BETAFPV

SuperX双频接收机

使用说明书

Welcome to **ExpressLRS!**

ExpressLRS | BETAFPV

BETAFPV SuperX双频接收机是基于开源项目ExpressLRS开发的新一代双频遥控无线系统，采用了Espressif最新的物联网芯片ESP32-C3和Semtech第三代射频收发芯片LR1121，支持Sub-GHz（190-960MHz）和2.4GHz ISM频段，具有LoRa模式和FSK模式，无FLRC模式。LoRa模式可与其他基于SX1276或SX1280的ELRS接收机完全兼容。独有的FSK模式的刷新率可达1000Hz，具有超低延时的特性。

SuperX Mono双频接收机基于单LR1121芯片设计，搭配900M+2.4G双频天线，可在900M和2.4G频段自由切换，兼具刷新率高和遥控距离长的优点，装机成本低，适用于装机空间小，一套整机既能近距离操控又能远航的场景。

SuperX Nano双频分集接收机基于双LR1121芯片设计，搭配900M+2.4G双频天线，可在900M真分集模式、2.4G真分集模式以及900M+2.4G双频分集模式之间自由切换，具有抗干扰能力强，信号链路稳定的优点，可轻松应对复杂电磁环境，适用于竞赛、远航、摄影等对信号稳定性和延时具有极高要求的场景。

项目Github地址：https://github.com/ExpressLRS
项目官方网址：https://www.expresslrs.org/

▌基本参数

	Mono	Nano
MCU	ESP32-C3	
回传功率	20dBm	
输入电压	5V	
协议	CRSF, SBUS, SUMD, DJI RS2 Pro, Mavlink	
RF Chip	Single LR1121	Dual LR1121
接收模式	Single	Diversity/Gemini
频段	900M/2.4G	900M+2.4G
天线接口	IPEX MHF I x1	IPEX MHF I x2
重量	0.82g	1.45g
尺寸	12.3 x 18.6mm	16.3 x 21.4mm
脚本名称	BFPV SuperX Mon	BFPV SuperX Nan

SuperX Mono双频接收机产品框图如下所示。
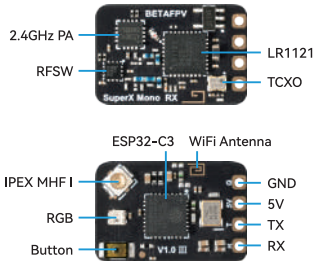
SuperX Nano双频分集接收机产品框图如下所示。
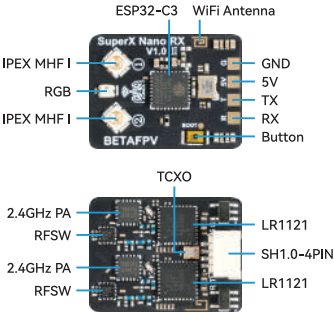
▌状态指示

指示灯颜色	状态	含义
彩虹	渐变	开机启动
绿色	快闪	WiFi升级模式
红色	快闪	未检测到射频芯片
橙色	双闪	对频模式
橙色	三闪	已连接，但与模型匹配中的设置不符
橙色	慢闪	等待连接
	常亮	已连接，颜色表示刷新率

刷新率对应的RGB灯颜色如下图所示:
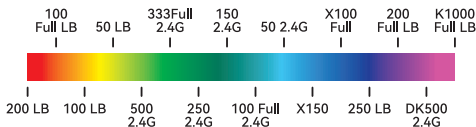
LB(LowBand)是900M频段下的刷新率，基于LoRa模式;
2.4G是2.4G频段下的刷新率，基于Lora模式;
X是工作在900M+2.4G双频段下的刷新率，基于LoRa模式;
Full是可实现16通道全分辨率输出的刷新率;
DK500 2.4G和K1000 Full LB是基于FSK模式的刷新率，DK500 2.4G是在
2.4G频段下以1000Hz的刷新率重复发送两次数据包，用以增强抗干扰性;
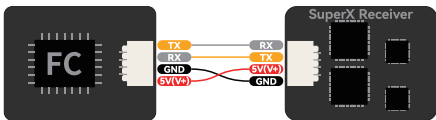K1000 Full LB可在900M频段下以1000Hz的刷新率下发送遥测数据，适
用于Mavlink和Ardupilot用户。

基本配置

SuperX接收机目前可支持CRSF/SBUS/SUMD等协议。下面以
CRSF协议为例，介绍其与Betaflight固件飞控的连线和端口配置。
SuperX接收机和飞控之间的连线，如下图所示。

焊接线序示意
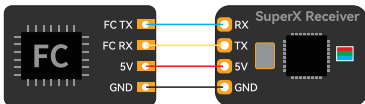
JST SH连接器线序示意

注意：Betaflight定义的JST SH连接器线序为5V(V+)、GND、RX、TX，
ExpressLRS定义的线序为GND、5V(V+)、TX、RX，在使用端子线插接时
请注意线序是否正确。

将飞控连接到Betaflight Configurator，进行基本配置。首先在"端
口"页面，开启飞控串口（以UART1为例）为"串行数字接收机"。

标识符	设置/MSP		串行数字接收机
USB VCP	🟠	115200 ▼	⚪
UART1	⚪	115200 ▼	🟠
UART2	🟠	115200 ▼	⚪

在"配置"页面，设置接收机模式（Receiver Mode）为"串行接收机（通过UART）"，设置串行数字接收机协议（Serial Receiver Provider）为"CRSF"，其他协议请选择对应的选项。

接收机

| 串行接收机 (通过 UART) ▼ | 接收机模式 |

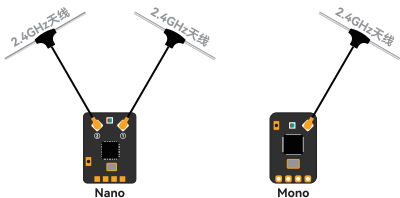·必须将接收机对应的 UART 设置为"数字串行接收机"(在端口页面)
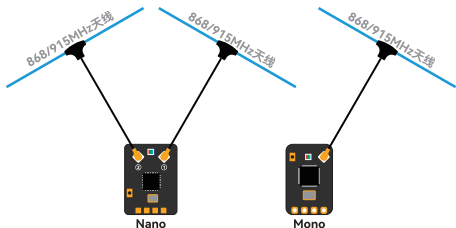·从下拉列表中选择正确的数据格式，如下：

| CRSF ▼ | 串行数字接收机协议 |

▎天线搭配

接收机出厂标配的是900M+2.4G双频T型天线，既能在Low Band频段工作，又能在2.4G频段工作。若使用普通单频天线，需要按以下要求搭配天线。

- 2.4G模式，ANT1和ANT2需安装2.4G天线；
- Low Band模式，ANT1和ANT2需安装868/915M天线；
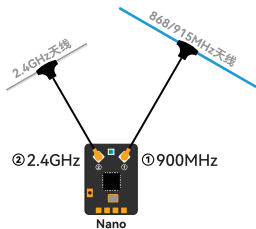- X模式，ANT1必须安装868/915M天线，ANT2必须安装2.4G天线。

① 2.4G模式

② Low Band模式

③ X模式（Mono接收机无X模式）

注意：切换刷新率时，必须先确认搭配的天线是否正确，否则会造成遥控距离短，甚至接收机损坏的问题。

▌对频方法

SuperX接收机出厂固件使用的是ExpressLRS V3.x正式版协议，而且没有设置对频密码（Binding Phrase）。所以对频的高频头也必须是ExpressLRS V3.x以上版本，并且未设置对频密码。

1. 连续给接收机上电、断电三次，上电、断电时间保持1秒，或长按BOOT按键持续2秒，进入对频状态；
2. 接收机上RGB进入橙色双闪状态，表示接收机处于对频模式；
3. 使用遥控器或者高频头和接收机进行对频；如果接收机RGB变为常亮，则表示对频成功。

注意：对频一次，接收机会记住对频信息，以后重启会自动连接成功，无需重新对频；

注意：如果重刷了接收机的固件，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。请将高频头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。

注意：建议将两个天线尽可能地分开摆放，以获得更好的接收效果。

▌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技术支持网页下获取。

网页链接： https://betafpv.flowus.cn/

● 最新说明书；
● 如何升级固件；
● 常见问题。

BETAFPV

SuperX Receiver
User Manual

Welcome to **ExpressLRS!**

The BETAFPV SuperX ELRS Gemini Xross Receiver is a new-generation dual-band remote control wireless system developed based on the open-source ExpressLRS project. It adopts Espressif's latest IoT chip ESP32-C3 and Semtech's third-generation RF transceiver chip LR1121, supporting Sub-GHz (190-960MHz) and 2.4GHz ISM frequency bands, with LoRa mode, FSK mode, but no FLRC mode. The LoRa mode is fully compatible with other ELRS receivers based on SX1276 or SX1280. The unique FSK mode offers a packet rate of up to 1000Hz, featuring ultra-low latency.

The SuperX Mono Gemini Receiver is developed from a single LR1121 chip, paired with 900M+2.4G dual-band antennas, allowing free switching between 900M and 2.4G bands. Delivering both high packet rates and extended control range at low installation cost, this compact solution is ideal for space-constrained builds that demand both precise close-range control and reliable long-distance flight performance.

The SuperX Nano Gemini Diversity Receiver integrates dual LR1121 chips, paired with 900M+2.4G dual-band antennas, enabling free switching between 900M true diversity mode, 2.4G true diversity mode, and 900M+2.4G dual-band diversity mode. This receiver presents strong anti-interference performance and solid signal stability, making it uniquely capable of handling complex electromagnetic environments. Designed for mission-critical applications, it's the optimal solution for competitive racing, long-distance flights, and aerial photography where signal reliability and ultra-low latency are paramount.

● Github link: https://github.com/ExpressLRS
● Official Website: https://www.expresslrs.org/

Specifications

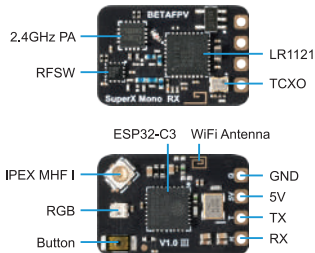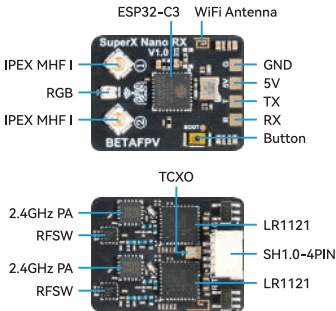|	**Mono**	**Nano**
MCU	ESP32-C3	
Telemetry Power	20dBm	
Input Voltage	5V	
Protocols	CRSF, SBUS, SUMD, DJI RS2 Pro, Mavlink	
RF Chip	Single LR1121	Dual LR1121
Reception Mode	Single	Diversity/Gemini
Frequency Band	900M/2.4G	900M+2.4G
Antenna Connector	IPEX MHF I x1	IPEX MHF I x2
Weight	0.82g	1.45g
Dimensions	12.3 x 18.6mm	16.3 x 21.4mm
LUA Name	BFPV SuperX Mon	BFPV SuperX Nan

Diagram of SuperX Mono Gemini Receiver:

2.4GHz PA — BETAFPV
LR1121
RFSW —
TCXO
SuperX Mono RX

ESP32-C3 — WiFi Antenna
IPEX MHF — GND
5V
RGB — TX
Button — RX
V1.0

Diagram of SuperX Nano Gemini Diversity Receiver:

ESP32-C3 — WiFi Antenna
SuperX Nano RX V1.0
IPEX MHF — GND
RGB — 5V
TX
IPEX MHF — RX
BETAFPV — Button

TCXO
2.4GHz PA — LR1121
RFSW —
SH1.0-4PIN
2.4GHz PA —
RFSW — LR1121

Status Indicators

Indicator Color	Status	Implication
Rainbow	Fade effect	Starting up
Green	Fast flash	WIFI upgrade mode enabled
Red	Fast flash	RF chip not detected
Orange	Double flash	Binding mode enabled
Orange	Triple flash	Connected but mismatched mode-match configuration
Orange	Slow flash	Waiting for connection
	Solid on	Connected, color indicates packet rate

The below picture shows the RGB light color corresponding to the packet rate:
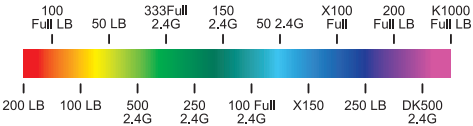
LB (LowBand): Packet rate on 900M band (LoRa mode)

2.4G: Packet rate on 2.4G band (LoRa mode)

X: Packet rate on dual bands (900M+2.4G) in Gemini Mode(LoRa mode)

Full: Packet rate on 16-channel full-resolution output

DK500 2.4G: Sending data packets twice to enhance resistance against interference using the 2.4G band with a packet rate of 1000Hz (FSK mode)

K1000 Full LB : Sending telemetry date using the 900M band at a packet rate of 1000Hz, suitable for Mavlink and Ardupilot users (FSK mode).
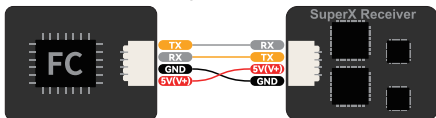
Configuration

The SuperX receiver currently supports CRSF/SBUS/SUMD protocols. The following takes CRSF protocol as an example to introduce its connection and port configuration with Betaflight firmware flight controller.

The connection between the SuperX receiver and the flight controller is shown as below.

Wiring Diagram
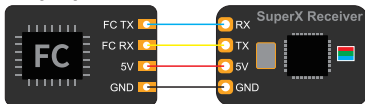
JST SH Connector Pin Configuration

Note: Betaflight and ExpressLRS use different JST SH connector pin configurations. Betaflight: 5V (V+), GND, RX, TX,
ExpressLRS: GND, 5V (V+), TX, RX.
When using the terminal wires for connection, please check the sequence.

Connect the flight controller to Betaflight Configurator for basic configuration. On the "Ports" tab, enable the flight controller serial port like UART1 as "Serial Rx".

Identifier	Configuration/MSP		Serial Rx
USB VCP	⬤ 115200		⬜
UART1	⬜ 115200		⬤
UART2	⬤ 115200		⬜

On the "Configuration" tab, set "Receiver Mode" to "Serial (via UART)" and "Serial Receiver Provider" to "CRSF" (choose corresponding provider for other protocols).

Receiver

Serial (via UART) ▼	Receiver Mode

Note: Remember to configure a Serial Port (via Ports tab) and choes a Serial Receiver Provider when using RX_SERIAL ferture

| CRSF ▼	Serial Receiver Provider

Antenna Matching

The 900M+2.4G dual-band T-type antenna is the factory default antenna and can operate in both Low band and 2.4G frequency bands. The following steps and illustrations are for single-band antenna users:

● 2.4G mode: Install 2.4G antennas on ANT1 and ANT2;
● Low Band mode: Install 868/915M antennas on ANT1 and ANT2;
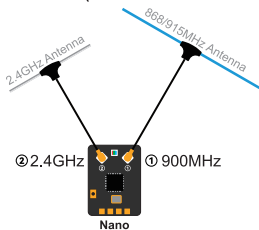● X mode: ANT1 must use 868/915M antenna, ANT2 must use 2.4G antenna.

① **2.4G mode**
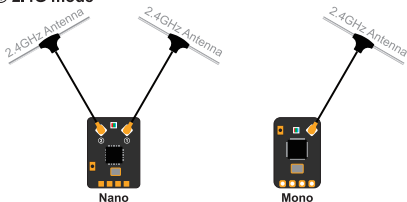
② **Low Band mode**
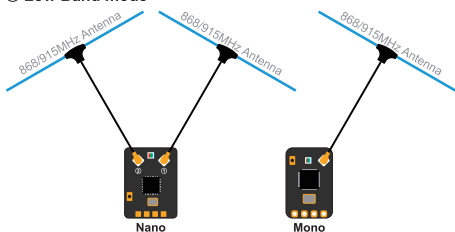
③ **X mode (not available on Mono Receiver)**

2.4GHz Antenna

868/915MHz Antenna

② 2.4GHz   ① 900MHz

Nano

NOTE: Always check antenna compatibility before changing packet rates. Mismatched antennas will reduce control range and damage the receiver.

Bind

The SuperX Receiver uses ExpressLRS V3.x official protocol as its default firmware without a pre-set binding phrase. For successful operation, ensure the transmitter also uses ExpressLRS V3.x or later firmware with no pre-set binding phrase.

1. Power-cycle the receiver 3 times with a 1-second interval or press and hold the BOOT button for 2 seconds to enter binding mode.

2. The RGB indicator blinks orange twice, which indicates the receiver is in bind mode.

3. Configure remote control or transmitter module to bind with the receiver. If the RGB indicator is a solid light, it's bound!

Notes:
● After binding once, the receiver will remember the autosaved binding phrase and device. Further restarting of the device will be bound automatically without the need for a rebinding process.
● If you have flashed firmware to the SuperX and configured the binding phrase, you will not be able to bind using the method above. Please set the same binding phrase for the transmitter module, this allows the receiver to be bound to the device automatically.
● It is recommended to place the two antennas as far apart as possible for better reception.

More Information

ExpressLRS is actively updating its firmware versions, please check BETAFPV Support (Technical Support -> ExpressLRS Radio Link) for more details and latest maunal.
https://support.betafpv.com/hc/en-cn

● Latest user manual;
● How to upgrade the firmware;
● FAQ and troubleshooting.