FLIGHT CONTROLLER LUX-H7

BASIC MANUAL

MCU: STM32H743VIT6, 480MHz , 1MB RAM, 2MB Flash
IMU: MPU6000 (SPI1) & ICM20602 (SPI4)
Baro: Infineon DPS310 (I2C2)
OSD: AT7456E (SPI2)
Blackbox: MicroSD card socket (SDIO)

7x UARTs (1,2,3,4,6,7,8) with built-in inversion.
13x PWM outputs(including “LED” pad)
2x I2C ports
1x CAN bus
6x ADC
USB Type-C(USB2.0)
2x JST-SH1.0_8pin connector for 4in1 ESC
1x JST-SH1.0_8pin connector for DJI FPV Air Unit
Dual Camera Inputs switch
9V ON/OFF switch

Vbat Input: 6~36V (2~8S LiPo)
BEC 5V 2A cont. (Max.3A)
BEC 9V 2A cont. (Max.3A)

Firmware
ArduPilot: MATEKH743
BetaFlight: MATEKH743

Mounting: 30.5 x 30.5mm, Φ4mm with Grommets Φ3mm
Dimensions: 36 x 36 x 5 mm

LAYOUT

Rx6-SBus Jumper

If using non-DJI FPV remote controller, keep this pad unbridged

If using DJI FPV Remote Controller, Bridging this pad will link Rx6 to SBus pin on JST-SH-6P connector

DA2 & CL2: I2C2

Rssi: Analog RSSI IN, 0~3.3V
RSSI_ANA_PIN 8 (ArduPilot)

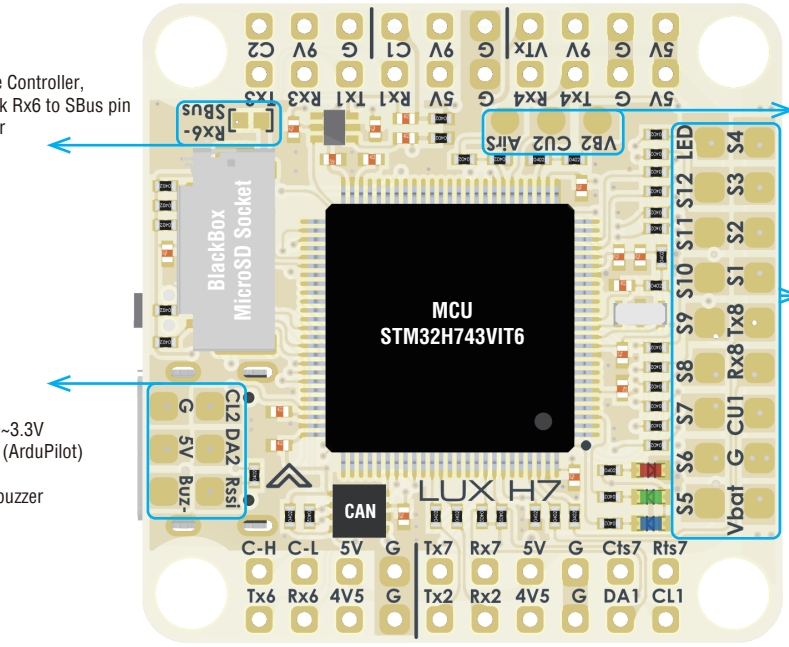
Buz- & 5V: Passive 5V buzzer

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

VTx: Video OUT for Video Transmitter

9V: onboard regulator 9V 2A cont. Max.3A
*** ON/OFF switchable via ArduPilot Relay or Modes/USER1 (Betaflight), Default ON
5V: onboard regulator 5V 2A cont. Max.3A
G: Ground

Tx1/Rx1: UART1_Tx & Rx
Tx3/Rx3: UART3_Tx & Rx
Tx4/Rx4: UART4_Tx & Rx



VB2: 1K:20K Voltage divider built-in
Max.69V supported
BATT2_VOLT_PIN 18,
BATT2_VOLT_MULT 21
Betaflight voltage meter scale 210
MCU PIN PA4(A04)

CU2: For external current sensor2, 0~3.3V
BATT2_CURR_PIN 7
MCU PIN P74(A07)

AirS: Analog Airspeed sensor (0~6.6V)
20K:20K voltage divider built-in
ARSPD_PIN 4

S1-S12: PWM1~PWM12
LED: 2812LED signal, PWM13(ArduPilot)

Tx8 & Rx8: UART8_Tx & Rx

CU1: current sensor signal IN, 0~3.3V
BATT_CURR_PIN 11

Vbat: Battery Voltage IN, 6~36V DC
Battery Voltage divider: 1K:10K
BATT_VOLT_PIN 10
BATT_VOLT_MULT 11
BF voltage meter scale 110

G: Ground

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

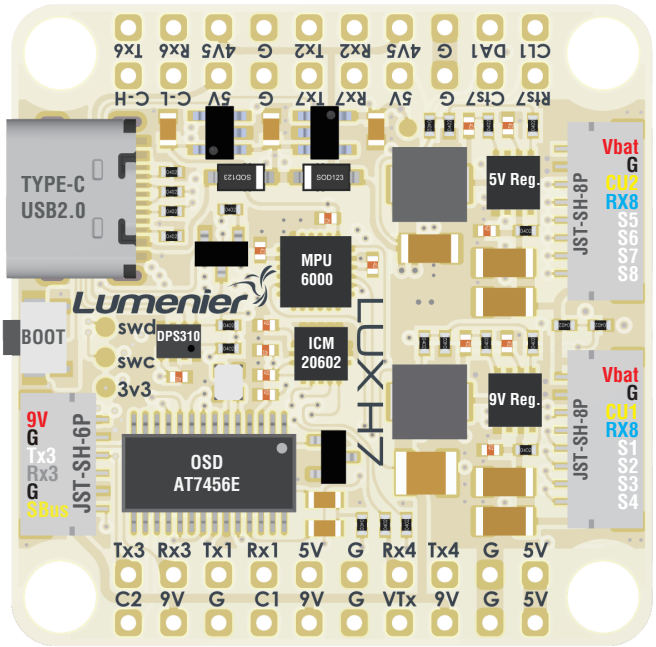
C-L: CAN bus Low
C-H: CAN bus High

Rx6: UART6-RX for Serial_RX by default
PPM share RX6 pad
Tx6: UART6-Tx

Tx7/Rx7: UART7_Tx & Rx
CTs7/Rts7: UART7_CTS/RTS for ArduPilot telemetry

Tx2/Rx2: UART2_Tx & Rx
DA1 & CL1: I2C1, for compass

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



3V3: LDO 3.3V
swd: SWDIO
swc: SWCLK

Vbat: Battery Voltage IN, 6~36V DC
Battery Voltage divider: 1K:10K
BATT_VOLT_PIN 10
BATT_VOLT_MULT 11
BF voltage meter scale 110
*** DO NOT connect different batteries to "Vbat" in parallel

G: Ground

Rx8: UART8_Rx for BL32_ESC telemetry

CU1: current sensor signal IN, 0~3.3V
MCU pin PC1(C01)

CU2: current sensor2 IN, 0~3.3V
MCU pin PA7(A07)

If using CU2 as current ADC in Betaflight
CLI: resource ADC_CURR 1 A07

Size & Weight: 36x36x6mm /7g
Holes: Φ4mm, 30.5mm x 30.5mm

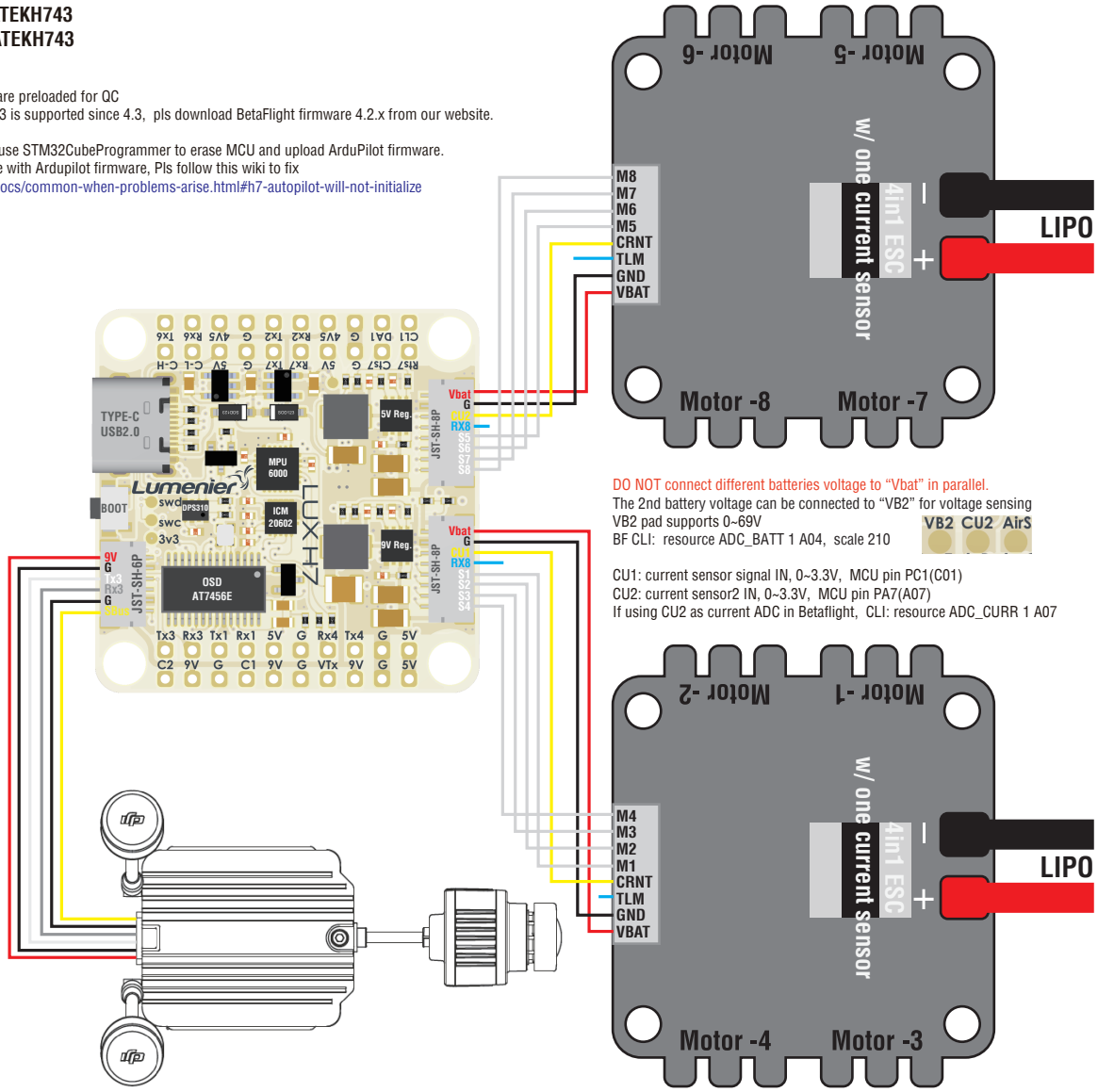
Packing
1x LUX-H7
2x JST-SH-8P cable 5cm
2x JST-SH-8P connector
1x JST-SH-6P to JST-GH-8P cable 8cm for DJI air unit
6x M3 Silicon Grommets

Wiring (Multirotors)

ArduPilot hwdef: MATEKH743
BetaFlight target: MATEKH743

LUX-H7 has betaflight firmware preloaded for QC
BetaFlight Target MATEKH743 is supported since 4.3, pls download BetaFlight firmware 4.2.x from our website.

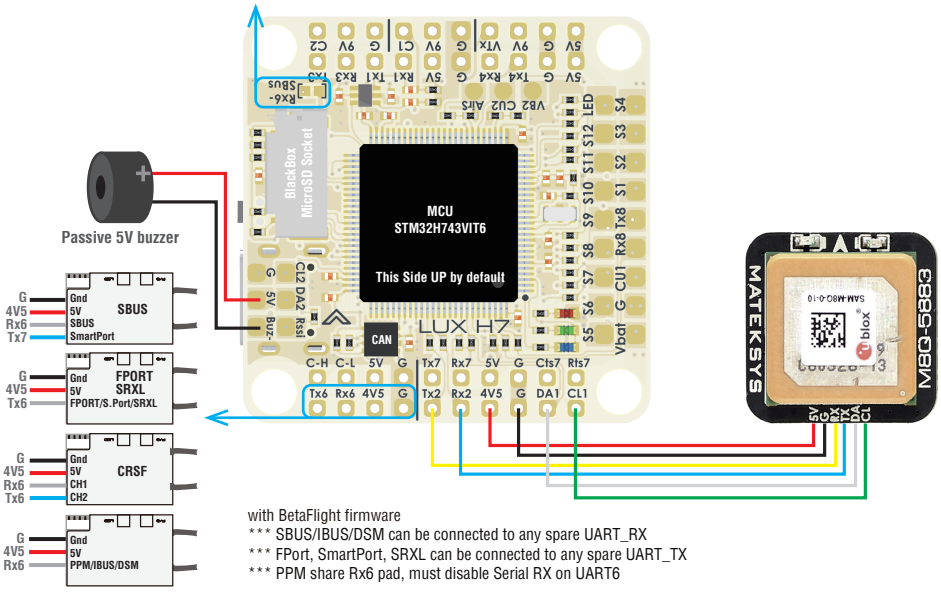
It is highly recommended to use STM32CubeProgrammer to erase MCU and upload ArduPilot firmware.
If H743 MCU will not initialize with Ardupilot firmware, Pls follow this wiki to fix
https://ardupilot.org/copter/docs/common-when-problems-arise.html#h7-autopilot-will-not-initialize



DO NOT connect different batteries voltage to "Vbat" in parallel.
The 2nd battery voltage can be connected to "VB2" for voltage sensing
VB2 pad supports 0~69V
BF CLI: resource ADC_BATT 1 A04, scale 210

CU1: current sensor signal IN, 0~3.3V, MCU pin PC1(C01)
CU2: current sensor2 IN, 0~3.3V, MCU pin PA7(A07)
If using CU2 as current ADC in Betaflight, CLI: resource ADC_CURR 1 A07

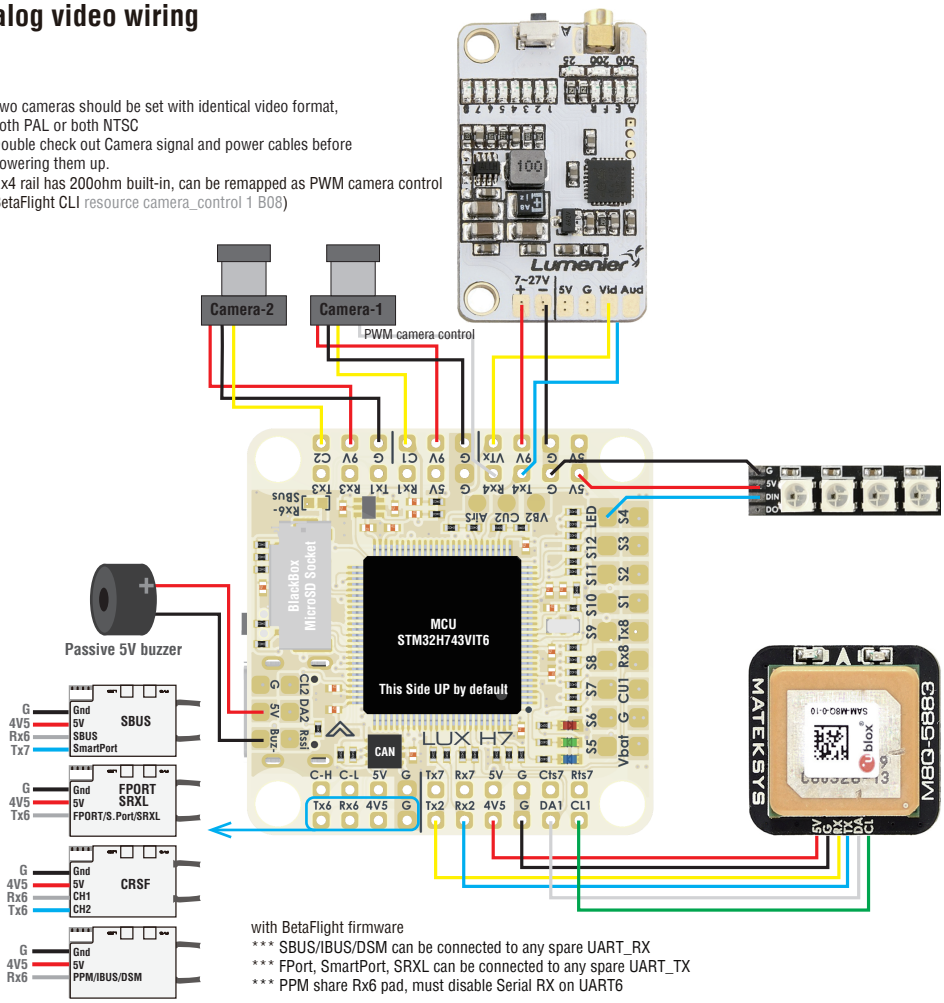
If using DJI FPV Remote Controller, Bridging this pad will link Rx6 to SBus pin on JST-SH-6P connector
If using other remote controllers, keep this pad unbridged



with BetaFlight firmware
*** SBUS/IBUS/DSM can be connected to any spare UART_RX
*** FPort, SmartPort, SRXL can be connected to any spare UART_TX
*** PPM share Rx6 pad, must disable Serial RX on UART6

Analog video wiring

*** Two cameras should be set with identical video format, both PAL or both NTSC
*** Double check out Camera signal and power cables before powering them up.
*** Rx4 rail has 200ohm built-in, can be remapped as PWM camera control (BetaFlight CLI resource camera_control 1 B08)



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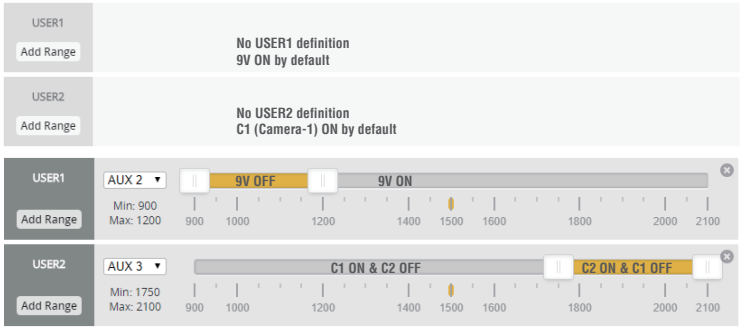
*** PPM share Rx6 pad, must disable Serial RX on UART6

9V Power / Camera switch

If using DJI FPV Remote Controller and Air Unit is powered by 9V, DO NOT enable 9V power switch, just keep it ON by default.

BetaFlight PINIO



ArduPilot Relay

Camera-1 and 9V On by default
GPIOs

PD10 PINIO1 OUTPUT GPIO(81) //9V pad power switch
PD11 PINIO2 OUTPUT GPIO(82) //Camera switch
# RCx_OPTION: RC input option

28 Relay On/Off
34 Relay2 On/Off

RELAY_PIN 81 //Vsw GPIO
RC7_OPTION 28 //Relay On/Off, Use CH7 of Transmitter to switch 9V
RELAY_PIN2 82 //Camera switch GPIO
RC8_OPTION 34 //Relay2 On/Off, Use CH8 of Transmitter to switch camera

The configured feature will be triggered when the auxiliary switch's pwm value becomes higher than 1800. It will be deactivated when the value falls below 1200.
Check the pwm value sent from the transmitter when the switch is high and low using the Mission Planner's Initial Setup >> Mandatory Hardware >> Radio Calibration screen.
If it does not climb higher than 1800 or lower than 1200, it is best to adjust the servo end points in the transmitter.

I/O Mapping

ArduPilot						
PWM	S1	PB0	5 V tolerant I/O	PWM1 GPIO50	TIM8_CH2N	Group1
	S2	PB1	3.3 V tolerant I/O	PWM2 GPIO51	TIM8_CH3N	
	S3	PA0	5 V tolerant I/O	PWM3 GPIO52	TIM5_CH1	Group2
	S4	PA1	5 V tolerant I/O	PWM4 GPIO53	TIM5_CH2	
	S5	PA2	5 V tolerant I/O	PWM5 GPIO54	TIM5_CH3	
	S6	PA3	5 V tolerant I/O	PWM6 GPIO55	TIM5_CH4	
	S7	PD12	5 V tolerant I/O	PWM7 GPIO56	TIM4_CH1	Gourp3
	S8	PD13	5 V tolerant I/O	PWM8 GPIO57	TIM4_CH2	
	S9	PD14	5 V tolerant I/O	PWM9 GPIO58	TIM4_CH3	
	S10	PD15	5 V tolerant I/O	PWM10 GPIO59	TIM4_CH4	
	S11	PE5	5 V tolerant I/O	PWM11 GPIO60	TIM15_CH1	Group4
	S12	PE6	5 V tolerant I/O	PWM12 GPIO61	TIM15_CH2	
	LED	PA8	5 V tolerant I/O	PWM13 GPIO62	TIM1_CH1	Group5
PWM1~PWM13 are Dshot and PWM capable. However, mixing Dshot and normal PWM operation for outputs is restricted into groups, ie. enabling Dshot for an output in a group requires that ALL outputs in that group be configured and used as Dshot, rather than PWM outputs. If servo and motor are mixed in same group, make sure this group run lowest PWM frequency according to the servo specification. ie. Servo supports Max. 50Hz, ESC must run at 50Hz in this group.						
ADC	No pad 1K:10K divider builtin	PC0	0~36V	Vbat ADC	BATT_VOLT_PIN BATT_VOLT_MULT	10 11.0
	CU1 Pad	PC1	0~3.3V	Current ADC	BATT_CURR_PIN	11
	VB2 Pad 1K:20K divider builtin	PA4	0~69V	Vbat2 ADC	BATT2_VOLT_PIN BATT2_VOLT_MULT	18 21.0
	CU2 Pad	PA7	0~3.3V	Current2 ADC	BATT2_CURR_PIN	7
	RSSI Pad	PC5	0~3.3V	RSSI ADC Analog RSSI	RSSI_ANA_PIN RSSI_TYPE	8 1
	AirS Pad 20K:20K divider builtin	PC4	0~6.6V	AirS ADC Analog Airspeed	ARSPD_PIN ARSPD_TYPE	4 2
I2C	I2C1 CL1/DA1	PB6/PB7	5 V tolerant I/O	Digital Airspeed I2C	ARSPD_BUS	1
				MS4525 DLVR-L10D	ARSPD_TYPE	1 9
				Compass	COMPASS_AUTODEC	1
	I2C2 CL2/DA2	PB10/PB11	5 V tolerant I/O	on board Baro DPS310		
CAN	CAN1	PD0/PD1	5 V tolerant I/O	CAN Node	CAN_D1_PROTOCOL CAN_P1_DRIVER	1 1
				CAN GPS	GPS_TYPE	9
				CAN Compass	COMPASS_TYPEMASK	0
				CAN Airspeed sensor	ARSPD_TYPE	8
UART	USB	PA11/PA12	5 V tolerant I/O	USB	console	SERIAL0
	RX7 TX7 RTS7 CTS7	PE7/8/9/10	3.3 V tolerant I/O	UART7	telem1	SERIAL1
	TX1 RX1	PA9/PA10	5 V tolerant I/O	USART1	telem2	SERIAL2
	TX2 RX2	PD5/PD6	5 V tolerant I/O	USART2	GPS1	SERIAL3
	TX3 RX3	PD8/PD9	5 V tolerant I/O	USART3	GPS2	SERIAL4
	TX8 RX8	PE1/PE0	5 V tolerant I/O	UART8	USER	SERIAL5
	TX4 RX4	PB9/PB8	5 V tolerant I/O	UART4	USER	SERIAL6
	TX6 RX6	PC6/PC7	5 V tolerant I/O	USART6	RC input/Receiver	SERIAL7
				RX6	SBUS/IBUS/DSM/PPM	

BetaFlight					
PWM	S1	PB0	5 V tolerant I/O	TIM3_CH3	Motor
	S2	PB1	3.3 V tolerant I/O	TIM3_CH4	
	S3	PA0	5 V tolerant I/O	TIM5_CH1	
	S4	PA1	5 V tolerant I/O	TIM5_CH2	
	S5	PA2	5 V tolerant I/O	TIM5_CH3	
	S6	PA3	5 V tolerant I/O	TIM5_CH4	
	S7	PD12	5 V tolerant I/O	TIM4_CH1	
	S8	PD13	5 V tolerant I/O	TIM4_CH2	
	S9	PD14	5 V tolerant I/O	TIM4_CH3	
	S10	PD15	5 V tolerant I/O	TIM4_CH4	
	S11	PE5	5 V tolerant I/O	TIM15_CH1	Servo
	S12	PE6	5 V tolerant I/O	TIM15_CH2	
	LED	PA8	5 V tolerant I/O	TIM1_CH1	2812LED
	RX4	PB8	5 V tolerant I/O	TIM16_CH1	
	TX4	PB9	5 V tolerant I/O	TIM17_CH1	
ADC	Vbat ADC, No pad 1K:10K divider builtin	PC0	0~36V	Vbat ADC	scale 110
	CU1 pad	PC1	0~3.3V	Current ADC	
	VB2 Pad 1K:20K divider builtin	PA4	0~69V	Vbat2 ADC	scale 210
	CU2 Pad	PA7	0~3.3V	Current2 ADC	
	RSSI Pad	PC5	0~3.3V	RSSI ADC	Analog RSSI
	AirS Pad 20K:20K divider builtin	PC4	0~6.6V	AirS ADC	Analog Airspeed
I2C	I2C1 CL1/DA1	PB6/PB7	5 V tolerant I/O	Compass	qmc5883l/hmc5883l /lis3mdl
	I2C2 CL2/DA2	PB10/PB11	5 V tolerant I/O	on board Barometer	DPS310
UART	USB	PA11/PA12	5 V tolerant I/O	USB	
	RX7 TX7	PE7/PE8	3.3 V tolerant I/O	UART7	USER
	TX1 RX1	PA9/PA10	5 V tolerant I/O	USART1	USER
	TX2 RX2	PD5/PD6	5 V tolerant I/O	USART2	USER
	TX3 RX3	PD8/PD9	5 V tolerant I/O	USART3	USER
	TX8 RX8	PE1/PE0	5 V tolerant I/O	UART8	USER
	TX4 RX4	PB9/PB8	5 V tolerant I/O	UART4	USER
	TX6 RX6	PC6/PC7	5 V tolerant I/O	UART6_RX	PPM & Serial RX
				UART6_TX	FPORT/SRXL