BETAFPV

P4 ELRS 2.4G

PWM Receiver | PWM接收机

使用说明书 | USER MANUAL

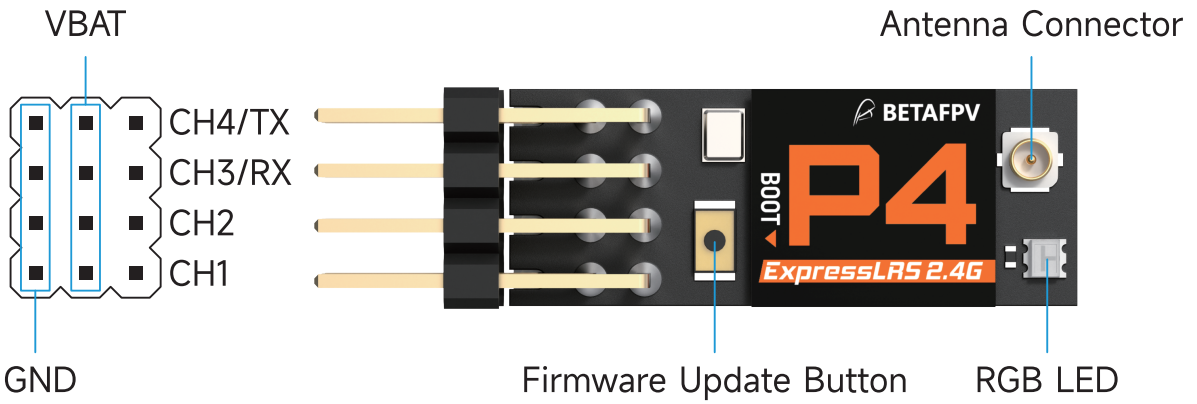
第 I 版　2026-09-14

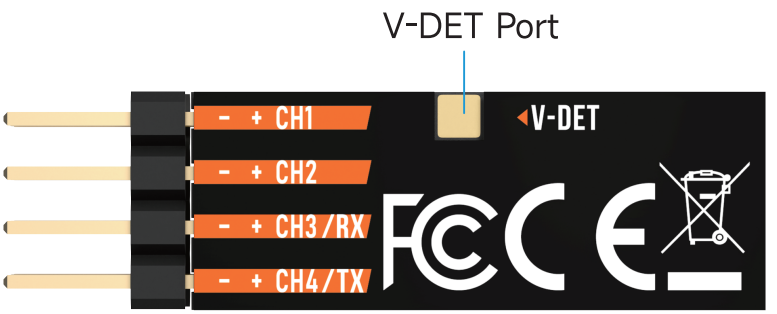
The P4 ELRS 2.4G PWM Receiver is a next-generation RC receiver built on the open-source ExpressLRS project. Powered by ELRS, it delivers extended operating range, rock-solid connectivity, ultra-low latency, high refresh rates, and versatile configuration options.

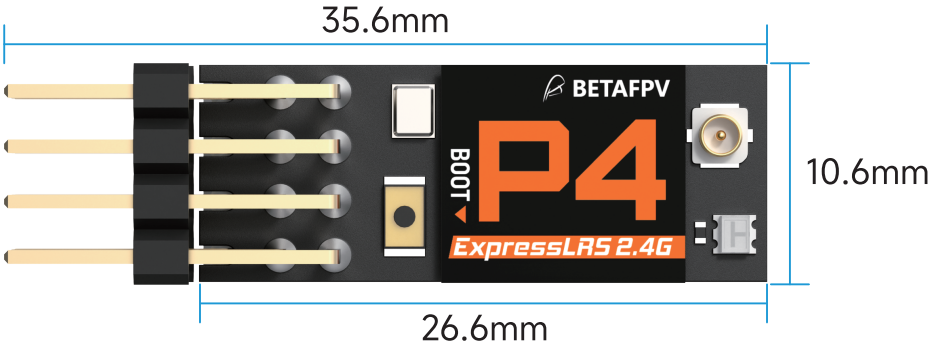
Specifications

- Weight: 2.05g (without antenna)
- Dimension: 35.6*10.6*7.6mm (without antenna)
- Telemetry Power: 17mW
- Frequency Band: 2.4GHz
- Working Voltage: 3.5V-8.4V
- Rated Current: 55mA@5V
- Antenna Connector: U.FL
- Output Protocols: PWM/CRSF/SBUS
- Voltage Detection Range: 3V-27V
- PWM Channels: 4 Channels

Schematic Diagram





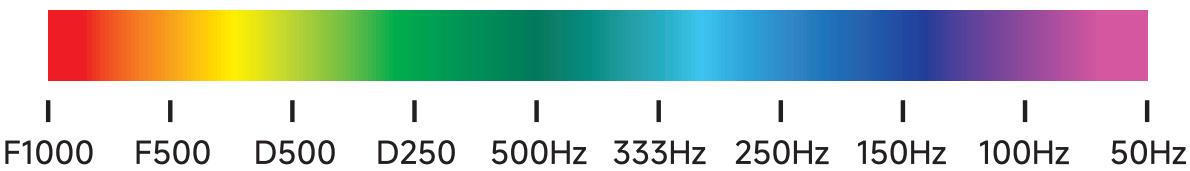


Indicator Status

Indicator Color	Status	Description
Rainbow	Fade Effect	Powering On
Green	Slow Flash	Wi-Fi Update Mode
Red	Fast Flash	RF Chip Not Detected
Orange	Double Flash	Binding Mode
Orange	Triple Flash	Connected, but Model Match settings do not match
Orange	Slow Flash	Waiting for connection
	Solid On	Connected and the color indicates the packet rate

The RGB LED color corresponds to the current packet rate:

2.4GHz:



• F1000 and F500 are packet rates available under FLRC mode, which is supported only on ELRS 2.4 GHz systems. FLRC mode provides faster modulation and lower latency than standard LoRa mode, but with a shorter control range, making it better suited for racing applications.

● D500 and D250 are packet rates available in DVDA (Déjà Vu Diversity Aid) mode. Operating on the F1000 packet rate in FLRC mode, DVDA enhances link reliability in challenging RF environments by transmitting duplicate packets. D500 and D250 indicate that each packet is transmitted twice and four times respectively.

Binding

The receiver comes preloaded with ExpressLRS V3.x firmware and does not have a Binding Phrase configured by default. To bind successfully, ensure that the transmitter module is also running ExpressLRS V3.x (or later) and that no Binding Phrase is configured.

● Power the receiver on and off three times, keeping each power-on and power-off cycle between 1 and 2 seconds. The receiver will then enter Binding Mode.

● When the RGB LED begins flashing orange twice repeatedly, the receiver has entered Binding Mode.

● Enter Binding Mode on the radio transmitter or transmitter module to start the binding process. When the RGB LED turns solid, the binding process is complete.

Note:

● After the device has been successfully bound, the receiver will store the binding information and automatically reconnect in the future. There is no need to repeat the binding process.

● If the receiver has been flashed with firmware configured with a Binding Phrase, it cannot be bound using the method described above. Please configure the same Binding Phrase on the transmitter module to enable automatic binding with the receiver.

● It is recommended to separate the two antennas as far as possible to achieve optimal reception performance.

Failsafe and Channel Output Configuration

When the connection between the radio transmitter and receiver is lost , the receiver automatically activates its failsafe function. Each channel will output its preset failsafe value to help maintain safe operation and reduce the risk of damage or injury. It's necessary to set up failsafe values properly if you

are not using a flight controller, such as in an RC plane or fixed-wing aircraft.
The receiver's CH3-CH4 can be used not only as PWM signal output channels, but also can be configured as Serial Output Ports. For example, CH3 and CH4 can be configured to output CRSF or SBUS signals for connection to a flight controller or other compatible devices.
Configure the channel output mode as follows:
● After the receiver is powered on, wait for 60 seconds without connecting the transmitter;
● The RGB LED will begin slow flashing green, and the receiver will automatically enable Wi-Fi (Wi-Fi Name: ExpressLRS RX; Password: expresslrs);
● Connect a mobile phone or computer to the Wi-Fi network, then open a web browser and go to http://10.0.0.1. On the configuration page, you can configure the Channel Output and Failsafe settings.

Output	Features	Mode	Input	Invert?	750us?	Failsafe Mode	Failsafe Pos
1	Serial2	50Hz	ch1	☐	☐	Set Position	1500
2	Serial2	50Hz	ch2	☐	☐	Set Position	1500
3	RX	50Hz	ch3	☐	☐	Set Position	988
4	TX	50Hz	ch4	☐	☐	Set Position	1500

Failsafe Setup

The output value of the servo can be obtained when the out-of-control protection value is inputted and the system goes out of control.

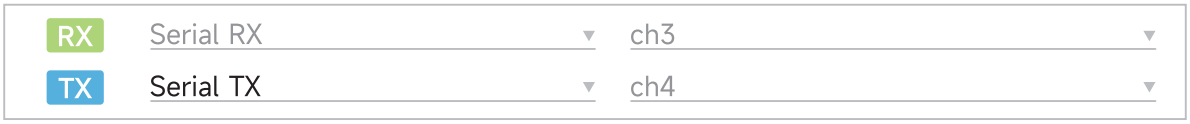
Note:
● Do not click "Invert" option.
● The failsafe value will be halved if "750us" option is enabled.
● When the failsafe value is above 1500, the output mode will automatically change to "On/ Off" mode.

Channel Output Mode Setup

The receiver supports the following channel output modes:
● 50-400Hz: PWM frequency;
● 10KHzDuty: Used to drive micro motors directly;
● ON/OFF: Outputting High or Low power level;
● Serial TX/RX: Serial Ports

CRSF/ SBUS Output Setup

- Set RX Mode to Serial RX and set TX Mode to Serial TX;



- Select CRSF or SBUS in Serial Protocol and click "SAVE";



- On the Options page, configure the UART Baud Rate. (The baud rate cannot be configured when SBUS is selected.)

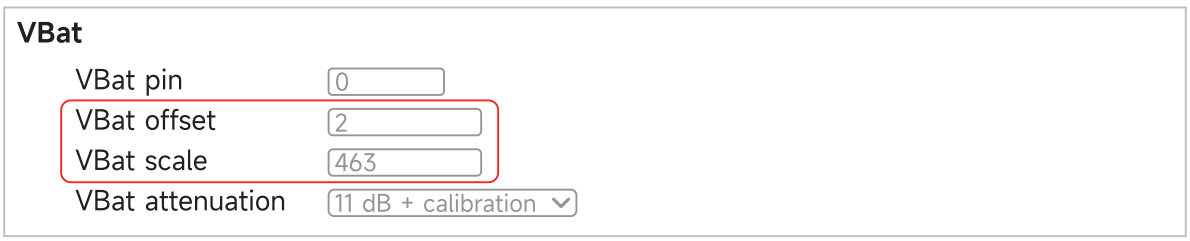


- Click "SAVE&REBOOT" to finish configuring CRSF/SBUS port.

Voltage Telemetry Setup

V-DET supports input supports a voltage range of 3-27V. When input voltage is above 27V, the receiver will be damaged.

- Connection: Solder one end of the voltage sensing wire to the receiver's V-DET pad, and connect the other end to the positive terminal of the battery or ESC. The voltage detection function can monitor the voltage of only one battery or power source.
- Voltage correction: Set correction parameters in the webpage http://10.0.0.1/hardware.html



Service & Support

As ExpressLRS project is actively and frequently updated, please check BETAFPV Website or Technical Support for latest information, including:

User Manal

BETAFPV Technical Support

- The newest user manual;
- Firmware upgrade instructions;
- FAQ and troubleshooting.

Compliance Information

FCC statements

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.
NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes 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.

EU Declaration of Conformity

Hereby, Shenzhen Baida Moxing Co.,Ltd. declares that the radio equipment type P4 ELRS 2.4G PWM Receiver is in compliance with directive 2014/53/EU.

CE

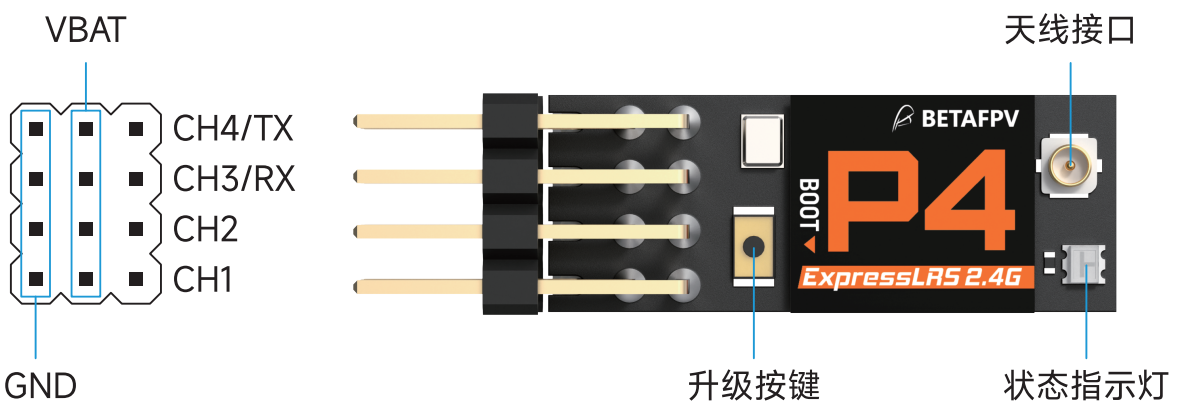
The full text of the EU declaration of conformity is available at the following internet address: https://support.betafpv.com/hc/en-us

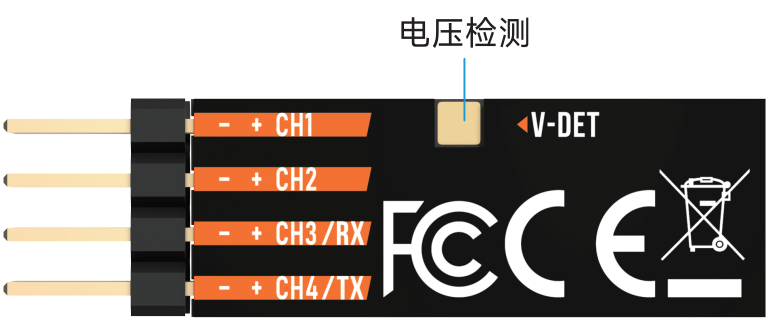
P4 ELRS 2.4G PWM接收机，是基于开源项目ExpressLRS新一代遥控无线系统开发的产品。ELRS系统具有遥控距离长，连接稳定，延迟低，刷新率高，配置灵活等特点。

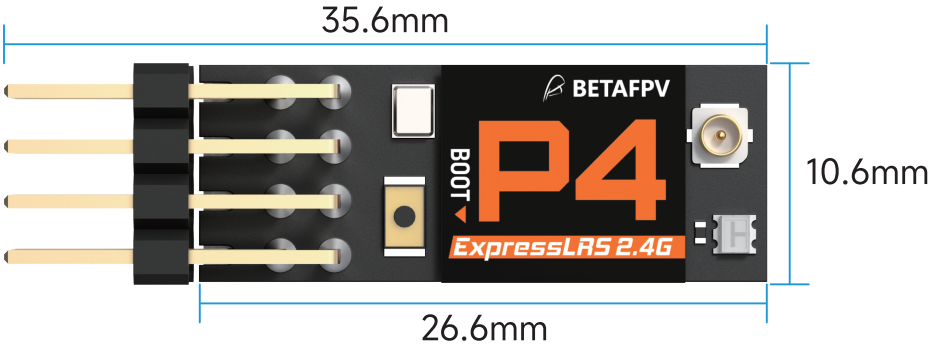
规格参数

- 重量：2.05g（不含天线）
- 产品尺寸：35.6*10.6*7.6mm（不含天线）
- 回传功率：17mW
- 频段：2.4GHz
- 工作电压：3.5V-8.4V
- 额定电流：55mA@5V
- 天线接口：U.FL
- 数据输出：PWM/CRSF/SBUS
- 电压检测范围：3V-27V
- PWM通道数：4通道

产品图片







状态指示灯

指示灯颜色	状态	含义
彩虹	渐变	开机启动
绿色	慢闪	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

刷新率对应的状态指示灯颜色

2.4GHz:



- 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。

对频

接收机出厂固件使用的是ExpressLRS V3.x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版本，并且未设置对频密码。

- 通过连续给接收机上电、断电三次，上电、断电时间保持1-2秒，进入对频状态；
- 接收机上指示灯进入橙色两次快速闪烁，表示处于对频模式；
- 使用遥控器或者高频头和接收机进行对频；如果接收机指示灯变为常亮，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；
- 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；
- 建议将接收机的两个天线尽可能地分开摆放，以获得更好的接收效果。

失控保护和通道输出设置

接收机在失去信号、不受控制后，失控保护功能会自动启动，此时各通道将保持预设的失控保护状态值以维持设备运行，保护设备以及人员安全。在不使用飞控进行飞行时（例如直升机或固定翼），提前设置失控保护状态值可以最大限度地保证飞行安全。

接收机的CH3~CH4不仅可以作为PWM信号的输出端口，也可以设置为通信串口。例如CH3和CH4可以设置为CRSF或SBUS以连接飞控等设备。

设置方法如下：

- 接收机上电启动后，在不连接遥控器的情况下等待60秒；
- 指示灯进入绿色慢闪状态，接收机自动打开WiFi（WiFi名称：ExpressLRS RX，WiFi密码：expresslrs）；
- 使用手机或者电脑连接WiFi，浏览器登录http://10.0.0.1即可找到通道输出配置和失控保护设置页面。

	Output	Features	Mode	Input	Invert?	750us?	Failsafe Mode	Failsafe Pos
1	Serial2	50Hz		ch1	☐	☐	Set Position	1500
2	Serial2	50Hz		ch2	☐	☐	Set Position	1500
3	RX	50Hz		ch3	☐	☐	Set Position	988
4	TX	50Hz		ch4	☐	☐	Set Position	1500

失控保护设置

在失控保护值输入失控时舵机的输出值即可。

注意：

- 不要勾选“反向”；
- 如果勾选了“750us”标志，则失控保护值需要减半；
- 失控保护值大于1500时，模式将会自动转换为“On/Off”模式。

通道输出设置

通道输出模式一共有以下几种：

- 50-400Hz：输出PWM信号频率
- 10KHzDuty：用于直接驱动微型电机
- ON/OFF：输出高电平或低电平
- Serial TX/RX：串行通信端口

CRSF/SBUS输出设置

- 将RX模式设置为serial RX,将TX 的模式设置为Serial TX；



- 在Serial Protocol中可选择CRSF和SBUS串口协议，点击“SAVE”保存设置；



- 在options页面设置波特率（SBUS串口协议不能设置波特率）；

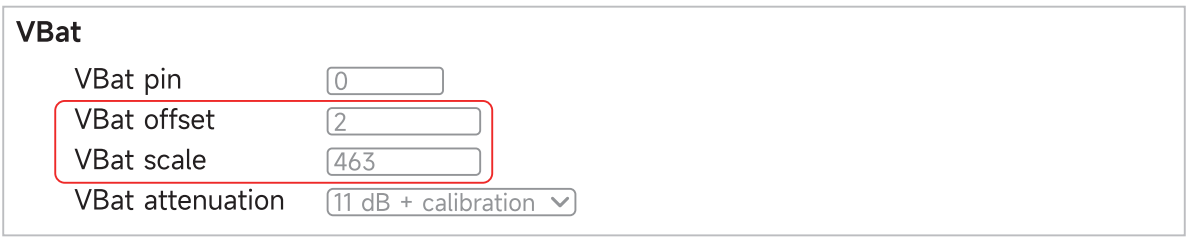


- 点击“SAVE&REBOOT”即完成CRSF/SBUS输出的设置。

电压回传检测设置

V-DET（电压检测）支持3-27V电压输入，输入电压超过27V会对接收机造成损坏。

- 使用方法：将电压检测线一端焊接到接收机的V-DET焊盘上，另一端连接到电池或电调的正极线上。电压检测只能检测一个电池或电源的电压。
- 电压校正：可在网页http://10.0.0.1/hardware.html中设置校正参数。



服务与支持

由于ExpressLRS项目处于更新活跃期，更多详细的信息，如常见问题，最新的说明书等，请访问BETAFPV官网或官方技术支持页面。

产品说明书

官方技术支持

- 最新说明书；
- 如何升级固件；
- 常见问题。