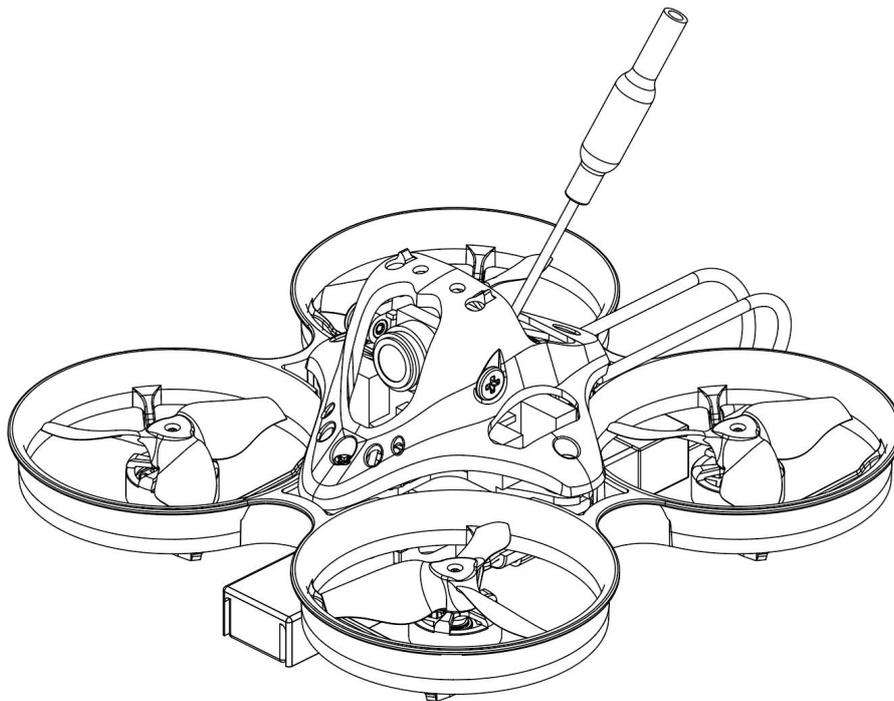


*Tinyhawk Nanoscout*

# Tinyhawk Nanoscout



Thank you for purchasing the Tinyhawk Nanoscout.  
Designed in California, USA, and manufactured in China.

## **Disclaimer**

1. Please read this disclaimer carefully before using this product.
2. By using this product, you agree to this disclaimer and confirm that you have read this product carefully.
3. This product is not suitable for individuals under 18 years old. It is strongly recommended that children under 18 years old be supervised by adults.
4. Please carefully read the user manual and warnings.
5. Before each flight, ensure that the battery is fully charged, the power connection is secure, and avoid flying near crowds, children, animals, or objects.
6. Tinyhawk Nanoscout is equipped with open-source flight controllers and electronic speed controllers to meet the upgrading needs of FPV enthusiasts.
7. EMAX is not liable for any direct or indirect damages or injuries caused by the use of this product.

## **Notes**

1. Please assemble and operate this product correctly according to the instructions.
2. Fly this product in a safe area away from crowds.
3. Do not use this product in strong electromagnetic environments.
4. Do not use this product in harsh environments such as wind, rain, lightning, snow, etc.
5. Do not use this product if you have physical or mental illness, dizziness, fatigue, or under the influence of alcohol or drugs.
6. Do not modify or use unauthorized EMAX parts and accessories.
7. This manual is for the Tinyhawk Nanoscout series and may include information about other models or different products. Please refer to the product you purchased.

## **Support**

For updates or technical support, please visit [emax-usa.com](http://emax-usa.com) or [emaxmodel.com](http://emaxmodel.com).



**Tinyhawk Nanoscout -BNF**

	Tinyhawk Nanoscout
wheelbase	65mm
Maximum size	L*W*H=84x84x35mm
weight	23.1g (excluding battery)
motor	08015(22000KV)
propeller	Avia 31mm
FC	STM32F411 (100MHz) main control Integrated 4-in-1-6A-8 bit electronic control, input voltage 1S Onboard ELRS (2.4G) receiver (SPI communication)
camera	RunCam Nano 3
Image transmission	EMAX-32-bit open-source simulation image transmission Power: 25mW/100mW/200mW/400mW
Battery	1S HV 320mAh(EM2.0)

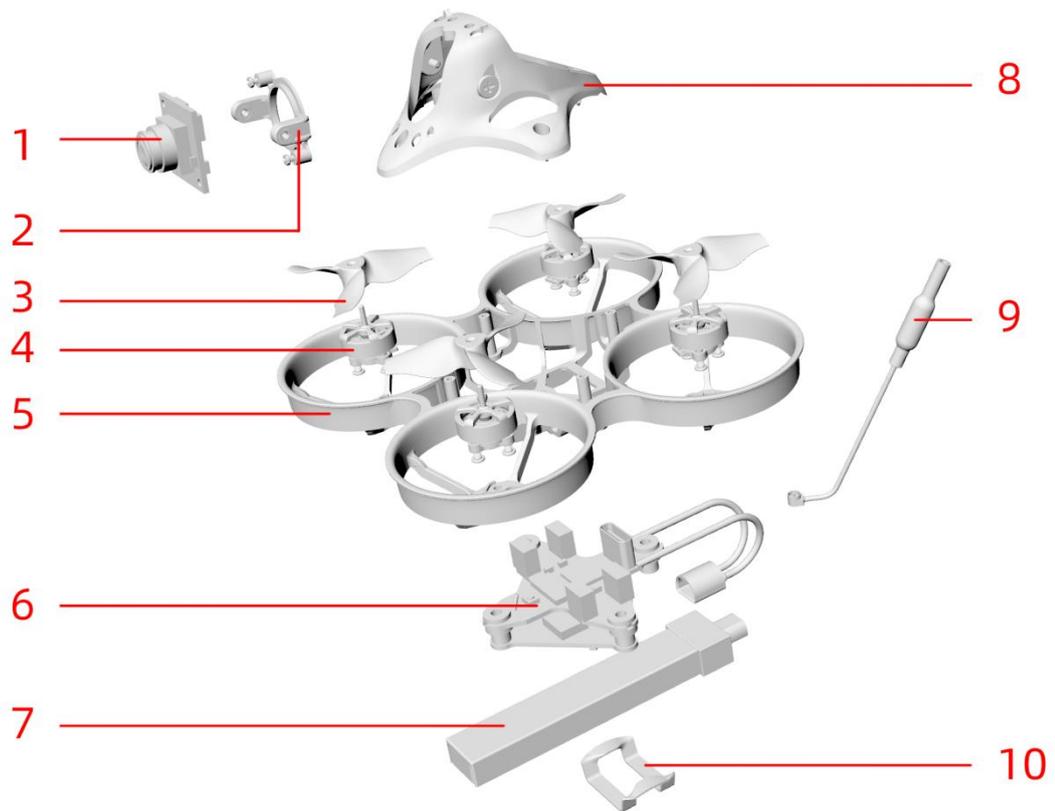
**Tinyhawk Nanoscout - BNF Product List**

1. Tinyhawk Nanoscout ..... ×1
2. EMAX 1s HV 320mAh ..... ×1
3. Charger ..... ×1
4. Propellers ..... (2xCW, 2xCCW)
5. Accessory Pack ..... ×2



## 1. Tinyhawk Nanoscout

### 1.1 Tinyhawk Nanoscout

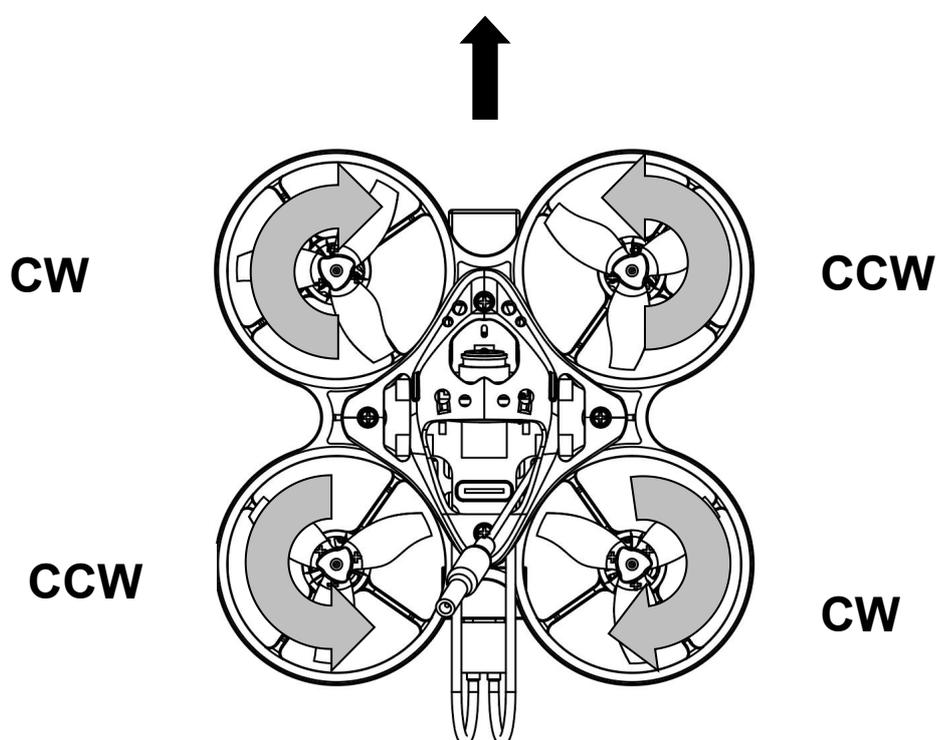


- 1· Camera
- 2· Camera mount/bracket
- 3· Propeller
- 4· Brushless motor
- 5· Frame (as in the frame of an aircraft or drone)
- 6· Main control board (flight controller)
- 7· 1S battery (1-cell battery)
- 8· Aircraft fuselage frame
- 9· Antenna
- 10· Battery securing rubber band

## 1.2 Tinyhawk Nanoscout Propellers & Brushless Motors

### 1.2.1 Tinyhawk Nanoscout Propellers

Tinyhawk Nanoscout propellers have two rotational directions: clockwise (CW) and counterclockwise (CCW). When purchasing a set of propellers, please buy 2 clockwise and 2 counterclockwise propellers. Propellers rotate along the blunt edge. When installing propellers, please follow the correct direction as shown in the diagram below.



**Propeller Installation:** Align the 3 shafts of the propeller with the 3 shafts of the motor, supporting behind the motor. Press the propeller blades with your hand until they are flush with the motor shaft.

**Warning:** Incorrect propeller installation may cause the Tinyhawk Nanoscout to be unable to fly properly and become uncontrollable. Verify carefully that the propeller direction is correct. Lack of support behind the motor may lead to frame breakage. Ensure safety precautions when installing propellers!!!

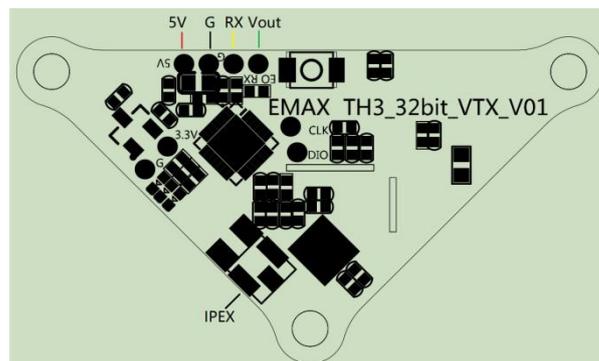
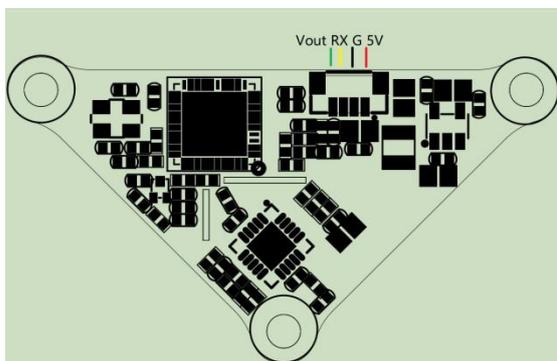
**Propeller Removal:** Use a small tool (such as a 1.5mm hex wrench or a small screwdriver) to press between the metal at the bottom of the motor and the Tinyhawk Nanoscout. Hold the propeller blades with your fingers until the propeller pops out from the motor.

**Warning:** Only remove the propeller blades when replacing them with new ones. Practice safety precautions when removing propellers and using tools!!!

**1.2.2 Tinyhawk Nanoscout Brushless Motor** The model of the Tinyhawk Nanoscout brushless motor is: 08015 (22000KV). **Note:** The connector terminals between the motor and the main control board are: P = 1.25mm, 1x3p plug connector.

**1.3 Tinyhawk Nanoscout Camera** The model of the Tinyhawk Nanoscout camera is: RUCAM Nano 3.

**1.4 Tinyhawk Nanoscout Video Transmitter 4.4.1 EMAX 32-bit Open Source Analog Video Transmitter Schematic**



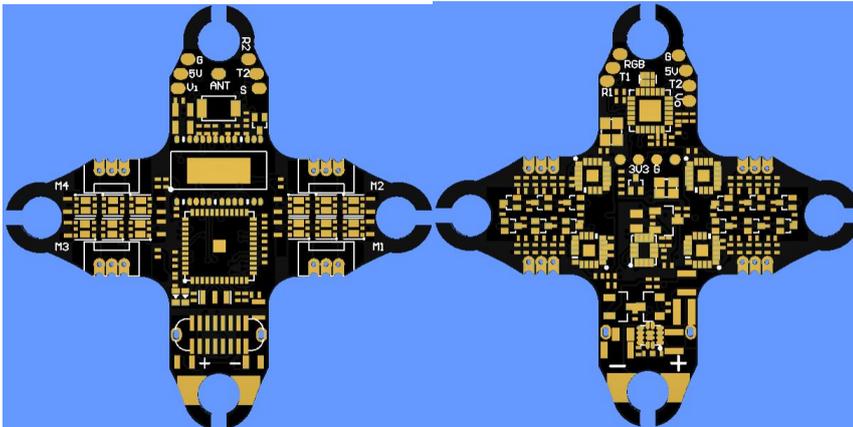
EMAX 32-bit simulation image transmission

frequency	5.8G 40CH
RF power	25mW/100mW/200mW/400mW
Power/Current	5V
Support agreement	Smartaudio agreement
Power signal interface	P=0.8mm,1x4p
Firmware Update	Support updating VTX firmware through flight control
antenna	Omnidirectional antenna, gain 2db
Antenna interface	IPEX 1st generation or welding

## 1.5 Tinyhawk Nanoscout-AIO

### 1.5.1 Tinyhawk Nanoscout-AIO Schematic

Tinyhawk Nanoscout PLUS-AIO integrates an ELRS (2.4G) receiver, 6A BIHeliSuite ESC, and F411 flight controller on a single board.



## 1.5.2 Tinyhawk Nanoscout

### Flight control part

FC (MCU)	STM32F411CEU6 (100MHz)
Gyroscope&accelerometer (MPU)	ICM42688 (SPI connect)
Character overlay (OSD)	AT74569E(SPI connect)
input voltage	1S
output voltage (BEC)	5V@2A、3.3V@1A
firmware (betaflight)	EMAX_TINYHAWKF4SX1280
Support electric adjustment protocol	Shot150 、 D-Shot300, D-Shot600,Multishoth, OneShot125、PWM
Programmable RGB color lights	support
Serial port	2 ↑ (UART1、UART2)
SBUS protocol	support (UART1)

### Electric tuning part

Continuous current	6A
peak current	6.7A(10S)
FC ((MCU)	EFM8BB21F16G(50MHz)
input voltage	1S
Firmware (Bluebird)	JESC_SH90_48_2_3.HEX;

### Receiver

RF chip	SX1280(SPI support)
Frequency band	2400-2480MHz
agreement	CRSF

## 2. Advanced Features

### 2.1 Aircraft Re-level Calibration

After multiple takeoffs and landings, the aircraft's gyroscopic data may drift, causing attitude problems during flight. At this point, you can calibrate the aircraft's gyro data with the following steps:

1. Connect the flight controller to the computer using a Type-C data cable and ensure it is in a level position.
2. Open the Betaflight Configurator software.
3. Click on "Calibrate Accelerometer" and then click "Reset Z-axis".
4. Check in the Betaflight Configurator software to see if the aircraft's status returns to normal. A prompt will indicate that accelerometer calibration is complete.

### **2.2.3 Changing Binding Key for Flight Controller**

Through the Betaflight Configurator software and EMAX Serial Upgrade Tool, you can read the current binding keys of both the aircraft and the transmitter. You can write the aircraft's binding key to the transmitter using the EMAX Serial Upgrade Tool, or write the transmitter's binding key to the flight controller using the Betaflight Configurator software.

#### **Changing Flight Controller Binding Key via Betaflight Configurator:**

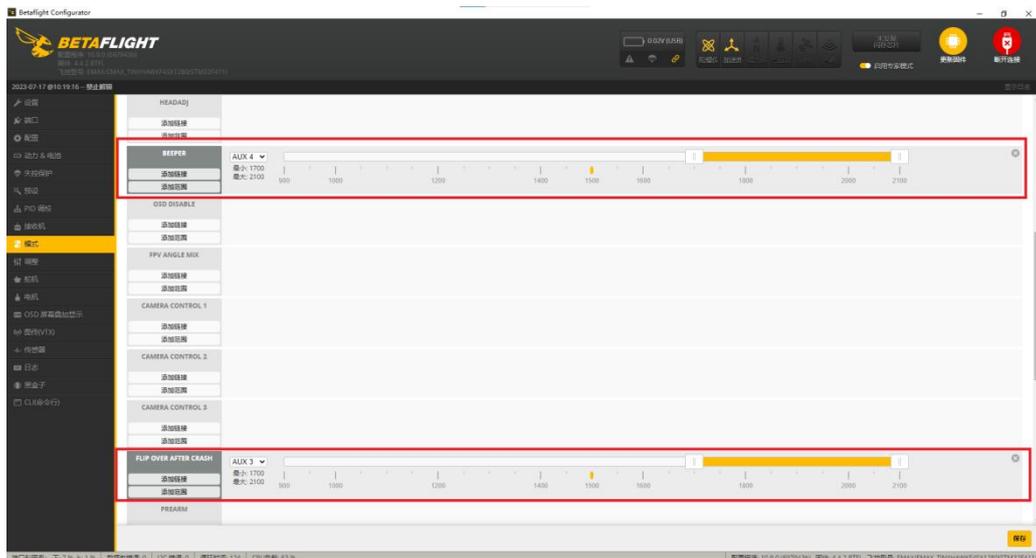
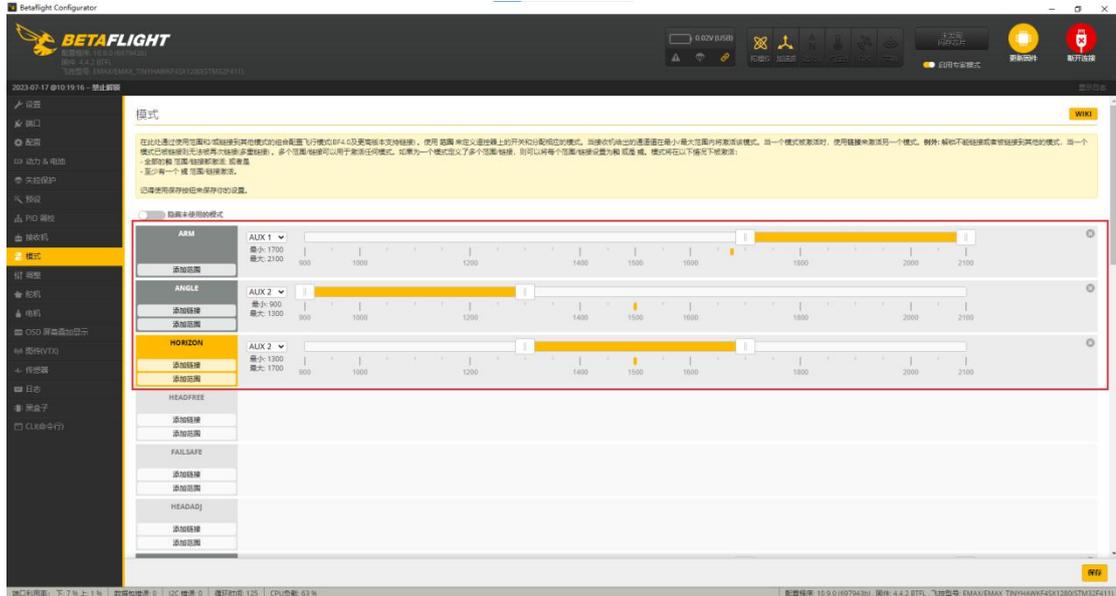
1. Enter the following command into the command line of the Betaflight Configurator (using 0, 1, 2, 3, 4, 5 as an example for the key):
2. Save the changes.
3. Press Enter. Wait for the flight controller to restart and enter Betaflight Configurator again. This indicates that the binding key modification was successful.

### **2.3 Adjusting Mode Settings**

In the E8 Transmitter (ELRS-2.4G):

- AUX 1 is a 3-position switch, used as the ARM switch (Unlock).
- AUX 2 is a 3-position switch, used for flight modes: Acro (Manual), Horizon (Semi-Stable), Angle (Stable).
- AUX 3 is a 2-position switch, configured for Flip Over After Crash (Turtle mode).
- AUX 4 is a 2-position switch, configured for the Beeper.

If you wish to modify the mode settings, locate the corresponding channels for the switches in the Betaflight Configurator software, make the desired changes, and then save and restart.

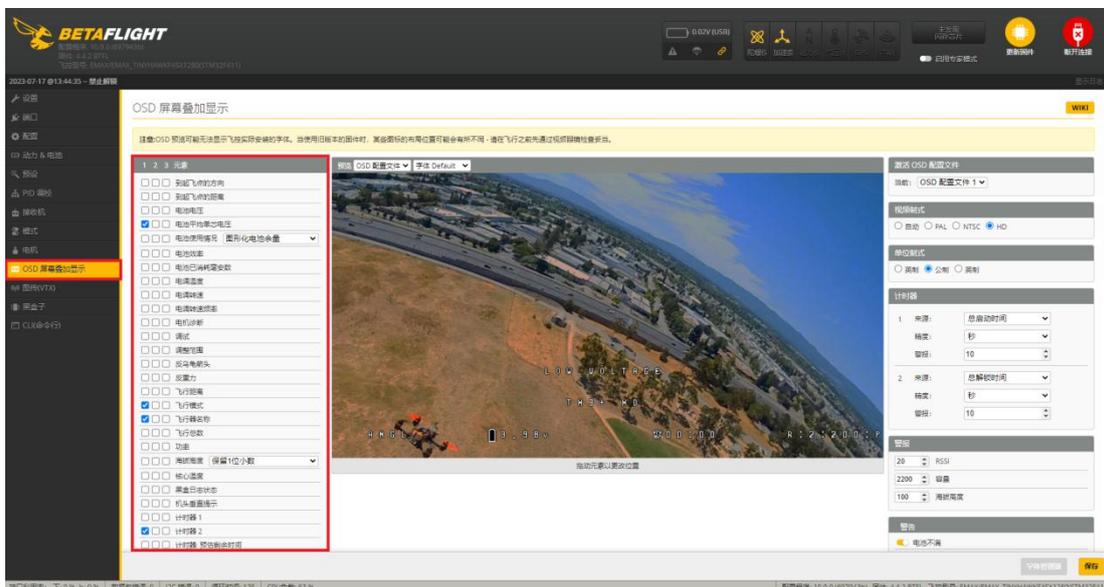


## 2.4 Changing OSD Settings

To change OSD settings using the Betaflight Configurator software, Tinyhawk Nanoscout comes pre-configured with OSD settings. If you wish to make changes, follow these steps:

1. In the Betaflight Configurator software, locate the OSD (On-Screen Display) tab.
2. Configure the OSD screen overlay according to the characters and information you wish to display on your FPV goggles.

3. Click "Save" to apply the changes.
4. After saving, restart the system to implement the updated OSD settings.



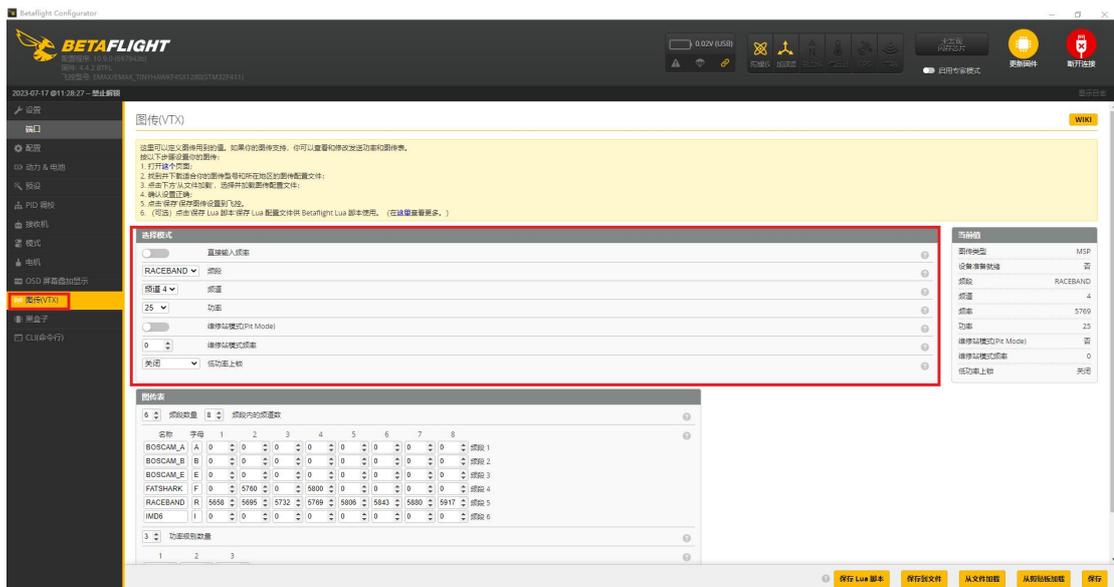
## 2.5 Changing VTX (Video Transmitter) Settings

### 2.5.1 Modifying VTX Settings Using Betaflight Configurator

Tinyhawk Nanoscout comes with the default VTX settings of R:4:25mW. If you wish to make changes, follow these steps:

1. Open the Betaflight Configurator software.
2. Locate the VTX tab.
3. Modify the desired parameters such as channel, frequency, power, and enable low power lock.
4. Click "Save" to apply the changes.
5. After saving, restart the system to implement the updated VTX settings.

**Note:** The low power lock feature ensures that the VTX operates at low power until it is unlocked. Once unlocked, it operates at the set power level.



### 2.5.2 Changing VTX Settings Using Video Goggles OSD

The Tinyhawk Nanoscout is equipped with SmartAudio, which is already configured. The analog video transmitter's SmartAudio is on UART2 TX. Power on the Tinyhawk Nanoscout, Transporter II, and E8 Transmitter.

Follow the on-screen instructions to enter the main setup menu. Center the throttle, move the left stick left, and pitch up (THROTTLE MID + YAW LEFT + PITCH UP) to enter the OSD parameter adjustment menu.

In the menu interface, use pitch (up/down) to navigate and select menu options. Move the cursor to "FEATURES," then push the roll stick (right) to enter the next menu. Use pitch (up/down) to move the cursor to "VTX SA." Push the roll stick (right) to enter the VTX configuration menu.

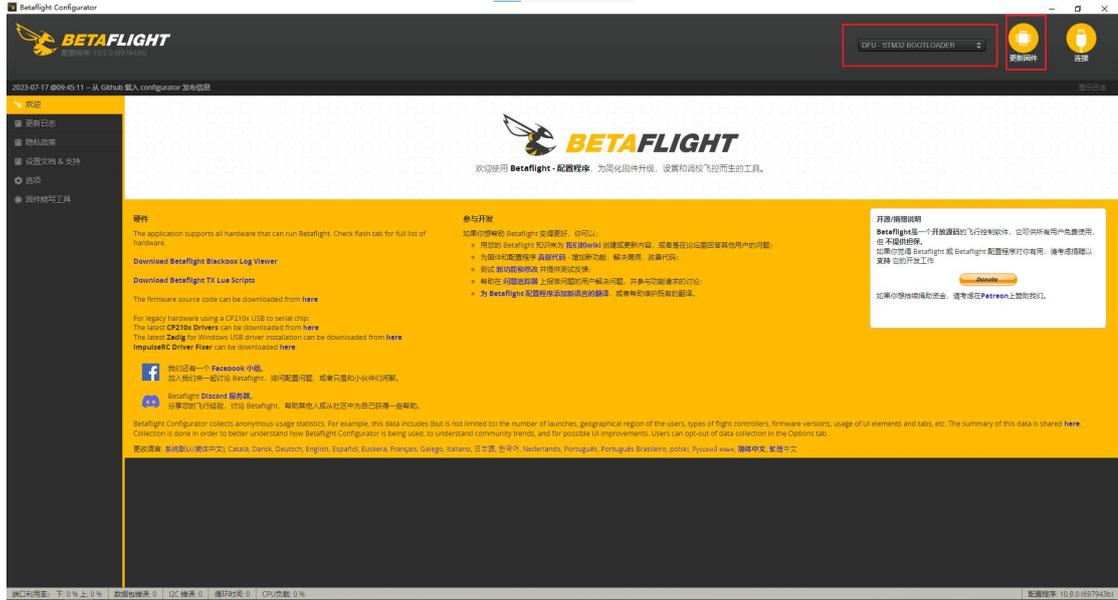
In the VTX SA menu, you can configure BAND, CHAN, and POWER. Use the pitch stick (up/down) to move the cursor and select the desired VTX options. Once the parameters are set, move the cursor to "SET" and push the roll stick (right) to enter "SET" and select "YES." Push the roll stick (right) again to save the settings.

In the VTX SA menu, move the cursor to "CONFIG" to enter the menu. Move the cursor to "PIT FMODE," then push the roll stick (right) to turn off the VTX power.

Note: The low-power lock function allows the VTX to operate at low power before unlocking, and then operate at the set power.

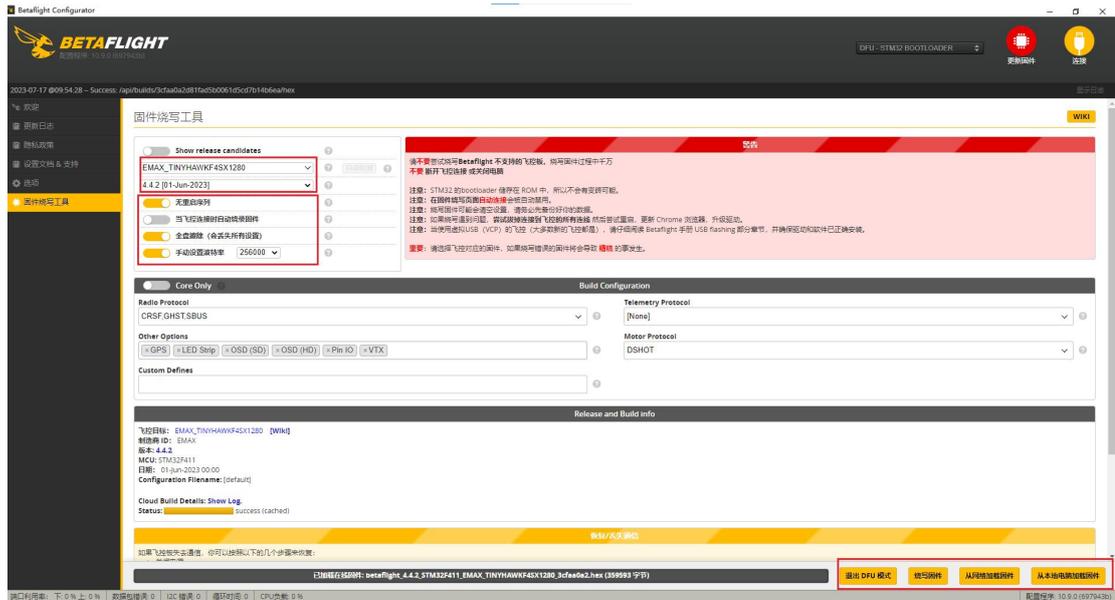
## 2.6 Flight Controller Firmware Flashing

First, locate the Boot button on the flight controller board. Then, while holding down the Boot button, connect the flight controller using a Type-C data cable to enter DFU mode. Next, click on the update firmware button.



### Steps for Flight Controller Firmware Flashing

- Step 1:** Select EMAX\_TINYHAWKF4SX1280, 4.4.3 as the firmware. In the dropdown menu, choose a manual baud rate of 256000.
- Step 2:** Choose to load the firmware from the internet or from your local computer. Wait for the download to complete.
- Step 3:** Finally, click on the "flash firmware" button. After a few seconds, the flashing process will be complete.

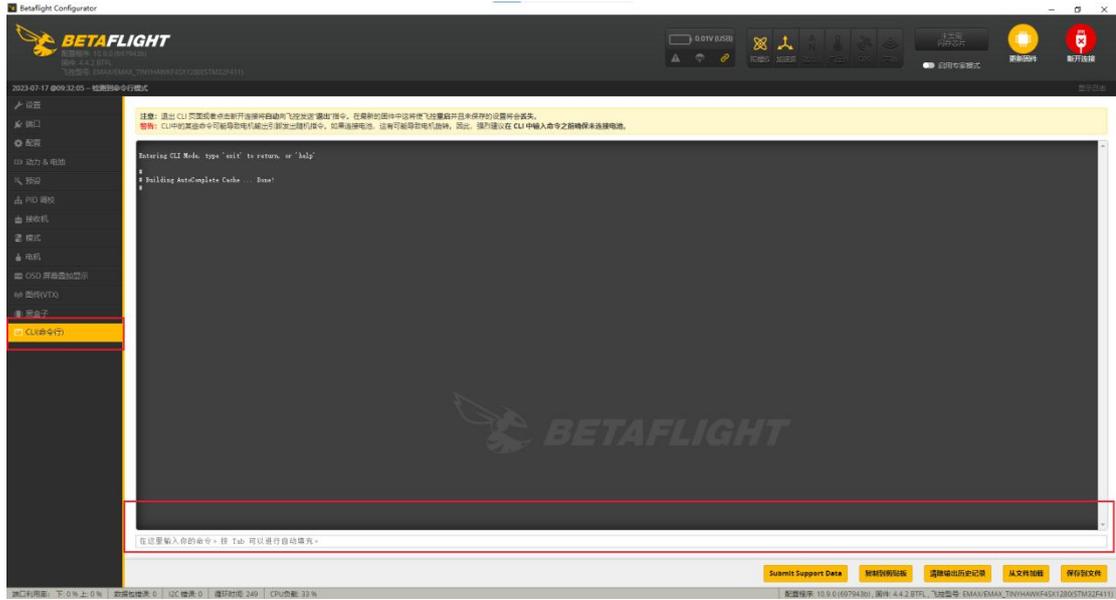


## Notes:

- The BOOT button and BIND button are the same button, which is also the only button on the flight controller board. If DFU mode is not detected, please check if your computer has the necessary drivers installed.

## 2.7 Flight Controller Parameter Flashing

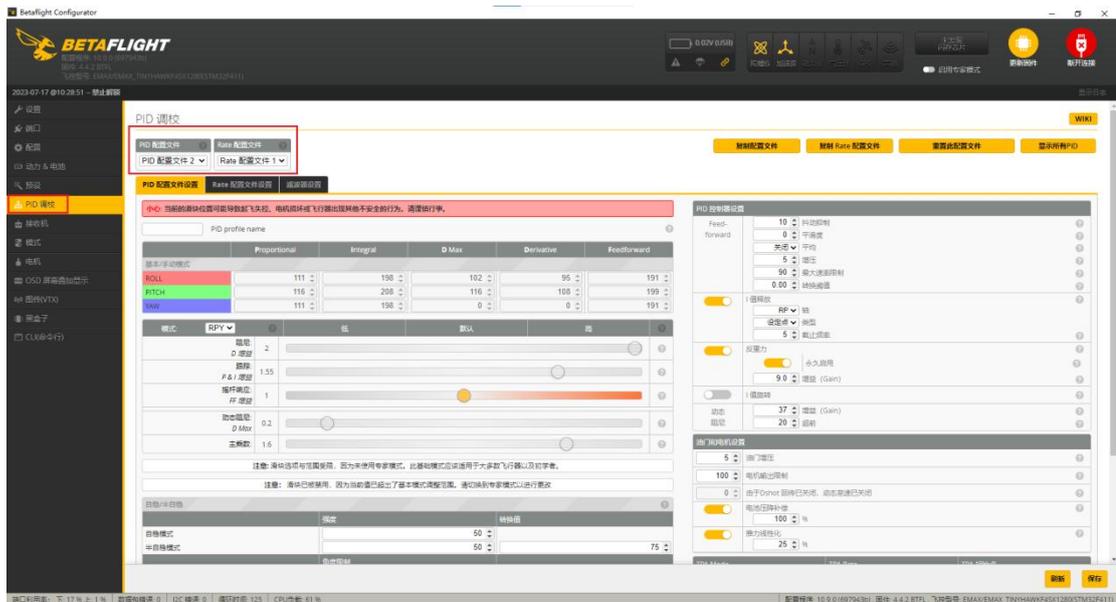
1. Download the latest CLI Dump file from <https://emax-usa.com/>.
2. Open the CLI Dump file in a text editor and copy all the text.
3. Paste the copied text into the command line interface (CLI) of the Betaflight Configurator software and press Enter.
4. Once the process is complete, reconnect to the Betaflight Configurator software. The Tinyhawk Nanoscout will be restored to its default settings.



## 2.8 Tinyhawk Nanoscout-PID File Overview

PID Configuration File 1 is tailored and optimized for the Tinyhawk Nanoscout and the provided Emax 1s HV 320 mAh battery, designed for ultimate flight control both indoors and outdoors. This file is optimized for the best indoor flight control when using the Emax 1s HV 650 mAh battery.

This configuration has been professionally adjusted by multiple experts. EMAX strongly recommends not altering these values arbitrarily.



## **Disclaimer**

The Tinyhawk Nanoscout has been adjusted to its optimal state. Changing the factory PID settings may affect flight time, overall speed, control of the aircraft, and may cause internal motor overheating. We do not recommend changing any settings of the Tinyhawk Nanoscout or upgrading the firmware to a new version.

Thank you for purchasing our product! Enjoy your flight!



Warning:

## Safety Notice

Please be aware of your surroundings. Usage is prohibited for individuals under 18 years of age. This product contains small parts. Keep out of reach of children to prevent accidental ingestion.



**MADE IN CHINA**