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.

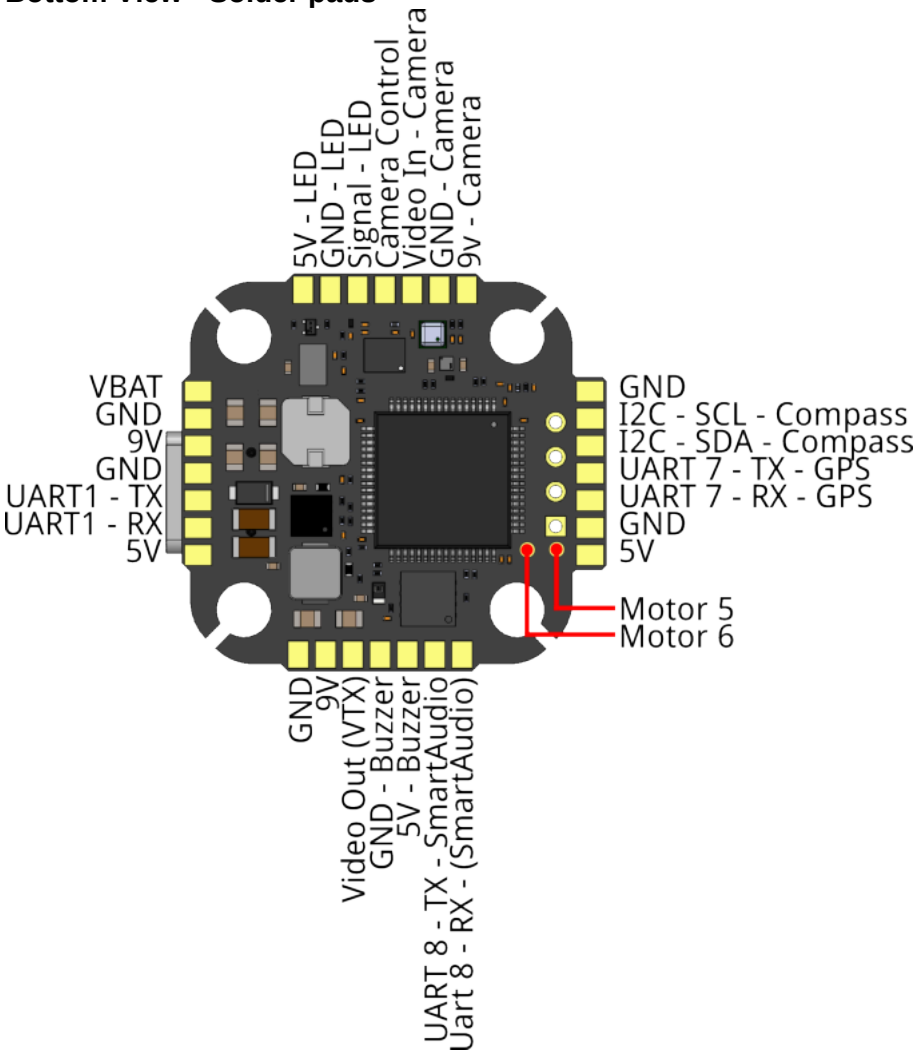
Note:
When using INAV, TX3 and RX3 (HD Video connector) bust be swapped

2.4. Serial Ports

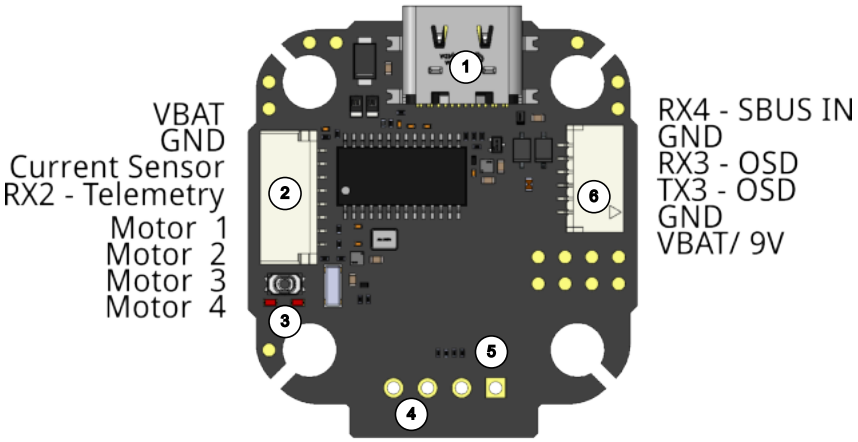
Port	Usage	Available Pins
UART 1	Spare	Full UART
UART 2	ESC Telemetry	RX only
UART 3	MSP, HD Video connector	Full UART
UART 4	S.BUS, HD Video connector	RX only
UART 5	Direct mounted Receiver	Full UART
UART 7	GPS	Full UART
UART 8	SmartAudio	Full UART

2.5. Pinout

Bottom View - Solder pads



Top View - Connectors

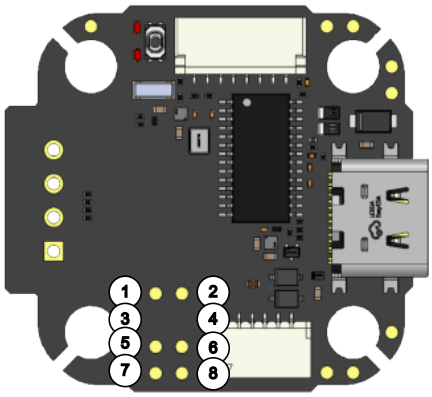


1 -- USB-C Port	2 -- ESC Port	3 -- Bootloader Button

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)

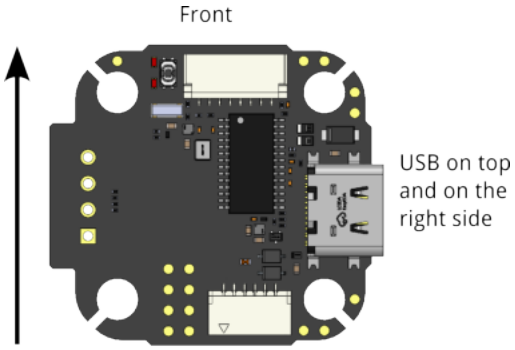
set pinio_box2 = 48 # (USER2)

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 sensnor*

2.8. Voltage Sensor Settings

BETAFLIGHT

Scale:	210
Divider:	10
Multiplier Value:	1

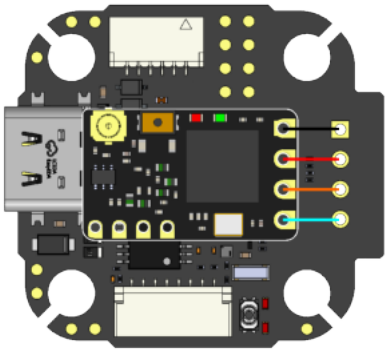
INAV

Scale:	2100
Offset:	0

2.9. Peripheral Connections

2.9.1. Receiver - Solder-on

Receiver



Port Settings

UART 5:	Serial RX: on

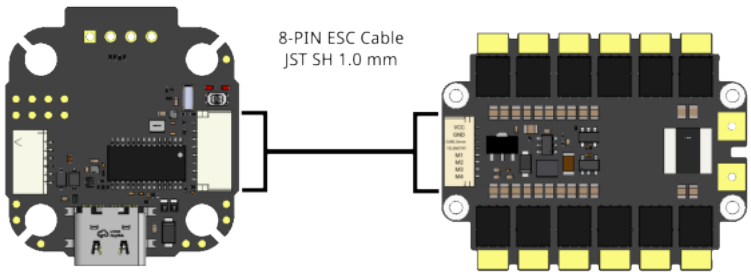
Note:
Further information on the settings can be found in the CROSSFIRE/TRACER manual

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



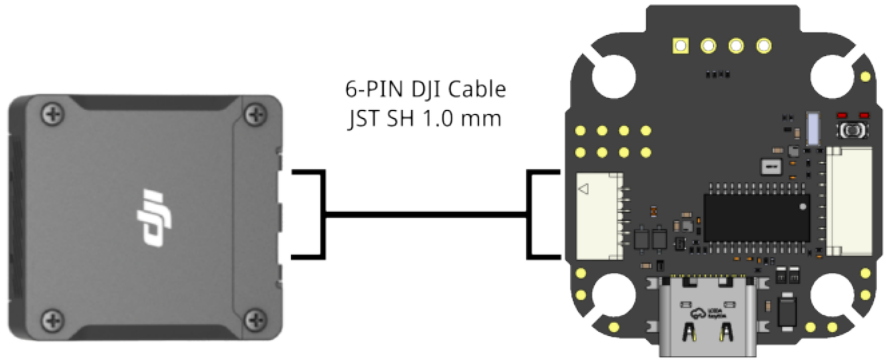
Port Settings

UART 2:	Sensor Input: ESC,
	Baudrate: Auto

2.9.3. HD Video Systems

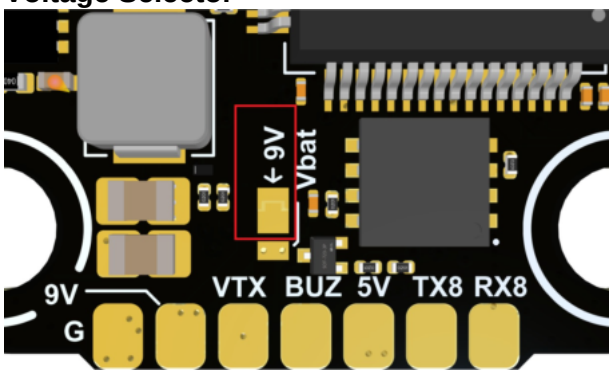
Connect your VTX to the designated port for your HD video system. The plug supports MSP and S.Bus if you want to use a DJI remote to control your drone.

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]

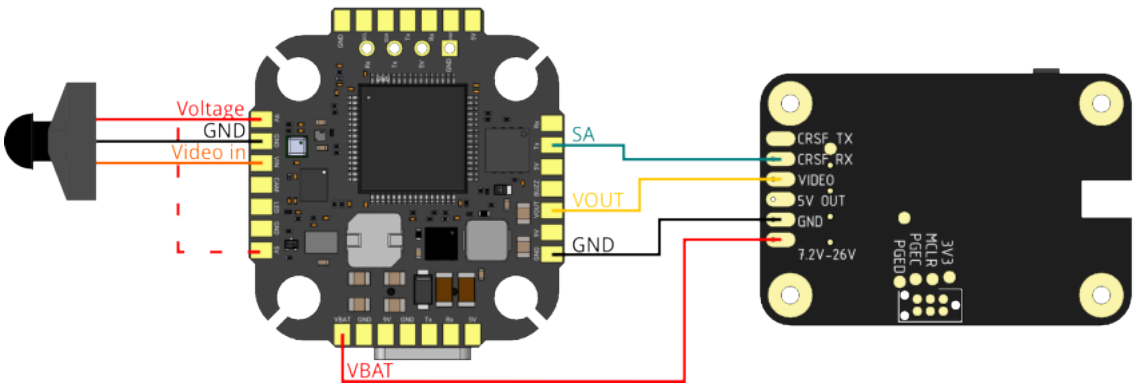
(8) *Baud rate might be different. Check the video system manual for details.*
(9) *Disables the external receiver*

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

2.9.4. Analog Video Systems

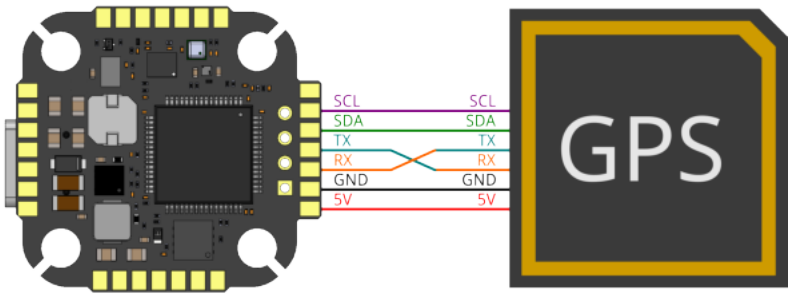
The camera will be power by the internal 9 V or the 5 V supply, depending on the used voltage pad.

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