



SuperD分集接收机

使用说明书



Welcome to ExpressLRS!

第 II 版 2023-05-25

BETA FPV SuperD分集接收机，是基于开源项目ExpressLRS开发的新一代真分集遥控无线系统。ExpressLRS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。相比于单天线单接收接收机，具有更稳定和更可靠的链路连接。

项目Github地址：<https://github.com/ExpressLRS>

项目官方网址：<https://www.expresslrs.org/>

SuperD分集接收机2.4G版本基本参数如下：

- 重量：1.1g（只有接收机）
- 尺寸：22mm*14mm
- TLM功率（回传功率）：20dBm
- 频段：2.4GHz ISM
- 工作电压：5V
- 天线接口：IPEX MHF 1

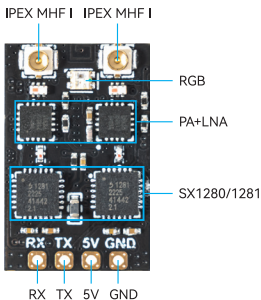
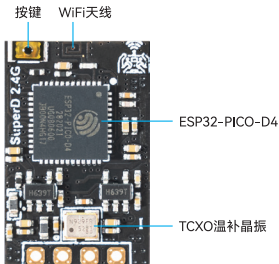
SuperD分集接收机915M/868M版本基本参数如下：

- 重量：1.2g（只有接收机）
- 尺寸：22mm*14mm
- TLM功率（回传功率）：17dBm
- 频段：915MHz/868MHz
- 工作电压：5V
- 天线接口：IPEX MHF 1

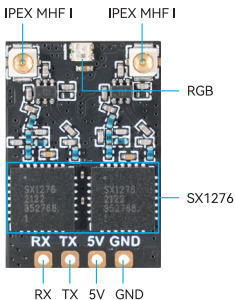
相对于市面上其它分集接收机（Diversity Receiver），SuperD分集接收机有以下特点：

- 遵循ELRS官方最新双天线双接收方案，有两路完整的射频接收电路，才是真正的分集接收机；
- 使用TCXO温补晶振，频率更准确，无惧高温，无惧严寒，长时间飞行也不会丢失信号；
- 采用两路射频接收电路共用同一个晶振方案，提供更加同步稳定的射频时钟。

SuperD分集接收机2.4G版本的产品框图如下所示。



SuperD分集接收机915M/868M版本的产品框图如下所示

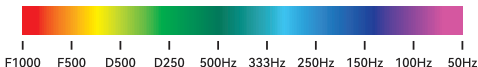


接收器状态指示灯含义：

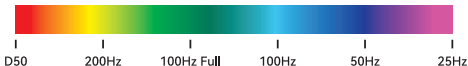
指示灯颜色	状态	含义
彩虹	渐变	开机启动
绿色	快闪	WIFI升级模式
红色	快闪	未检测到射频芯片
橙色	双闪	绑定模式
橙色	三闪	已连接，但与模型匹配中的设置不符
橙色	慢闪	等待连接
	常亮	已连接，颜色表示刷新率

刷新率对应的RGB灯颜色如下图所示：

2.4G:



915M/868M:



F1000和F500是FLRC模式下的刷新率，仅ELRS 2.4G支持该模式，该模式提供更快的调制和更低的延时，但接收距离比普通的Lora模式要短，适用于竞赛；

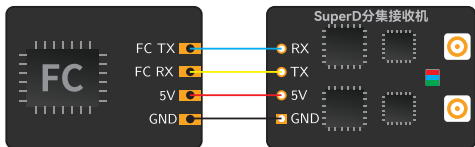
D500和D250是DVDA (Déjà Vu Diversity Aid) 模式下的刷新率，该模式工作在FLRC模式的F1000刷新率下，通过多次发送相同的数据包在有复杂干扰的情况下提供更可靠的链路连接，D500和D250分别表示将相同的数据包重复发送两次和四次；

D50是ELRS Team900的特有模式，在Lora模式的200Hz刷新率下，将相同的数据包重复发送四次，接收距离与200Hz相当；100Hz Full 是在Lora模式的200Hz刷新率下实现16通道全分辨率输出的模式，接收距离与200Hz相当。

基本配置

SuperD分集接收机目前只支持Crossfire串行信号。下面以使用Betaflight固件的飞控为例，介绍其连线和端口配置。

SuperD分集接收机和飞控之间的连线，如下图所示。



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	<input checked="" type="checkbox"/> 115200 ▾	<input type="checkbox"/>
UART1	<input type="checkbox"/> 115200 ▾	<input checked="" type="checkbox"/>
UART2	<input checked="" type="checkbox"/> 115200 ▾	<input type="checkbox"/>

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”。

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

对频

SuperD分集接收机出厂固件使用的是ExpressLRS V3.0.0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 V3.0.0以上版本，并且未设置对频密码。

1. 通过连续给接收机上电、断电三次，上电、断电时间保持2秒，进入对频状态；
2. 接收机上RGB两次快速闪烁，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；
- 常见问题。



SuperD Diversity Receiver User Manual



Welcome to ExpressLRS!

BETA FPV SuperD diversity receiver is based on ExpressLRS project, which is an open-source RC link for RC applications. ExpressLRS aims to achieve the best possible link performance in both speeds, latency, and range. This makes ExpressLRS one of the fastest RC links available while still offering long-range performance. Compared to a single antenna receiver, the diversity receiver is way more stable on signal transmission.

Github Project Link: <https://github.com/ExpressLRS>

ELRS official website: <https://www.expresslrs.org/>

SuperD ELRS 2.4G Diversity Receiver

Specifications:

- Weight: 1.1g (receiver only)
- Size: 22mm*14mm
- Telemetry power : 20dBm
- Frequency bands: 2.4GHz ISM
- Input voltage: 5V
- Antenna connector: IPEX MHF 1

SuperD ELRS 915M/868M Diversity Receiver

Specifications:

- Weight: 1.2g (receiver only)
- Size: 22mm*14mm
- Telemetry power : 17dBm
- Frequency bands: 915MHz/868MHz
- Input voltage: 5V
- Antenna connector: IPEX MHF 1

Compared to other diversity receivers on the market, the SuperD diversity receiver has the following features:

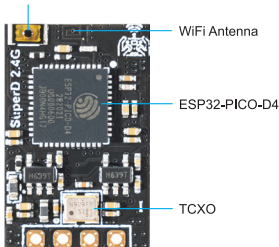
- According to the latest official ELRS dual antenna and dual reception scheme, there are two complete RF receiver chains, allowing it to be a true diversity receiver;
- With the temperature-compensated crystal oscillator (TCXO), frequency is more accurate. The receiver is accurate and stable

over varying temperatures, regardless of extreme heat or severe cold environments, reducing the chance of signal loss during long-range flight;

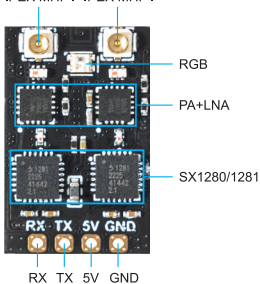
- Two RF receiving circuits share the same crystal oscillator, providing a synchronized and stable RF clock.

SuperD diversity receiver 2.4G version diagram is shown as below.

BOOT Button



IPEX MHF I IPEX MHF I



SuperD diversity receiver 915M/868M version diagram is shown as below.

BOOT Button



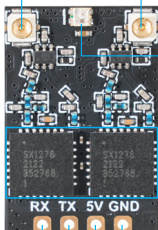
ESP32-PICO-D4

TCXO

WiFi Antenna

IPEX MHF I

IPEX MHF I



RGB

SX1276

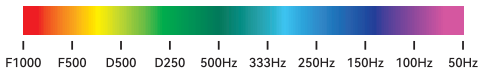
RX TX 5V GND

Receiver status RGB indications are shown as below.

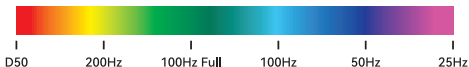
RGB Color	Status	Implication
Rainbow	Fade effect	Power on
Green	Quick flash	WIFI upgrading mode
Red	Quick flash	No RF chip was detected
Orange	Double flash	Binding mode
Orange	Triple flash	Connected but mismatched model-match configuration
Orange	Slow flash	Waiting for the connection
	Solid on	Connected and color indicates packet rate

The RGB light color corresponding to the packet rate is shown in the figure below:

2.4G:



915M/868M:



F1000 and F500 are packet rates in FLRC mode(only workable in ELRS 2.4G), providing faster modulation and lower latency, but at the same time having shorter reception distance than normal Lora mode. This mode is a great choice for racers.

D500 and D250 are packet rates in DVDA(Déjà Vu Diversity Aid) mode. This mode works at the F1000 data packet rate of FLRC mode, providing better link

connection in the case of complex interference by sending the same data packet multiple times. D500 and D250 indicate that the same data packet is sent twice and four times respectively.

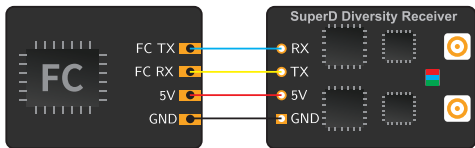
D50 is an exclusive mode under ELRS Team900. It will send packets four times repeatedly under 200Hz Lora Mode. Its receiving distance is equivalent to 200Hz.

100Hz Full is the mode that can achieve 16-channel full resolution output at the 200Hz packet rates of Lora mode. Its receiving distance is equivalent to 200Hz.

Basic Configuration

ExpressLRS uses the Crossfire serial protocol (AKA CRSF protocol) to communicate between the SuperD diversity receiver and the flight controller board. Take the flight controller using the Betaflight firmware as an example to introduce its wiring and port configuration.

The connection between the SuperD diversity receiver and the flight controller is shown in the figure below.



Connect the flight controller to the Betaflight Configurator for basic configuration. First, on the "Port" page, enable the flight controller serial port (take UART1 as an example) as "Serial Rx".

Identifier	Configuration/MSP	Serial Rx
USB VCP	<input checked="" type="checkbox"/> 115200 ▾	<input type="checkbox"/>
UART1	<input type="checkbox"/> 115200 ▾	<input checked="" type="checkbox"/>
UART2	<input checked="" type="checkbox"/> 115200 ▾	<input type="checkbox"/>

On the configuration page, set Receiver Mode to “Serial(via UART) ”and Serial Receiver Provider to “CRSF”.

Receiver

Serial(via UART) Receiver Mode

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

CRSF Serial Receiver Provider

Bind

The default firmware of the SuperD diversity receiver uses the ExpressLRS V3.0.0 protocol and has no preset binding phrase. Therefore, the firmware version of the transmitter module must be ExpressLRS V3.0.0 or later versions. Both the receiver and transmitter module should not have any binding phrase.

- Power on and off the receiver 3 times, each step pausing 2 seconds to enter binding mode;
- When the indicator starts fast blink with orange twice, the receiving is at binding mode;
- Enter the radio or transmitter module's binding mode to bind with the receiver; if the Indicator has turned solid, it indicates that the device has been bound successfully.

Note: 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.

Note: If you have flashed firmware to the receiver 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.

Note: It is recommended to place the two antennas as far apart as possible for better reception.

More Information

ExpressLRS is actively updating firmware versions, please check BETA FPV Support (Technical Support -> ExpressLRS Radio Link) for more details and latest manual.

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

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