2.4GHz Two-Way Radio System

1.   Introduction:

The Two-way Radio System developed by FrSky provides an additional return link that would be used for monitoring the Rx's voltage, temperature, location, speed and so on.

2.   Overviews

2.1   Transmitter modules:

a)   Model: DFT

Compatible with the following transmitters:

Futaba: 3PM, 3PK, 7U, 8U, 8J, 9C, 9Z, 10C, FN series, T10C, FC-18, FC-28.

Hitec: Optic 6, Eclipse 7, Prism 7.

WFLY: WFT09, WFT08.

b)   Model: DJT

Compatible with the following transmitters:

JR: 347/388/783/U8/PCM10/PCM10S/PCM10SX/ PCM10IIS/8103/J9303/MX-22/MX-24S/PX/9XII.

2.2 Receiver module:

a)   Model: D8R, D8RHV

Compatible with FrSky Two Way module DFT/DJT.

b)   Model: V8R, V8RHV, V8R7, V8R7HV, V8R4

V8 receivers work with DFT/DJT, just in receive-only mode.

3.   Features

a)   Advanced Continuous Channel Shifting Technology (ACCST SYSTEM) achieves high reliable link in interference rich environments.

b)   Easy to bind and instant link-up.

c)   Excellent reboot times.

d)   All channels failsafe.

f)   Very smooth servo movement.

g)   Alarm on events of receiver (low battery voltages, poor reception, etc.)

h)   Error-free link, by using 48bits CRC algorithm.

i)   Low power consumption.

j)   True two-antenna diversity.

k)   Firmware upgradable.

4.   Function of Two Way communication

a)   Two way communication between receiver and transmitter

b)   Receiver is able to accept 2 analog inputs, which can be used to monitor battery voltage, temperature sensor, etc., and transfer them to transmitter. Users can set the Alarm Point of these analog voltages, when exceed or below these points, sound alarm is presented.

c)   Receiver is able to accept serial data streams from simple 3-wire RS232 port, such information as GPS, altitude, and user developed data can be transferred to Tx without error, and presented at the RS232 port on the Tx.

5.   Specifications

5.1   Receiver specifications:

Model: D8R

Weight: 16.2g

Dimension: 54*27*17mm

Operating Voltage Range: 4.0V-7.2V

Operating Current: 100mA

Specified Range: 1.5km (Ground Range)

Resolution: 11bit (3072)

Latency: 22ms

Number of Channels: 8CH

Analog voltage: 0~3.3V

5.2   Transmitter module specifications:

Model: DFT, DJT

Operating Voltage Range: 6.0V-13.0V

Operating Current: 50mA

Output Power: 60mW

Resolution: 11bit (3072)

Important!

The effective range of control refers to the distance between the transmitter and the receiver clear of obstruction. All data was tested and verified by FrSky.

However this is not guaranteed due to many factors such as the flying environment and the weather, which can greatly affect the effective range of control.

It is extremely important to range check your models prior to each flying session!

6. How To Use

6.1 Setup

6.1.1 Installation of the transmitting module:

a) Remove the original transmitting module.

b) Put the FrSky 2.4GHz transmitter module into the module port of your RC transmitter and screw on the transmitting antenna.

c) Check the MODE switch to its corresponding position.

Mode	Switch 1	Switch 2	Mode
1	OFF	OFF	Two-way Mode
2	OFF	ON	V8 Mode
3	ON	OFF	Not Defined
4	ON	ON	Firmware Upgrade

d) Turn the transmitter power on and check the LED status on the module.

6.1.2 Installation of receivers:

The D8R receiver incorporates two separate antennas which enable them to receive the radio signal at two different locations. please make sure that the two antennas be apart placed and 90 degrees crossed.

Please note:

to go around solid obstacles is weaker than 72 or 36 MHz. So the antennas must avoid objects with high conductivity, such as metal parts, servos, ESC's, battery packs, wires, and carbon fiber structures. If possible put the tip of the antennas outside of the fuselage for maximum reception.

6.1.3 Receiver and Transmitter Setup Instructions:

Follow the steps below to properly set up your system.

a) Turn your FUTABA or JR transmitter on and switch it to PPM mode, power off the TX.

b) Check the working mode of the Tx module.

c) Turn the transmitter on while holding the programming button. Release it a few seconds later. The RED LED on the transmitter module will flash indicating the transmitter is ready to bind the receivers.

d) Connect the battery to the receiver while holding the receiver's button. The LED on the receiver will flash indicating the binding process is complete. Turn off the receiver.

e) Turn off the transmitter and receiver to finish the binding procedure.

f) Turn on the transmitter.

g) Connect the battery to the receiver, the Green LED on the receiver will indicate the receiver is receiving commands from the transmitter.

After the steps above are completed, both the transmitter and receiver are ready to be used.

6.2 Range check

For safe operation, it is necessary to perform pre-flight range check.

Caution must be paid when the units in the environment of metal fences, concrete buildings, or rows of trees. Loss of signal may be experienced.

Perform a range check as follows (Note: this would be done with the receiver installed in the model):

a) Place the model at least two feet (60cm) above non-metal contaminated ground; for example a wooden bench.

b) Place the receiver's antenna apart. Do NOT let the antenna touch the ground.

c)   Place the antenna of the transmitter in a vertical position.

d)   Turn on the transmitter and receiver.

e)   To enter Range Check Mode, press and hold the "F/S Range" button of the transmitter for 4 second, the RED LED of the transmitter module will be turned off, the effective distance will be decreased to 1/30.

f)   Walk away from the model while simultaneously operating the controls on the transmitter, confirm that all controls are completely and correctly operational at least 30 meters away.

g)   Press the "F/S Range" button for 1S-4S, the transmitter will exit Range Check Mode.

7   Safety range indicator

The Two-Way Radio System has a feature to show the RSSI (Received Signal Strength Indication) of the receiver. When the RSSI is low, the Tx module would give out three types of alarm.

Red: The receiver is very far from the Tx.

Orange: The receiver is sound, but would be far from Tx.

Yello: The receiver is sound,

Green: The receiver is OK.

Note: Due to many environment factors, there may be casual alarm.

8   Failsafe

The receiver integrates the failsafe function for all channels.

To set failsafe positions, press briefly(less then 1 second) the "F/S Range" button of the Receiver, the Tx module will make a long "beep" indicating the failsafe position is remembered by the receiver.

9   Alarm operation

9.1   Alarm states

Tx module monitors the state of receiver and notify user by audible alarm.

The alarm state is made a distinction between three levels:

Red (Highest): constant three Beeps

Yellow (General): one Beep

Green: No Beep

Alarm sourced from:

-Rx interface 1: Analog Port 1 on Rx;

-Rx interface 2: Analog Port 2 on Rx;

-Rx interface 3: RSSI of Rx;

Note: The alarm threshold of Rx interface 1 and 2 could be set by user. Two alarm thresholds and three levels alarm state are available for both of Rx interface 1 and 2.

And the RSSI alarm setting is default by factory.

9.2   Pins Definition:

The Pin definition on receiver and Tx module:

It should be noted that the 3.3V voltage only have a limited driving current (1~10mA), should not be used for driving a MPU.

RXD	+5V	GND
AD2	×	GND
AD1	×	GND

RXD	Input to Tx module
TXD	Output from Tx module
+5V	Not regulated voltage
GND	Ground

RXD: input to receiver, RS232 level

AD2: Voltage: max 3.3V

AD1: Voltage: max 3.3V

Pins Definition at Rx   Pins Definition at Tx

10   LED Status:

10.1 LED status on Transmitter module:

Red LED on and Green LED flashing: Working Mode.

Red LED off and Green LED flashing: Range Check Mode.

Red LED flashing: Binding Mode.

10.2 LED status on Receiver:

Red LED flashing and Green LED off: No Signal.

Red LED flashing and Green LED on: Binding OK.

11   Firmware Upgrade

Frsky have developed a machanism of firmware upgrade. With it, user would like to upgrade to new version of software when available. And the Two-Way Radios System is supported by this machanism.

Steps are followed:

a)   Set module to Upgrade Mode.

b)   Connect the module to PC through a RS232 cable.

c)   Start Upgrade software on PC.

d)   Select file and corresponding port.

e)   After the Serial No. is got, press Download.

f)   After the progress bar reached 100%, the software of the module is updated.

<u>* For more information, please kindly refer to the Two Way Protocol.</u>

12   Contact Information

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FCC STATEMENT

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

The SAR limit of USA (FCC) is 1.6 W/kg averaged over one gram of tissue.

Device types D8T (FCC ID: XYFD8TD8R) has also been tested against this

SAR limit. The highest SAR value reported under this standard during product

certification for use on the body is 1.408 W/kg.