230, 460 and 1000 corresponding to 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, 230400bps, 460800bps and 1000000bps respectively.	57	1000	1	No
S2	**AIR_SPEED**[1] Air data rate in 'one-byte form'. Accepted values are 12, 56, 64, 100, 125, 200, 224, 500 and 750 corresponding to 12000bps, 56000bps 64000bps, 100000bps, 125000bps, 200000bps, 250000bps, 224000bps, 500000bps and 750000bps respectively.	64/200[4,8]	750	12	Yes
S3	**NETID** Network ID.	25	255	0	Yes
S4	**TXPOWER**[1] Transmit power in dBm.	30	30	0	No
S5	**ECC**[2]	0	1	0	Yes

Reg #	S Register Description	Default Value	Maximum Value	Minimum Value	Must be the same at both ends of the link?
	Enables or disables the Golay error correcting code.				
S6	**MAVLINK[3]** Enables or disables the MAVLink framing and reporting	1	1	0	No
S7	**OP_RESEND** Opportunistic resend allows the node to resend packets if it has spare bandwidth	0	1	0	No
S8	**MIN_FREQ[1]** Min frequency in KHz	915000 /868000[4,8]	927000 /870000[4]	902000 /865000[4,8]	Yes
S9	**MAX_FREQ[1]** Max frequency in KHz	928000 /870000[4]	928000 /870000[4]	903000 /865000[4,8]	Yes
S10	**NUM_CHANNELS[1]** Number of frequency hopping channels	20/1[4,8]	51[8]/8[4,8]	1	Yes
S11	**DUTY_CYCLE[1]** The percentage of time to allow transmit	100	100	10	No
S12	**LBT_RSSI[1]** Listen before talk threshold	0	220	25	Yes
S13	**RTSCTS** Ready-to-send and Clear-to-send flow control.	0	1	0	No
S14	**Max Window** Max transit window size used to limit max time/latency if required otherwise will be set automatically	131	400	20	Yes
S15	**Encryption Level** Encryption level 0=off, 1=128bit AES	0	1	0	Yes
S16	**GPIO1.1 R/C input** Set GPIO 1.1 (pin 15) as R/C(PPM) input	0	1	0	No
S17	**GPIO1.1 R/C output** Set GPIO 1.1 (pin 15) as R/C(PPM) output	0	1	0	No
S18	**GPIO1.1 SBUS input[7]** Set GPIO 1.1 (pin 15) as R/C(PPM) input	0	1	0	No
S19	**GPIO1.1 SBUS output[7]** Set GPIO 1.1 (pin 15) as R/C(PPM) output	0	1	0	No
S20	**ANT_MODE** 0= Diversity, 1= Antenna 1 only, 2= Antenna 2 only, 3= Antenna 1 TX and antenna 2 RX	0	3	0	No
S21	**GPIO1.3 Status LED output** Set GPIO 1.3 (pin 12) as output with state that mirrors the status LED on the modem	0	1	0	No
S22	**GPIO1.0 485 TX control output[6]** Set GPIO 1.0 (pin 13) as control signal on DINIO and RS485 interface boards.	0	1	0	No

Reg #	S Register Description	Default Value	Maximum Value	Minimum Value	Must be the same at both ends of the link?
S23	**Rate and Frequency Band** Switches between valid settings for the frequencies, channels and airspeeds that can be set on compliant modems ensuring compliance is maintained. See section 3.4 for FCC-related information.	0	3	0	Yes
R0	**TARGET_RSSI** Optimal RSSI value to try to sustain (255/0[8] disables the feature) V3.09 and earlier this is based on RSSI figures. After v3.12 this changes to being based on receiver dBm	255/110[8]	50/0[8]	255/0[8]	No
R1	**HYSTERESIS_RSSI** Amount of change before power levels altered. V3.09 and earlier this is based on RSSI figures. After v3.12 this changes to being based on receiver dBm	50/15[8]	20/2[8]	50/5[8]	No

Table 3: RFD900x SiK firmware parameters

Notes:

[1] The listed values are the full range of options available on unrestricted modems. The range of settings available may be altered on compliant systems to maintain compliance to the appropriate standards

[2] ECC - Software Detection and correction, extra packet information, twice the packet length, is sent to allow the recovery of corrupted packets. Disabled in version 3.15 and up. Error detection is handled by CRC since at least version 3.01

[3] Injects RSSI packet when MAVLink protocol used and heartbeat packet detected.

[4] 868 modems

[5] Experimental feature settings not currently available

[6] This setting controls modem functionality linked with 485 interface and DINIO products it is not intended for use outside of this application.

[7] Version 3.09 the SBUS function is mapped to GPIO1.3

[8] Version 3.15 and up

a) Modifying parameters with the TXMOD web interface

The modem settings, described in Table 4, can be viewed and modified on the TXMOD and on any remote modem connected to it by using the browser interface introduced in Section 3.2.2.

To do so, point your preferred browser to the module's IP address to access the TXMOD web interface.

- *Click on 'RFD900x Radio Settings'* to access the modem's setup interface. Note: If the TXMOD has not been paired yet with any other modem, the remote side will appear empty and the message "Sorry no parameters available" will be shown.

Figure 12 - TXMOD modem configuration page.

- Settings can be refreshed using the 'L*oad Fresh Parameters*' button.
- Parameters can be adjusted in the text boxes as required
- Apply changes using the '*Save Params*' button. Note: Changes on the AIR_SPEED, NETID, MIN_FREQ, MAX_FREQ and NUM_CHANNELS parameters should be applied to remote radio settings as well to avoid losing the radio link.

3.2.4 Displaying telemetry using the S.PORT

When using a TXMOD v2.0 or a modified TXMOD, telemetry information can be displayed on the screen of selected RC transmitters. The user may use Yaapu's LUA script to display telemetry data in a very intuitive way and improves flight experience.

- Enable S.PORT output inside the 'General Settings' menu. See figure 9.
- Check this link for supported devices and installation instructions.

Figure 13 – Telemetry screen on a Taranis running Yaapu's LUA script
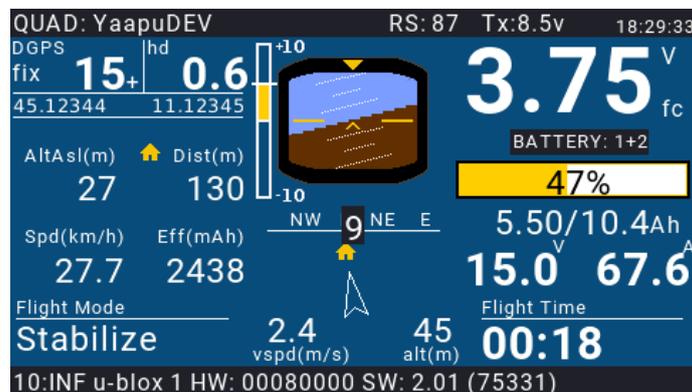
Figure 14 – Telemetry screen on a Horus RC running Yaapu's LUA script

3.3 Vehicle Modem

The TXMOD bundle should come supplied with a vehicle modem that has the required firmware version. If that is the case, the easiest way to configure it is through the browser interface explained in section 3.2.3.

However if the modem is not the one supplied with the kit, or the TXMOD firmware has been updated, or the modems are not connecting, the vehicle modem can be should be configured or updated with an FTDI cable and the RFD900 Tools.

- Connect the FTDI cable. The black wire of the FTDI, i.e. pin 1, should connect to pin 1 on the lower row of modem header
- Ensure the jumper is fitted as per figure 1. The jumper should connect the second and third pins, aka pin 4 and 6, on the top row of the modem header.

Figure 15 - Modem connected to FTDI cable (pins 1,3,5,7,9,11) to enable serial communications.
Jumper connection (pins 4&6).

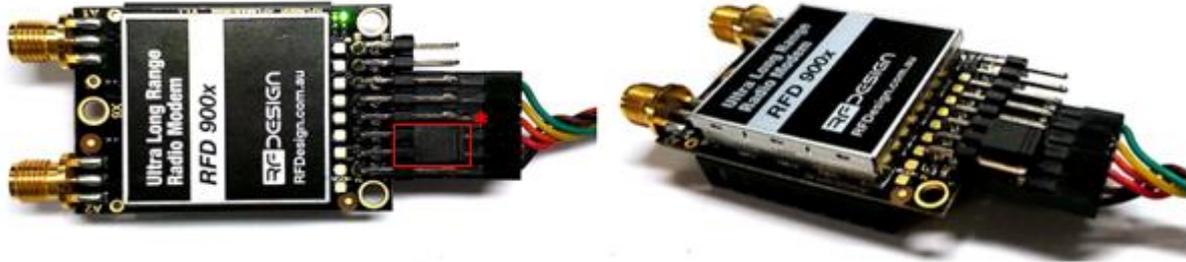To configure the modem using the RFD900 tools, download and install the software using the links on section 7 if it is not installed on your computer yet.
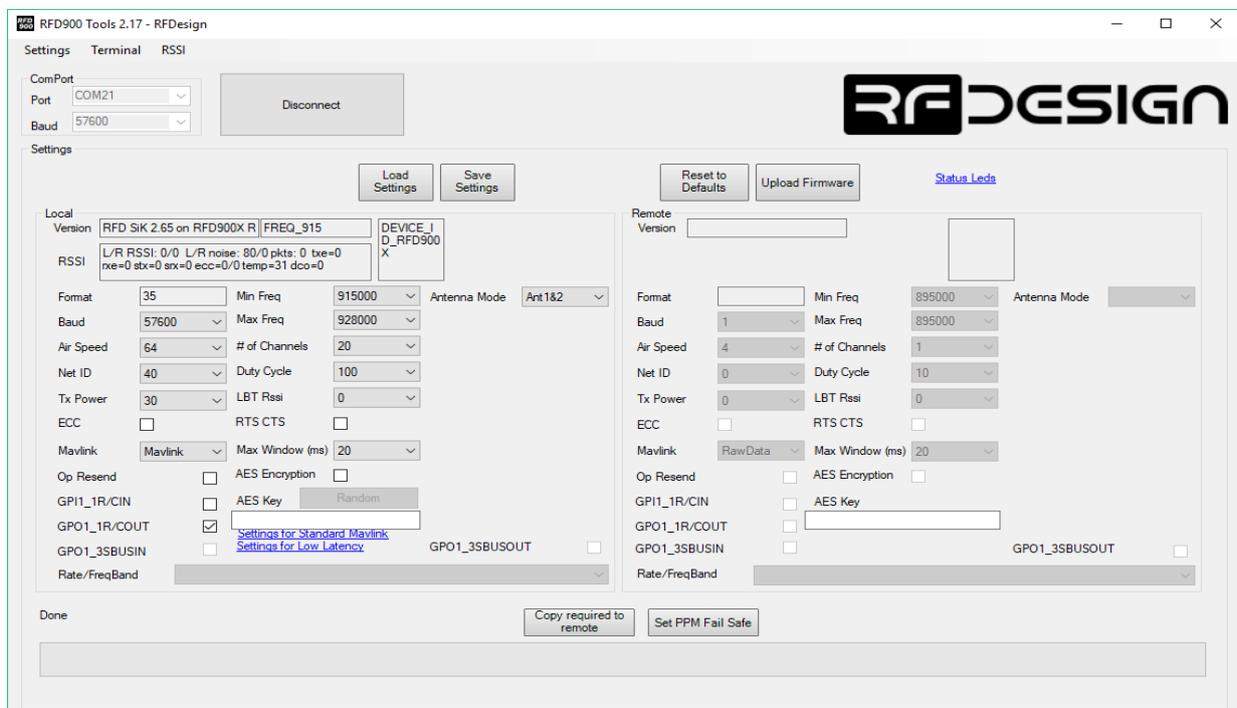
*Figure 16 – Vehicle m*odem configuration on RFD900 tools.

- Ensure the firmware on the vehicle modem is the same as the one on the TXMOD.
- Update firmware if required by clicking on 'Upload Firmware' and choose the *.bin file Note: Firmware can be download through the links in section 7.
- Wait until the process finishes (a message will appear at the bottom of the page)
- Reboot the modem.
- Use the interface to configure the parameters. Note: The AIR_SPEED, NETID, TXPOWER, MIN_FREQ, MAX_FREQ and NUM_CHANNELS parameters should be the same as the ones in the TXMOD modem.
- Set modem GPIO1.1 as a PPM output. Note: This allows the modem pin 15 to output the PPM stream received from the TXMOD modem. This will be configured automatically by the First Run Wizard.
- Save the settings to the modem.

If the modem has been configured correctly it will be able to link with the TXMOD modem, indicated by a solid green LED on both devices. From this point onwards the FTDI cable is no longer required to configure the vehicle modem. Instead this can be done over the air via the TXMOD using the browser interface described in section 3.2.2 as long as the modem in the vehicle and TXMOD are linked. Note: Firmware updates to the vehicle modem can only be done by means of the FTDI cable.

Settings on the modem can be defaulted by means of the reset to defaults button.

4 Ground control station software

Once the modem and Wi-Fi communications are configured it is possible to use the telemetry data stream. The example in this section uses Mission Planner for Windows and Tower for Android. Other software can be used provided it supports Transmission Control Protocol (TCP) or User Datagram Protocol (UDP).

- Connect your computer or smart device to the configured Wi-Fi network; that is either the TXMOD Access Point or the linked network when using the module as a station.
- Open Mission Planner on your computer or Tower App on your Android device
- Choose TCP or UDP and press the button "CONNECT" as per figure 17.
- When prompted, enter the IP address and port number in the pop-up boxes. Default values in AP mode are IP *192.168.4.1,* TCP port number 23 and UDP 14550. After that, if properly connected, telemetry data should be available, and the control software should run missions as normal.
- Parameters should start loading provided that the TXMOD is properly bond to the modem on the aircraft (solid green LED) and both devices are powered up.
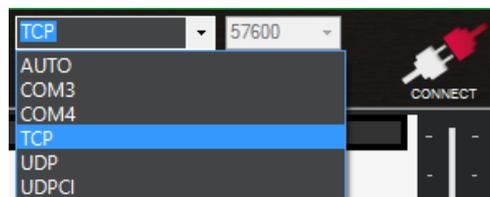
Figure 17 – Mission planner connection options.
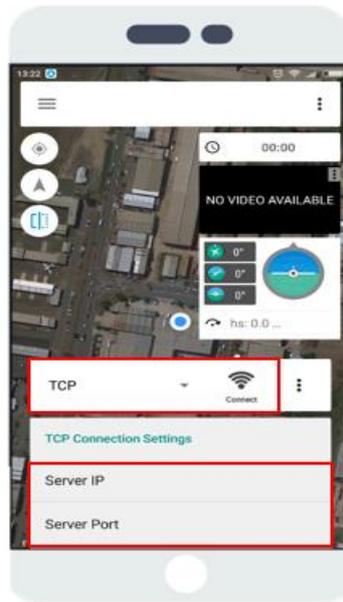
Figure 18 - Tower configuration on Android.

5 Antenna Recommendation

Any antenna with a male RPSMA fitting 50 Ohm impedance and matched to the 902-928MHz or 868MHz ISM band can be used. The recommended antenna for the TXMOD is the 3 dBi half wave dipole which is provided in the kit and is available for purchase on the RFDesign store.

Figure 19 -: 900MHz Half Wave Dipole Antenna 3 dBi.

When assembling and disassembling the TXMOD from the transmitter, be aware the antenna may have to be removed then reattached due to mechanical interference.

6 Technical Specifications

6.1 TXMOD Power Consumption

The graph indicates the current consumption of the TXMOD vs the supplied battery voltage. It should be noted that this graph is generated with the RFD modem configured for 30dBm, or 1 W, transmission. Changing the modem power will significantly affect the current draw. The graph has been divided to illustrate some common RC battery configurations.
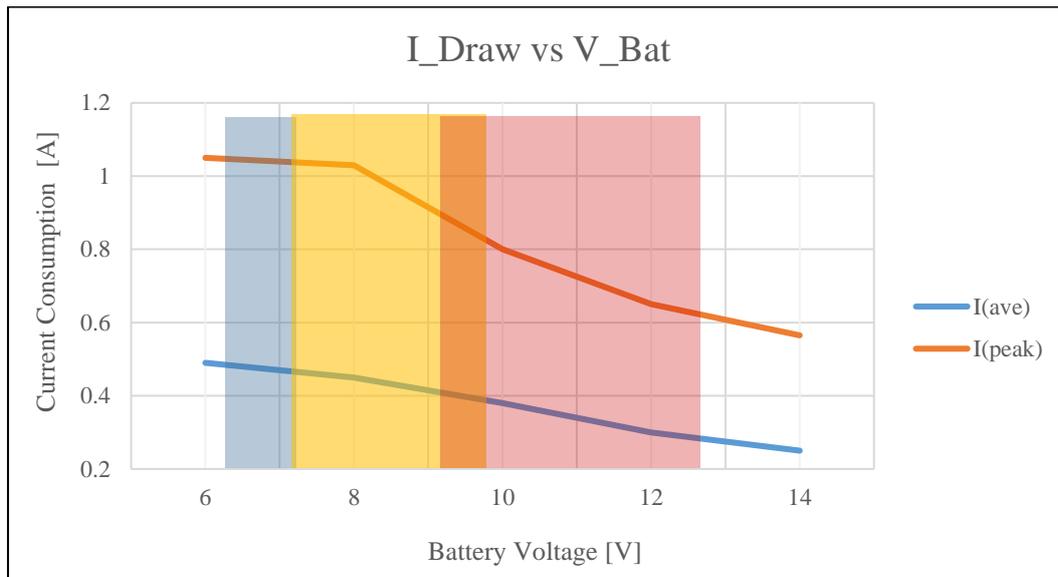
*Figure 20 - TXMOD current consumption vs RC battery voltage. **A)** (Blue area) 6S Ni-MH*
***B)** (Orange area) 3S LiFe **C)** (Red area) 3S LiPo.*

6.2 Modem Specification

Table 4- Performance	
Supported RF Data Rates	4, 64, 125, 250 and 500 kbits/sec
Indoor Range	500 m – 1 km
Line-Of-Sight Range	40km or more depending on antennas
Transmit Power	0 to 30dBm in 1dBm steps
Receiver Sensitivity	>121dBm

Table 5 - Features	
Configuration Method	AT Commands, APM Planner, Customized Configuration Tool
Frequency Band	902 MHz – 928 MHz
Interference Immunity	FHSS (Frequency Hopping Spread Spectrum)
Serial Interface Data Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 450800, 1000000 baud/s

Table 6 - Networking and Security	
Addressing Options	Network ID: 0 –255
Channels	Up to 50 Frequency Hopping Channels
Supported Network Topologies	Point to point

6.3   Wi-Fi Specifications

Table 7 - Wi-Fi Parameters	
Wi-Fi Protocols	802.11 b/g/n
Frequency Range	2.4GHz-2.5GHz (2400MHz-2483.5MHz)
Wi-Fi mode	station/softAP/
Security	WPA/WPA2
Encryption	WEP/TKIP/AES
Firmware Upgrade	OTA (via network)
Network Protocols	IPv4, TCP/UDP/HTTP/FTP
User Configuration	Browser interface

Table 8 – Wi-Fi Transceiver Characteristics

Parameters	Min	Typical	Max	Unit
Input frequency	2412		2484	MHz
Input impedance		50		Ω
Input reflection			-10	dB
Output power of PA for 72.2Mbps	15.5	16.5	17.5	dBm
Output power of PA for 11b mode	19.5	20.5	21.5	dBm
Sensitivity				
DSSS, 1 Mbps		-98		dBm
CCK, 11 Mbps		-91		dBm
6 Mbps (1/2 BPSK)		-93		dBm
54 Mbps (3/4 64-QAM)		-75		dBm
HT20, MCS7 (65 Mbps, 72.2 Mbps)		-72		dBm
Adjacent Channel Rejection				
OFDM, 6 Mbps		37		dBm
OFDM, 54 Mbps		21		dBm
HT20, MCS0		37		dBm
HT20, MCS7		20		dBm

6.4 TXMOD Radio Controller Interface

Table 9 - RC Parameters

Parameters	Min	Typical	Max	Unit
Latency	-	45	78	ms
TXMOD Supply Voltage	+5	-	+18	V
Current Draw (peak at input voltage of 5V)	-	-	1.2	A

6.5 TXMOD Compliance

Table 10 - Compliance	
Radio	AS/NZS 4268 : 2017 FCC 47CFR 15.247 FCC 47CFR Part 1.1307 FCC 47CFR 1.1310 IC RSS247
EMC	CISPR22-10 FCC PART 15 SUBPART B:2018 ICES-003 Issue 6 : 2017 RSSGEN

6.6   Physical Dimensions

This section provides the TXMOD dimensional drawings. The module it has been designed to fit into the rear expansion bay of an FrSky Taranis X9D. Users may find that it can be fitted to other transmitters. To ensure functionality check the physical dimensions and electrical interface are compatible and follow the information described in sections 1.2 and section 2.
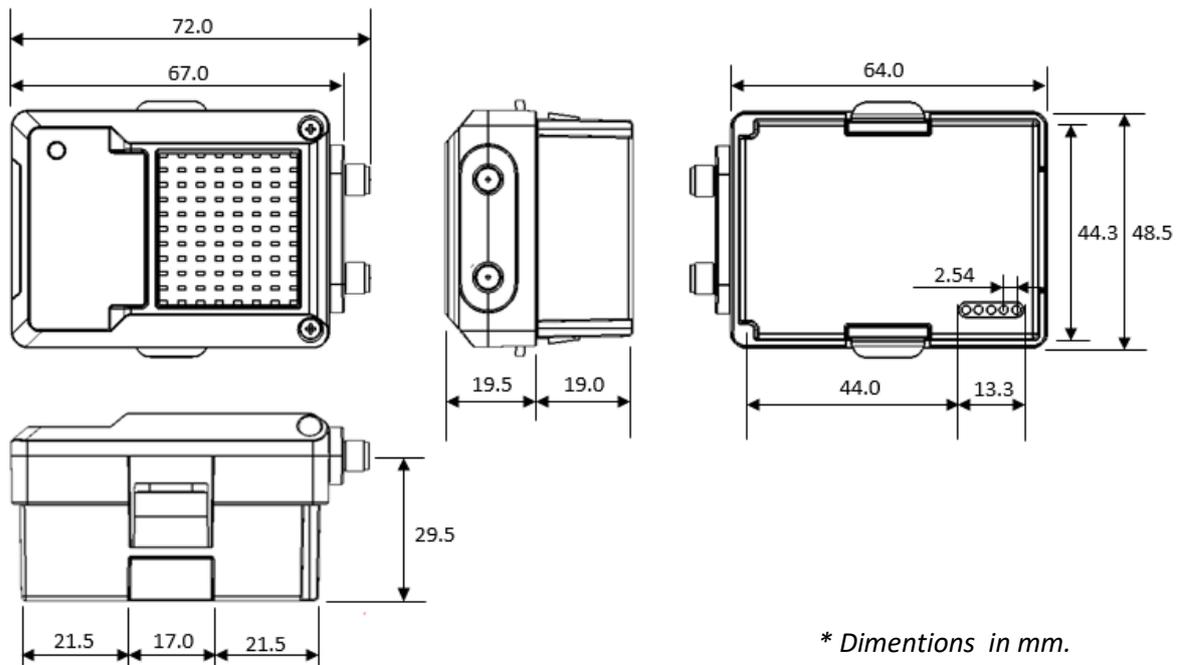

Figure 21 - TXMOD physical dimensions Top (upper left), Front (centre), Bottom (right) and Side (lower left) views

7 Useful Links

TXMOD Wi-Fi firmware
http://files.rfdesign.com.au/firmware/

TXMOD - Adding S.PORT Support
http://files.rfdesign.com.au/Files/documents/TXMOD%20-%20Adding%20S.PORT%20Support.pdf

RFDesign Modem Firmware
http://files.rfdesign.com.au/firmware/

RFDesign Modem 900x and ux Datasheet
http://files.rfdesign.com.au/Files/documents/RFD900x%20DataSheet%20V1.1.pdf
http://files.rfdesign.com.au/Files/documents/RFD900ux%20DataSheet%20v1.2.pdf

RFD900x Peer to Peer firmware - User Manual
http://files.rfdesign.com.au/Files/documents/RFD900x%20Peer-to-peer%20V3.X%20User%20Manual%20V1.3.pdf

RFDesign Programming Tools
Software: http://files.rfdesign.com.au/tools/

Manual:
http://files.rfdesign.com.au/Files/documents/RFD%20Modem%20Tools%20Manual%20V1.1.pdf

CoolTerm
http://freeware.the-meiers.org/

Mission Planner
http://ardupilot.org/planner/index.html

FrSky Taranis X9D Plus
https://www.frsky-rc.com/taranis-x9d-plus-2/

Mission Planner
http://ardupilot.org/planner/docs/common-install-mission-planner.html

Revision History

Version	Date	Changes
1.0	12/04/2019	Release document
1.1	22/05/2020	Format and content updates
1.2	27/05/2020	Added S.PORT information
1.3	17/06/2020	Updated default password
1.4	18/06/2020	Added information on Table 1 about pin E; Fixed page numbering; Added section 3.2.4