



MATEKSYS

FLIGHT CONTROLLER F722-SE

BASIC MANUAL

MCU: 21.6MHz STM32F722RET6

IMU: MPU6000 & ICM20602, Dual Gyros built-in

Baro: BMP280

OSD: AT7456E

Blackbox: MicroSD card slot

5x Uarts (1,2,3,4,6) with built-in inversion

1x Softserial supported

8x Dshot/Proshot/oneshot outputs

1x I2C

4x RX6 pads for BLheli32 ESC telemetry

4x individual ESC power/signal pads

1x Group of G/S1/S2/S3/S4 pads for 4in1 ESC Signal/GND

Vbat filtered output power for VTX, switchable via AUX (modes tab-user1)

Dual Camera image switchable via AUX (modes tab-user2)

Camera control

Smartaudio & Tramp VTX protocol

WS2812 Led Strip

Beeper

RSSI

INAV analog airspeed

Input: 6~36V (3~8S LiPo)

PDB: 4x35A (Max.4x46A)

BEC: 5V 2A cont. (Max.3A)

LDO 3.3V: Max.200mA

Current Sensor 184A (Scale 179)

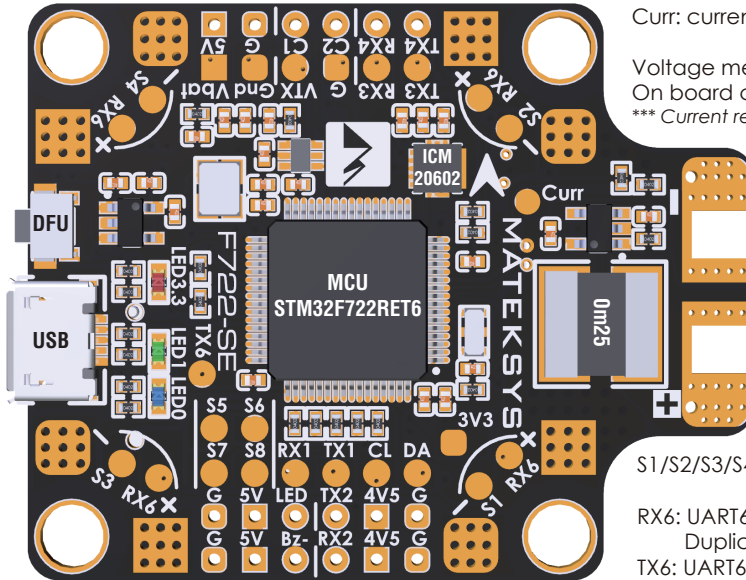
Battery Voltage Sensor: 1:10 (Scale 110)

LAYOUT

C1: Camera-1 video IN (Default)
 C2: Camera-2 video IN
 *** C1/C2 can be switched via PINIO2 (Modes Tab/USER2)

VTX: Video OUT for Video Transmitter
 Vbat: Battery voltage filtered, Max.1A load on this pad. (Default ON)
 *** ON/OFF can be switched via PINIO1 (Modes Tab/USER1)

G/Gnd: Ground
 RX3 & TX3: UART3
 RX4 & TX4: UART4
 *** RX4 has 200ohm built-in, can be remapped to PWM camera control
 (CLI resource camera_control 1 A01)



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

S5/S6
 S7/S8: ESC signal

Curr: current sensor signal IN or OUT
 Voltage meter scale: 110
 On board current sensor: 184A (Scale 179)
 *** Current readout is not accurate when load <1A

+ & - : LiPO & ESC power pads
 6~36V (2~8S)
 *** 50V capacitor is necessary
 with 8S input

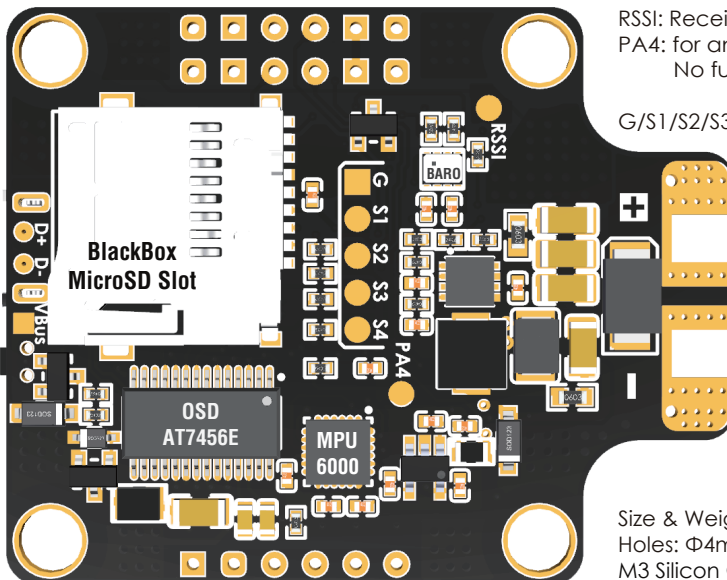
S1/S2/S3/S4: ESC signal
 RX6: UART6_RX, One per corner
 Duplicates of RX6 pad for ESC Telemetry
 TX6: UART6_TX, nearby 3xLEDs

5V: onboard BEC 5V 2A cont. Max.3A
 4V5: 4.4~4.8V, Max.500mA, the voltage is also supplied when connecting via USB
 3V3: LDO3.3V Max.200mA
 G: Ground

RX1 & TX1: UART1
 CL & DA: I2C1_SCL & SDA

RX2: UART2_RX for Serial RX by default, PPM share RX2 pad
 TX2: UART2_TX
 *** TX2 can be remapped to softserial_tx1 to get one more Uart for Frsky SmartPort
 (CLI resource SERIAL_TX 11 A02)
 *** F722 MCU has built-in inversion, SBUS can be connected to any unused UART_RX.
 *** Frsky FPort, SmartPort, Tramp & SmartAudio can be connected to any unused UART_TX

LED: 2812 LED signal
 Bz- & 5V: General active 5V buzzer
 Bz- /5V/G: for MATEKSYS DBUZ5V



D+ & D-: USB data
 VBus: USB voltage

RSSI: Receiver RSSI IN
 PA4: for analog Airspeed sensor in INAV
 No function in BF
 G/S1/S2/S3/S4: for 4in1 ESC

Size & Weight: 36x46mm /10g
 Holes: Φ4mm, 30.5mm mounting
 M3 Silicon Grommets included

Target

BetaFlight / INAV: MATEKF722SE

*** CLI defaults after reflashing

Check and swap the Gyros (BetaFlight)

CLI status

```
# status
System Uptime: 6 seconds
Current Time: 0000-01-01T00:00:00.000+00:00
Voltage: 0 * 0.1V (OS battery - NOT PRESENT)
CPU Clock=216MHz, Vref=3.32V, Core temp=47degC, GYRO=MPU6000, ACC=MPU6000
SD card: Startup failed
```

CLI get gyro_to_use
FIRST = MPU6000 by default
SECOND = ICM20602
BOTH is not supported on this FC

```
# get gyro_to_use
gyro_to_use = FIRST
Allowed values: FIRST, SECOND, BOTH
```

Select ICM20602

CLI set gyro_to_use = second
save

```
# set gyro_to_use = second
gyro_to_use set to SECOND
```

*** ICM20602 provides fast response, but it is sensitive. Be sure vibration and ESC noise are good filtered.

Check and swap the Gyros (INAV)

CLI status

```
# status
System Uptime: 52 seconds
Current Time: 2041-06-28T01:04:00.000+00:00
Voltage: 0.39V (IS battery - NOT PRESENT)
CPU Clock=216MHz, GYRO=MPU6000, ACC=MPU6000, BARO=BMP280, PITOT=ADC
```

CLI get gyro_to_use
0 = MPU6000 by default
1 = ICM20602

```
# get gyro_to_use
gyro_to_use = 0
Allowed range: 0 - 1
```

CLI get acc_hardware

```
acc_hardware = MPU6000
Allowed values: NONE, AUTO, ADXL345, MPU6050, MMA845x, BMA280, LSM303DLHC, MPU6000, MPU6500,
```

Select ICM20602

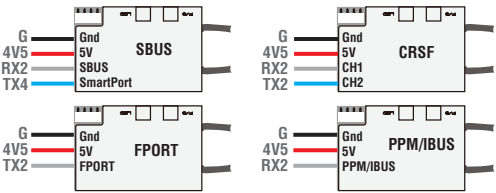
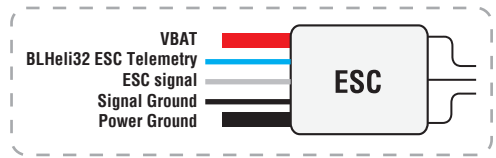
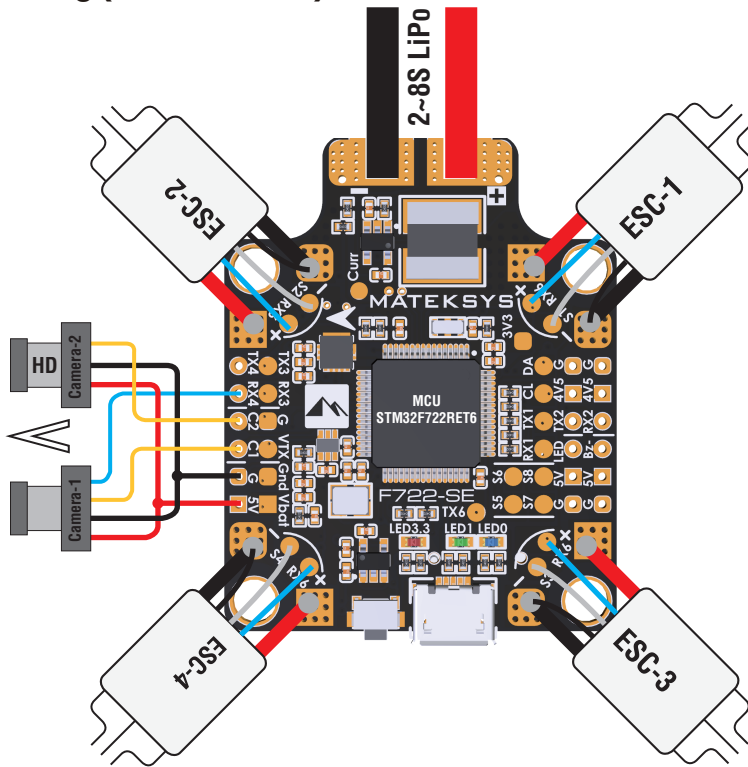
CLI set gyro_to_use = 1
set acc_hardware = MPU6500
save

```
# set gyro_to_use = 1
gyro_to_use set to 1
# set acc_hardware = MPU6500
acc_hardware set to MPU6500
```

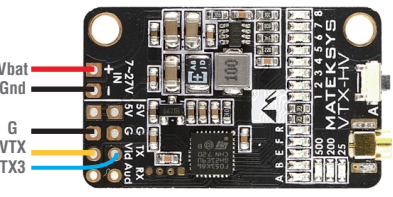
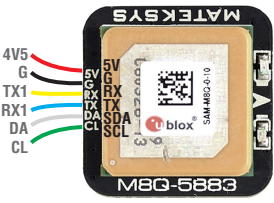
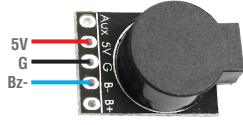
VTX Power / Camera switcher (BetaFlight / INAV)

USER1	No USER1 definition Vbat(for VTX) ON by default	
USER2	No USER2 definition C1 (Camera-1) ON by default	
USER1	AUX 2 Vbat OFF Vbat ON Min: 900 Max: 1200	
USER2	AUX 2 C1 ON & C2 OFF C2 ON & C1 OFF Min: 1725 Max: 2100	

Wiring (Individual ESC)



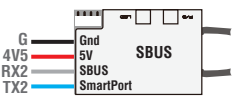
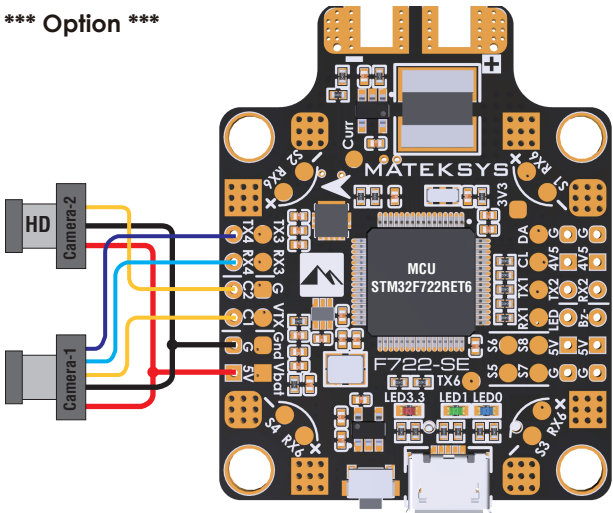
*** SBUS/IBUS/DSM can be connected to any unused UART_RX
 *** Frsky FPort, SmartPort can be connected to any unused UART_TX
 *** PPM share RX2 pad, must disable Serial RX on UART2



*** RX4 pad has 200ohm built-in, can be remapped to PWM camera control (BF CLI resource camera_control 1 A01)

Identifier	Configuration/MSP	Serial Rx	Telemetry Output	Sensor Input	Peripherals
USB VCP	<input checked="" type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	Disabled AUTO	Disabled AUTO
UART1	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	GPS AUTO	Disabled AUTO
UART2	<input type="checkbox"/> 115200	<input checked="" type="checkbox"/>	Disabled AUTO	Disabled AUTO	Disabled AUTO
UART3	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	Disabled AUTO	IRC Tramp AUTO
UART4	<input type="checkbox"/> 115200	<input type="checkbox"/>	SmartPort AUTO	Disabled AUTO	Disabled AUTO
UART6	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	ESC AUTO	Disabled AUTO

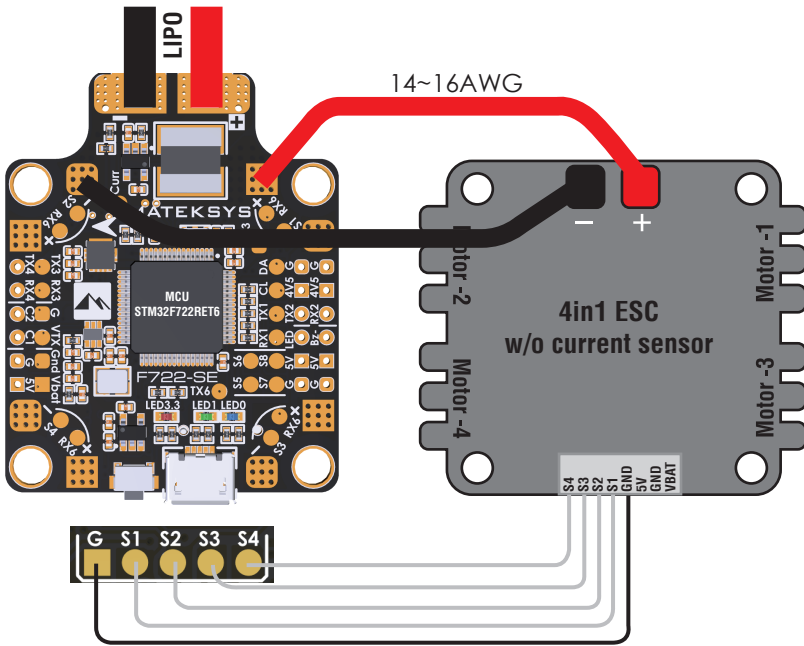
*** Option ***



*** BF CLI resource serial_tx 11 A02 to get softserial_tx1 on TX2 pad for SmartPort

Identifier	Configuration/MSP	Serial Rx	Telemetry Output	Sensor Input	Peripherals
USB VCP	<input checked="" type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	Disabled AUTO	Disabled AUTO
UART1	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	GPS AUTO	Disabled AUTO
UART2	<input type="checkbox"/> 115200	<input checked="" type="checkbox"/>	Disabled AUTO	Disabled AUTO	Disabled AUTO
UART3	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	Disabled AUTO	IRC Tramp AUTO
UART4	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	Disabled AUTO	RunCam Devic AUTO
UART6	<input type="checkbox"/> 115200	<input type="checkbox"/>	Disabled AUTO	ESC AUTO	Disabled AUTO
SOFTSERIAL1	<input type="checkbox"/> 115200	<input type="checkbox"/>	SmartPort AUTO	Disabled AUTO	Disabled AUTO

Wiring (4in1 ESC)



Battery

Onboard ADC Voltage Meter Source

Onboard ADC Current Meter Source

3.3 Minimum Cell Voltage

4.3 Maximum Cell Voltage

3.5 Warning Cell Voltage

0 Capacity (mAh)

Voltage Meter

Battery 0 V

110 Scale

10 Divider Value

1 Multiplier Value

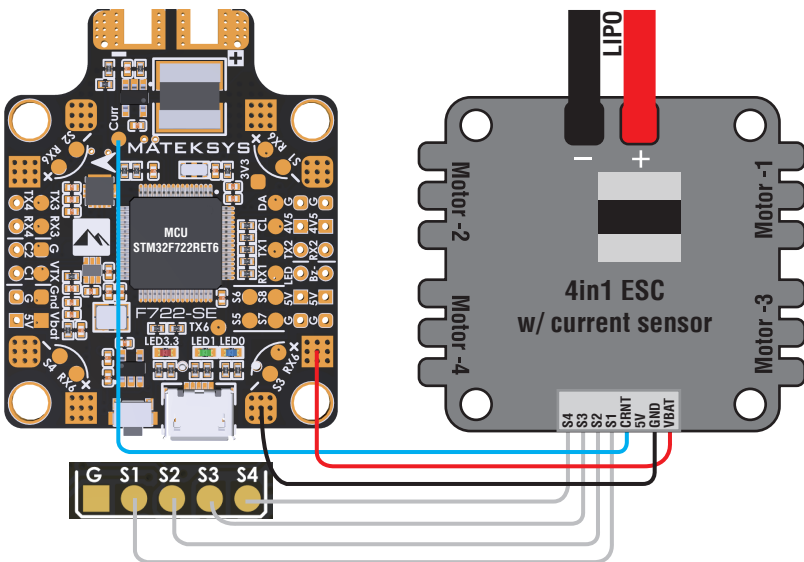
Amperage Meter

F722-SE Current sensor 184A, scale 179

Battery 0.00 A

179 Scale [1/10th mV/A]

0 Offset [mA]



Battery

Onboard ADC Voltage Meter Source

Onboard ADC Current Meter Source

3.3 Minimum Cell Voltage

4.3 Maximum Cell Voltage

3.5 Warning Cell Voltage

0 Capacity (mAh)

Voltage Meter

Battery 0 V

110 Scale

10 Divider Value

1 Multiplier Value

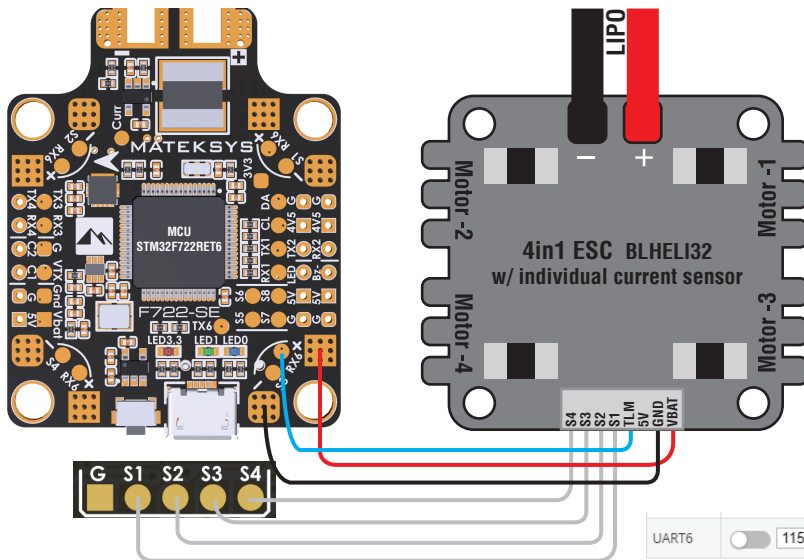
Amperage Meter

Use the current sensor scale of 4in1

Battery 0.00 A

179 Scale [1/10th mV/A]

0 Offset [mA]



Battery

ESC Sensor Voltage Meter Source

ESC Sensor Current Meter Source

3.3 Minimum Cell Voltage

4.3 Maximum Cell Voltage

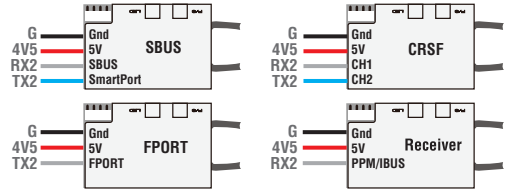
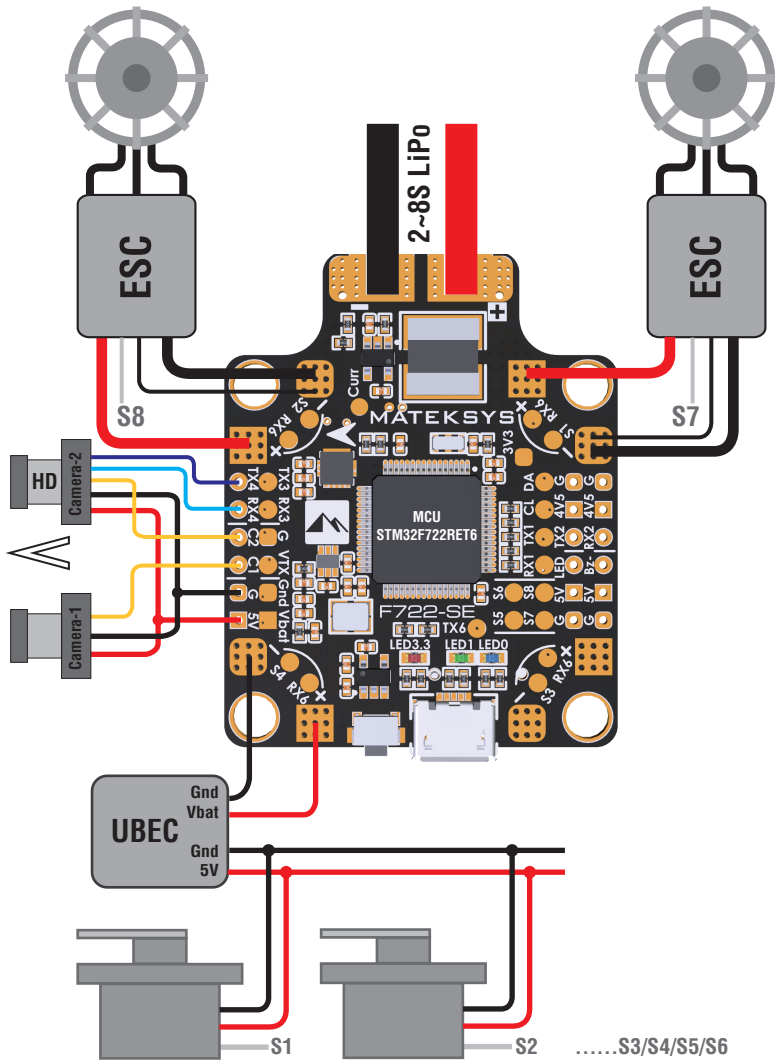
3.5 Warning Cell Voltage

0 Capacity (mAh)

ESC_SENSOR Use KISS/BLHeli_32 telemetry as sensor

UART6 115200 Disabled AUTO ESC AUTO

Wiring (INAV Airplane)



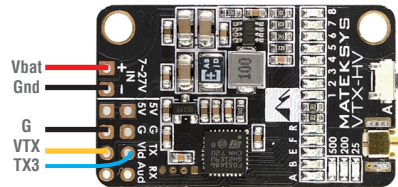
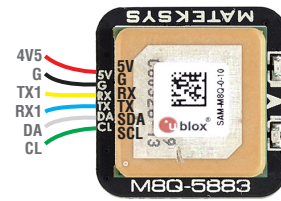
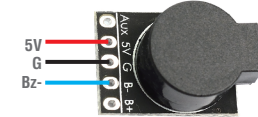
*** SBUS/IBUS/DSM can be connected to any unused UART_RX
 *** Frsky FPort, SmartPort can be connected to any unused UART_TX
 *** PPM share RX2 pad, must disable Serial RX on UART2

Other Features

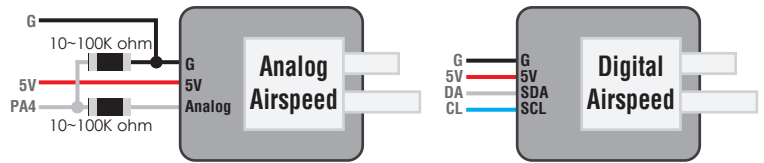
- Enable CPU based serial ports
- Telemetry output

SOFTSERIAL1 MSP 115200

*** Enable softserial_tx1 on TX2 pad for saving one Uart



- Airplane** S7 & S8 for motors
S1/S2/S3/S4/S5/S6 for servos
- Multicopter** S1/S2/S3/S4/S5/S6 for motors
S7 & S8 for servos
- Tricopter** S1/S2/S3 for motors
S7 for servo



Ports

[DOCUMENTATION FOR INAV](#)

Note: not all combinations are valid. When the flight controller firmware detects this the serial port configuration will be reset.
Note: Do NOT disable MSP on the first serial port unless you know what you are doing. You may have to reflash and erase your configuration if you do.

Identifier	Data	Telemetry	RX	Sensors	Peripherals
USB VCP	<input checked="" type="checkbox"/> MSP 115200	Disabled AUTO	<input type="checkbox"/> Serial RX	Disabled 115200	Disabled 115200
UART1	<input type="checkbox"/> MSP 115200	Disabled AUTO	<input type="checkbox"/> Serial RX	GPS 57600	Disabled 115200
UART2	<input type="checkbox"/> MSP 115200	Disabled AUTO	<input checked="" type="checkbox"/> Serial RX	Disabled 115200	Disabled 115200
UART3	<input type="checkbox"/> MSP 115200	Disabled AUTO	<input type="checkbox"/> Serial RX	Disabled 115200	IRC Tramp 115200
UART4	<input type="checkbox"/> MSP 115200	Disabled AUTO	<input type="checkbox"/> Serial RX	Disabled 115200	RunCam Device 115200
UART6	<input type="checkbox"/> MSP 115200	Disabled AUTO	<input type="checkbox"/> Serial RX	Disabled 115200	Disabled 115200
SOFTSERIAL1	<input type="checkbox"/> MSP 115200	SmartPort AUTO	<input type="checkbox"/> Serial RX	Disabled 115200	Disabled 115200