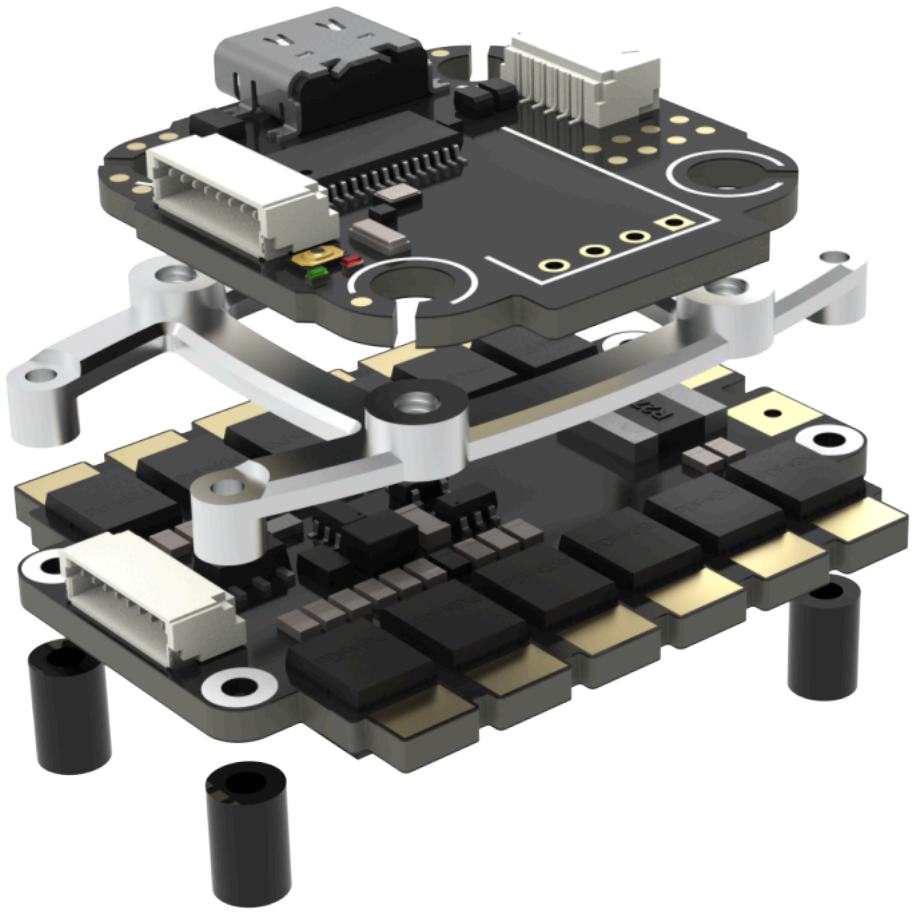
# TBS LUCID

*FC, ESC and Accessory series*



TBS LUCID flight stack

Rev 1.08

# Contents

# 1. General

## 1.1. Support

If you got any question left after reading this manual, have a look at the TBS FAQ.

For personal help open a ticket or check the status of your ticket.

## 1.2. TBS AGENT

Updating, configuring and managing your TBS gear is done by the TBS AGENT versions:

**TBS AGENT Desktop**

What was formally known as just *TBS AGENT* has become the TBS AGENT Desktop. Installed on your PC/Mac, allowing you to upgrade your gear and adjust it anywhere, even if you got no internet connection.(1)

It allows for the full function set like:

- Up- and Downgrading the firmware
- Configuration by USB and by WiFi (2)/ Internet (3)
- Telemetry view with live map and drone data
- Setting the User ID on the device(4)

**TBS AGENT Web**

As the AGENT Desktop, the AGENT Web includes all the same features, but can be run in your browser. Simply visit https://www.team-blacksheep.com/agentm from any Chromium based browser (e.g. Chrome, Edge etc.) and connect to your device in the same way as with AGENT Desktop.

**TBS AGENT Lite**

The successor of the CRSF-Lua script, running on your radio. It allows for full configuration your connected devices like start binding for new receivers or changing the VTX settings.

- AGENT Lite for FreedomTx/openTx
- AGENT Lite for edgeTx
- AGENT Lite for ethos

Any CRSF device can be used with the TBS AGENT(5)

---

*(1) For initial/new firmware file download to your PC/Mac, the AGENT must have a working internet connection.*
*(2) The Device must be connected to your PC/Mac by WiFi, direct or by a common hotspot*
*(3) The Device must be connected to a hotspot with working internet connection*
*(4) Only for CROSSFIRE/TRACER transmitters*
*(5) AGENT Desktop/ Web only works with TBS gear like CROSSFIRE, TRACER or FUSION*

# 2. F4 FC - Freestyle

## 2.1.

The TBS LUCID flight stack is the latest in product engineering at TBS. Built for racing and freestyle applications and developed to cater to the needs of both seasoned pilots and enthusiastic newcomers.

The F4 Flight controller is a 20x20 masterpiece built for the Lucid flight stack but compatible with all 20x20 ESCs. It is similarly designed for the TBS CROSSFIRE & TBS TRACER ecosystem but will work with any radio receiver - we don't judge :)

There are plug-and-play connectors for the DJI O3 digital system and 4in1 ESCs, following the BETAFLIGHT connector standard. The solder pads for auxiliary devices are designed and arranged to be easy to solder and logical for installation in your favorite drone frames, such as the TBS Source One.

## 2.2. Specification

| | | | |
|---|---|---|---|
| Processor:Processor: | AT32F435 | Weight: | 4.51 g |
| IMU: | ICM-42688P | Receiver: | Solder on |
| Baro: | bmp388 | DJI Airunit: | Dedicated connector |
| Input Voltage: | 3-8 S compatible | Blackbox: | Built-in, 8 MB |
| BEC Voltage: | 9V: 2.5A | OSD: | Built-in |
| | 5V: 2A | Servo Outputs | 4 (6) (2x solder point) |
| UARTs | 6 | Size/ Mounting: | 31x29 mm, 20x20 mounting, M3 |

## 2.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| BETAFLIGHT | TBS_LUCID_FC* | 4.5 |
| | TBS_LUCID_MOD_FC* | 4.5 |
| INAV | TBS_LUCID_FC | 8.0 |



**Note:** *Below the NanoRX solder pads, if you can spot a “P1” label on the PCB, the *TBS_MOD_FC* target must be used. Otherwise, use the *TBS_LUCID_FC* target.

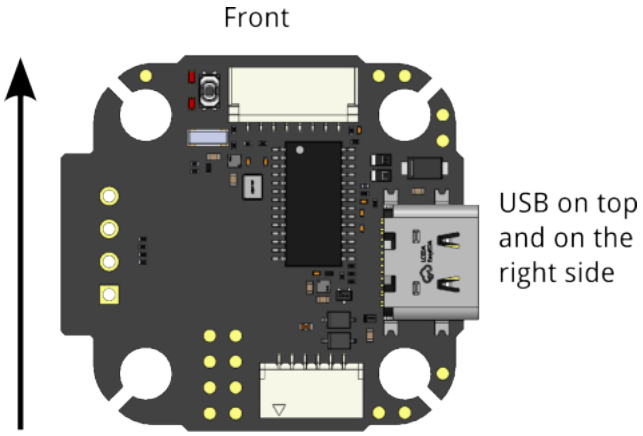
**Note:** When using INAV, TX3 and RX3 (HD Video connector) bust be swapped

## 2.4. Serial Ports

| Port | Usage | Available Pins |
|---|---|---|
| UART 1 | Spare | Full UART |
| UART 2 | ESC Telemetry | RX only |
| UART 3 | MSP, HD Video connector | Full UART |
| UART 4 | S.BUS, HD Video connector | RX only |
| UART 5 | Direct mounted Receiver | Full UART |
| UART 7 | GPS | Full UART |
| UART 8 | SmartAudio | Full UART |

## 2.5. Board Orientation

**Installation direction**

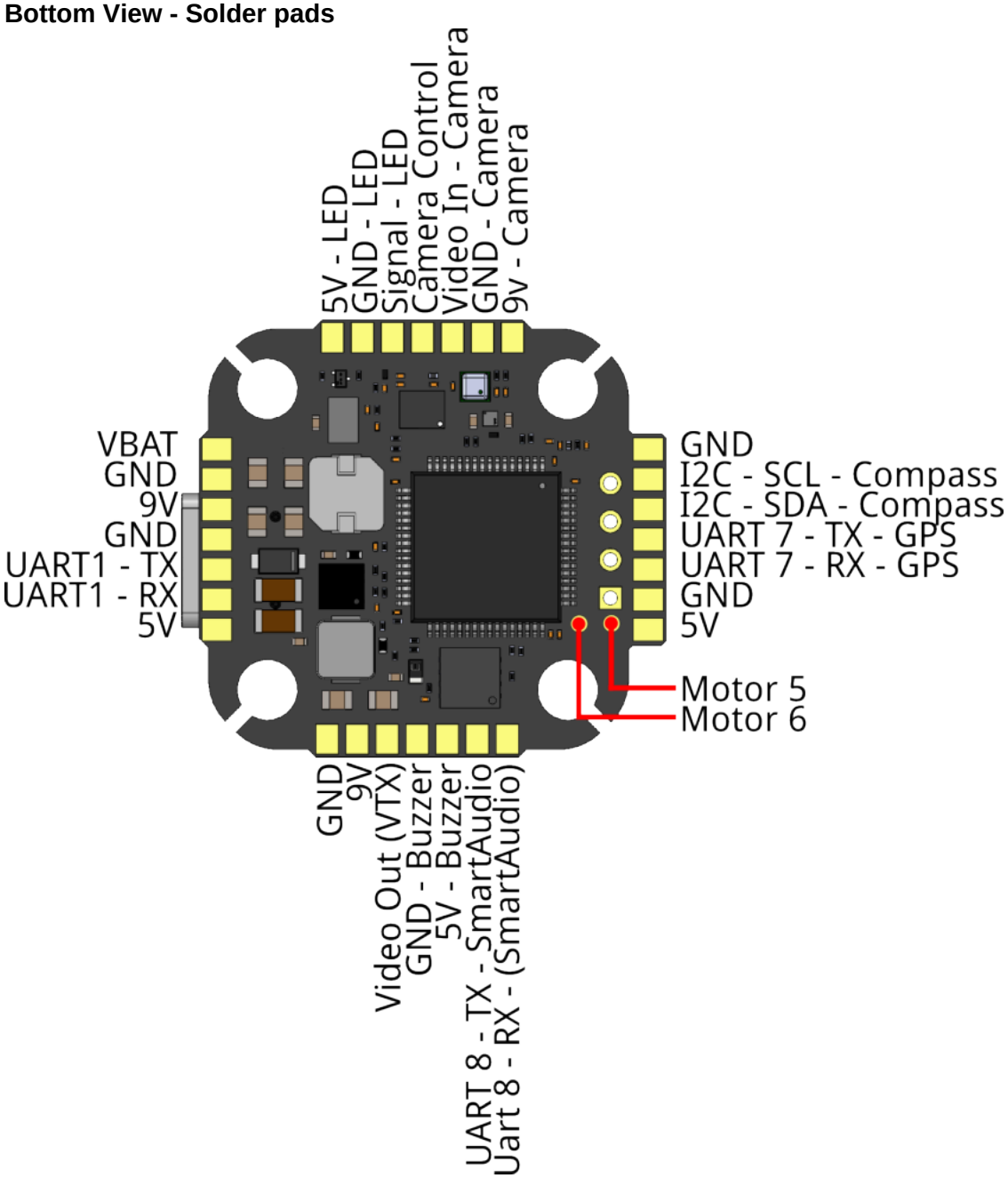



**BETAFLIGHT**

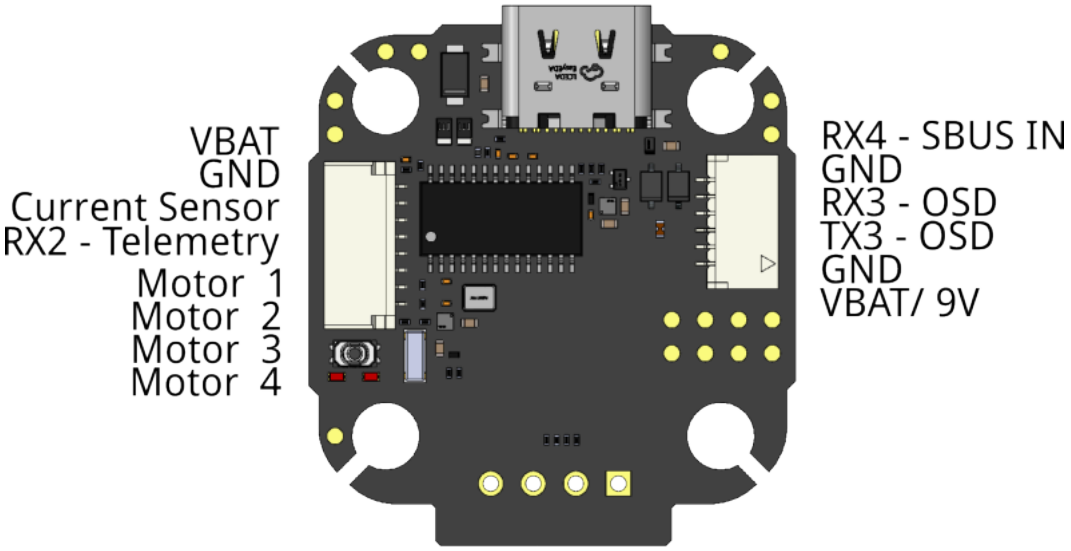
| | | |
|---|---|---|
| Roll Degrees: 180° | Pitch Degrees: 0° | Yaw Degrees: 90° |
| First GYRO: CW0° | MAG Alignment: Default | |

# 2.6. Pinout

**Bottom View - Solder pads**

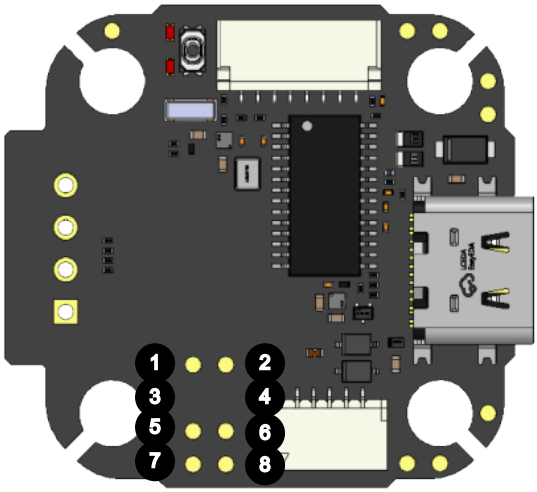


## Top View - Connectors




**Note:** On FC's with **P1** or **P2** or **P3** label, the voltage selector is not available. The VBAT pin passes the battery voltage through

## Additional Pins




| | | |
|---|---|---|
| 1 - Motor 4 | 2 - Motor 1 | 3 - USB + |
| 4 - USB -[7] | 5 - Motor 3 | 6 - Motor 2 |
| 7 - SWDIO/ PinIO USER 1 | 8 - SWDCLK/ PinIO USER 2 | |

(6) *removed on FC's with **P4** Label and higher*
(7) *removed on FC's with **P4** Label and higher*

# 2.7. GPIO Pins

**CameraControl (CC)**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | CameraControl | camera_control_pin = PC5 | CameraControl |
| INAV | ADC In | adc_channel_3_pin = PC5 | ADC |

**1/ SWDIO**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio1_pin = PA13 | USER1 |
| INAV | PinIO | pinio1_pin = PA13 | USER1 |

**2/ SWDCLK**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio2_pin = PA14 | USER2 |
| INAV | PinIO | pinio2_pin = PA14 | USER2 |

**Note:**
For USER1/ USER2 modes to work in INAV as PinIO, they must be activated by cli commands:

*set pinio_box1=46* (USER1)

*set pinio_box2=48* (USER2)

**Note:**
Enabling the CameraControl (CC) pin as ADC, the following cli command must be used:

*set vbat_adc_channel = 3*

# 2.8. Voltage Sensor Settings

**BETAFLIGHT**

| | |
|---|---|
| Scale: | 210 |
| Divider: | 10 |
| Multiplier Value: | 1 |

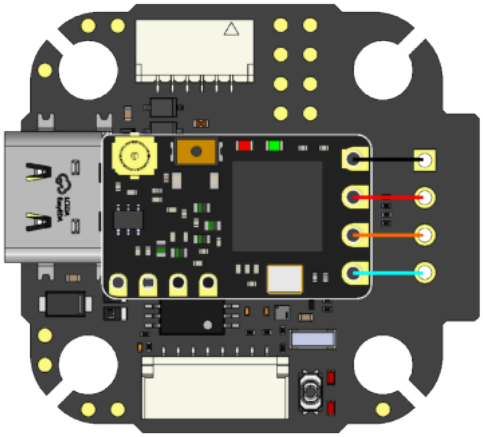
**INAV**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

# 2.9. Peripheral Connections

## 2.9.1. Receiver - Solder-on

**Receiver**



**Port Settings**

| | |
|---|---|
| UART 5: | Serial RX: on |

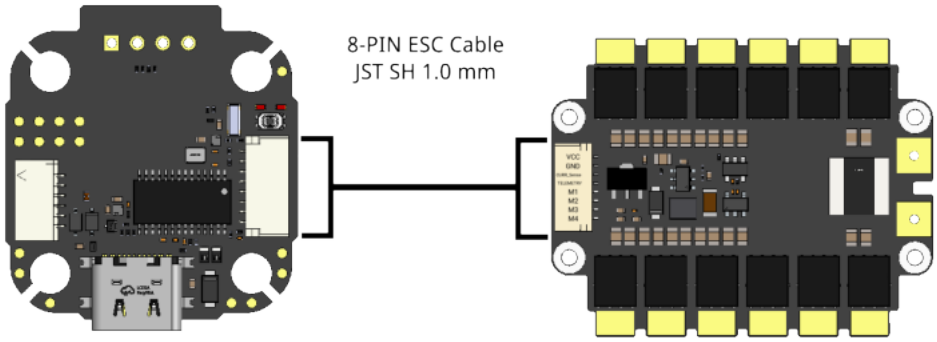
**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 2.9.2. ESC (LUCID 4in1)

When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.

**Note:** When using a non-TBS ESC, check the pinout and adjust it if required (ESC side)

**ESC Connection**



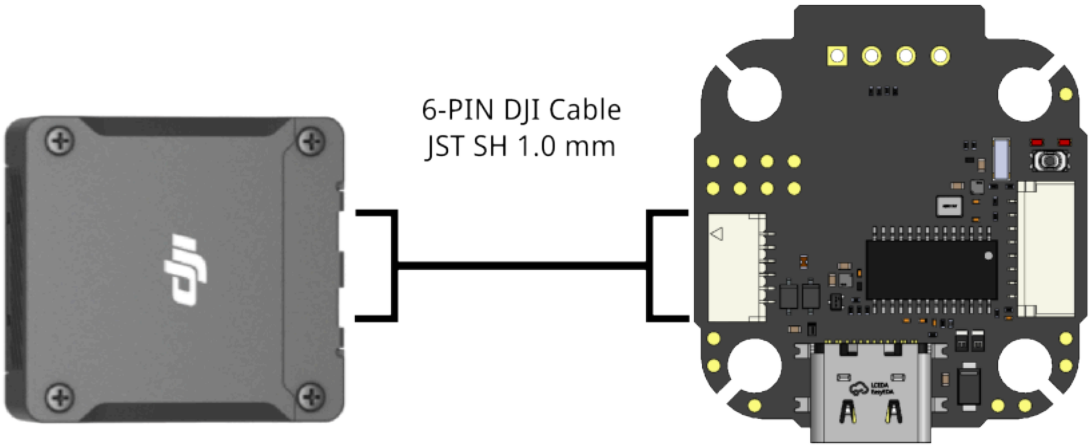
**Port Settings**

| | |
|---|---|
| UART 2: | Sensor Input: ESC, |
| | Baudrate: Auto |

## 2.9.3. HD Video Systems

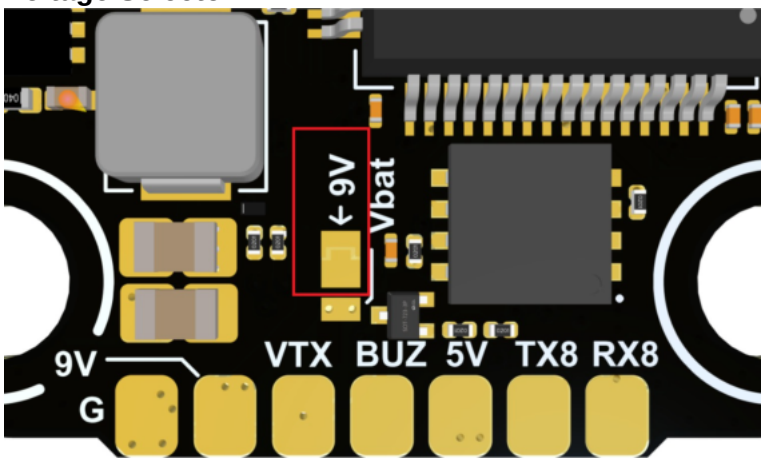
Connect your VTX to the designated port for your HD video system. The plug supports MSP and S.Bus if you want to use a DJI remote to control your drone.

**VTX connection**




The supply voltage can be adjusted by a solder jumper. Factory settings is 9 V.

**Voltage Selector**




**Note:** On FC's with **P1** or **P2** or **P3** label, the voltage selector is not available. The VBAT pin passes the battery voltage through

**Port Settings**

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baud rate: 115200[8] |

**Included Receiver Settings (optional)**

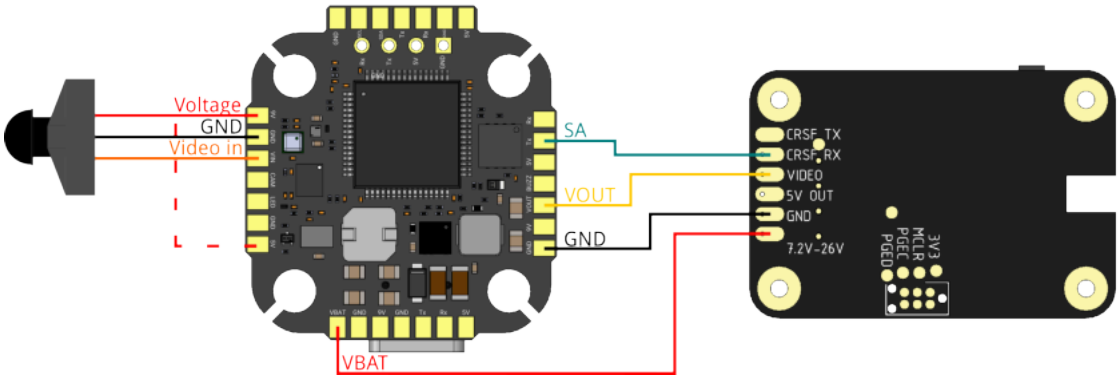
| | |
|---|---|
| UART 4: | Serial RX: on |
| UART 5: | Serial RX: off [9] |

**Note:** When using INAV, TX and RX of UART 4 must be swapped in the cable

## 2.9.4. Analog Video Systems

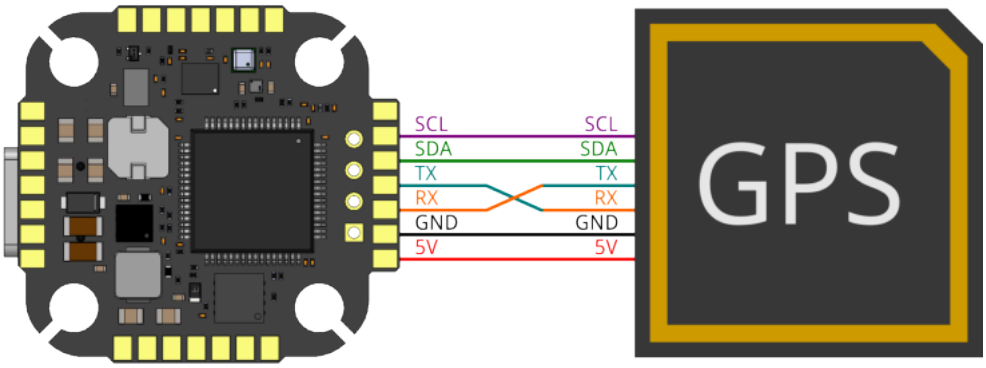
The camera will be power by the internal 9 V or the 5 V supply, depending on the used voltage pad.

**Analog Video setup**




## 2.9.5. GPS and Compass

**GPS Connection**




(8) *Baud rate might be different. Check the video system manual for details.*
(9) *Disables the external receiver*

**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

**port Setings**

| | |
|---|---|
| UART 7: | Peripheral: GPS |
| | Baudrate: depends on GPS |

# 3. F4 FC - Pro

## 3.1. Specification

| | | | |
|---|---|---|---|
| Processor: | AT32F435 | Weight: | 4.51 g |
| IMU: | MPU6000 | Receiver:Receiver: | Solder on |
| Baro: | bmp388 | DJI Airunit: | Dedicated connector |
| Input Voltage: | 3-8 S compatible | Blackbox: | Built-in, 8 MB |
| BEC Voltage: | 9 V: 2.5 A | OSB: | Built-in |
| | 5 V: 2 A | Servo Outputs | 4 (6) (2x solder-point) |
| UARTs | 6 | Size/ Mounting: | 31x29 mm, 20x20 mounting, M3 |

## 3.2. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| BETAFLIGHT | TBS_LUCID_PRO_FC | 4.5 |
| INAV | TBS_LUCID_PRO_FC | 8.0 |

**Note:** When using INAV, TX3 and RX3 (HD Video connector) bust be swapped

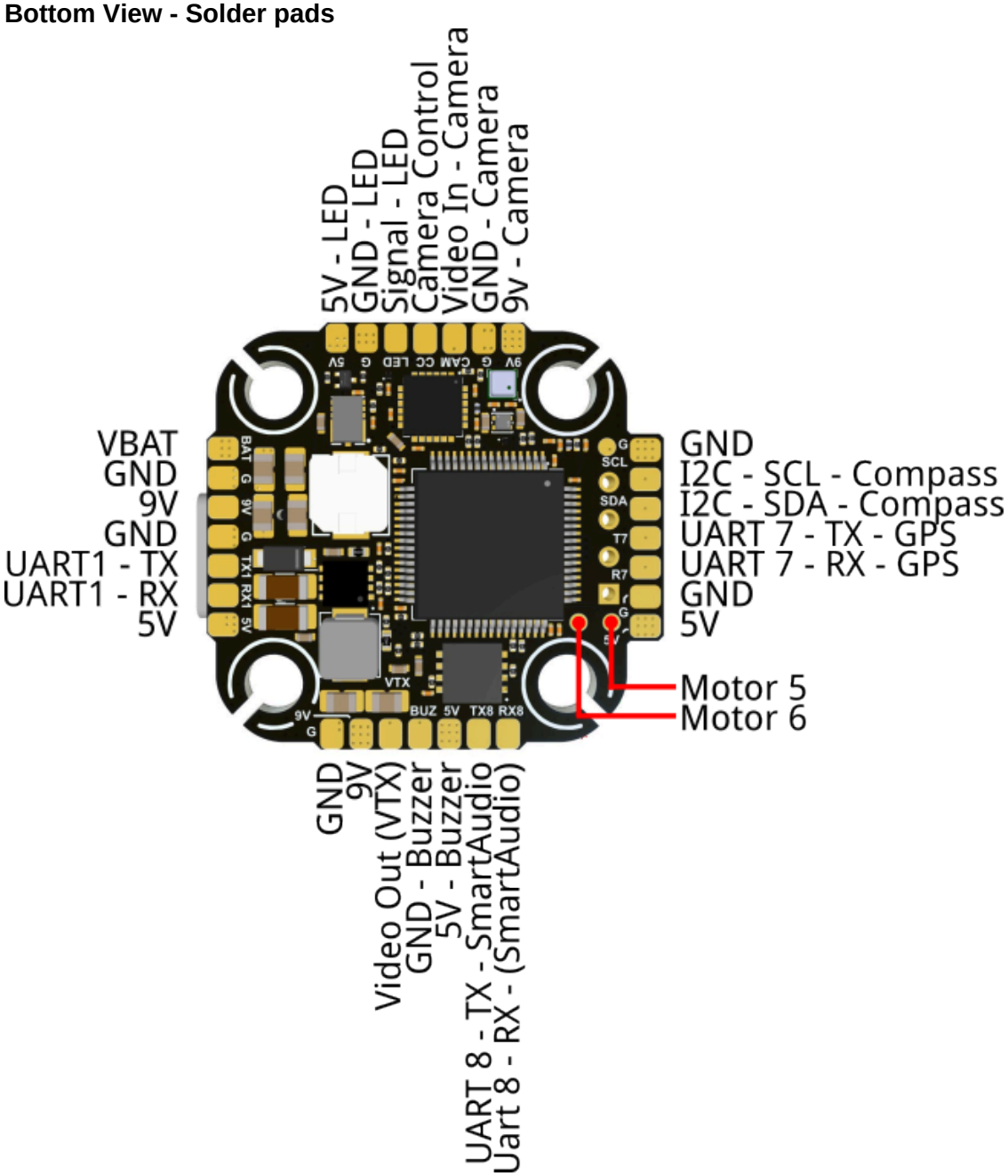
## 3.3. Serial Ports

| Port | Usage | Available Pins |
|---|---|---|
| UART 1 | Spare | Full UART |
| UART 2 | ESC Telemetry | RX only |
| UART 3 | MSP, HD Video connector | Full UART |
| UART 4 | S.BUS, HD Video connector | RX only |
| UART 5 | Direct mounted Receiver | Full UART |
| UART 7 | GPS | Full UART |
| UART 8 | SmartAudio | Full UART |

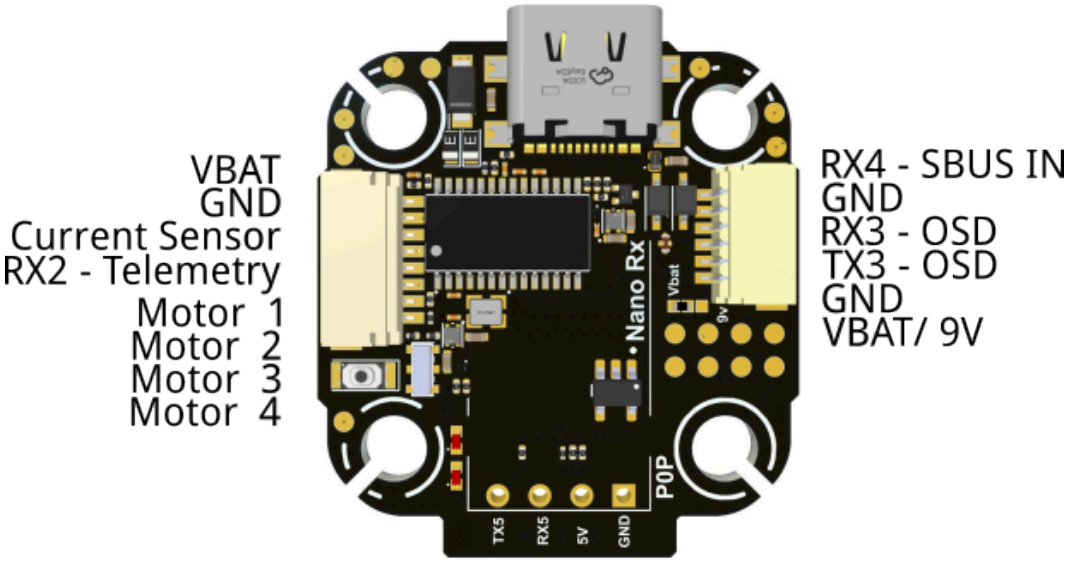


# 3.4. Pinout

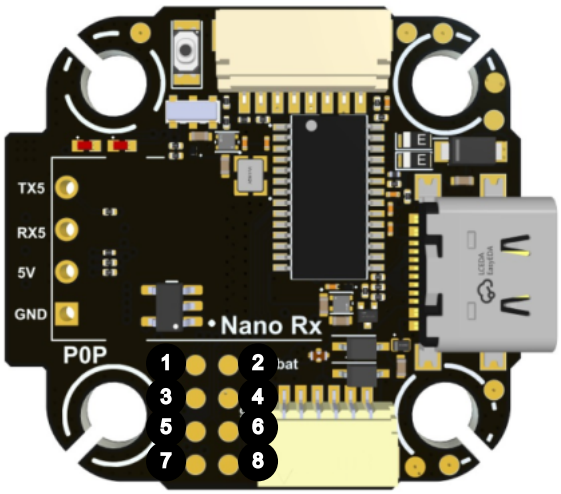
**Bottom View - Solder pads**



## Top View - Connectors




## Additional Pins




| | | |
|---|---|---|
| 1 - Motor 4 | 2 - Motor 1 | 3 - USB + |
| 4 - USB - | 5 - Motor 3 | 6 - Motor 2 |
| 7 - SWDIO/ PinIO USER 1 | 8 - SWDCLK/ PinIO USER 2 | |

# 3.5. GPIO Pins

**CameraControl (CC)**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | CameraControl | camera_control_pin = PC5 | CameraControl |
| INAV | ADC In | adc_channel_3_pin = PC5 | ADC |

**1/ SWDIO**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio1_pin = PA13 | USER1 |
| INAV | PinIO | pinio1_pin = PA13 | USER1 |

**2/ SWDCLK**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio2_pin = PA14 | USER2 |
| INAV | PinIO | pinio2_pin = PA14 | USER2 |

**Note:**
For USER1/ USER2 modes to work in INAV as PinIO, they must be activated by cli commands:

*set pinio_box1=46* (USER1)

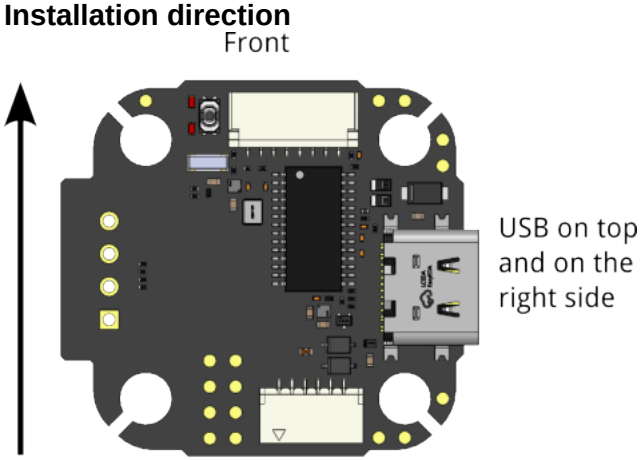
*set pinio_box2=48* (USER2)

**Note:**
Enabling the CameraControl (CC) pin as ADC, the following cli command must be used:

*set vbat_adc_channel = 3*

# 3.6. Board Orientation

**Installation direction**




**BETAFLIGHT**

| | | |
|---|---|---|
| Roll Degrees: 180° | Pich Degrees: 0° | Yaw Degrees: 180css° |
| First GYRO: CW 0° | MAG Alignment: Default | |

# 3.7. Voltage Sensor Settings

**BETAFLIGHT**

| | |
|---|---|
| Scale: | 210 |
| Divider: | 10 |
| Multiplier Value: | 1 |

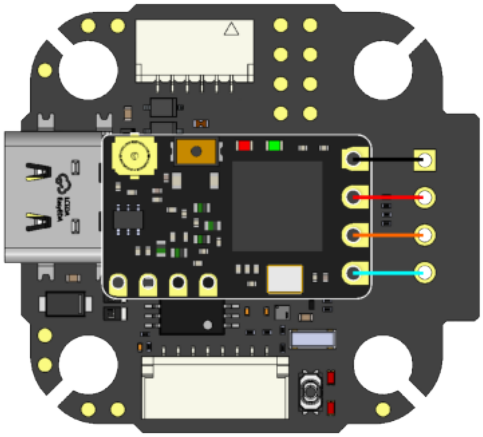
**INAV**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

# 3.8. Peripheral Connections

## 3.8.1. Receiver - Solder-on

**Receiver**



**Port Settings**

| | |
|---|---|
| UART 5: | Serial RX: on |

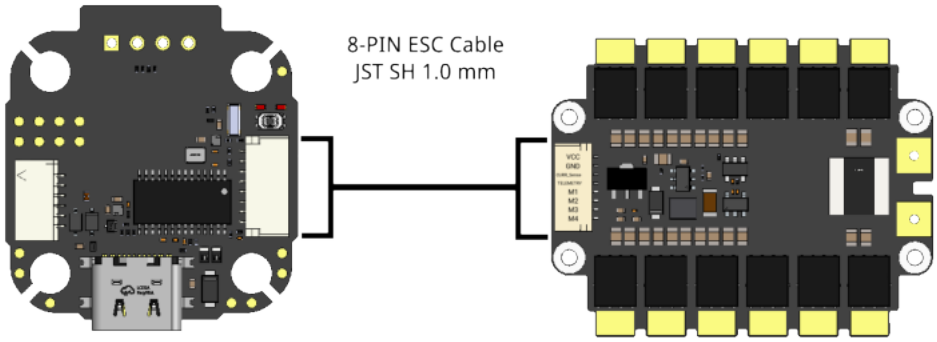
**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 3.8.2. ESC (LUCID 4in1)

When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.

**Note:** When using a non-TBS ESC, check the pinout and adjust it if required (ESC side)

**ESC Connection**



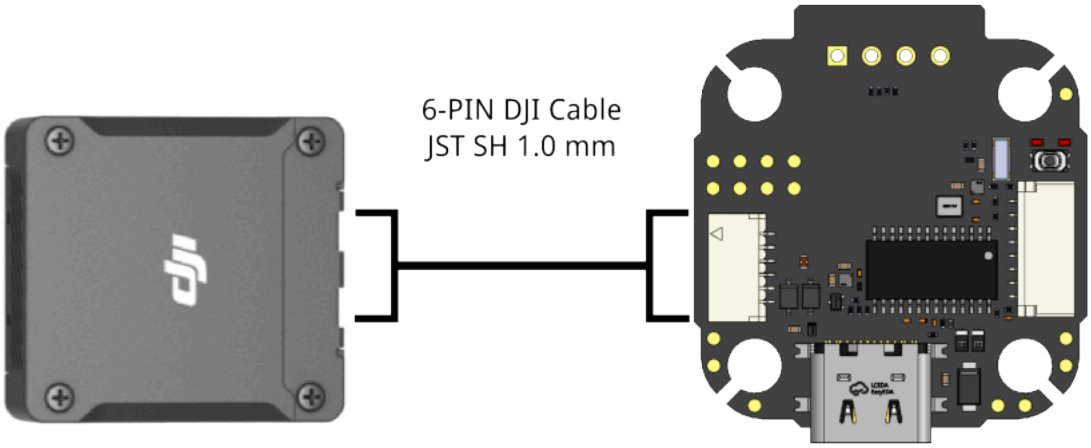
**Port Settings**

| | |
|---|---|
| UART 2: | Sensor Input: ESC, |
| | Baudrate: Auto |

## 3.8.3. HD Video Systems

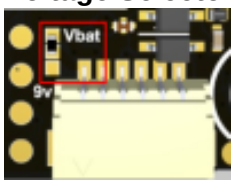
Connect your VTX to the designated port for your HD video system. The plug supports MSP and S.Bus if you want to use a DJI remote to control your drone.

**VTX connection**




The supply voltage can be adjusted by a solder jumper. Factory settings is 9 V.

**Voltage Selector**




**Port Settings**

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baud rate: 115200[10] |

**Included Receiver Settings (optional)**

| | |
|---|---|
| UART 4: | Serial RX: on |
| UART 5: | Serial RX: off[11] |

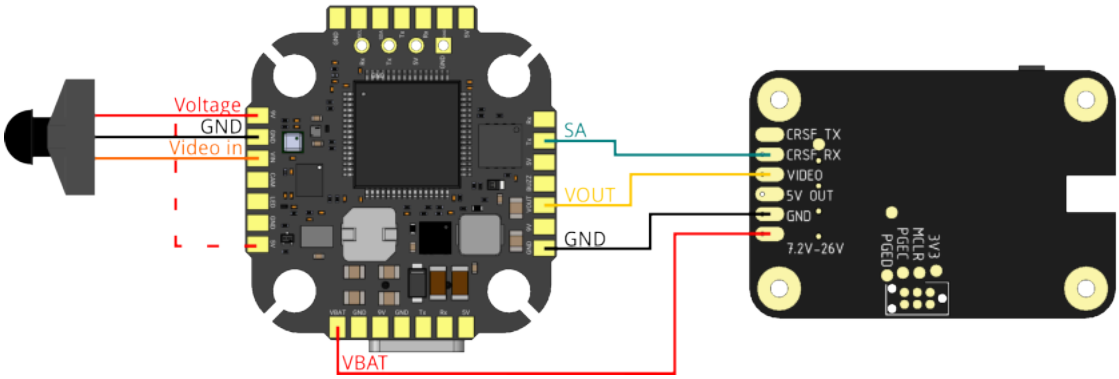
*(10) Baud rate might be different. Check the video system manual for details.*
*(11) Disables the external receiver*

**Note:** When using INAV, TX and RX of UART 4 must be swapped in the cable

## 3.8.4. Analog Video Systems

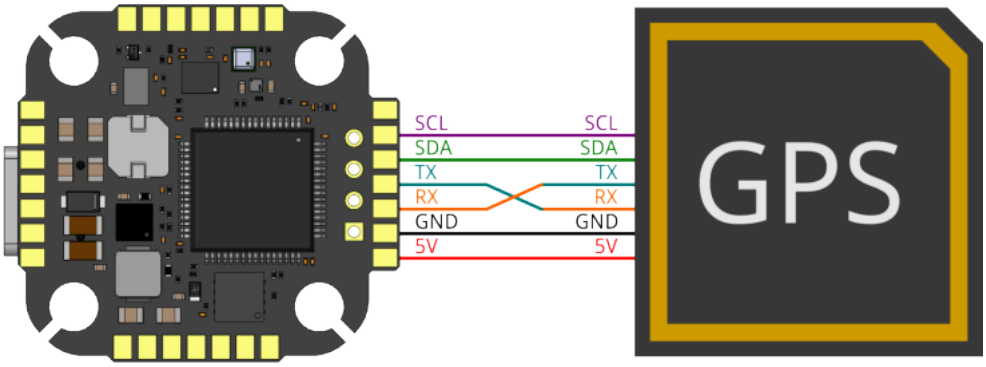
The camera will be power by the internal 9 V or the 5 V supply, depending on the used voltage pad.

**Analog Video setup**




## 3.8.5. GPS and Compass

**GPS Connection**




**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

**port Setings**

| | |
|---|---|
| UART 7: | Peripheral: GPS |
| | Baudrate: depends on GPS |

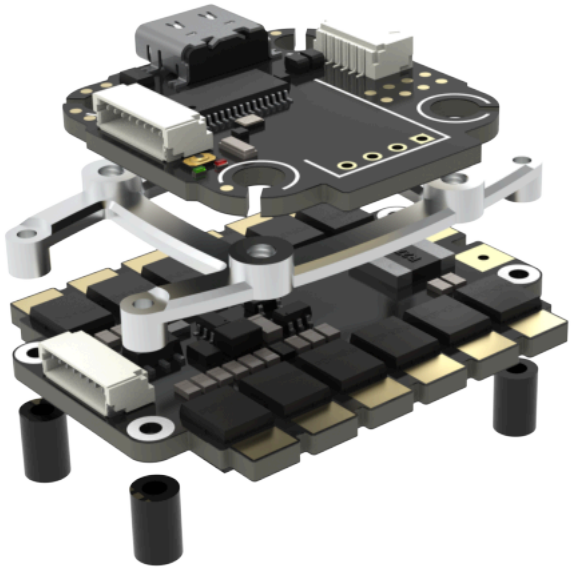
# 4. Gorilla mount

## 4.1.

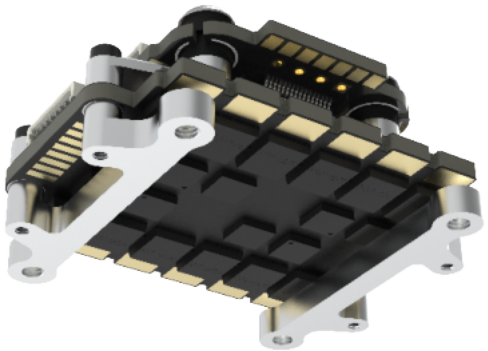
With the LUCID system, a new ESC mounting pattern took place. The TBS Gorilla mount is designed to sit atop 4-in-1 ESCs featuring a Gorilla mounting pattern. It includes 20x20 (M3) mounting points on top, allowing you to easily attach your preferred flight controller.

The Gorilla mounting system consists of 3 parts:

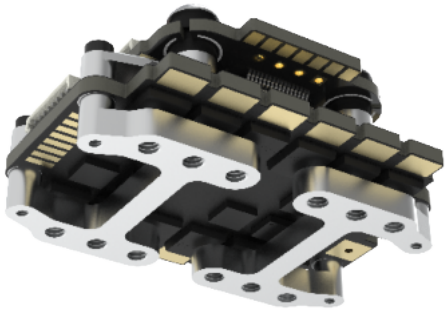
**FC (20x20) Adapter**



**Frame Adapter 30x30**



**Frame Adapter 20x20**



If you want to use the Gorilla pattern in your project:

- Technical drawing (hole spacing)
- Frame developter pack

# 5. Mini AIO FC - 1-2S

## 5.1.

The TBS LUCID AIO 1-2S was engineered to tick a lot of boxes for long range 1S/2S drone pilots as well as whoop pilots that don't enjoy radio link limitations and need a bit of extra power from their stack.

Built to a 25x25 "Whoop" form factor, it is the only board that has the necessary grunt to run 2S boards without burning out, while also being capable of running 1S batteries down so low you will hear them beg for mercy.

The "AIO" stands for all in one, or a 3-in-1 specifically. Included is an Flight controller, 4in1 ESC and Crossfire Receiver. It also comes with an OSD chip for analog video.

It hopefully goes without saying that each TBS Lucid AIO is tested out of the factory and has been put through the wringer by some of the most seasoned whoop pilots before being offered for sale, which further distinguishes the board from some of the incumbents.

## 5.2. Specification

| | | | |
|---|---|---|---|
| Processor: | AT32F435RMT7 | Weight: | 4 g |
| IMU: | ICM-42688P | Receiver: | Built-in (CROSSFIRE) |
| Baro: | bmp388 | DJI Airunit: | Supported |
| Input Voltage: | 1-2 S compatible | Blackbox: | Built-in, 8 MB |
| BEC Voltage: | 5 V: 2 A | OSD: | Built-in |
| UARTs | 3 | Motor Outputs: | 4 |
| Current/Motor: | 7A/Motor, 24A total | Size/ Mounting: | 30x30 mm, 25x25 mounting, M3 |

## 5.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| BETAFLIGHT | LUCID_AIO | 4.5 |
| INAV | Not yet available | / |
| CROSSFIRE | / | 6.10 |
| AM32 (ESC) | AM32_TBS_MINI_F421 | 2.18 |

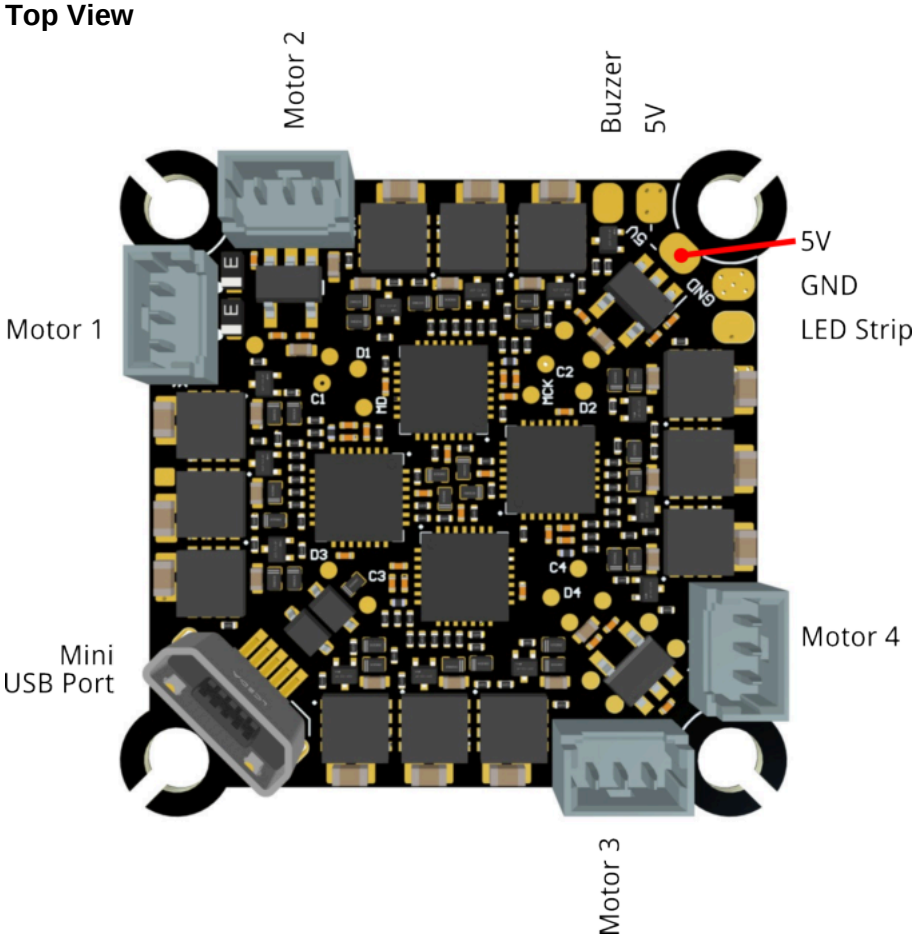


# 5.4. Serial Ports

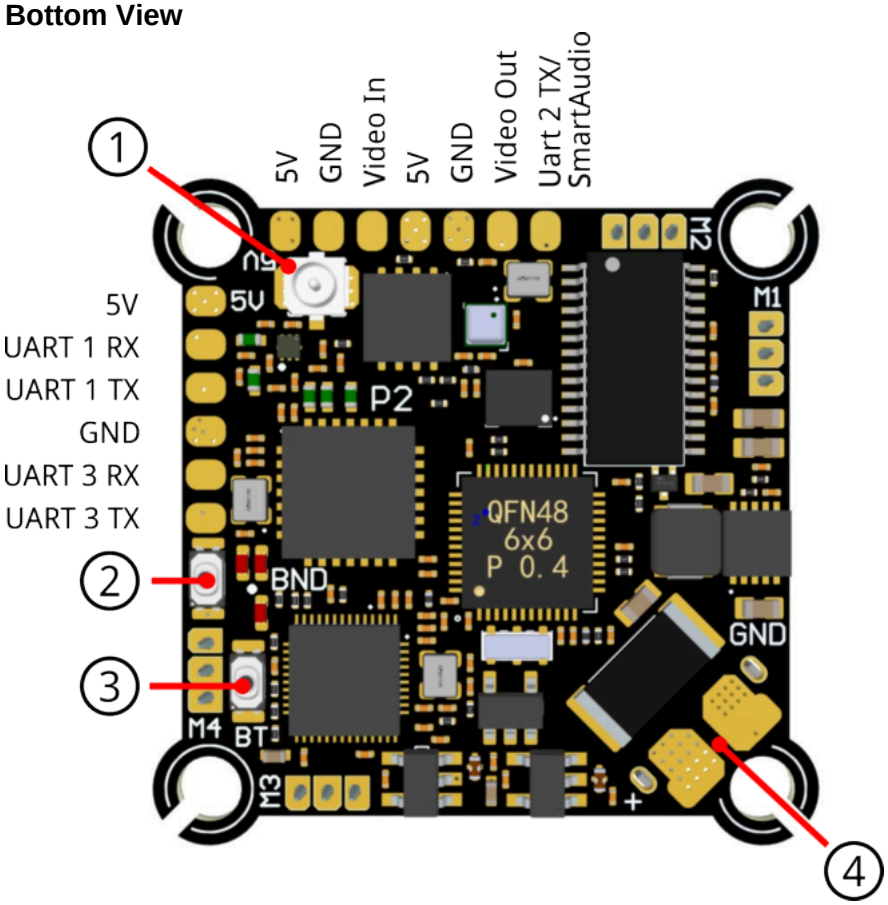
| Port | Usage | Available Pins |
|---|---|---|
| UART 1 | Spare | Full UART |
| UART 2 | SmartAudio | TX only |
| UART 3 | MSP, HD Video connector | Full UART |
| UART 5 | Built-in Receiver | Full UART |

# 5.5. Pinout

**Top View**



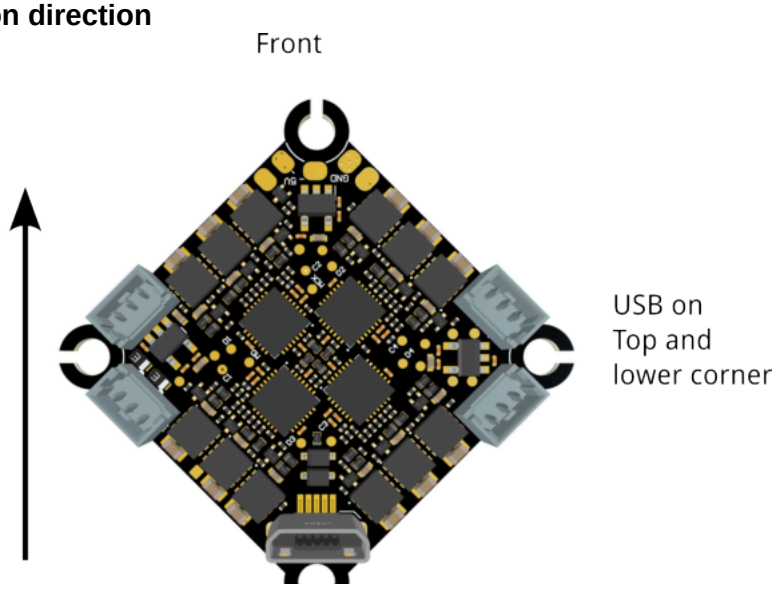
**Bottom View**




| | |
|---|---|
| 1 - CROSSFIRE Receiver Antenna | 2 - Bind-Button |
| 3 - Bootloader-Button | 4 - Battery Solder pads |

# 5.6. Board Orientation

**Installation direction**



**BETAFLIGHT**

| | | |
|---|---|---|
| Roll Degrees: 0° | Pich Degrees: 0° | Yaw Degrees: -45° |
| First GYRO: CW 0° | MAG Alignment: Default | |

# 5.7. Voltage Sensor Settings

**BETAFLIGHT**

| | |
|---|---|
| Scale: | 57 |
| Divider: | 18 |
| Multiplier : | 1 |

# 5.8. Peripheral Connections

## 5.8.1. Receiver - Built-in

**Port Settings**

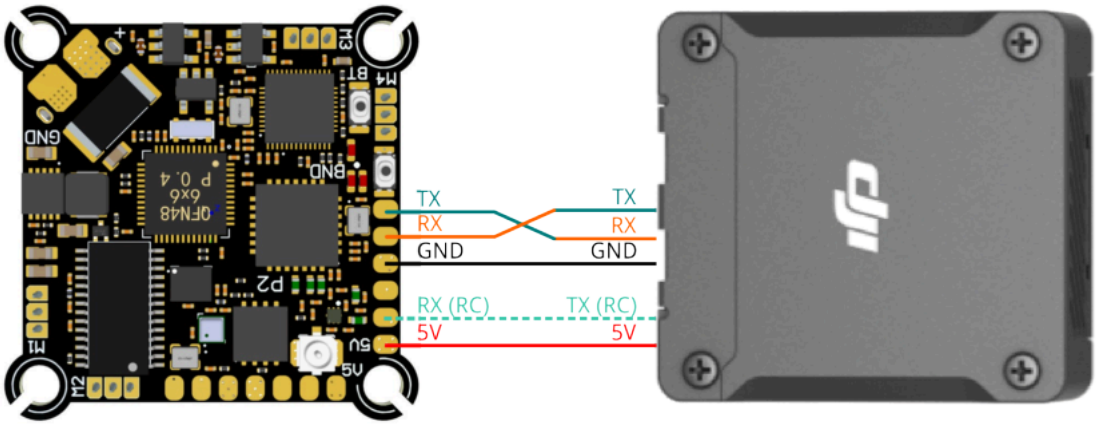
| | |
|---|---|
| UART 5: | Serial RX: on |

**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 5.8.2. HD Video Systems

Connect your VTX to the designated port for the HD video system.

**HD System Connection**




The supply voltage is fixed 5 V. Make sure your VTX and additional Peripherals do now draw more than the built-in BEC *(on page 27)* can provide.

**Port Settings**

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baudrate: 115200[12] |

**Included Receiver Settings (optional)**

| | |
|---|---|
| UART 1: | Serial RX: on |
| UART 5: | Serial RX: off[13] |

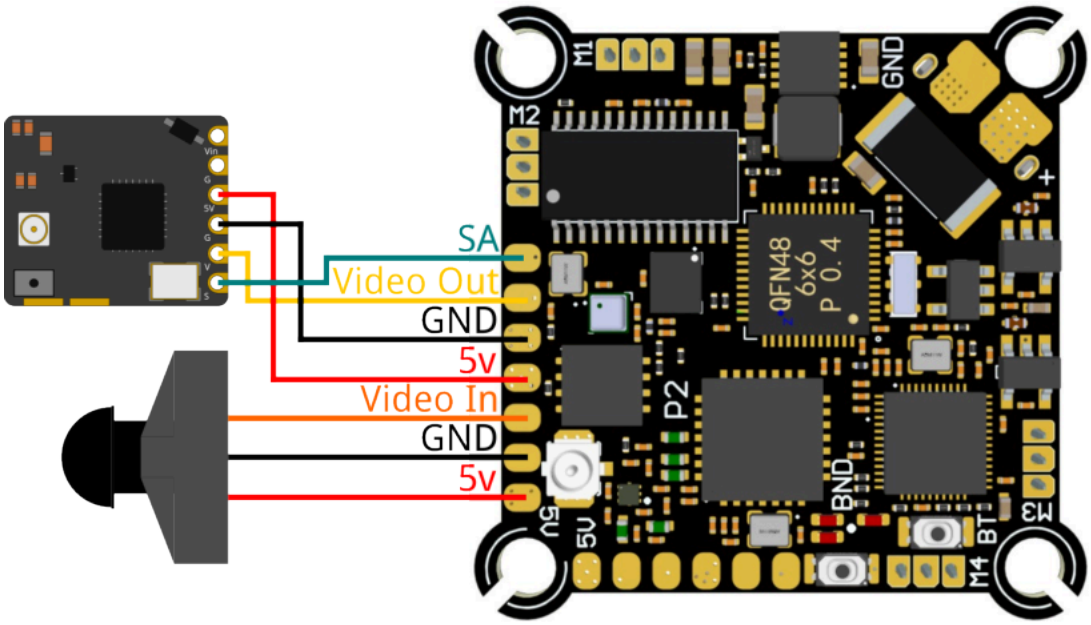
*(12) Baudrate might be different. Check the video system manual for details.*
*(13) Disables the internal receiver*

**Note:** Using the HD VTX RC receiver blockes the port for a GPS

## 5.8.3. Analog Video Systems

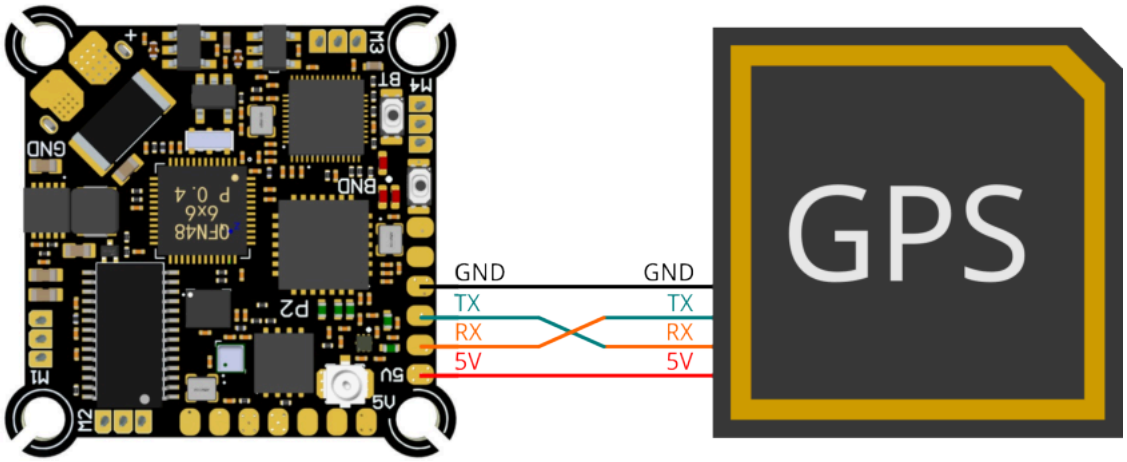
The camera will be power by the internal 5 V supply.

**Analog Video setup**




## 5.8.4. GPS

**GPS Connection**




**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

**Port Settings**

| | |
|---|---|
| UART 1: | Peripheral: GPS |
| | Baudrate: depends on GPS |

# 6. H7 FC

## 6.1.

The TBS LUCID H7 FC is a powerhouse built for those who crave peak performance and adaptability in their drones. Whether you're ripping through freestyle moves or fine-tuning a racing rig, the TBS Lucid H7 delivers with its robust 480MHz processor and seamless support for BETAFLIGHT, ArduPilot, and INAV. Featuring dual camera inputs, DJI FPV OSD compatibility, and a compact design, it fits effortlessly into any setup. Designed for both seasoned pros and enthusiastic newcomers, this flight controller makes pushing the limits of your drone easier than ever.

## 6.2. Specification

| | | | |
|---|---|---|---|
| Processor: | STM32H743VIH6 | Weight: | 4 g |
| IMU: | ICM42688 (2x)<br>Dual Gyro | Receiver: | Solder on (by wire) |
| Baro: | Infineon DPS310 | DJI Airunit: | Supported |
| Input Voltage: | 3-8 S compatible | Blackbox: | By SD Card |
| BEC Voltage: | 5 V: 2 A | OSD: | Built-in |
| UARTs | 7 | Servo Outputs | 13 |
| I2C: | 2 | Size/ Mounting: | 32x32 mm, 30.5x30.5 mounting, M3 |
| Additional Features: | SPI, CAN, Multiple analog Inputs, ADC Vbat pad supports up to 69V | | |

## 6.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| BETAFLIGHT | TBS_LUCID_H7 | 4.5 |
| INAV | TBS_LUCID_H7 | 8.0 |
| ArduPilot(14) | TBS_LUCID_H7 | 4.6.0 BETA 2 |

(14) *Ardu Wiki for settings*

# 6.4. Serial Ports

**Serial Ports**

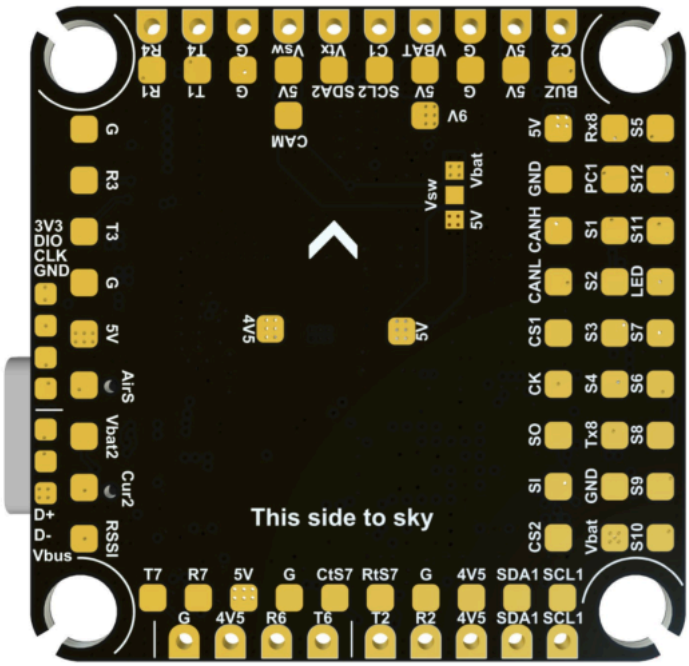
| Port | Usage | Available Pins |
|---|---|---|
| UART 0 | USB | Full UART |
| UART 1 | S.Bus | Full UART (just RX on DJI plug) |
| UART 2 | GPS | Full UART with DMA |
| UART 3 | MSP, HD Video Connector | Full UART with DMA |
| UART 4 | Spare | Full UART |
| UART 6 | Receiver | Full UART with DMA |
| UART 7 | Spare | Full UART with DMA |
| UART 8 | ESC Telemetry | Full UART |

**ArduPilot Specification**

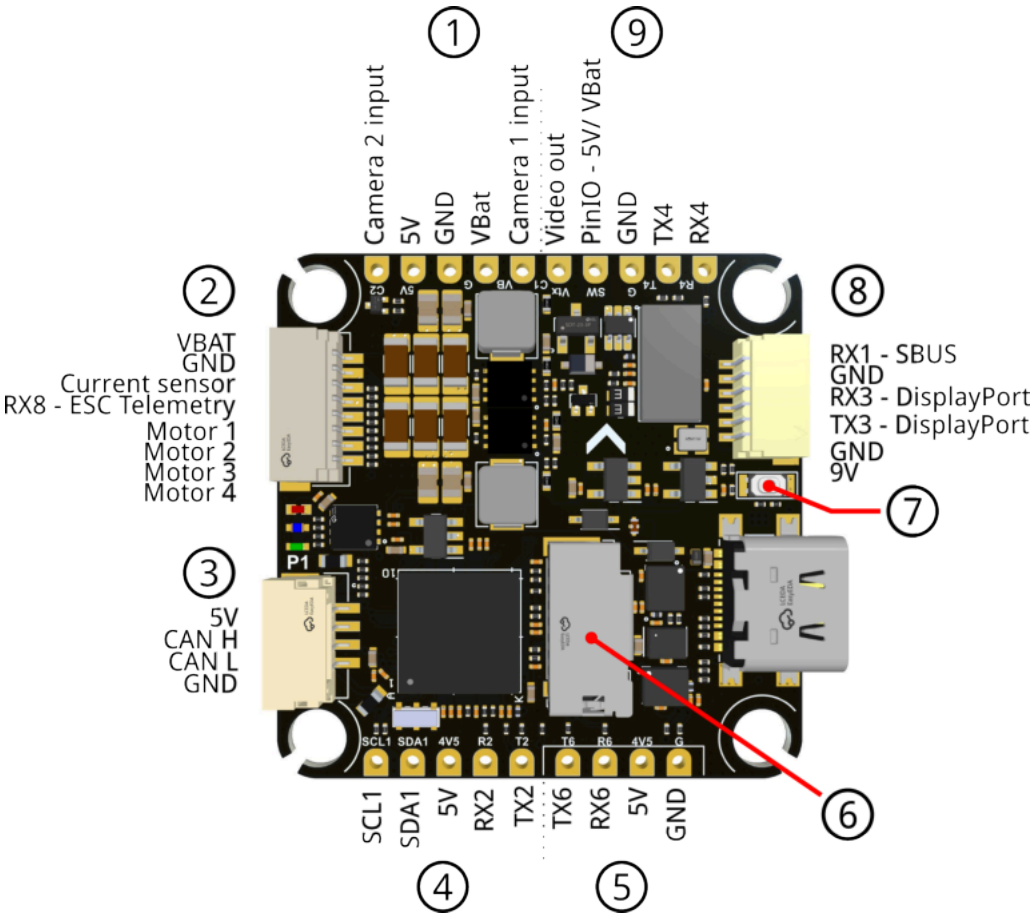
| Port | Ardu-portArdu-Port | Ardu-UsageArdu-Usage | 5V Tolerant |
|---|---|---|---|
| UART 0 | SERIAL0 | USB | Yes |
| UART 1 | SERIAL1 | S.Bus | Yes |
| UART 2 | SERIAL2 | GPS1 | Yes |
| UART 3 | SERIAL3 | MSP Displayport | Yes |
| UART 4 | SERIAL4 | TELEM1 | Yes |
| UART 6 | SERIAL6 | Receiver | Yes |
| UART 7 | SERIAL7 | TELEM2 | no, 3.3 V |
| UART 8 | SERIAL8 | ESC | Yes |

# 6.5. Pinout

### Top View

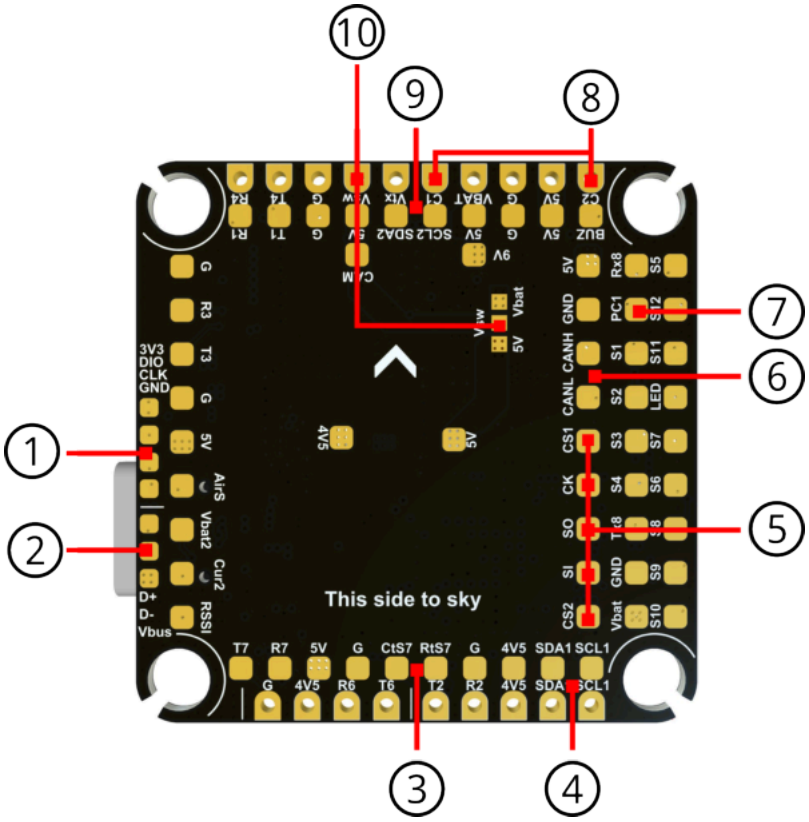



### Bottom View



| | | |
|---|---|---|
| 1 - Camera port | 2 - ESC port | 3 - CAN port |
| 4 - GPS port | 5 - Receiver port | 6 - SD-Card Slot |
| 7 - Bootloader-Button | 8 - DJI port | 9 - VTX port |

**Additional Connections**




| | | |
|---|---|---|
| 1 - SWD | 2 - UBS | 3 - Hardware Flow Control UART 7 |
| 4 - I2C 1 | 5 - SPI | 6 - CAN |
| 7 - Analog in (from ESC) | 8 - Camera 1/2 input | 9 - I2C 2 |
| 10 - PinIO switch with selectable voltage (by solder jumper) | | |

# 6.6. GPIO Pins

**VSW**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio1_pin = PD10 | USER1 |
| INAV | PinIO | pinio1_pin = PD10 | USER1 |
| ArduPilot | Relay | GPIO 81 | RELAY2 |

**Video in Selector (C1/C2)**

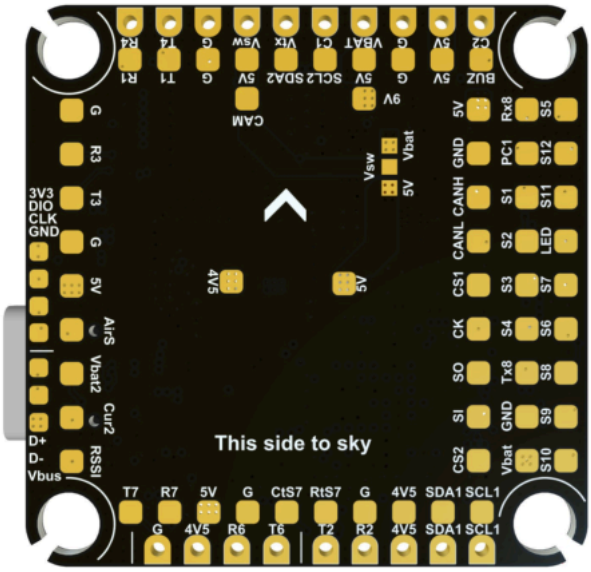
| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio2_pin = PD11 | USER2 |
| INAV | PinIO | pinio2_pin = PD11 | USER2 |
| ArduPilot | Relay | GPIO 82 | RELAY3 |

# 6.7. Board Orientation

The top/front direction is shown on the FC:

- Front: indicated by ^
- Top: *This side to sky* pointing up

**Installation direction**




**BETAFLIGHT**

| | | |
|---|---|---|
| Roll Degrees: 0° | Pich Degrees: 0° | Yaw Degrees: 0° |
| First GYRO: CW 0° | MAG Alignment: Default | |

# 6.8. Voltage Sensor Settings

**BETAFLIGHT Input 1 (up to 33 V)**

| | |
|---|---|
| Scale: | 110 |
| Divider: | 100 |
| Multiplier Value: | 10 |

**BETAFLIGHT Input 2 (up to 69 V)**

| | |
|---|---|
| Scale: | 210 |
| Divider: | 20 |
| Multiplier Value: | 1 |

**INAV (up to 33 V)**

| | |
|---|---|
| Scale: | 1100 |
| Offset: | 0 |

**INAV Battery Battery Input 2 (up to 69 V)**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

**ArduPilot Input 1 (up to 33 V)**

| | |
|---|---|
| BATT_MONITOR: | 4 |
| BATT_VOLT_PIN | 10 |
| BATT_VOLT_MULT | 11.0 |

**ArduPilot Battery Input 2 (up to 69 V)**

| | |
|---|---|
| BATT2_MONITOR: | 4 |
| BATT2_VOLT_PIN | 18 |
| BATT2_VOLT_MULT | 11.0 |

# 6.9. Current Sensor Settings

**BETAFLIGHT Input 1**

| | |
|---|---|
| Scale: | Depends on used Sensor |
| Value: | Depends on used Sensor |

**BETAFLIGHT Input 2**

| | |
|---|---|
| Scale: | Depends on used Sensor |
| Value: | Depends on used Sensor |

**INAV Input 1**

| | |
|---|---|
| Scale: | Depends on used Sensor |
| Offset: | Depends on used Sensor |

**INAV Input 2**

| | |
|---|---|
| Scale: | Depends on used Sensor |
| Offset: | Depends on used Sensor |

**ArduPilot Input 1**

| | |
|---|---|
| BATT_CURR_PIN | 11 |
| BATT_AMP_PERVLT | Depends on used Sensor |

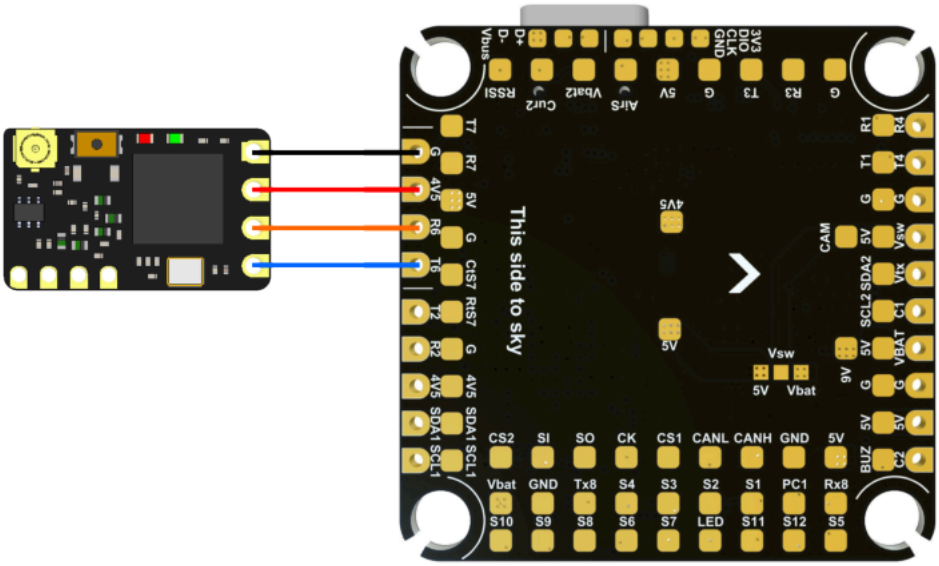
**ArduPilot Input 2**

| | |
|---|---|
| BATT2_CURR_PIN | 7 |
| BATT2_AMP_PERVLT | Depends on used Sensor |

# 6.10. Peripheral Connections

## 6.10.1. Receiver

**Receiver connection**




**Note:** Receiver and FC pin layout match up, allowing the receiver to be direct soldered. When done as in the picture above, the *Bind* button can become hard to reach!

**BETAFLIGHT/ INAV**

| | |
|---|---|
| UART 6: | Serial RX: on |

**ArduPilot**

| | |
|---|---|
| SERIAL6: | Depends on chosen protocol (MAVLink, CRSF) |

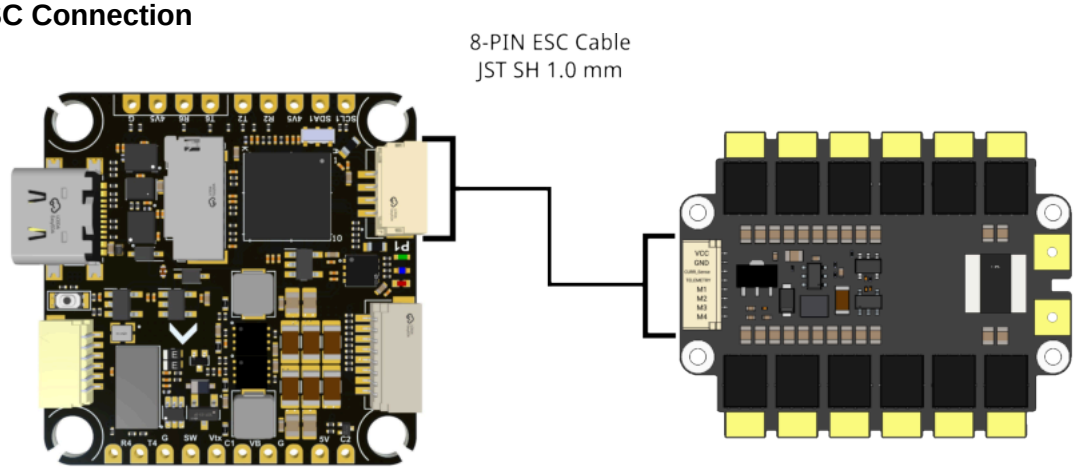
**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 6.10.2. ESC (LUCID 4in1)

When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.

**Note:** When using a non-TBS ESC, check the pinout and adjust it if required (ESC side)

### ESC Connection



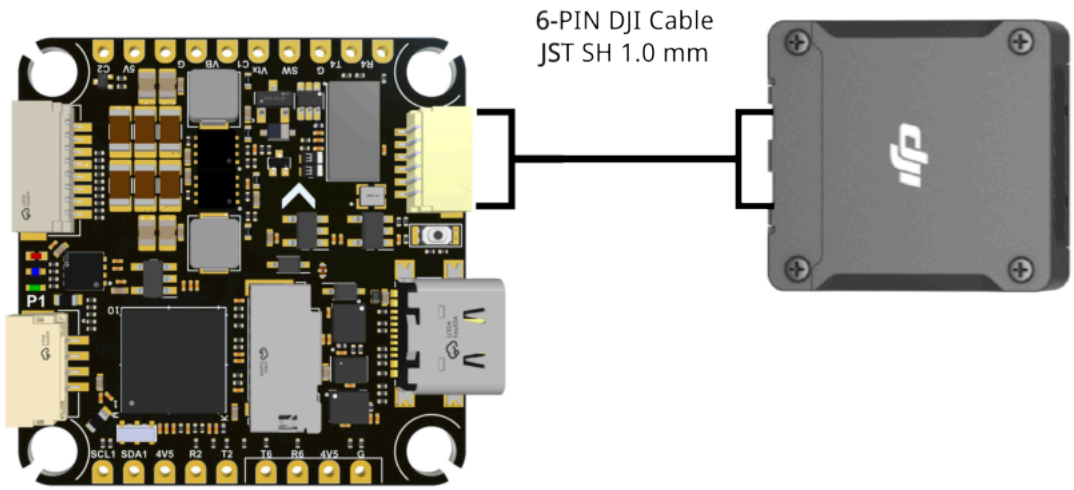

### Port Settings

| | |
|---|---|
| UART 8: | Sensor Input: ESC, |
| | Baudrate: Auto |

## 6.10.3. HD Video Systems

Connect your VTX to the designated port for the HD video system.

### HD System Connection




The supply voltage is fixed 9 V.

**Port Settings**

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baud rate: 115200 (15) |

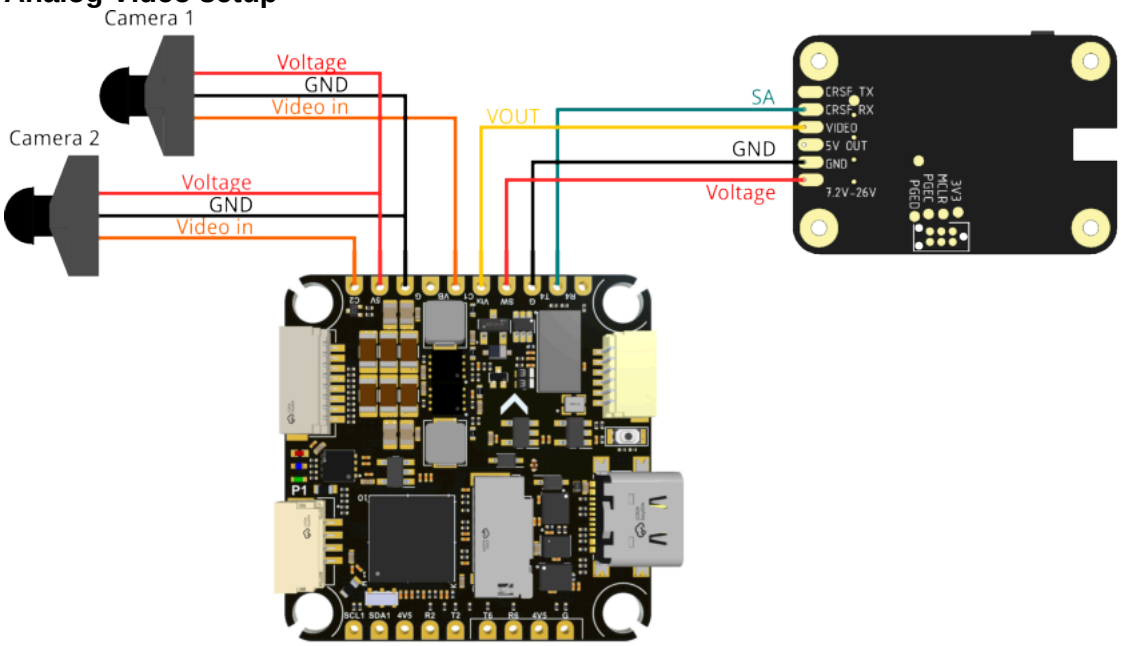
**Included Receiver Settings (optional)**

| | |
|---|---|
| UART 1: | Serial RX: on |
| UART 6: | Serial RX: off (16) |

## 6.10.4. Analog Video Systems

BY wiring the VTX to the PINIO connector an selecting the correct voltage for your VTX, you can disable the VTX when on the ground by software.

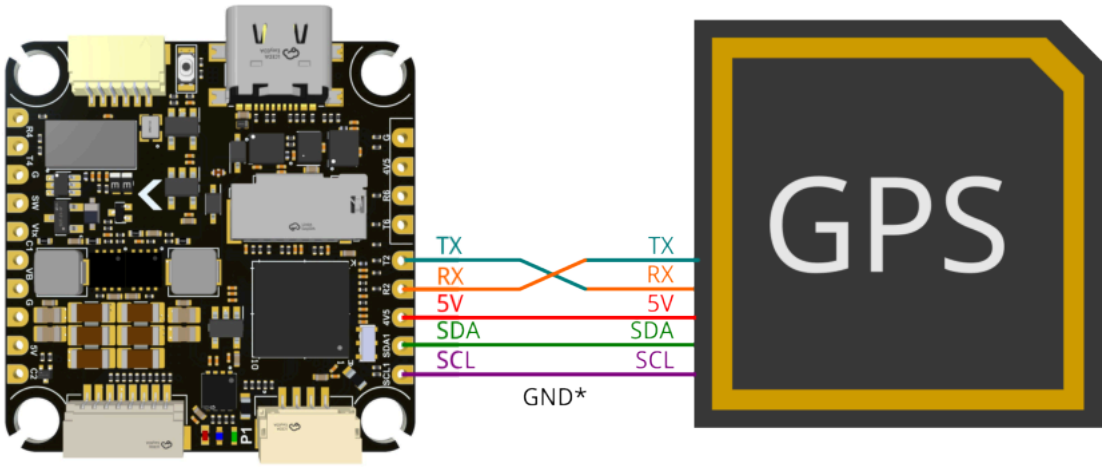
**Analog Video setup**




(15) *Baud rate might be different. Check the video system manual for details.*
(16) *Disables the external receiver*

## 6.10.5. GPS and Compass

### GPS Connection




**Note:** *GND is available on the backside as solder-point

**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

### Port Settings

| | |
|---|---|
| UART 2: | Peripheral: GPS |
| | Baudrate: depends on GPS |

# 7. H7 FC - Wing

## 7.1.

For seasoned wing pilots, affordable high quality flight controllers have been far and between. Shortcomings in either supported software, redundancy on hardware, or price, have made it hard to pick a clear contender for your next project.

Introducing the TBS LUCID H7 Wing FC. Full-featured, versatile, reliable, and affordable.

## 7.2. Specification

| | | | |
|---|---|---|---|
| Processor: | STM32H743VIH6 | Weight: | 25 g |
| IMU: | ICM42688 | Receiver: | Solder on (by wire) |
| Baro: | Infineon DPS310 | DJI Airunit: | Supported |
| Input Voltage: | 3-12 S compatible | Blackbox: | By SD Card |
| BEC Voltage: | 5 V: 3 A (FC)<br>9/12 V: 5 A (FPV) | OSD: | Built-in |
| UARTs | 7 | Servo Outputs | 13 |
| I2C Ports: | 2 | Size/ Mounting: | 54 x 36 x 13 mm<br>30.5x30.5 mounting, M3 |
| Additional Features: | SPI, CAN, Multiple analog Inputs, ADC Vbat2 pad supports up to 69V, Additional Analog Inputs(17), Current Sensor, USB-C Extension Board w. Buzzer | | |

## 7.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| BETAFLIGHT | note yet available | |
| INAV | TBS_LUCID_H7_WING | 8.0.1 |
| ArduPilot(18) | TBS_LUCID_H7_WING | 4.6.0 BETA 2 |

(17) *RSSI, Airspeed Sensor, User1, User2*
(18) *Ardu Wiki for settings*

# 7.4. Serial Ports

**Serial Ports**

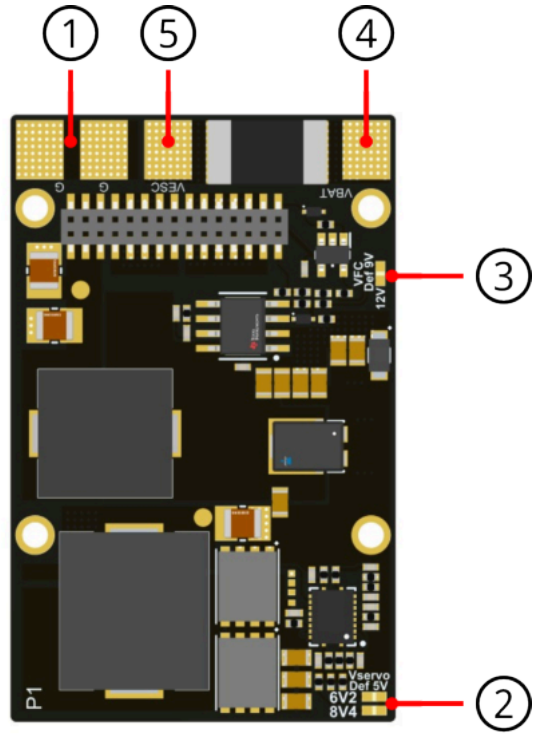
| Port | Usage Usage | Available Pins |
|---|---|---|
| UART 0 | USB | Full UART |
| UART 1 | S.Bus | Full UART (just RX on DJI plug) |
| UART 2 | GPS | Full UART with DMA |
| UART 3 | MSP, HD Video Connector | Full UART with DMA |
| UART 4 | Spare | Full UART |
| UART6 | Receiver | Full UART with DMA |
| UART 7 | Spare | Full UART with DMA |
| UART 8 | ESC Telemetry | Full UART |

**ArduPilot Specification**

| Port | Ardu-Port | Ardu-Usage | 5V Tolerant |
|---|---|---|---|
| UART 0 | SERIAL0 | USB | Yes |
| UART 1 | SERIAL1 | S.Bus | Yes |
| UART 2 | SERIAL2 | GPS1 | Yes |
| UART 3 | SERIAL3 | MSP Displayport | Yes |
| UART 4 | SERIAL4 | TELEM1 | Yes |
| UART6 | SERIAL6 | Receiver | Yes |
| UART 7 | SERIAL7 | TELEM2 | no, 3.3 V |
| UART 8 | SERIAL8 | ESC | Yes |

# 7.5. Pinout

**Power Board**



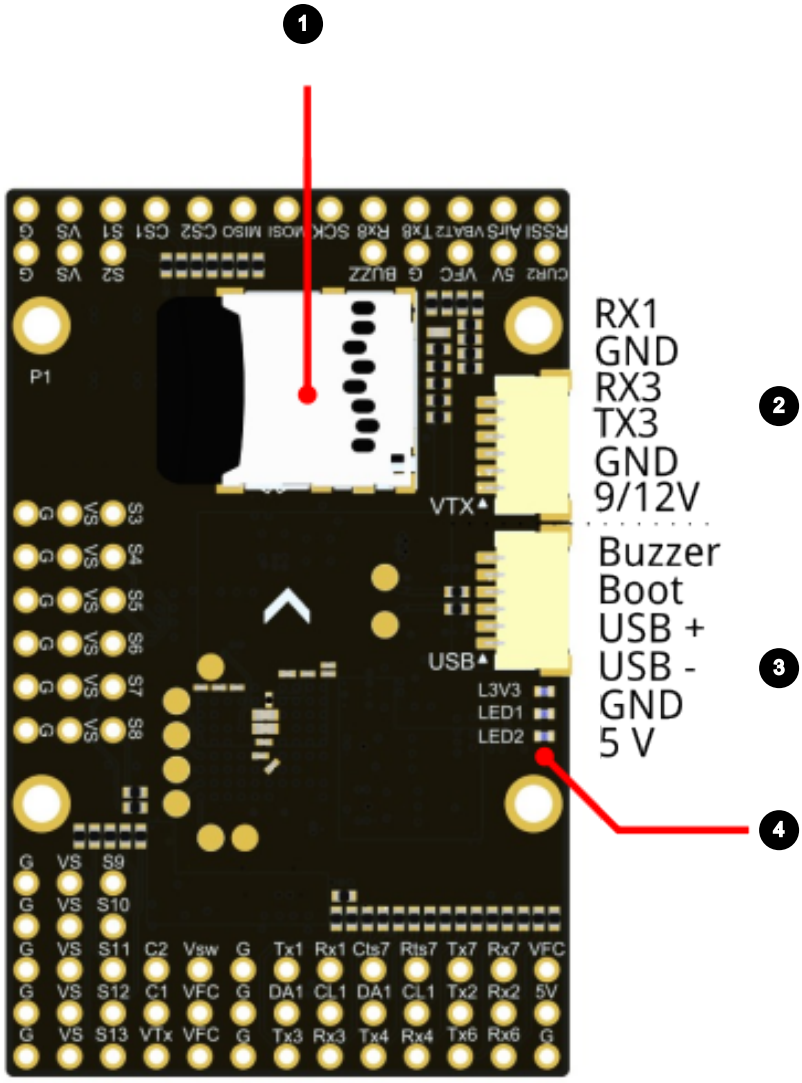

| | | |
|---|---|---|
| 1 - GND in/out | 2 - Servo Voltage Selector | 3 - HD-Video port Voltage Selector |
| 4 - Battery in | 5 - Battery out | |

**Servo Voltage Selector settings**

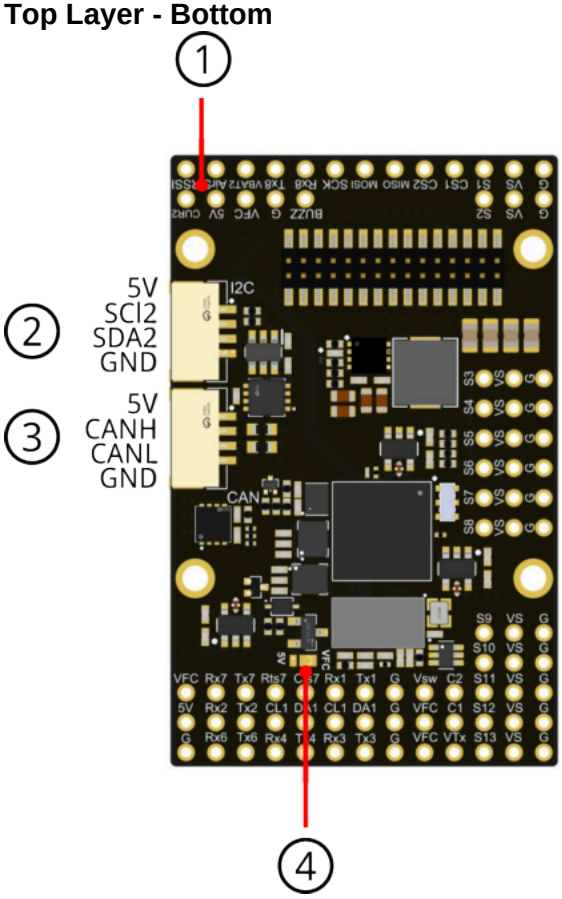
| Pin | 5V | 6.2V | 8.4V | 9.2V |
|---|---|---|---|---|
| 6V2 | open | closed | open | closed |
| 8V4 | open | open | closed | closed |

**Important:** Do not cross-bridge the voltage selector pads

## Top Plate - Top

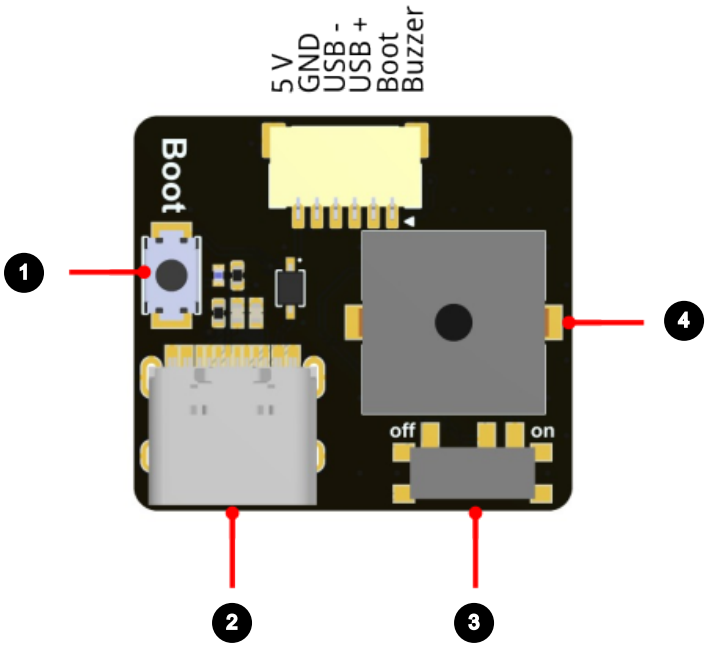


### Top Layer - Bottom



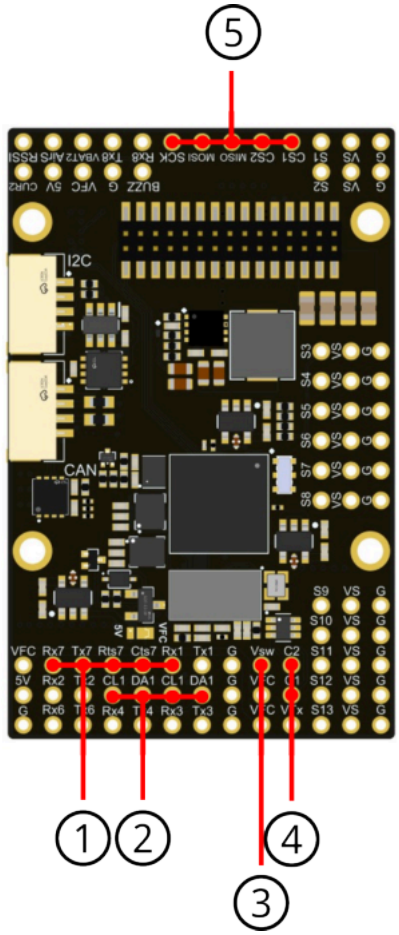

| | |
|---|---|
| 1 - Additional Inputs | 2 - I2C 2 |
| 3 - CAN | 4 - GPIO Voltage Selector |

### USB Board



| | |
|---|---|
| 1 - Boot-Button | 2 - USB-C Port |
| 3 - Buzzer On/OFF Switch | 4 - Buzzer |

**Additional Connections**




| | | |
|---|---|---|
| 1 - Hardware Flow Control UART 7 | 2 - I2C 1 | 3 - Pinout switch (VSW) |
| 4 - Camera 1/2 | 5 - SPI | |

# 7.6. GPIO Pins

**VSW**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio1_pin = PD10 | USER1 |
| INAV | PinIO | pinio1_pin = PD10 | USER1 |
| ArduPilot | Relay | GPIO 81 | RELAY2 |

**Video in Selector (C1/C2)**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | PinIO | pinio2_pin = PD11 | USER2 |
| INAV | PinIO | pinio2_pin = PD11 | USER2 |
| ArduPilot | Relay | GPIO 82 | RELAY3 |

# 7.7. Voltage Sensor Settings

**INAV Battery Input 1 (up 69 V)**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

**INAV Battery Input 2 (up to 69V)**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

**ArduPilot Battery Input 1 (up 69 V)**

| | |
|---|---|
| BATT_MONITOR: | 4 |
| BATT_VOLT_PIN | 10 |
| BATT_VOLT_MULT | 11.0 |

**ArduPilot Battery Input 2 (up to 69V)**

| | |
|---|---|
| BATT2_MONITOR: | 4 |
| BATT2_VOLT_PIN | 18 |
| BATT2_VOLT_MULT | 11.0 |

# 7.8. Current Sensor Settings

**INAV Input 1**

| | |
|---|---|
| Scale: | 200 |
| Offset: | 0 |

**INAV Input 2**

| | |
|---|---|
| Scale: | Depends on used Sensor |
| Offset: | Depends on used Sensor |

**ArduPilot Input 1**

| | |
|---|---|
| BATT_CURR_PIN | 11 |
| BATT_AMP_PERVLT | 40.0 |

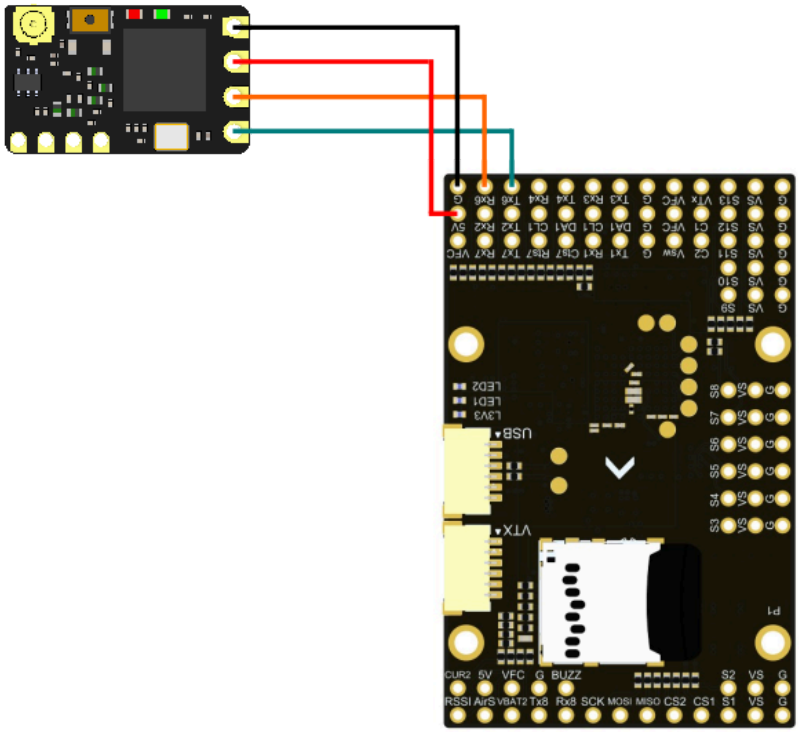
**ArduPilot Battery Input 2**

| | |
|---|---|
| BATT2_CURR_PIN | 7 |
| BATT2_AMP_PERVLT | Depends on used Sensor |

# 7.9. Peripheral Connections

## 7.9.1. Receiver

**Receiver connection**



**Note:** Receiver and FC pin layout match up, allowing the receiver to be direct soldered. When done as in the picture above, the *Bind* button can become hard to reach!

**Port Settings - BETAFLIGHT/ INAV**

| | |
|---|---|
| UART 6: | Serial RX: on |

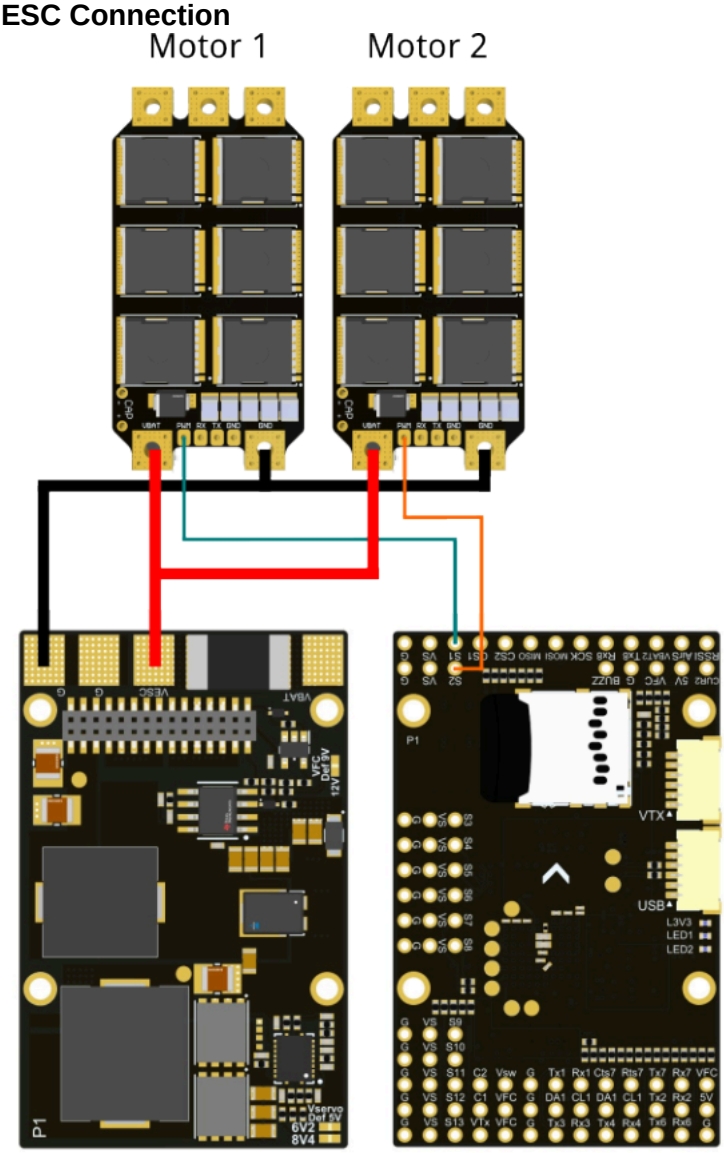
**ArduPilot**

| | |
|---|---|
| SERIAL6: | Depends on chosen protocol (MAVLink, CRSF) |

**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 7.9.2. ESC

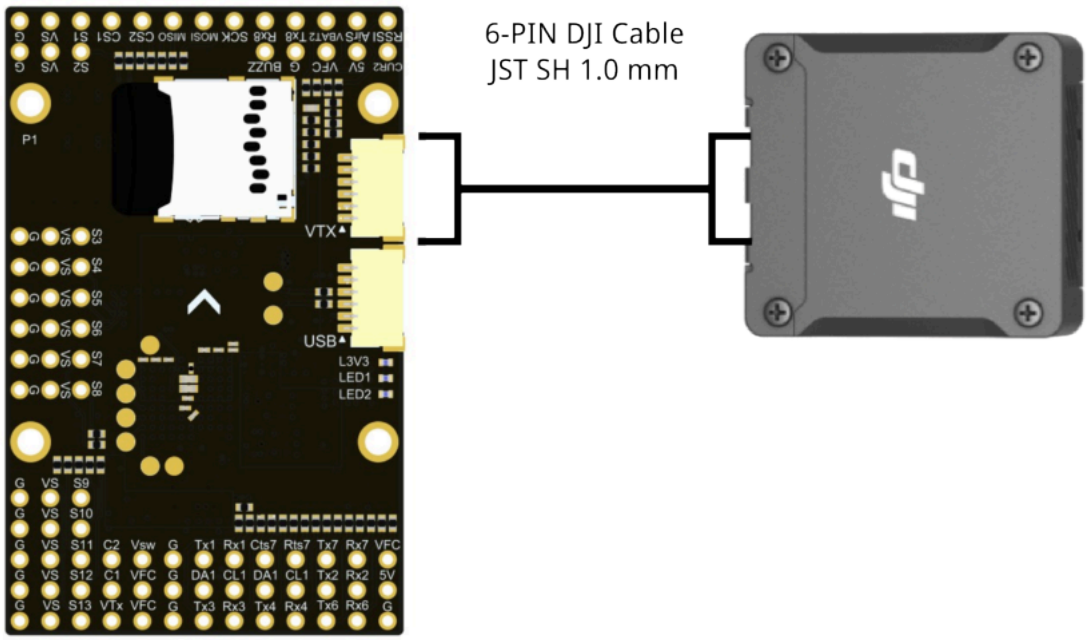
**ESC Connection**




## 7.9.3. HD Video Systems

Connect your VTX to the designated port for the HD video system.

### HD System Connection




The supply voltage is fixed 9 V.

### Port Settings

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baud rate: 115200[19] |

### Included Receiver Settings (optional)

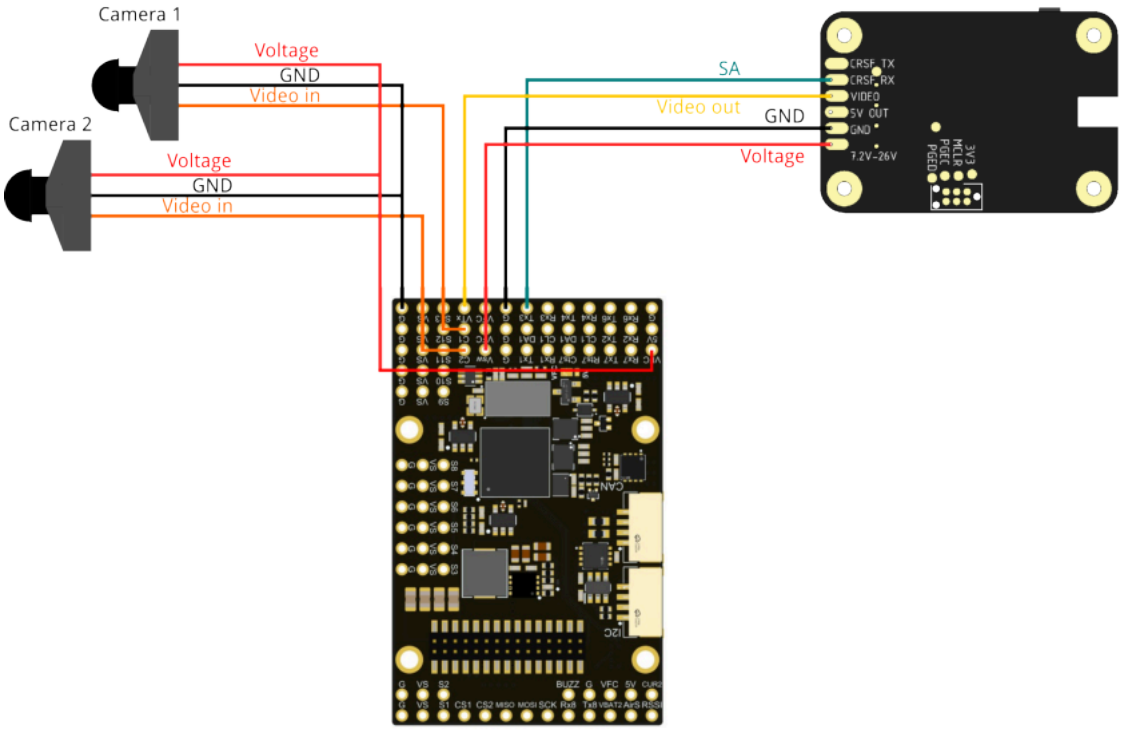
| | |
|---|---|
| UART 1: | Serial RX: on |
| UART 6: | Serial RX: off[20] |

## 7.9.4. Analog Video Systems

**Note:** By wiring the VTX to the PINIO connector an selecting the correct voltage for your VTX, you can disable the VTX when on the ground by software.

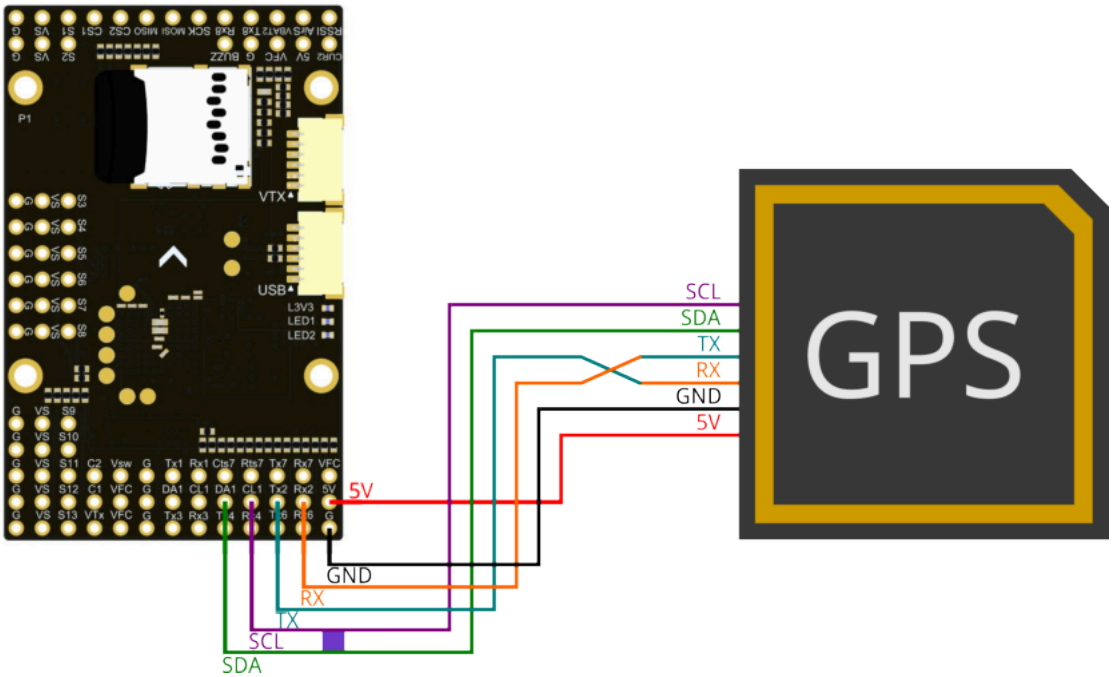
(19) *Baud rate might be different. Check the video system manual for details.*
(20) *Disables the external receiver*

### Analog Video setup




## 7.9.5. GPS and Compass

### GPS Connection




**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

**BETAFLIGHT/ INAV Settings**

| | |
|---|---|
| UART 2: | Peripheral: GPS |
| | Baud rate: depends on GPS |

# 8. H7 FC - Wing AIO

## 8.1.

The TBS LUCID H7 Wing AIO 2-6S 50A is your quick plug & play wing FC for flying wings with up to 1m wingspan, or 1.5kg of takeoff weight (approximately). Running the STM32H7 chip, a custom AM32 50A ESC in a sleek, heat-dissipating plastic case with plug connectors for peripherals such as servos, VTx, Camera, GPS and external USB.

Designed for both seasoned pros and enthusiastic newcomers, this flight controller takes the chore out of building your FPV setup and gets you up and running quicker and easier.

## 8.2. Specification

**Note:** The lower part of the housing acts as a heat-sink.

**FC**

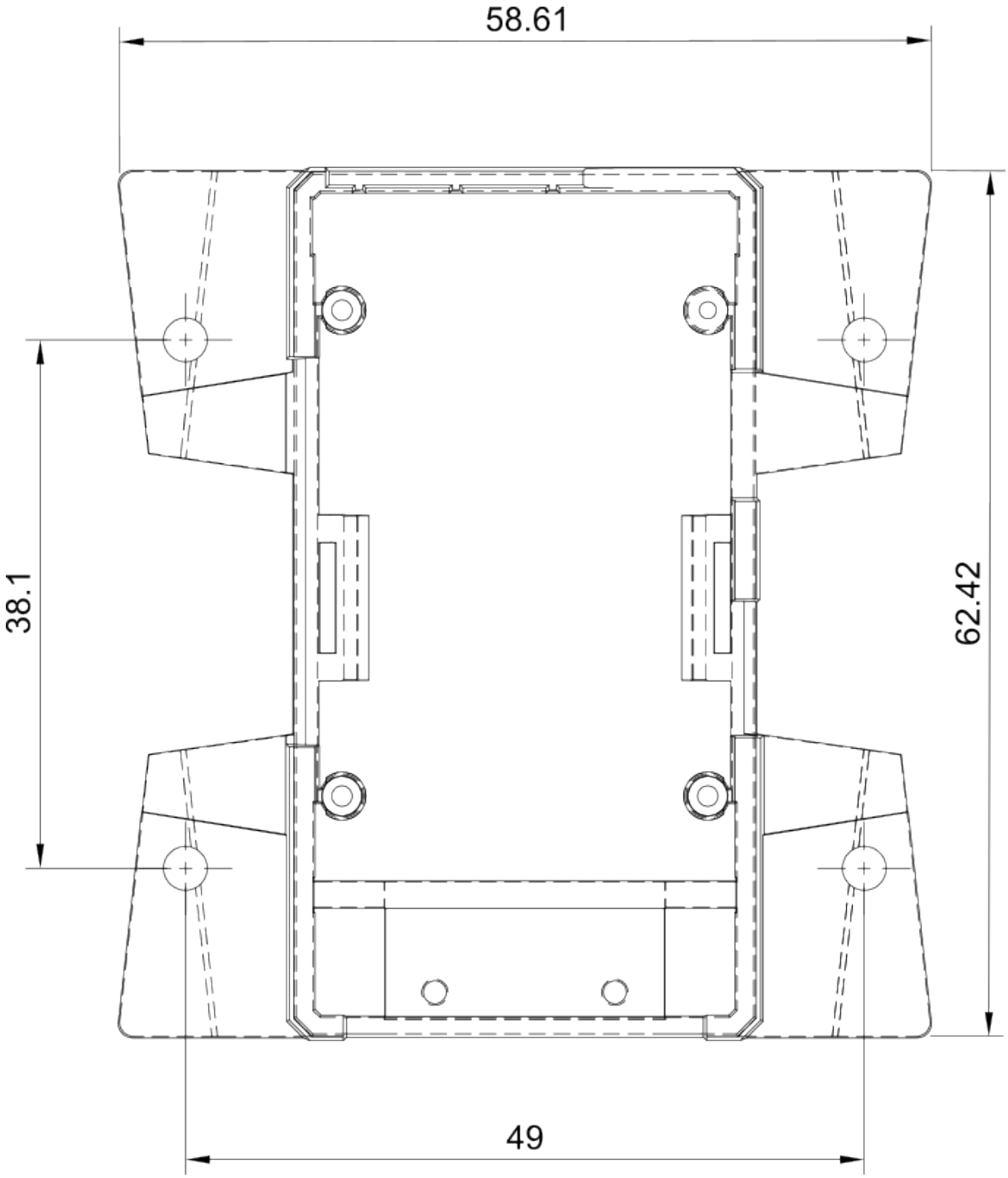
| | | | |
|---|---|---|---|
| Processor: | STM32H743VIH6 | Weight: | 51 g |
| IMU: | ICM-42688P (SPI1)<br>ICM-42688P (SPI4) | Receiver: | Connected by Plug |
| Baro: | Infineon DPS310 | DJI Airunit: | Supported by Plug |
| Input Voltage: | 3-6 S | Blackbox: | By SD Card |
| BEC Voltage: | 5/6.2/7.2/8.4 V 5A (21)<br>5 V 1A (22) | OSD: | Built-in |
| UARTs | 7 | Servo Outputs | 6 (23) |
| I2C Ports: | 2 | Size: | 59 x 63 x 22.4 mm |
| Additional Features: | SPI, CAN, Current Sensor, Additional Analog Inputs(24), USB-C Extension Board w. Buzzer | | |

(21) *Servo, VTX, Camera*
(22) *Receiver, GPS, CAN bus*
(23) *6 accessible, 1 extra for internal ESC connection*
(24) *RSSI, Airspeed Sensor, User1, User2*

**ESC**

| | | | |
|---|---|---|---|
| Firmware: | AlkaMotors32 (AM32) | Weight: | 5 g |
| Input Voltage: | 3-6 S | Motor Outputs | 1, MR30 Connector |
| Current: | 40 A (60 s) | Protocols: | DShot 300/600 |
| | 50 A (peak 10 s) | | ESC Telemetry |
| Mounting | Soldered on to FC | Size: | 31.3 x 23.4 mm |

# 8.3. Mounting - Dimensions




**Notice:** All dimensions are given in mm

# 8.4. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| INAV | TBS_LUCID_H7_WING_MINI | 8.0.1 |
| ArduPilot(25) | INAV TBS_LUCID_H7_WING | 4.6.0 BETA 2 |
| AM32 (ESC) | AM32_TBS_6S_4in1_F421 | 2.18 |

# 8.5. Serial Ports

**Serial Ports**

| Port | Usage | Available Pins |
|---|---|---|
| UART 0 | USB | Full UART |
| UART 1 | S.Bus | Full UART (just RX on DJI plug) |
| UART 2 | VTX/ Spare | Full UART with DMA(26) |
| UART 3 | MSP, HD Video Connector | Full UART with DMA |
| UART 4 | Receiver | Full UARTFull UART |
| UART 6 | GPS | Full UART with DMA |
| UART 7 | ESC Telemetry | Used internaly |
| UART 8 | Spare | Full UART (27) |

**ArduPilot Specification**

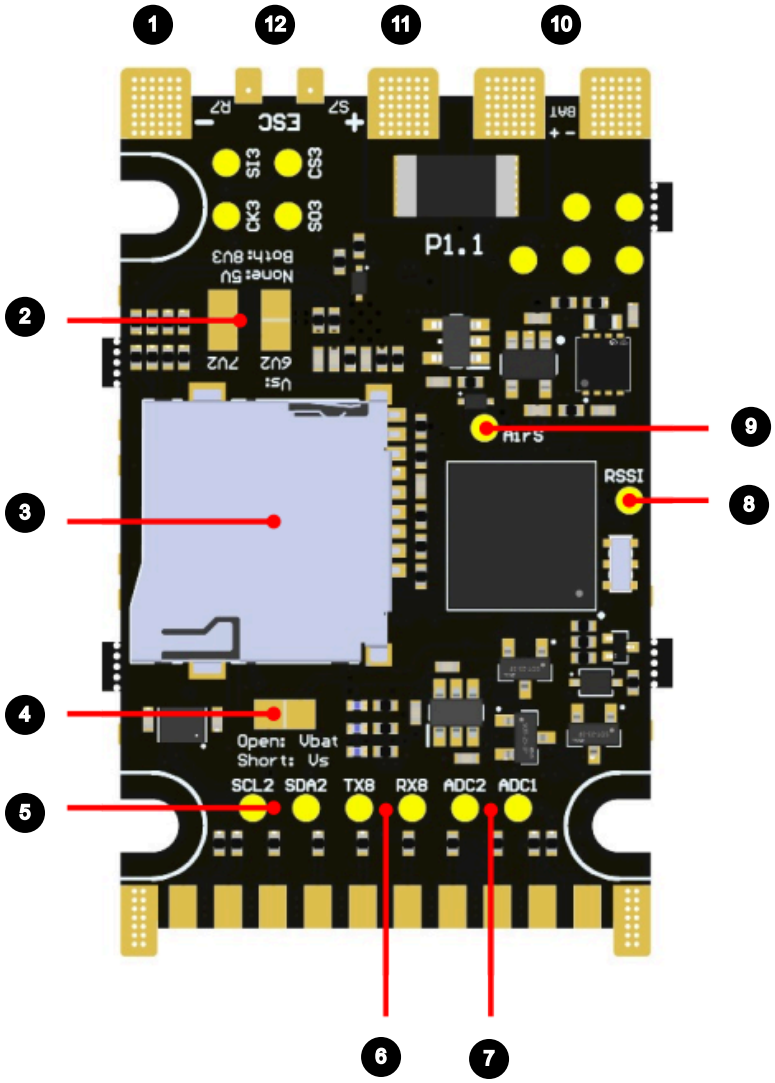
| Port | Ardu-Port | Ardu-Usage | 5V Tolerant |
|---|---|---|---|
| UART 0 | SERIAL0 | USB | Yes |
| UART 1 | SERIAL1 | S.Bus | Yes |
| UART 2 | SERIAL2 | VTX/ Spare | Yes |
| UART 3 | SERIAL3 | MSP Displayport | Yes |
| UART 4 | SERIAL4 | Receiver | Yes |
| UART 6 | SERIAL6 | GPS1 | Yes |
| UART 7 | SERIAL7 | ESC | no, 3.3 V |
| UART 8 | SERIAL8 | TELEM2 | Yes |

(25) *Ardu Wiki for settings*
(26) *Located on the Servo Connector*
(27) *Accessible as solder-point inside the cover*

# 8.6. Pinout

**Note:** Status LEDS are installed but not visible when installed in to the housing

### Top Plate




| | | |
|---|---|---|
| 1 - ESC GND | 2 - Servo Voltage Selector | 3 - SD Card Holder |
| 4 - HD-Video port Voltage Selector (VBAT/ VServo (2)) | 5 - I2C 2 | 6 - UART 8 |
| 7 - ADC 1 / 2 (28) | 8 - Analog RSSI in | 9 - Analog Airpseedsensor in |
| 10 - Battery In | 11 - ESC VBAT | 12 - ESC Signal |

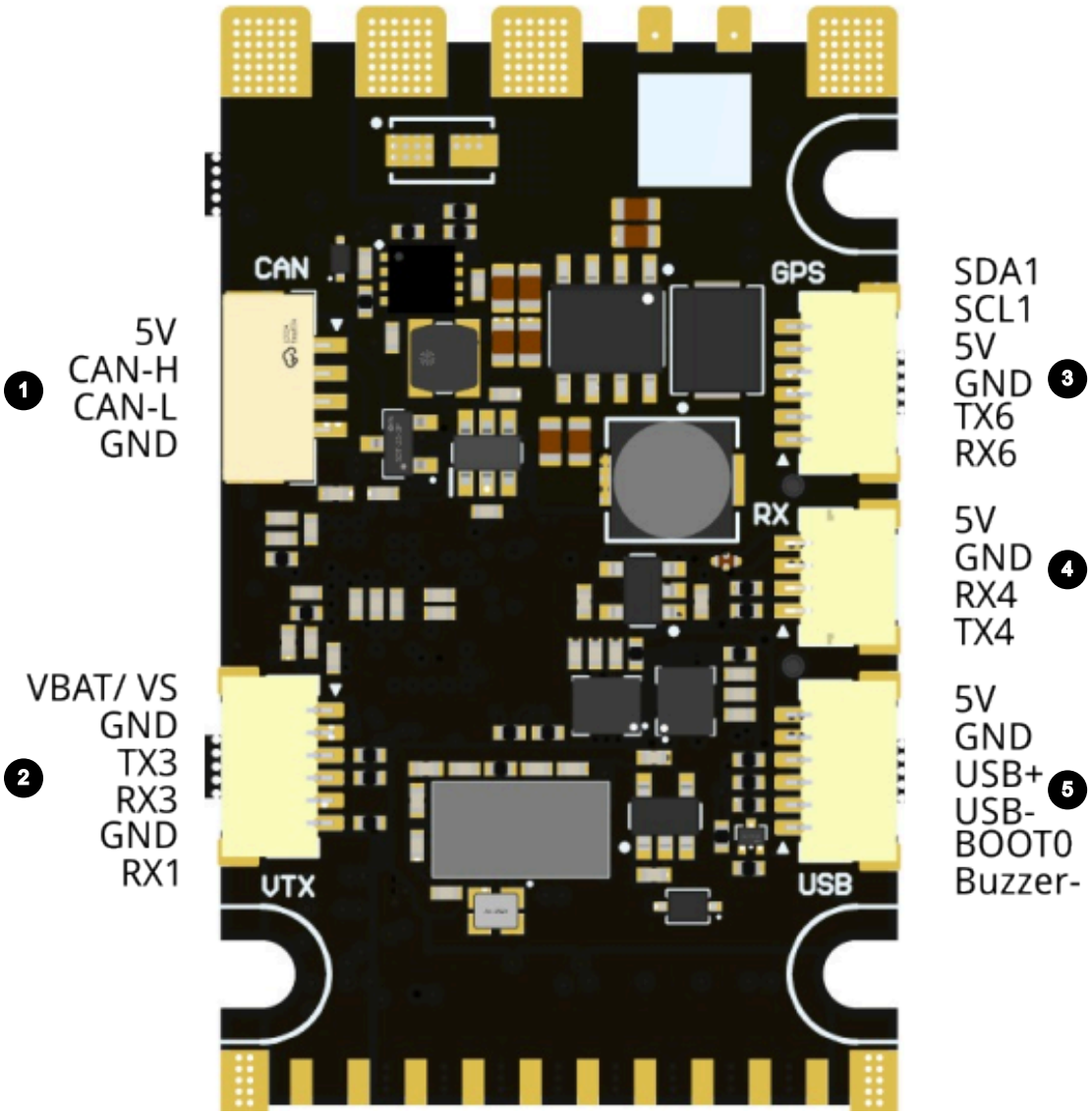
(28) *Internally used for VBAT and Current Sensor*

**Servo Voltage Selector settings (2)**

| Pin | 5V | 6.2V | 7.4V | 9.2V |
|---|---|---|---|---|
| 6V2 | open | closed | open | closed |
| 7V2 | open | open | closed | closed |

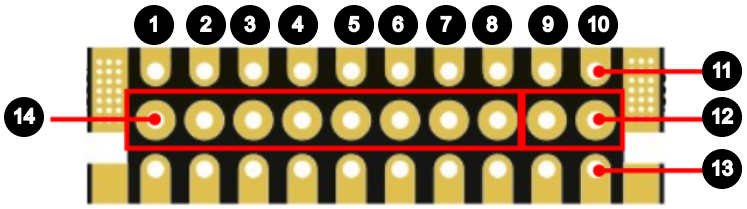
**Important:** Don't cross-bridge the voltage selector pads

**Bottom Plate**



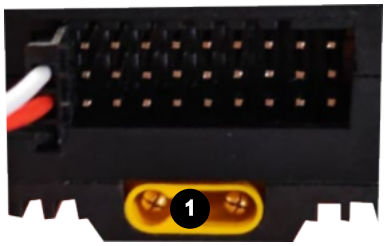

| | | |
|---|---|---|
| 1 - CAN-Conenctor | 2 - DJI Connector | 3 - GPS-Connector |
| 4 -Receiver-Connector | 5 - USB Connector | |

### Servo Connector - Front View

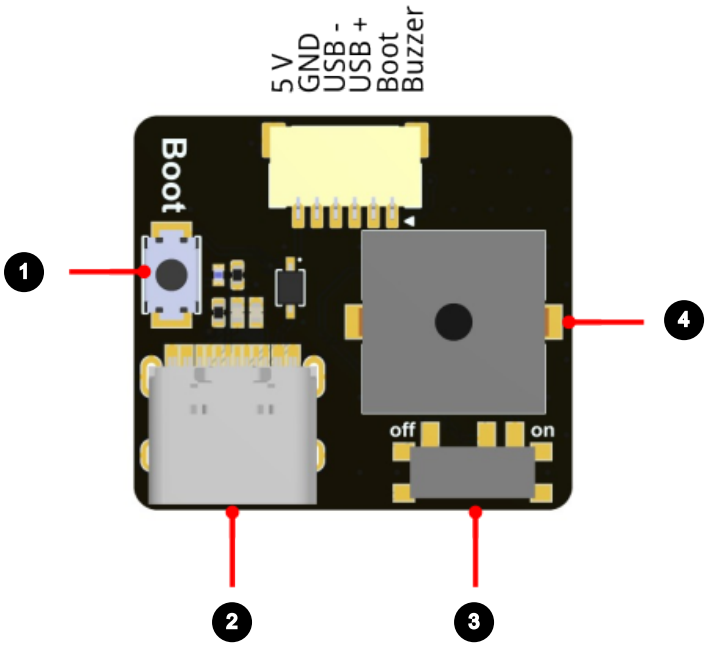



| | | |
|---|---|---|
| 1..6 - Servo 1-6 | 7 - TX 2 | 8 - RX 2 |
| 9 - Analog Video In | 10 - Analog Video Out | 11 - Signal Row |
| 12 - Voltage FPV (HD-Voltage selector) | 13 - GND Row | 14 - Servo Voltage Row (Vservo selector) |

### Front with Motor-Connector (1)




### USB Board




| | |
|---|---|
| 1 - Boot-Button | 2 - USB-C Port |
| 3 - Buzzer On/OFF Switch | 4 - Buzzer |

# 8.7. GPIO Pins

**VSW**

| Firmware | Function Name | CLI/ Settings | Function |
|---|---|---|---|
| BETAFLIGHT | / | / | / |
| INAV | PinIO | pinio1_pin = PD10 | USER1 |
| ArduPilot | Relay | GPIO 81 | RELAY 2 |

**Note:** The PINIO turns off power supply on the HD-Video connector and the analog-video-servo pins

# 8.8. Voltage Sensor Settings

**INAV**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

**ArduPilot**

| | |
|---|---|
| BATT_MONITOR: | 4 |
| BATT_VOLT_PIN | 10 |
| BATT_VOLT_MULT | 11.0 |

# 8.9. Current Sensor Settings

**INAV**

| | |
|---|---|
| Scale: | 200 |
| Offset: | 0 |

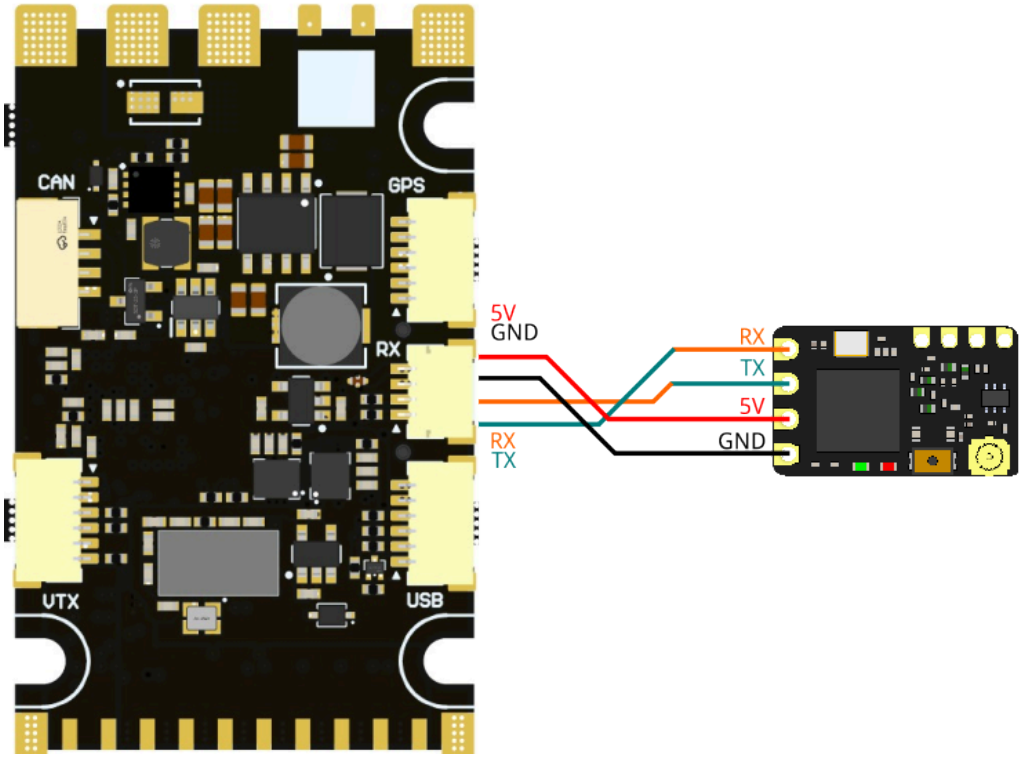
**ArduPilot**

| | |
|---|---|
| BATT_CURR_PIN | 11 |
| BATT_AMP_PERVLT | 40.0 |

# 8.10. Peripheral Connections

## 8.10.1. Receiver

**Receiver connection**




**Port Settings - BETAFLIGHT/ INAV**

| | |
|---|---|
| UART 4: | Serial RX: on |

**ArduPilot**

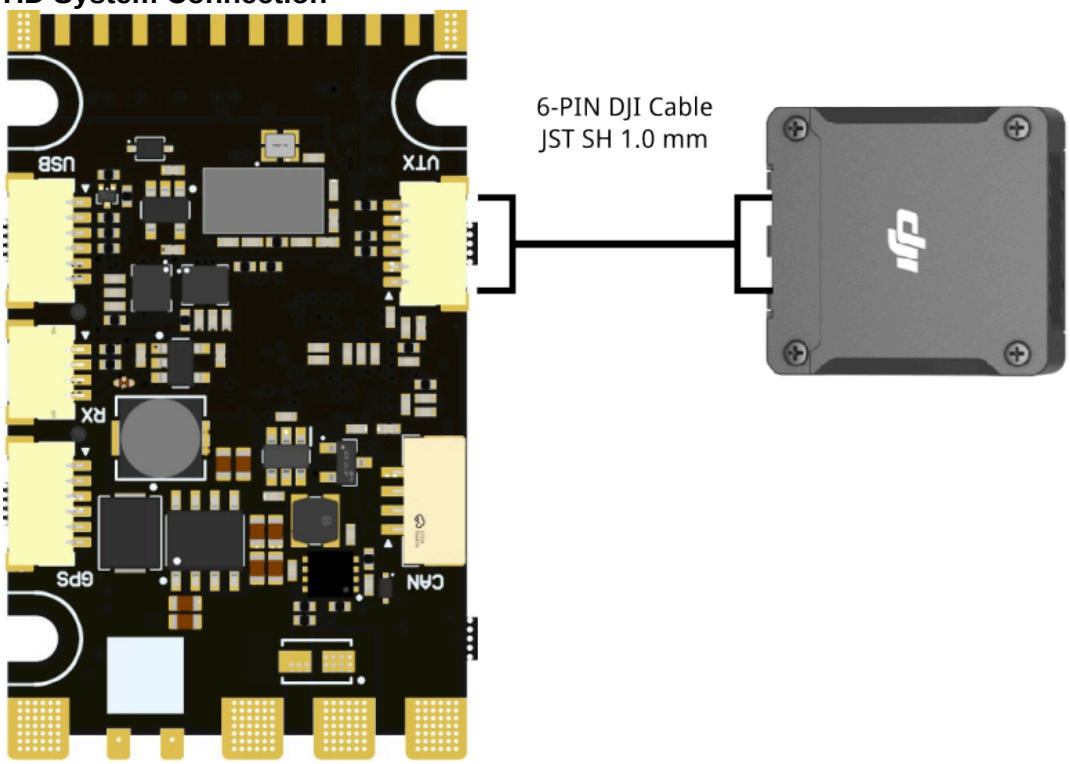
| | |
|---|---|
| SERIAL4: | Depends on chosen protocol (MAVLink, CRSF) |

**Note:** Further information on the settings can be found in the CROSSFIRE/TRACER manual

## 8.10.2. HD Video Systems

Connect your VTX to the designated port for the HD video system.

### HD System Connection




**Note:**

The supply voltage is either VBAT or Servo voltage.

### Port Settings

| | |
|---|---|
| UART 3: | MSP: on/ Peripherals: Displayport |
| | Baud rate: 115200[29] |

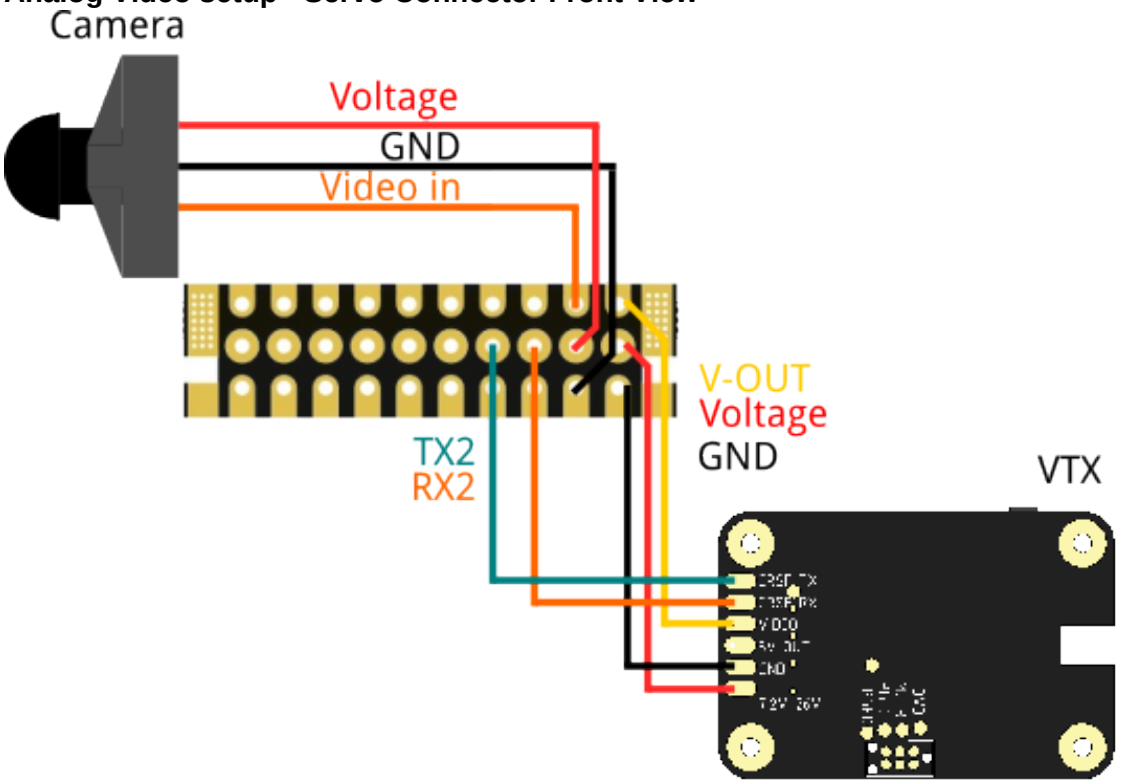
### Included Receiver Settings (optional)

| | |
|---|---|
| UART 1: | Serial RX: on |
| UART 6: | Serial RX: off[30] |

(29) *Baud rate might be different. Check the video system manual for details.*
(30) *Disables the external receiver*

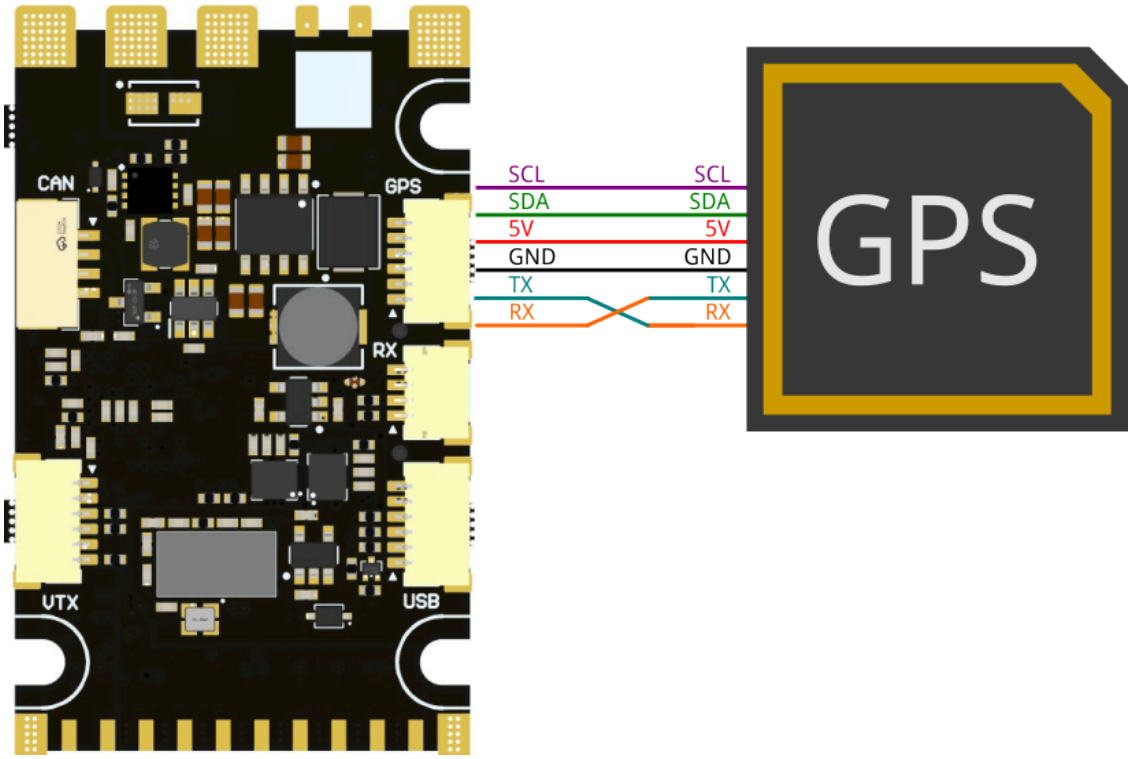
## 8.10.3. Analog Video

**Analog Video setup - Servo Connector Front View**




## 8.10.4. GPS and Compass

**GPS Connection**



**Note:** RX and TX must be swapped on one device (FC TX → GPS RX)

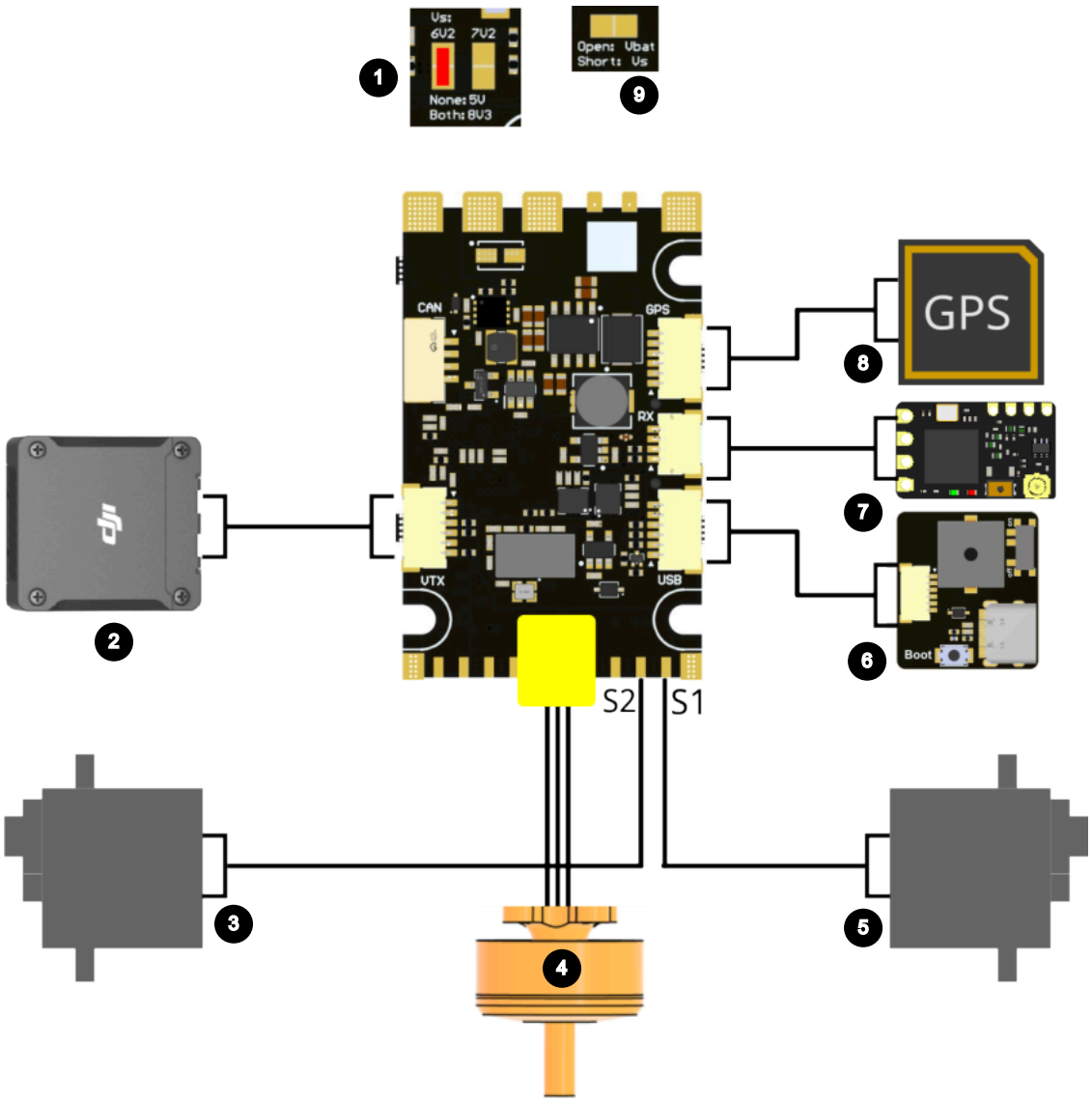
**Port Settings**

| | |
|---|---|
| UART 6: | Peripheral: GPS |
| | Baud rate: depends on GPS |

# 8.11. Connection Excaple

## 8.11.1. TBS CHUPITO Connection Example

**Wiring Example - Bottom View**




| | | |
|---|---|---|
| 1 – Voltage Selector Servos | 2 – HD-VTX | 3 – Servo Left Elevon incl. Servo Extension |
| 4 – Motor | 5 – Servo Right Elevon incl. Servo Extension | 6 – USB-Board |
| 7 – Receiver | 8 – GPS | 9 – Voltage Selector VTX |

**Note:** The VTX Voltage selector (9) must be left open if the video system requires more than 6.2 V to operate.

# 9. Wing PDB

## 9.1.

There is no doubt that innovation and choice in quadcopter FC's outpaces those of their wing counterparts. Yet, separate wing FC's are necessary due to the limited wiring space, lack of current sensing, necessary voltage rails and more. There are flight controllers specifically for wings, but they create a tasty bundle of wire spaghetti in your wing, which can lead to reliability issues at worst, or are an eye sore at best.

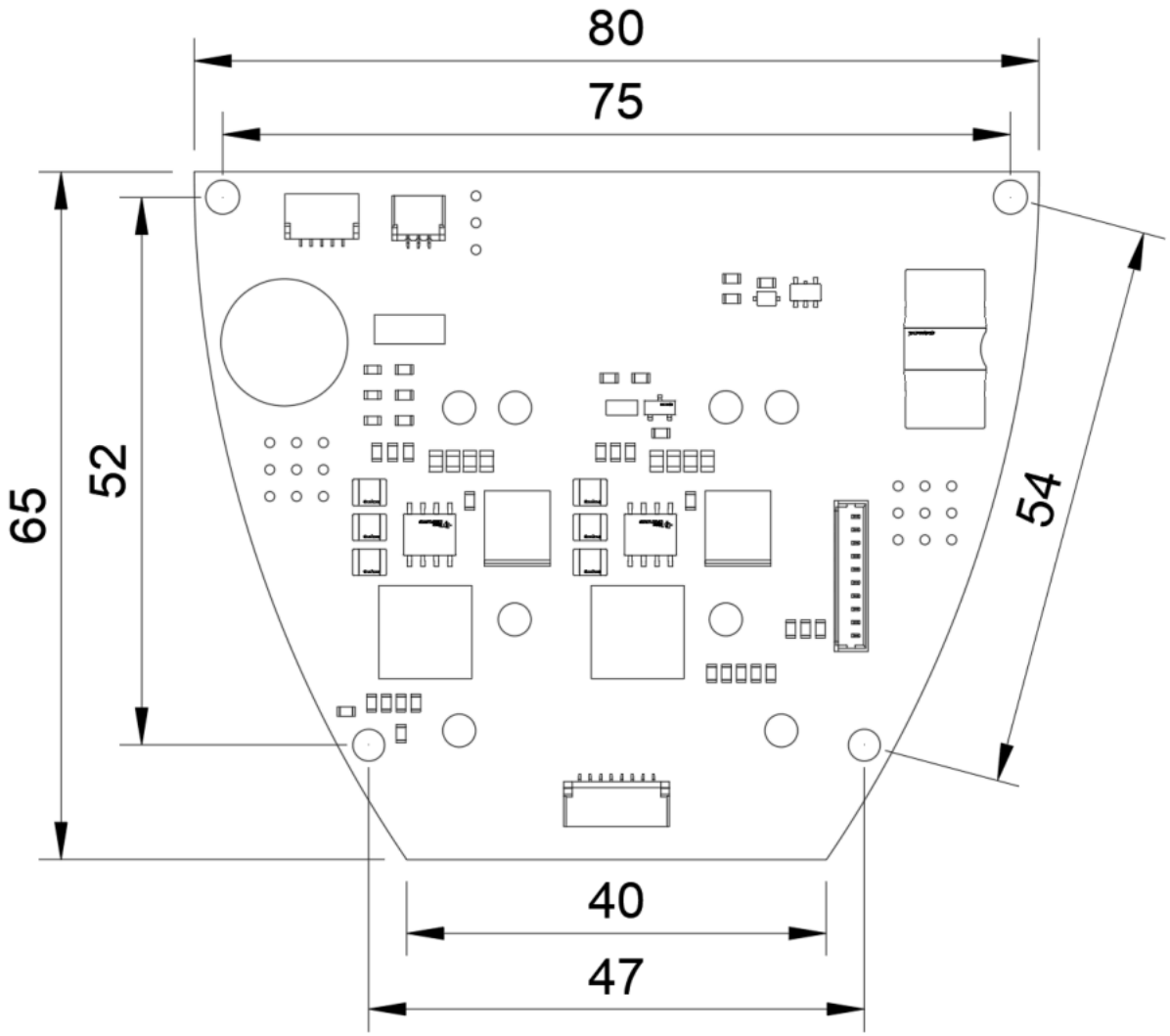
Admittedly, this PDB is made predominantly for the TBS's wing, but it's compatible with any wing that has up to 4[31]/ 8[32] control servos and one or two motors. As such, it's worth a consideration to clean up both your analog or digital builds and recycle one of the 20x20 or 30.5x30.5 FCs you've surely got laying around.

## 9.2. Specification

| | | | |
|---|---|---|---|
| Current | | Weight: | 26.5 g |
| Input Voltage: | 14 S (60 V) max. | Motor Outputs | 2 |
| Current: | 90 A (continuous) | Servo Outputs | 6 (V1) |
| | 200 A (peak) | | 10 (V2) |
| Current Sensor: | Yes | BEC: | 6 V/ 4 A (V1) |
| Voltage Sensor: | Yes | | 5/8 V 4 A (V2) |
| Mounting | 3D Files available | Size: | 34x22 mm |

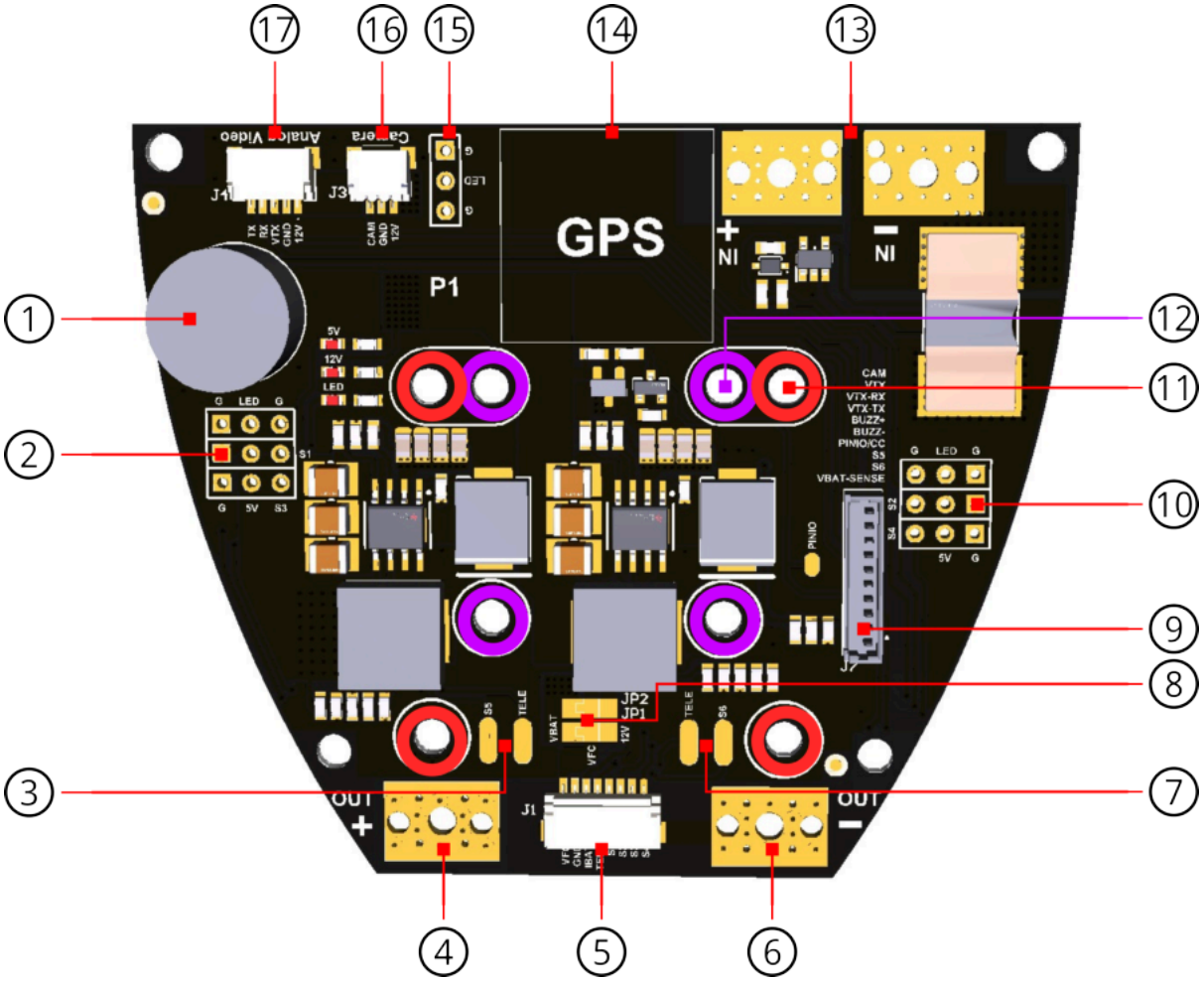
(31) *V1 PDB*
(32) *V2 PDB*

# 9.3. Mounting - Dimensions




**Notice:** All dimensions are given in mm

# 9.4. Pinout V1

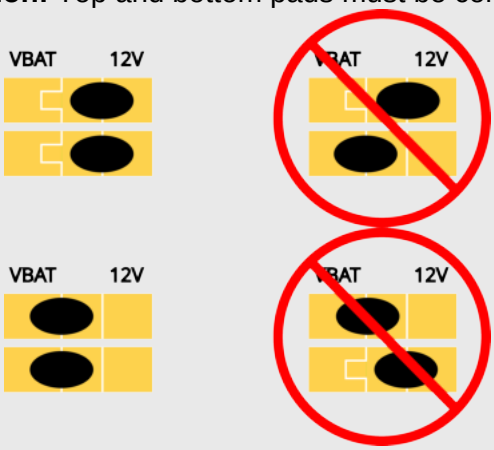



| | | |
|---|---|---|
| 1 - Buzzer | 2 - LED/ Servo Pins (1/3) | 3 - Motor 1 - Signal |
| 4 - Motor Power pad (+) | 5 - FC/ ESC Connector (LUCID FC) | 6 - Motor Power pad (-) |
| 7 - Motor 2 - Signal | 8 - FC Voltage Selector (12V/ VBAT) | 9 - FC/ Peripheral Connector |
| 10 - LED/ Servo Pins (2/4) | 11 - 30.5x30.5 mm FC Mounting | 12 - 20x20 mm FC Mounting |
| 13 - Battery Input Pads | 14 - GPS Space | 15 - LED Pin |
| 16 - Camera Connector | 17 - VTX Connector | |

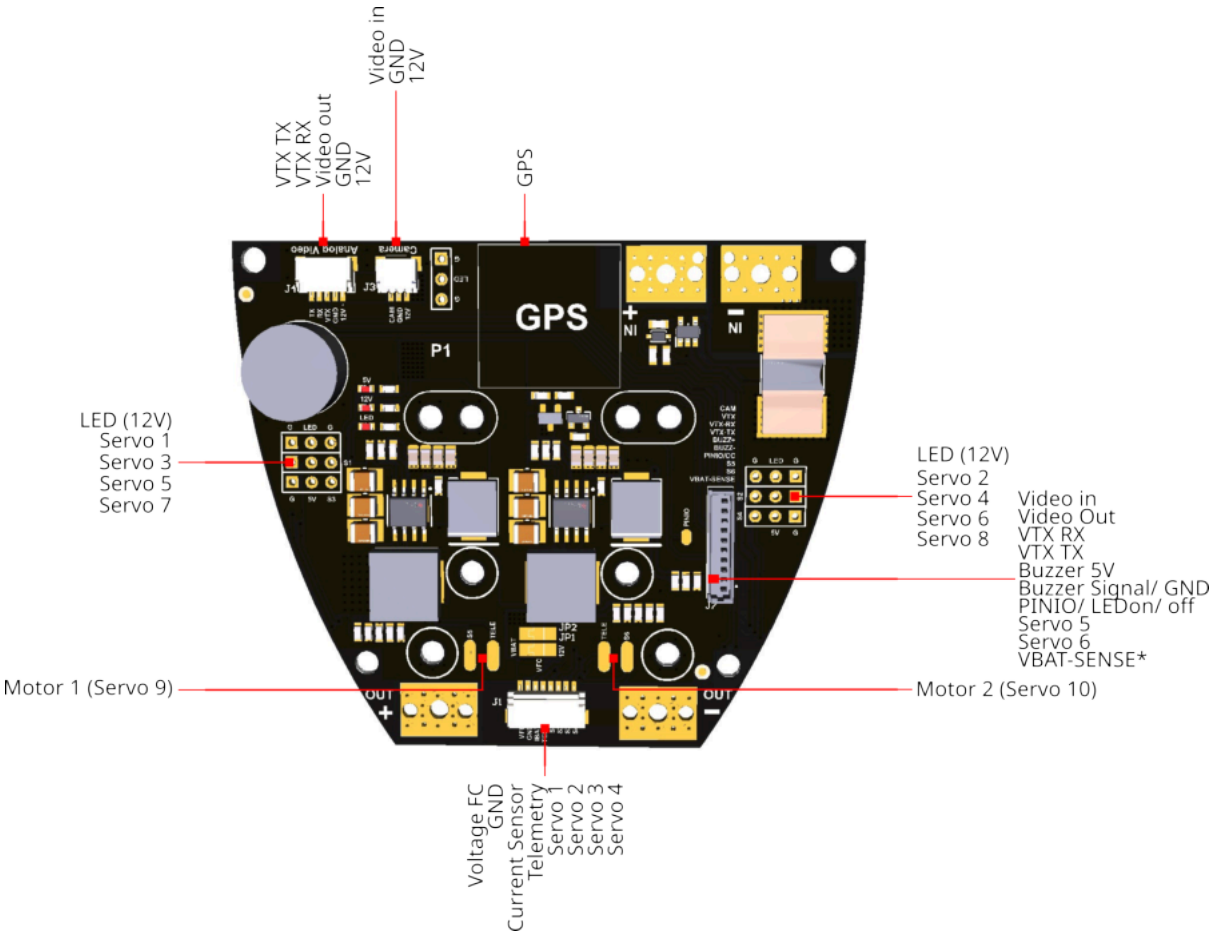
**Voltage Selector**

| 8 - Left/ Center | 8 - Right/ Center |
|---|---|
| FC Supply Battery Voltage | FC Supply 12V |

**Attention:** Top and bottom pads must be connected to the same side/ voltage



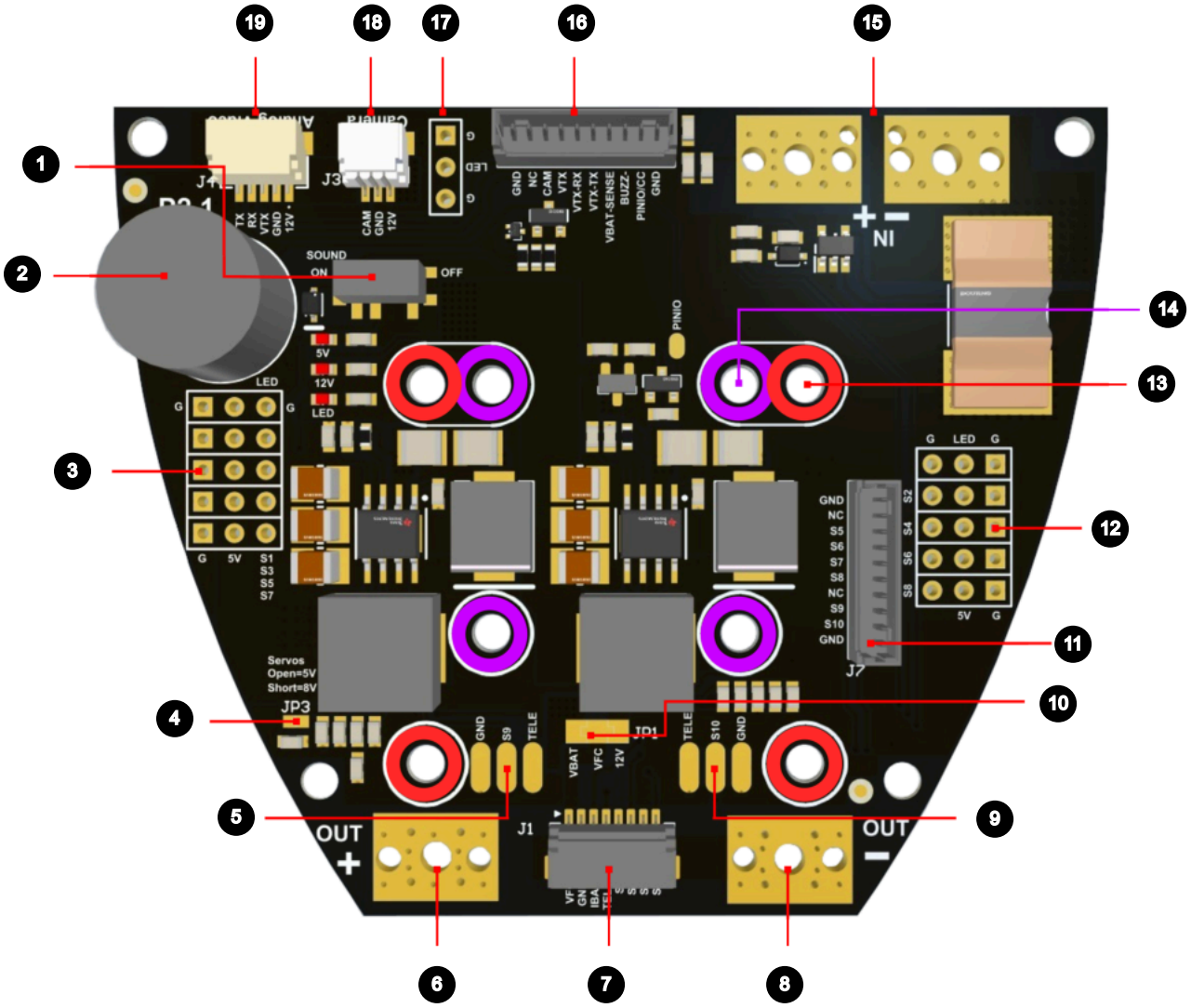

setting




**Note:** * VBAT Sensor must only be used when the FC voltage selector is set to **12 V**[33]

(33) *CC-Pad on LUCID F4 Pro/ Freestyle FC*

# 9.5. Pinout V2

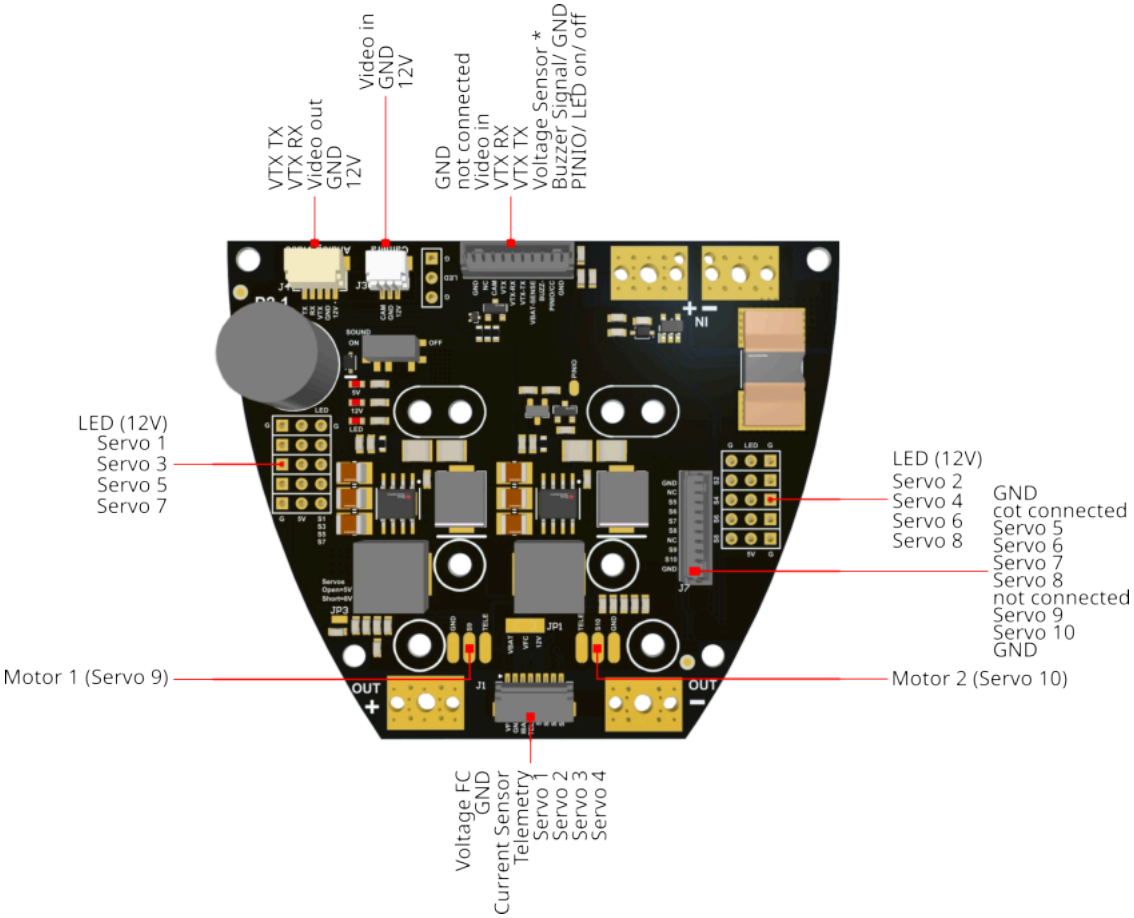



| | | |
|---|---|---|
| 1 - Buzzer on/off switch | 2 - Buzzer | 3 - LED/ Servo Pins (1/3/5/7) |
| 4 - Servo Voltage Selector (5/ 8 V) | 5 - Motor 1 - Signal | 6 - Motor Power pad (+) |
| 7 - FC/ ESC Connector (LUCID FC) | 8 - Motor Power Pad (-) | 9 - Motor 2 - Signal |
| 10 - FC Voltage Selector (12V/ VBAT) | 11 - FC /Servo Connector | 12 - LED/ Servo Pins (2/4/6/8) |
| 13 - 30.5 x 30.5 mm FC Mounting | 14 - 20 x 20 mm FC Mounting | 15 - Battery Input Pads |
| 16 - FC/ Peripheral Connector | 17 - LED Pin | 18 - Camera Connector |
| 19 - VTX Connector | | |

**Voltage Selectors**

| 4 - Open | 4 - Closed | 8 - Left/ Center | 8 - Right/ Center |
|---|---|---|---|
| Servos 5 V | Servos 8 V | FC Supply Battery Voltage | FC Supply 12 V |

**Attention:** Bridging all pads will cause a short




**Note:** * VBAT Sensor must only be used when the FC voltage selector is set to **12 V**(34)

# 9.6. Voltage Sensor Settings

**Note:** Only set up when using the voltage sensor pin for the measurement

(34) *CC-Pad on LUCID F4 Pro/ Freestyle FC*

**INAV**

| | |
|---|---|
| Scale: | 2100 |
| Offset: | 0 |

# 9.7. Current Sensor Settings

**INAV**

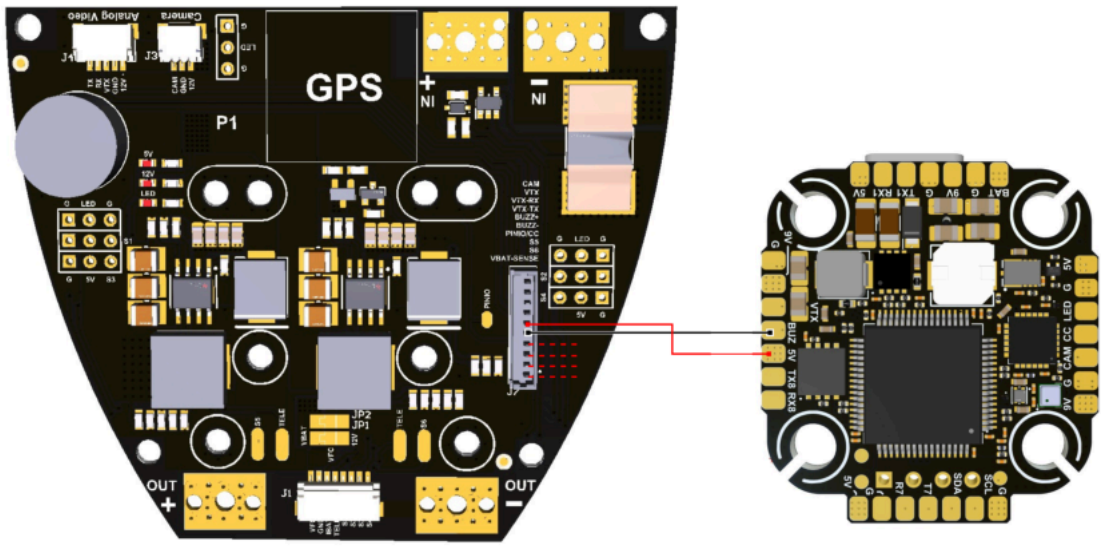
| | |
|---|---|
| Scale: | 250 |
| Offset: | 0 |

# 9.8. Peripheral Connections

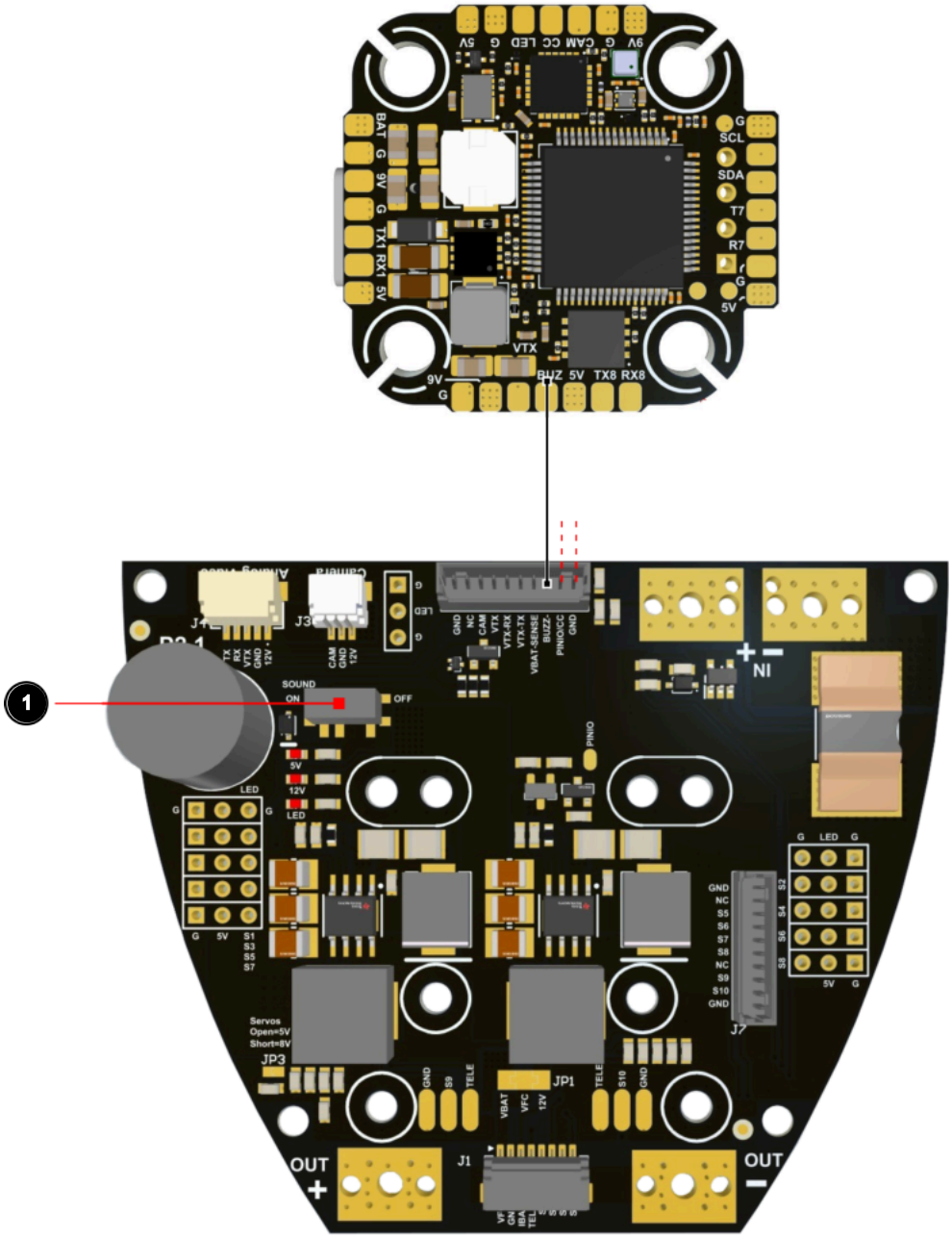
## 9.8.1. Buzzer

Connected to the PCB, the internal buzzer is either powered by the FC's 5 V pad (PDB V1) or by the PDB (PDB V2).

**PDB V1 Buzzer Connection**



### PDB V2 Buzzer Connection




**Note:** The buzzer can be disabled on the PCB by the built-in switch (1)

## 9.8.2. LEDs

The LED pins on the PDB are connected to the internal 12 V supply and controlled by the *PINIO* pad.

Connect it to a pin of your FC and set it to be used as *I/O*. If voltage level on the *PINIO* pad switches to high (3.3 V) the 12 V output will torn on.

With a CROSSFIRE/ TRACER receiver, the GPIO function can be used as well. Make sure the receiver and the PDB share the same ground.

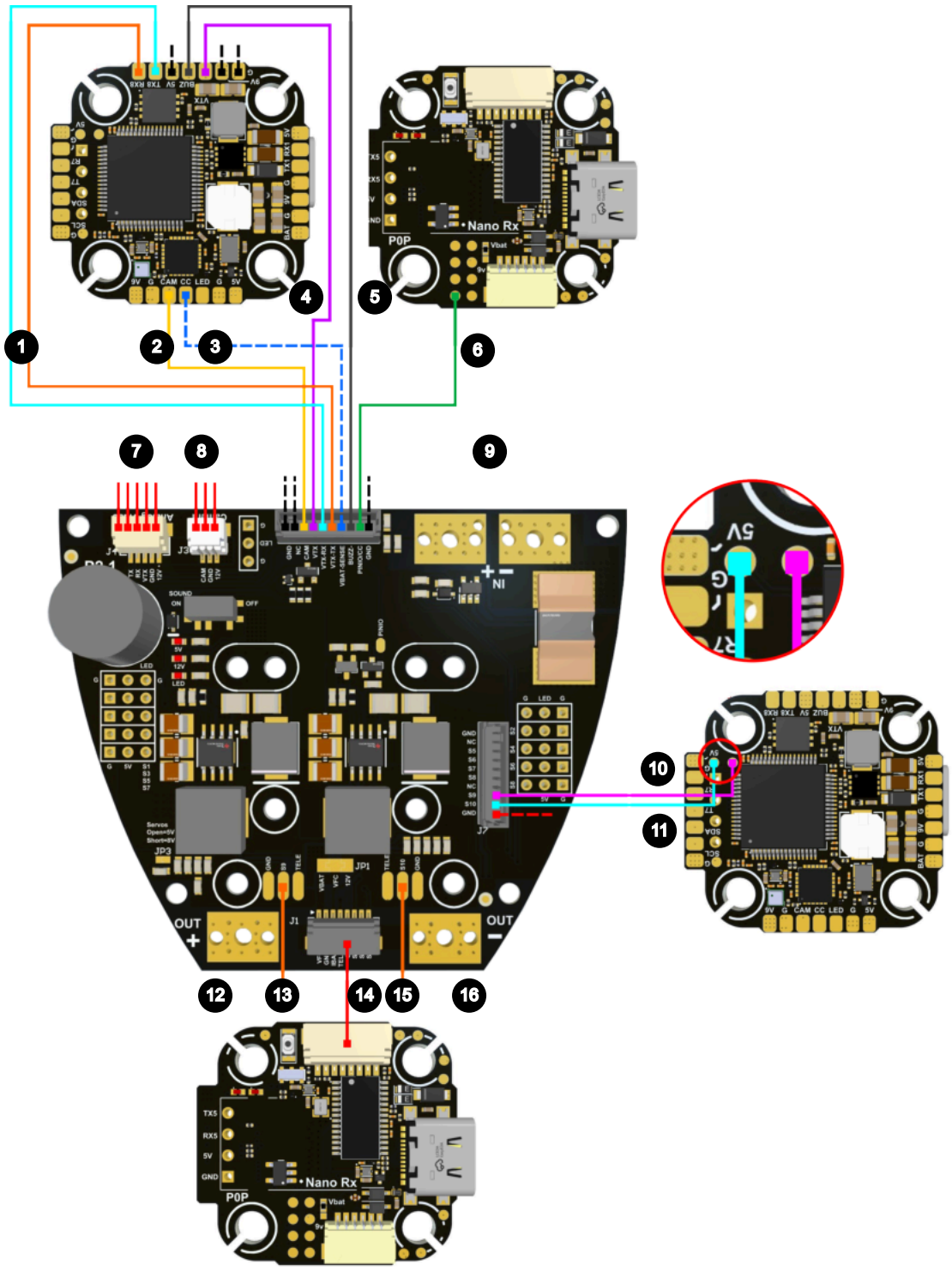
**Note:** The outer pins of the connector are both connected to ground, center to +12 V.

**Note:** If no signal is connected to the *PINIO* pad, the ELD supply will remain `off`

# 9.9. Connection Excaple

## 9.9.1. LUCID F4 FC Connection - Example

**Wiring-example - TBS MOJITO**



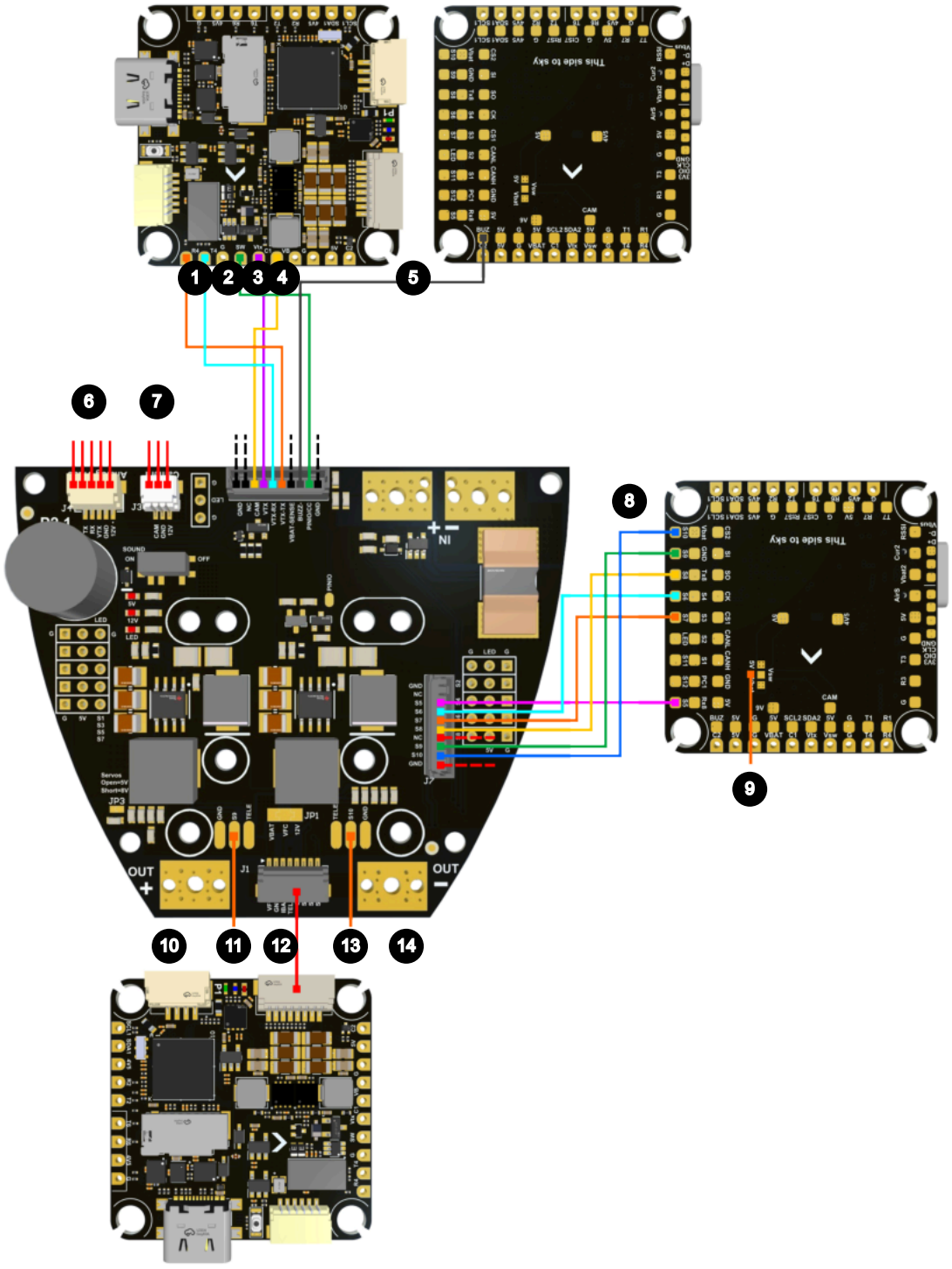
| | | |
|---|---|---|
| 1 - VTX Serial (SmartAudio, CRSF) | 2 - Video In (Camera) | 3 - Camera Control/ Voltage Sensor(37) |
| 4 - Video Out (VTX) | 5 - Buzzer | 6 - LED Control (*PinIO*) |
| 7 - Video Out - To VTX | 8 - Video in - To Camera | 9 - Battery Ins |
| 10 - Servo 9 - Motor 1 | 11 - Servo 10 - Motor 2 | 12 - ESC Power Out *VBAT* |
| 13 - ESC 1 Signal | 14 - FC/ESC Connector (38) | 15 - ESC 2 Signal |
| 16 - ESC Power Out *GND* | | |

**Important:** Voltage Sensor (3) and *Camera Control* use the same pin. Do not connect both at the same time. **When using the Voltage Sensor, the *Camera Control* function must not be activated.**

(37) *Voltage Sensor when FC is powered by 12 V*
(38) *Connects VBAT, Current sensor and Servo 1-4*

## 9.9.2. LUCID H7 FC Connection - Example

**Wiring-example - TBS MOJITO**




| | | |
|---|---|---|
| 1 - VTX Serial (SmartAudio, CRSF) | 2 - LED Control (*PinIO*) | 3 - Video Out (VTX) |
| 4 - Video In (Camera) | 5 - Buzzer | 6 - Video Out - To VTX |

| | | |
|---|---|---|
| 7 - Video in - To Camera | 8 - Servo 5..10 | 9 - Voltage Selector PinIO |
| 10 - ESC Power Out VBAT | 11 - ESC 1 Signal | 12 - FC/ESC Connector (40) |
| 13 - ESC 2 Signal | 14 - ESC Power Out *GND* | |

**Important:** Voltage Selector (9) must be set to **5 V**.

**Note:** Servo 9 (10) must be connected for motor 1(2) signal. Servo 5..8 are optional.

*(40) Connects VBAT, Current sensor and Servo 1-4*

# 10. Single ESC - 12S

## 10.1.

The TBS LUCID12S ESC is a force to be reckoned with. Built for high voltage and high power applications that demand high reliability and power at your fingertips.

Featuring an 8-layer high current density board with excellent heat resistance, the ESC is built to withstand the harshest punishment of everyday flying while delivering excellent payload capabilities. With built-in TVS, voltage spikes are no longer a concern. The ESC achieves excellent power-to-weight density without needing heavy heat sinks by focusing on thermal dissipation from the ground up.

A close collaboration with AM32 allowed us to squeeze the last bit of performance without breaking the bank.

## 10.2. Specification

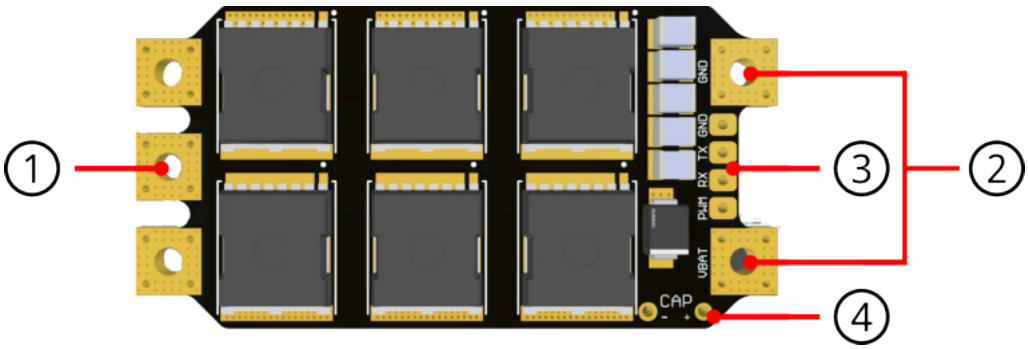
| | | | |
|---|---|---|---|
| Firmware: | AlkaMotors32 (AM32) | Weight: | 19 g |
| Input Voltage: | 3-12 S | Motor Outputs: | 1 |
| Current: | 60 A (Continuous) | Protocols: | DShot 300/600 with ESC Telemetry |
| | 70 A (peak, 60 s) | | KISS ESC Telemetry |
| | 90 A (peak 40 s) | | CRSF |
| | 120 A (peak 30 s) | | PWM |
| Mounting | / | Size: | 58x29 mm |

## 10.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| AlkaMotors32 | AM32_TBS_12S_F415 | 2.18 |



# 10.4. Pinout

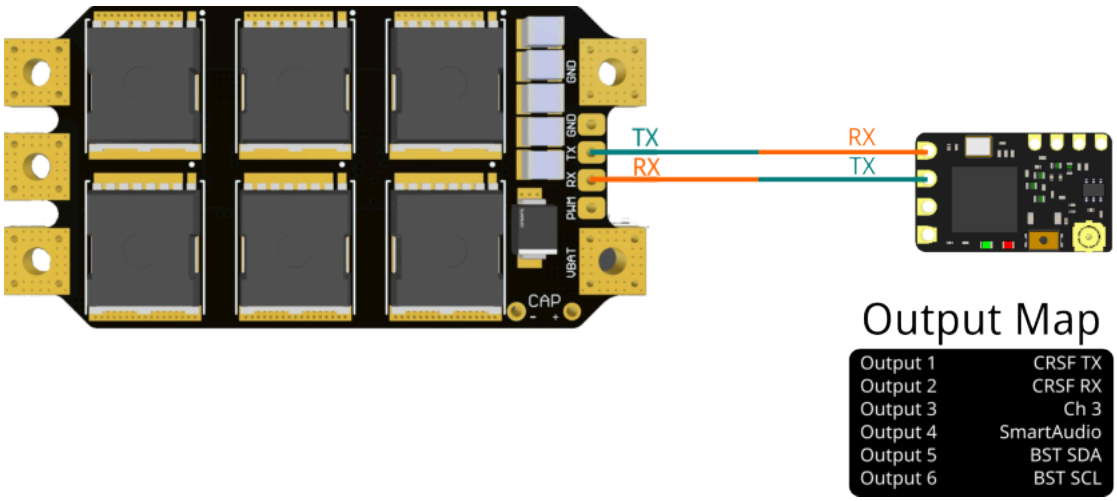



| | |
|---|---|
| 1 - Motor | 2 - Input/ Battery |
| 3 - RC Input | 4 - External Capacitor Pads |

# 10.5. Peripheral Connections

## 10.5.1. Receiver - CRSF

**CRSF Connection**



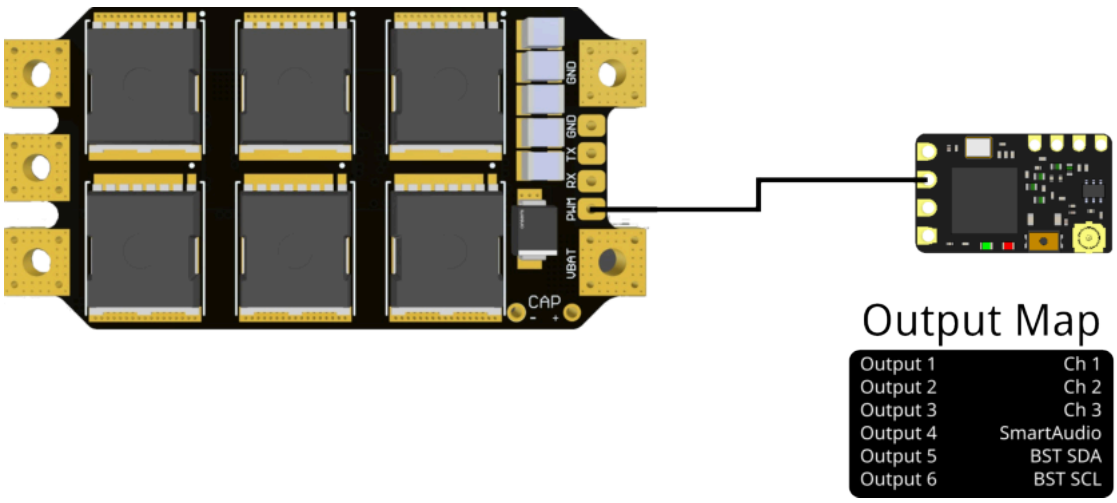

CRSF enables extra features over other protocols:

- Configuration on the fly (by TBS AGENT through the connected CROSSFIRE/ TRACER connection)
- Telemetry Sensors
- CRSF as RC input signal (channel selectable by CRSF menu)

## 10.5.2. Receiver Connection - PWM

When using an FC, its recommended to use CRSF *(on page 87)*, KISS Telemetry or DShot or

**CRSF Connection**



# 11. 4in1 ESC - 3-6S

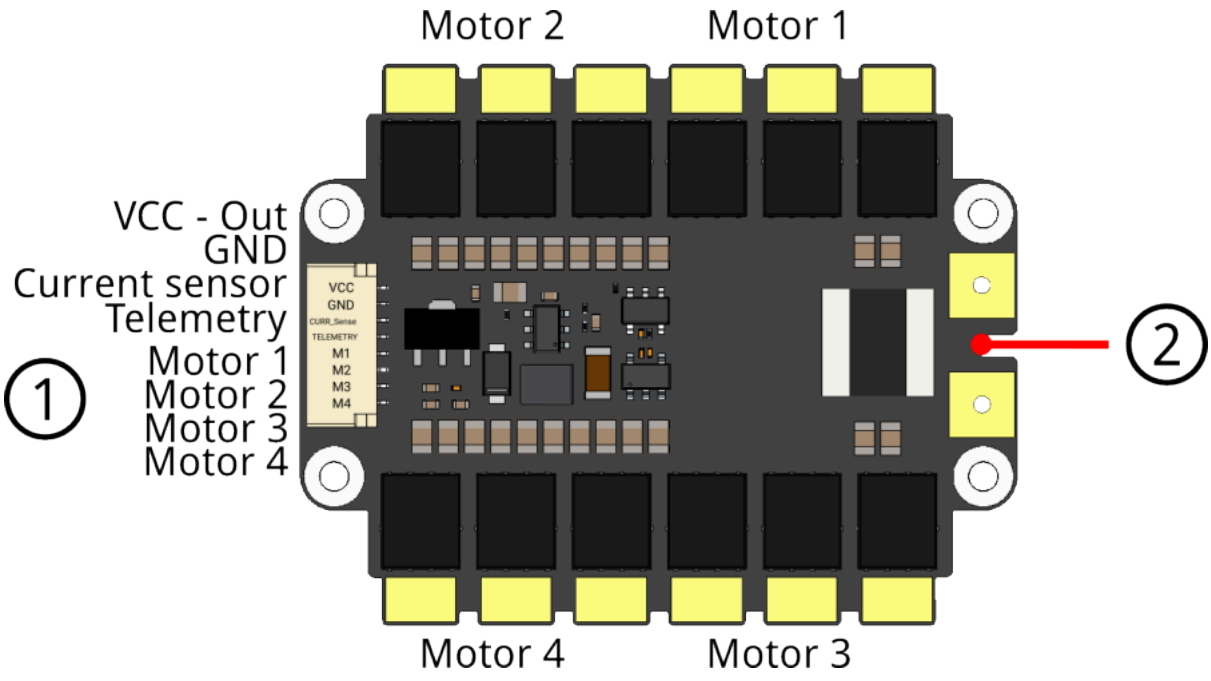
## 11.1. Specification

| | | | |
|---|---|---|---|
| Firmware: | AlkaMotors32 (AM32) | Weight: | 13.81 g |
| Input Voltage: | 3-6 S | Motor Outputs | 4 |
| Current: | 60 A (continuous) | Protocols: | DShot 300/600 with ESC Telemetry |
| | 70 A (peak, 60 s) | | KISS ESC Telemetry |
| Current Sensor: | Yes | | CRSF |
| Voltage Sensor: | No | | PWM |
| Mounting | Gorilla Pattern, M2 | Size: | 34x22 mm |

## 11.2. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| AlkaMotors32 | AM32_TBS_6S_4IN1_F421 | 2.18 |

## 11.3. Pinout



| | |
|---|---|
| 1 - FC Connector | 2 - Input/ Battery, Capacitor |

# 11.4. Capacitor

Depending on the motor size used, certain capacitors need to be installed on the hardware.

**Important:** The cable length of the capacitor must not exceed 1 cm

| Motor Size | Capacitor (ESC) | Capacitor (FC) |
|---|---|---|
| 22 - 24 mm | min. 500 µF | not required |
| 25 - 29 mm | min. 1000 µF | not required |
| ≥30 mm | min. 1000 µF | min. 220 µF (recommended) |

# 11.5. Current Sensor Settings

**BETAFLIGHT**

| | |
|---|---|
| Scale: | 125 |
| Offset: | 0 |

**INAV**

| | |
|---|---|
| Scale | 125 |
| Offset: | 0 |

# 12. 4in1 ESC - 3-8S

## 12.1.

Featuring an 8-layer high current density board with twice the market average on-board capacitance, the ESC is built to withstand the harshest punishment of everyday FPV flying while delivering buttery-smooth flight characteristics paired with face-melting acceleration. By focusing on thermal dissipation from the ground up, the flight stack achieves excellent power to weight density without the need of heavy heat sinks.

## 12.2. Specification

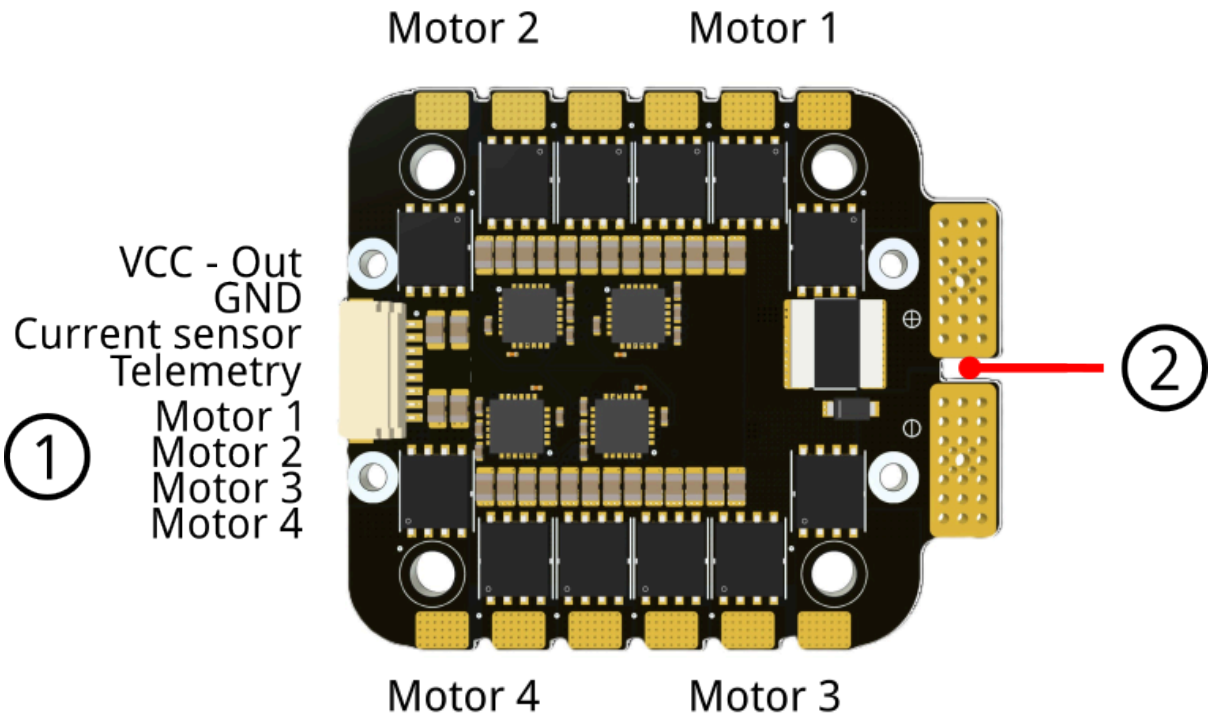
| | | | |
|---|---|---|---|
| Firmware: | AlkaMotors32 (AM32) | Weight: | 17.58 g |
| Input Voltage: | 3-8 S | Motor Outputs | 4 |
| Current: | 4 x 55 A (peak, 60 s) | Protocols: | DShot 300/600 with ESC Telemetry |
| | 85 A (peak, 10 s) | | KISS ESC Telemetry |
| Current Sensor: | Yes | | CRSF |
| Voltage Sensor: | No | | PWM |
| Mounting | Gorilla Pattern (M2) | Size: | 34x44 mm |
| | 30.5x30.5 mm (M3) | | |

## 12.3. Firmware

| Firmware | Target | Min. FW Version |
|---|---|---|
| AlkaMotors32 | AM32_TBS_8S_4IN1_F421 | 2.18 |



# 12.4. Pinout




| | |
|---|---|
| 1 - FC Connector | 2 - Input/ Battery, Capacitor |

# 12.5. Capacitor

Depending on the motor size used, certain capacitors need to be installed on the hardware.

**Important:** The cable length of the capacitor must not exceed 1 cm

| Motor Size | Capacitor (ESC) | Capacitor (FC) |
|---|---|---|
| 22 - 24 mm | min. 500 µF | not required |
| 25 - 29 mm | min. 1000 µF | not required |
| ≥30 mm | min. 1000 µF | min. 220 µF (recommended) |

# 12.6. Current Sensor Settings

**BETAFLIGHT**

| | |
|---|---|
| Scale: | 50 |
| Offset: | 0 |

**INAV**

| | |
|---|---|
| Scale: | 50 |
| Offset: | 0 |

# Changelog

| Revi-sion | Date | Changes |
|---|---|---|
| 1.00 | / | • Initial release after moving from GDocs<br>• General revision |
| 1.01 | / | • FC F4<br>◦ Corrected BF Scaling Value<br>◦ Included INAV Scaling |
| 1.02 | 2025-07-29 | • Style<br>◦ Fixed Image Map colors<br>◦ incl. Note Pictogram<br>• General<br>◦ Added GPIO Section to relevant FC's<br>◦ Updated Voltage/ Current Scaling on all FC's<br>• Wing PDB<br>◦ Updated V2 Pinout<br>◦ V2 Servo Voltage Selector correction (open/closed)<br>◦ Added FC wiring example with V2 PDB an LUCID F4 FC<br>• F4 FC<br>◦ Cleanup in Pinout Section<br>◦ Added for Freestyle FC voltage selector (HW Revision)<br>• ESC's<br>◦ Fixed Current Sensor Scaling |
| 1.03 | 2025-08-10 | • New Hardware: H7 Wing FC |
| 1.04 | 2025-08-14 | • FC H7 Wing<br>◦ Fixed Receiver wiring (Power to 5V) |
| 1.05 | 2025-08-15 | • New Hardware: FC Wing Mini AIO |
| 1.06 | 2025-08-19 | • FC Wing Mini AIO<br>◦ Specification: note about the housing<br>◦ Added Note about the installation direction<br>◦ Servo connections moved to the "correct" side |

| Revi-sion | Date | Changes |
|---|---|---|
| | | • FC F4<br>◦ Added CLI command to use GPIO pins as USER1/2 |
| 1.07 | 2025-08-22 | • Layout<br>◦ Changelog moved to the end of the document<br>• FC Wing Mini AIO<br>◦ Input Voltage Range fixed<br>◦ Weight corrected<br>◦ Wiring example VTX voltage jumper changed<br>• FC H7 Wing<br>◦ Weight corrected |
| 1.08 | 2025-08-29 | • Layout<br>◦ Changed all tables to full page with<br>• FC F4 Pro/Freestyle<br>◦ Updated Spec: Voltage range<br>◦ Servo 5/6 label swapped<br>◦ Fixed CLI command pin number for PINIO User 1<br>• FC H7 Wing<br>◦ ESC Wiring Power Lines corrected |