MATEKSYS

FLIGHT CONTROLLER F765-WSE

QUICK START GUIDE

MCU: STM32F765VIH6, 216MHz, 2MB Flash
IMU: ICM42688-P (SPI4)
Baro: DPS310 (I2C2)
OSD: AT7456E (SPI2)
Blackbox: MicroSD card slot (SDIO)

6.5x Uarts (1,2,3,Rx5,6,7,8) with built-in inversion
1x Softserial1_Tx option (INAV)
12x PWM outputs
2x I2C
1x CAN
6x ADC (VBAT, Current, RSSI, Analog AirSpeed, VB2, CU2)
1x JST-GH_4pin connector for I2C2
1x JST-GH_4pin connector for CAN
1x JST-SH_6pin connector for external USB and buzzer

Dual Camera Inputs switch
9V(12V) for VTX power switch

6.8~30V DC IN (2~6S LiPo)
High-precision Current Sense 220A Range
BEC 5V 2A for FC
BEC 9V 2A for camera/VTX, 12V option
BEC Vx 8A cont. 10A Peak for servos, 5V, 6V or 7.2V option
LDO 3.3V 200mA

INAV Target: MATEKF765SE
ArduPilot hwdef: MATEKF765SE

LAYOUT

	INAV AirPlane	INAV Multirotor	ArduPilot
S1	Motor	Motor	PWM1
S2	Motor	Motor	PWM2
S3	Servo	Motor	PWM3
S4	Servo	Motor	PWM4
S5	Servo	Motor	PWM5
S6	Servo	Motor	PWM6
S7	Servo	Servo	PWM7
S8	Servo	Servo	PWM8
S9	Servo	Servo	PWM9
S10	Servo	Servo	PWM10
S11	Servo	Motor	PWM11
S12	Servo	Motor	PWM12
LED	2812 LED	2812 LED	PWM13

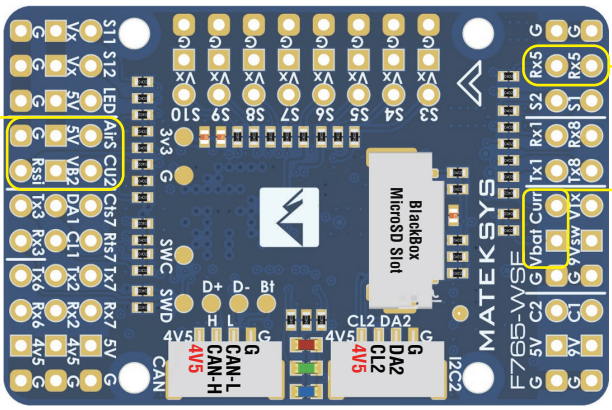
Vx: BEC 5V/6V/7.2V for servos, Default is 5V
8A cont. Max.10A

AirS: Analog Airspeed sensor (0~6.6V)
1: 1 voltage divider built-in
Rssi: Analog RSSI ADC, 0~3.3V
RSSI_ANA_PIN 11 (ArduPilot)
VB2: Voltage divider 1K:20K, 0~69V
BATT2_VOLT_PIN 4
BATT2_VOLT_MULT 21
CU2: for external current sensor, 0~3.3V
BATT2_CURR_PIN 15

TX3/RX3: UART3
TX7/RX7: UART7
CTs7/Rts7: Uart7_CTS/RTS for ArduPilot Telem1

TX2/RX2: UART2
DA1 & CL1: I2C1_SDA, SCL, for compass

RX6: UART6-RX for Serial_RX by default
PPM share RX6 pad
TX6: UART6-TX



Rx5: UART5_RX for ESC telemetry
DO NOT connect the ESC BEC output (Red wire in middle of connector) to Rx5 pad.

TX1/RX1: UART1
TX8/RX8: UART8

Vbat: Battery voltage
onboard battery voltage sense: BATT_VOLT_PIN 12, BATT_VOLT_MULT 21
INAV scale 2100

Curr: Current signal (0~3.3V)
onboard current sense: BATT_CURR_PIN 13, BATT_AMP_PERVLT 66.7
INAV scale 150

9V: 9V output, 9V will increase to 12V if "12V" jumper on bottom PDB is bridged.
9Vsw: 9V ON/OFF can be switched via ArduPilot Relay or Modes/USER1 (INAV)
Max.1.5A load on this pad. (Default ON)
5V: onboard BEC 5V 2A cont. Max.3A
G: Ground
VTX: Video OUT for Video Transmitter
C1: Camera-1 video IN (Default)
C2: Camera-2 video IN
*** C1/C2 can be switched via ArduPilot Relay or Modes/USER2 (INAV)
*** Two cameras should be set with identical video format, both PAL or both NTSC

3.3: LDO3.3V 200mA
D+ & D-: USB data
Bt: MCU Boot pin

CAN Port
CAN-H/L: CAN high/low
JST-GH-4P connector

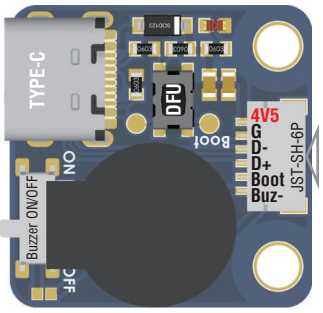
I2C2 Port
DA2 & CL2: I2C2-SDA, SCL
JST-GH-4P connector

4V5: 4.4~4.8V, Max.500mA
*** the voltage is also supplied when connecting via USB
5V is not supplied when connecting USB only.

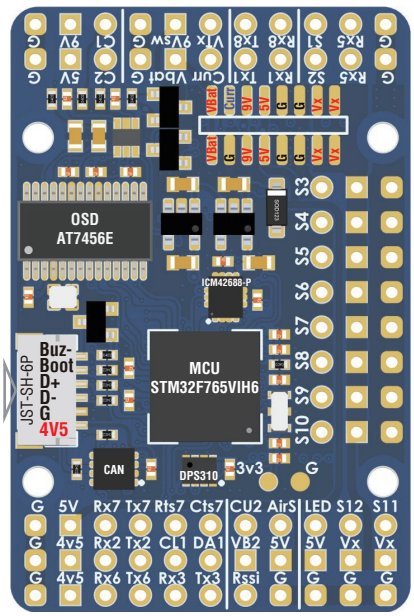
LED 0: Blue, FC Status
LED 1: Green, FC Status
LED 3.3: Red, 3.3V Status

DFU Button: DFU mode
Connect USB to the PC While holding the boot button in.

Red LED, USB power indicator



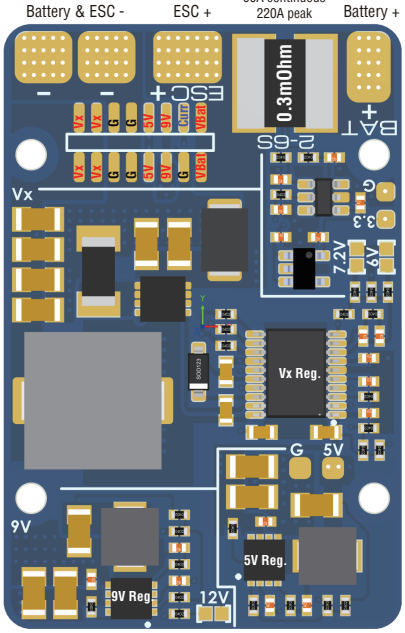
6pin wires



Size: 44x29x14.5mm
Weight: 22g w/ USB exterder
Holes: Φ2mm, 25mm mounting

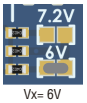
Current Sense resistor
90A continuous
220A peak

Battery & ESC - ESC + Battery + 6.8V~30V





Vx= 5V (default)



Vx= 6V



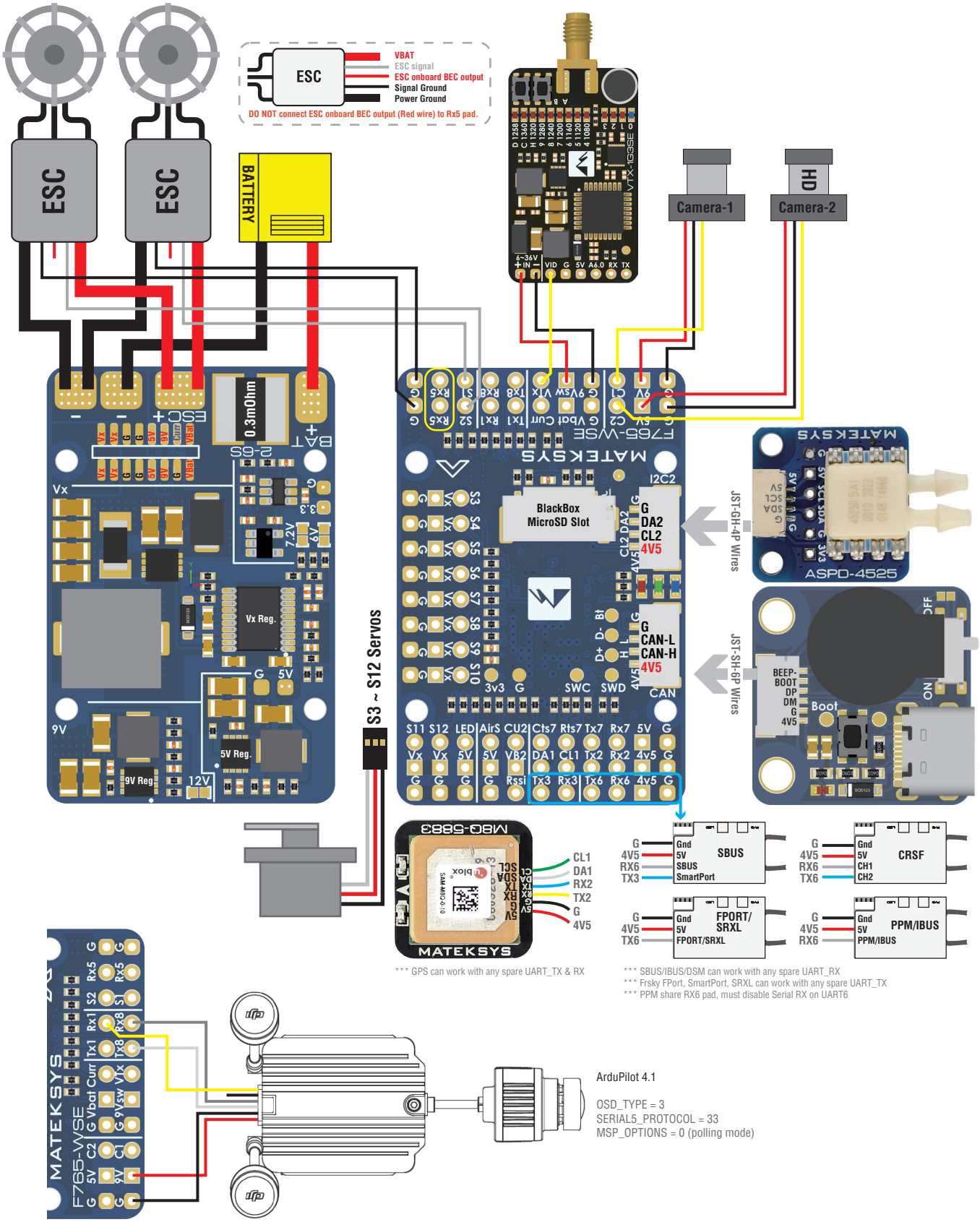
Vx= 7.2V



9V increase to 12V

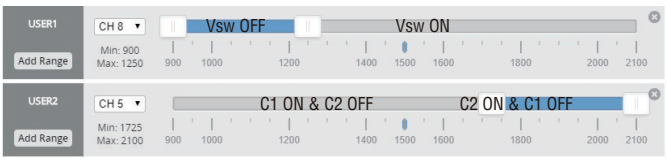
Wiring

INAV fw: MATEKF765SE
ArduPilot fw: MATEKF765SE



9Vsw Power / Camera switch

USER1 Add Range	No USER1 definition 9Vsw ON by default
USER2 Add Range	No USER2 definition C1 (Camera-1) ON by default



I/O Mapping

ArduPilot						
PWM	S1	PA0	5 V tolerant I/O	PWM1 GPIO50	TIM2_CH1	Group1
	S2	PA1	5 V tolerant I/O	PWM2 GPIO51	TIM2_CH2	
	S3	PA2	5 V tolerant I/O	PWM3 GPIO52	TIM5_CH3	Group2
	S4	PA3	5 V tolerant I/O	PWM4 GPIO53	TIM5_CH4	
	S5	PB0	5 V tolerant I/O	PWM5 GPIO54	TIM8_CH2N	Group3
	S6	PB1	5 V tolerant I/O	PWM6 GPIO55	TIM8_CH3N	
	S7	PD12	5 V tolerant I/O	PWM7 GPIO56	TIM4_CH1	Gourp4
	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	TIM9_CH1	Group5
	S12	PE6	5 V tolerant I/O	PWM12 GPIO61	TIM9_CH2	No DMA
	LED	PA8	5 V tolerant I/O	PWM13 GPIO62	TIM1_CH1	Group6
				SERVO13_FUNCTION 120, NTF_LED_TYPES neopixel		
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	Vbat Pad 1K:20K divider builtin	PC2	0~36V on F765-WSE	Vbat ADC onboard battery voltage sense	BATT_VOLT_PIN BATT_VOLT_MULT	12 21.0
	Curr pad	PC3	0~3.3V	Current ADC onboard current sense	BATT_CURR_PIN BATT_AMP_PERVLT	13 66.7
	VB2 Pad 1K:20K divider builtin	PA4	0~69V	Vbat2 ADC	BATT2_VOLT_PIN BATT2_VOLT_MULT	4 21.0
	CU2 Pad	PC5	0~3.3V	Current2 ADC	BATT2_CURR_PIN BATT2_AMP_PERVLT	15 /
	RSSI Pad	PC1	0~3.3V	RSSI ADC Analog RSSI	RSSI_ANA_PIN RSSI_TYPE	11 1
	AirS Pad 20K:20K divider builtin	PC0	0~6.6V	AirS ADC Analog Airspeed	ARSPD_PIN ARSPD_TYPE	10 2
I2C	I2C1 CL1/DA1	PB6/PB7	5 V tolerant I/O	Compass	COMPASS_AUTODEC	1
	I2C2 CL2/DA2	PB10/PB11	5 V tolerant I/O	onboard Baro DPS310		
				Digital Airspeed I2C MS4525 DLVR-L10D	ARSPD_BUS ARSPD_TYPE ARSPD_TYPE	0 1 9
CAN	CAN1	PD0/PD1	5 V tolerant I/O	CAN Node	CAN_D1_PROTOCOL CAN_P1_DRIVER	1 1
				CAN GPS CAN Compass CAN Airspeed sensor	GPS_TYPE COMPASS_TYPEMASK ARSPD_TYPE	9 0 8
UART	USB	PA11/PA12	5 V tolerant I/O	USB	console	SERIAL0
	RX7 TX7 RTS7 CTS7	PE7/8/9/10	5 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
	TX6 RX6	PC6/PC7	5 V tolerant I/O	USART6	RC input/Receiver	SERIAL7
				RX6	SBUS/IBUS/DSM/PPM	
				TX6	SRXL2	
	RX5	PB8	5 V tolerant I/O	UART5	USER	SERIAL8

INAV					
PWM	S1	PA0	5 V tolerant I/O	TIM2_CH1	Fixed Wing Motor
	S2	PA1	5 V tolerant I/O	TIM2_CH2	
	S3	PA2	5 V tolerant I/O	TIM5_CH3	Fixed Wing Servo
	S4	PA3	5 V tolerant I/O	TIM5_CH4	
	S5	PB0	5 V tolerant I/O	TIM3_CH3	
	S6	PB1	5 V tolerant I/O	TIM3_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	TIM9_CH1	
	S12	PE6	5 V tolerant I/O	TIM9_CH2	
	LED	PA8	5 V tolerant I/O	TIM1_CH1	2812LED
ADC	Vbat pad 1K:20K divider builtin	PC2	0~36V on F765-WSE	Vbat ADC ADC_CHANNEL_1	scale 2100
	Curr Pad	PC3	0~3.3V	Current ADC ADC_CHANNEL_2	scale 150
	RSSI Pad	PC1	0~3.3V	RSSI ADC ADC_CHANNEL_3	Analog RSSI
	AirS Pad 20K:20K divider builtin	PC0	0~6.6V	AirS ADC ADC_CHANNEL_4	Analog Airspeed
	VB2 Pad 1K:20K divider builtin	PA4	0~69V	ADC_CHANNEL_5	scale 2100
	CU2 Pad	PC5	0~3.3V	ADC_CHANNEL_6	spare
I2C	I2C1 CL1/DA1	PB6/PB7	5 V tolerant I/O	Compass	QMC5883 / HMC5883 IST8310 / IST8308 MAG3110 / LIS3MDL
				OLED	0.96"
	I2C2 CL2/DA2	PB10/PB11	5 V tolerant I/O	onboard Barometer	DPS310
				Digital Airspeed sensor	MS4525
				Temperature sensor	
UART	USB	PA11/PA12	5 V tolerant I/O	USB	
	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
	RX5	PB8	5 V tolerant I/O	UART5	USER
	TX6 RX6	PC6/PC7	5 V tolerant I/O	UART6_RX	PPM & Serial RX
				UART6_TX	FPORT/SRXL
	RX7 TX7	PE7/PE8	3.3 V tolerant I/O	UART7	USER
	TX8 RX8	PE1/PE0	5 V tolerant I/O	UART8	USER