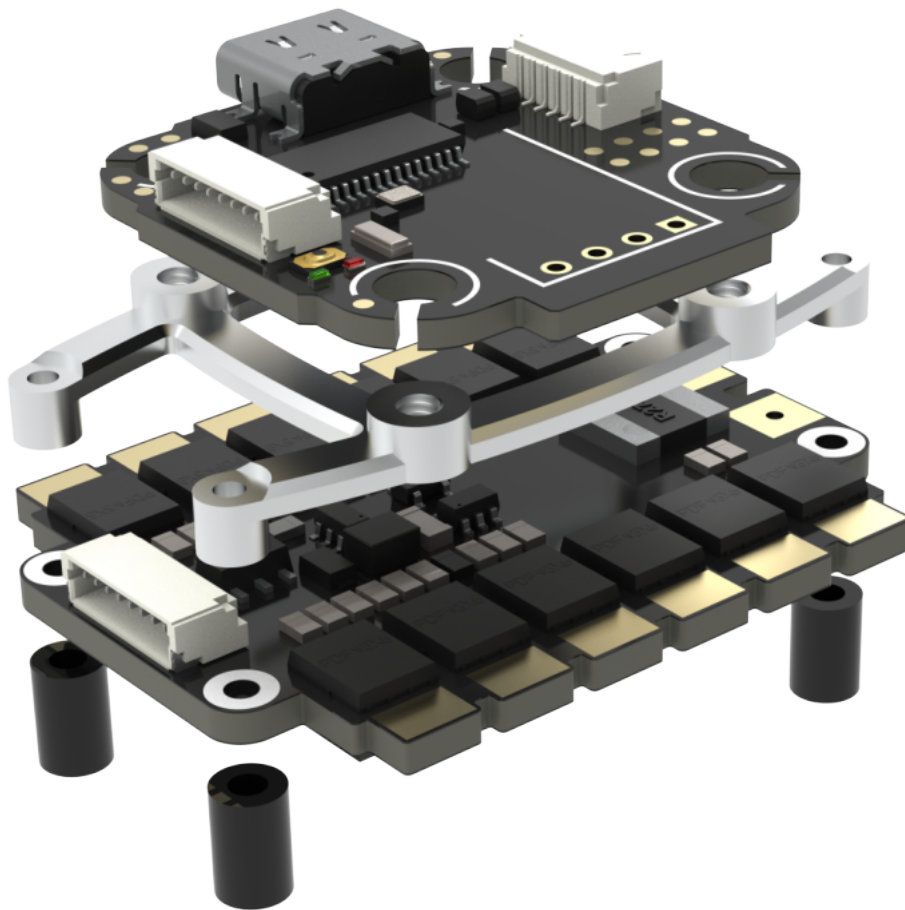

TBS LUCID

FC, ESC and Accessory series



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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. About this Manual

This document is part of the product. Read it carefully before using the LUCID.

1.2.1. Updates

This manual is subject to change due to technical development.

Visit the [TBS website](#) and check for updated versions.

1.2.2. Usage

In this manual, the GPIO section of each FC chapter has a table including the *MCU Pin-row*. The entry's in this row are there for reference and must **not** be entered in to the command line of the FC firmware configurator unless stated otherwise.

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	CameraControl	PC5	CameraControl

1.3. 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⁾

⁽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



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⁾

1.4. Drivers

1.4.1. AT32 DFU Driver

In order to flash the FC's with AT32 chip, the correct DFU driver must be installed:

1. Visit the Artery™ website <https://arterytek.com>
2. Visit **Support > Program and Debug**
3. Search for *ISP Programmer*

AT32 Driver Download

ISP Programmer In-System-Programming tool supporting AT32 MCU	 05_ISP ISP	ALL_MCUs	V2.0.18	2025/09/22
--	---	----------	---------	------------

4. Download the file and unpack it
5. Install the Driver Artery_ISP_Programmer_V2.0.18.zip
 \Artery_DFU_DriverInstall\Artery_DFU_driverInstaller.exe

1.4.2. STM32 DFU Driver

In order to flash the FC's with STM32® chip, the correct DFU driver must be installed.

ImpulseRC™ Driver Fixer

1. Visit the ImpulseRC website <https://impulserc.com/>
2. Download the *ImpulseRC Driver Fixer*
3. Bring the FC in to the *Bootloader Mode* by the FC firmware
4. Start the ImpulseRC™ Driver Fixer

⁽⁵⁾ AGENT Desktop/ Web only works with TBS gear like CROSSFIRE, TRACER or FUSION



1.5. External Firmwares

1.5.1. Am32 ESC Firmware

- [Website](#)
- [Github project page](#)
- [Online Configurator](#)

1.5.2. ArduPilot

ArduPilot firmware is open-source software that serves as an autopilot for various unmanned vehicles, including drones (Copter, Plane), ground vehicles (Rover), and underwater robots (Sub), enabling autonomous flight, navigation, and control by running on flight controller hardware, with options to build custom versions for specific needs or limited hardware.

- [Website](#)
- [Github project page](#)
- [Configurator overview](#)

1.5.3. BETAFLIGHT

BETAFLIGHT is an open-source flight control software for FPV drones and fixed-wing aircraft, providing high performance, advanced features, and customization for piloting, running on the flight controller hardware like an operating system for your drone. It's known for precision tuning, OSD support, and is constantly updated by a community for better flight stability, especially for racing and freestyle, with configuration done via the configurator application.

- [Website](#)
- [Github project page](#)
- [Configurator download](#)

1.5.4. INAV

INAV is an open-source flight control firmware for drones and RC aircraft, focusing on advanced navigation, GPS-assisted flight, and autonomous features like waypoint navigation, making it popular for fixed-wing planes and long-range multirotors, providing stability and mission planning.

- [Github project page](#)
- [Configurator download](#)

2. F4 FC - Freestyle

2.1. About

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:	AT32F435
IMU:	ICM-42688P
Baro:	bmp388
UARTs:	6
Servo Outputs:	4 (6) (2x solder point)
Size:	31 x 29 mm
Mounting:	20 x 20 mm, M3
Weight:	4.51 g
Blackbox:	Built-in, 8 MB
OSD:	Built-in
Input Voltage:	3 - 8 S compatible
BEC Voltage:	5 V: 2 A 9 V: 2.5 A
Receiver:	Solder on
DJI Airunit:	Dedicated connector

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) must be swapped

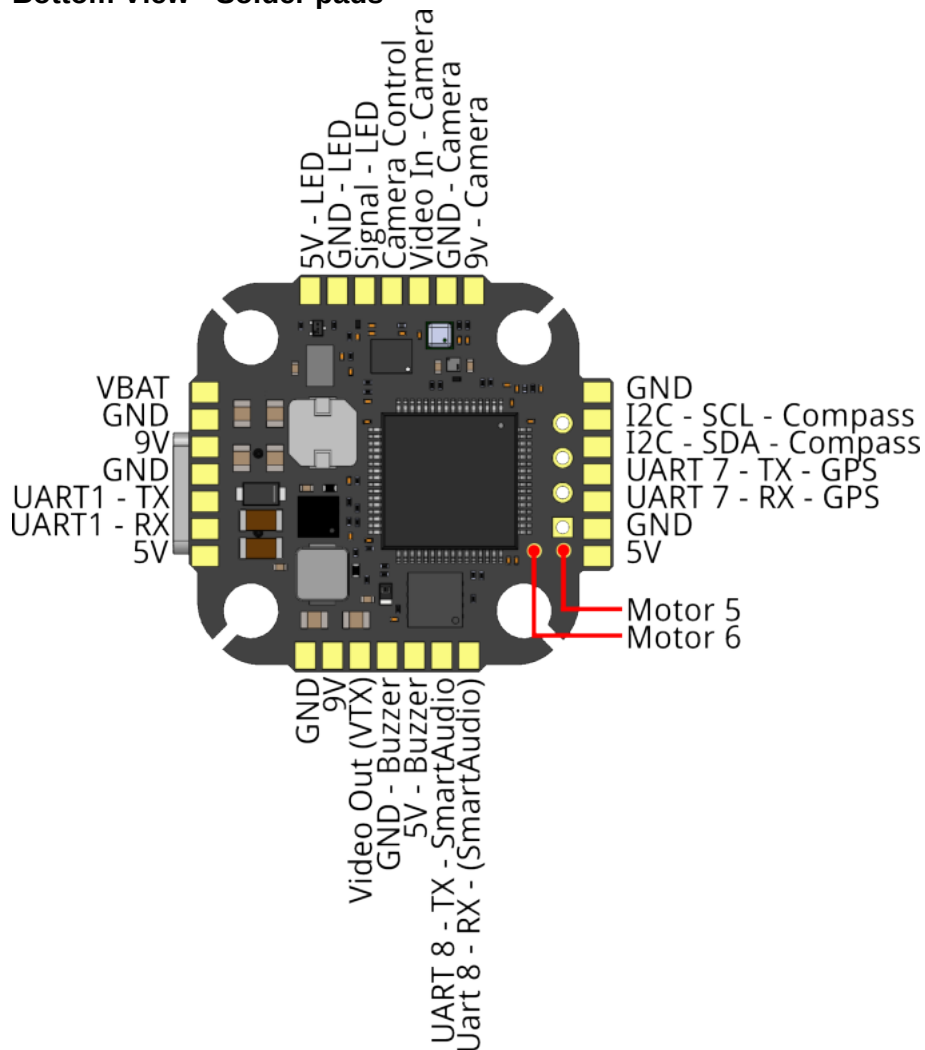
2.4. Serial Ports

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

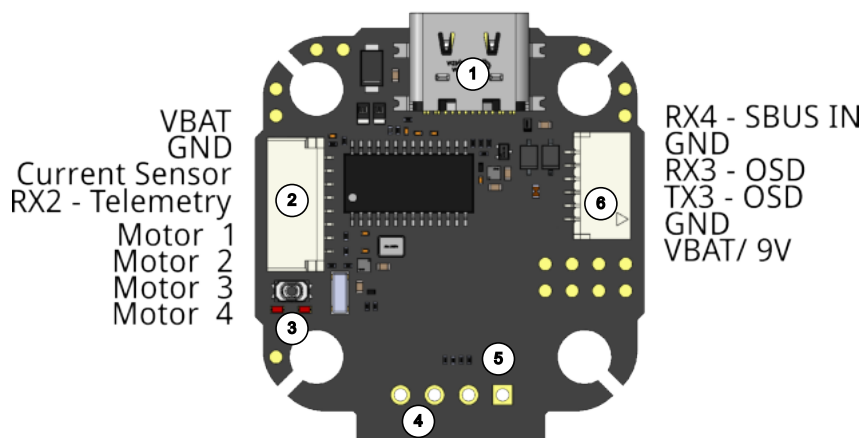


2.5. Pinout

Bottom View - Solder pads



Top View - Connectors



1 -- USB-C Port

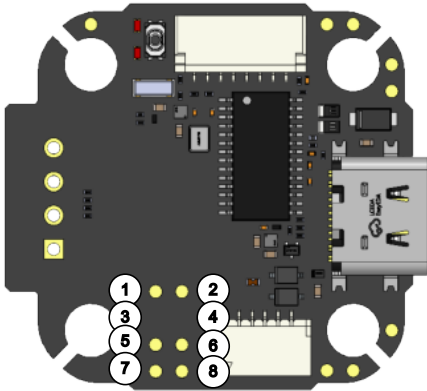
2 -- ESC Port

3 -- Bootloader Button

4 -- Receiver Port UART 5	5 -- Status LEDs	6 -- HD VTX Port
---------------------------	------------------	------------------

**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 - ⁽⁶⁾	5 - Motor 3	6 - Motor 2
7 - SWDIO/ PinIO USER 1	8 - SWDCLK/ PinIO USER 2	

2.6. GPIO Pins

**Note:**

All GPIO-Pins are *high-active*.

Setting them to **On** in your Flight Software **enables** the output.

CameraControl (CC)

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	CameraControl	PC5	CameraControl
INAV	ADC In	PC5	ADC

1/ SWDIO

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PA13	USER1
INAV	PinIO	PA13	USER1

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



2/ SWDCLK

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PA14	USER2
INAV	PinIO	PA14	USER2



Note:

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

```
set pinio_box1 = 47 # (USER1)
```

```
set pinio_box2 = 48 # (USER2)
```



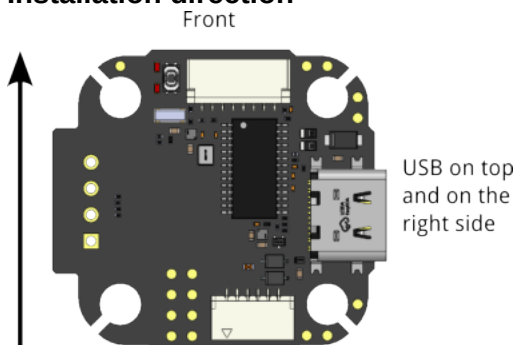
Note:

Enabling the **CameraControl** (CC) pin as ADC⁽⁷⁾, the following CLI command must be used:

```
set vbat_adc_channel = 3
```

2.7. Board Orientation

Installation direction



BETAFLIGHT

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

(7) external voltage sensor

2.8. Voltage Sensor Settings

BETAFLIGHT

Scale:	210
Divider:	10
Multiplier Value:	1

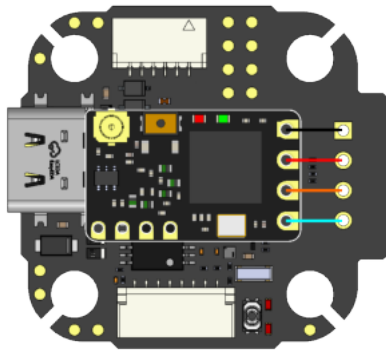
INAV

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)

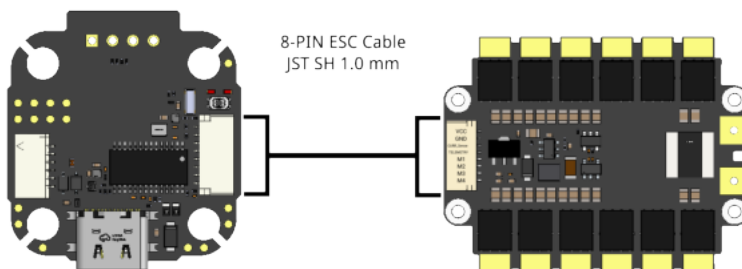
When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.



Note:

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

ESC Connection



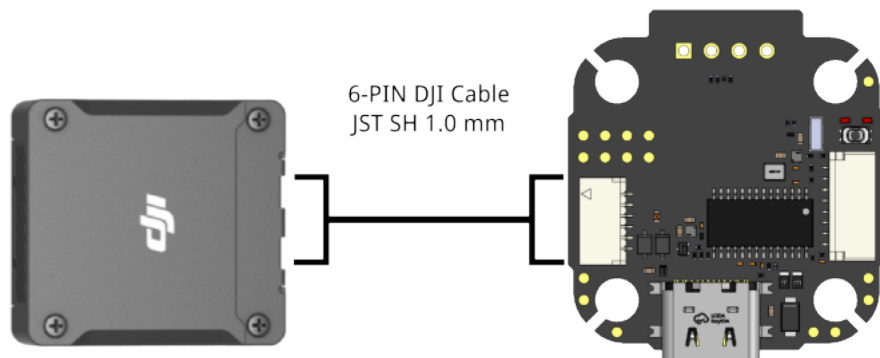
Port Settings

UART 2:	Sensor Input: ESC,
	Baudrate: Auto

2.9.3. HD Video Systems

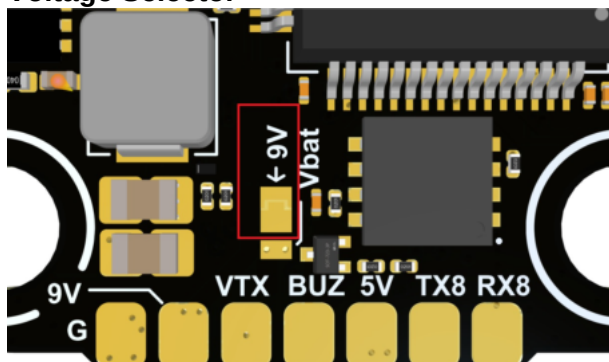
Connect your VTX to the designated port for your HD video system. The plug supports MSP and S.Bus if you want to use a DJI remote to control your drone.

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⁾

⁽⁸⁾ Baud rate might be different. Check the video system manual for details.

⁽⁹⁾ Disables the external receiver



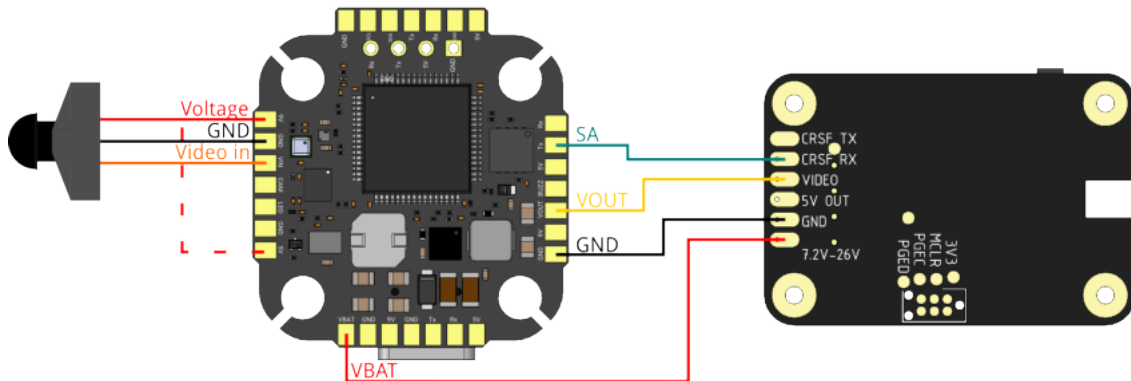
Note:

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

2.9.4. Analog Video Systems

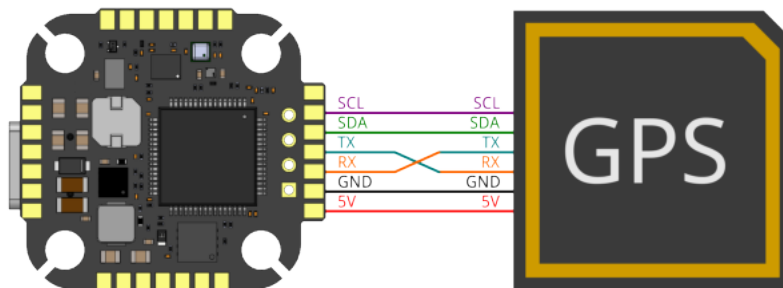
The camera will be power by the internal 9 V or the 5 V supply, depending on the used voltage pad.

Analog Video setup



2.9.5. GPS and Compass

GPS Connection



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
IMU:	MPU6000
Baro:	bmp388
UARTs:	6
Servo Outputs:	4 (6) (2x solder point)
Size:	31 x 29 mm
Mounting:	20 x 20 mm, M3
Weight:	4.51 g
Blackbox:	Built-in, 8 MB
OSD:	Built-in
Input Voltage:	3 - 8 S compatible
BEC Voltage:	5 V: 2 A 9 V: 2.5 A
Receiver:	Solder on
DJI Airunit:	Dedicated connector

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) must be swapped

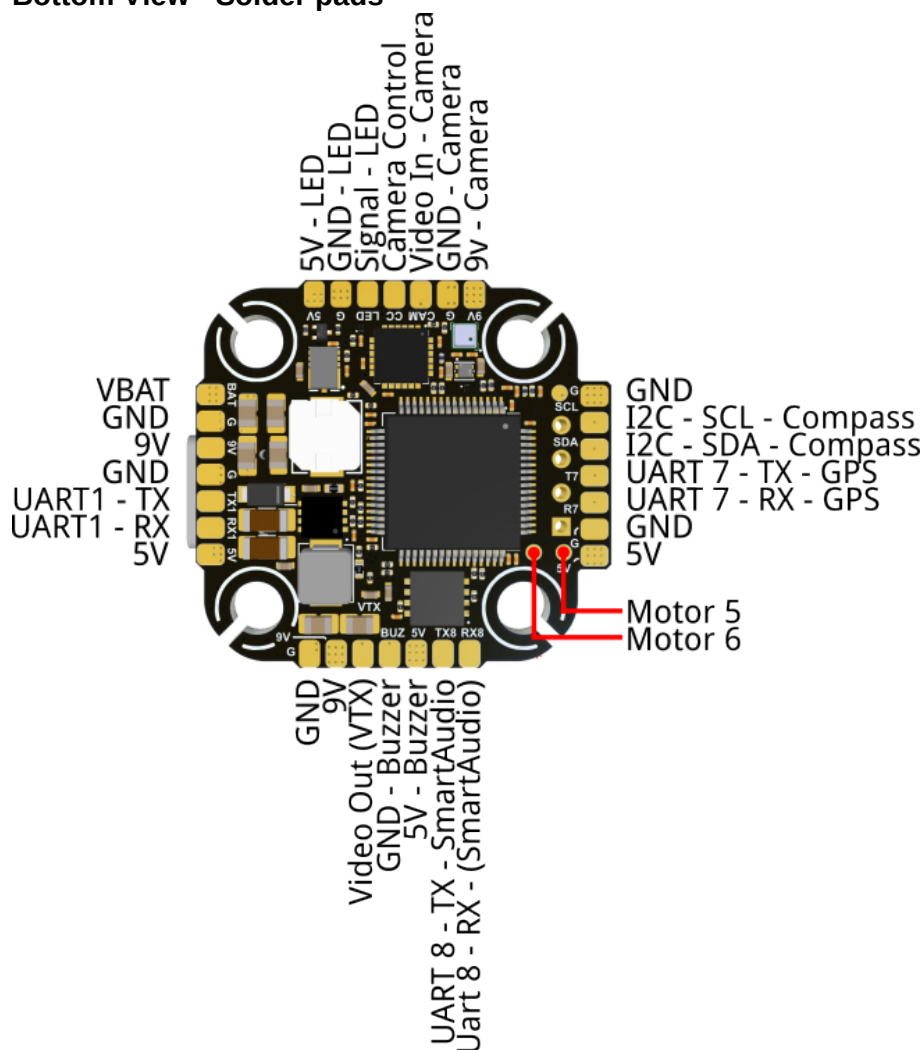


3.3. Serial Ports

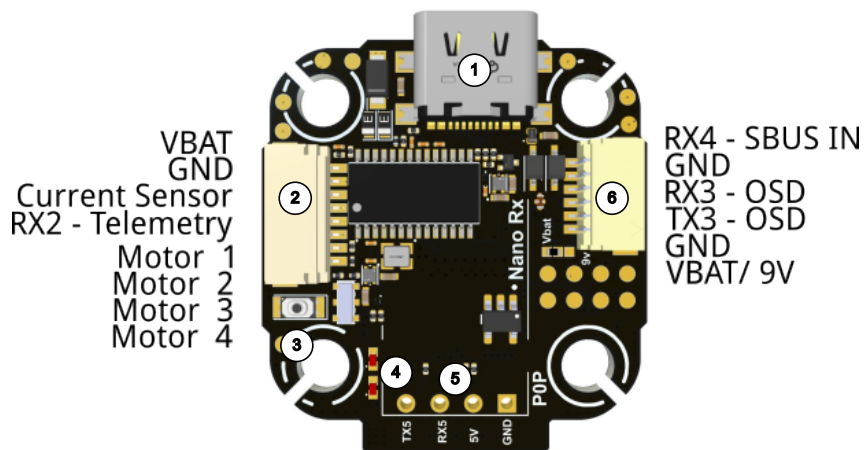
Port	Usage	Available Pins
UART 1	Spare	Full UART
UART 2	ESC Telemetry	RX only
UART 3	MSP, HD Video connector	Full UART
UART 4	S.BUS, HD Video connector	RX only
UART 5	Direct mounted Receiver	Full UART
UART 7	GPS	Full UART
UART 8	SmartAudio	Full UART

3.4. Pinout

Bottom View - Solder pads

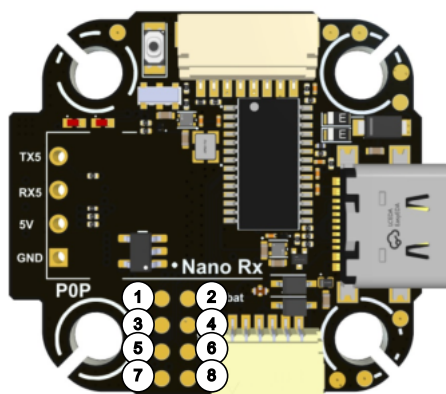


Top View - Connectors



1 -- USB-C Port	2 -- ESC Port	3 -- Bootloader Button
4 -- Status LEDs	5 -- Receiver Port UART 5	6 -- HD VTX Port

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



Note:

All GPIO-Pins are *high-active*.



Setting them to **On** in your Flight Software **enables** the output.

CameraControl (CC)

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	CameraControl	PC5	CameraControl
INAV	ADC In	PC5	ADC

1/ SWDIO

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PA13	USER1
INAV	PinIO	PA13	USER1

2/ SWDCLK

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PA14	USER2
INAV	PinIO	PA14	USER2



Note:

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

```
set pinio_box1 = 47 # (USER1)
```

```
set pinio_box2 = 48 # (USER2)
```



Note:

Enabling the **CameraControl** (CC) pin as ADC⁽¹⁰⁾, the following CLI command must be used:

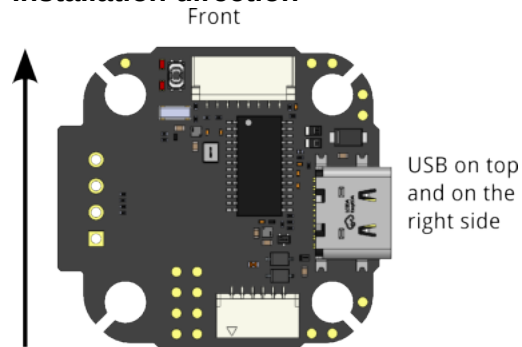
```
set vbat_adc_channel = 3
```

(10) external voltage sensor



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

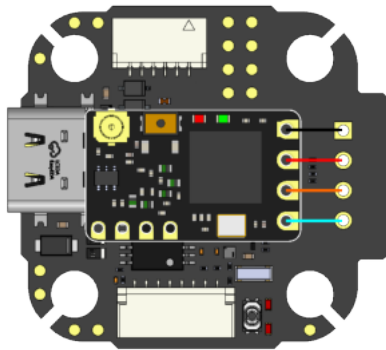
INAV

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)

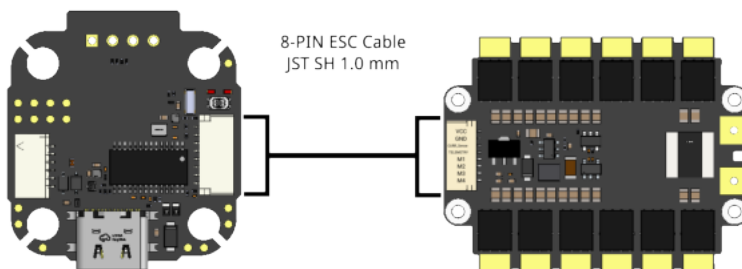
When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.



Note:

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

ESC Connection



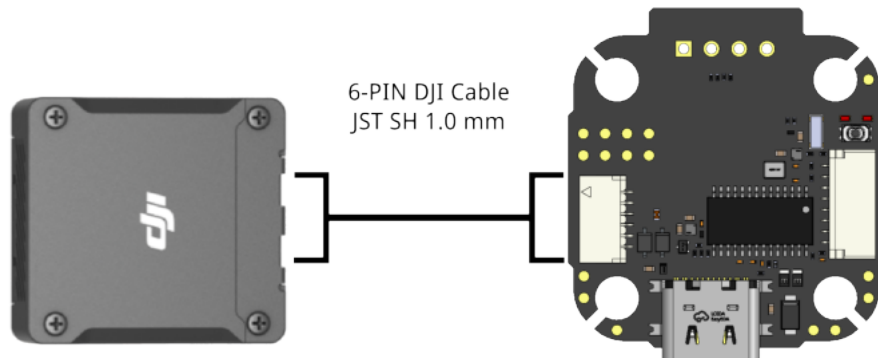
Port Settings

UART 2:	Sensor Input: ESC,
	Baudrate: Auto

3.8.3. HD Video Systems

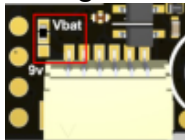
Connect your VTX to the designated port for your HD video system. The plug supports MSP and S.Bus if you want to use a DJI remote to control your drone.

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 ⁽¹¹⁾

Included Receiver Settings (optional)

UART 4:	Serial RX: on
UART 5:	Serial RX: off ⁽¹²⁾



Note:

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

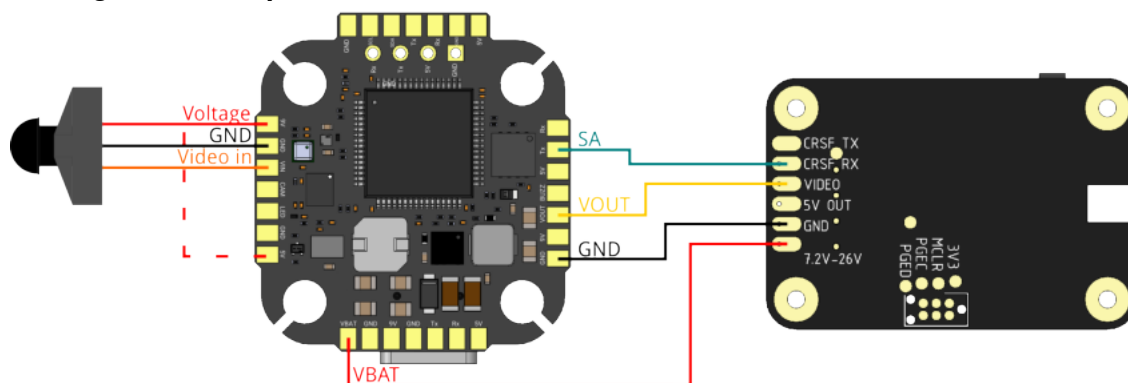
3.8.4. Analog Video Systems

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

⁽¹¹⁾ Baud rate might be different. Check the video system manual for details.

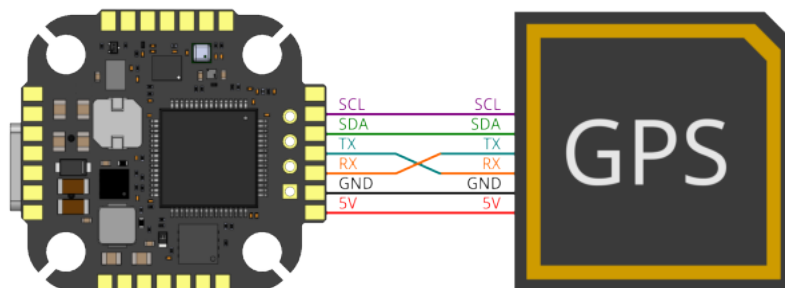
⁽¹²⁾ Disables the external receiver

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 Settings

UART 7:	Peripheral: GPS
	Baudrate: depends on GPS

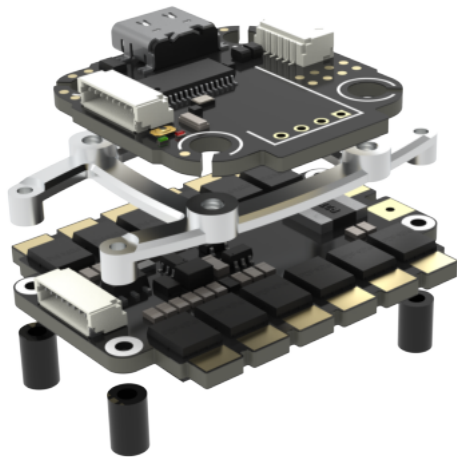
4. Gorilla mount

4.1. About

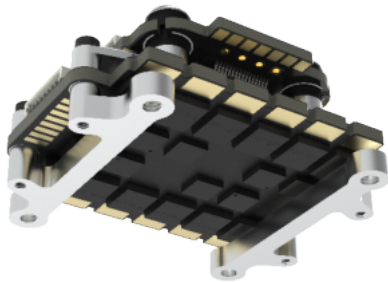
With the LUCID system, a new ESC mounting pattern took place. The TBS Gorilla mount is designed to sit atop 4-in-1 ESCs featuring a Gorilla mounting pattern. It includes 20x20 (M3) mounting points on top, allowing you to easily attach your preferred flight controller.

The Gorilla mounting system consists of 3 parts:

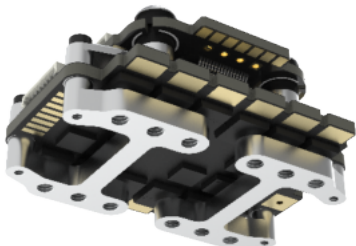
FC (20x20) Adapter



Frame Adapter 30x30



Frame Adapter 20x20



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

- [Technical drawing \(hole spacing\)](#)
- [Frame developer pack](#)



5. Mini AIO FC - 1-2S

5.1. About

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

5.3. Firmware

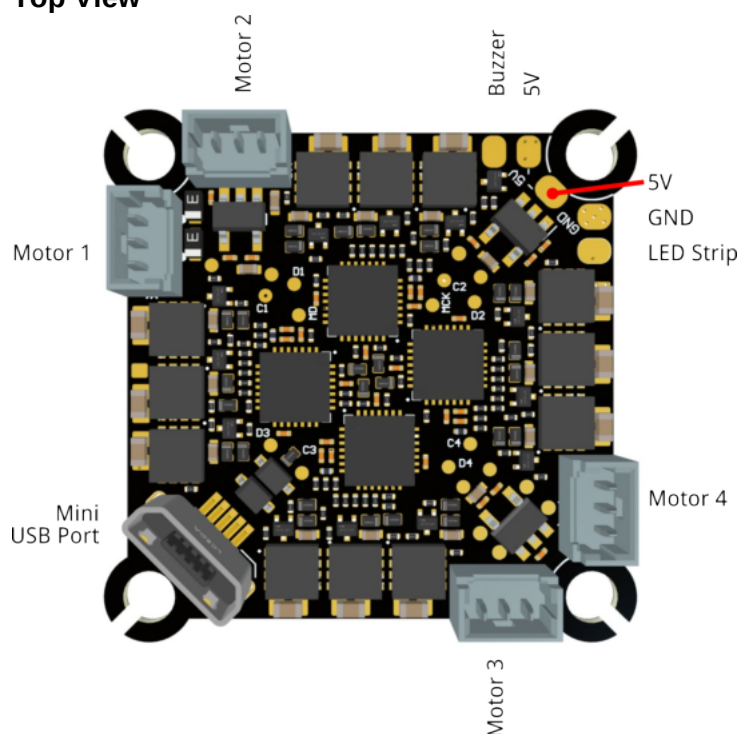
Firmware	Target	Min. FW Version
BETAFLIGHT	LUCID_AIO	4.5
INAV	Not yet available	/
CROSSFIRE	/	6.10
AM32 (ESC)	AM32_TBS_MINI_F421	2.18

5.4. Serial Ports

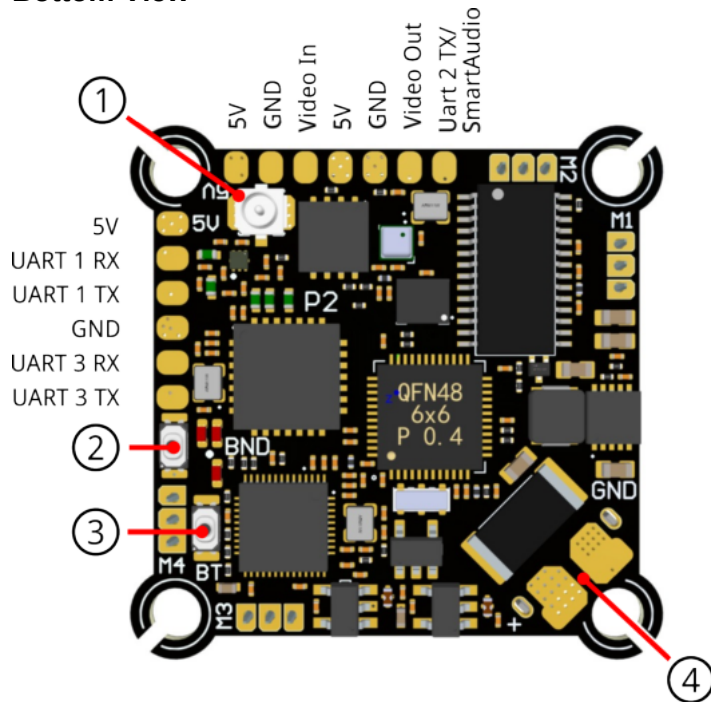
Port	Usage	Available Pins
UART 1	Spare	Full UART
UART 2	SmartAudio	TX only
UART 3	MSP, HD Video connector	Full UART
UART 5	Built-in Receiver	Full UART

5.5. Pinout

Top View



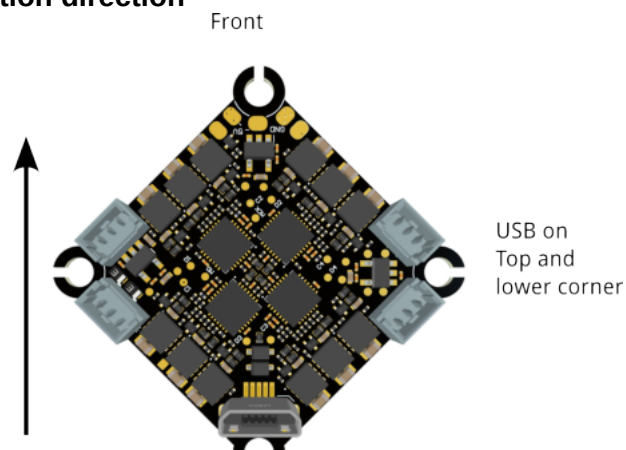
Bottom View



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
---------	---------------



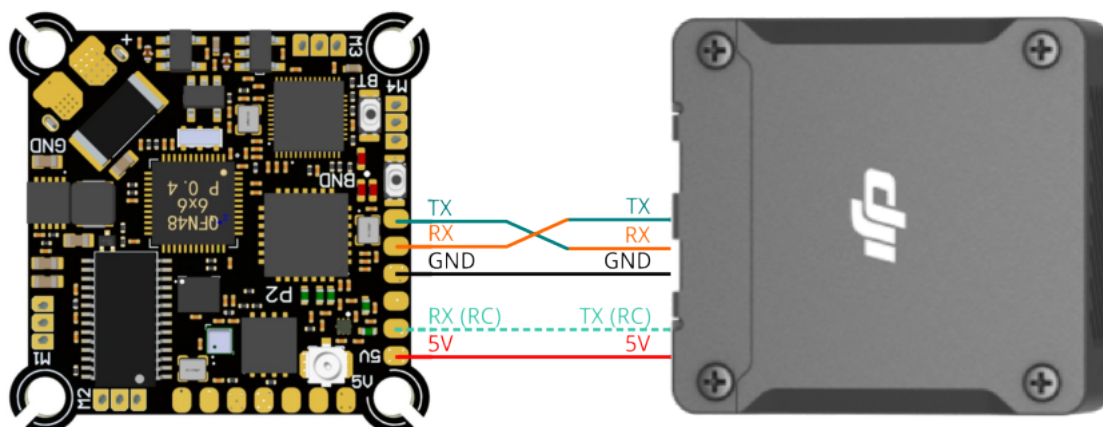
Note:

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](#) can provide.

Port Settings

UART 3:	MSP: on/ Peripherals: Displayport
	Baudrate: 115200 ⁽¹³⁾

Included Receiver Settings (optional)

UART 1:	Serial RX: on
UART 5:	Serial RX: off ⁽¹⁴⁾



Note:

Using the HD VTX RC receiver blocks the port for a GPS

⁽¹³⁾ Baudrate might be different. Check the video system manual for details.

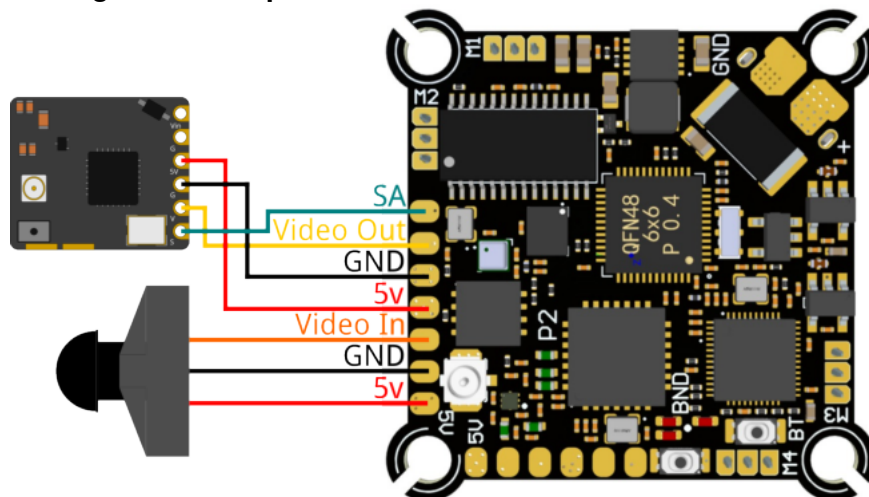
⁽¹⁴⁾ Disables the internal receiver



5.8.3. Analog Video Systems

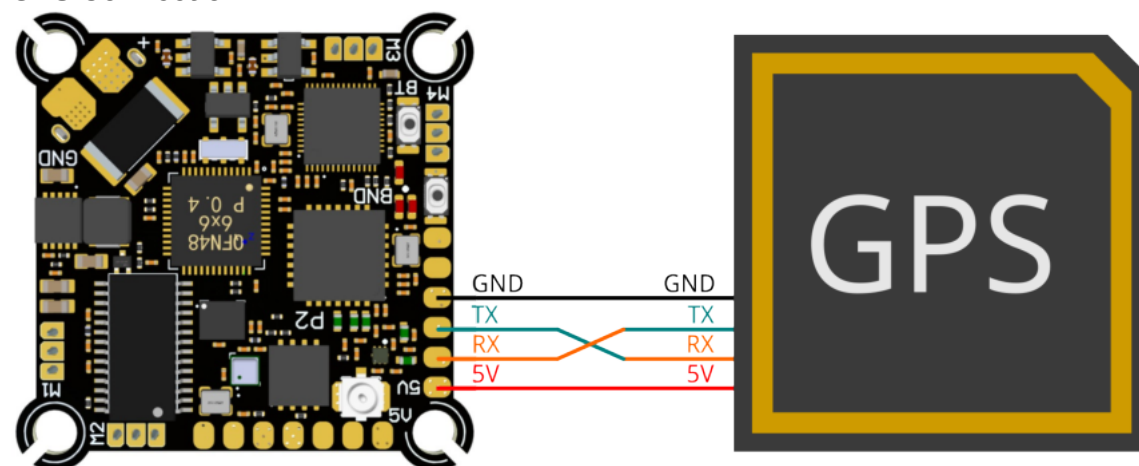
The camera will be power by the internal 5 V supply.

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. About

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
IMU:	ICM42688 - Dual Gyro
Baro:	V1: Infineon DPS310 V2: Infineon DPS368
UARTs:	7
I2C Ports:	2
Servo Outputs:	13
Size:	32 x 32 mm
Mounting:	30.5 x 30.5 mm, M3
Weight:	4 g
Blackbox:	External, by SD-Card
OSD:	Built-in
Input Voltage:	3 - 8 S compatible
BEC Voltage:	5 V: 2 A 9 V: 2 A
Receiver:	Solder on (by wire)
DJI Airunit:	Dedicated connector
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	8.0.1
ArduPilot ⁽¹⁵⁾	TBS_LUCID_H7	4.6.0

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

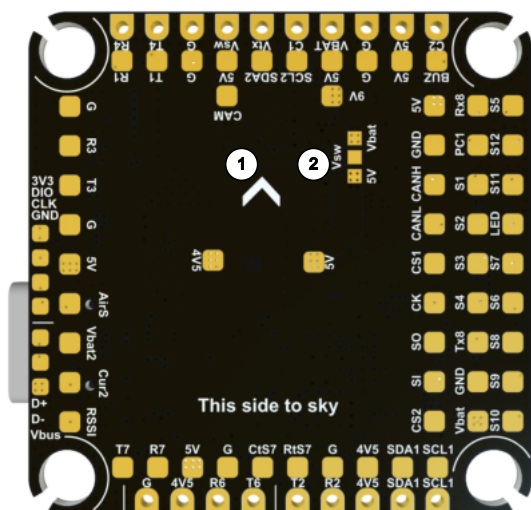
Port	Ardu-port	Ardu-Usage	5V Tolerant
UART 0	SERIAL0	USB	Yes
UART 1	SERIAL1	S.Bus	Yes
UART 2	SERIAL2	GPS1	Yes
UART 3	SERIAL3	MSP Displayport	Yes
UART 4	SERIAL4	TELEM1	Yes
UART 6	SERIAL6	Receiver	Yes
UART 7	SERIAL7	TELEM2	no, 3.3 V
UART 8	SERIAL8	ESC	Yes

(15) [Ardu Wiki for settings](#)

6.5. Pinout

6.5.1. Pinout V1

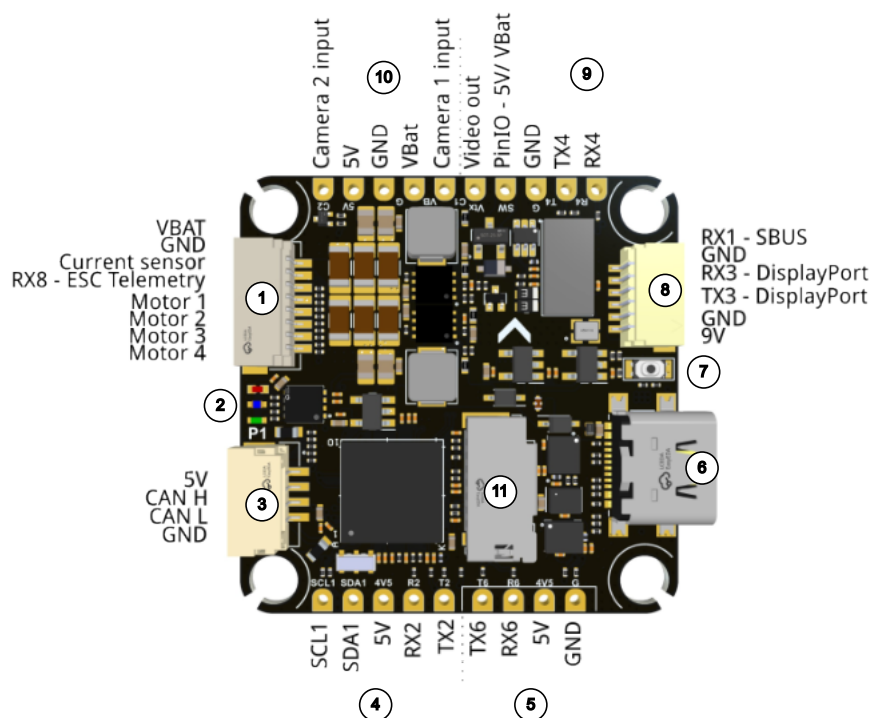
Top View



1 -- Direction Arrow

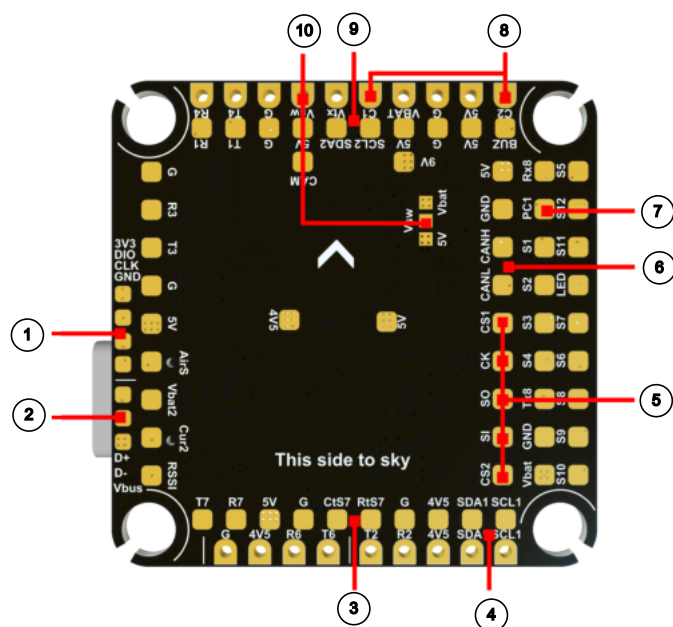
2 -- VSW Voltage Selector

Bottom View



1 -- ESC Port	2 -- Status LEDs	3 -- CAN Port
4 -- GPS Pads	5 -- Receiver Pads	6 -- USB-C Port
7 -- Bootloader Button	8 -- HD VTX Port	9 -- Analog VTX Pads
10 -- Analog Camera Pads	11 -- SD Card Slot	

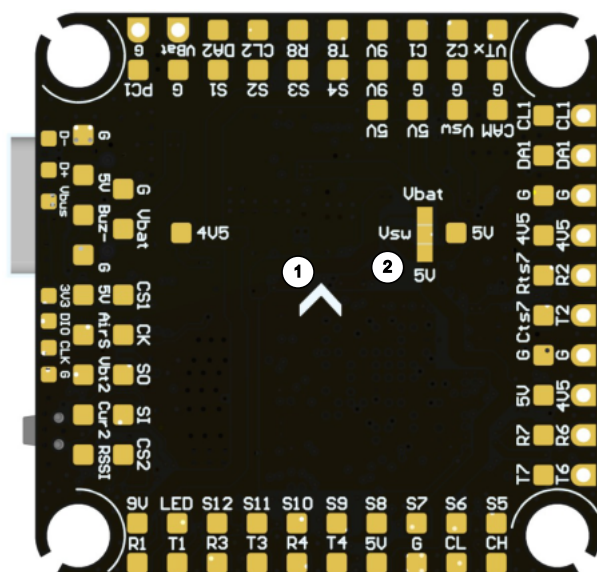
Additional Connections



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

6.5.2. Pinout V2

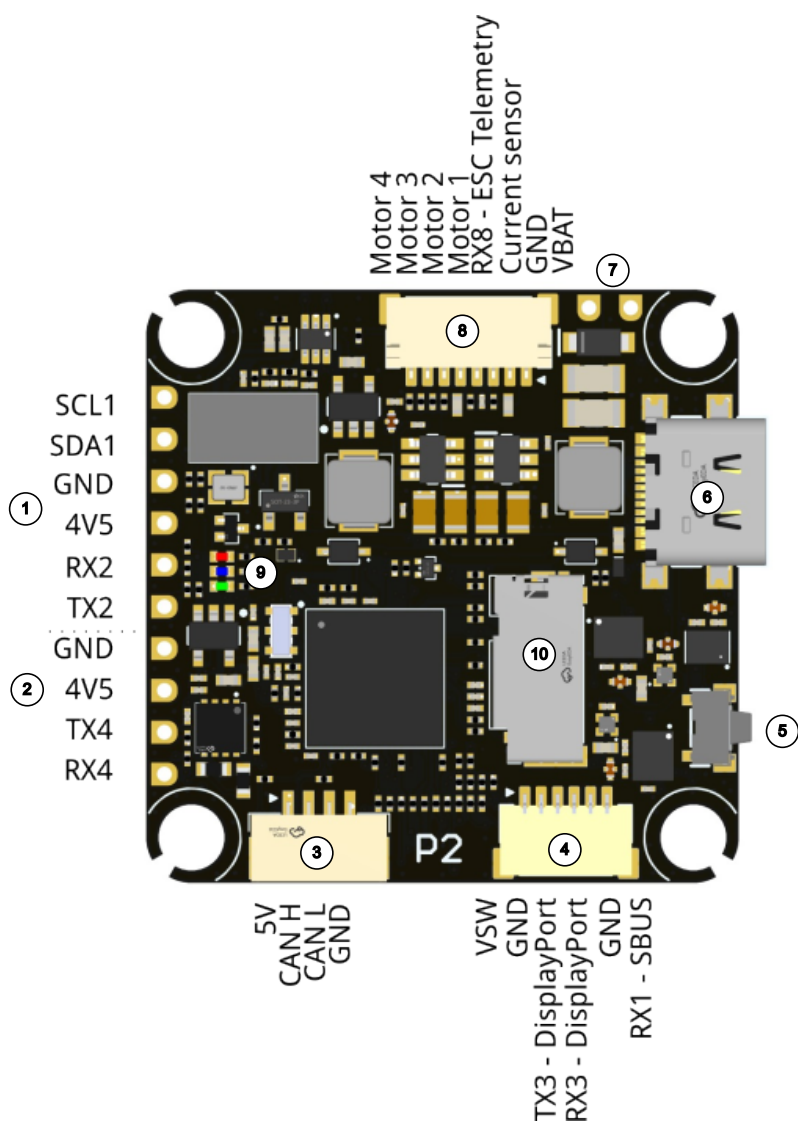
Top View



1 -- Direction Arrow

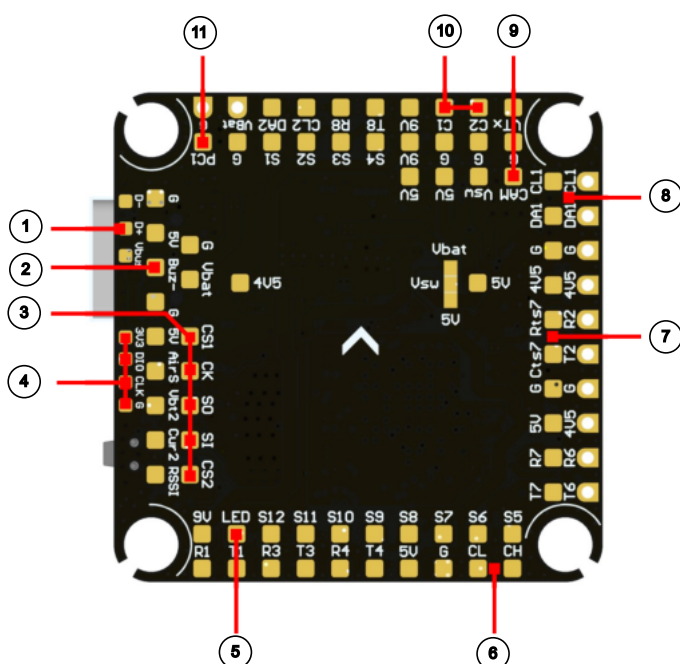
2 -- VSW/ HD Video Port Voltage Selector

Bottom View



1 -- GPS Pads	2 -- Receiver Pads	3 -- CAN Port
4 -- HD VTX Port	5 -- Bootloader Button	6 -- USB-C Port
7 -- VBAT/GND Pads	8 -- ESC Port	9 -- Status LEDs
10 -- SD Card Slot		

Additional Connections



1 -- USB Breakout	2 -- Buzzer Signal	3 -- SPI
4 -- SWD	5 -- LED	6 -- CAN
7 -- Hardware Flow Control UART 7	8 -- I2C 1	9 -- Camera 1 Input
10 -- Camera 1/2 Input	11 -- Analog in Breakout (Current from ESC)	

6.6. GPIO Pins



Note:

VSW - Voltage Switch (PinIO) and Video in Selector (C1/C2)-Pins are *high-active*.

Settings them to **On** in your Flight Software **enables** the output.

VTX BEC 9/12 is *low-active*.

Settings them to **On** in your Flight Software **disables** the output.

VSW - Voltage Switch (PinIO)

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PD10	USER1
INAV	PinIO	PD10	USER1
ArduPilot	Relay	GPIO 81	RELAY2

Video in Selector (C1/C2)

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PD11	USER2
INAV	PinIO	PD11	USER2
ArduPilot	Relay	GPIO 82	RELAY3

VTX BEC 9/12 Controls HD VTX supply and all 9/12V labled pins

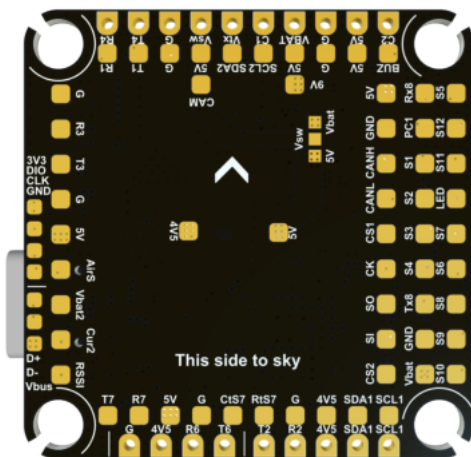
Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PC13	USER3
INAV	PinIO	PC13	USER3
ArduPilot	Relay	GPIO 83	RELAY4

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

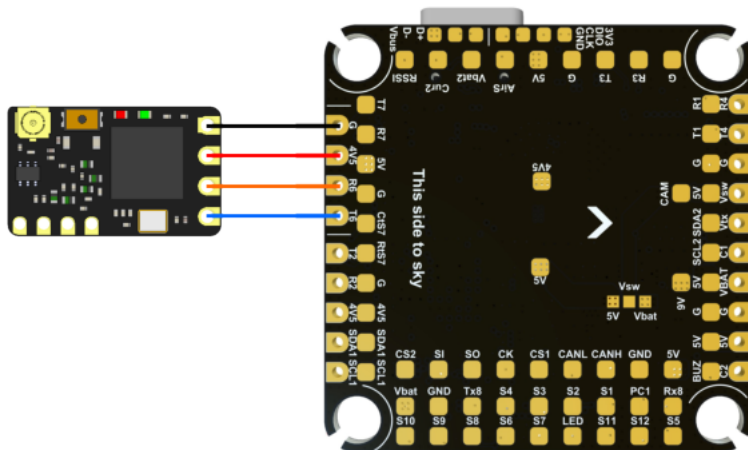
ArduPilot Input 2

BATT2_CURR_PIN	7
BATT2_AMP_PERVLT	Depends on used Sensor

6.10. Peripheral Connections

6.10.1. Receiver

Receiver connection - V1 FC



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)

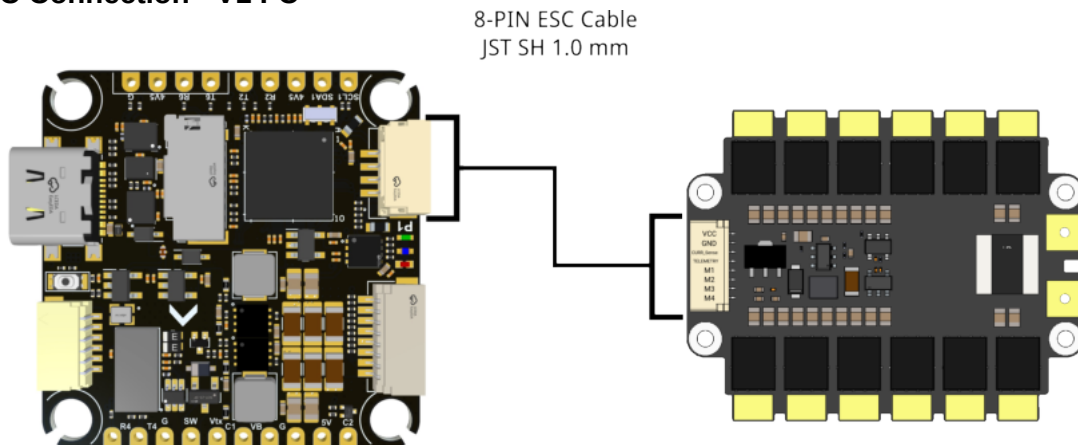
When using the LUCID 4in1 ESC, connect the included 8-pin cable to the FC and the ESC. This connection will provide VBat, GND, 4 ESC signals, and analog current sensor data.



Note:

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

ESC Connection - V1 FC



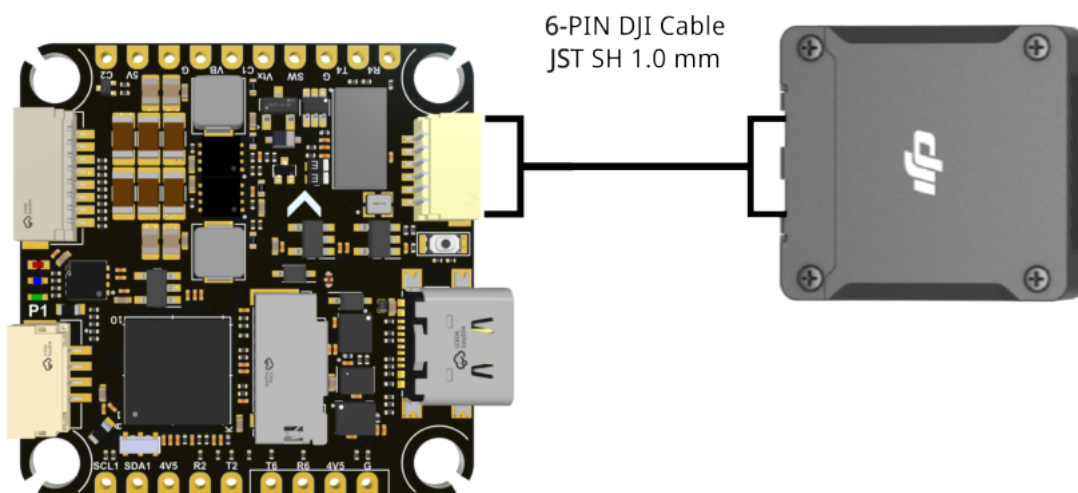
Port Settings

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 - V1 FC



The supply voltage is

- 9 V (V1)
- 5 V or VBAT (V2)

Port Settings

UART 3:	MSP: on/ Peripherals: Displayport
	Baud rate: 115200 ⁽¹⁶⁾

⁽¹⁶⁾ Baud rate might be different. Check the video system manual for details.

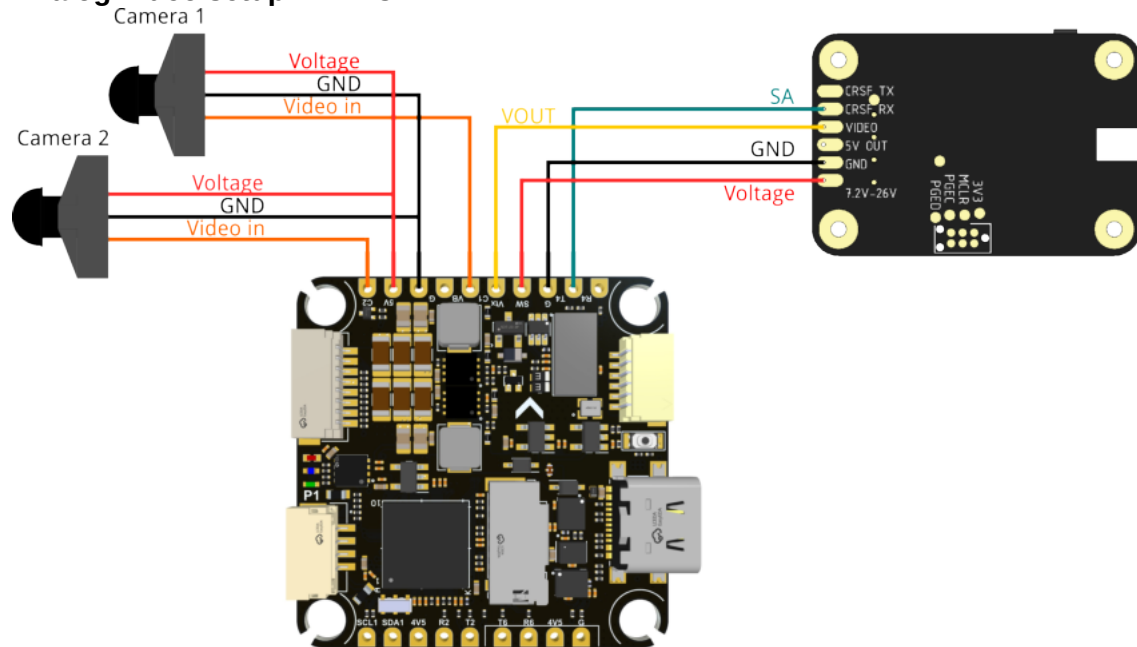
Included Receiver Settings (optional)

UART 1:	Serial RX: on
UART 6:	Serial RX: off ⁽¹⁷⁾

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.

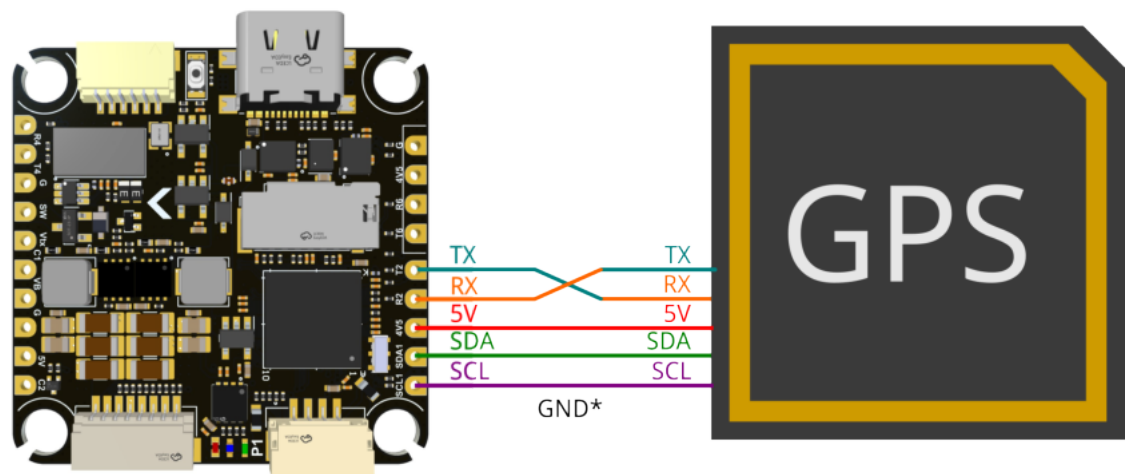
Analog Video setup - V1 FC



(17) Disables the external receiver

6.10.5. GPS and Compass

GPS Connection - V1 FC



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. About

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
IMU:	ICM42688
Baro:	Infineon DPS310
UARTs:	7
I2C Ports:	2
Servo Outputs:	13
Size:	54 x 36 x 13 mm
Mounting:	30.5 x 30.5 mm, M3
Weight:	25 g
Blackbox:	External, by SD-Card
OSD:	Built-in
Input Voltage:	3 - 12 S compatible
BEC Voltage:	5 V: 3 A (FC and Sensors) 9 / 12 V: 5 A (FPV) 5 - 8.4 V: 10 A (Servos)
Receiver:	Solder on (by wire)
DJI Airunit:	Supported
Additional Features:	SPI CAN Multiple analog Inputs Additional Analog Inputs ⁽¹⁸⁾ ADC Vbat2 pad supports up to 69V Current Sensor USB-C Extension Board w. Buzzer

(18) RSSI, Airspeed Sensor, User1, User2



7.3. Firmware

Firmware	Target	Min. FW Version
INAV	TBS_LUCID_H7_WING	9.00
ArduPilot ⁽¹⁹⁾	TBS_LUCID_H7_WING	4.6.0

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

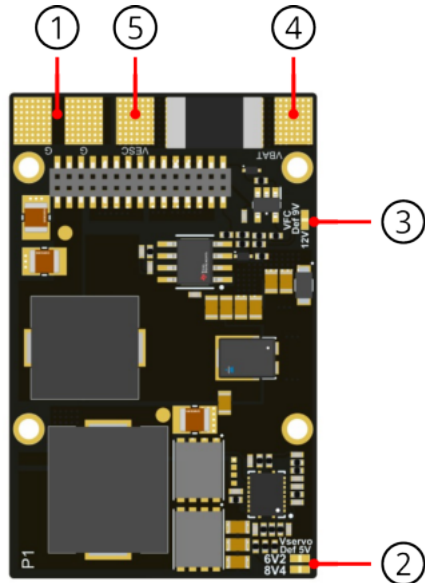
Port	Ardu-Port	Ardu-Usage	5V Tolerant
UART 0	SERIAL0	USB	Yes
UART 1	SERIAL1	S.Bus	Yes
UART 2	SERIAL2	GPS1	Yes
UART 3	SERIAL3	MSP Displayport	Yes
UART 4	SERIAL4	TELEM1	Yes
UART6	SERIAL6	Receiver	Yes
UART 7	SERIAL7	TELEM2	no, 3.3 V
UART 8	SERIAL8	ESC	Yes

(19) [Ardu Wiki for settings](#)



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	5 V	6.2 V	8.4 V
6V2	open	closed	open
8V4	open	open	closed



Important:

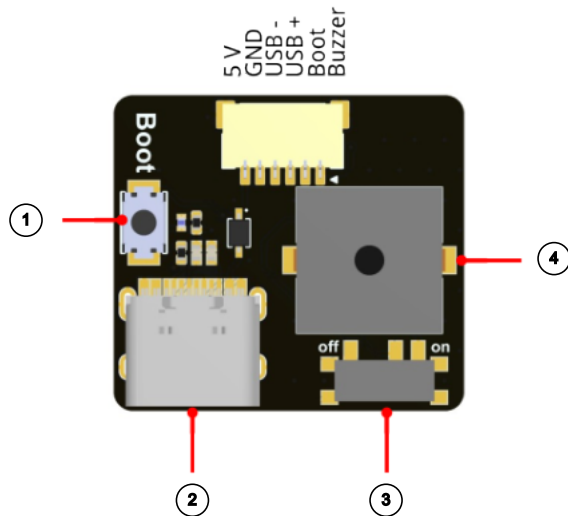
Do not close both selectors at the same time.

Do not cross-bridge the voltage selector pads.



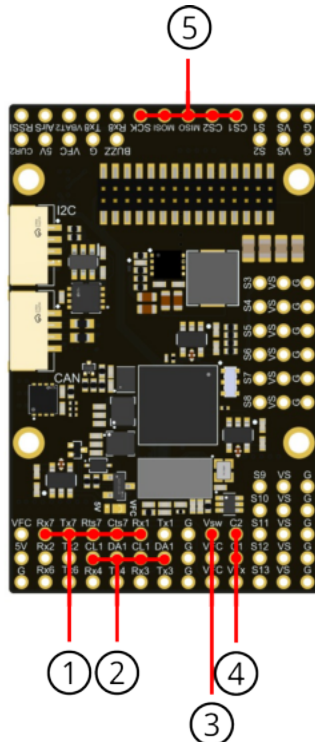
1 - Additional Inputs	2 - I2C 2
3 - CAN	4 - GPIO Voltage Selector

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 - PinIO Switch (VSW)
4 - Camera 1/2	5 - SPI	

7.6. GPIO Pins



Note:

All GPIO-Pins are *high-active*.

Settings them to **On** in your Flight Software **enables** the output.

VSW - Voltage Switch (PinIO) - VTX Voltage Supply

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PD10	USER1
INAV	PinIO	PD10	USER1
ArduPilot	Relay	GPIO 81	RELAY2

Video in Selector (C1/C2)

Firmware	Function Name	MCU Pin	Function
BETAFLIGHT	PinIO	PD11	USER2
INAV	PinIO	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

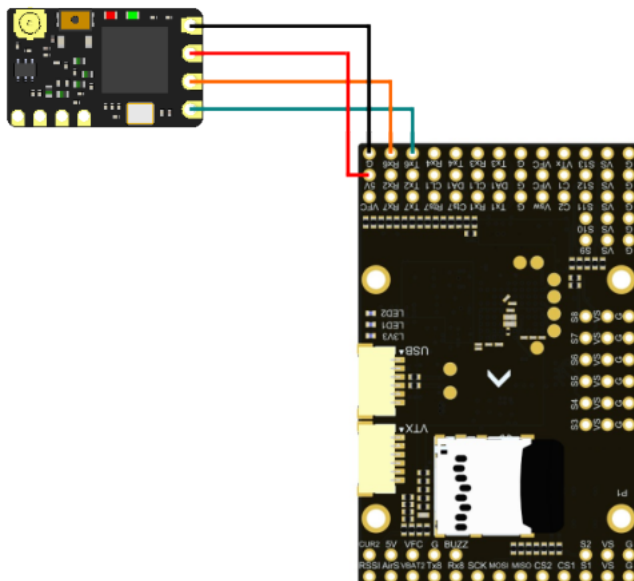
ArduPilot Battery Input 2

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

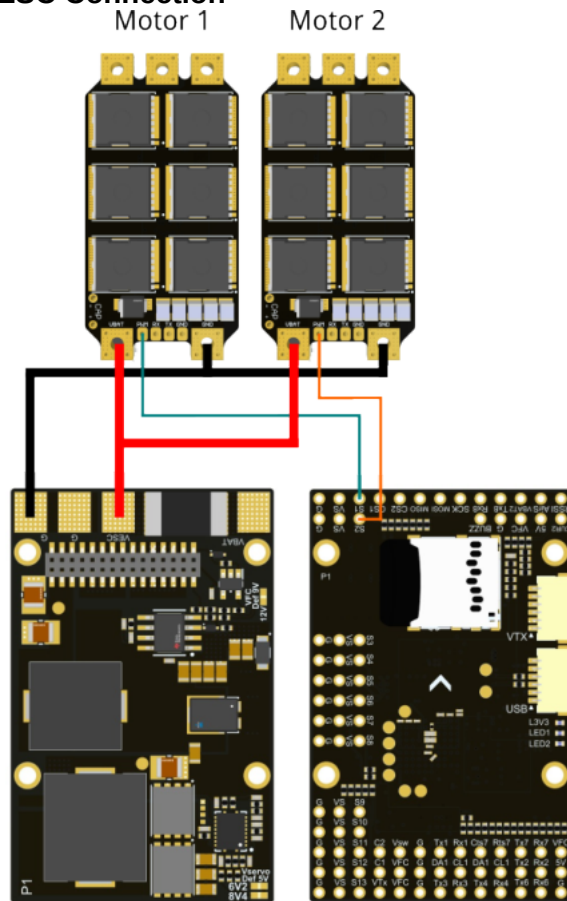
7.9.2. ESC



Important:

The Signal ground must always be connected. The ESC can be damaged if left open.

ESC Connection



7.9.3. HD Video Systems



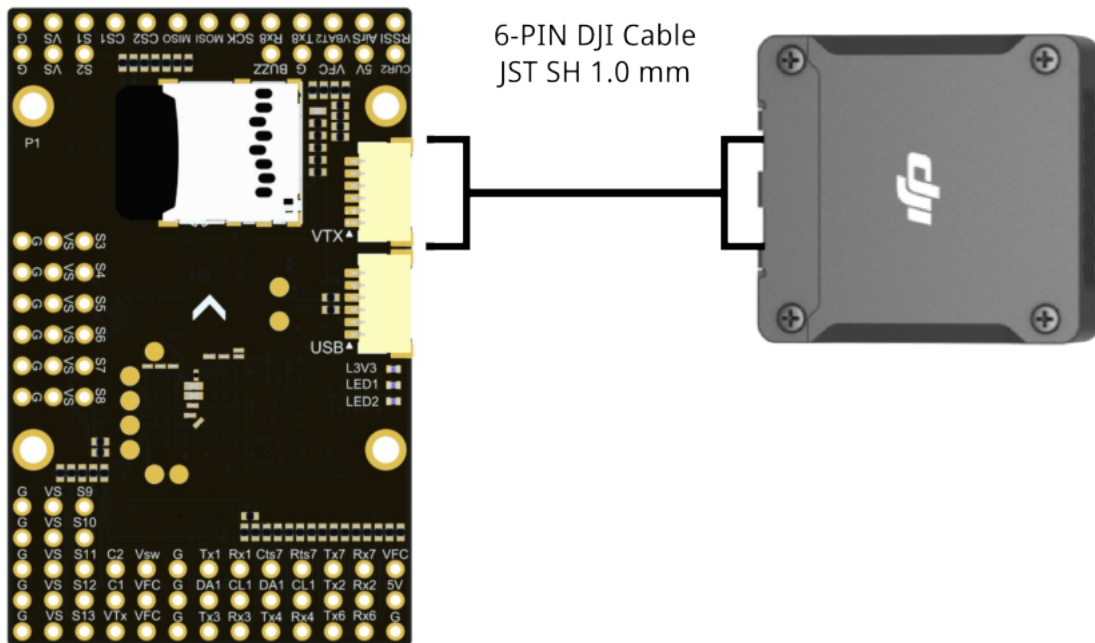
Note:

For the VTX supply to work, **VSW - Voltage Switch (PinIO)** (USER1 (INAV)/ REALY2 (ArduPilot)) must be set to **On**.

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 ⁽²⁰⁾

Included Receiver Settings (optional)

UART 1:	Serial RX: on
UART 6:	Serial RX: off ⁽²¹⁾

7.9.4. Analog Video Systems



Note:

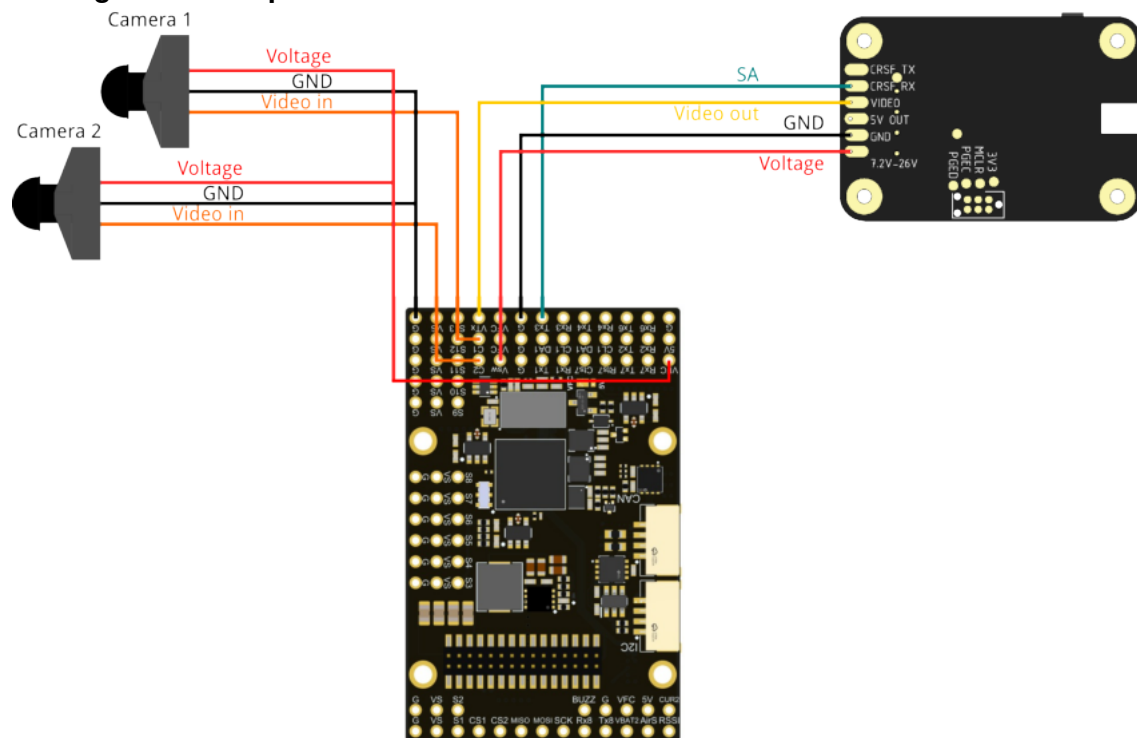
For the VTX supply to work, **VSW - Voltage Switch (PinIO)** (USER1 (INAV)/ REALY2 (ArduPilot)) must be set to **On**.

⁽²⁰⁾ Baud rate might be different. Check the video system manual for details.

⁽²¹⁾ Disables the external receiver

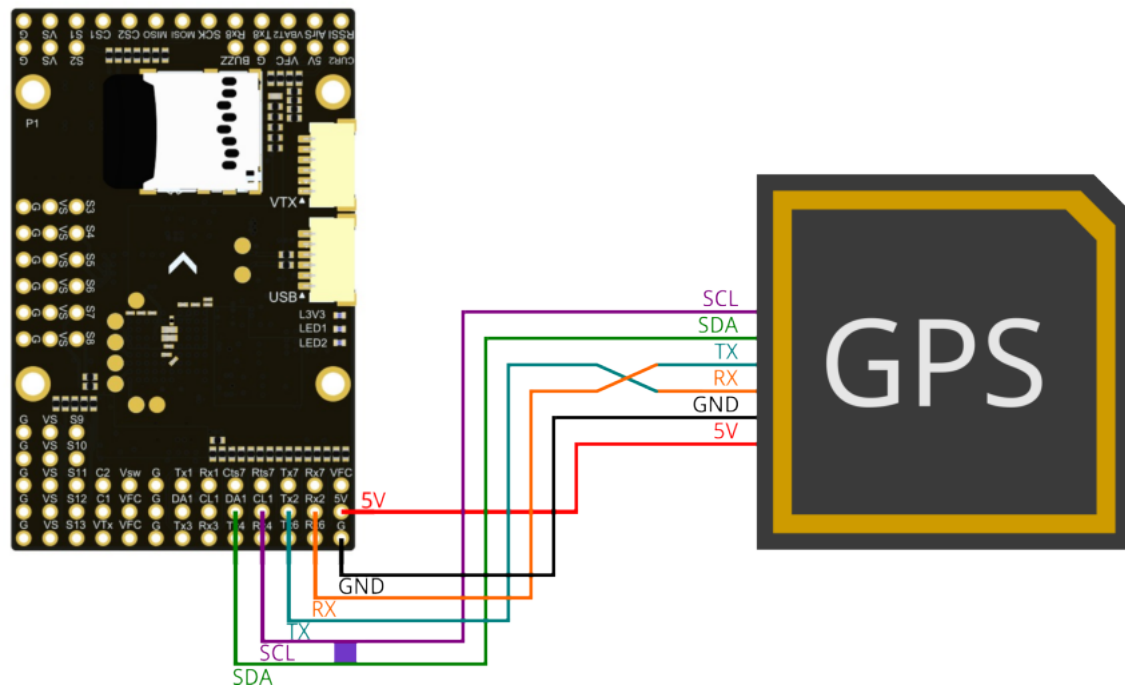


Analog Video setup



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. About

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 housing acts as a heat-sink for the ESC.



FC

Processor:	STM32H743VIH6
IMU:	ICM-42688P - Dual Gyro
Baro:	Infineon DPS310
UARTs:	7
I2C Ports:	1 ⁽²²⁾
Servo Outputs:	6 ⁽²³⁾
Size:	59 x 63 x 22.4 mm
Mounting:	38 x 49 mm, M3
Weight:	51 g
Blackbox:	External, by SD-Card
OSD:	Built-in
Input Voltage:	6 - 26 V 3 - 6 S
BEC Voltage:	5 V: 1 A (FC, Receiver, GPS, CAN Bus) 5 - 8.4 V: 5 A (Servo, VTX, Camera)
Receiver:	Dedicated connector
DJI Airunit:	Dedicated connector
Additional Features:	CAN Connector Current Sensor Additional Analog Inputs ⁽²⁴⁾ USB-C Extension Board w. Buzzer

ESC

Firmware:	AlkaMotors32 (AM32)
Motor Outputs:	1, MR30 Connector
Size:	31.3 x 23.4 mm
Weight:	5 g
Mounting:	Soldered on to FC
Input Voltage:	6 - 26 V 3 - 6 S
Current	50 A (continuous) 60 A (10 s)
Protocols:	PWM DSHOT 300/600

(22) Second I2C port internally used for the baro sensor

(23) 6 accessible, 1 extra for internal ESC connection

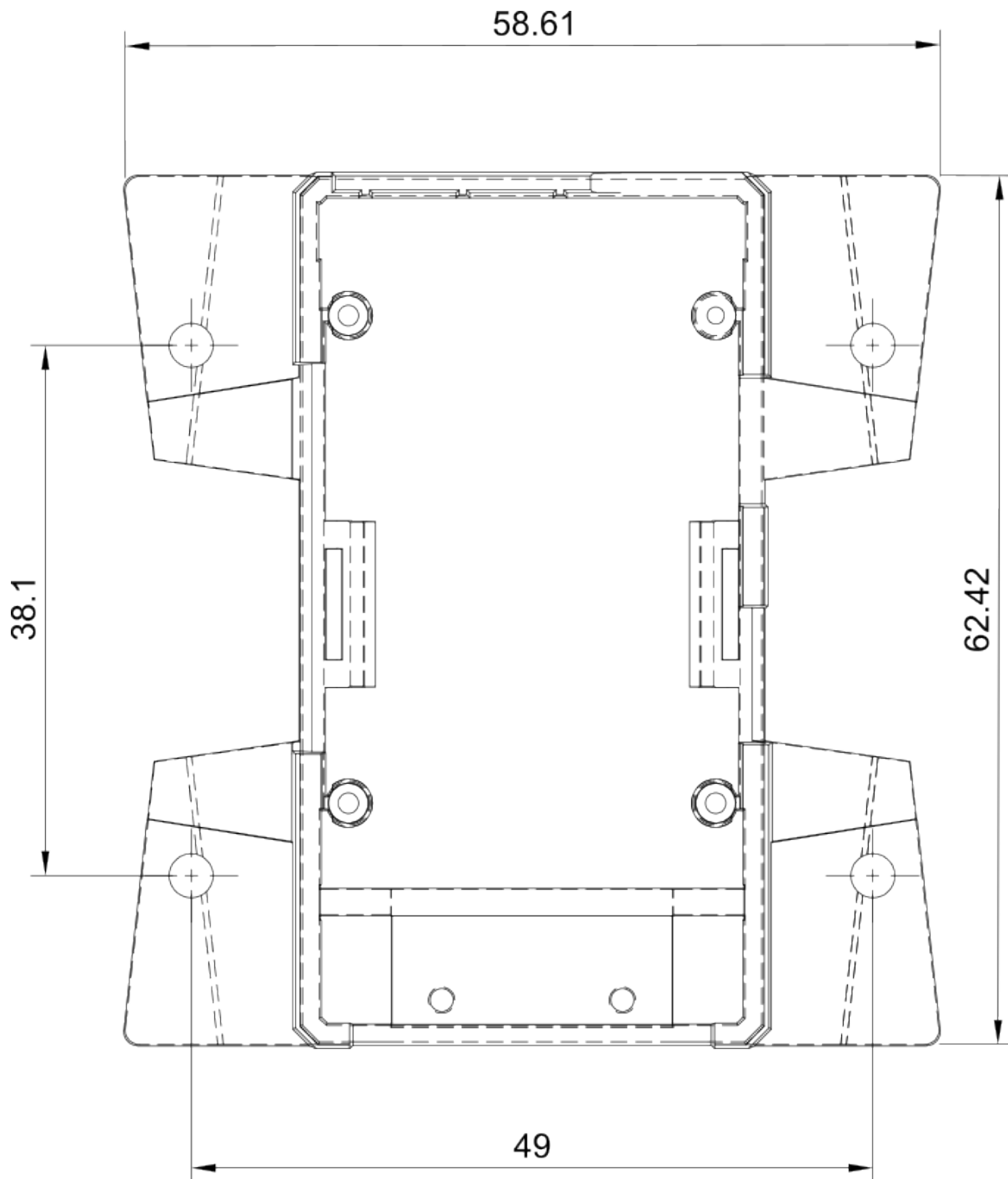
(24) RSSI, Airspeed Sensor





Notice:
The ESC signal is connected to *PWM 7*.

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⁾⁽²⁶⁾	INAV TBS_LUCID_H7_WING	4.6.3
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 ⁽²⁷⁾
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 internally
UART 8	Spare	Full UART ⁽²⁸⁾

(25) [Ardu Wiki for settings](#)

(26)  **Notice:**
When flashing ArduPilot, the serial ports should be adjusted to match the mapping show in the [Serial Ports](#) section

(27) Located on the Servo Connector

(28) Accessible as solder-point inside the cover



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

8.6. Pinout

**Note:**

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

**CAUTION:**

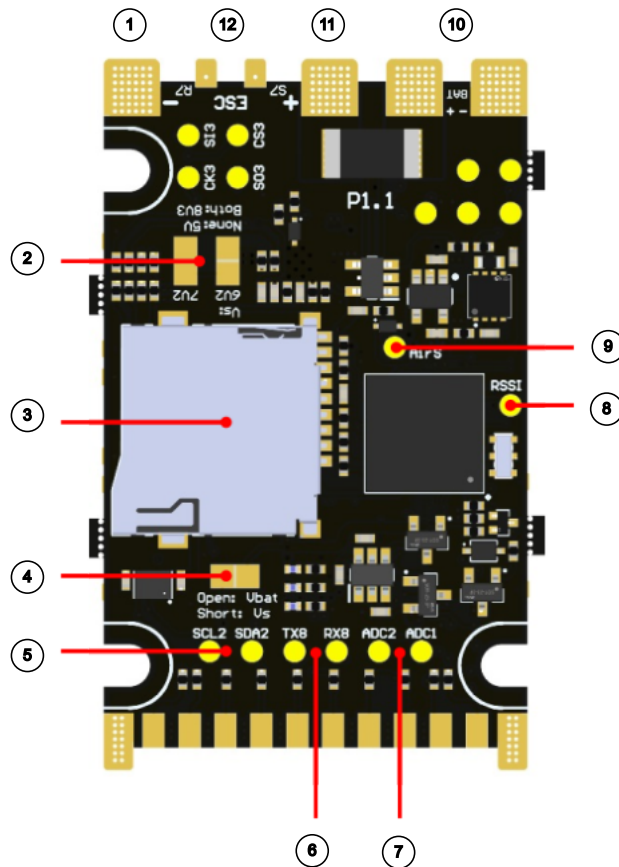
On some units the VTX voltage selector (4) does not work. The output will remain at battery voltage level.

Units that have been factory-repaired got a colored sticker on the case.

Please contact the TBS support if your unit does not have the sticker on the case.



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 ⁽²⁹⁾	8 - Analog RSSI in	9 - Analog Airspeed Sensor in
10 - Battery In	11 - ESC VBAT	12 - ESC Signal

Servo Voltage Selector settings (2)

Pin	5 V	6.2 V	7.4 V	8.4 V
6V2	open	closed	open	closed
7V2	open	open	closed	closed



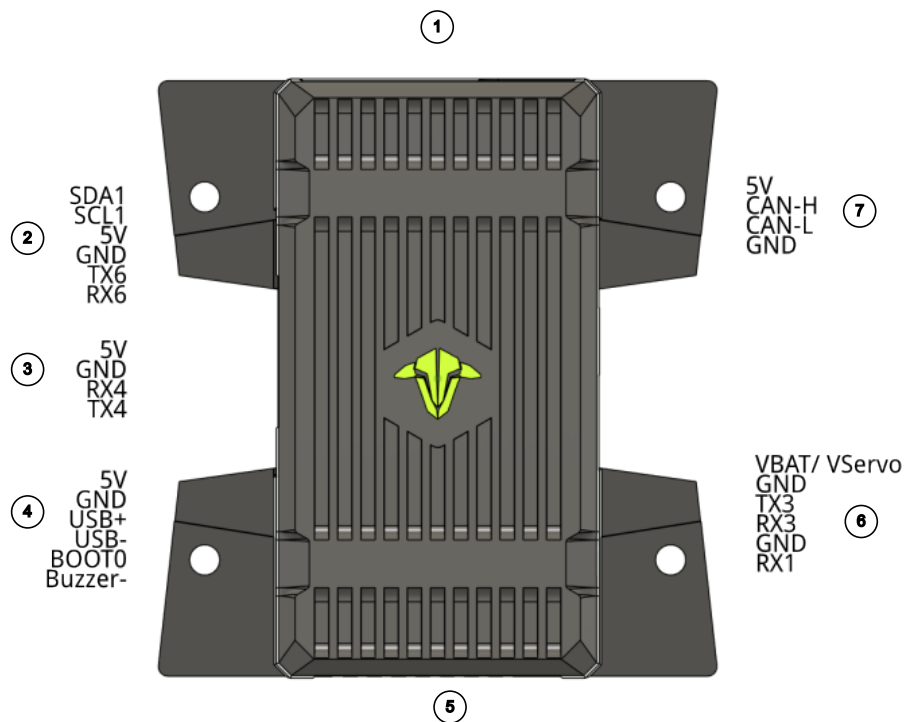
Important:

Don't cross-bridge the voltage selector pads

⁽²⁹⁾ Internally used for VBAT and Current Sensor

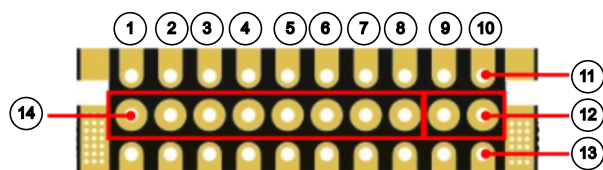


Connectors - View from Top-Down



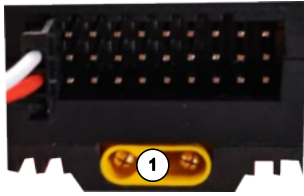
1 - Battery Cable	2 - GPS Connector	3 - Receiver Connector
4 -USB Connector	5 - Servo Pins/ Motor Con- nector	6 - DJI Connector
7 - CAN Connector		

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)

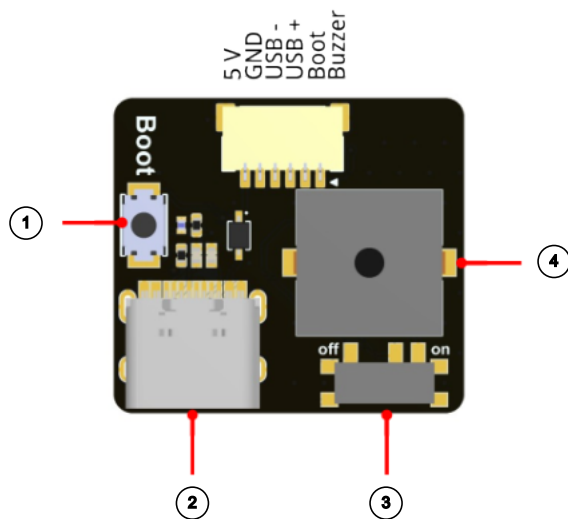
Servo Connector - Front View with Motor-Connector (1)



Notice:

The ESC signal is connected to *PWM 7*.

USB Board



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

8.7. GPIO Pins



Note:

GPIO is *high-active*. Setting it to **On** in your Flight Software **enables** the output.

VSW - Voltage Switch (PinIO) - VTX Voltage Supply

Firmware	Function Name	MCU Pin	Function
INAV	PinIO	PD10	USER1
ArduPilot	Relay	GPIO 81	RELAY 2

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

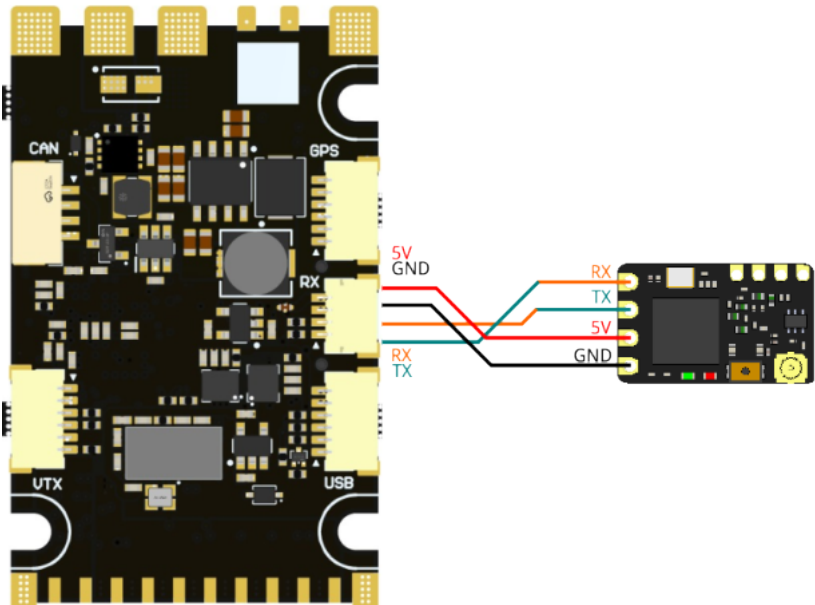
ArduPilot

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

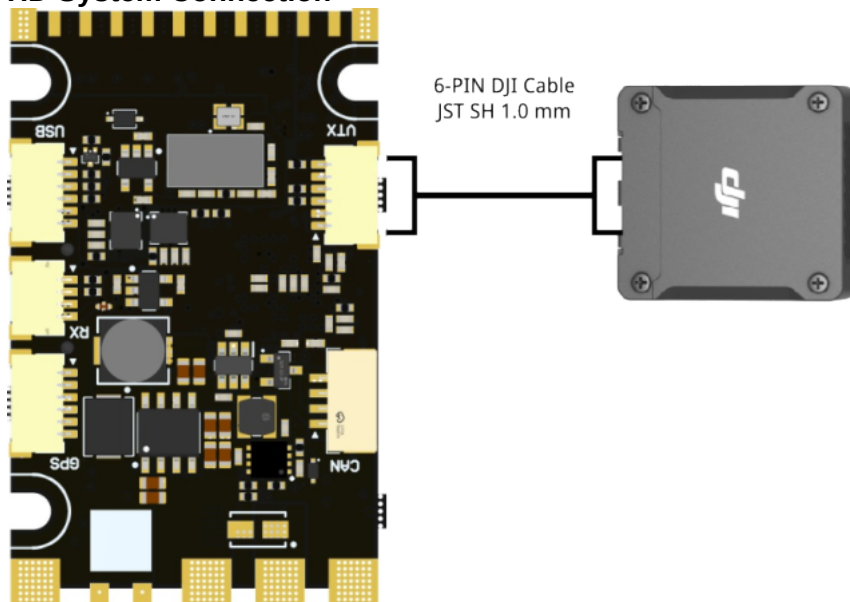
8.10.2. HD Video Systems

**Note:**
For the VTX supply to work, **VSW - Voltage Switch (PinIO)** (USER1 (INAV)/ REALY2 (ArduPilot)) must be set to **On**.

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 ⁽³⁰⁾

Included Receiver Settings (optional)

UART 1:	Serial RX: on
UART 6:	Serial RX: off ⁽³¹⁾

8.10.3. Analog Video



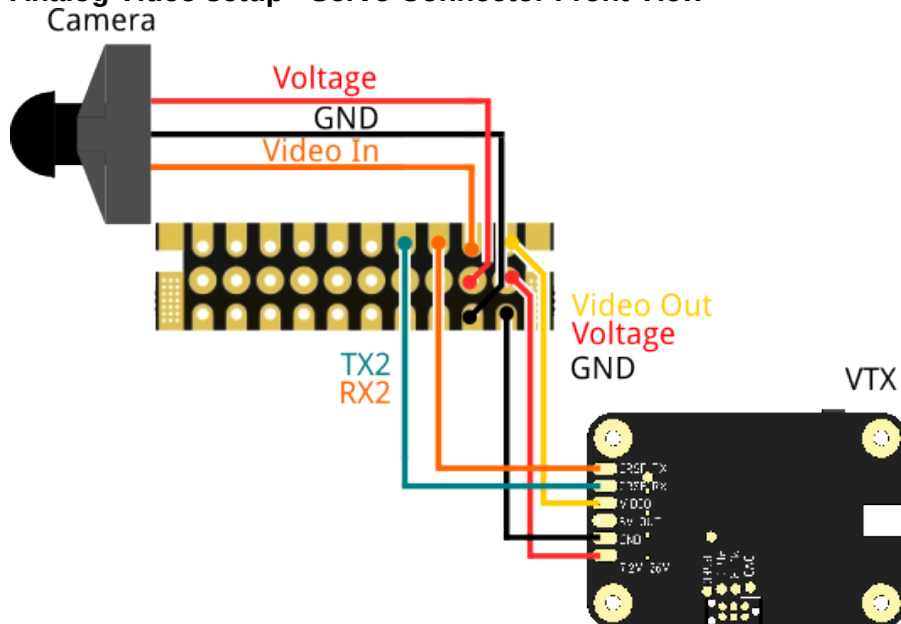
Note:

For the VTX supply to work, **VSW - Voltage Switch (PinIO)** (USER1 (INAV)/ REALY2 (ArduPilot)) must be set to **On**.

⁽³⁰⁾ Baud rate might be different. Check the video system manual for details.

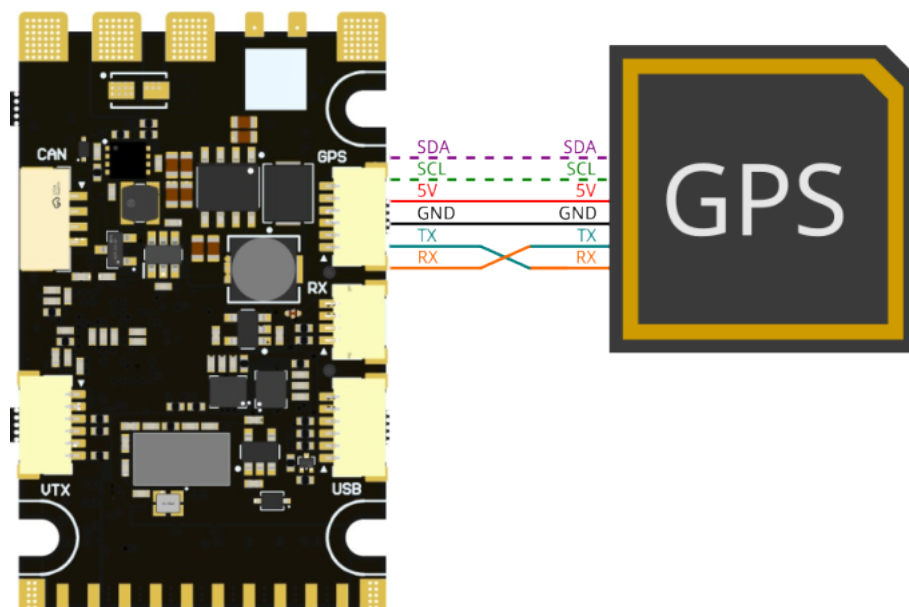
⁽³¹⁾ Disables the external receiver

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 Example

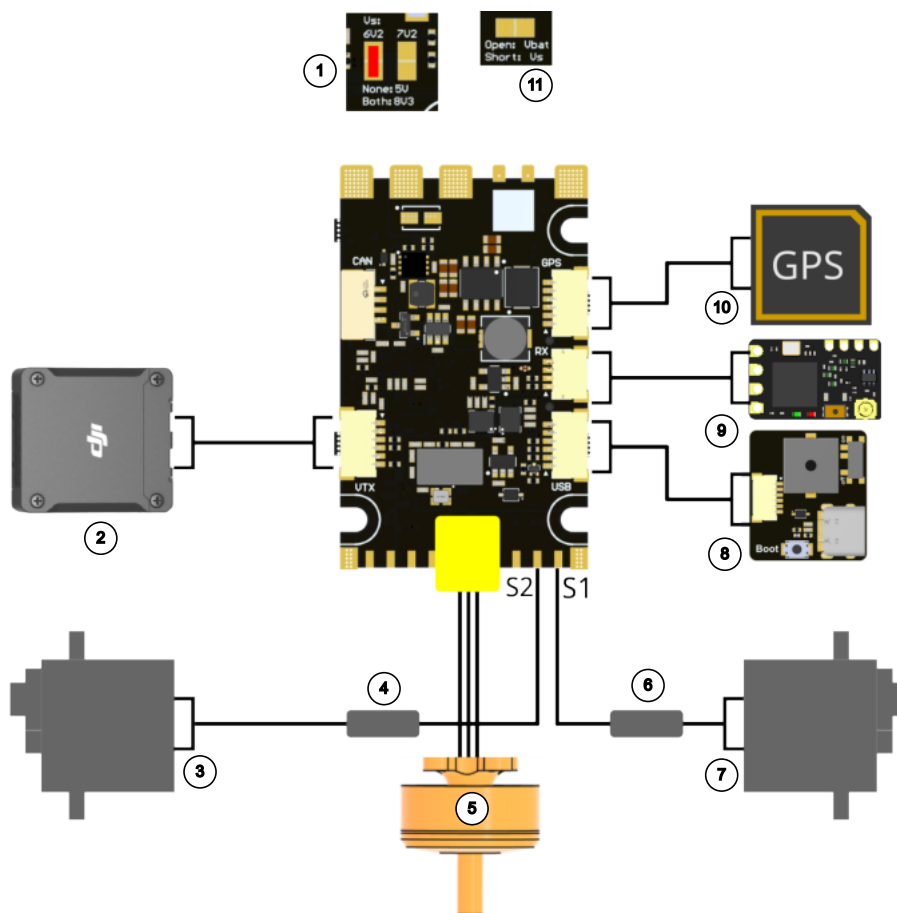
8.11.1. TBS CHUPITO Connection Example

Wiring Example - Bottom View



Important:

On some units the VTX voltage selector (11) does not work. The output will remain VBAT voltage. Please contact the TBS support.



1 – Voltage Selector Servos	2 – HD-VTX	3 – Servo Right Elevon incl. Servo Extension
4 – Servo Extension	5 – Motor	6 – Servo Extension
7 – Servo Left Elevon incl. Servo Extension	8 – USB-Board	9 – Receiver
10 – GPS	11 – VTX Voltage Selector	



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. About

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⁽³²⁾ / 8⁽³³⁾ 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

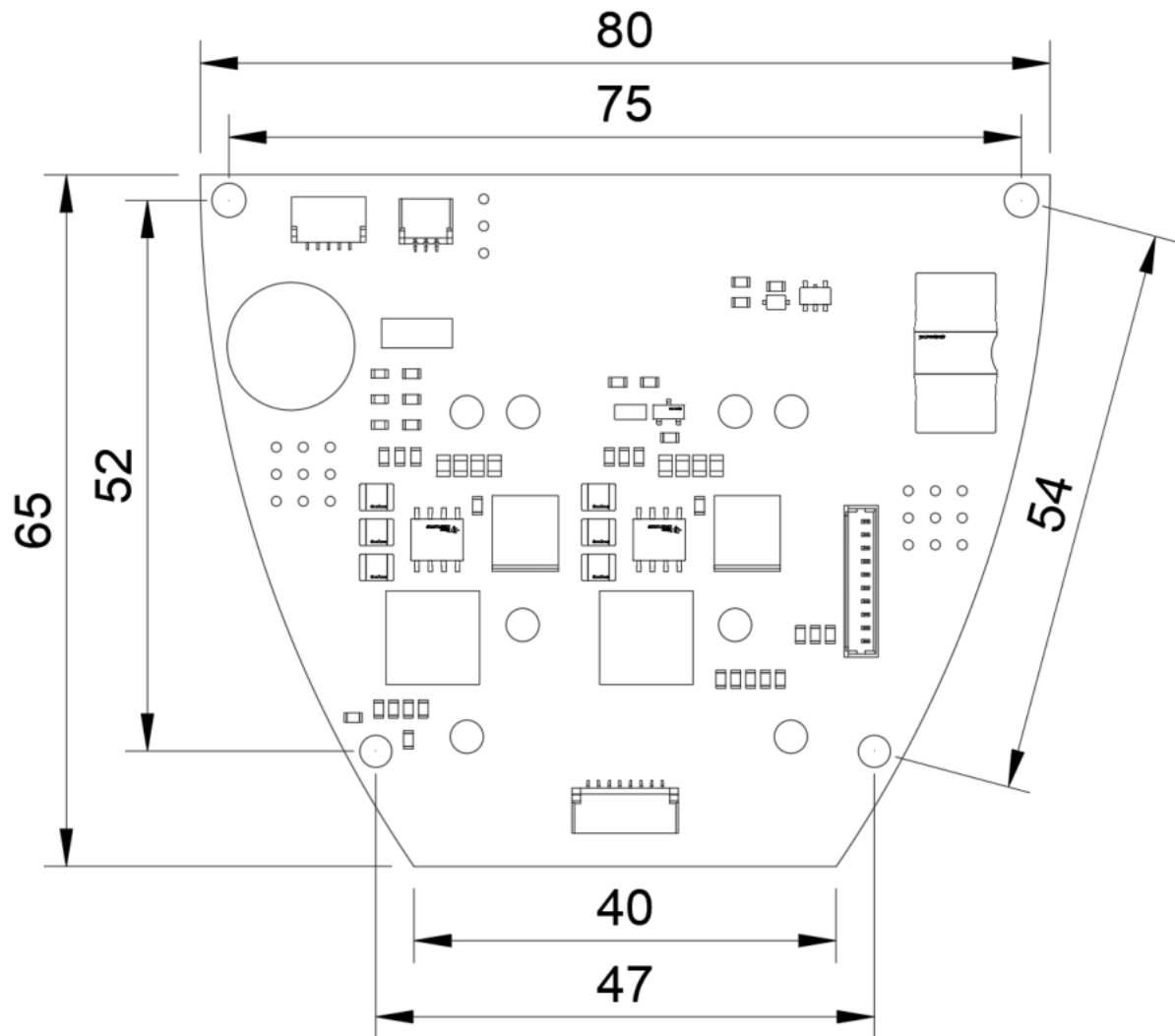
Servo Outputs:	V1: 6 V2: 10
Motor Outputs:	2
Size:	80 x 65 mm
Mounting:	3D Files available 20 x 20 mm (FC) 30.5 x 30.5 mm (FC)
Weight:	26.5 g
Input Voltage:	60 V 14 S
BEC Voltage Servos:	V1: 6 V: 4 A V2: 5/8 V 4 A
BEC Voltage LED/FC/VTX/Camera:	12 V: 4 A
Current Sensor:	90 A (continuous) 200A (10 s)

(32) V1 PDB

(33) V2 PDB



9.3. Mounting - Dimensions



Notice:

All dimensions are given in mm

9.4. Pinout

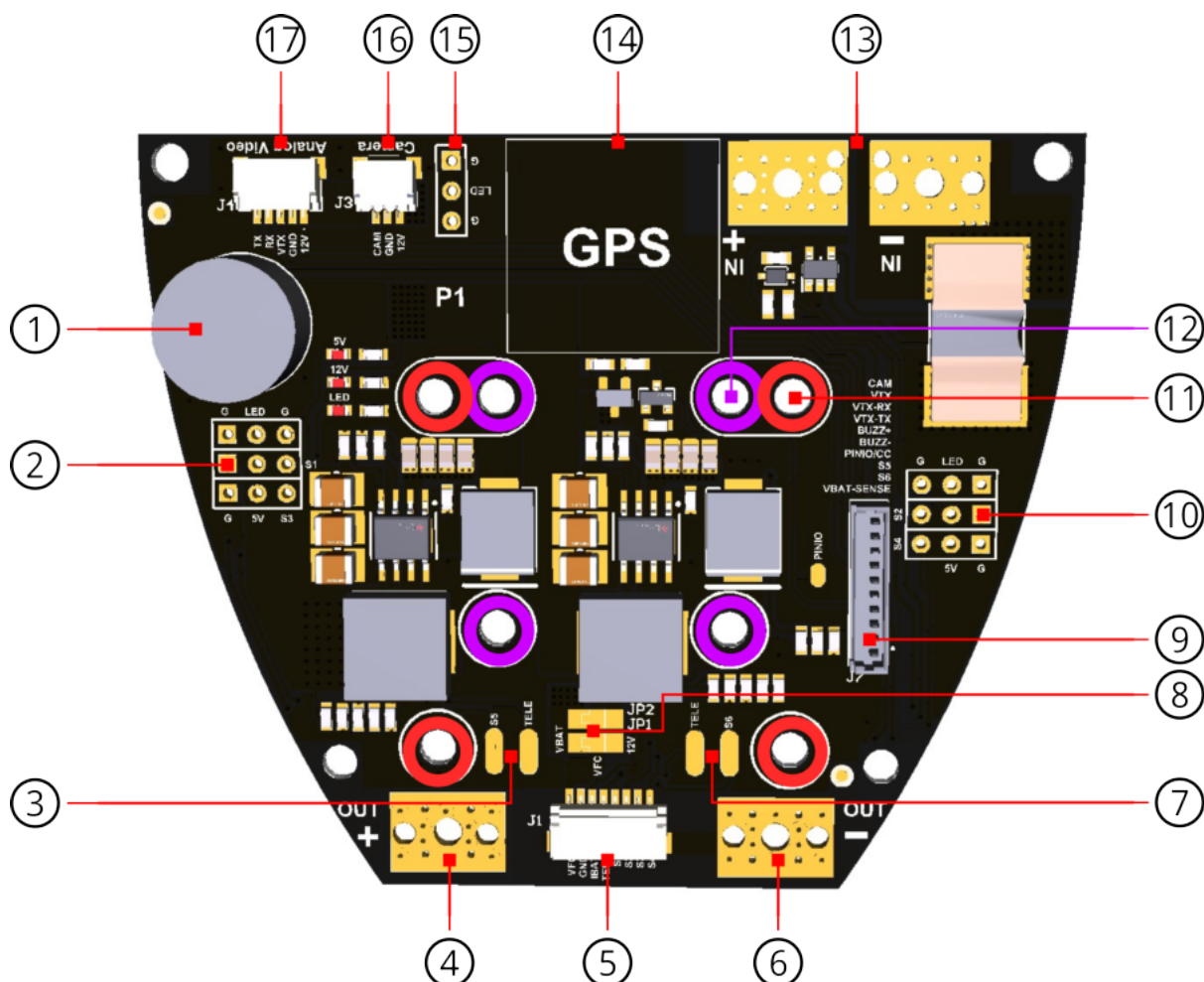
9.4.1. Pinout V1



Important:

The Signal ground must always be connected. The ESC can be damaged if left open.





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	

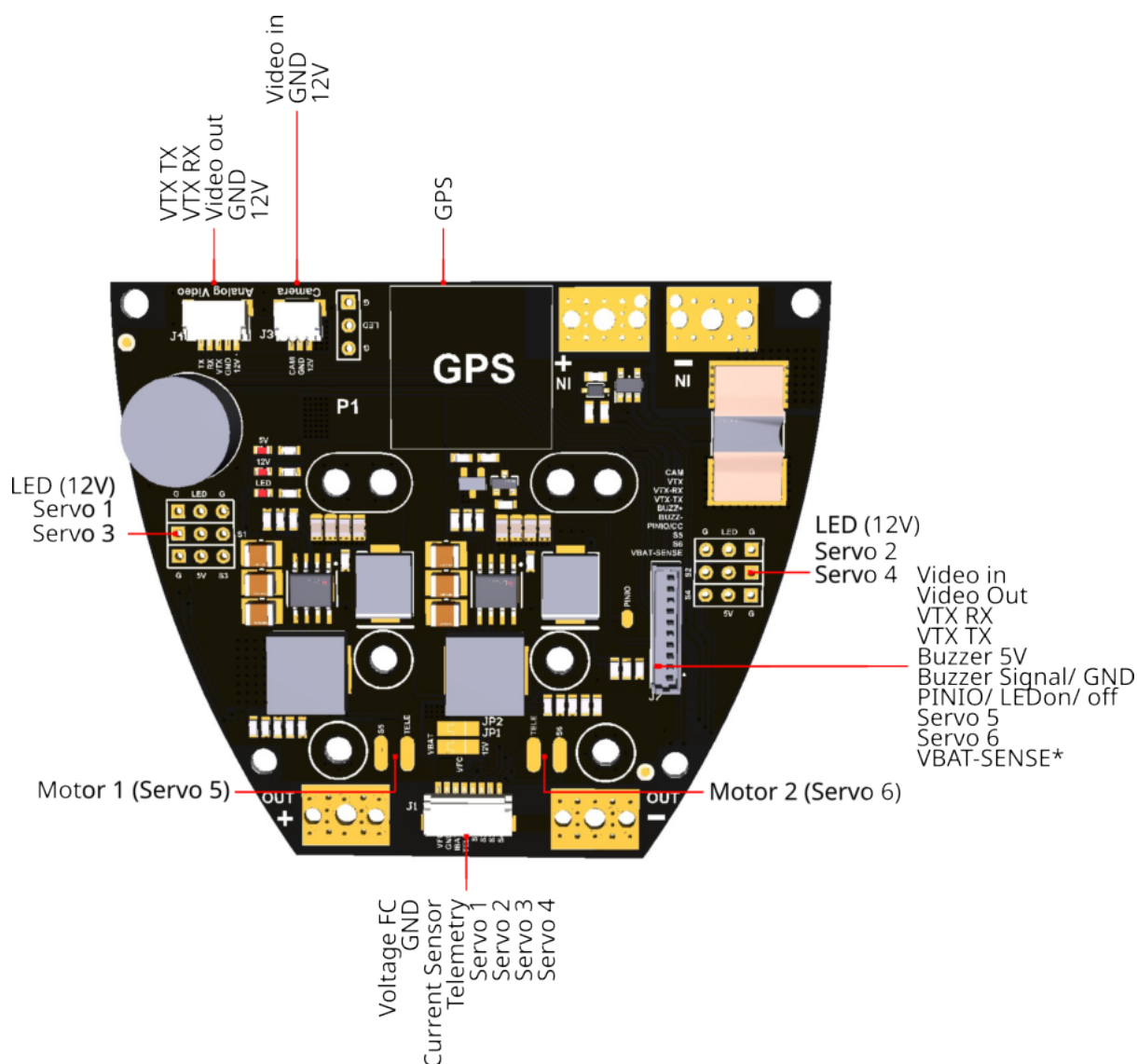
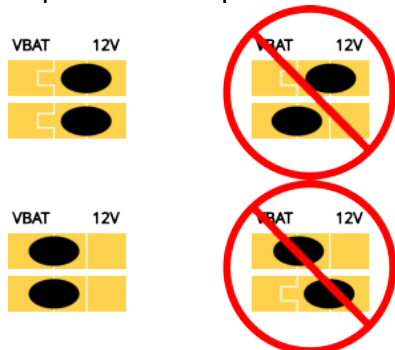
Voltage Selector

FC (8) - Left/ Center	FC (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**⁽³⁴⁾

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



9.4.2. Pinout V2



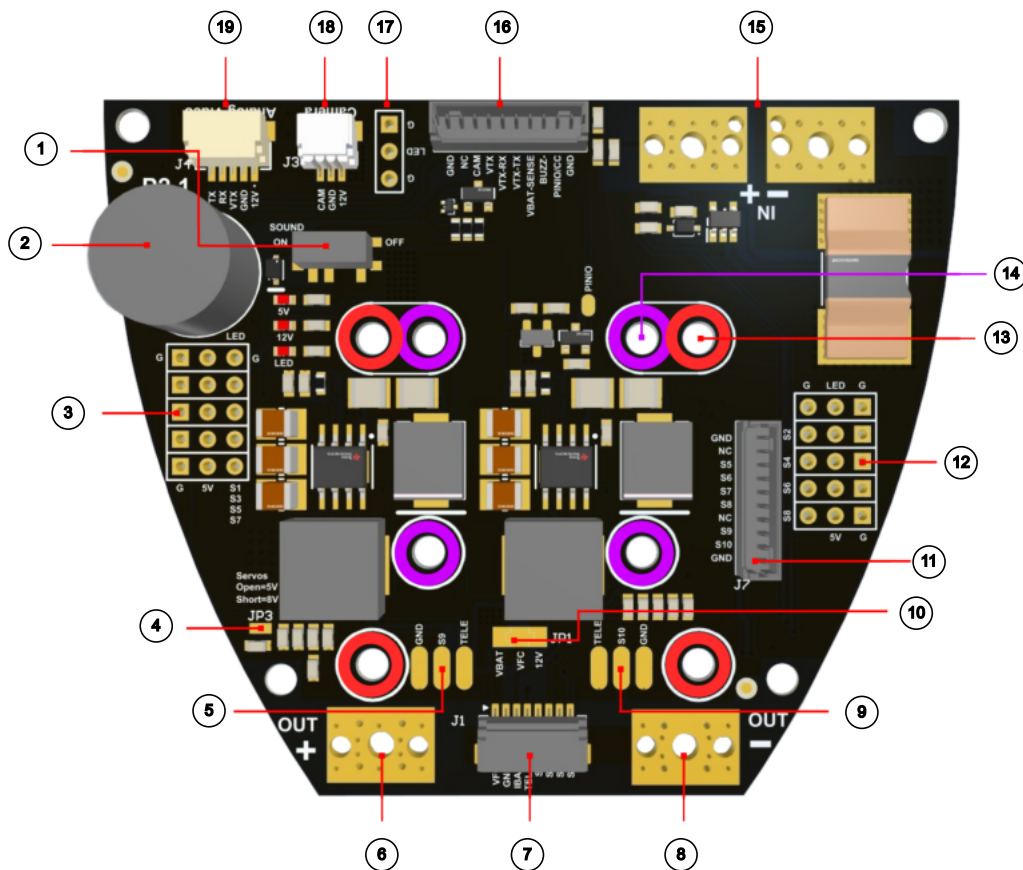
Important:

The Signal ground must always be connected. The ESC can be damaged if left open.



Note:

THE PCB is set to power the FC by 12 V by default. Switching to VBAT can be done by changing the solder jumper (10).



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

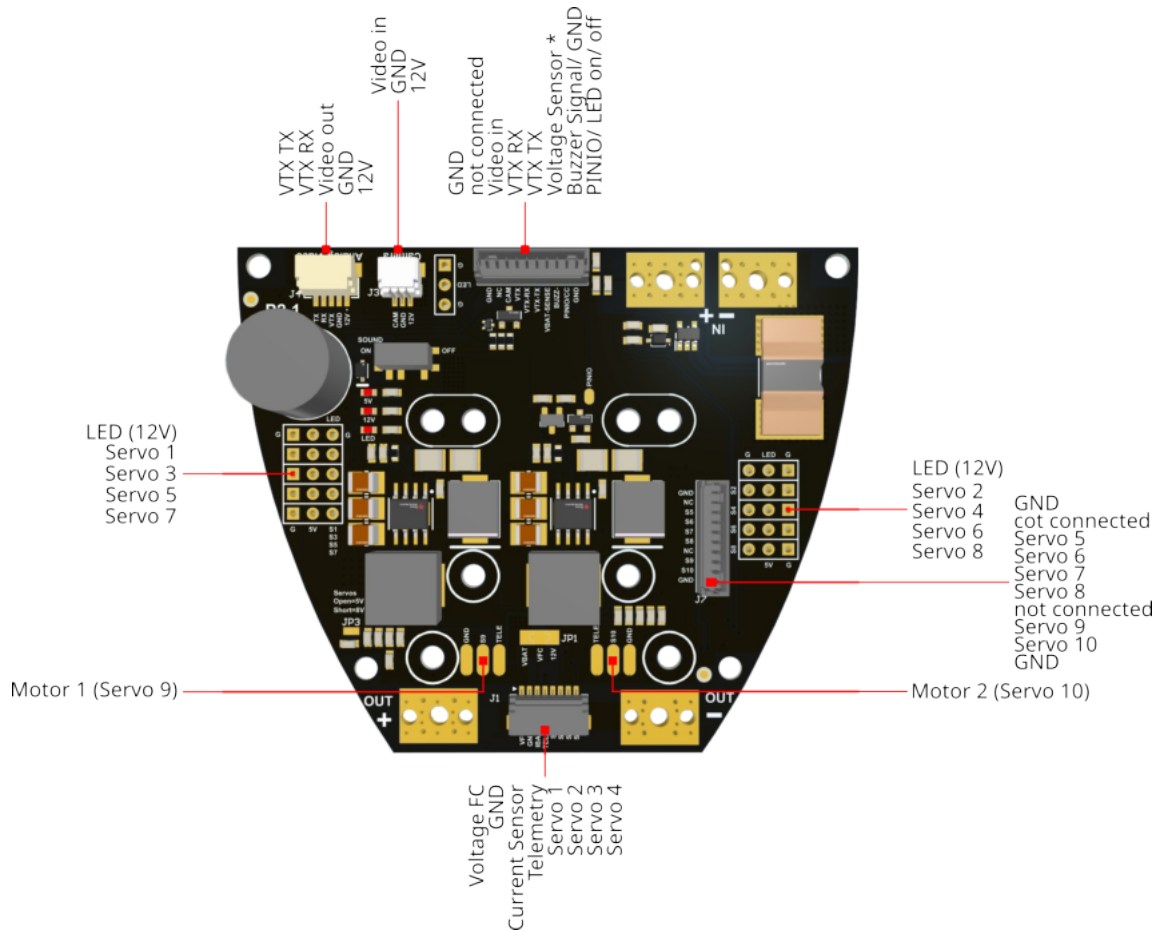
Servo (4) - Open	Servo (4) - Closed	FC (10) - Left/ Center	FC (10) - Right/ Center
Servos 5 V	Servos 8 V	FC Supply Battery Voltage	FC Supply 12 V



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**⁽³⁵⁾

9.5. Voltage Sensor Settings



Note:

Only set up when using the voltage sensor pin for the measurement

INAV

Scale:	2100
Offset:	0

9.6. Current Sensor Settings

INAV

Scale:	250
Offset:	0

⁽³⁵⁾ CC-Pad on LUCID F4 Pro/ Freestyle FC

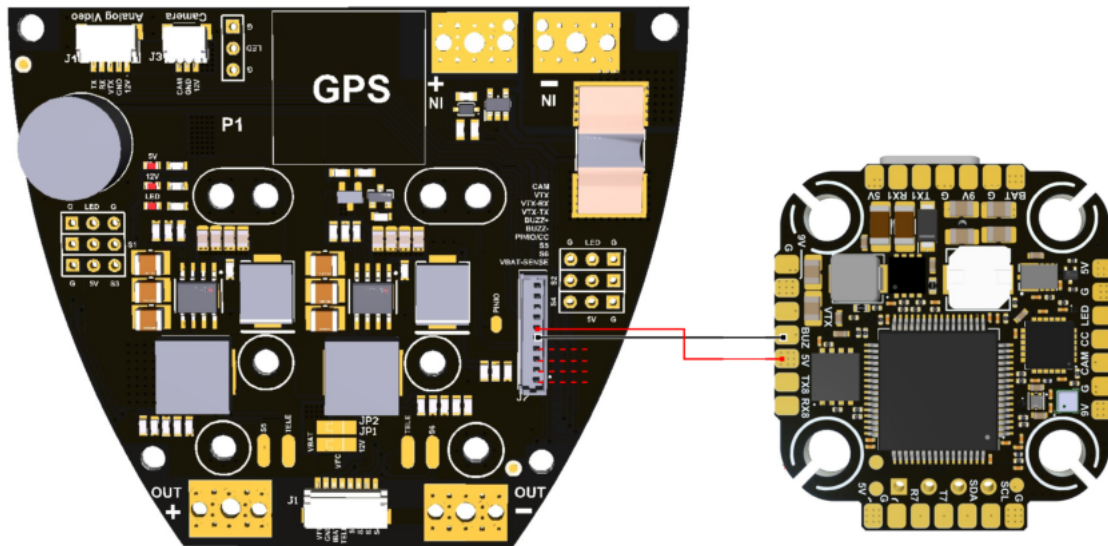


9.7. Peripheral Connections

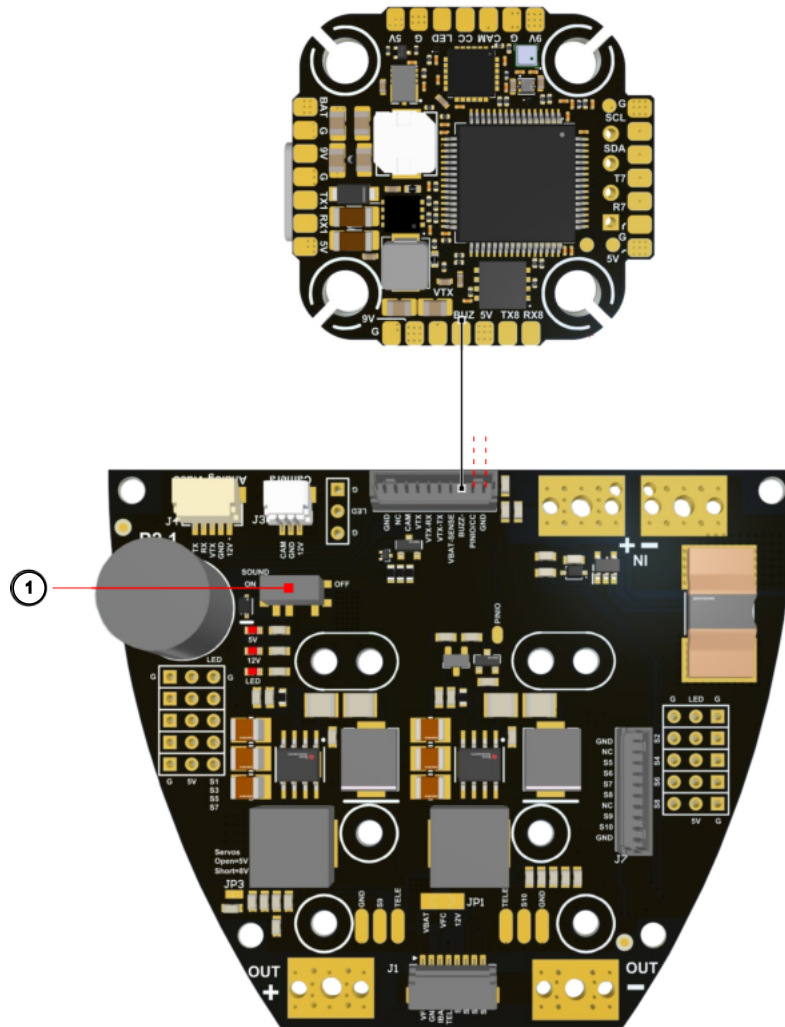
9.7.1. Buzzer

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)

9.7.2. 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 the 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 turn 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.



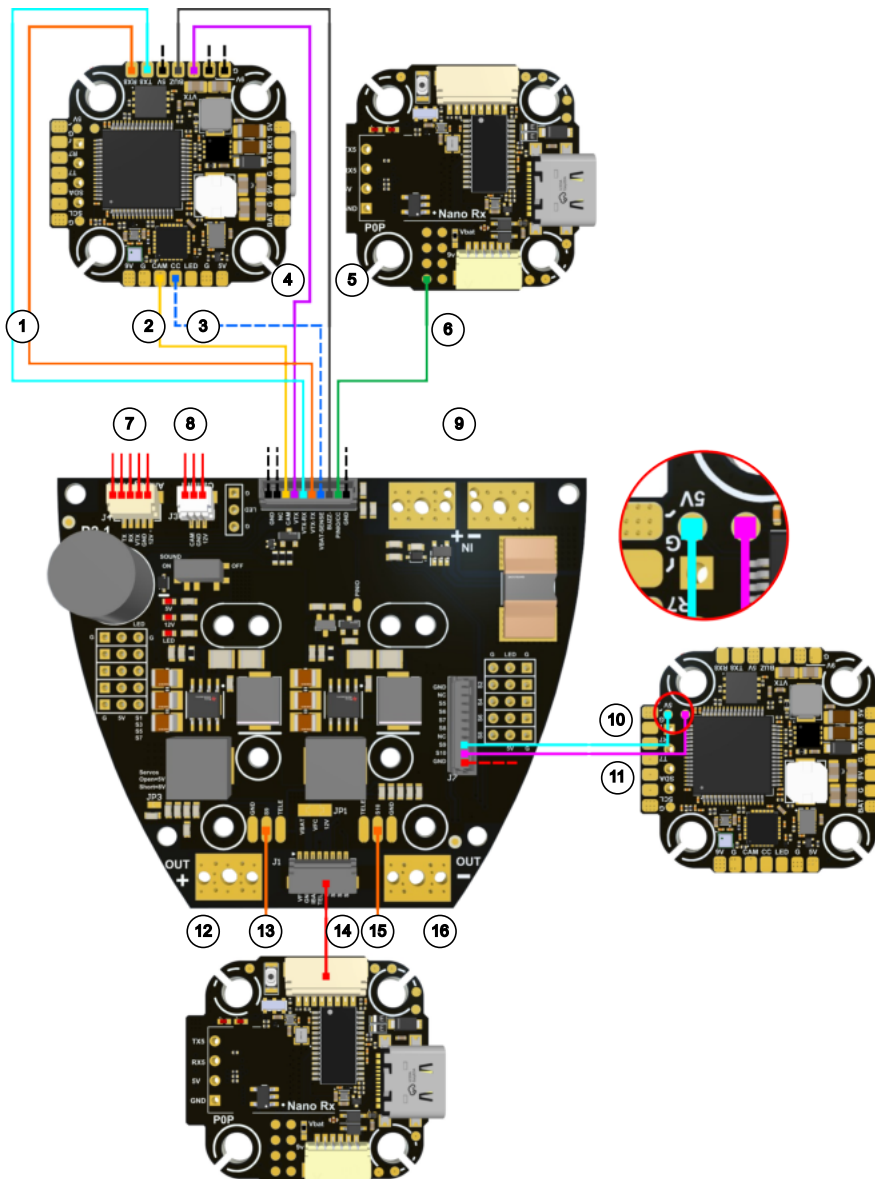
Note:

If no signal is connected to the *PINIO* pad, the LED supply will remain off

9.8. Connection Example

9.8.1. LUCID F4 FC Connection - Example

Wiring-example - TBS MOJITO



1 - VTX Serial (SmartAudio, CRSF)	2 - Video In (Analog Camera)	3 - Camera Control/ Voltage Sensor ⁽³⁸⁾
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⁽³⁸⁾ Voltage Sensor when FC is powered by 12 V



4 - Video Out (Analog VTX)	5 - Buzzer	6 - LED Control (<i>PinIO</i>)
7 - Video Out - To Analog VTX	8 - Video in - To Analog Camera	9 - Battery Ins
10 - Servo 9 - Motor 1	11 - Servo 10 - Motor 2	12 - ESC Power Out <i>VBAT</i>
13 - ESC 1 Signal	14 - FC/ESC Connector ⁽³⁹⁾	15 - ESC 2 Signal
16 - ESC Power Out <i>GND</i>		



Important:

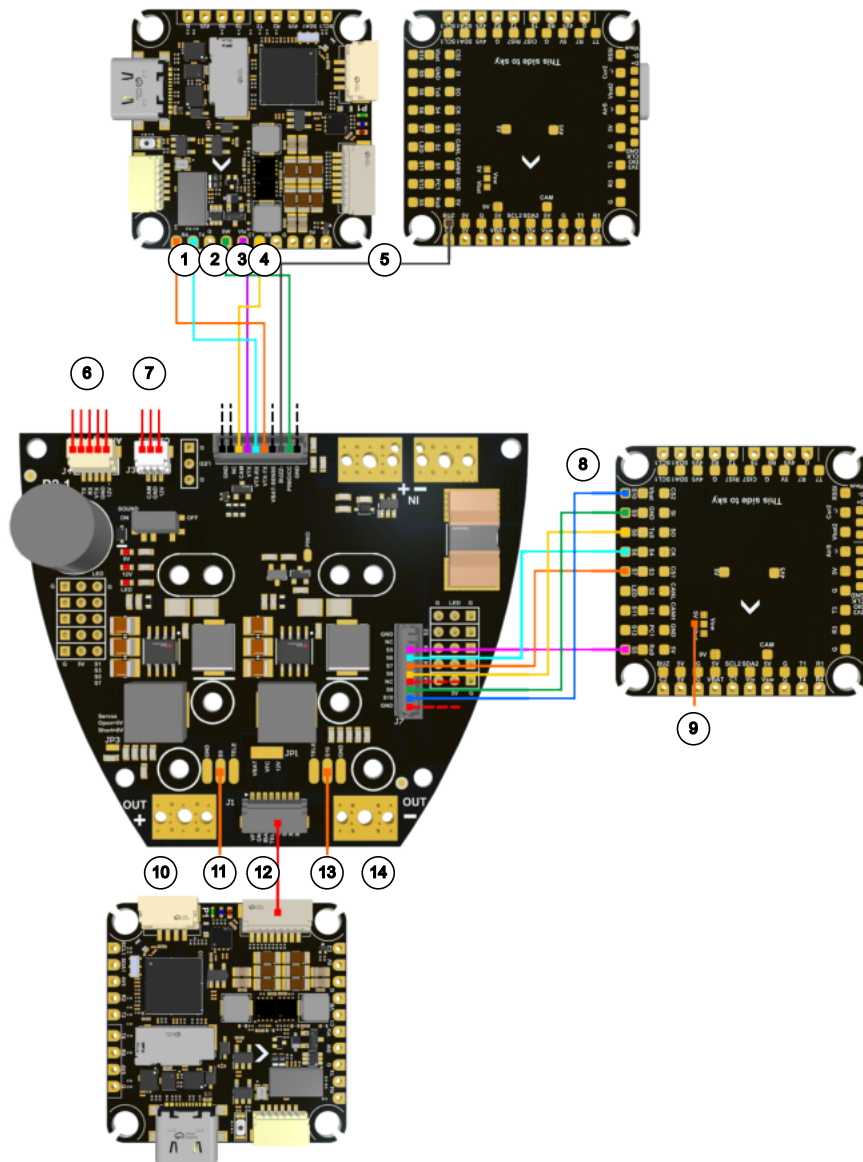
Voltage Sensor (3) and *Camera Control* use the same pin. Do not connect both at the same time. **When using the Voltage Sensor, the *Camera Control* function must not be activated.**

⁽³⁹⁾ Connects *VBAT*, Current sensor and Servo 1-4



9.8.2. LUCID H7 FC Connection - Example

Wiring-example - TBS MOJITO



1 - VTX Serial (SmartAudio, CRSF)	2 - LED Control (PinIO)	3 - Video Out (Analog VTX)
4 - Video In (Analog Camera)	5 - Buzzer	6 - Video Out - To Analog VTX
7 - Video in - To Analog Camera	8 - Servo 5..10	9 - Voltage Selector PinIO
10 - ESC Power Out VBAT	11 - ESC 1 Signal	12 - FC/ESC Connector ⁽⁴¹⁾

⁽⁴¹⁾ Connects VBAT, Current sensor and Servo 1-4

13 - ESC 2 Signal	14 - ESC Power Out <i>GND</i>	
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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.



10. Single ESC - 12 S

10.1. About

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)
Motor Outputs:	1
Size:	58 x 29 mm
Weight:	19 g
Mounting:	/
Input Voltage:	3 - 12 S
Current:	50 A (continuous) 70 A (60 s) 90 A (40 s) 120 A (30 s)
Protocols:	PWM CRSF DSHOT 300/600 with ESC telemetry KISS ESC Telemetry

10.3. Firmware

Firmware	Target	Min. FW Version
AlkaMotors32	AM32_TBS_12S_F415	2.18
	AM32_TBS_12S_G071	2.20



Note:

ESC's produced late 2025-12 or later require the *G071* firmware.



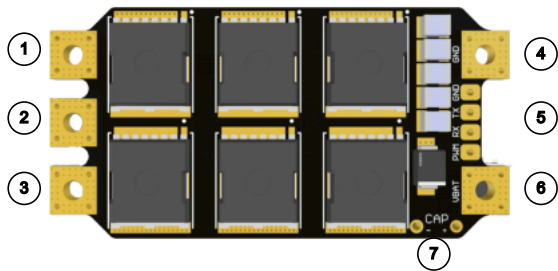


Check the print on the main chip of the ESC for the correct chip type (e. g. *stm32g071*)

10.4. Pinout



Important:
The Signal ground must always be connected. The ESC can be damaged if left open.



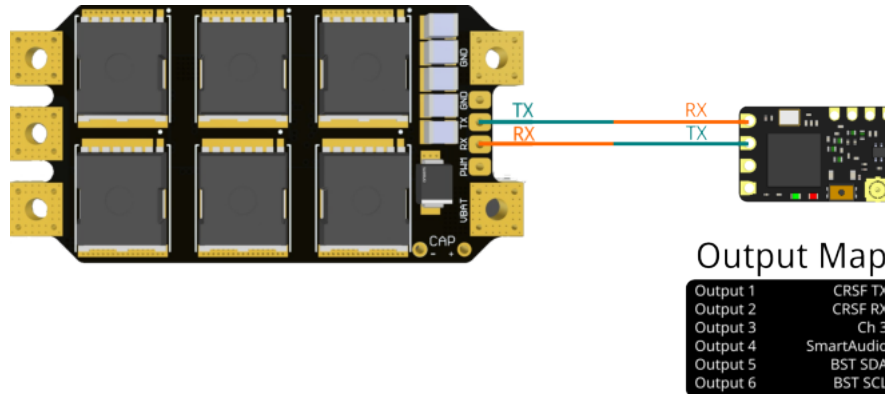
1..3 – Motor	4 – Battery In - GND	5 – RC Input
6 – Battery In	7 – External Capacitor Pads	



10.5. Peripheral Connections

10.5.1. Receiver Connection - CRSF

CRSF Connection



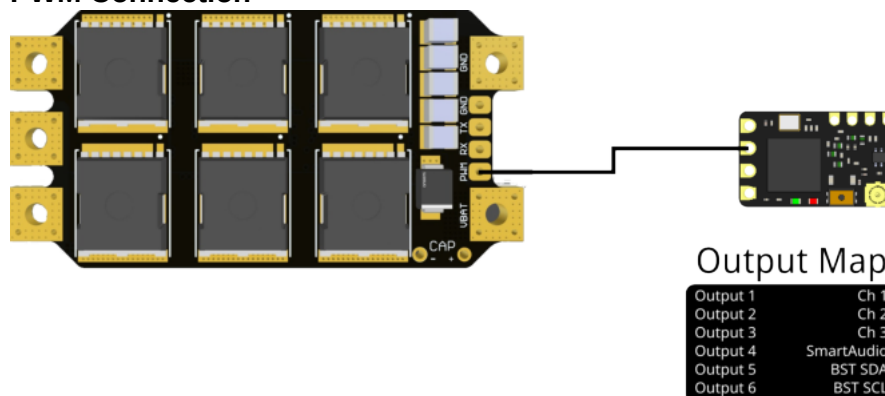
CRSF enables extra features over other protocols:

- 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 CRSE, KISS Telemetry or DShot

PWM Connection



11. Single ESC - 16 S

11.1. About

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.

11.2. Specification

	RAWDOG Version	Heatsink and Capacitor PCB version
Firmware:	AlkaMotors32 (AM32)	
Motor Outputs:	1	
Size:	107 x 57 x 38 mm	107 x 57 x 36 mm ⁽⁴²⁾
Weight: ⁽⁴³⁾	74 g	222 g
Mounting:	/	
Input Voltage:	3 - 16 S	
Current:	120 A (continuous)	• 200 A, 600 s • 580A, 10 s ⁽⁴⁴⁾
Protocols:	PWM CRSF DShot 300/600 with ESC telemetry KISS ESC Telemetry	

⁽⁴²⁾ Max. Height at the Capacitor PCB

⁽⁴³⁾ Excl. Cables

⁽⁴⁴⁾ With airflow: 33 m/s

11.3. Firmware

Firmware	Target	Min. FW Version
AlkaMotors32	AM32_TBS_16S_L431 AM32_TBS_16S_L431_CAN	2.19

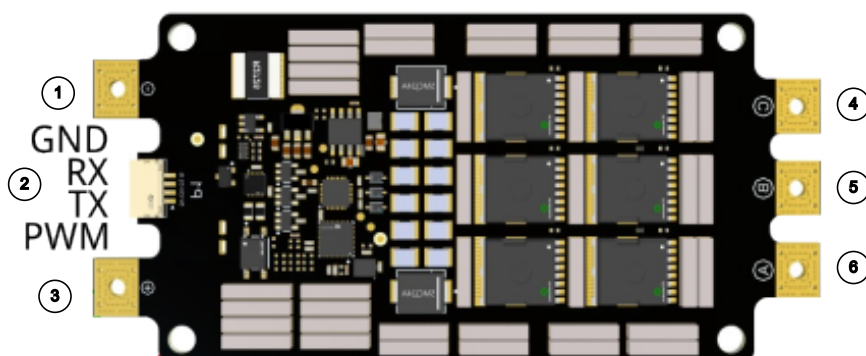
11.4. Pinout



Important:

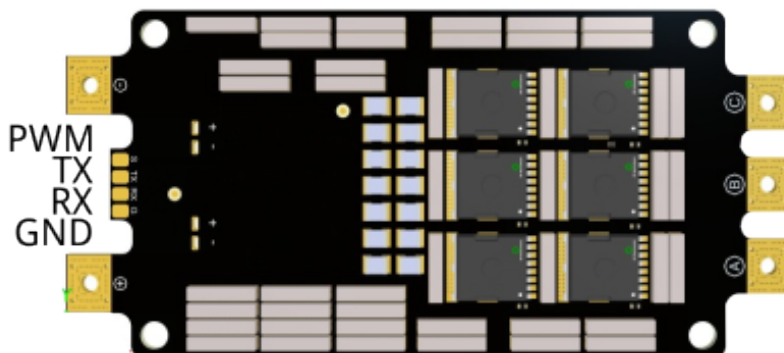
The Signal ground must always be connected. The ESC can be damaged if left open.

Top



1 – Battery In - VBat	2 – RC Input
3 – Battery In - GND	4..6 – Motor

Bottom



Heatsink and Capacitor PCB



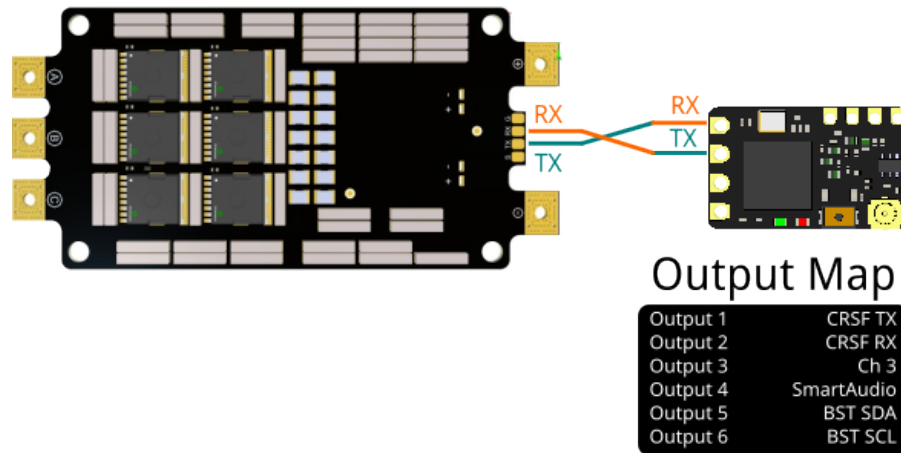
1 -- Heat Sink	2 -- Capacitor PCB
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11.5. Peripheral Connections

11.5.1. Receiver Connection - CRSF

CRSF Connection



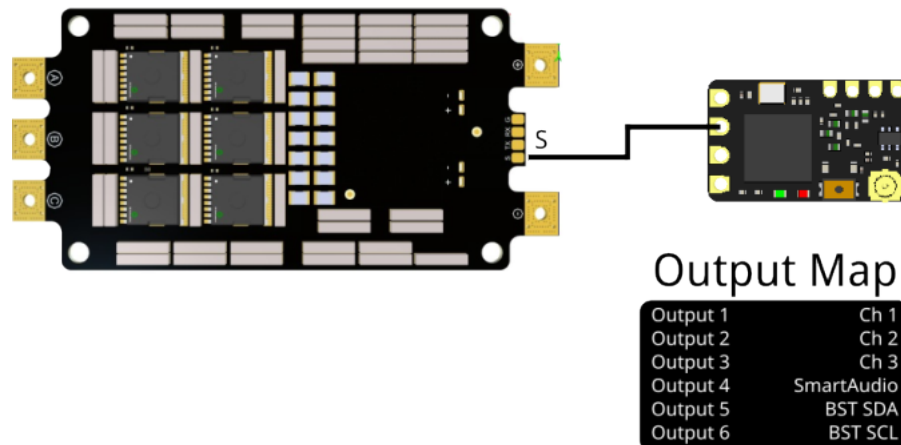
CRSF enables extra features over other protocols:

- 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)

11.5.2. Receiver Connection - PWM

When using an FC, its recommended to use CRSF, KISS Telemetry or DShot

PWM Connection



12. 4in1 ESC - 3-6 S

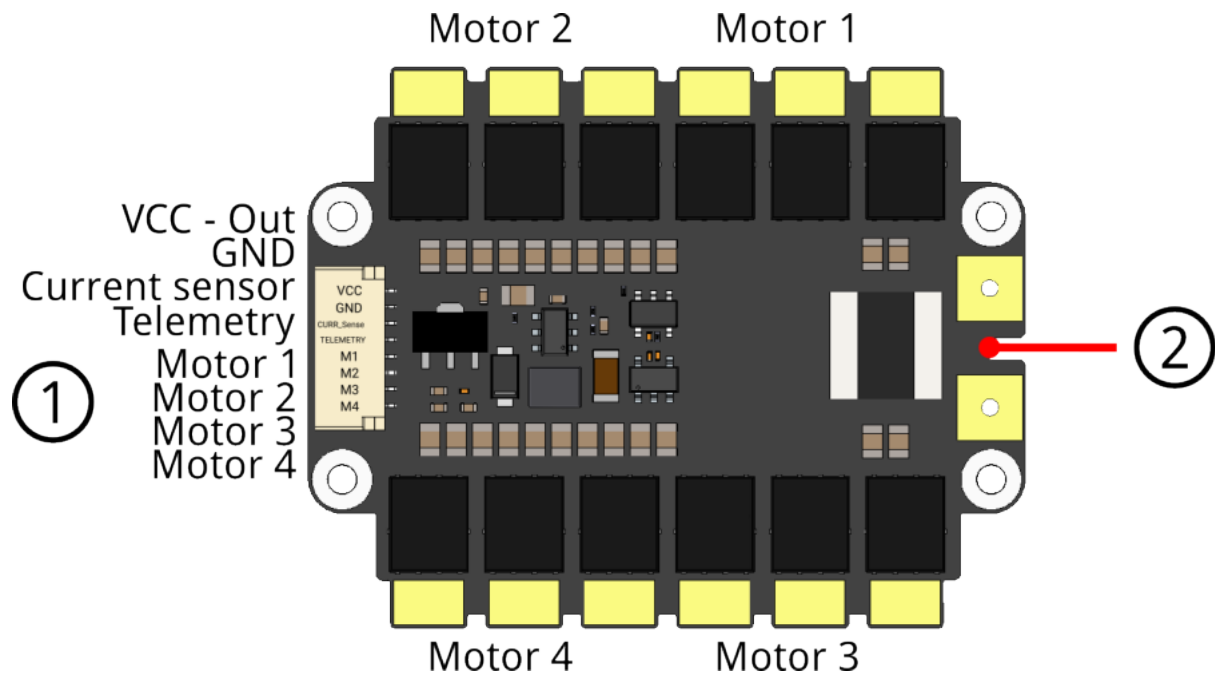
12.1. Specification

Firmware:	AlkaMotors32 (AM32)
Motor Outputs:	4
Size:	34 x 44 mm
Weight:	13.81 g
Mounting:	Gorilla Pattern, M2 Bracket for 20 x 20 mm Bracket for 30.5 x 30.5 mm
Input Voltage:	3 - 6 S
Current:	4 x 50 A (continuous) 4 x 60 A (300 s) 4 x 70 A (60 s)
Protocols:	PWM CRSF DSHOT 300/600 with ESC telemetry KISS ESC Telemetry
Current Sensor:	Yes

12.2. Firmware

Firmware	Target	Min. FW Version
AlkaMotors32	AM32_TBS_6S_4IN1_F421	2.18

12.3. Pinout



1 - FC Connector

2 - Input/ Battery, Capacitor

12.4. 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 μ F	not required
25 - 29 mm	min. 1000 μ F	not required
≥ 30 mm	min. 1000 μ F	min. 220 μ F (recommended)

12.5. Current Sensor Settings

BETAFLIGHT

Scale:	125
Offset:	0

INAV

Scale	125
Offset:	0



13. 4in1 ESC - 3-8 S

13.1. About

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.

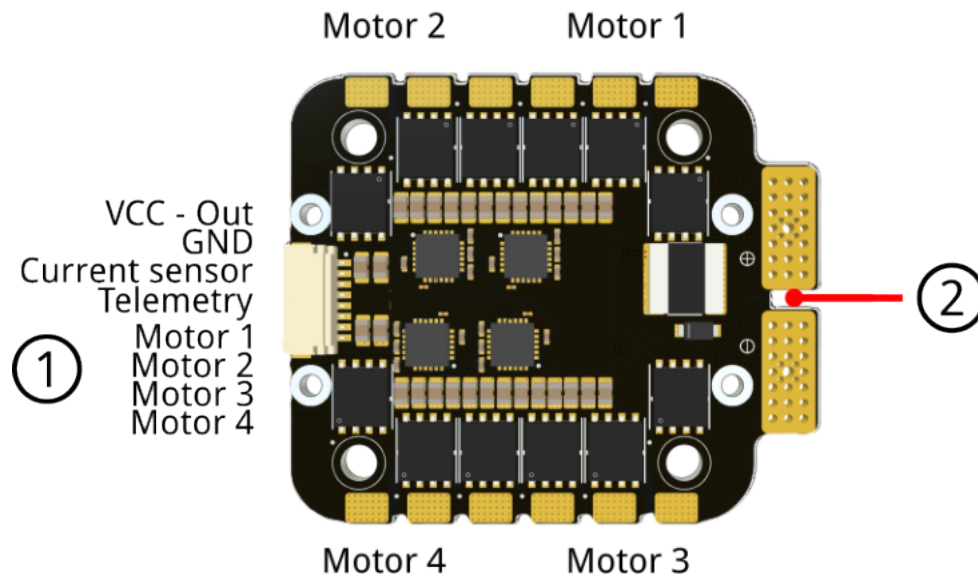
13.2. Specification

Firmware:	AlkaMotors32 (AM32)
Motor Outputs:	4
Size:	34 x 44 mm
Weight:	13.81 g
Mounting:	Gorilla Pattern, M2 30.5x30.5 mm, M3 Bracket for 20 x 20 mm
Input Voltage:	3 - 8 S
Current:	4 x 50 A (continuous) 4 x 60 A (60 s) 4 x 85 A (10 s)
Protocols:	PWM CRSF DSHOT 300/600 with ESC telemetry KISS ESC Telemetry
Current Sensor:	Yes

13.3. Firmware

Firmware	Target	Min. FW Version
AlkaMotors32	AM32_TBS_8S_4IN1_F421	2.18

13.4. Pinout



1 - FC Connector

2 - Input/ Battery, Capacitor

13.5. 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 μ F	not required
25 - 29 mm	min. 1000 μ F	not required
≥ 30 mm	min. 1000 μ F	min. 220 μ F (recommended)

13.6. Current Sensor Settings

BETAFLIGHT

Scale:	50
Offset:	0

INAV

Scale:	50
Offset:	0

Changelog

Revision	Date	Changes
1.00	/	• Initial release after moving from GDocs • General revision
1.01	/	• FC F4 ◦ Corrected BF Scaling Value ◦ Included INAV Scaling
1.02	2025-07-29	• Style ◦ Fixed Image Map colors ◦ incl. Note Pictogram • General ◦ Added GPIO Section to relevant FC's ◦ Updated Voltage/ Current Scaling on all FC's • Wing PDB ◦ Updated V2 Pinout ◦ V2 Servo Voltage Selector correction (open/closed) ◦ Added FC wiring example with V2 PDB an LUCID F4 FC • F4 FC ◦ Cleanup in Pinout Section ◦ Added for Freestyle FC voltage selector (HW Revision) • ESCs ◦ Fixed Current Sensor Scaling
1.03	2025-08-10	• New Hardware: H7 Wing FC
1.04	2025-08-14	• FC H7 Wing ◦ 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 ◦ Specification: note about the housing ◦ Added Note about the installation direction ◦ Servo connections moved to the "correct" side • FC F4 ◦ Added CLI command to use GPIO pins as USER1/2
1.07	2025-08-22	• Layout ◦ Changelog moved to the end of the document

Revision	Date	Changes
		- FC Wing Mini AIO - Input Voltage Range fixed - Weight corrected - Wiring example VTX voltage jumper changed - FC H7 Wing - Weight corrected
1.08	2025-08-29	- Layout - Changed all tables to full page with - FC F4 Pro/Freestyle - Updated Spec: Voltage range - Servo 5/6 label swapped - Fixed CLI command pin number for PinIO User 1 - FC H7 Wing - ESC Wiring Power Lines corrected
1.09	2025-09-03	- FC H7 Wing - Spec: added Servo BEC spec - Pinout: Servo voltage selector settings corrected, warning added
1.10	2025-09-05	- FC H7 Wing AIO  Important: VTX Voltage Selector jumper not working. Please contact the TBS support. - Servo Voltage Selector corrected (8.4 V max.)
1.11	2025-09-13	- General: - Missing Firmwares and Driver Section included again - Wing PCB - V1 Pinout fixed - FC General - Added Note in GPIO section if outputs are active high or low - FC H7 Wing Added Connector -Pinout from top-down
1.12	2025-10-04	- General: - Added "About this Manual" section - FC General - Changed the "CLI/Function" label" to "MCU Pin" for clarity - FC F4 Pro/ Freestyle

Revision	Date	Changes
		◦ Fixed INAV CLI commands for PinIO • FC H7 Wing AIO ◦ Removed Pinout "Bottom View" for clarity ◦ Fixed I2C Labels in GPS Wiring Example ◦ Added INAV Timer information ◦ Added Note for fixed voltage selector units ◦ Fixed ESC current rating ◦ Fixed Wiring in Analog Video Example ◦ Flipped Front view image for clarity ◦ Fixed Wiring in Analog Video Example, Flipped Front view image
1.13	2025-10-29	• General: ◦ Added STM32 DFU Driver Section ◦ Fixed AT32 DFU Driver ◦ New Layout for Specification-section • ESC 12 S ◦  Important: The Signal ground must always be connected. The ESC can be damaged if left open. • FC H7 ◦ Added V2 Hardware Revision in Specification and Pinout  Note: Peripheral Connections images are still based on V1 FC • FC H7 Wing, H7 Wing Mini ◦ Added INAV version (INAV 8.0.1) ◦ Added note for ESC signal is <i>PWM 7</i>
1.14	2025-12-10	• Minor Layout changes • New Hardware: 16 S Single ESC
1.15	2026-01-10	• Singel ESC - 12 S ◦ Updated Firmware Target