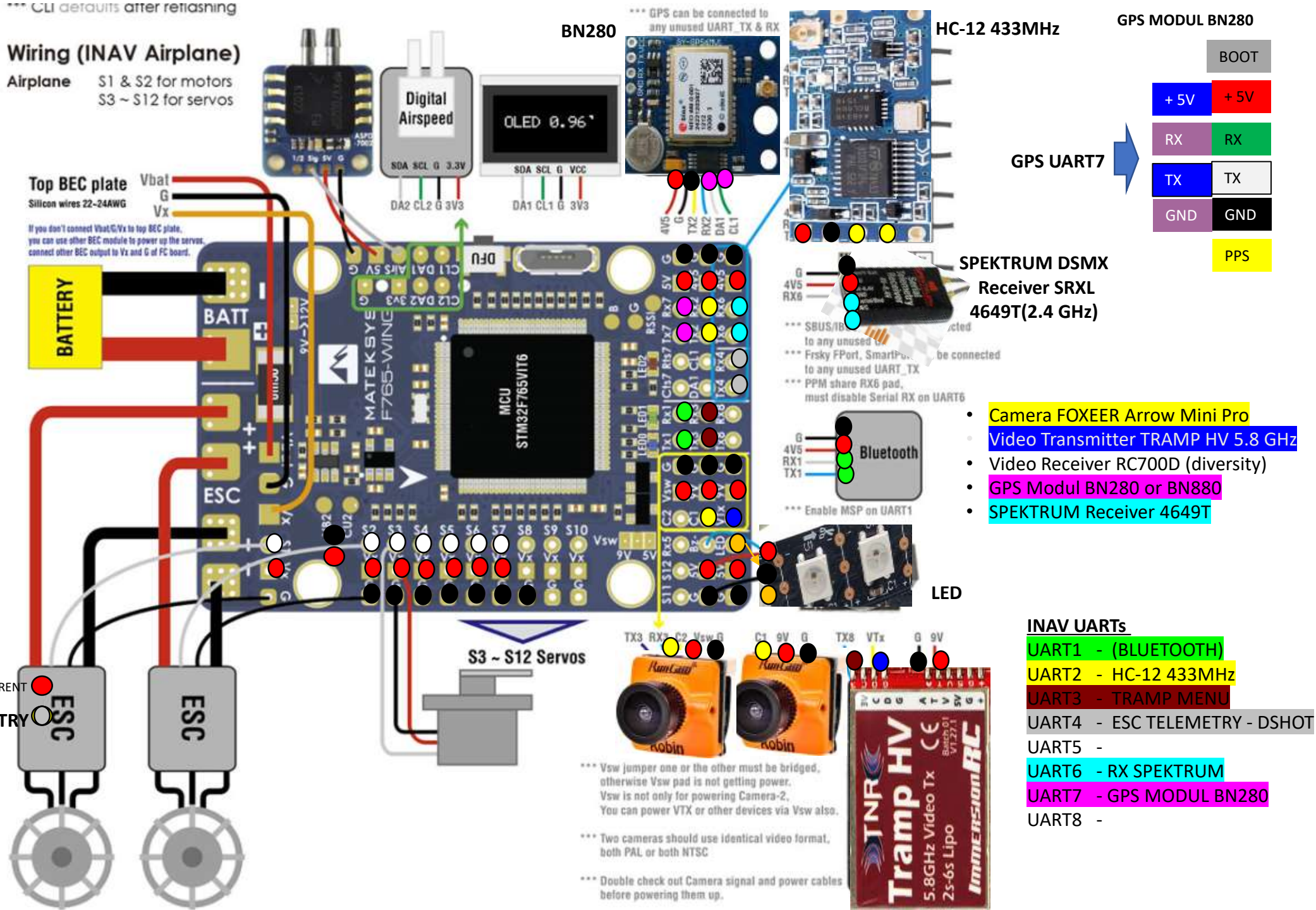
8.3.2020
DuPe

MATEK
F765 WING

iNAV 2.4.0 - MATEK F765

INAV OUTPUT

S1 - MOTOR1
S2 - MOTOR2
S3 - PITCH/ELEV
S4 - ROLL/AIL1
S5 - ROLL/AIL1
S6 - YAW/RUDD



- ESC DYS Aria 35A 32bit (BL_Heli32 (v.32_64)
- (BEC FOXY UBEC 5V/3A)

- Camera FOXEER Arrow Mini Pro
- Video Transmitter TRAMP HV 5.8 GHz
- Video Receiver RC700D (diversity)
- GPS Modul BN280 or BN880
- SPEKTRUM Receiver 4649T

INAV UARTs

UART1 - (BLUETOOTH)
UART2 - HC-12 433MHz
UART3 - TRAMP MENU
UART4 - ESC TELEMETRY - DSHOT
UART5 -
UART6 - RX SPEKTRUM
UART7 - GPS MODUL BN280
UART8 -

F405-WING General Wiring

29.1.2020
DuPe

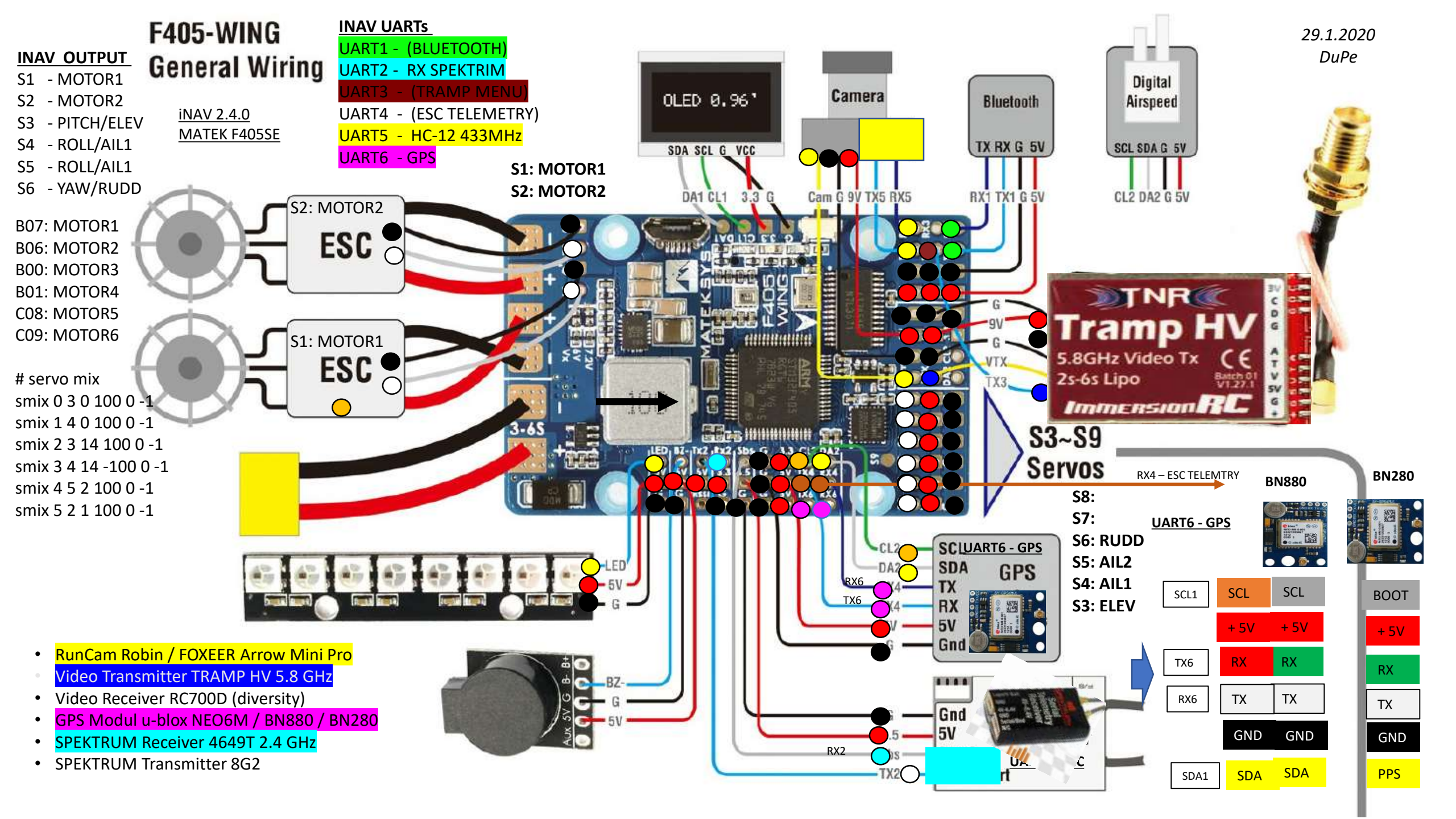
iNAV 2.4.0
MATEK F405SE

INAV OUTPUT
S1 - MOTOR1
S2 - MOTOR2
S3 - PITCH/ELEV
S4 - ROLL/AIL1
S5 - ROLL/AIL1
S6 - YAW/RUDD

B07: MOTOR1
B06: MOTOR2
B00: MOTOR3
B01: MOTOR4
C08: MOTOR5
C09: MOTOR6

```
# servo mix
smix 0 3 0 100 0 -1
smix 1 4 0 100 0 -1
smix 2 3 14 100 0 -1
smix 3 4 14 -100 0 -1
smix 4 5 2 100 0 -1
smix 5 2 1 100 0 -1
```

INAV UARTs
UART1 - (BLUETOOTH)
UART2 - RX SPEKTRIM
UART3 - (TRAMP MENU)
UART4 - (ESC TELEMETRY)
UART5 - HC-12 433MHz
UART6 - GPS



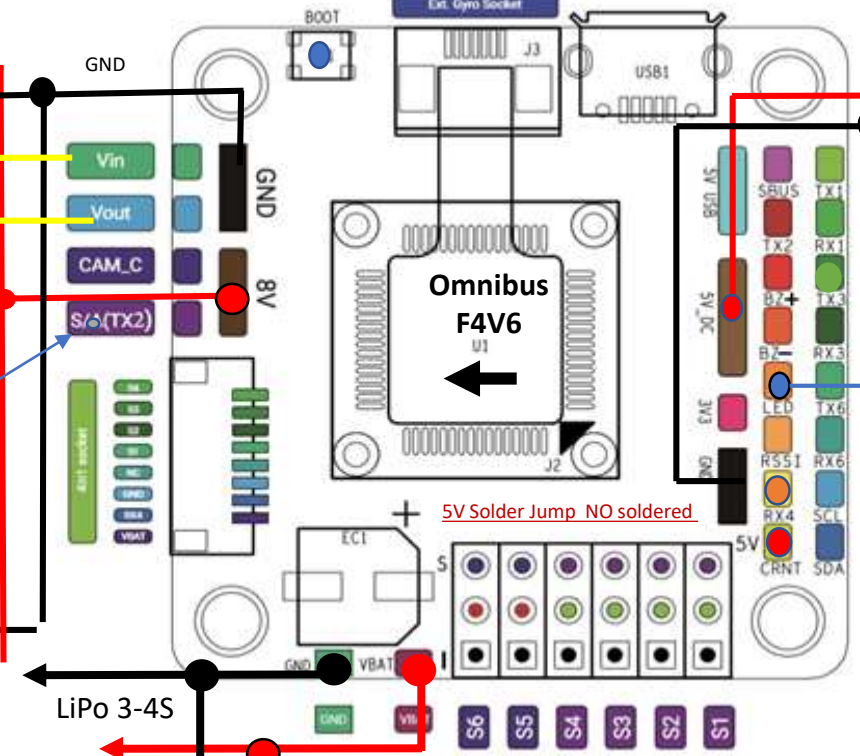
- RunCam Robin / FOXEER Arrow Mini Pro
- Video Transmitter TRAMP HV 5.8 GHz
- Video Receiver RC700D (diversity)
- GPS Modul u-blox NEO6M / BN880 / BN280
- SPEKTRUM Receiver 4649T 2.4 GHz
- SPEKTRUM Transmitter 8G2

27.1.2020
DuPe

+8V
GND
VIDEO IN

- RunCam Robin / FOXEER Arrow Mini Pro
- Video Transmitter TRAMP HV
- Video Receiver RC700D (diversity)
- GPS Modul NEO 6M / BN280
- SPEKTRUM Receiver 4649T, Transmitter 8G2
- ESC+BEC 40A
- *ESC DYS Aria 35A 32bit – BL_Heli32 (v.32_64)*
- *BEC FOXY UBEC 5V/3A*

TRAMP MENU
VIDEO OUT
+5V OUT
GND
+8V IN



LiPo 3-4S

LED STRIP
+5V
GND

RX SPEKTRUM2048 (INAV)
TX SPEKTRUM2048 BIDIRECTIONAL SRXL (BETAFLIGHT)
(aktuálně RX4 – odloupnutí pads pro UART1+3

SPEKTRUM DSMX
Receiver SRXL
4649T(2.4 GHz)

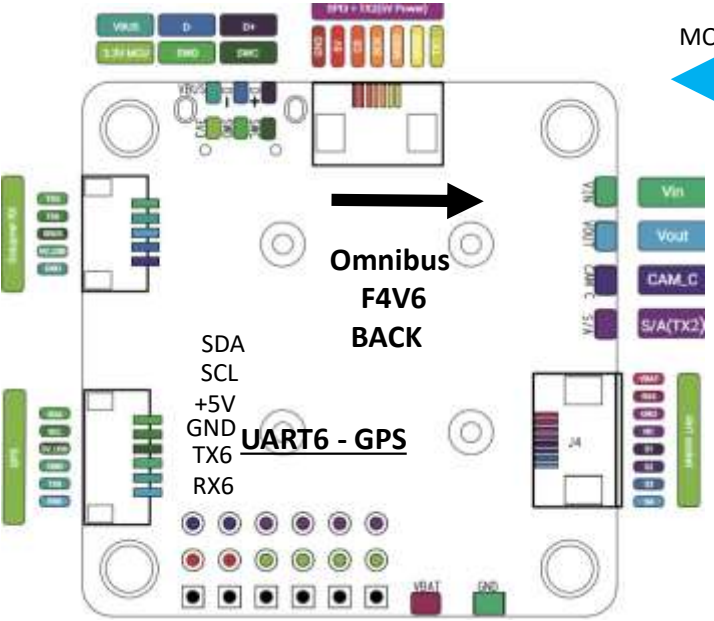
MOTOR
ESC
PWM1 - MOTOR1
CU-ESC TELEMETRY CURRENT
TE-ECS TELEMETRY (DSHOT)
BEC
+5V (SERVO)

INAV 2.4.0 OMNIBUSF4V6

```
B00: MOTOR1
B01: MOTOR2
A03: MOTOR3
B05: MOTOR4
C08: MOTOR5
C09: MOTOR6

smix 0 3 0 100 0 -1
smix 1 4 0 100 0 -1
smix 2 3 14 100 0 -1
smix 3 4 14 -100 0 -1
smix 4 5 2 100 0 -1
smix 5 2 1 100 0 -1

set platform_type = AIRPLANE
mmix reset
mmix 0  1.000  0.000  0.000  0.000
mmix 1  1.000  0.000  0.000  0.000
```

BETAFLIGHT 4.1.1 OMNIBUSF4V6

```
resource MOTOR 1 C08
resource MOTOR 2 C09
resource SERVO 1 B05
resource SERVO 2 A03
resource SERVO 3 B01
resource SERVO 4 B00

mixer CUSTOMAIRPLANE

smix reset
smix 0 3 0 100 0 0 100 0
smix 1 4 0 100 0 0 100 0
smix 2 2 1 100 0 0 100 0
smix 3 5 2 100 0 0 100 0
```



AIRBOT OMNIBUS F4V6

- STM32 F405 MCU
- INCL. BARO BMP280
- SPI Sensor MPU6000
- 6PWM output, 5x UART
- V1A BEC on board(3-6s) 8V BEC Camera
- Flash, Only 36x36mm,
- holes 30.5x30.5mm

INAV ports F4V6

S1 B00 - MOTOR1
S2 B01 - MOTOR2
S3 A03 - PITCH/ELEV
S4 B05 - ROLL/AIL1
S5 C09 - YAW/RUDD
S6 C08 - ROLL/AIL2

BETAFLIGHT ports F4V6

S1 B00 > B05 - YAW/RUDD
S2 B01 > A03 - ROLL/AIL1
S3 A03 > B01 - ROLL/AIL2
S4 B05 > B00 - PITCH/ELEV
S5 C09 > C09 - MOTOR2
S6 C08 > C08 - MOTOR1

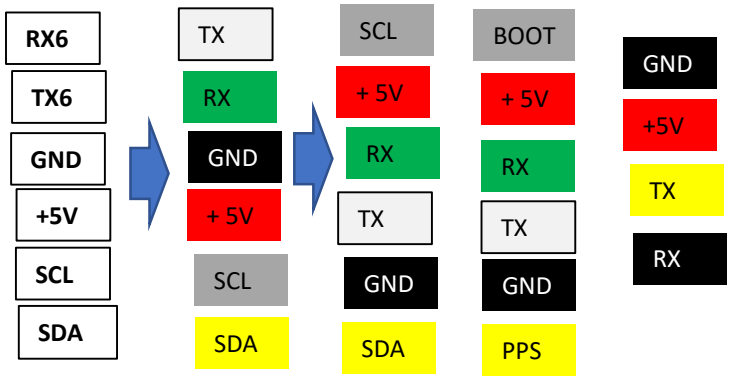
UARTs

UART1 - odloupnut
UART2 - TX TRAMP
UART3 - odloupnut
UART4 - RX SPEKTRIM
UART5 -
UART6 - GPS

GPS MODUL

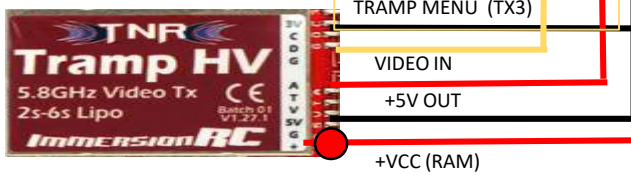
BN880 **BN280** **u-blox NEO-6M**

UART6 - GPS

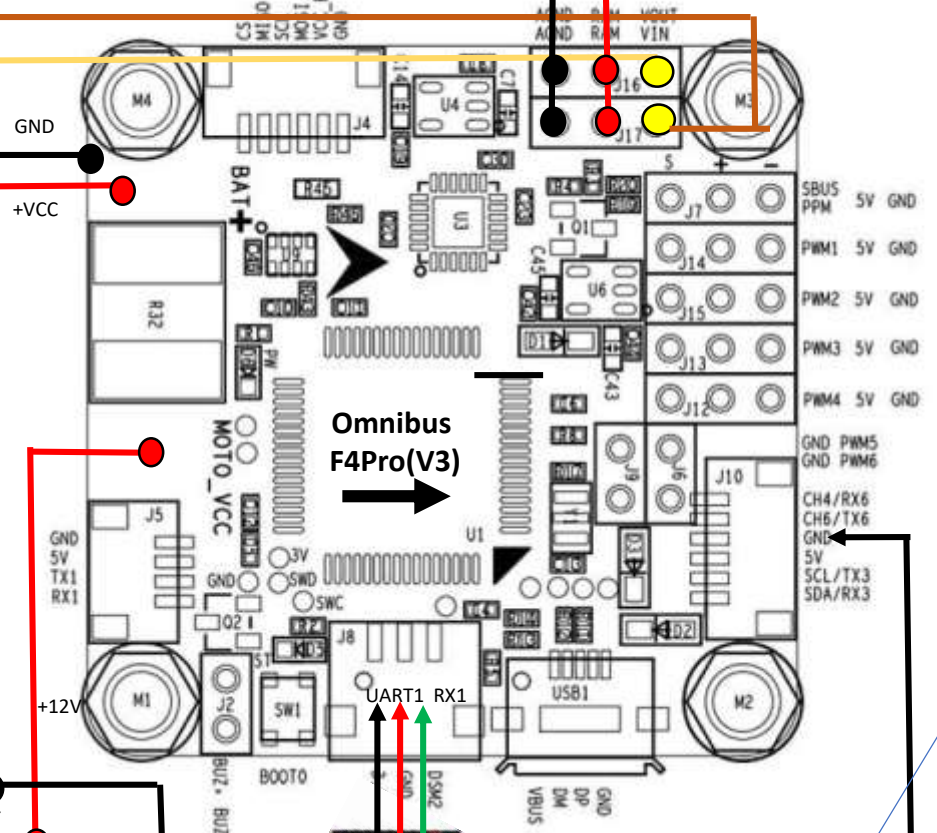


28.01. 2020
DuPe

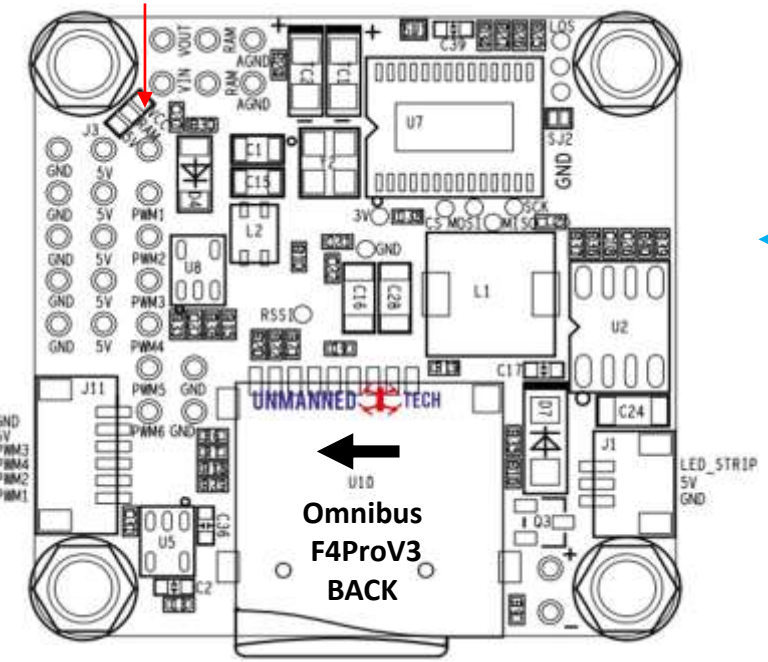
- Camera FOXEER Arrow Mini Pro
- Video Transmitter TRAMP HV 5.8 GHz
- Video Receiver RC700D (diversity)
- GPS Modul BN280 or BN880
- SPEKTRUM Receiver 4649T + Transmitter 8G2



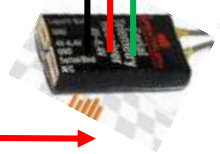
GND
VIDEO OUT
TRAMP MENU (TX3)
VIDEO IN
+5V OUT
+VCC (RAM)
GND
+VCC
+12V
LiPo 3-4S
MOTOR



RAM Jump Soldered to VCC



ESC+BEC
+5V SERVOS
PWM1 – MOTOR1



SPEKTRUM
Receiver 4649T
J8 - UART1

AIRBOT OMNIBUS F4Pro(V3)

- STM32 F405 MCU
- SPI Gyro MPU6000
- On-Board OSD (FC over SPI bus)
- Baro (BMP280)
- MicroSD Blackbox
- 5v3a SBEC
- 6PWM output
- Built-in Current Sensor
- On-Board Video Filter 5V to VTX and Camera

UARTs
UART1 - RX SPEKTRIM
UART2
UART3 - odloupnut
UART4 -
UART5 -
UART6 - odloupnut (GPS)

INAV 2.3.0
OMNIBUSF4Pro

PWM1 B00 - MOTOR1
PWM2 B01 - MOTOR2
PWM3 A03 - PITCH/ELEV
PWM4 A02 - ROLL/AIL1
PWM5 A01 - ROLL/AIL2
PWM6 A08 - YAW/RUDD

B00: MOTOR1
B01: MOTOR2
A03: MOTOR3
A02: MOTOR4
A01: MOTOR5
A08: MOTOR6

smix 0 3 0 100 0 -1
smix 1 4 0 100 0 -1
smix 2 3 14 100 0 -1
smix 3 4 14 -100 0 -1
smix 4 5 2 100 0 -1
smix 5 2 1 100 0 -1

BETAFLIGHT 4.1.1
OMNIBUSF4Pro

resource MOTOR 1 B00
resource MOTOR 2 B01
resource MOTOR 3 NONE
resource MOTOR 4 NONE
resource MOTOR 5 NONE
resource MOTOR 6 NONE
resource MOTOR 7 NONE
resource MOTOR 8 NONE
resource SERVO 1 A03
resource SERVO 2 A02
resource SERVO 3 A01
resource SERVO 4 A08

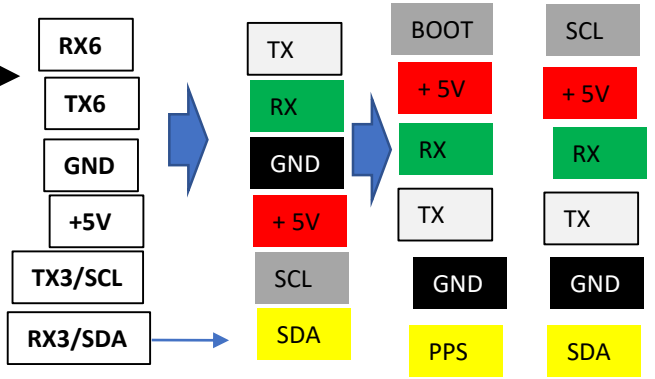
mixer CUSTOMAIRPLANE
smix reset
smix 0 3 0 100 0
smix 1 4 0 100 0
smix 2 5 2 100 0
smix 3 2 1 100 0

set platform_type = AIRPLANE
mmix 0 1.000 0.000 0.000 0.000
mmix 1 1.000 0.000 0.000 0.000

BN280 **BN880**

GPS - UART6
J10-UART 6+3
(porucha konektoru)

GPS MODUL



F405 WING

MCU: 168MHz STM32F405
IMU: MPU6000 accelerometer/gyro (SPI)
Baro: BMP280 (I2C)
OSD: INAV OSD w/ AT7456E chip
Blackbox: MicroSD card slot (SD/SDHC)
VCP & 6x UARTs
2x Motors, 7x Servos outputs, 2x I2C
3x LEDs for FC STATUS (Blue, Red) and 3.3V indicator(Red)
Built in inverter for SBUS input (UART2-RX)
PPM/UART Shared: UART2-RX
SoftSerial on TX2 pad
Battery Voltage Sensor: 1:10 (Scale 1100)
WS2812 Led Strip : Yes
Beeper : Yes , RSSI: Yes
Mounting: 30.5 x 30.5mm, Φ4mm with Grommets Φ3mm
Dimensions: 56 x 36 x 13 mm Weight: 25g

PDB:
Input voltage range: 9~30V (3~6S LiPo) w/TVS protection
2x ESC power pads
Current Senor: 104A, 3.3V ADC, Scale 317

BEC 5V output:
Designed for Flight controller, Receiver, OSD, Camera, Buzzer, 2812 LED_Strip, Buzzer, GPS module, AirSpeed
Continuous current: 2 Amps, Max.3A

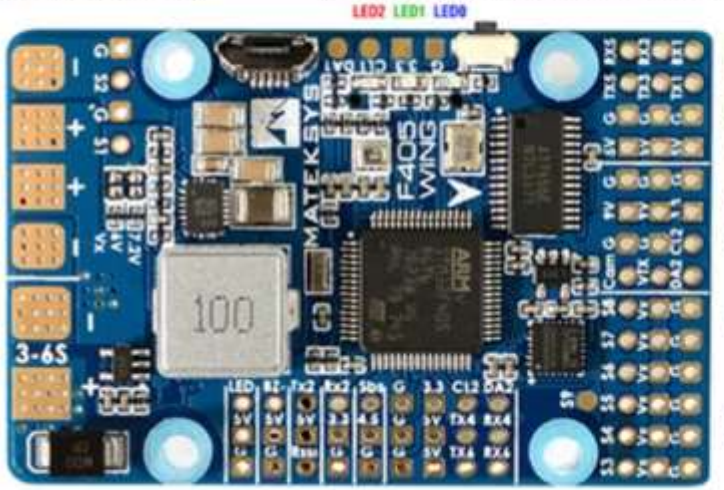
BEC 9V /12V output:
Designed for Video Transmitter, Camera, Gimbal ect.
Continuous current: 2 Amps, Max.3A
12V option with Jumper pad

BEC Vx output:
Designed for Servos
Voltage adjustable, 5V Default, 6V or 7.2V via jumper
Continuous current: 5 Amps, Max.6A
Output Ripple: 50mV (VIn=24V, VOut=5V@5A load)

BEC 3.3V output:
Designed for Baro / Compass module and Spektrum RX
Linear Regulator
Continuous current: 500mA

\+ & - : LiPO & ESC power pads, 9~30V DC.
S1/S2: ESC signal for motor 1 & 2
G: ESC signal ground
Voltage meter scale: 1100
Current Sensor: 104A (Scale 317)

Button: Boot(DFU) mode button
LED0(Blue) & LED1(Green): FC Status indicator
LED2(Red):3.3V indicator
[DA1 CL1] : I2C1, supports Baro only, BMP280 /MS5611 /BMP085



TX1/RX1: UART1
TX3/RX3: UART3
TX5/RX5: UART5
5V: onboard BEC 5V 2A cont. Max.3A
G: Ground

VTX: Video Transmiter Signal
Cam: Camera video signal
9V: onboard BEC 9V 2A cont. Max.3A.
12V option w/ 12V jumper bridged.

[DA2 CL2] : I2C2, for compass and Pitot
compass HMC5883 /MAG3110 /QMC5883 /IST8310
Pitot_MS4525

S3/S4/S5/S6/S7/S8/S9: Servo signal
Vx: onboard BEC 5V/6V/7.2V 5A cont. Max.6A
for servos. Default is 5V

MCU: STM32F405RGT6(168MHz)
IMU: MPU6000
OSD: INAV OSD
Baro: BMP280
BlackBox: MicroSD Slot

Sbs: Built in inverter of RX2 for SBUS input
RX2: UART2-RX for DSM2, DSMX, IBUS, PPM share RX2 pad
TX2: Softserial_TX1 w/ CPU based serial ports enabled
TX2: UART2-TX pin w/o Softserial enabled
TX4/RX4: UART4
TX6/RX6: UART6

MATEKSYS Flight Controller F405-WING

* 168MHz STM32F405RGT6
* 6-Axis MPU6000
* Built-In OSD
* BMP280 Barometer
* MicroSD BlackBox
* 6x UARTs, 1x Softserial, 2x I2C
* 2x Motors & 7x Servos outputs

* 9~30V DC (3~6S LiPo)
* 104A Current Sensor
* BEC 5V 2A cont. Max.3A for FC
* BEC 9V 2A cont. Max.3A, 12V option
* BEC Vx 5A cont. Max.6A for servos
  Vx= 5V Default, 6V or 7.2V option
* LDO 3.3V 500mA cont.

* 56x36x13mm, 25g
* Mounting holes 30.5mm Φ4mm w/ Silicon grommets Φ3mm

INAV Target MATEKF405SE

5V: onboard BEC 5V 2A cont. Max.3A
4V5: 4.4~4.8V, the voltage is also supplied when connecting via USB
3.3: LDO3.3V Max.500mA
G: Ground

LED: W52812 LED signal output
Bz- & 5V: General active 5V buzzer
Bz-, 5V & G: Matek Dbuz5V
Rssi: Frsky RSSI input

12V Jumper

FC Specifications:
MCU: STM32F765VIT6, 216MHz , 512KB RAM, 2MB Flash
IMU: MPU6000 (SPI1) & ICM20602 (SPI3)
Baro: BMP280 (I2C2)
OSD: AT7456E (SPI2)
Blackbox: MicroSD card slot (SDIO)
7x Uarts (1,2,3,4,6,7,8) with built-in inversion.
1x Softserial1_Tx (INAV)
12x PWM outputs (S1~S10 support Dshot)
6x ADC (VBAT, Current, RSSI, Analog AirSpeed, VB2, CU2)
3x LEDs for FC STATUS (Blue, Red) and 3.3V indicator(Red)
2x I2C, 1x SPI4 break'out
Switchable Dual Camera Inputs
Switchable 5V/9V(12V) for Camera/VTX
High-precision Current Sense
ADC VB2 voltage divider: 1K:10K, ADC AirSpeed voltage divider: 10K:10K
TR/SA VTX control: Yes
WS2812 Led Strip : Yes
Beeper : Yes , RSSI: Yes
Analog Airspeed sensor: Yes , Digital Airspeed sensor: Yes
Dimensions: 54 x 36 x 13 mm, Weight: 26g

FC Firmware: INAV Target: MATEKF76/ArduPilot(ChiBiOS) Target: MATEKF765-WI

PDB:
Input voltage range: 9~36V (3~6S LiPo) w/TVS protection
2x ESC power pads
Battery Voltage Sensor: 1:10 (Scale 1100 in INAV, BATT_VOLT_MULT 11.0 in ArduP
Current Senor: 132A, 3.3V ADC (Scale 250 in INAV, 40 A/V in ArduPilot)

BEC 5V output:
Designed for Flight controller, Receiver, OSD, Camera, Buzzer, 2812 LED_Strip, Buz
AirSpeed
Continuous current: 2 Amps, Max.3A

BEC 9V /12V output:
Designed for Video Transmitter, Camera, Gimbal ect.
Continuous current: 2 Amps, Max.3A
12V option with Jumper pad

BEC Vx output:
Designed for Servos
Voltage adjustable, 5V Default, 6V or 7.2V via jumper
Continuous current: 8 Amps, Max.10A

BEC 3.3V output:
Designed for Baro / Compass module and Spektrum RX
Linear Regulator
Continuous current: 200mA

F765 WING LAYOUT

	INAV Airplane	INAV Multirotor	ArduPilot
S1	Motor	Motor	TIM2
S2	Motor	Motor	
S3	Servo	Motor	TIM5
S4	Servo	Motor	
S5	Servo	Motor	TIM1
S6	Servo	Motor	
S7	Servo	Servo	TIM4
S8	Servo	Servo	
S9	Servo	Servo	
S10	Servo	Servo	
S11	Servo	Motor, No DMA	TIM9
S12	Servo	Motor, No DMA	NO DMA

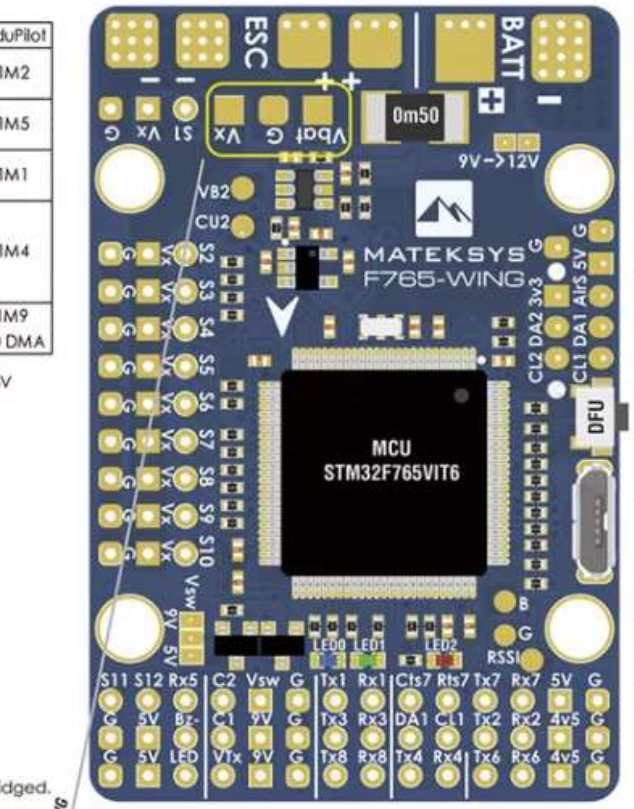
Vx: BEC 5V/6V/7.2V for servos, Default is 5V
8A cont. Max.10A

DShot is not supported on S11 & S12

RX5: UART5_RX, No TX5 on this FC

Bz- & 5V: General active 5V buzzer
Bz-, 5V & G: Matek Dbuz5V
LED: WS2812 LED signal output

5V: onboard BEC 5V 2A cont. Max.3A
9V: onboard BEC 9V 2A cont. Max.3A,
*** 9V rise to 12V if "9V->12V" jumper is bridged.
G: Ground



+ & - : Battery & ESC power pads. 9~36V DC(3~8S LIPO).

Voltage meter scale 1100 (INAV)
Current Sensor: 132A, Scale 250 (INAV)

Vsw: 5V/9V selection
*** ON/OFF can be switched via Modes/USER1 (INAV)
*** Max.1A load on this pad. (Default ON)

C1: Camera-1 video IN (Default)
C2: Camera-2 video IN
*** C1/C2 can be switched via Modes/USER2 (INAV)

VTX: Video OUT for Video Transmitter

ArduPilot tips
on board battery voltage: BATT_VOLT_PIN 12, BATT_VOLT_MULT 11
on board current sensor: BATT_CURR_PIN 13, BATT_AMP_PERVLT 40

VB2: Voltage divider 1K:10K, Max.36V supported
BATT2_VOLT_PIN 4, BATT2_VOLT_MULT 11
CU2: for external current sensor, Max.3.3V
BATT2_CURR_PIN 15

*** No definitions for VB2 & CU2 in INAV target

9V->12V 9V rise to 12V

AirS: Analog Airspeed sensor (0~6.6V)
1:1 voltage divider built-in

DA2 & CL2: I2C2
DA1 & CL1: I2C1
3.3: LDO3.3V 200mA

INAV tips
I2C1 compass QMC5883 /MAG3110 /HMC5883 /IST8310/LIS3MDL
OLED 0.96"
I2C2 Barometer BMP280 / MS5611
Digital AirSpeed sensor Pitot_MS4525
Temperature sensor

Button: Boot(DFU) mode button

LED 0: Blue, FC Status
LED 1: Green, FC Status
LED 3.3: Red, 3.3V Status

Rssi: Analog RSSI, RSSI_ANA_PIN 11 (ArduPilot)

4V5: 4.4~4.8V, Max.500mA
*** the voltage is also supplied when connecting via USB

TX1/RX1: UART1
TX3/RX3: UART3
TX8/RX8: UART8
TX4/RX4: UART4

TX7/RX7: UART7
CTs7/Rts7: Uart7_CTS/RTS for ArduPilot Telem1

TX2/RX2: UART2
DA1 & CL1: I2C1, for compass

RX6: UART6-RX for Serial_RX by default
PPM share RX6 pad
TX6: UART6-TX w/o Softserial enabled
TX6: Softserial1_TX w/ CPU based serial ports enabled

INAV tips
*** F765 MCU has inner inversion, SBUS can be connected to any unused UART_RX.*
*** Frsky FPort, SmartPort, TR/SA VTX control can be connected to any unused UART_TX*
*** GPS can be connected to any unused UART_TX & RX*

ection with silicon wires 20-24 AWG