



BOTWING

Flight Controller-F405

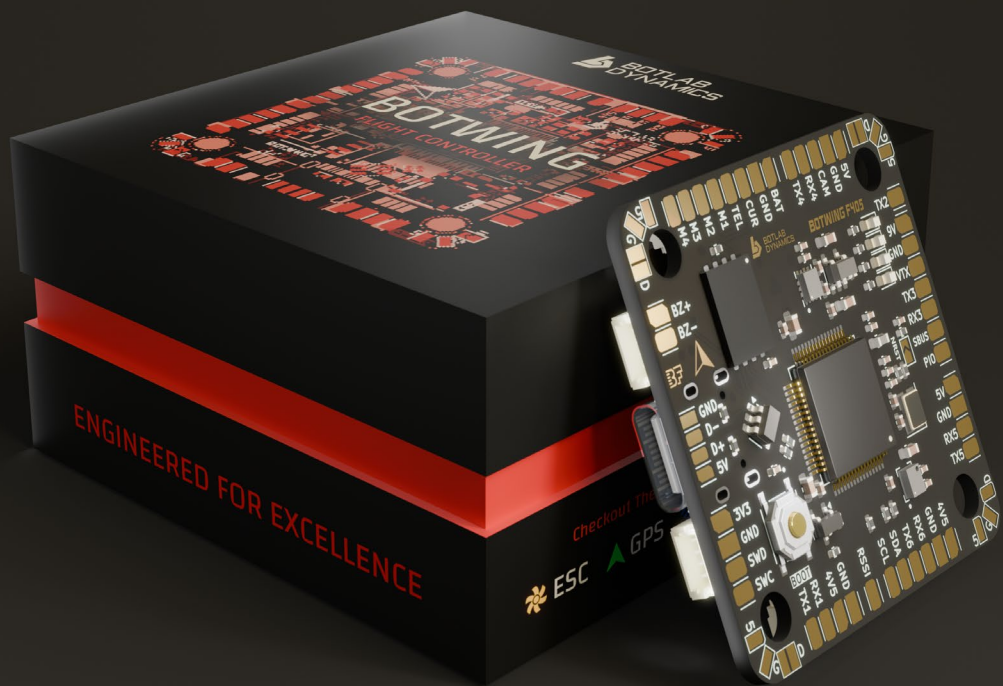
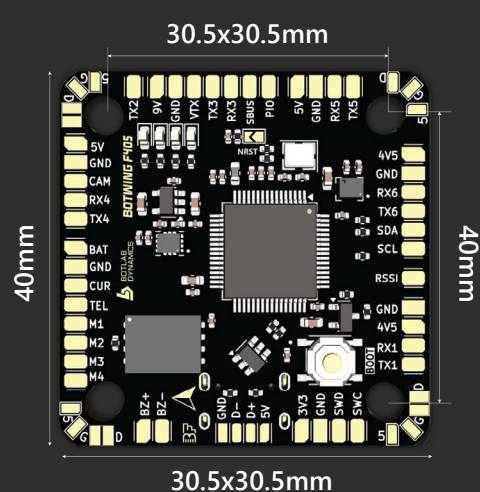


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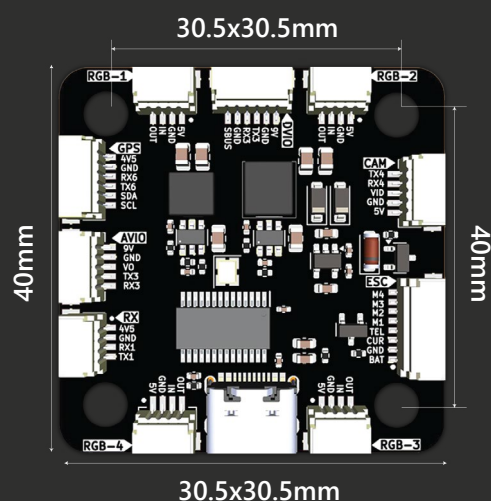
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FRONT



SIDE



BACK

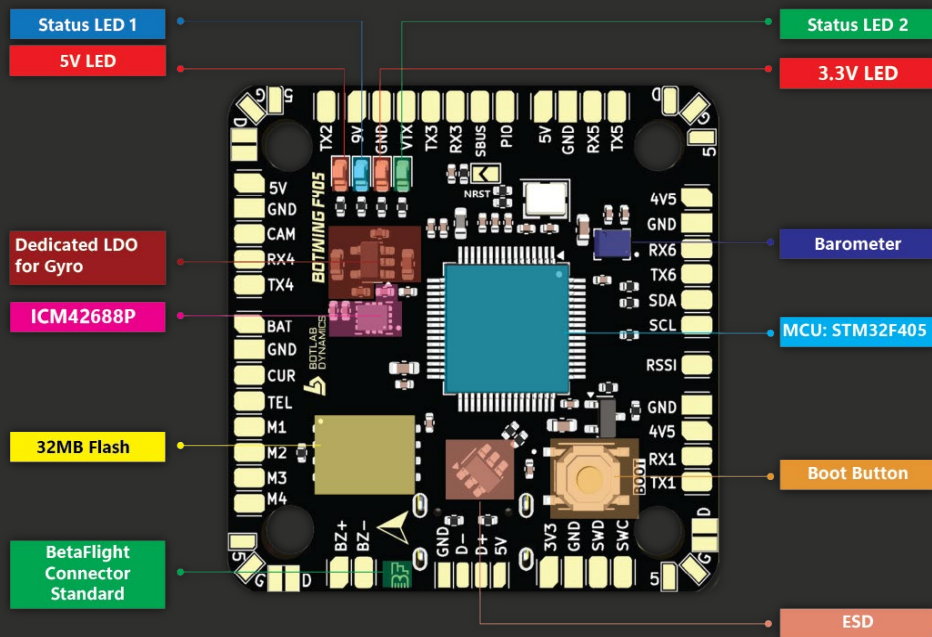
About Botwing F405

Meet BotWing F405, the versatile flight controller that powers everything - from FPV racing and cinematic drone shoots to DIY learning projects. Built around the reliable STM32F405 MCU and the precision ICM42688P gyro, BotWing F405 offers smooth, stable flight performance across a wide range of setups.

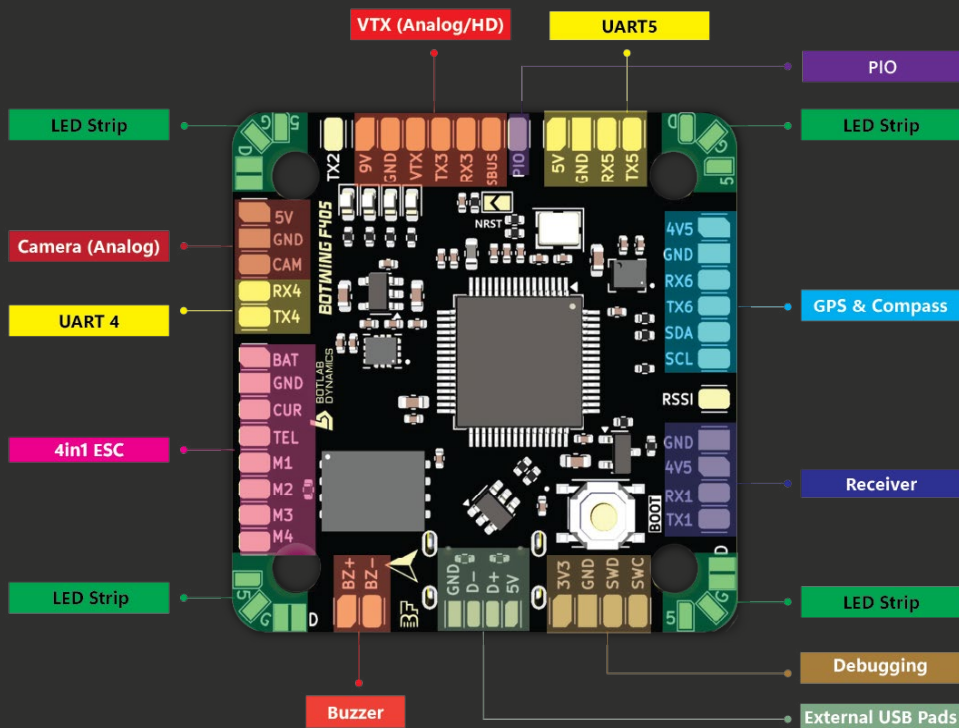
With support for Mission Planner, iNav, and BetaFlight, and a wide power input range (2S–6S LiPo), it's designed to adapt seamlessly to your needs - whether you're chasing racing flags or cinematic landscapes. The solderless design ensures clean, quick, and hassle-free assembly, making it ideal for builders at every experience level.

It features 4 motor outputs, integrated 32MB Blackbox logging, crisp AT7456E OSD display, plug-and-play DJI Air Unit compatibility, and a full suite of UARTs and LED strip

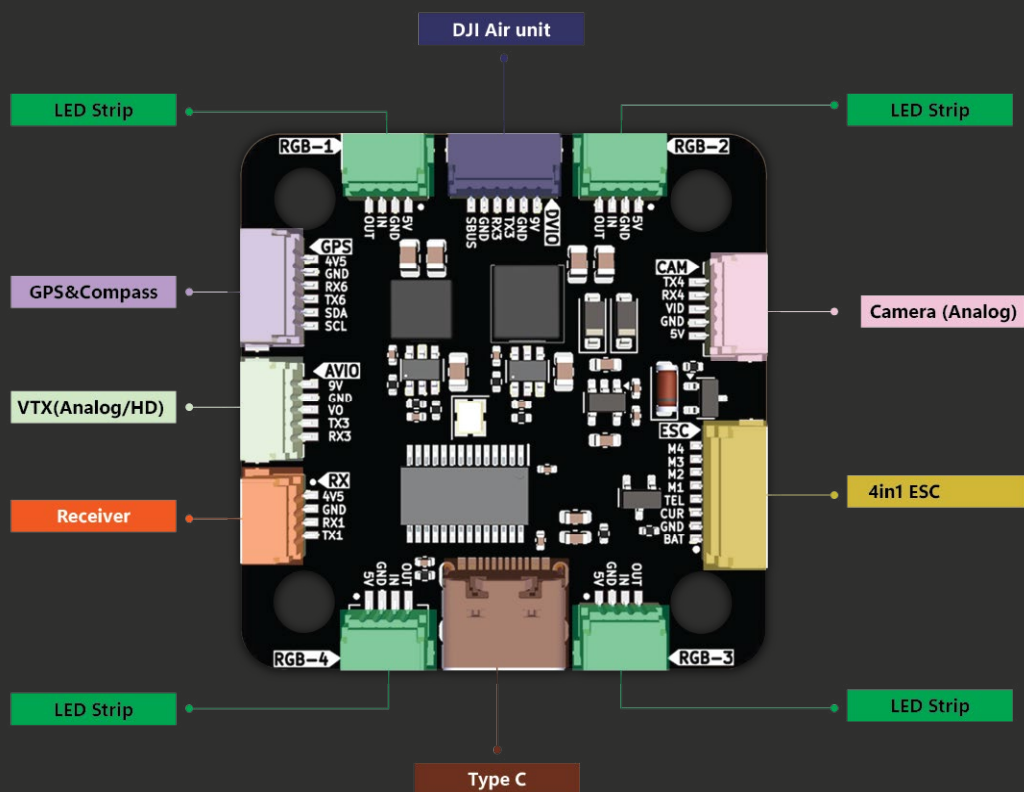
LAYOUT



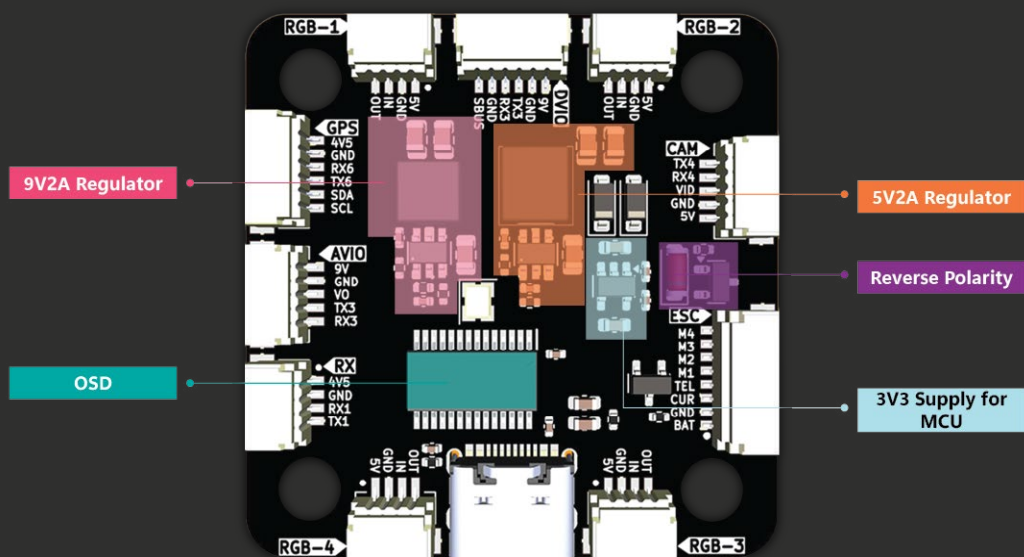
FRONT-I



FRONT-II



BACK-I



BACK-II

Specification

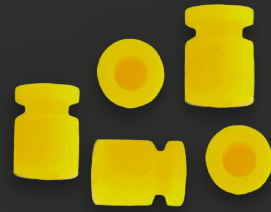
DimensionsWW	40x40mm
Firmware	Mission Planner, iNav , Beta-Flight
Firmware Target Name	BOTWINGF405
Mounting	30.5mm x 30.5mm (4mm hole size)
MicroController(MCU)	STM32F405
Motors Outputs	4 Motors
Gyro (IMU)	ICM42688P
Power Input	2S-6S LiPO
On Screen Display (OSD)	AT7456E
BlackBox	32 MB Winbond Blackbox
Buzzer	BZ+ and BZ- pad used for 5V Buzzer
i2C	i2C Supported SDA & SCL pads on front side. Used for magnetometer , sonar etc.
ESC Telemetry UART	UART-2
RSSI	Named as RSSI on the front side
Boot Button	Supported, Press and hold BOOT button and power the FC on at the same time, this will force the FC to enter into DFU Mode, This is used for Firmware Flashing

Led Pads for LED STRIP	Led Pads for LED STRIP Supported, 5V, GND, DATA pads are present on the top side.
Firmware Target Name	AM32_AT32PB4_540_F421
Weight	9gms
DJI AIR Unit-6-pin DJI Air Unit Plug	Plug and Play Port
UARTs	UART1(Radio) , UART2(ESC) , UART3(VTX) , UART4(Camera) , UART5 , UART6(GPS) (6 Sets)
USB Port Type	Type C
4.5V Pads	4 group of 4.5V pads is used
5V	5V pad 4 group of 5V Pads used in LED Strip, Total 5V Pads =6
9V pad	1 Pad is present
3.3V Pads	1 Pad is present
Camera Control Pad	Not Present

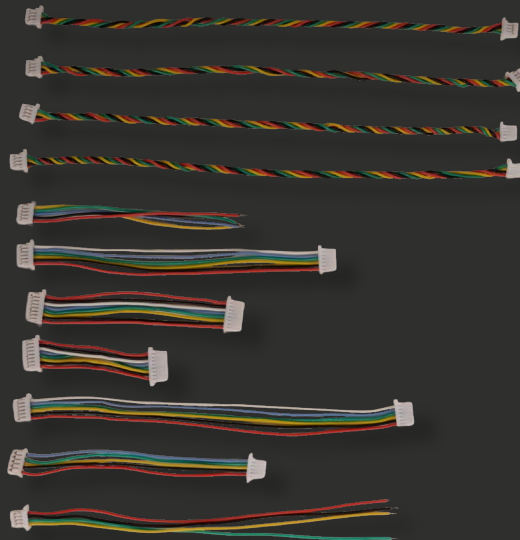
Package Include



1 x USB Protector



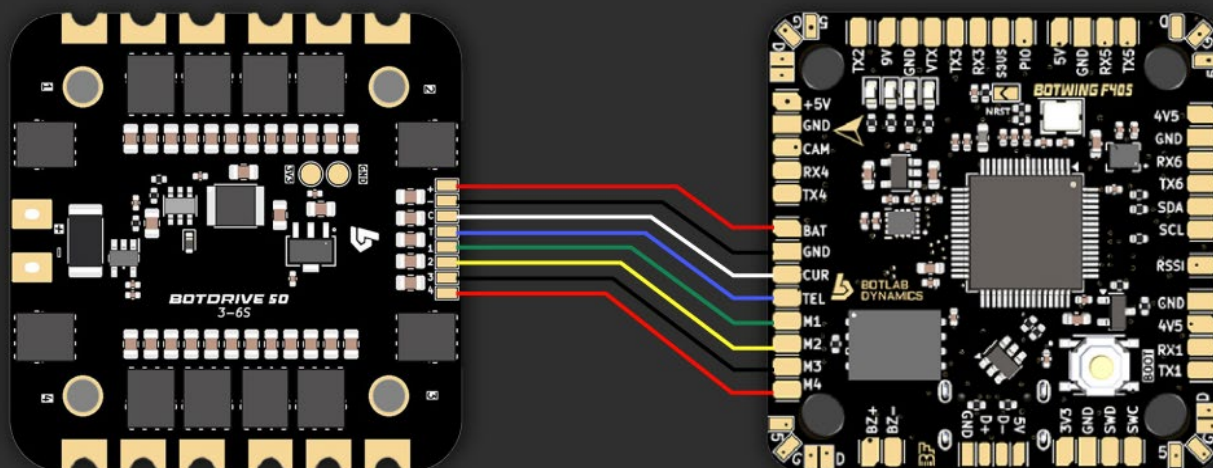
**5 x M3 Anti-Vibration
Silicone Grommet Insert**



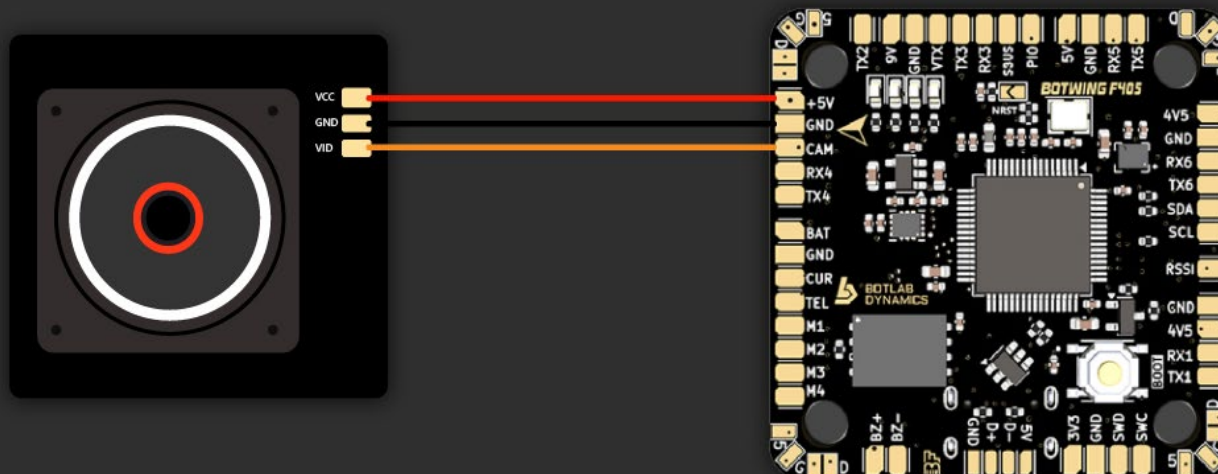
10 x Connectors Cables
Including - 5 x 150 & 180 mm length (4pin cable),
2 x 50 & 30 mm length (8pin cable),
2 x 60 & 80 mm length (6pin cable),
1 x 60 mm length (5pin cable)

Connections

Method 1 - Soldering

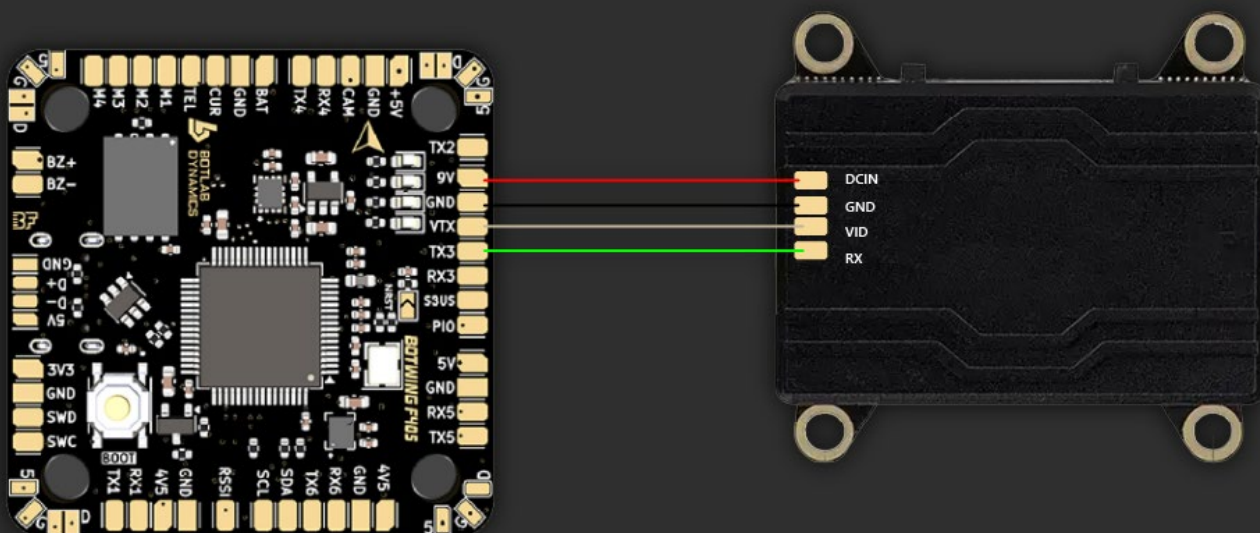


ESC-FC

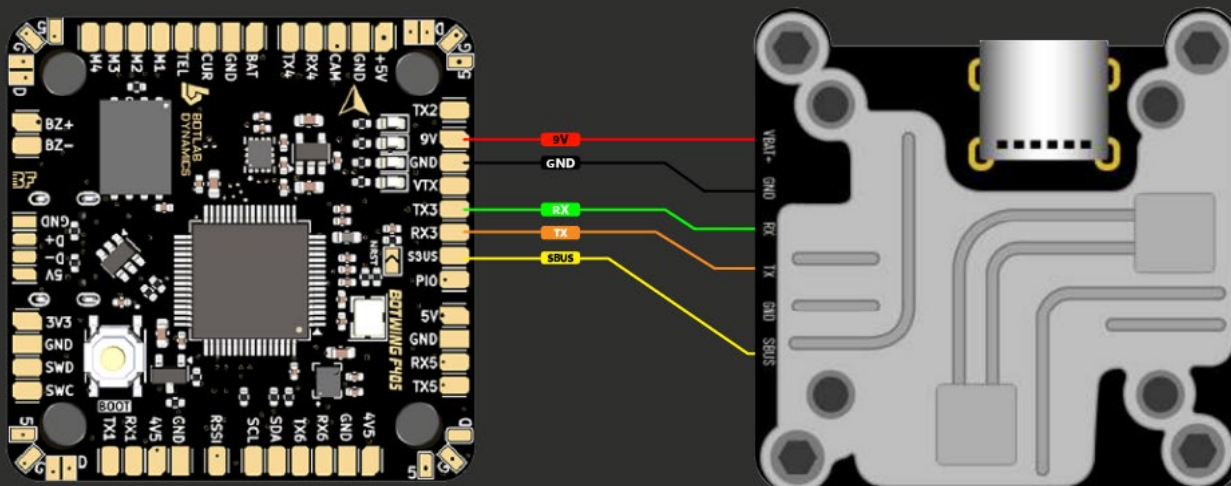


CAM-FC

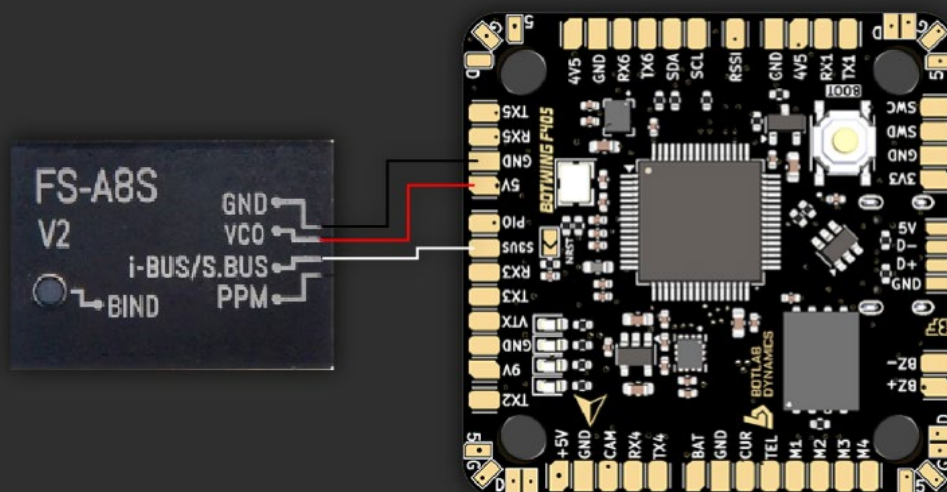




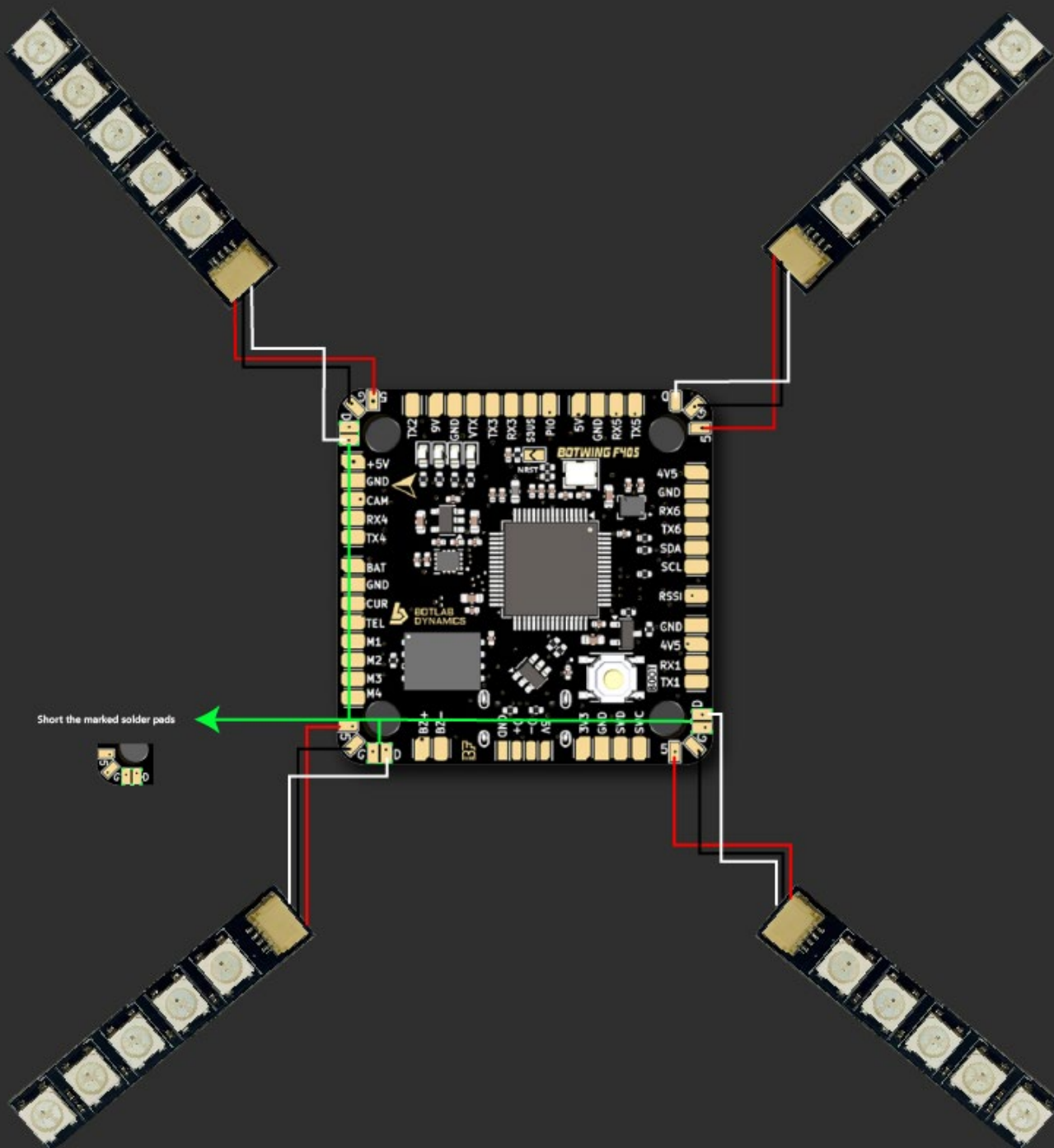
DJIO3-FC



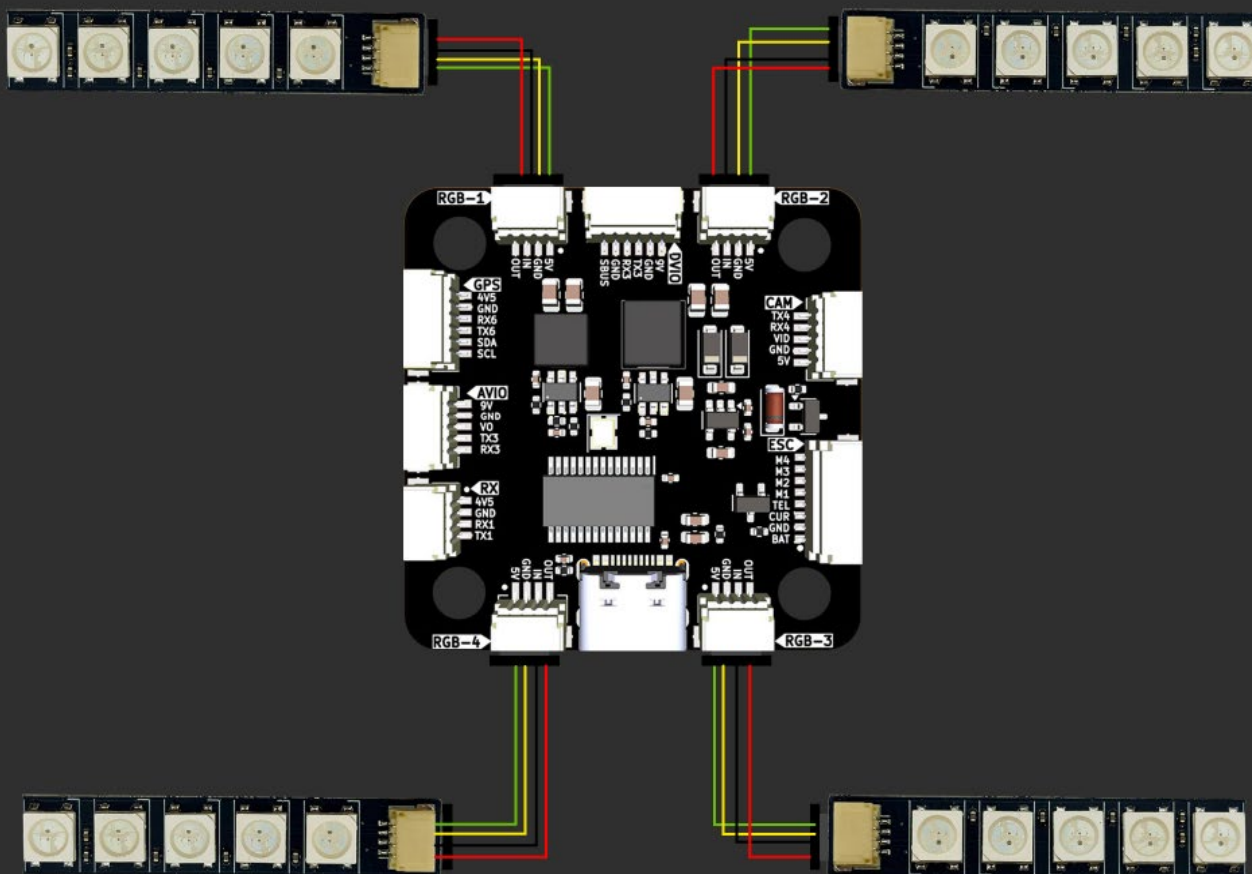
FC-CADDX VISTA



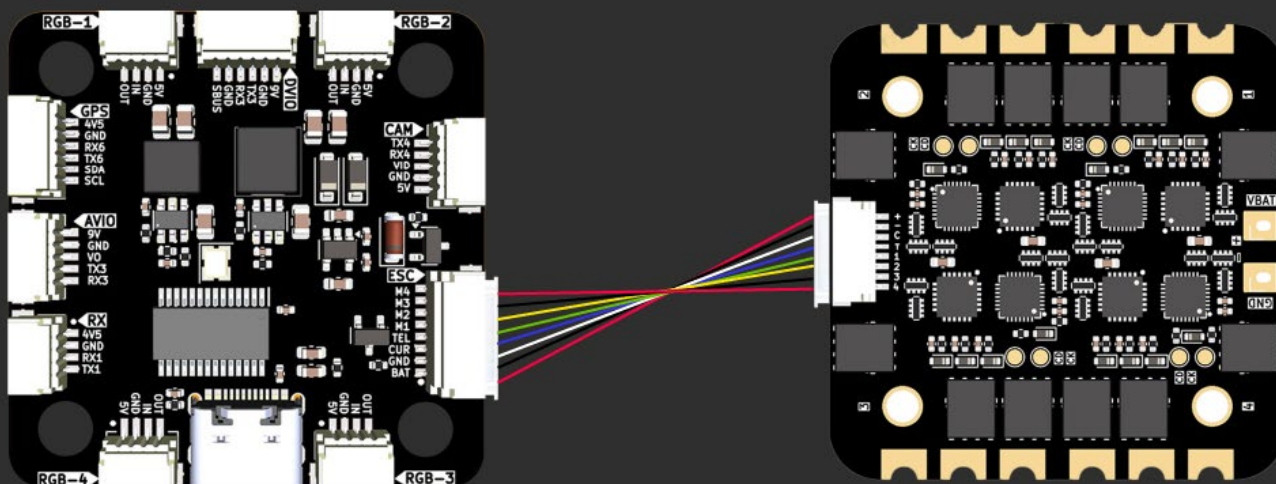
SBUS-FC



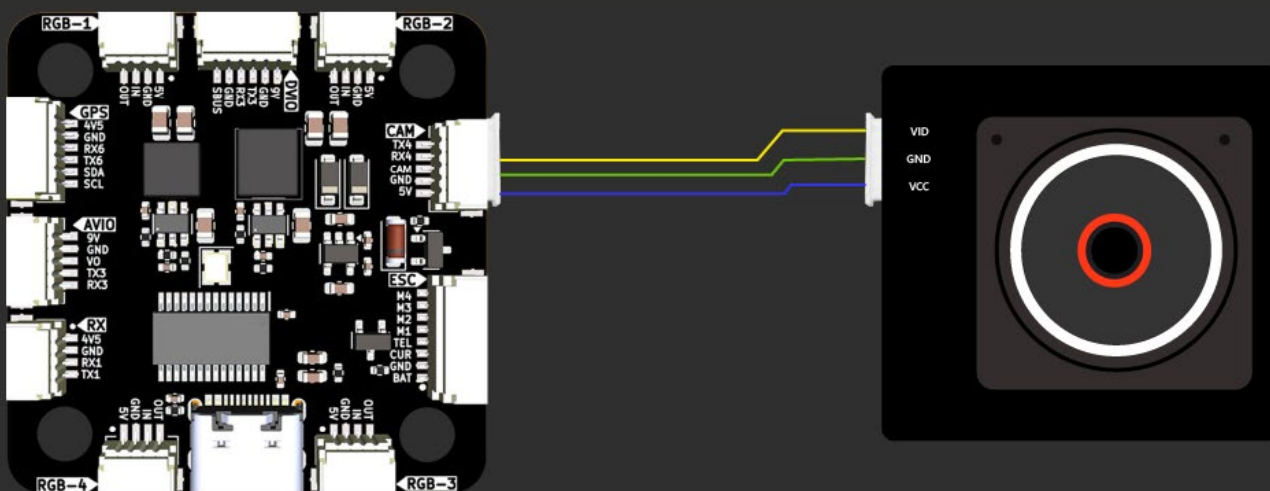
LED Strip Connections in parallel



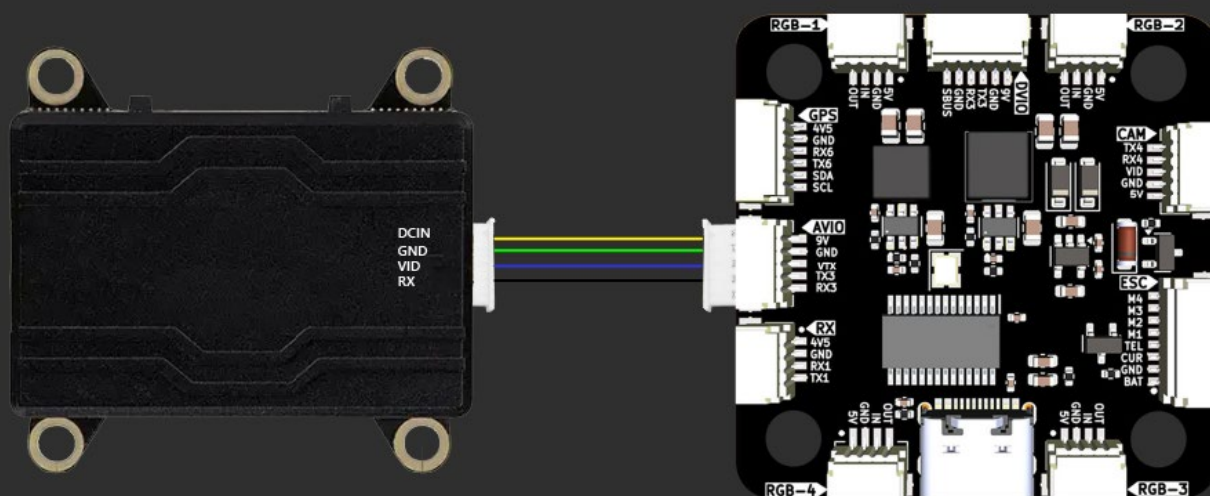
LED Strip Connections in series



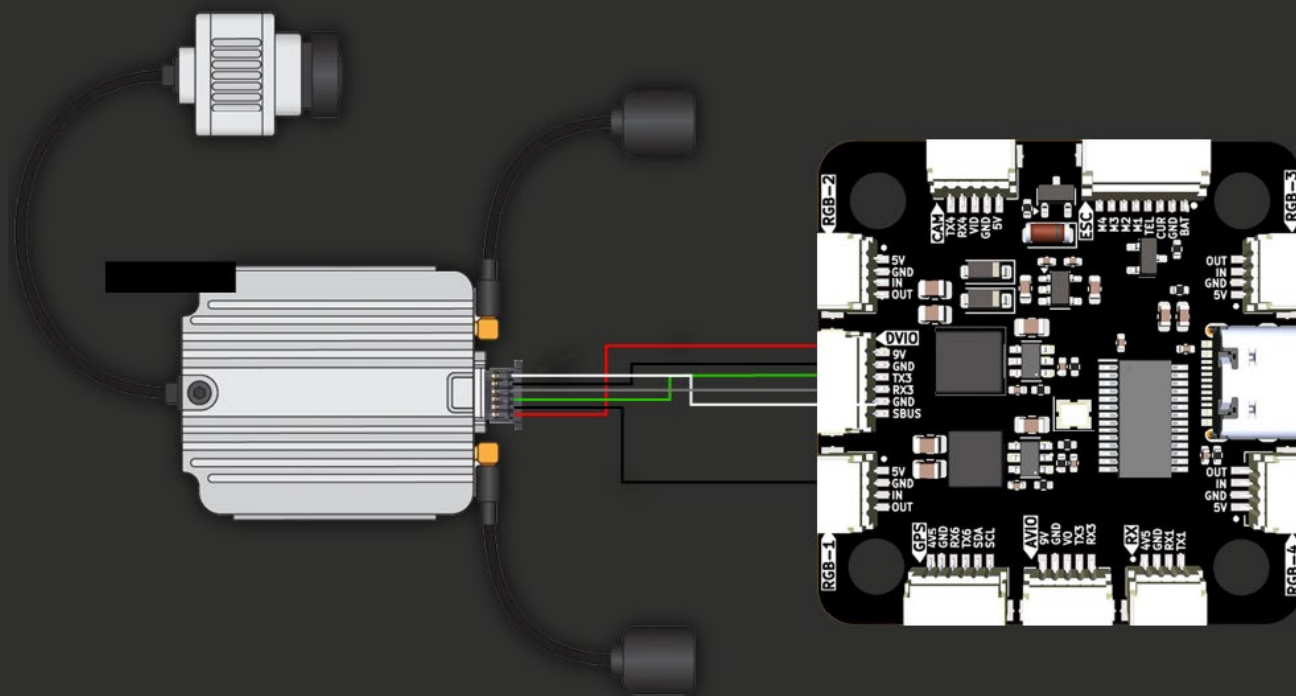
FC-ESC



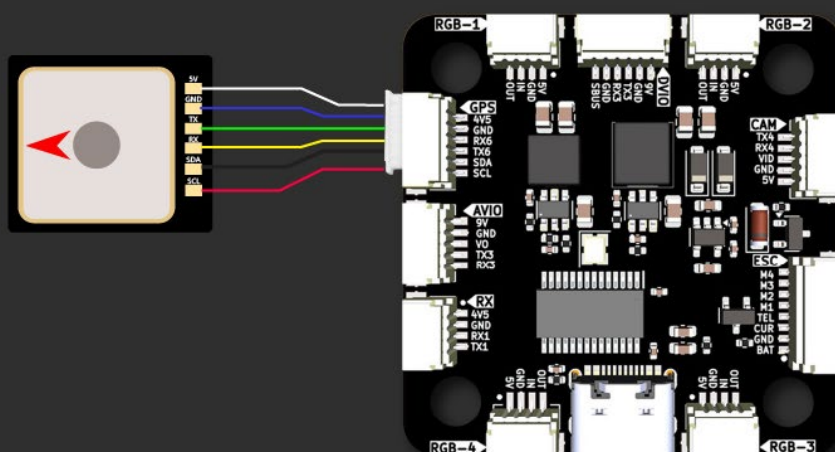
FC-CAM



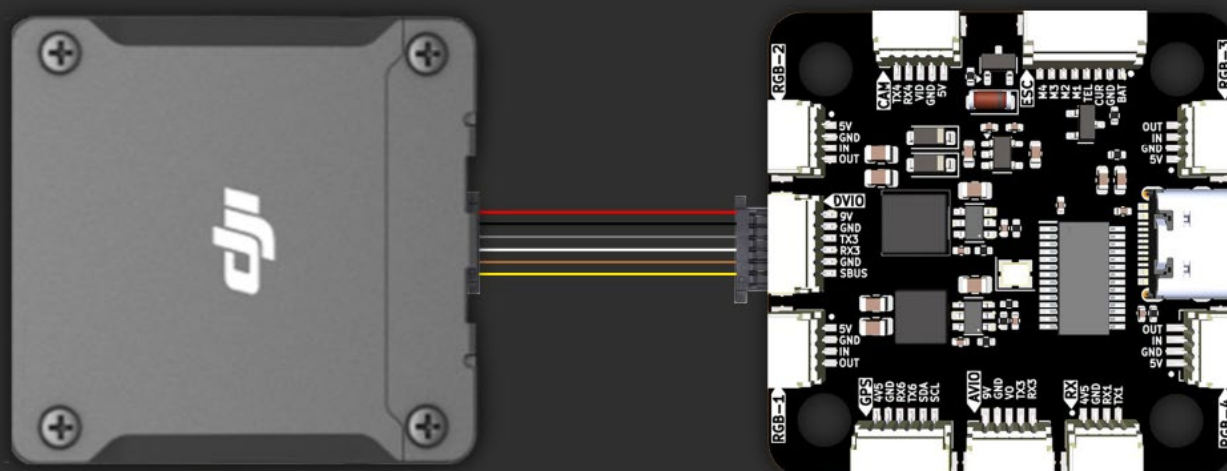
VTX-FC



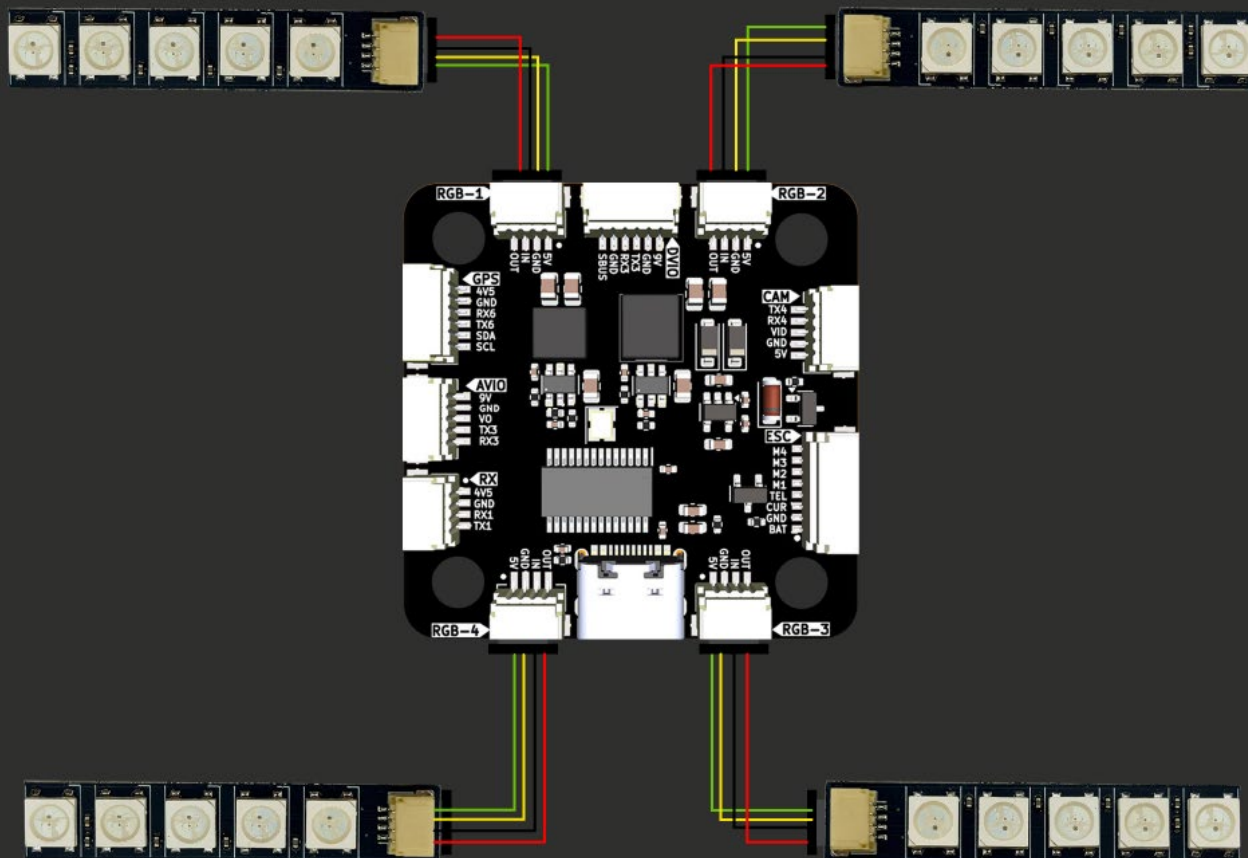
DJI AirUnit



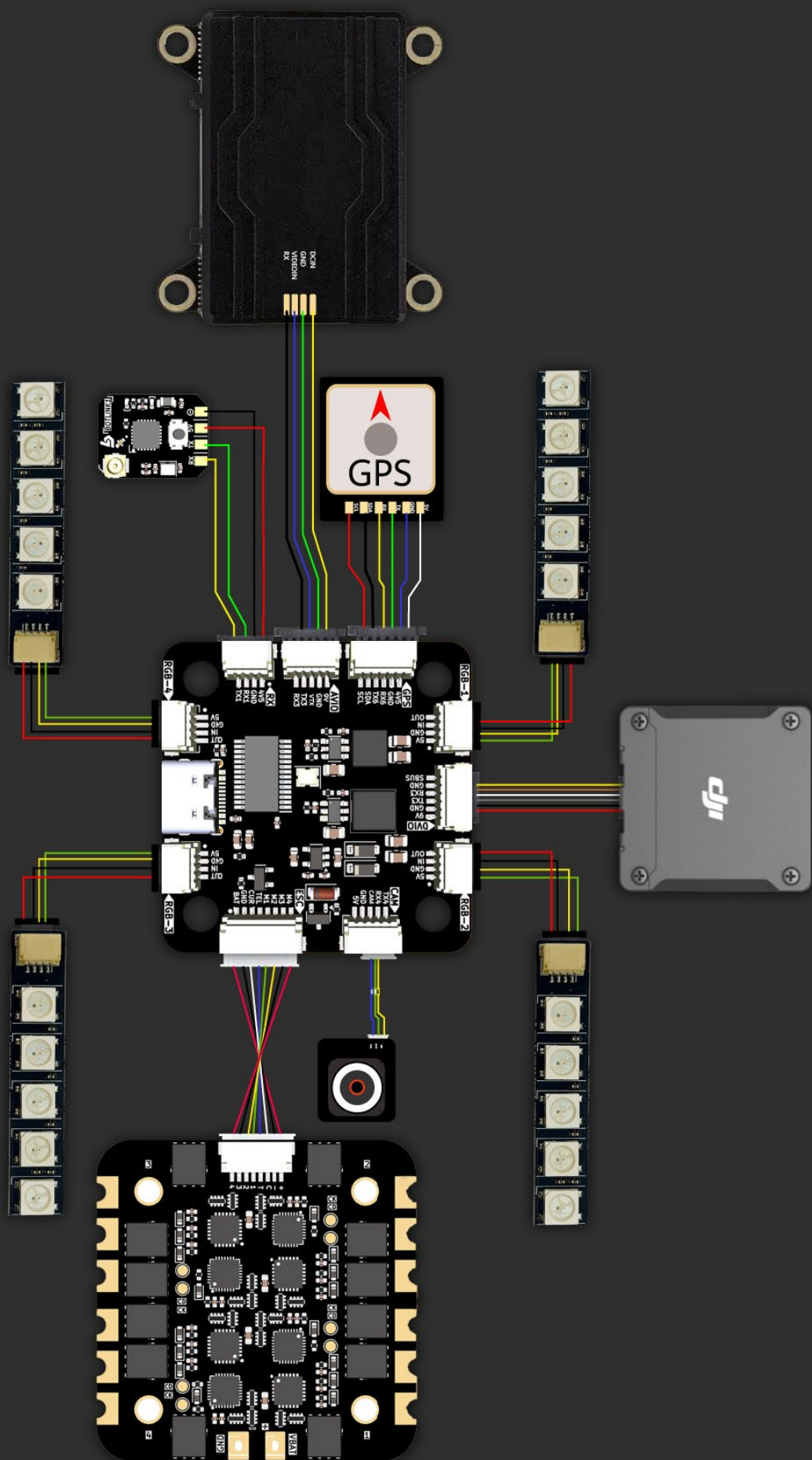
GPS-FC



DJIO3



FC-4pin LED's



LED Indication

RED LED	5V and 3.3V
Blue LED	Status LED 1
Green LED	Status LED 2

LED Connection Options:

You can connect LEDs to the F405 flight controller in two ways:

1. Solder Pads: Use the dedicated 5V, GND, and Signal pads on the board.
2. 4-Pin Connector: Use the 4-pin LED connector which includes: 5V, GND, Signal In, and Signal Out.

Daisy Chain Functionality

1. By default, the LED connectors are daisy-chained, allowing each connector to control a separate LED strip independently.
2. If you want all connectors to control standard LEDs in parallel (same signal to all strips), follow these steps:

Parallel LED Setup Instructions

1. Cut the Signal Out wire on all connectors except the first one.
2. Bridge the small pad next to the signal pad on the flight controller for each modified connector.
3. This reroutes all connectors to share the same signal line from the first connector, enabling synchronized LED behavior.

Note: Perform this modification only on three connectors. The first connector already supplies the master signal.

Avoid Sbus or RX use with DJI or Vice versa

When integrating an ExpressLRS (ELRS) receiver with a DJI Air Unit (such as the O3, Link, Vista, or Air Unit V1), it's crucial to manage the SBUS connections to prevent UART conflicts that can disrupt receiver functionality.

The DJI Air Unit's 6-pin connector includes an SBUS (or DJI HDL) wire, typically yellow, intended for use with DJI's own remote controllers. If you're utilizing an ELRS receiver instead of a DJI remote, this SBUS wire becomes redundant and can interfere with the ELRS receiver's operation by causing signal conflicts on the flight controller's UART. (Oscar Liang)

To resolve this, carefully remove the SBUS wire from the DJI Air Unit's connector. Use a fine tool, like a needle or tweezers, to gently lift the plastic tab securing the wire and slide it out of the connector. Once removed, insulate the exposed end with heat shrink tubing or electrical tape to prevent any potential short circuits. (Oscar Liang)

After disconnecting the SBUS wire, connect your ELRS receiver to an available UART on the flight controller, ensuring proper wiring of the TX and RX lines. In your flight controller's configuration software (such as Betaflight), enable the corresponding UART for serial RX and set the receiver protocol to CRSF, which is compatible with ELRS.

By removing the unnecessary SBUS connection from the DJI Air Unit, you eliminate potential signal conflicts, allowing your ELRS receiver to function correctly and ensuring reliable control of your drone.

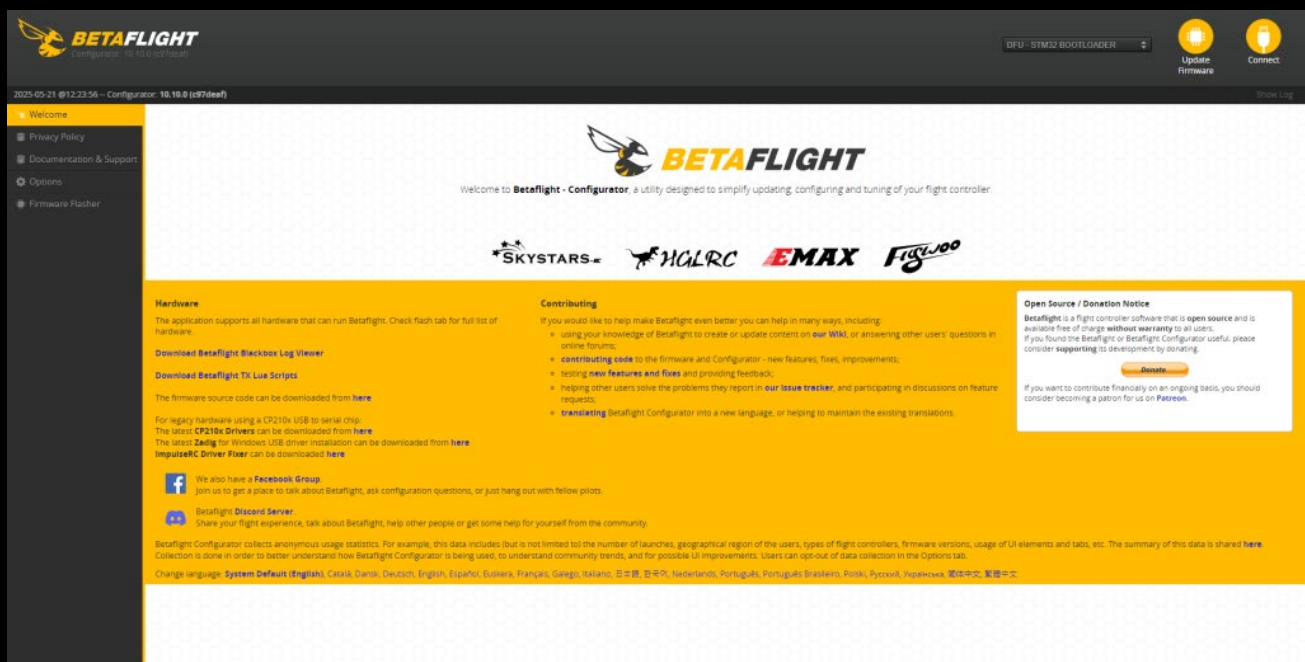
Firmware Flashing

Step 1: Install Betaflight configurator

1. Download the latest version of Betaflight Configurator from the official [Betaflight GitHub repository](#).
2. Install the appropriate version based on your operating system (Windows, macOS, or Linux).

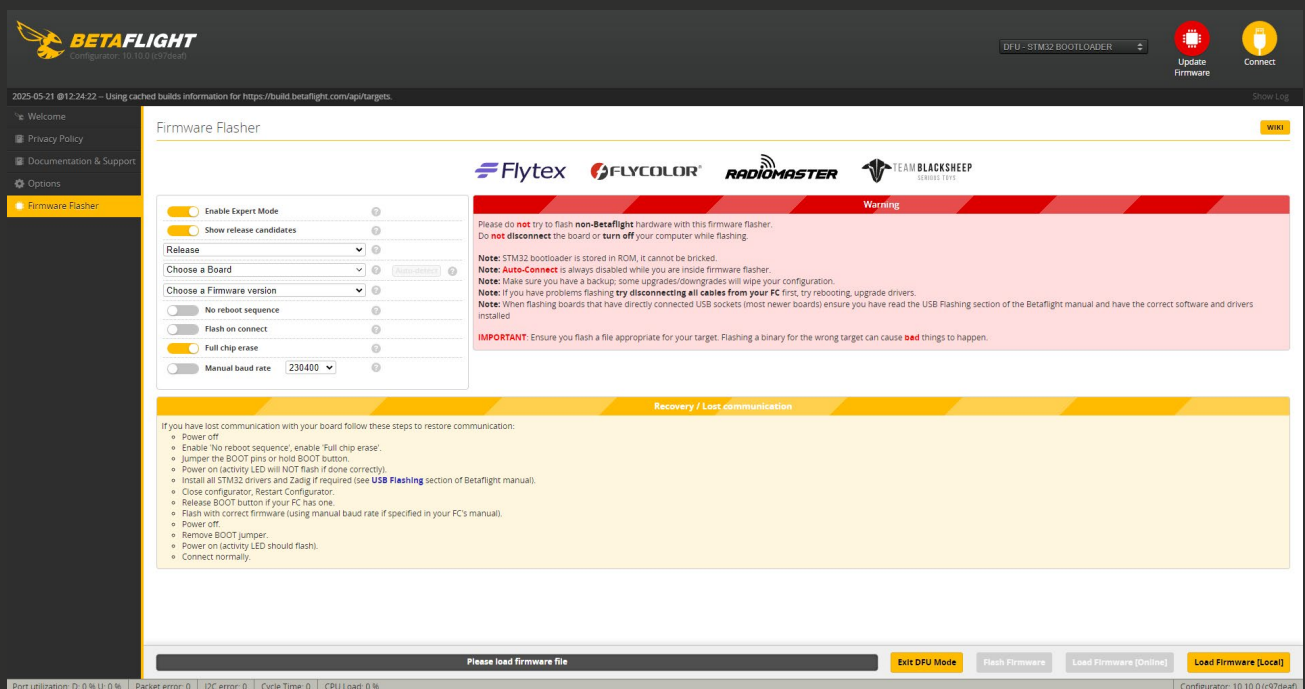
Step 2: Connect the Flight Controller

1. Use a USB Type-C cable to connect your Botwing F405 flight controller to your computer.
2. Launch the Betaflight Configurator on your system



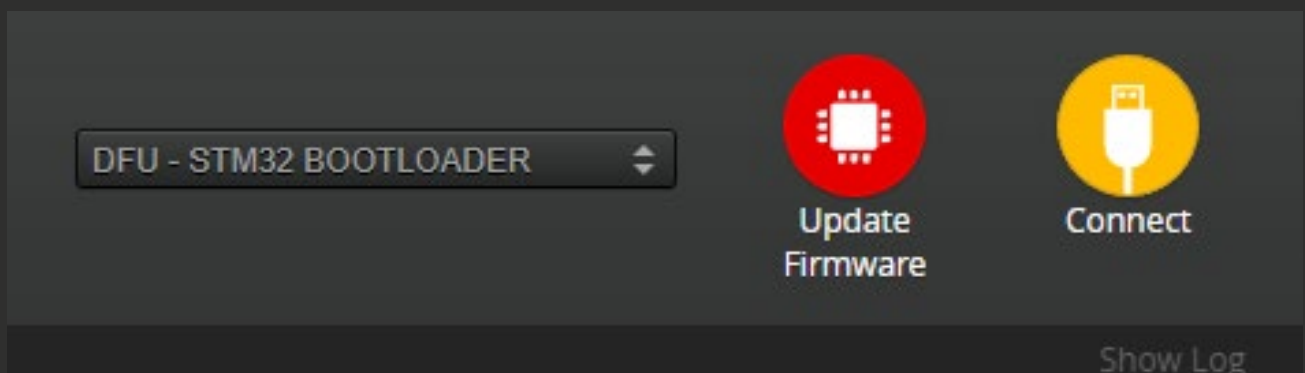
Step 3: Enter Bootloader (DFU) Mode

1. Locate the BOOT button on the Botwing F405 flight controller.
2. Press and hold the BOOT button, then connect the USB cable to power the board.
3. The flight controller will enter DFU mode.



Step 4: Confirm DFU Mode in Betaflight

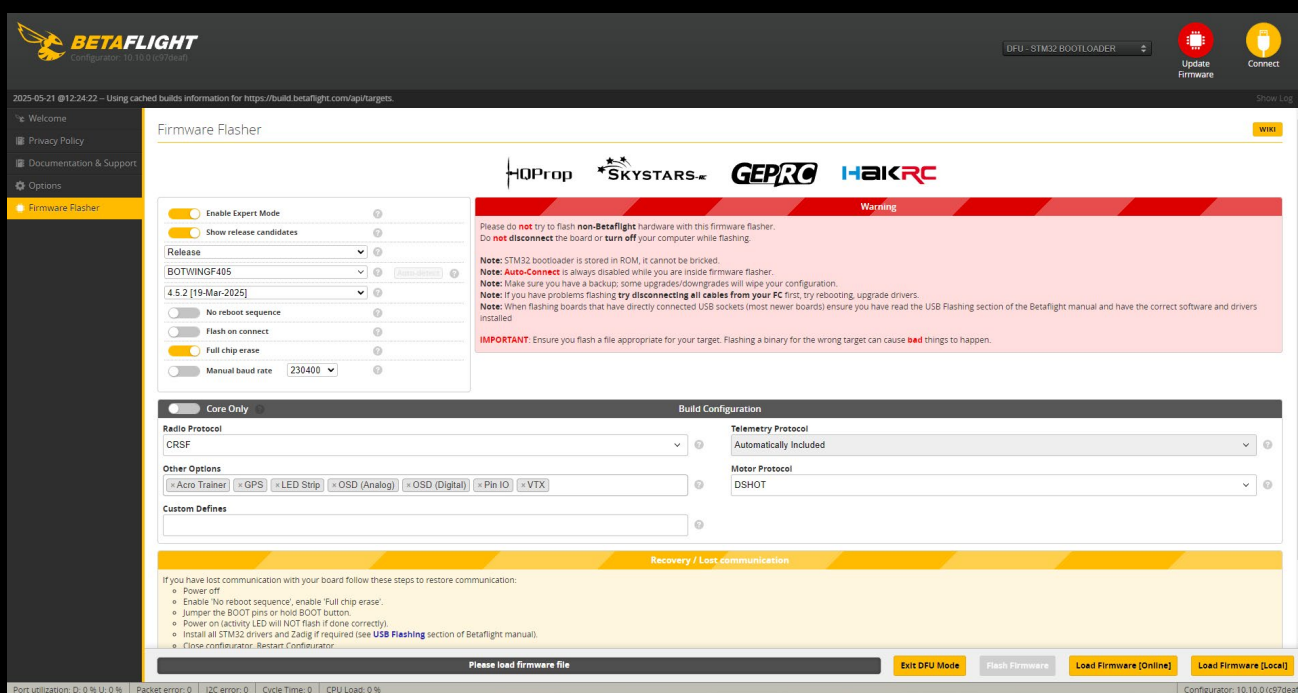
1. In Betaflight Configurator, go to the " Manual Bootloader (DFU)" option under the "Ports" section.



2. Ensure that the flight controller is detected in DFU mode — “DFU” will appear in the top-right status bar.

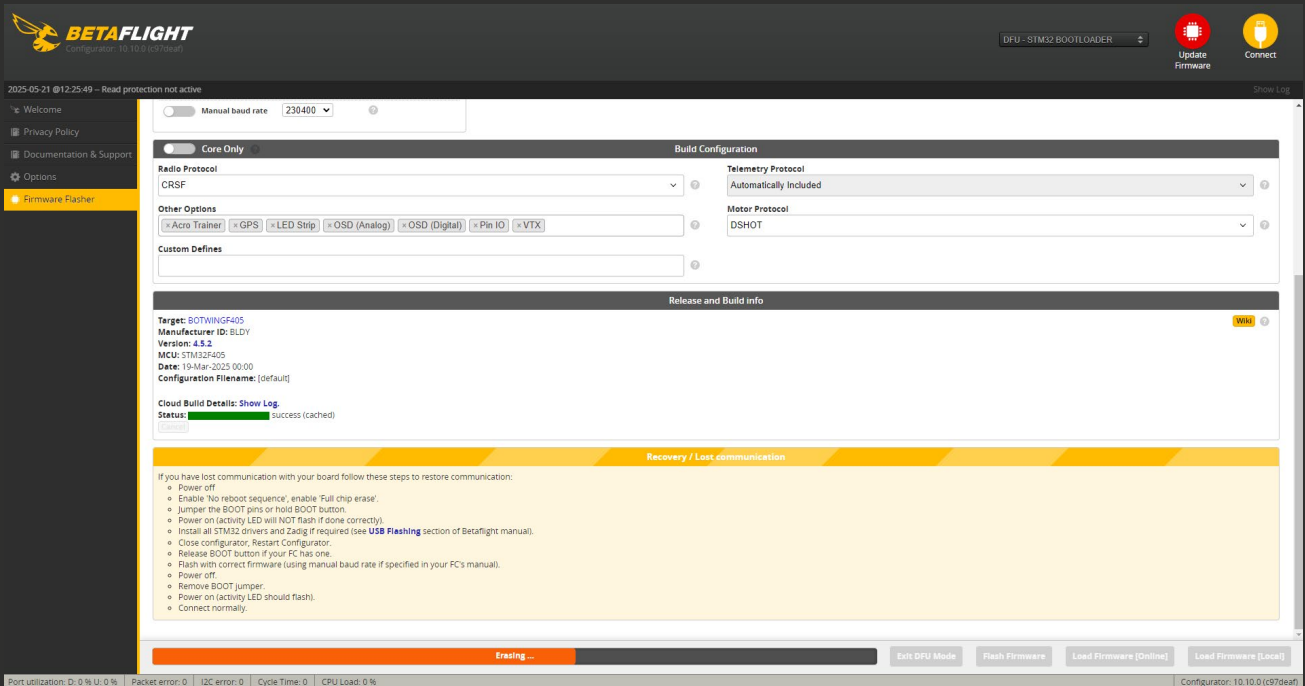
Step 5: Load Firmware

1. Navigate to the “Firmware Flasher” tab.
2. Under “Choose a board”, select Botwing F405.
3. Choose the desired firmware version from the dropdown under “Firmware Flasher” tab in Betaflight configurator.
4. Enable “Full chip erase” to ensure a clean install.
5. Click:
 - Load Firmware (Online)” to download the firmware from the internet, or
 - Load Firmware 9 (Local)” if you already have the firmware file.



Step 6: Flash Firmware

1. Click "Flash Firmware" to begin the installation process.
2. A progress bar will indicate flashing status.
3. Once complete, a success message will appear.



Step 7: Reconnect and configure

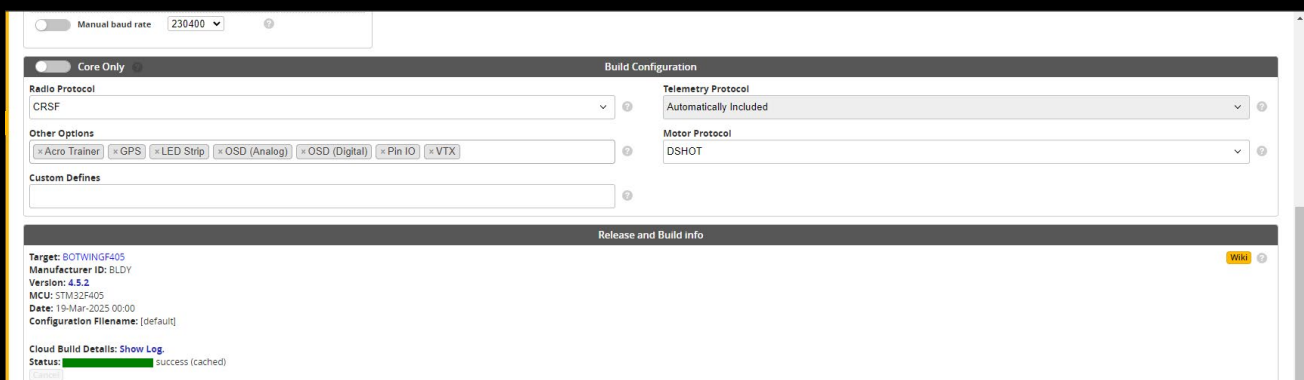
1. After flashing, disconnect and reconnect the USB cable to reboot the flight controller.
2. Betaflight Configurator should now detect the Botwing F405.
3. Proceed with the initial setup and configuration.

Step 8: Verify Firmware Installation

1. Go to the "Setup" tab in Betaflight.
2. Confirm the firmware version and verify that all sensors and peripherals are functioning correctly.

Important Instructions When Installing Betaflight Firmware:

1. Select the correct receiver protocol during firmware flashing (e.g., CRSF, SBUS, etc.).
2. Ensure the corresponding radio firmware (on both receiver and transmitter) is correctly installed and up to date.
3. Using the wrong protocol or outdated firmware can result in communication failure between the flight controller and your radio.
4. Always double-check protocol compatibility before flashing to avoid setup issues.



Connecting the Video Transmitter (VTX):

You can connect your VTX using either of the following methods:

1. Connection options:

- Connector Method: Plug the video transmitter into the designated connector on the BotWing F405 flight controller.
- Soldering Method: Solder the VTX power wires directly to the appropriate pads: 9V, Ground, and Signal.

Using USB Breakout Pads for Extended USB Connectivity

In scenarios where the onboard USB connector is damaged or inaccessible - such as in large drone builds - the Botwing F405 flight controller provides USB breakout pads as an alternative interface for connecting to a computer.

How to use USB Breakout Pads:

1. Locate the USB Breakout Pads:

- The Botwing F405 includes clearly marked USB breakout pads on the board.

2. Connecting to USB Breakout Pads:

- Soldering: Carefully solder the USB cable wires to the corresponding pads:
 - D+ and D- : USB data lines
 - 5V: Power supply line.
 - GND: Ground line.

3. Using the Extended USB connection:

- Once soldering is complete, you can use the extended USB connection to interface with your computer, functioning the same as the onboard USB port.
- This enables full access to the Betaflight Configurator for firmware flashing and configuration tasks.

Important Guidelines

- Ensure precise and secure soldering to prevent short circuits or connection issues.
- Double-check all wire connections to the breakout pads before powering the board, as incorrect wiring can damage the flight controller or connected devices.

Let's Connect

Please visit the botlabdynamics.store for manuals and support.