BETAFPV

Micro高频头

使用说明书

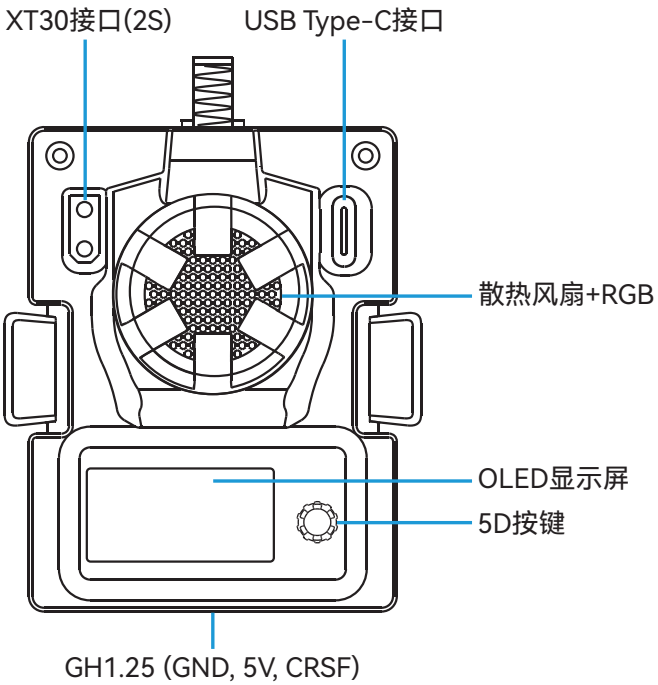
Welcome to ExpressLRS!

BETAFPV Micro高频头，是基于开源项目ExpressLRS开发的新一代遥控无线系统。ELRS系统具有遥控距离长，连接稳定，低延迟，刷新率高，配置灵活等特点。

项目官方Github地址：https://github.com/ExpressLRS
ExpressLRS官方暂时不支持OLED和按键，Micro高频头固件请到BETAFPV Github获取：https://github.com/BETAFPV/ExpressLRS

基本参数

- 频段（2.4GHz版本）：2.4GHz ISM
- 频段（915MHz/868MHz版本）：915MHz FCC/868MHz EU
- 输出功率：25mW/50mW/100mW/250mW/500mW (2.4GHz)
  100mW/250mW/500mW (915MHz/868MHz)
- 刷新率：50Hz/150Hz/250Hz/500Hz (2.4GHz)
  25Hz/50Hz/100Hz/200Hz (915MHz/868MHz)
- 输入电压：5-12V（2S）
- USB接口：Type-C

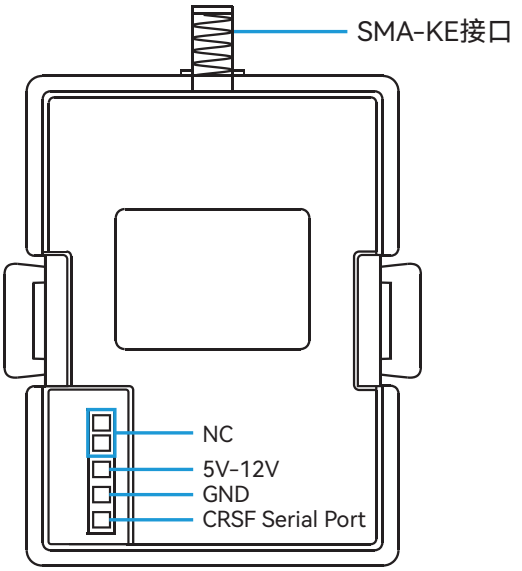


注意：请勿在Micro高频头接上3S及以上电池。否则，将造成永久性损坏。

Micro高频头能够匹配市面上所有使用Micro接口（也叫JR接口，SLIM接口）的遥控器。

基本配置

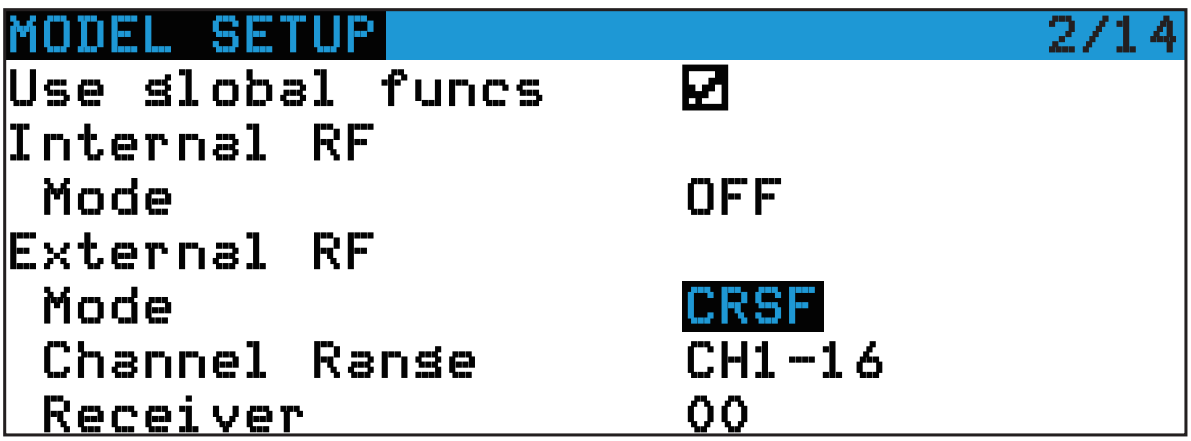
Micro高频头默认只接收Crossfire串行数据协议（简称CRSF）的信号。遥控器的高频头接口需要支持CRSF信号输出。下面以OpenTX遥控器系统为例，说明如何配置遥控器输出CRSF信号，并且使用LUA脚本控制Micro高频头。



注意：Micro高频头上电前，请安装好匹配的天线。否则，会导致高频头PA芯片损坏。

CRSF协议

在OpenTX系统中，选择MODEL SELECTION，进入MODEL SETUP界面，在该界面下，将Internal RF关闭（设置为OFF），将External RF开启，并且将输出Mode设置为CRSF。如下图所示。

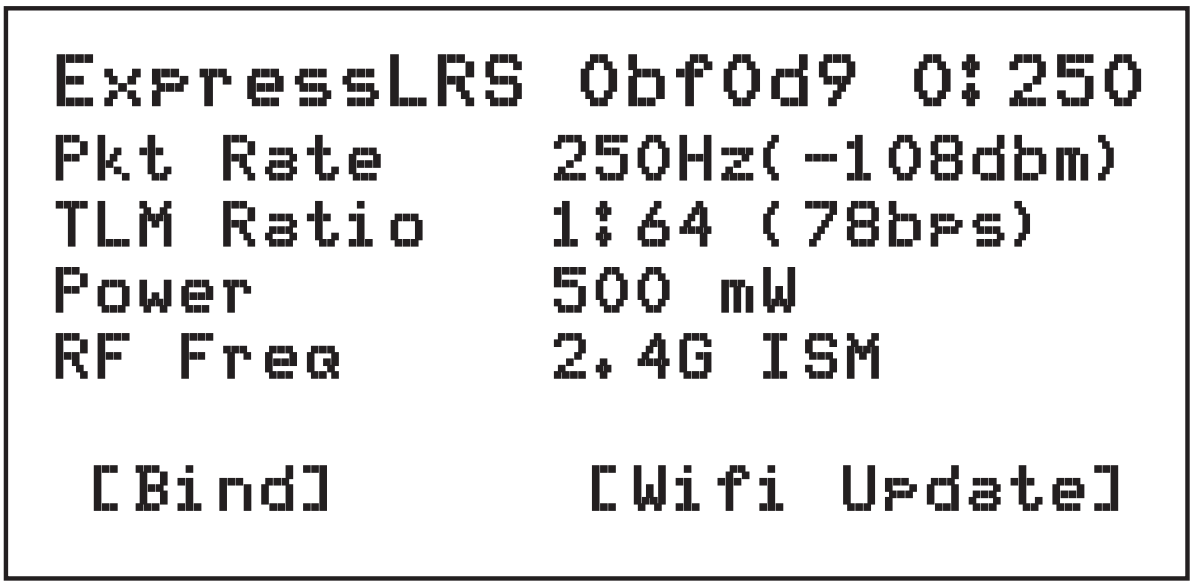


将Micro高频头连接正确，并且按照上面配置遥控器为外部高频头（External RF）的CRSF输出，原则上Micro高频头就可以正常使用。

LUA脚本操控

如果想修改Micro高频头的功率，刷新率等参数，则需要使用OpenTX系统的LUA脚本进行操作。如下所示。

- 将官方的LUA脚本ELRS.lua拷贝到遥控器的SD卡中，路径为Scripts/Tools;
- 在OpenTX系统上，长按SYS按键（例如RadioMaster T8遥控器等）或者MENU按键（例如Frsky Taranis X9D遥控器等），进入SD-HC CARD界面，在该界面下，选择ELRS.lua脚本并且运行该脚本;
- 如果LUA脚本成功运行，则界面如下图所示。



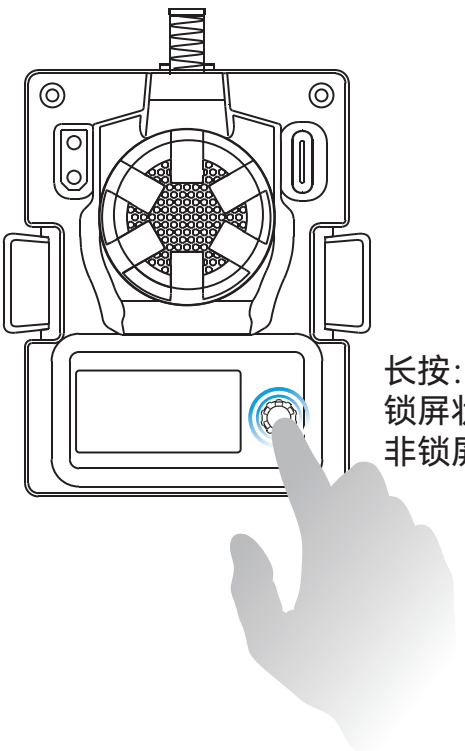
- 使用LUA脚本，可以选择配置Rate（刷新率），Ratio（回传包率），Power（输出功率）等参数；所有LUA脚本功能，说明如下表所示。

	参数名	参数说明
0:250	数据包 及坏包比例	位于界面右上角。表示高频头和遥控器直接每秒发送数据包的数量，以及坏包的数量
Pkt. Rate	数据包频率	频率越高，高频头发送数据包间隔越短，控制越精准
TLM Ratio	回传包率	例如，1:64表示，高频头发射出去64个数据包，接收机回传一个数据包
Power	功率	高频头发射功率
RF Freq	无线电频率	当前高频头使用的无线电所在频率
Bind	绑定	高频头进入绑定状态
Wifi Update	WIFI更新	高频头开启WIFI功能，用于固件更新

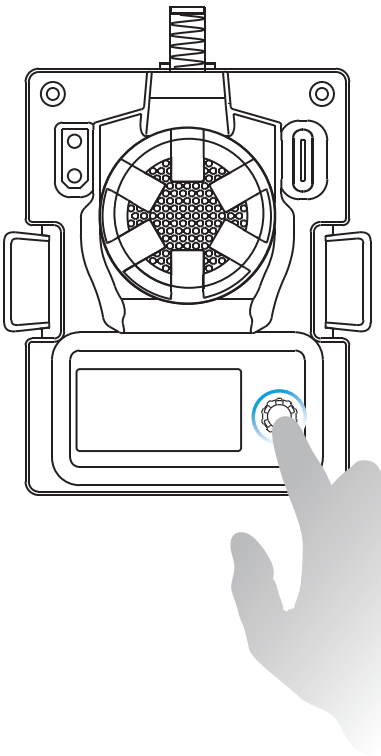
注意：官方LUA脚本ELRS.lua可以从BETAFPV支持网站（网址见更多信息段落）下载。

按键和OLED

Micro高频头上带的5维按键，只可使用垂直按压方向按键功能。前后左右4个维度的按键是无效的。按键功能说明如下。



长按：
锁屏状态下，解锁。
非锁屏状态下，设置改项的值。



短按：
锁屏状态下，按键无效。
非锁屏状态下，切换到下一行。

注意：通过按键和OLED解锁进入调参界面时，高频头与接收机的配对将会断开，调参结束回到锁屏状态会重新连接；若调参改变了数据包频率（Pkt. Rate），则必须重启接收机才能重新连接。

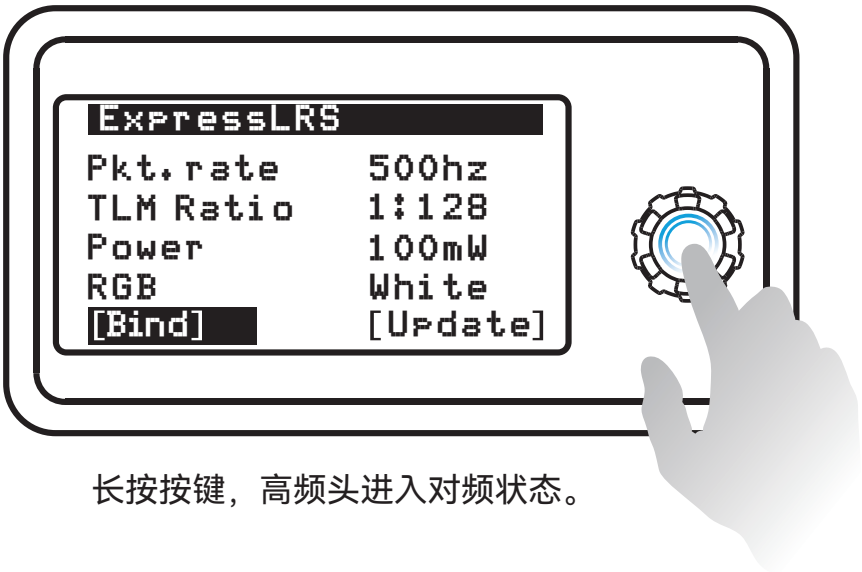
注意：通过按键和OLED启动高频头的WIFI功能之后，高频头进入WIFI升级固件状态，不再响应按键功能，无法退出。在WIFI固件升级之后，必须断电重启。

对频

Micro高频头出厂固件使用的是ExpressLRS V1.1.0正式版协议，而且没有设置对频密码（Binding Phrase）。所以对频的接收机也必须是V1.0.0~V1.1.0，并且没有设置过对频密码。

Micro高频头进入对频状态，有两种方式。第一种方式是使用LUA脚本，选择Bind，Micro高频头进入对频状态。详见“LUA脚本操控”段落。

第二种方式，使用OLED和按键，切换到BIND位置，长按按键，高频头进入对频状态。详见“按键和OLED”段落。

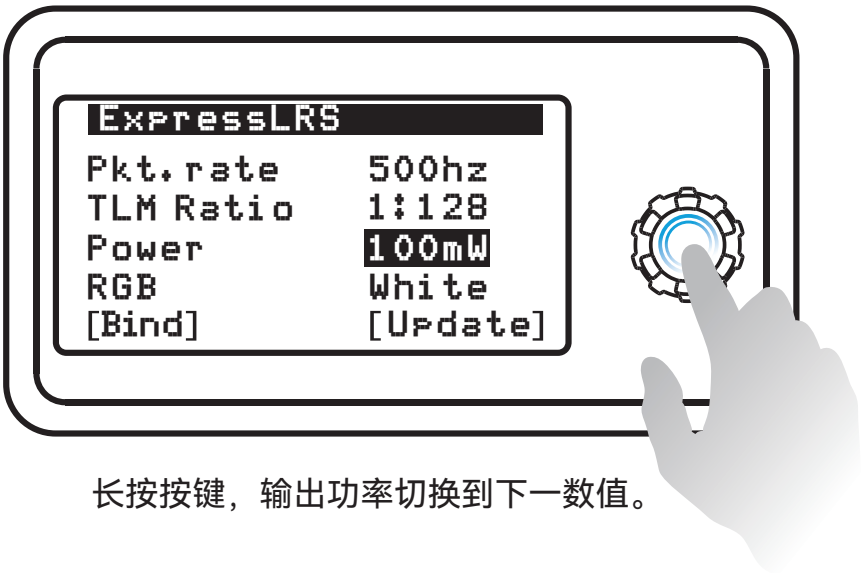


长按按键，高频头进入对频状态。

注意：高频头进入对频状态，没有灯光闪烁等提示。5秒之后高频头自动退出对频状态。
注意：如果重刷了高频头的固件，并且配置了对频密码（Binding Phrase），则无法通过上面方式进入对频状态。请将接收机也设置相同的对频密码，高频头和接收机则可以自动对频连接。

功率切换

Micro高频头目前支持的功率为100mW/250mW/500mW。
Micro高频头发射功率切换，也有两种方式。第一种方式是使用LUA脚本，选择Power，可在100mW、250mW、500mW直接切换。详见“LUA脚本操控”段落。
第二种方式，使用OLED和按键，切换到Output位置，长按按键，输出功率切换到下一数值。详见“按键和OLED”段落。



长按按键，输出功率切换到下一数值。

注意：高频头功率切换，没有灯光提示。功率为250mW及以上时，散热风扇自动开启。 高频头不支持1W或者2W的发射功率，切换到该数值之后，会自动回到所能够支持的最高功率500mW。

更多信息

由于ExpressLRS项目还处于更新活跃期，更多详细的信息，如常见问题，最新的说明书等，请到BETAFPV官方支持（技术支持->ExpressLRS遥控系列）下获取。

https://support.betafpv.com/hc/zh-cn

- 最新说明书;
- 如何升级固件;
- 常见解答问题。

BETAFPV

Micro TX Module

User Manual

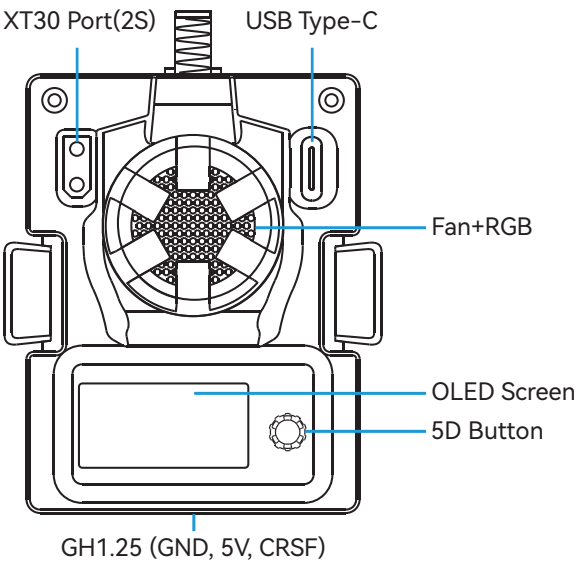
Welcome to ExpressLRS!

BETAFPV Micro RF TX module is based on ExpressLRS project, open source RC link for RC applications. ExpressLRS aims to achieve the best possible link performance in both speed, latency and range. This makes ExpressLRS become one of the fastest RC links available while still offering long-range performance.

Github Project Link: https://github.com/ExpressLRS
Facebook Group: https://www.facebook.com/groups/636441730280366
The ExpressLRS offical project does NOT support the OLED function for the moment. BETAFPV team has made a pull request on Github and wait for the offical to finish this merge. Please get the firmware from BETAFPV Github nowadays until ExpressLRS offical support.
https://github.com/BETAFPV/ExpressLRS

Specifications

- Frequency bands (2.4GHz version): 2.4GHz ISM
- Frequency bands (915MHz/868MHz version): 915MHz FCC/868MHz EU
- RF output power: 25mW/50mW/100mW/250mW/500mW (2.4GHz)
  100mW/250mW/500mW (915MHz/868MHz)
- Packet refresh rate: 50Hz/150Hz/250Hz/500Hz (2.4GHz)
  25Hz/50Hz/100Hz/200Hz (915MHz/868MHz)
- Input voltage: 5-12V (2S)
- USB port: Type-C

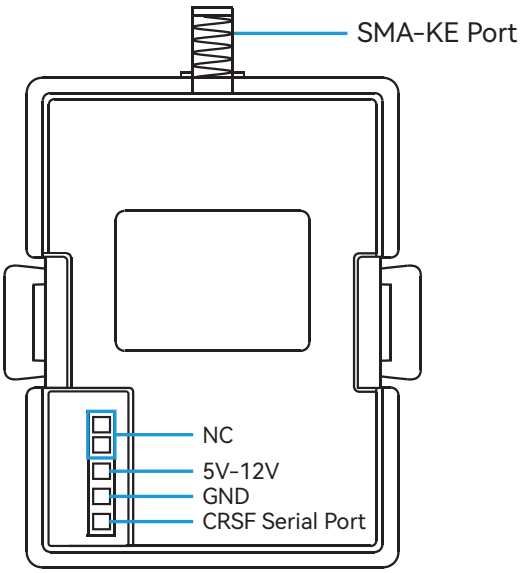


Note: Please DO NOT use 3S or above bettery to power up the TX module. Otherwise, the power supply chip in the TX module will be damaged permanently.

BETAFPV Micro RF TX module is compatible with radio transmitter which has the micro module bay (AKA JR/SLIM module bay, e.g. Frsky Taranis X9D、TBS Mambo).

Basic Configuration

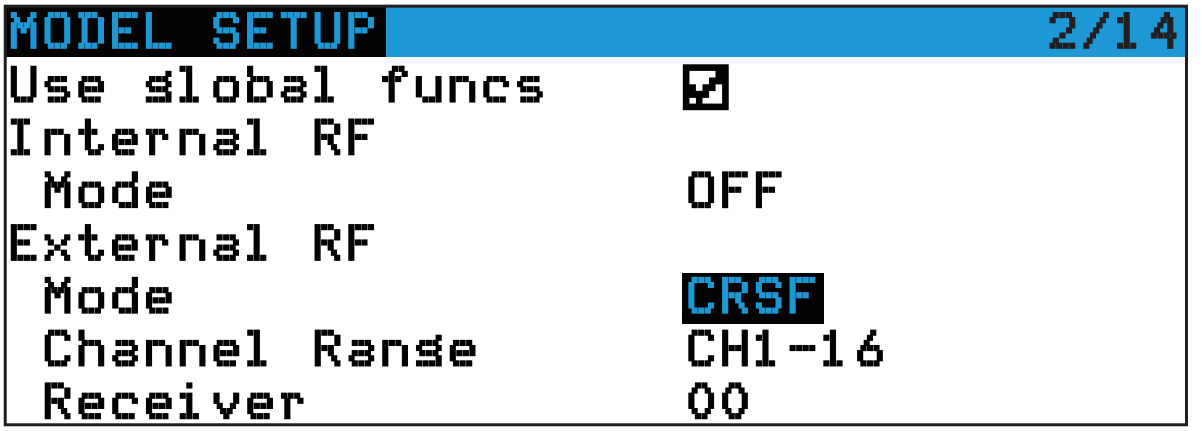
ExpressLRS uses the Crossfire serial protocol (AKA CRSF protocol) to communicate between the radio transmitter and the RF TX module. So make sure your radio transmitter support the CRSF serial protocol. Next, we use the radio transmitter with OpenTX system to show how to setup the CRSF protocol and LUA script.



Note：Please assemble the antenna before power on. Otherwise, the PA chip in the RF TX module will be damaged permanently.

CRSF Protocol

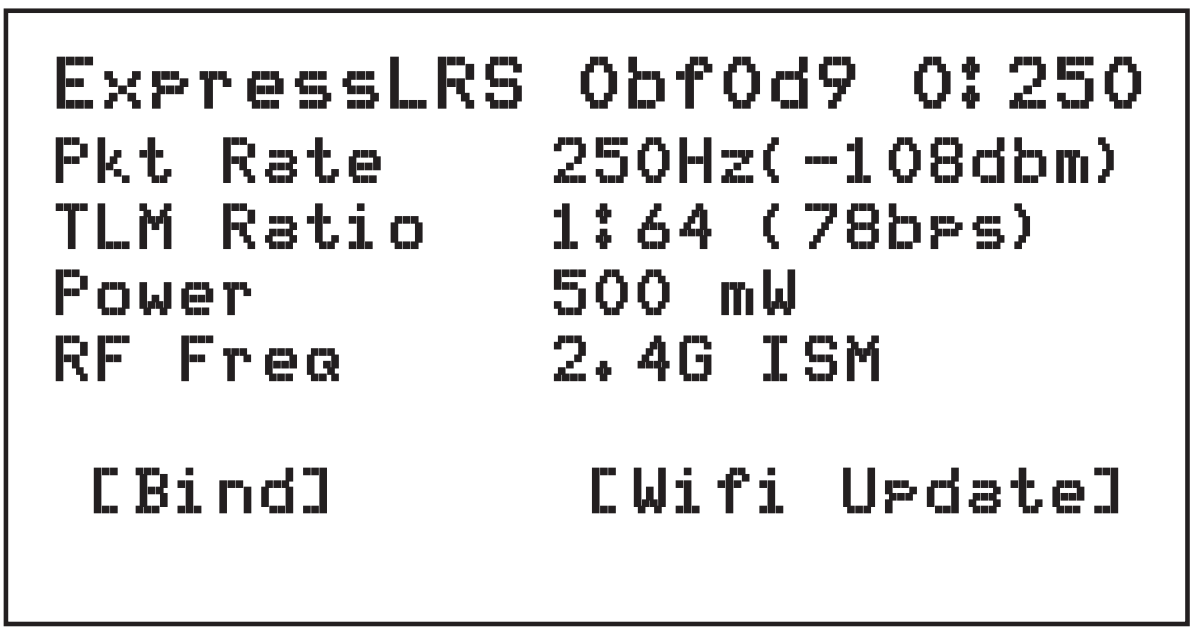
ExpressLRS uses the CRSF serial protocol to communicate between the radio transmitter and the RF TX module. To set this up, in OpenTX system, enter into model settings, and on the "MODEL SETUP" tab, turn off the "Internal RF". Next enable "External RF" and select "CRSF" as the protocol.



LUA Script

ExpressLRS use the OpenTX LUA script to control the RF TX module, like bind or setup.

- Save the ELRS.lua script files onto the radio transmitter's SD Card in the Scripts/Tools folder;
- Long press the "SYS" button (for RadioMaster T16 or similar radios) or the "Menu" button (for Frsky Taranis X9D or similar radios) to access the Tools Menu where you can find ELRS script ready to run with only one click;
- Below image show the LUA script run successfully;



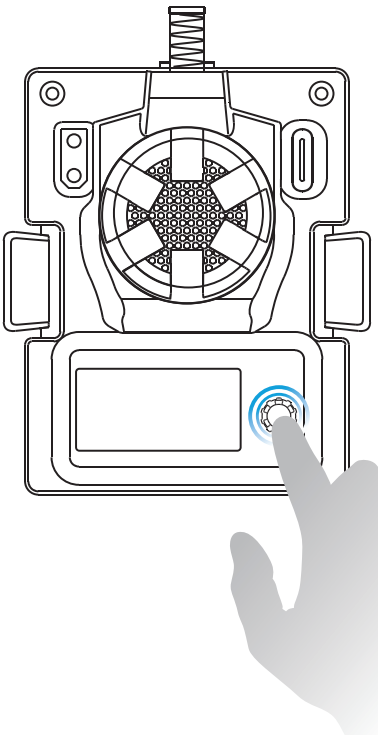
- With the LUA script, pilot could check and setup some configurations of the RF TX module.

0:250	On the top right. Indicator which tells how many bad UART packets and how many packets it's getting from the radio per second. It can be used to confirm the communication between the radio tansmitter and the RF TX module is working properly. e.g. 0:200 means 0 bad packets and 200 good packets per second.
Pkt. Rate	RF transmitter packet rate.
TLM Ratio	Receiver telemetry ratio.
Power	RF TX module output power.
RF Freq	Frequency bands.
Bind	Set the RF TX module into binding status.
Wifi Update	Open the WIFI function for firmware update.

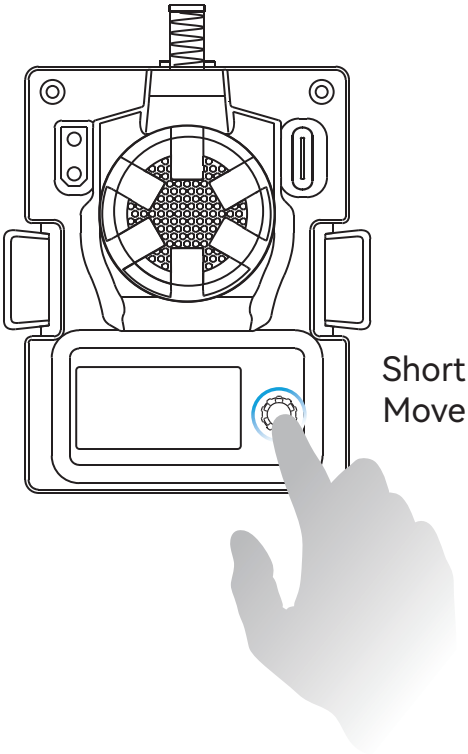
Note: The newest ELRS.lua script file is available in BETAFPV Support website (Link in More Information Chapter).

Button and OLED

There is a 5D button on the micro RF TX module. Pay attention only the virtical dimention works and the other four dimentions are invalid. Below is the basic operation of the button and OLED.



Long Press:
Enter menu page or
change the value of this row.



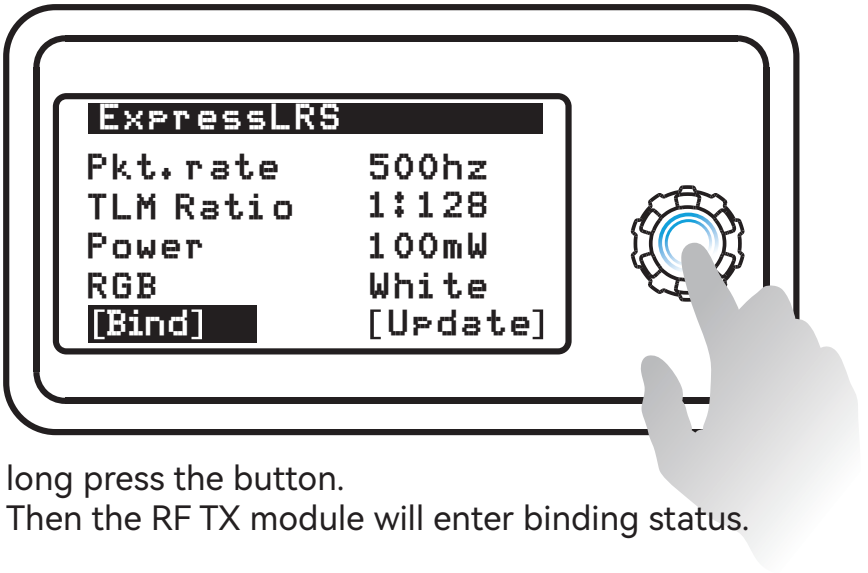
Short Press:
Move to the next row.

Note: When the RF TX module is entering menus page, the binding between RF TX module and receiver will be lost, the binding will recover after exiting menus page automatically; you must re-power the receiver if you have changed the Pkt Rate.

Note: When the RF TX module enters WIFI Upgrade status, the button will be invalid. Please re-power the RF TX module after firmware update via WIFI.

Bind

The Micro RF TX module comes with offically major release V1.1.0 protocol and no Binding Phrase inlcuded. So please make sure the receiver works on offically major release V1.0.0~V1.1.0 protocol. And no Binding Phrase setted. Micro RF TX module could enter binding status via ELRS.lua script, as description in "LUA Script" chapter. Besides, using the button and OLED, move to the BIND position and long press the button. Then the RF module will enter binding status.

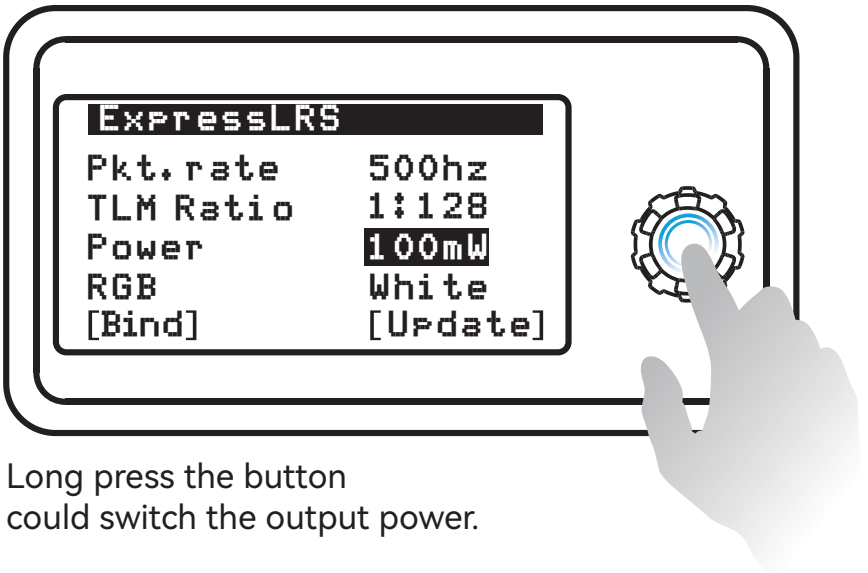


long press the button.
Then the RF TX module will enter binding status.

Note: The LED will NOT flash when enter binding status. The module will exit from binding status 5 seconds later auto.
Note: If you reflash firmware of the RF TX module with your own Binding Phrase, please make sure the receiver has the same Binding Phrase. The RF TX module and the receiver will bind automatically in this situation.

Output Power Switch

Micro RF TX module could switch the output power via ELRS.lua script, as description in "LUA Script" chapter.
Besides, using the button and OLED, move to the Output position. Long press the button could switch the output power.



Long press the button
could switch the output power.

Note: The RGB LED will NOT change according to the output power. When the output power is 250mW or above, the fan will spin automatically. The Micro RF TX module does NOT support 1W or 2W output. When switch to this value, the system will move to 500mW automatically.

More Information

As ExpressLRS project is still in frequently update, please check BETAFPV Support (Technical Support -> ExpressLRS Radio Link) for more details and newest maunal.

https://support.betafpv.com/hc/en-us

- Newest user manual;
- How to upgrade the firmware;
- FAQ and troubleshooting.