BETAFPV 2-3S 20A FC

BETAFPV F4 2-3S 20A Brushless Flight Controller User Manual

Model: F4 2-3S 20A AIO FC V1

1. Introduction

This manual provides detailed instructions for the installation, configuration, and operation of the BETAFPV F4 2-3S 20A AIO Brushless Flight Controller. Please read this manual thoroughly before using the product to ensure proper functionality and safety.

2. Product Overview

The BETAFPV F4 2-3S 20A AIO Flight Controller is an integrated solution designed for HD digital quadcopters, such as the Pavo Pico and Pavo20. It combines a powerful F4 flight controller with a 20A ESC, offering robust performance for 2-3S setups.

- Features a dual 9V@2A BEC for DJI O3 and 5V@3A for external devices.
- Includes a new DJI O3 6-pin PMU for simplified installation without soldering.
- Improved control with a 20A ESC featuring a single NMOS for continuous current capability.
- Offers additional UART TX3 and RX3 ports for connecting external devices.

Figure 2.1: BETAFPV F4 2-3S 20A AIO Flight Controller with key features highlighted, including BEC, FC MCU, PMU, IMU, Onboard RX, and ESC.

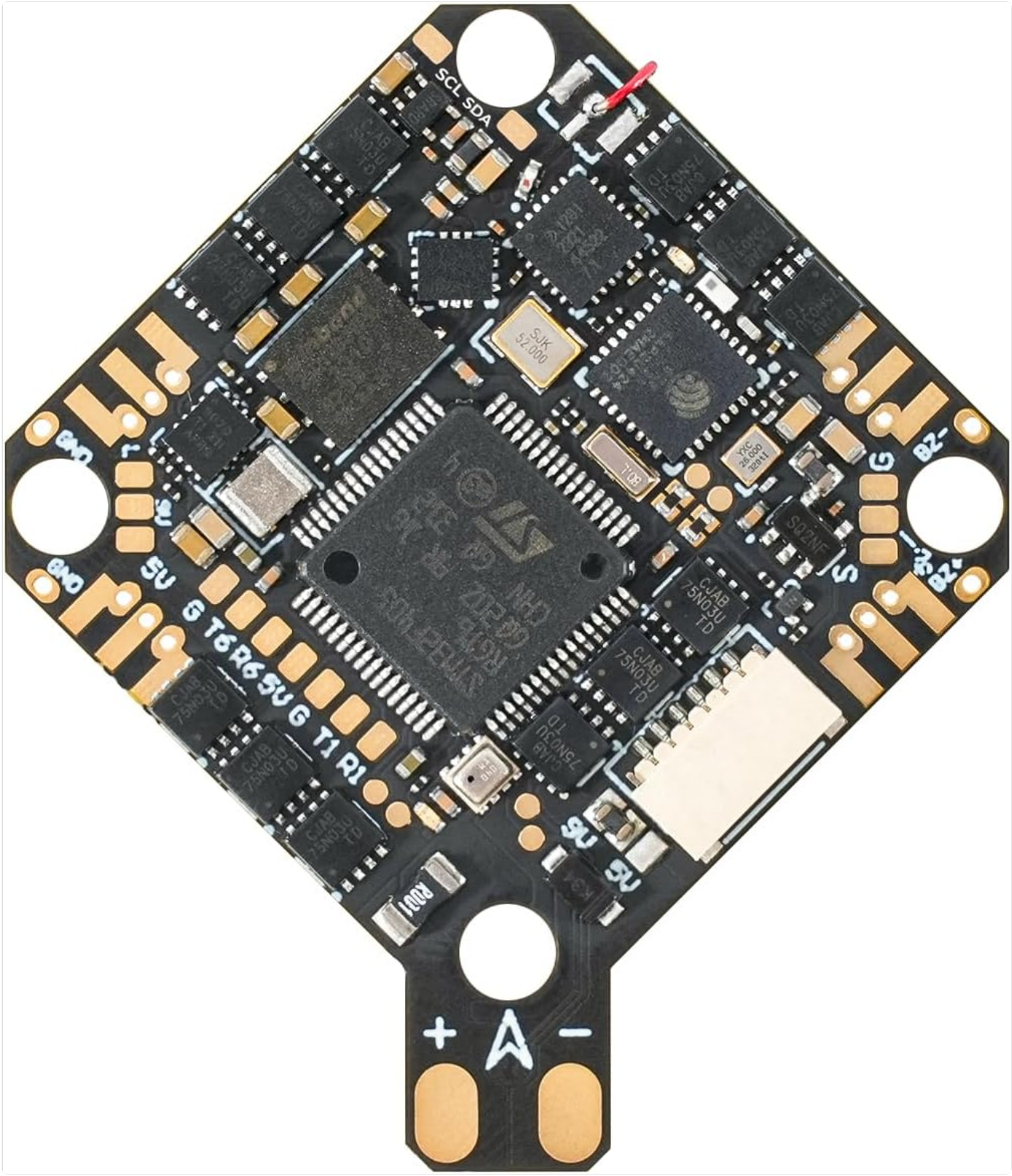

Figure 2.2: Top view of the BETAFPV F4 2-3S 20A AIO Flight Controller, showcasing its compact design and component layout.

3. Specifications

Component/Feature	Detail
Model	F4 2-3S 20A AIO V1 Brsushless Flight Controller
Weight	5.58g (without motor connectors and power cable), 5.92g (with motor connectors)
Mounting Hole Size	26mm x 26mm

Component/Feature	Detail
CPU	STM32F405RGT6 (168MHz)
Six-Axis Gyro/Accelerometer	ICM42688P (SPI connection)
Onboard Receiver	Serial ELRS 2.4G Receiver (Firmware: BETAFPV AIO 2400 RX ELRS V2.5.2)
Blackbox Memory	16MB
Sensors	Barometer (BMP280), Voltage & Current
5V BEC	5V 3A@8V supply
9V BEC	9V 2A@8V supply
USB Port	SH1.0 4-Pin
ESC Continuous Current	20A
ESC Peak Current	25A
ESC Input Voltage	2-3S
FC Firmware	Betaflight_4.4.1_BETAFPVF405
ESC Firmware	C_X_70_48_V0.19.2.hex for BB51 Bluejay hardware
Signal Support	D-shot300, D-shot600

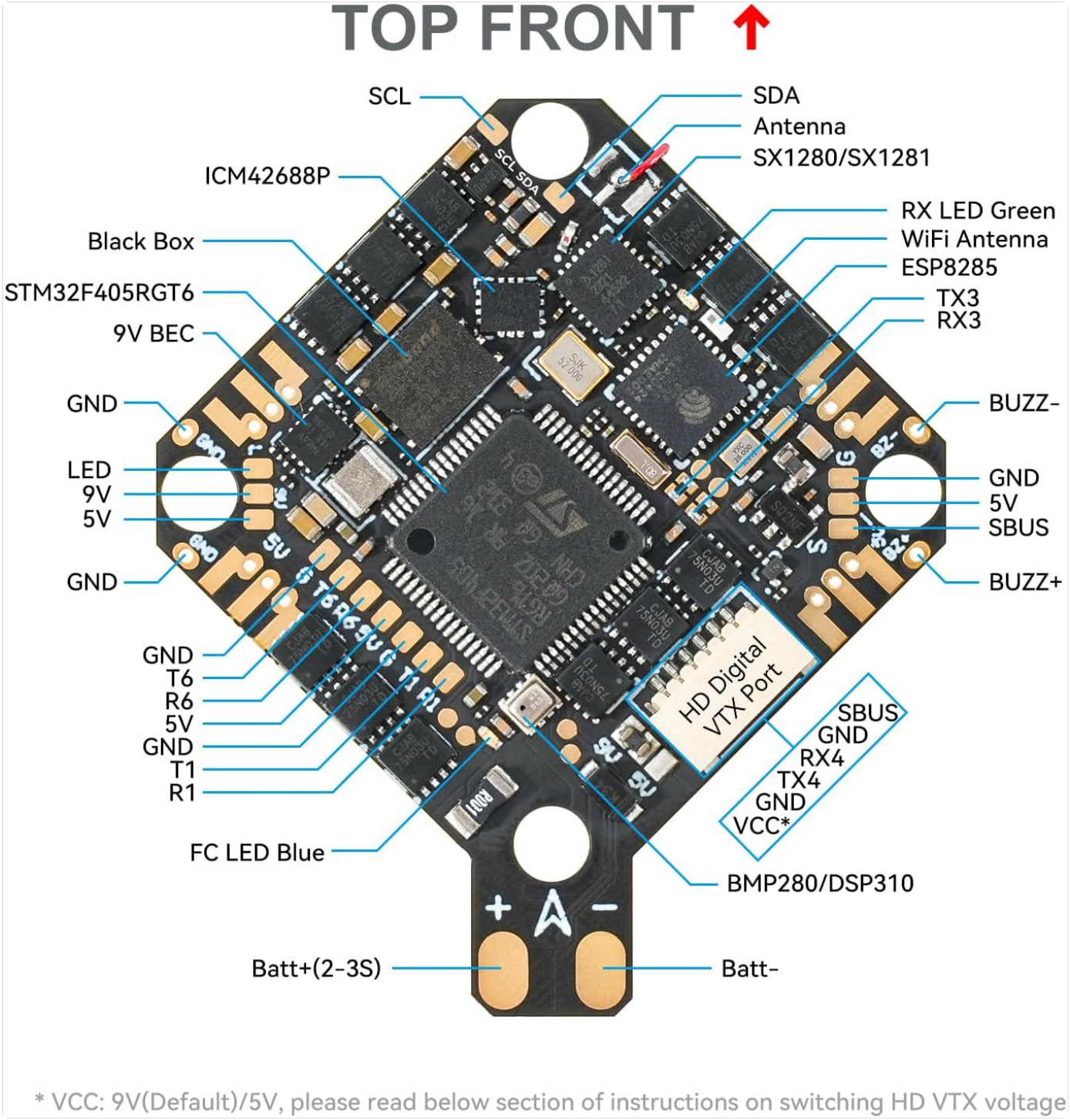

Figure 3.1: Top Front Pinout Diagram, detailing connections for SCL, SDA, Antenna, Black Box, BEC, GND, LED, SBUS, and Battery.

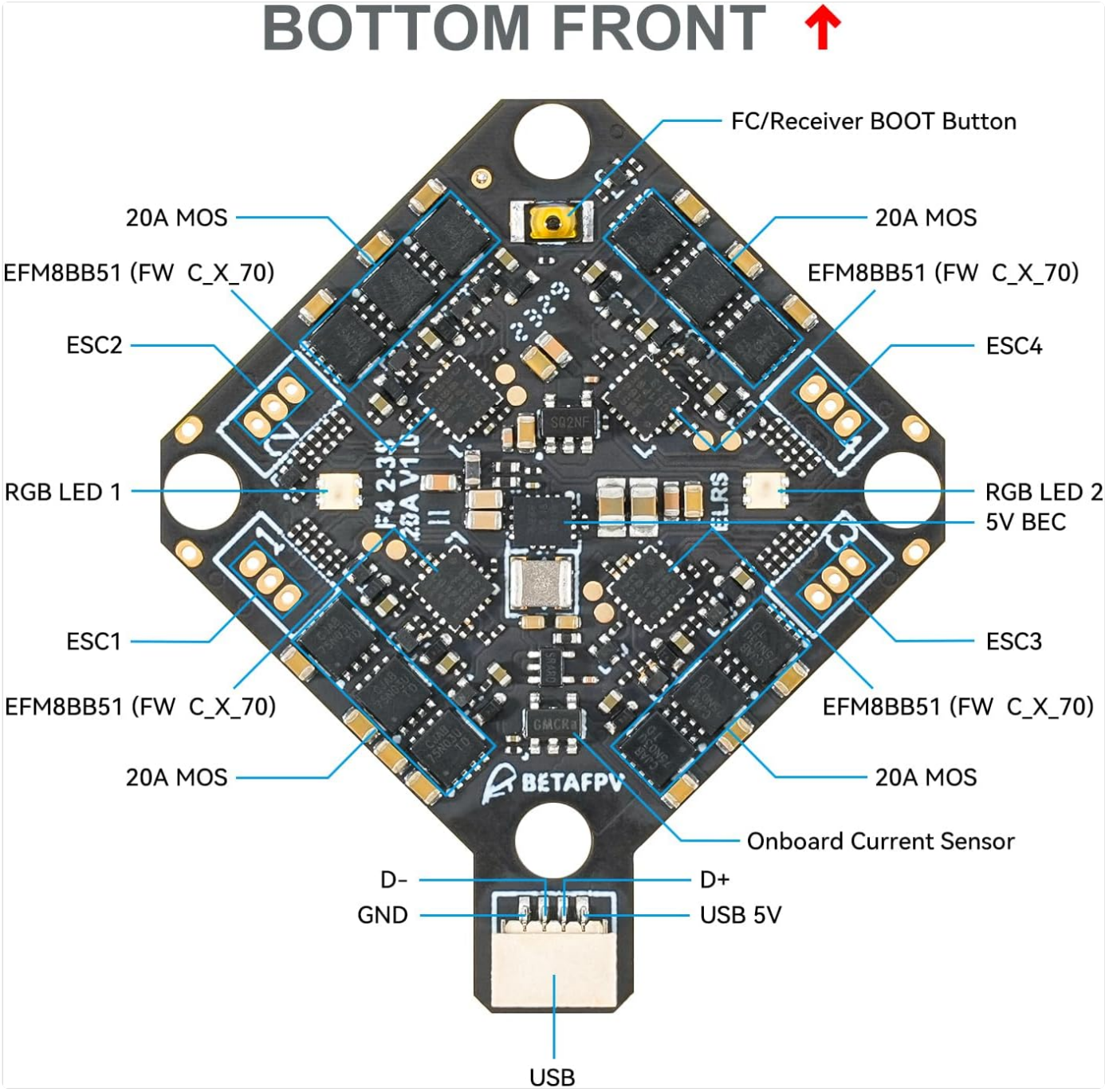

Figure 3.2: Bottom Front Pinout Diagram, showing ESC connections, RGB LEDs, Onboard Current Sensor, and USB port.

Figure 3.3: The flight controller on a digital scale, indicating its lightweight design at 5.58 grams.

4. What's in the Box

The package for the F4 2-3S 20A AIO FC V1 includes the following components:

- 1 * F4 2-3S 20A AIO FC V1
- 4 * M2*10 Machine Screw
- 4 * M2*10 Nylon Screw
- 4 * M2 Nuts
- 4 * Shock Absorbing Ball
- 4 * JST1.25mm Angle Socket
- 4 * JST1.25mm Straight Socket
- 1 * SH1.0 4Pin Adapter Cable
- 1 * Type-C to SH1.0 Adapter
- 1 * XT30 Power Cord
- 1 * Filter Capacitor
- 1 * 30mm Double-head VTX connector wire
- 1 * 60mm Single-head VTX connector wire

Figure 4.1: All components included in the BETAFPV F4 2-3S 20A AIO Flight Controller package, laid out for inspection.

5. Setup

5.1 Wiring and Connections

Careful wiring is essential for proper function. Refer to the pinout diagrams and connection instructions below.

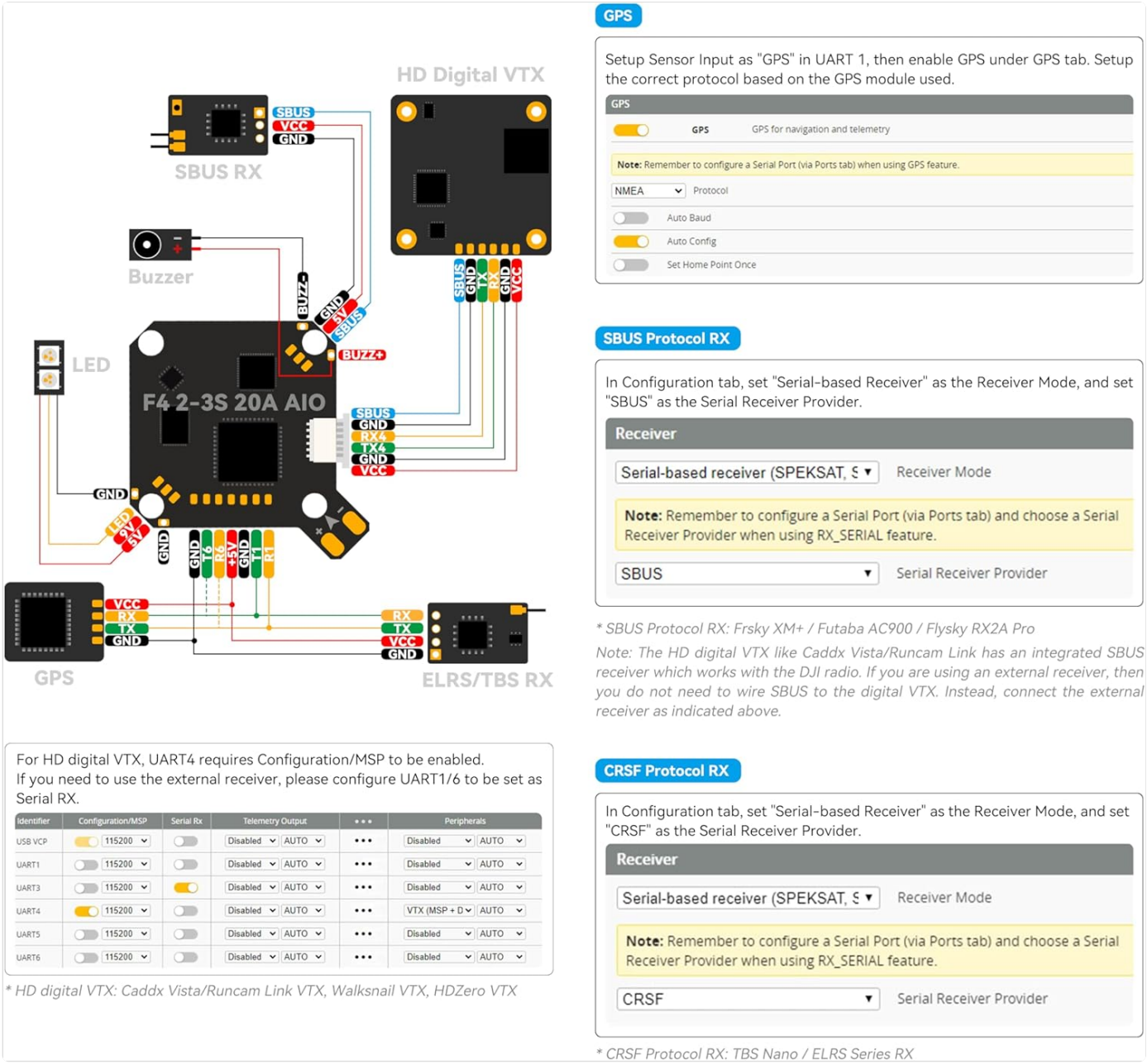

Figure 5.1: Detailed wiring diagram illustrating connections for GPS, SBUS, CRSF, HD Digital VTX, Buzzer, and LED.

SBUS Receiver Connection

If using an SBUS receiver, connect it to **UART5**. In Betaflight, configure the serial port for the SBUS receiver under the Ports tab and set 'Serial Receiver' as the Receiver Mode.

HD Digital VTX Voltage Selection

The default voltage for the HD VTX connector is 9V. If you are using WalkSnail Avatar HD mini 1s or lite, you will need to solder the chip bead from the 9V position to the 5V position to provide 5V power.

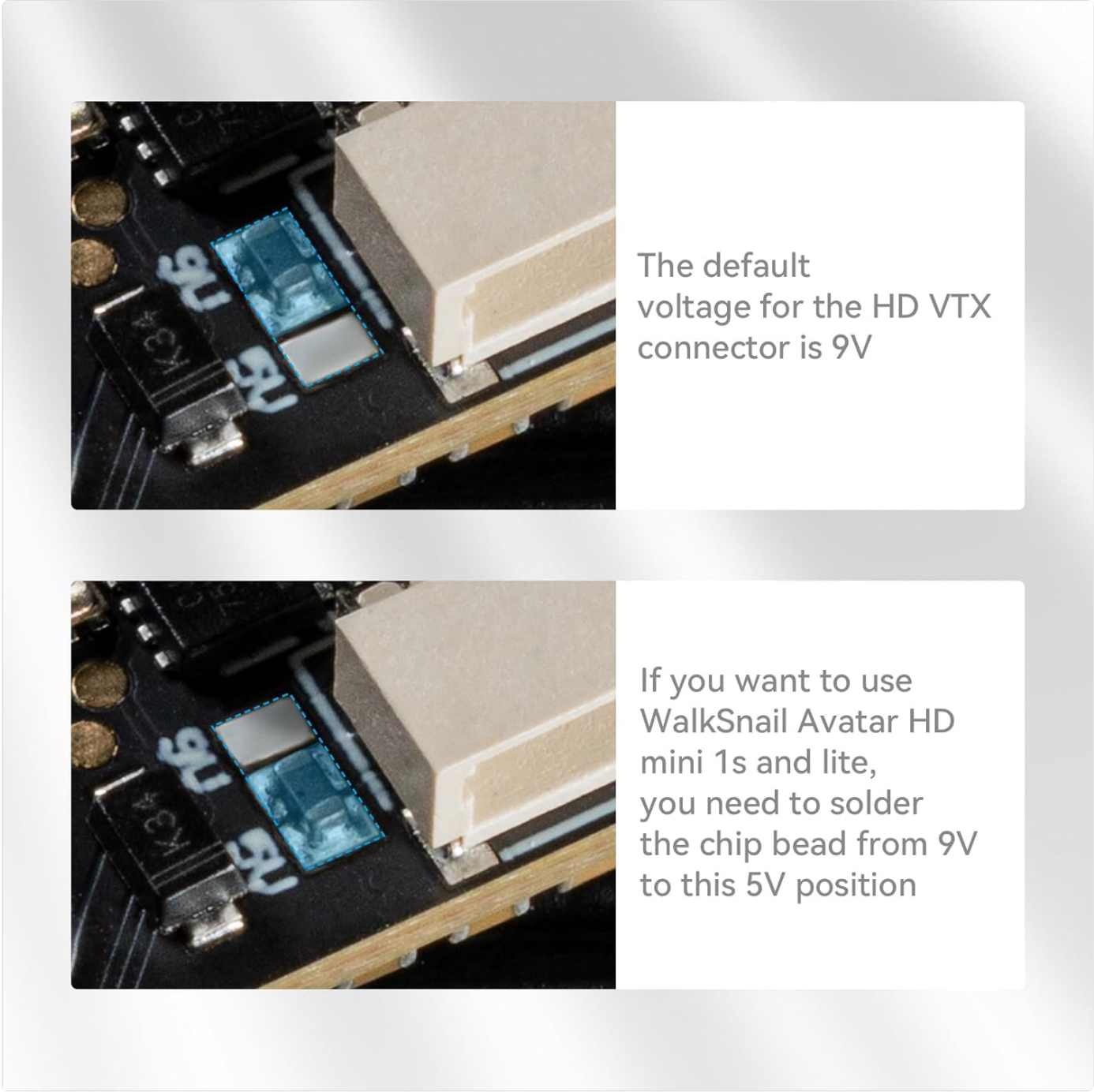

Figure 5.2: Instructions for switching the HD VTX voltage from the default 9V to 5V by resoldering a chip bead, necessary for specific VTX models.

UART3 Configuration

To enable UART3 for external devices, you may need to remove a specific resistor and/or chip bead on the flight controller. Refer to the diagram for the exact location.

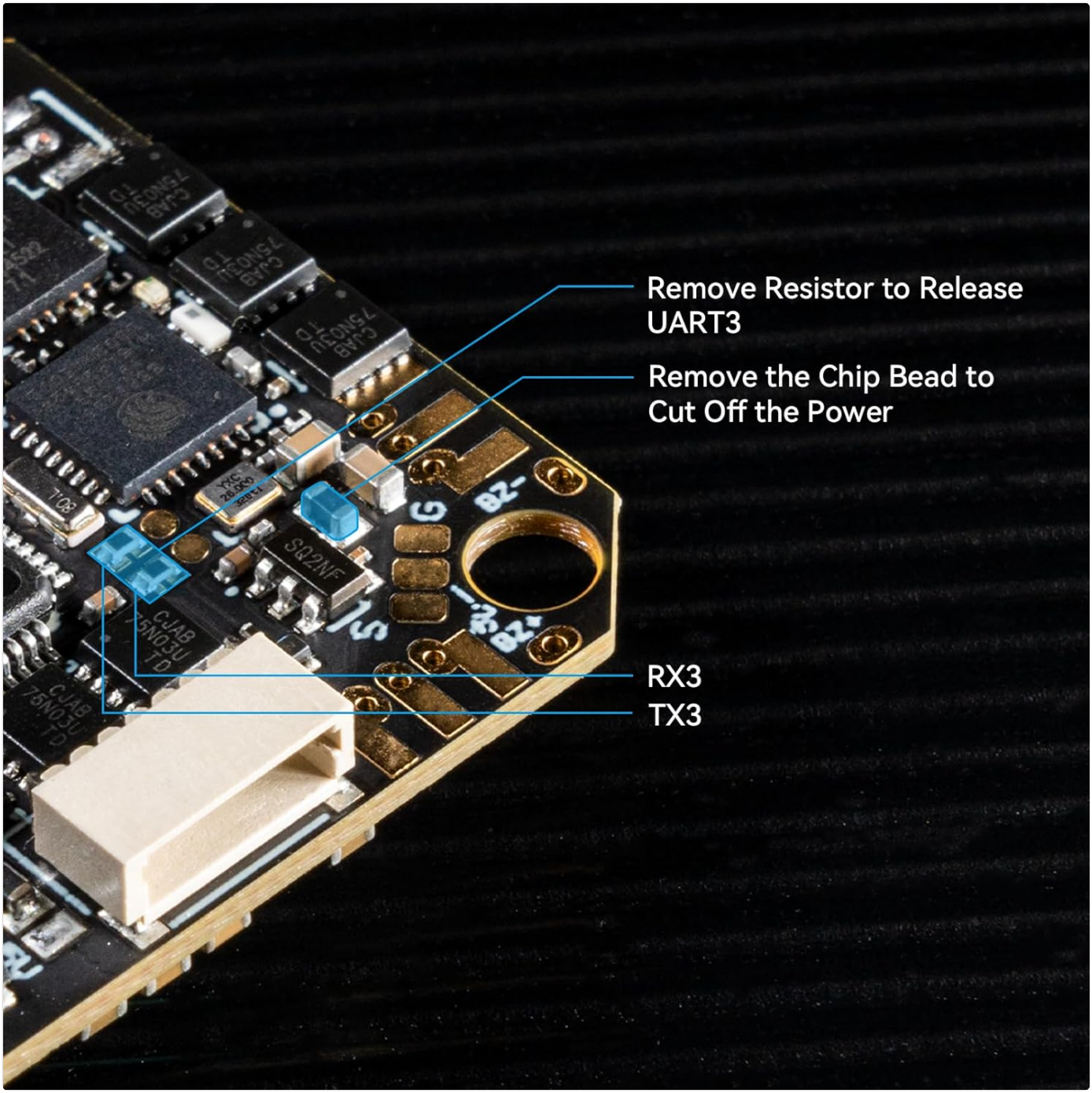

Figure 5.3: Close-up view indicating the resistor to remove to release UART3 and the chip bead to cut off power, enabling additional connectivity.

5.2 Firmware Flashing

The flight controller comes pre-flashed with Betaflight_4.4.1_BETAFPVF405 firmware. The ESC uses C_X_70_48_V0.19.2.hex for BB51 Bluejay hardware. For updates or re-flashing, use the Betaflight Configurator and Bluejay Configurator respectively. Ensure you select the correct target for your board.

6. Operating

Once the flight controller is correctly wired and configured in Betaflight, you can proceed with operating your quadcopter. Ensure all settings, including motor direction, PID tuning, and receiver protocols, are correctly set for your specific drone build.

- **Pre-Flight Checks:** Always perform a thorough pre-flight check, including verifying battery voltage, motor spin direction, and control surface response.
- **Arming:** Arm the quadcopter only when it is on a stable, level surface and clear of any obstructions.
- **Flight Modes:** Configure desired flight modes (e.g., Acro, Angle, Horizon) in Betaflight and assign them to your radio switches.

7. Maintenance

Regular maintenance helps ensure the longevity and reliability of your flight controller.

- **Inspection:** Periodically inspect the board for any signs of physical damage, loose connections, or solder joint issues.
- **Cleaning:** Gently clean the board with a soft brush or compressed air to remove dust and debris. Avoid using liquids directly on the electronics.
- **Storage:** Store the flight controller in a dry, anti-static environment when not in use.

8. Troubleshooting

If you encounter issues with your BETAFPV F4 2-3S 20A AIO Flight Controller, consider the following troubleshooting steps:

Problem	Possible Cause / Solution
Flight controller does not power on.	Check power connections (XT30, battery). Ensure correct voltage (2-3S). Inspect for short circuits.
Motors not spinning / ESC issues.	Verify ESC calibration and settings in Betaflight. Check motor connections. Ensure ESC firmware is correct and up-to-date. Inspect for burnt components on the ESC section.
Receiver not detected.	Confirm receiver is correctly wired to UART5. Check Betaflight Ports tab for serial RX enablement. Ensure receiver protocol (e.g., SBUS, CRSF) is correctly selected in Betaflight Configuration tab.
No video signal from HD VTX.	Check VTX power connection and voltage selection (9V/5V). Ensure VTX is properly connected to the HD Digital VTX Port.
Unstable flight / erratic behavior.	Check for vibrations affecting the gyro. Verify PID tuning settings. Ensure propellers are balanced and undamaged. Re-flash Betaflight firmware if necessary.

9. Warranty and Support

For specific warranty terms and conditions, please refer to the official BETAFPV website or contact their customer support directly. Keep your proof of purchase for any warranty claims.
For further assistance, technical support, or to explore other BETAFPV products, please visit the official BETAFPV store:

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