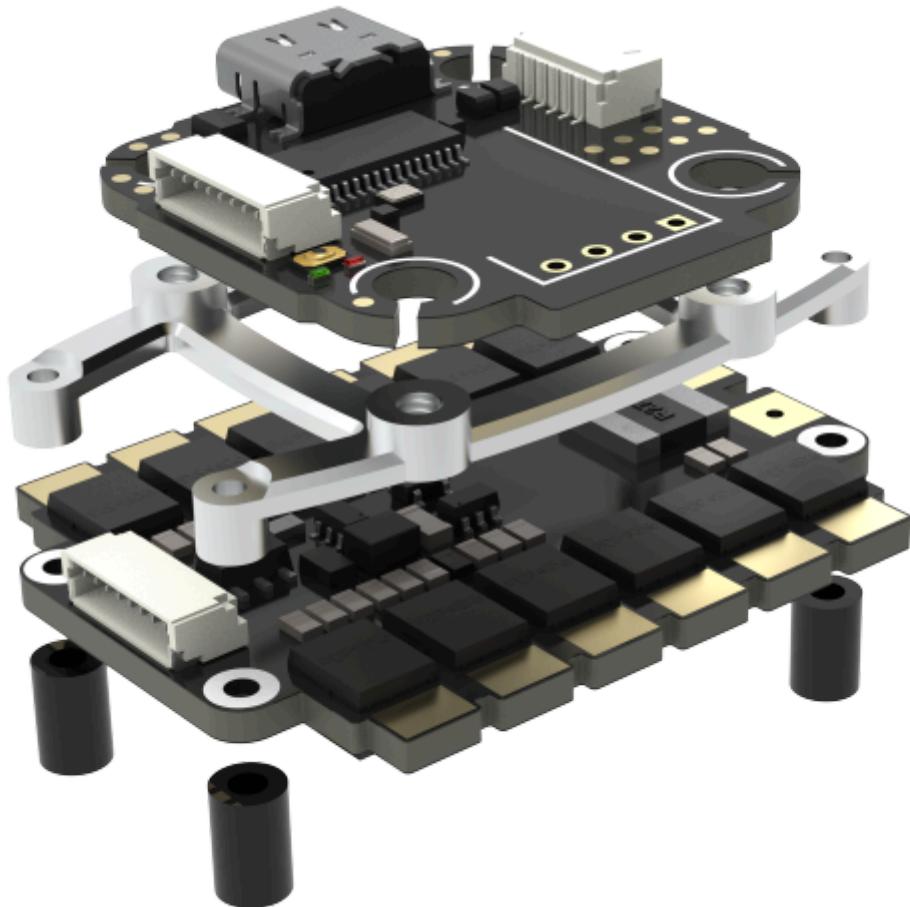


# TBS LUCID

*FC and ESC series*

Revision 2024-11-18



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.



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# Table of content

[General](#)

[FAQ](#)

[Configuration and Upgrade](#)

[LUCID F4 FC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[DFU-Driver](#)

[Serial Ports](#)

[Pinout Solder Pads](#)

[Pinout Plugs](#)

[INAV and DJI Port](#)

[Betaflight Voltage Sensor Settings](#)

[Board Orientation](#)

[Connections](#)

[Receiver \(direct mounted\)](#)

[ESC \(TBS LUCID 4in1\)](#)

[HD Video System](#)

[Analog Video w. SmartAudio VTX](#)

[GPS and Compass](#)

[Stack Mounting](#)

[LUCID H7 FC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[Serial Ports](#)

[Pinout](#)

[Connections](#)

[Receiver](#)

[LUCID AIO FC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[Pinout](#)

[Board Orientation](#)

[Sensor Scaling Settings](#)

[Current Sensor](#)

[Voltage Sensor \(when using external ADC from the PCB\)](#)

[Scale: 57](#)

[Divider Value : 18](#)



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[Multiplier Value:1](#)

[LUCID 4in1 3-6s ESC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[Pinout](#)

[Betaflight Current Sensor Settings](#)

[LUCID 4in1 3-8s ESC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[Pinout](#)

[Betaflight Current Sensor Settings](#)

[LUCID Single ESC](#)

[Features](#)

[Firmware/ Target](#)

[Size and Mounting](#)

[Pinout](#)

[Connections](#)

[CRSF direct connection](#)

[CRSF Features](#)

[LUCID Wing PDB](#)

[Features](#)

[Sensor Scaling Settings](#)

[Current Sensor](#)

[Voltage Sensor \(when using external ADC from the PCB\)](#)

[Size and Mounting](#)

[Pinout](#)

[LED Connection](#)



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# General

## FAQ

If you have any questions after reading this manual, visit the [TBS FAQ](#) section.

## Configuration and Upgrade

For the latest firmware version and configurator, visit the Github project pages:

**Any ESC:** AlkaMotors32 Since FW AM1.99

**F4 FC:** Betaflight Since FW BF 4.5

INAV Since 7.1.2

**H7 FC:** Betaflight 4.5.0

INAV 8.0

Ardu not yet

**AIO FC:** Betaflight not yet

INAV not yet

CROSSFIRE 6.XX #todo



## LUCID F4 FC

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 TBS Lucid 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.

For the professional pilot, an MPU6000 (Pro) variant is available (those who know will know), while the ICM-42688P (Freestyle) based version offers a state-of-the-art gyro solution at a better price.

### Features

AT32F435, ICM-42688P (freestyle version)/ MPU6000 (pro version) gyro, BMP280 baro, 4.51g  
6 UARTs, 1 I2C, CROSSFIRE/ TRACER direct solder mount, DJI Airunit support, 4 Motor outputs  
Built-in OSD, Blackbox (8MB),  
3-6S input , built-in BEC: 9V@ 2.5A, 5V@ 2A

### Firmware/ Target

Betaflight Target: TBS\_LUCID\_MOD\_FC/ TBS\_LUCID\_FC, FW 4.5 or later

Below the NanoRX solder pads, if you can spot a "P1" printer on the PCB, you must use the "...MOD\_FC" target otherwise, use the TBS\_LUCID\_FC target



### Size and Mounting

31\*29mm size

20\*20mm mounting holes, M3 with installed dampening rubbers



## DFU-Driver

In case you need to download the FC DFU driver manually:

- Visit the Artery Website and search for “F4 ISP”
- Download the “*ISP Programmer In-System-Programming tool supporting AT32 MCU*” file

ISP Multi-Port Programmer In-System-Multi-Port Programming tool supporting AT32 MCU	<a href="#">08_ISP Multi-Port</a> <a href="#">ISP Multi-Port</a>	V2.0.14	2024/05/29
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- Unzip it, navigate to the `\Artery_DFU_DriverInstall` folder
- Run the installer
- Reboot your FC

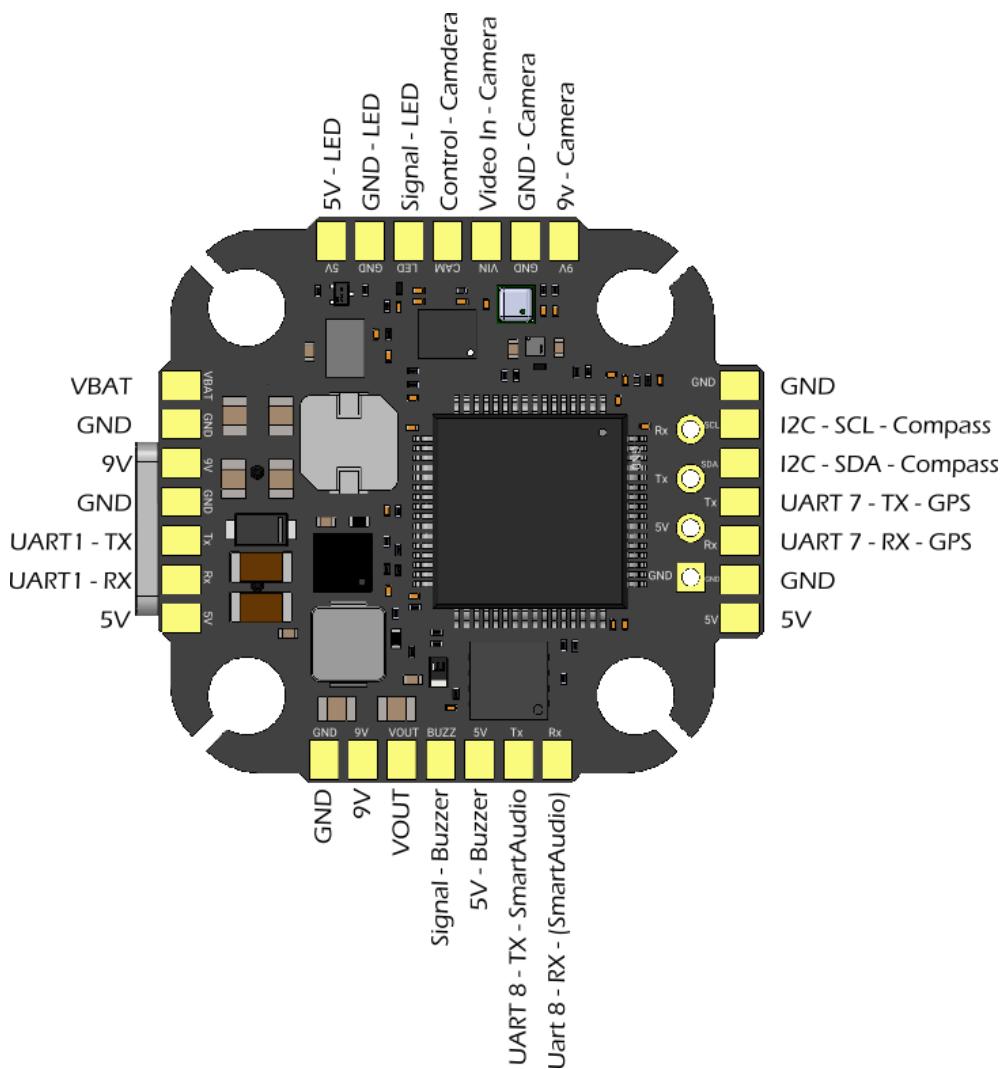
[Direct Download Link](#)



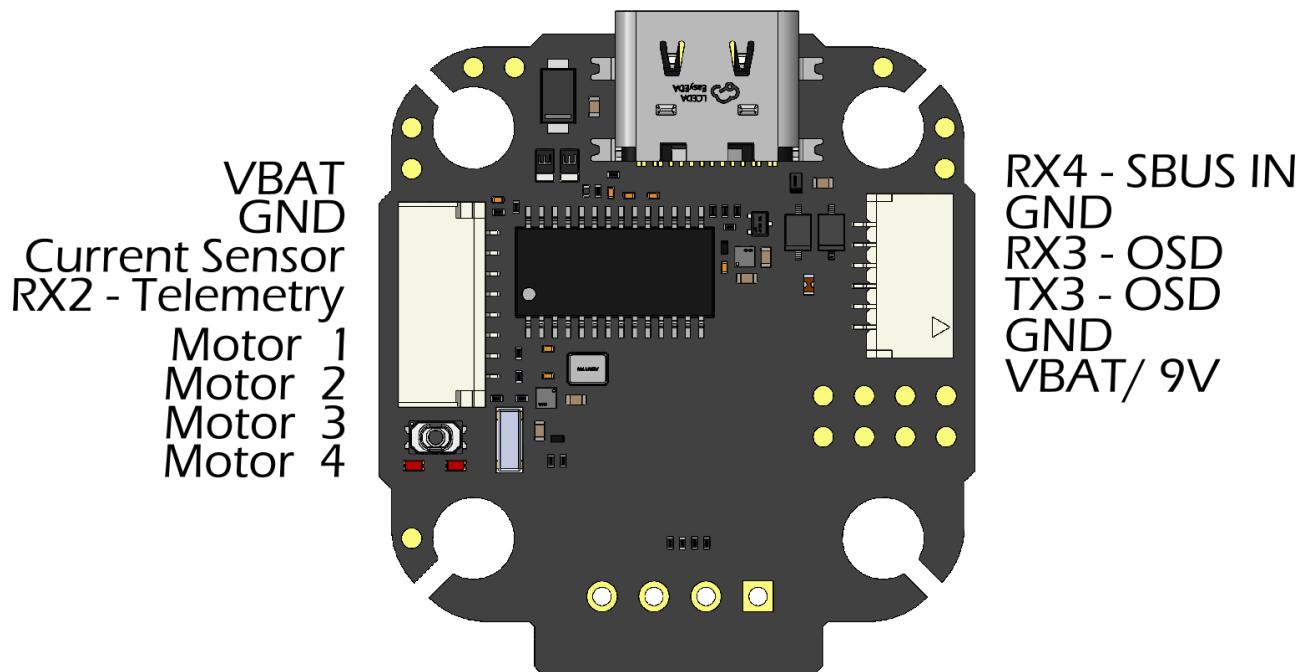
## Serial Ports

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

## Pinout Solder Pads



## Pinout Plugs



## INAV and DJI Port

If you want to use INAV, TX and RX3 needs to be swapped.

## Betaflight Voltage Sensor Settings

**Scale:** 111

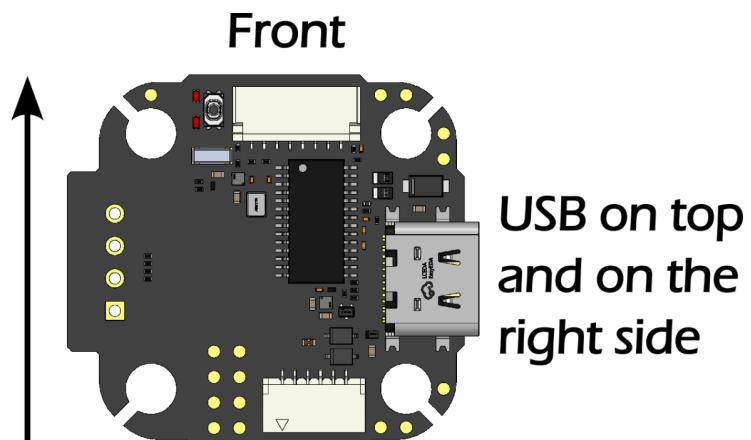
**Divider:** 10

**Value:** 1

**Pin:** C00 (ADC\_BATT 1)



## Board Orientation



Board and Sensor Alignment

<input type="button" value="180"/> Roll Degrees	<input type="button" value="0"/> Pitch Degrees	<input type="button" value="90"/> Yaw Degrees
First ▾ GYRO/ACCEL	CW 0° ▾ First GYRO	
Default ▾ MAG Alignment		

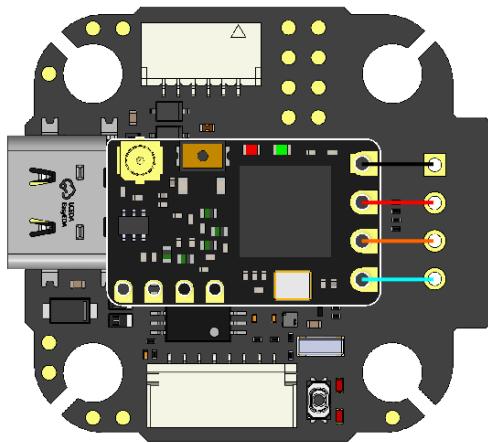
Freestyle - FC      Yaw = 90°  
Pro - FC            Yaw = -90°



## Connections

### Receiver (direct mounted)

By soldering them together, you can install your CROSSFIRE/ TRACER receiver directly on the LUCID FC using the provided 4-pin header. Leave some space between them for the best heat dissipation.



#### Important Note:

The "RX" and "TX" labels for the receiver are written from the receiver side. This means

*Receiver TX -> FC TX,*

*Receiver RX -> FC RX*

#### Betaflight ports setting:

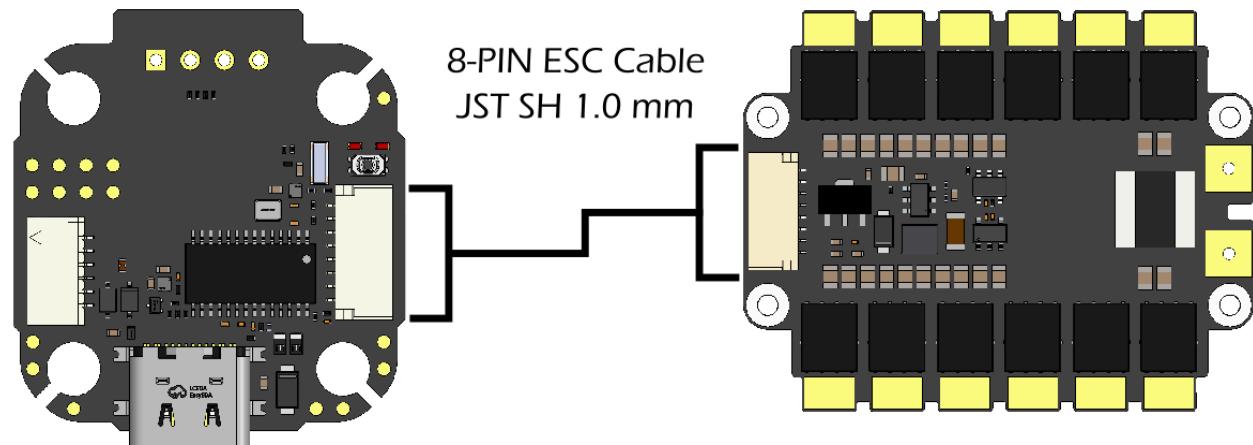
**UART 5      Serial RX = on**

For a complete Betaflight and CROSSFIRE/ TRACER settings list, visit the CROSSFIRE/ TRACER manuals.



## ESC (TBS 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 an analog current sensor.

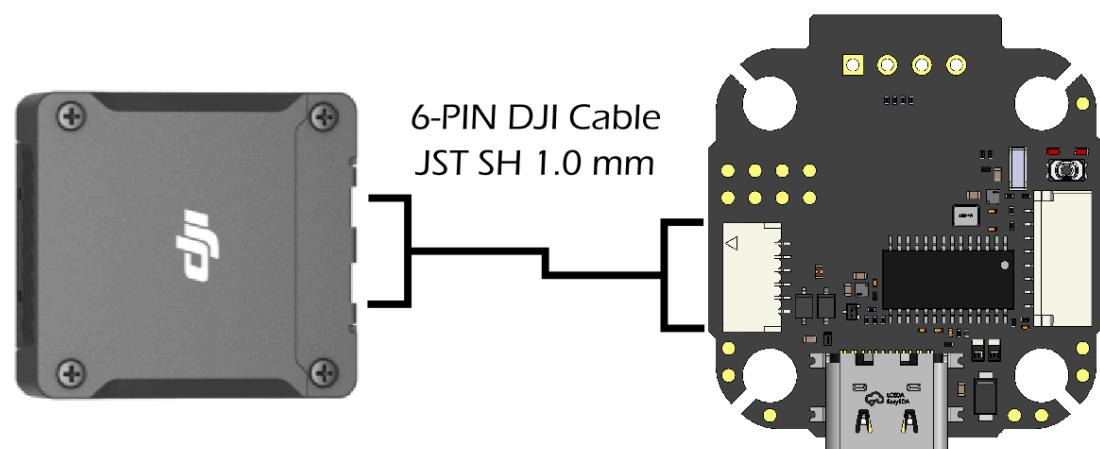


### Betaflight ports setting:

UART 2      Sensor Input: ESC, Baud Rate: Auto

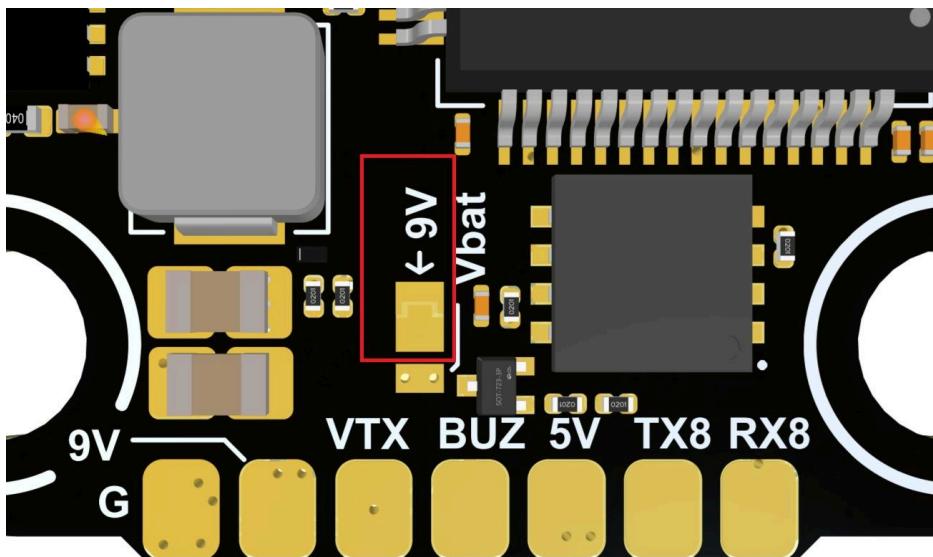
## HD Video System

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.



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The Voltage selector, allowing you to select between 9V and VBat, is located next to the plug:



The factory standard is 9V setting bridged.

**Betaflight ports setting:**

**UART 3      MSP = on, Baud Rate 115200\***

To use the DJI internal S.Bus receiver:

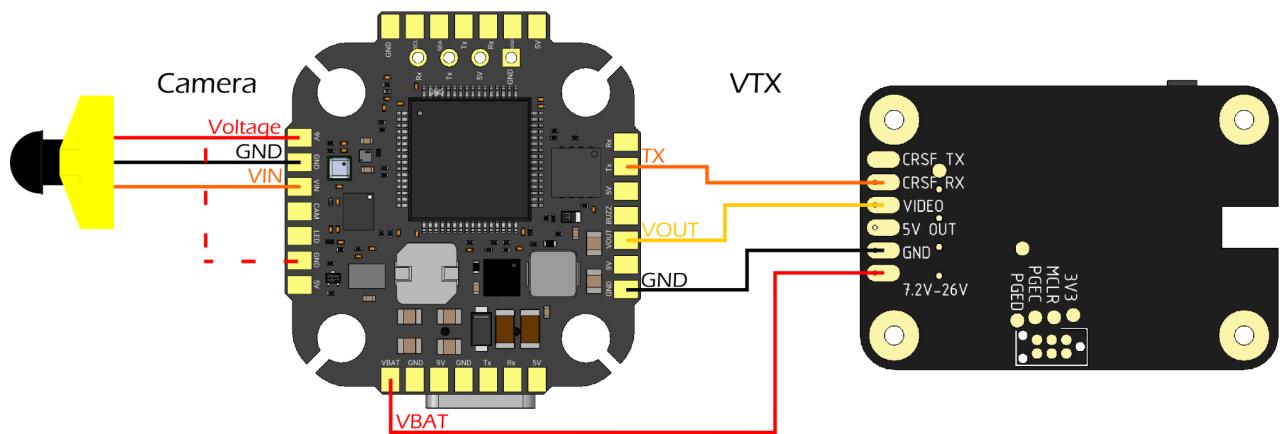
**UART 4      Serial RX = on**

**UART 5      Serial RX = off**

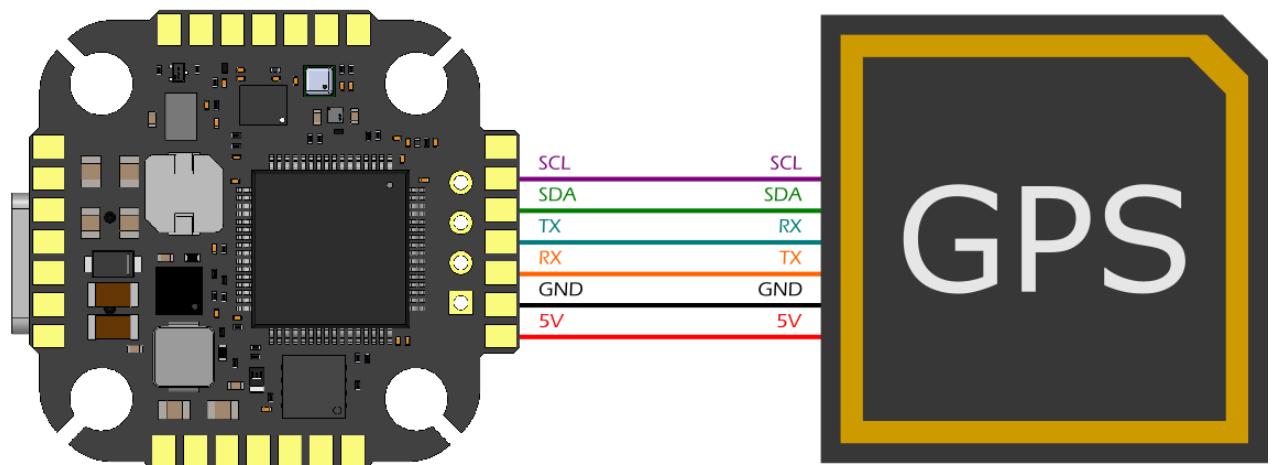
\*for details on the baud rate, consult the DJI manual



## Analog Video w. SmartAudio VTX



## GPS and Compass



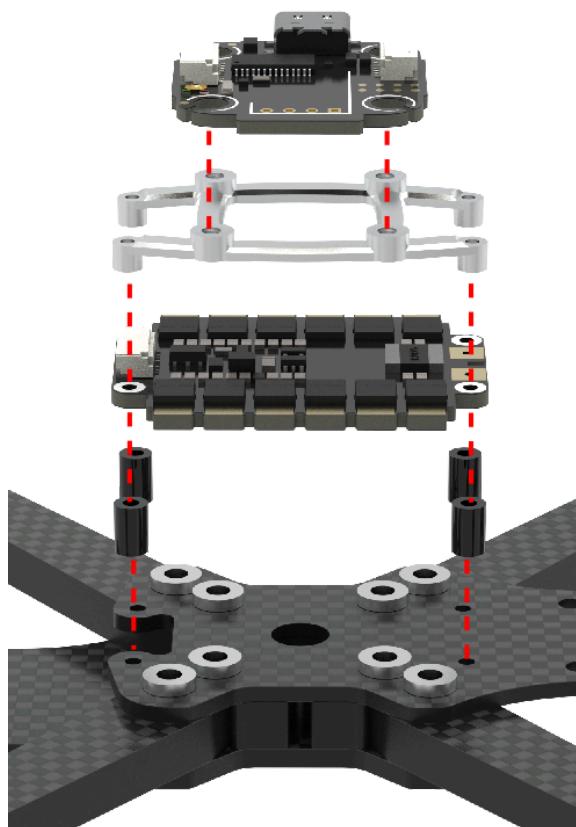
## Betaflight ports setting:

UART 7      Pheripherials: GPS, Baud Rate: depends on GPS receiver



## Stack Mounting

Installing the FC is easy with the provided Gorlia mount. If your frame does not support the ESC's mounting pattern, you can order an aluminum adapter for 30,5 \* 30,5mm or 20 \* 20mm mounting holes.



30,5 \* 30,5mm adapter



20 \* 20mm adapter



## LUCID H7 FC

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.

### Features

STM32H743VIH6, Infineon DPS310 gyro  
7 UARTs, 2 I2C, CAN, DJI Airunit support, 13 Motor outputs  
Built-in OSD, SD card slot, multiple analog inputs,  
3-8S input, built-in BEC: 5V@ 2A  
ADC Vbat2 pad supports up to 69V

### Firmware/ Target

BetaFlight target: 4.5.0  
INAV target: Since 8.0  
Ardu target not yet available

### Size and Mounting

32\*32  
30.5\*30.5 mounting holes, M3 with installed dampening rubbers

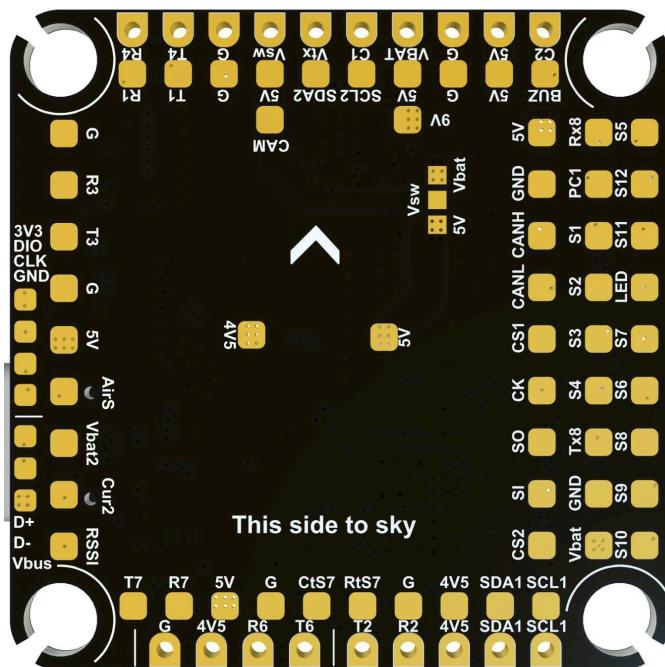
### Serial Ports

Port	Usage/ Available Pins	ARDU Port	ARDU function	5V tolerant
UART 0	USB	SERIAL0	USB	yes
UART 1	SBus, full UART (just RX on DJI plug)	SERIAL1	SBus	yes
UART 2	ESC Telemetry, full UART	SERIAL2	GPS1	yes
UART 3	MSP, HD Video Connector, full UART with DMA	SERIAL3	MSP DisplayPort	yes
UART 4	Spare, full UART	SERIAL4	Telem1	yes
UART 6	RC input, full UART with DMA	SERIAL6	Receiver	yes
UART 7	Spare, full UART with DMA and Hardware flow control pins	SERIAL7	Telem2	no, 3.3V
UART 8	ESC Telemetry, full UART	SERIAL8	ESC	yes



## Pinout

TOP



## Special Pins

DIO	SWD breakout	CS1 CS2	SPI Chip select
CLK	SWD breakout	SI/	SPI MOSI/ MISO
		PC1	Analog in pin from ESC port breakout
D+	USB breakout		
D-	USB breakout	RtS7	UART7 Hardware flow control
VBus	USB breakout	Cts7	UART7 Hardware flow control

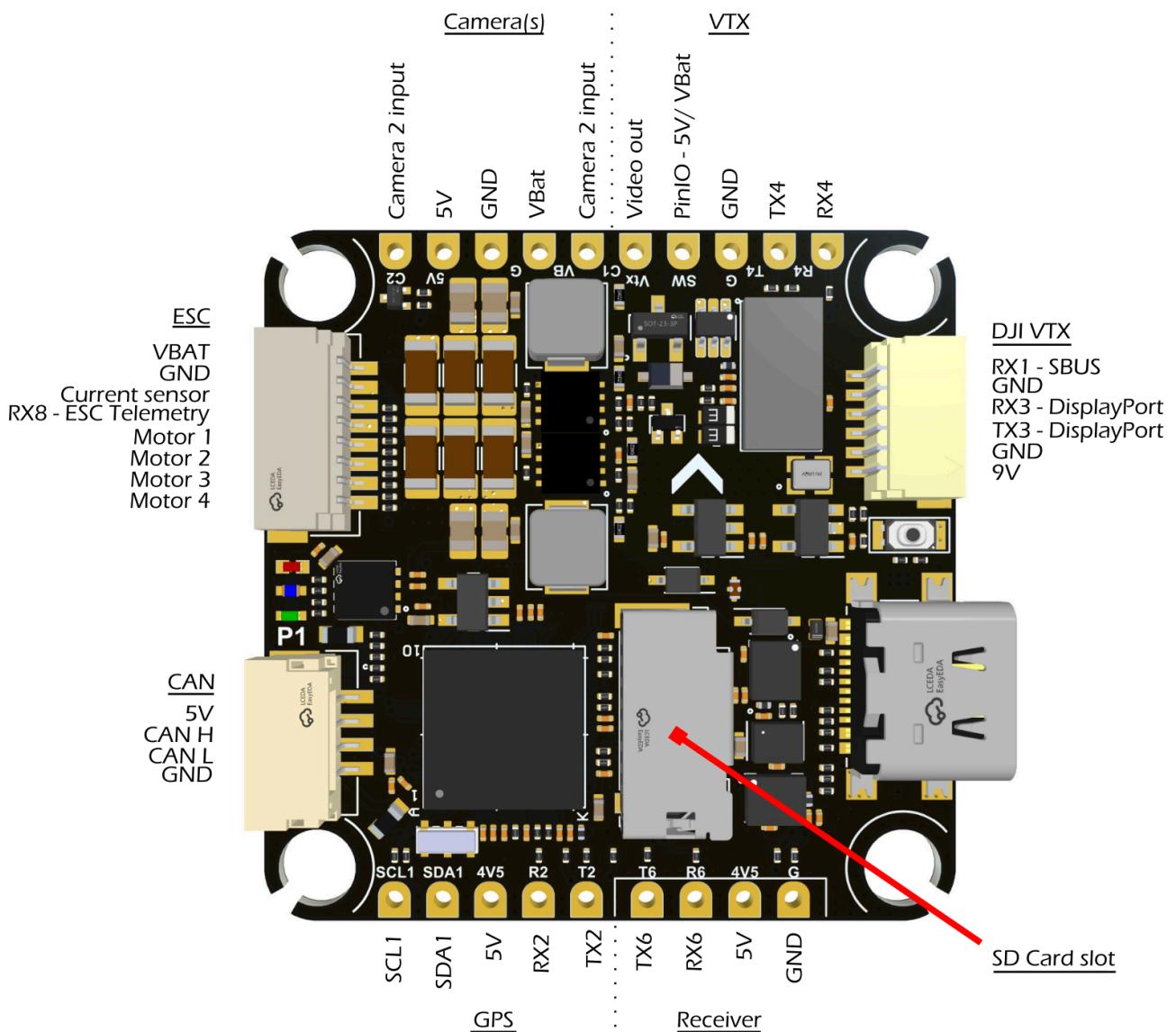
C1	Camera 1 video in*	CAM	Cam input, after switch*
C2	Camera 2 video in*	Vsw	PINIO switch with selectable voltage (by solder jumper)

AirS	Airspeed Sensor, 0-6.6V	Vbat2	External voltage sensor, 0-36V
Cur2	Secondary current sensor, 0-3.3V	RSSI	RSSI analog, 0-3.3V

\*use C1/C2 if you use two cameras (input before video switch) or CAM for single camera use (after video switch)



## BOTTOM



## Connections

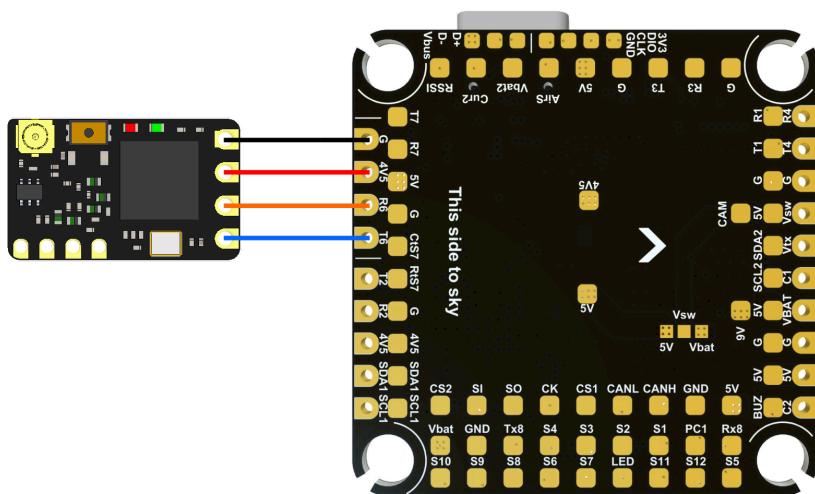
The ESC and DJI connection is identical to the [LUCID F4 FC](#).

## Receiver

The FC pinout matches the receiver pins, allowing the receiver to be directly soldered.

### Note:

Soldering the receiver to the top plate on top of the FC, the binding button can become hard to reach



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# LUCID AIO FC

#todo add some fluff

## Features

1-2s LiPo input, 5v 2A (on 2S)/ 1.3A ( 1S) outputs

Built-In CROSSFIRE receiver

Two full UARTS + 1 TX only for SmartAudio

Up to 7A per Motor/ 24A max

## Firmware/ Target

BetaFlight target: not yet available FW 4.6 or later

INAV target: not yet available

CROSSFIRE: 6.XX

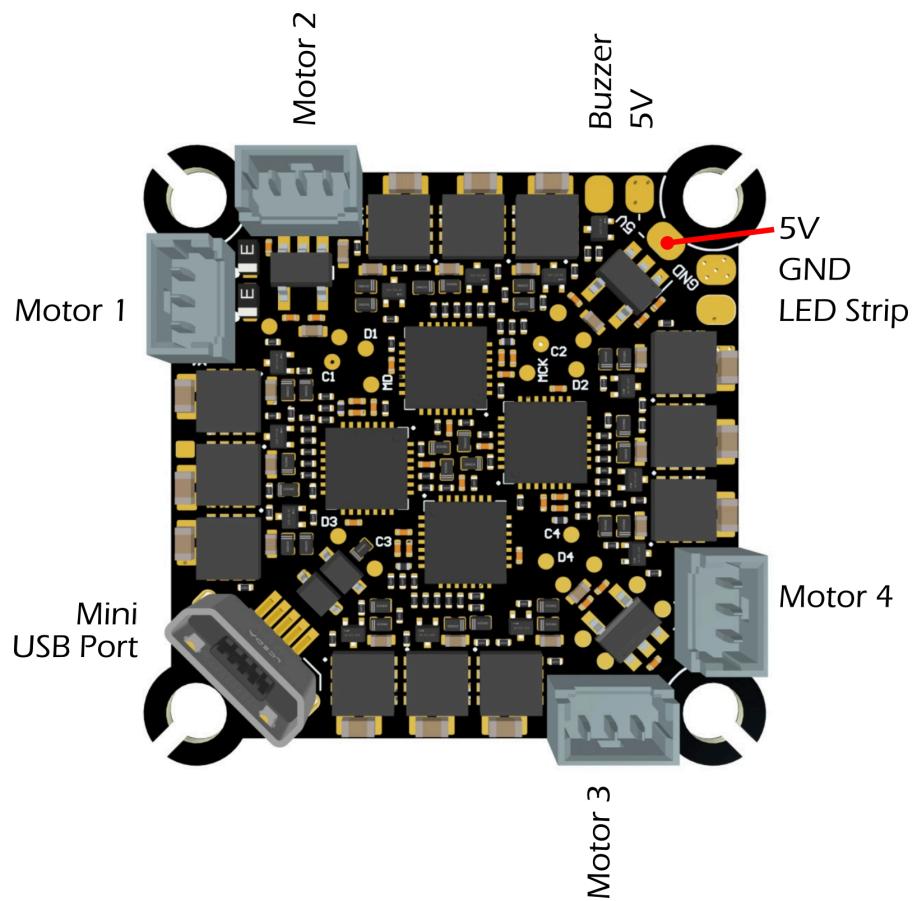
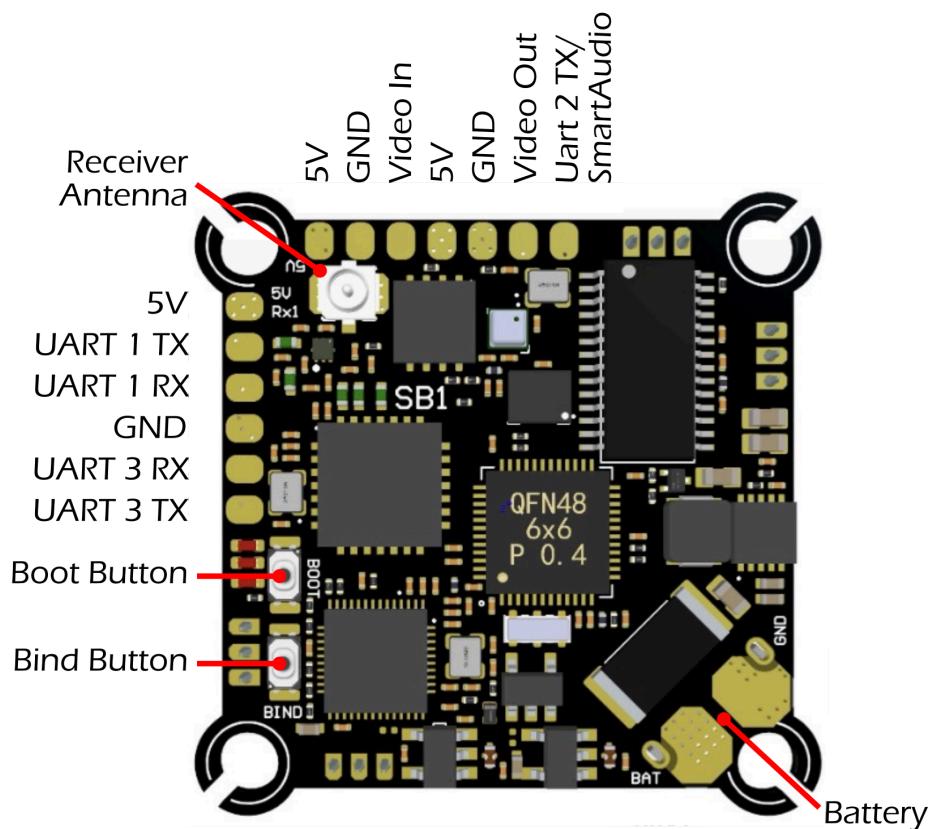
## Size and Mounting

32\*32

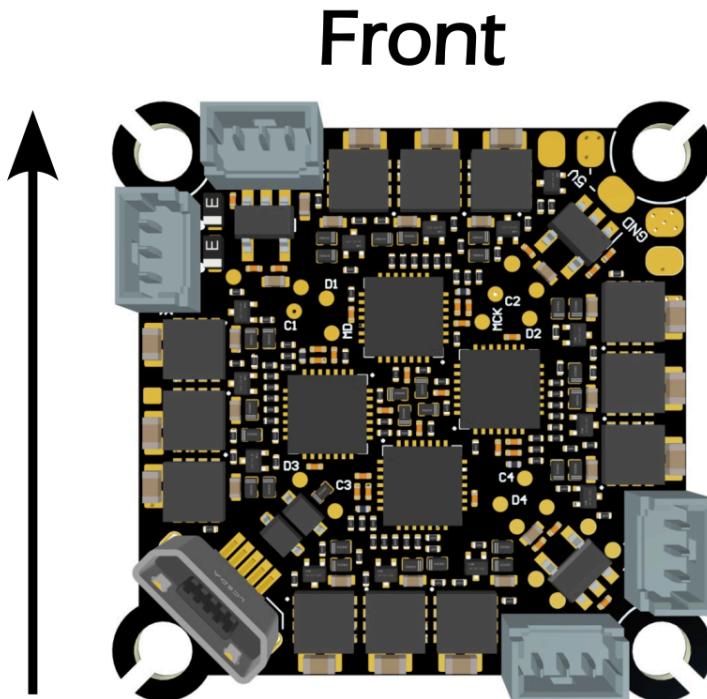
30.5\*30.5 mounting holes, M3 with installed dampening rubbers

## Pinout





## Board Orientation



USB on  
Top and  
left Side

#todo: bf screenshot

## Sensor Scaling Settings

### Current Sensor

**Scale:** 1300

**Offset:** 0

### Voltage Sensor (when using external ADC from the PCB)

**Scale:** 57

**Divider Value:** 18

**Multiplier Value:** 1



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## LUCID 4in1 3-6s ESC

The TBS Lucid 4in1 6S ESC 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.

Featuring an 8-layer high current density board with twice the average onboard capacitance, the ESC is built to withstand the harshest punishment of everyday FPV flying. Superior power delivery

### Features

4in1 ESC, 60A continuous/ 70A peak(60s), 3-6s input, 13.81g

AlkaMotors32 (AM32) FW, current-sensor port

Bi-directional Dshot 300/600, KISS ESC Telemetry

### Firmware/ Target

AlkaMotors32 Target: tbslu6s4in1, FW 1.99 or later

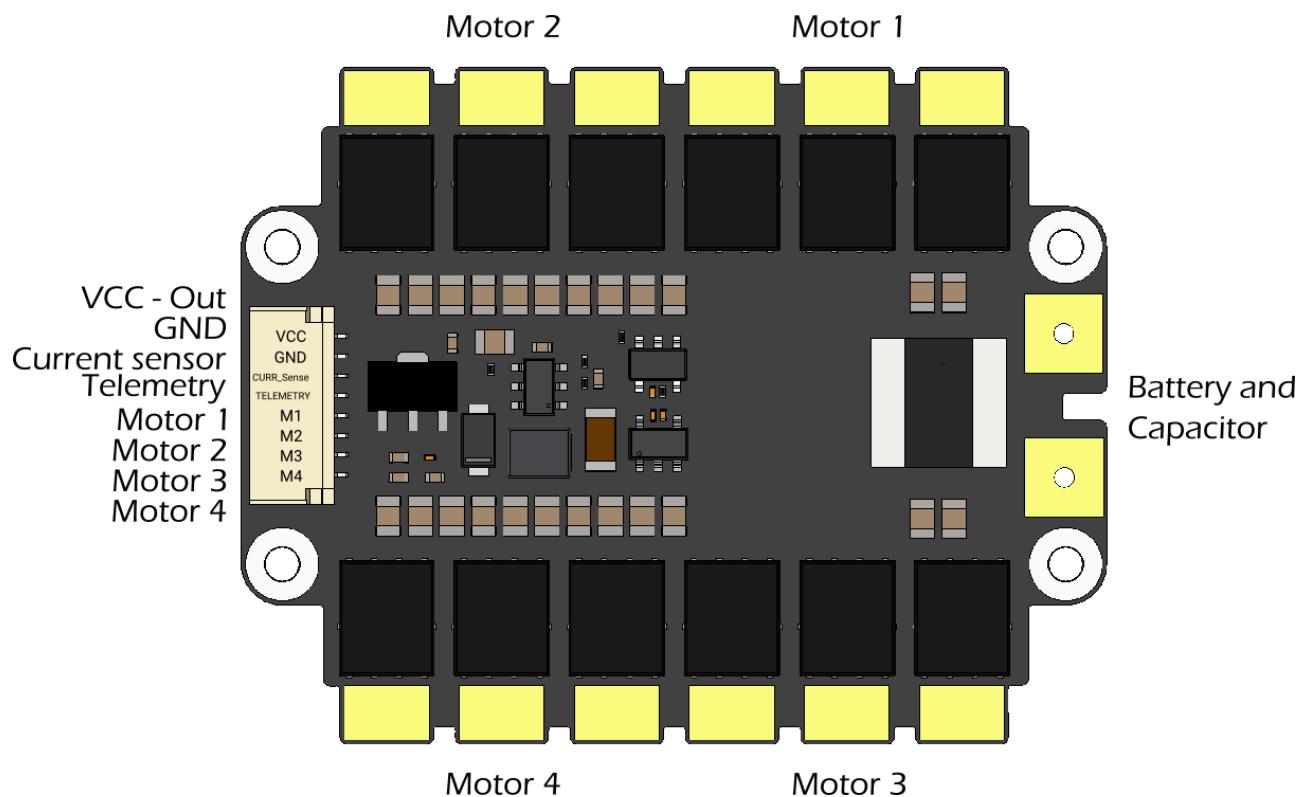
### Size and Mounting

34\*44mm size

GORILLA mounting, M2 - multi-position bracket (sold separately), including FC mounting adapter (black aluminum) for 20\*20mm FCs



## Pinout



## Betaflight Current Sensor Settings

**Scale:** 125

**Offset:** 0



## LUCID 4in1 3-8s ESC

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.

### Features

4in1 ESC, 55A x 4, 60 seconds/ 85A x 4, 10 seconds, 3-8s input, 17.58g

AlkaMotors32 (AM32) FW, current-sensor port

Bi-directional Dshot 300/600, KISS ESC Telemetry

### Firmware/ Target

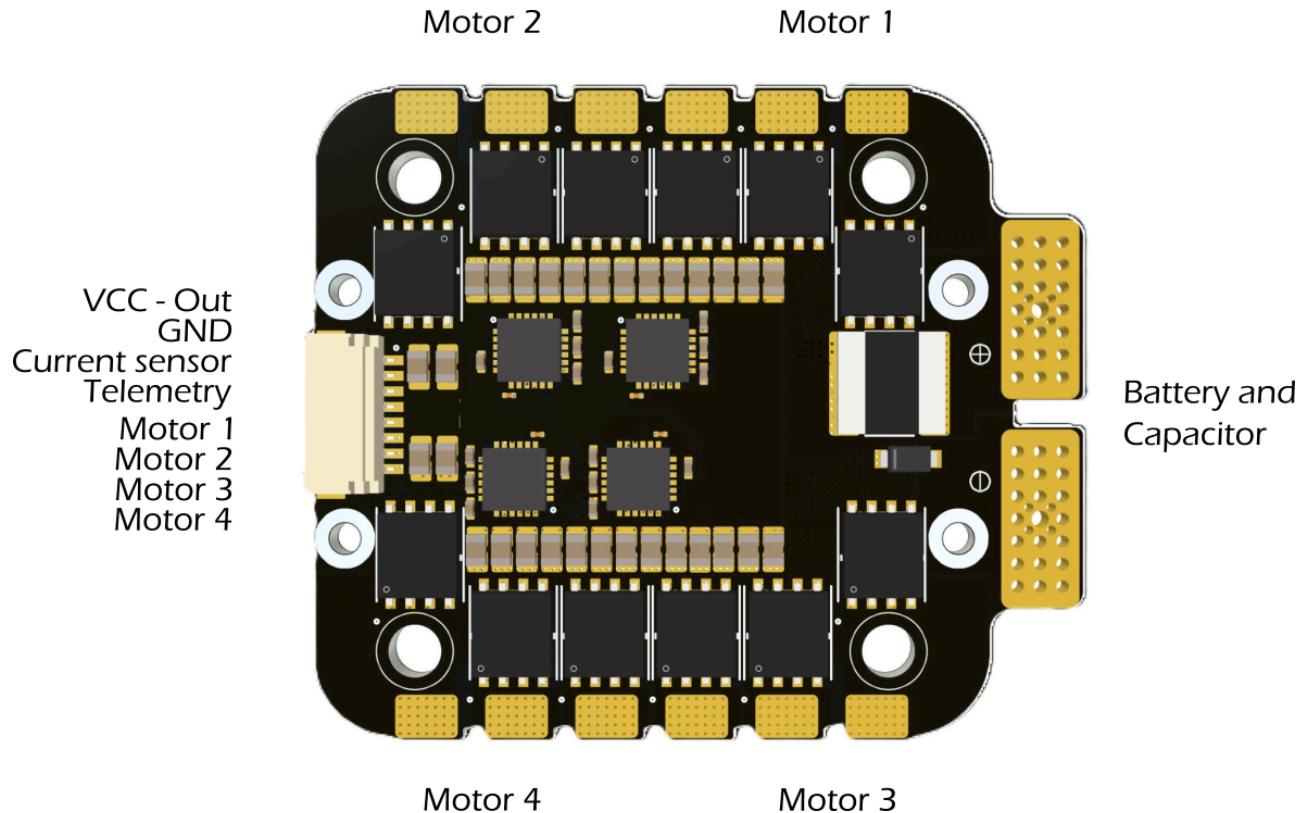
AlkaMotors32 Target: tbslu8s4in1, FW 1.99 or later ???

### Size and Mounting

34\*44mm size

30,5\*30,5mm(M3) and GORILLA mounting(M2) - multi-position bracket (sold separately)

### Pinout



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## Betaflight Current Sensor Settings

**Scale:** 50

**Offset:** 0



## LUCID Single ESC

The TBS Lucid 12S 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.

### Features

Single ESC, 60A continuous, 70A peak(60s), 90Apeak(40s), 120A (30s), 3-12s input, 19g

AlkaMotors32 (AM32) FW,

Bi-directional Dshot 300/600, KISS ESC Telemetry

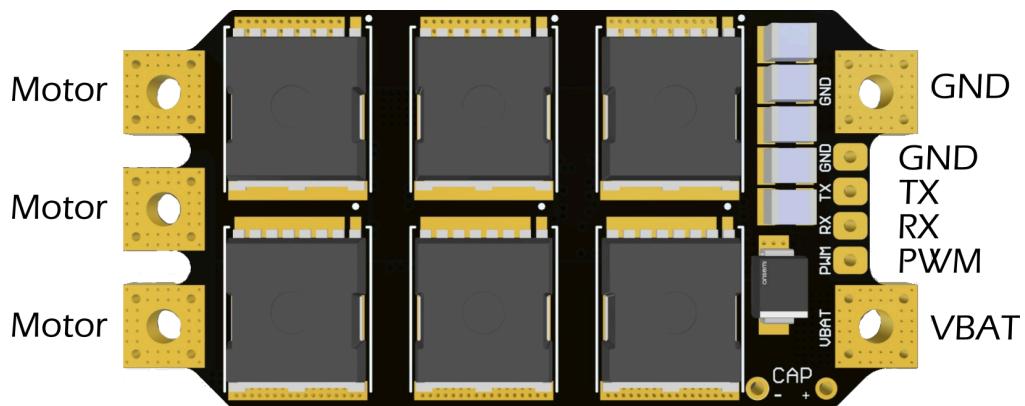
### Firmware/ Target

AlkaMotors32 Target: AM32\_TBS\_12S\_F421

### Size and Mounting

57.75mm x 29mm

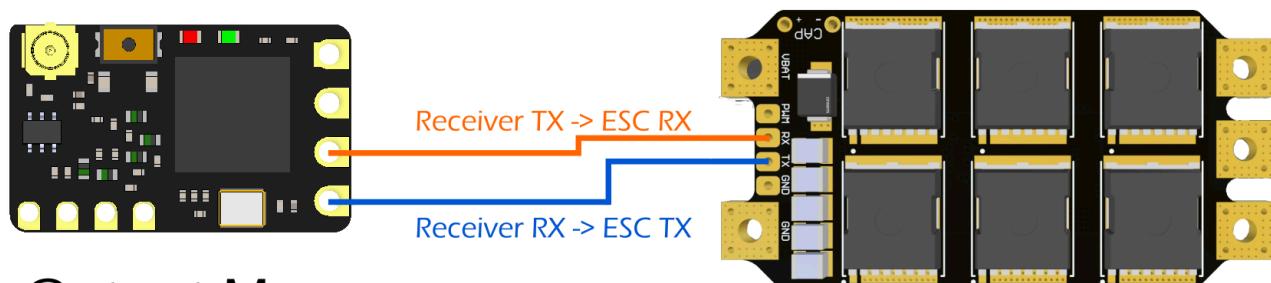
### Pinout



## Connections

The ESC detects the incoming signal source by itself. If you want to use the CRSF direct connection, connect it as follows. PWM and any protocol supported by ALKAMotors firmware - except for CRSF - must be connected to the PWM pad.

### CRSF direct connection



### Output Map

Output 1	CRSF TX
Output 2	CRSF RX
Output 3	Ch 3
Output 4	SmartAudio
Output 5	BST SDA
Output 6	BST SCL

## CRSF Features

- Telemetry sensors
- CRSF signal as RC input (channel selectable by the CRSF menu)
- Fully configurable by any AGENT on the go



## LUCID Wing PDB

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 upcoming wing, but it's compatible with any wing that has up to 4 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.

## Features

Built-in current sensor, single-point of connection for your whole setup to ease the wiring  
12V/ 4A (FC, VTX and LED) and 6V/ 4A (Servos)

Current sensor: 200A burst, 90A continuous

Max input voltage: 60V (14S)

## Sensor Scaling Settings

### Current Sensor

**Scale:** 250 -> Please adjust it to fit your setup (cable length etc.)

**Offset:** 0

### Voltage Sensor (when using external ADC from the PCB)

**Inav:** 2100

### BetaFlight:

**Scale:** 201 -> Please adjust it to fit your setup (cable length etc.)

**Divider Value:** 20

**Multiplier Value:** 1

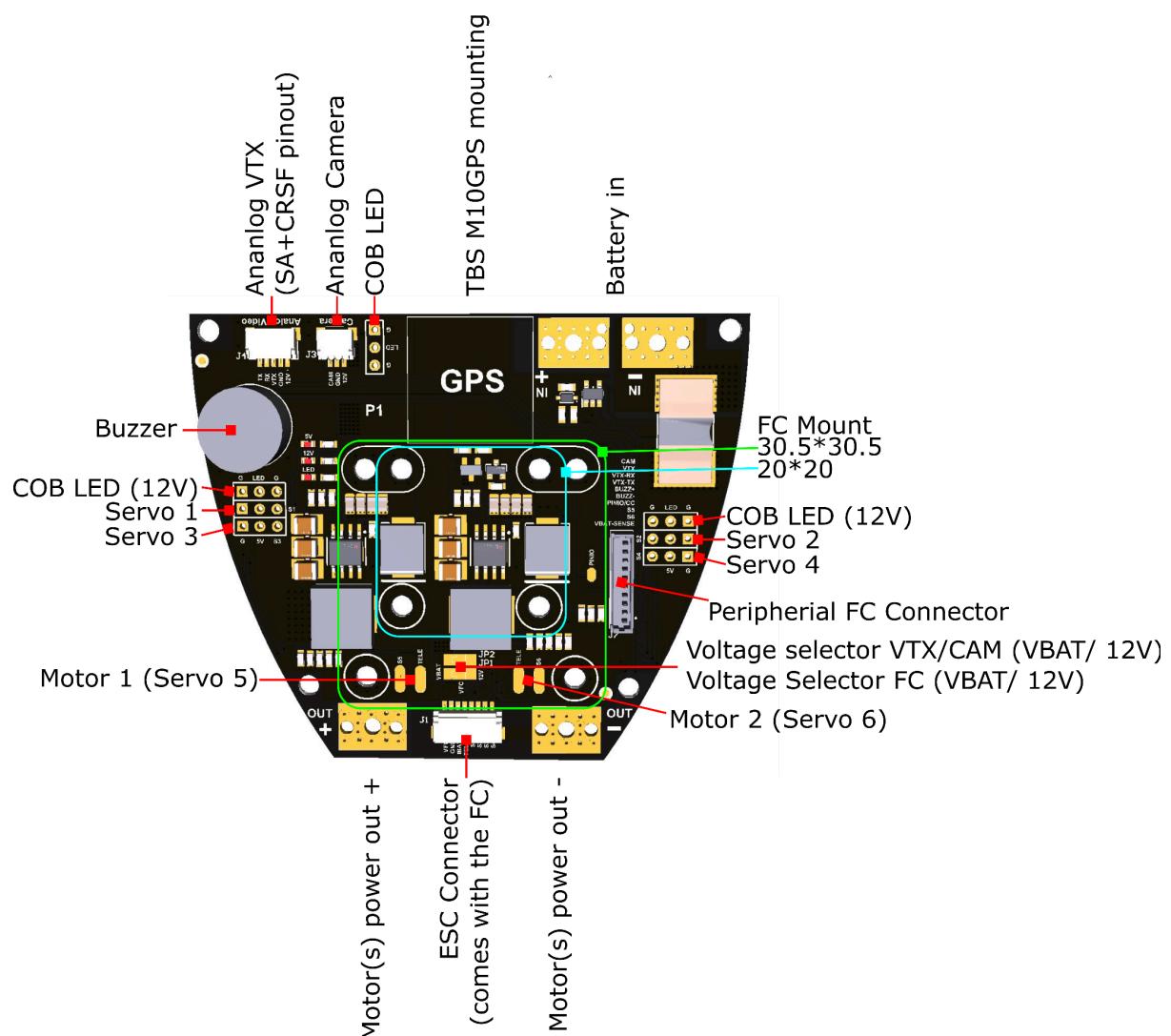


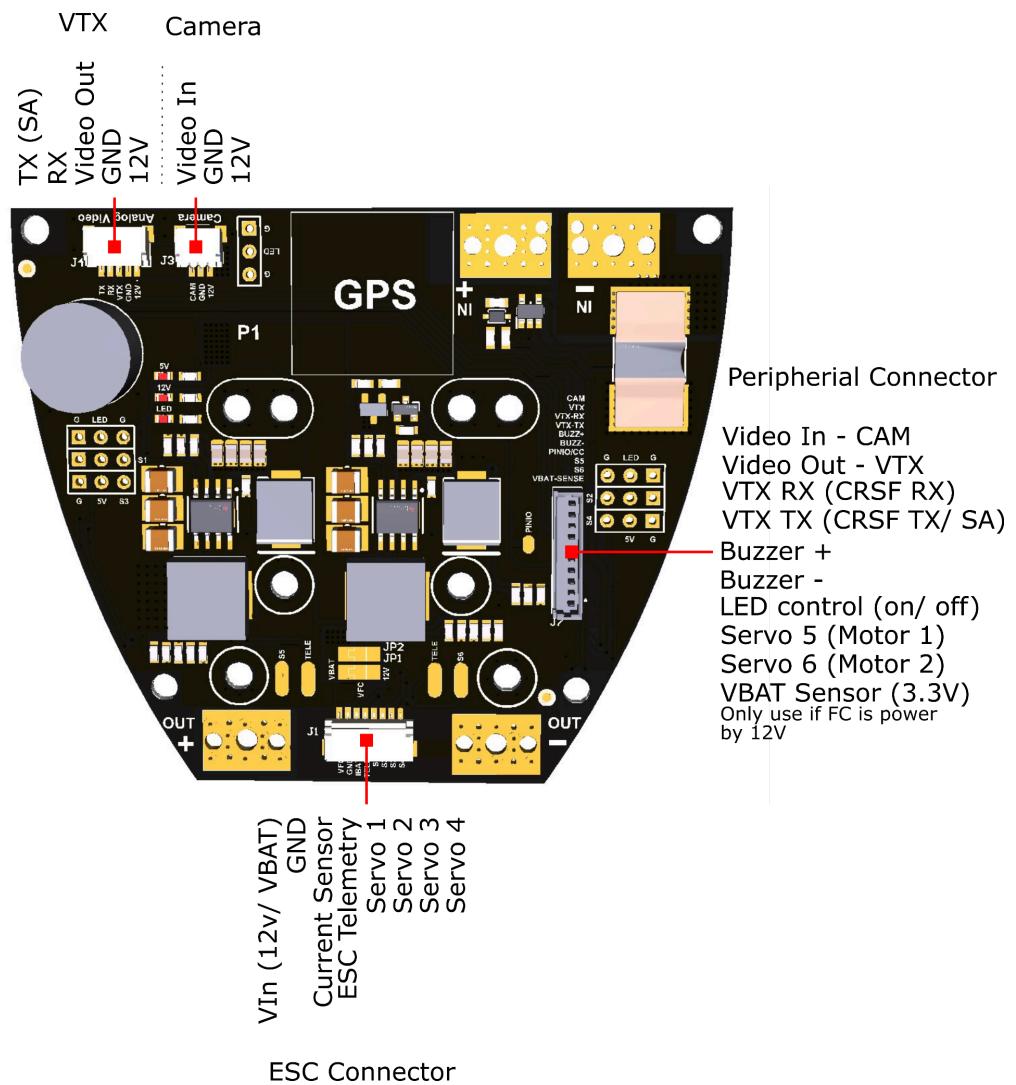
## Size and Mounting

FC Mount: 30.5\*30.5mm + 20\*20mm

Direct gluing in your Wing or using a 3D print

## Pinout





## LED Connection

The three LED connectors are powered by the internal 12V supply and controlled by the PINIO pin on the peripheral connector. If you use a LUCID F4 FC, the *CamControl* pins should be used for control.

If you want to do it directly with your CROSSFIRE/ TRACER rx, select GPIO in the receiver output map menu and connect it to the pin header or the solder pad labeled "PINIO" next to it.



