U10 STM32F103T6U6

Signal	Pin		Pin	Signal
STM_MOTOR1	15	PB0	PA0-WKUP	7	STM_MOTOR3
STM_MOTOR2	16	PB1	PA1	8	STM_MOTOR4
STM_PB2	17	PB2/BOOT1	PA2	9	STM_USART2_TX
STM_PB3	30	PB3/JTDO	PA3	10	STM_USART2_RX
MPU_INT	31	PB4/JNTRST	PA4	11	STM_SPI_NSS
HMC_INT	32	PB5	PA5	12	STM_SPI_CLK
STM_IIC_SCL	33	PB6	PA6	13	STM_SPI_MISO
STM_IIC_SDA	34	PB7	PA7	14	STM_SPI_MOSI

PA8 20 STM_LED1
PA9 21 STM_USART1_TX
PA10 22 STM_USART1_RX
PA11 23 STM_LED2
PA12 24 STM_LED3
PA13/JTMS/SWDIO 25 STM_SWDIO
PA14/JTCK/SWCLK 28 STM_SWCLK
PA15/JTDI 29 STM_LED4

2 OSC_IN/PD0
3 OSC_OUT/PD1
35 BOOT0
4 NRST
19 VDD_1
27 VDD_2
1 VDD_3
6 VDDA

VSS_1 18
VSS_2 26
VSS_3 36
VSSA 5

VCCA
R28 2.2K STM_IIC_SCL
R29 2.2K STM_IIC_SDA

Y2 16MHz
C38 15pF
C39 15pF
R32 100K
C40 100nF
VCC
VCCA

AGND DGND AGND DGND

VCC
C33 100nF
C34 100nF
C35 4.7uF
DGND

VCCA
C36 4.7uF
C37 10nF
AGND

VCC
D9 R30 10K STM_LED1
D10 R31 10K STM_LED2
D11 R33 10K STM_LED3
D12 R34 10K STM_LED4

U11 CP2102

Signal	Pin		Pin	Signal
	1	DCD	DTR	28	
	2	RI	DSR	27	
	3	GND	TXD	26	STM_USART1_RX
USBD+	4	D+	RXD	25	STM_USART1_TX
USBD-	5	D-	RTS	24	
	6	VDD	CTS	23	
	7	REGIN	NC	22	
VUSB	8	VBUS	NC	21	
	9	RST	NC	20	
	10	NC	NC	19	
	11	NC	NC	18	
	12	SUSPEND	NC	17	
	13	SUSPEND	NC	16	
	14	NC	NC	15	

C41 2.2uF
DGND

P7 HDR-1X10

		Pin	Signal
STM_TIM3_CH2	STM_ADC12_IN7	STM_PB2	1
STM_TIM3_CH1	STM_ADC12_IN6	STM_SPI_MOSI	2
	STM_ADC12_IN5	STM_SPI_MISO	3
	STM_ADC12_IN4	STM_SPI_CLK	4
STM_TIM2_CH4	STM_ADC12_IN3	STM_SPI_NSS	5
STM_TIM2_CH3	STM_ADC12_IN2	STM_USART2_TX	6
		STM_USART2_RX	7
		VCOM VCCA	8
			9
			10

AGND

P8 HDR-1X10

Pin	Signal	
10	STM_PB3	
9	NRF_P0.05	NRF_AIN6
8	NRF_P0.06	NRF_AIN7
7	NRF_P0.26	NRF_AIN0 NRF_XL2
6	NRF_P0.27	NRF_AIN1 NRF_XL1
5		
4	SWD	
3		
2	VCC +BAT	
1		

DGND

S2
2 NRF_SWDIO
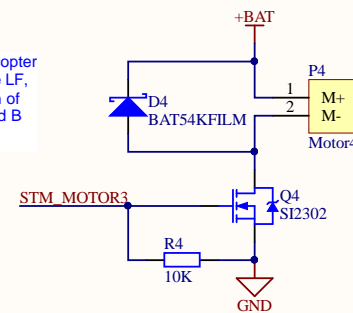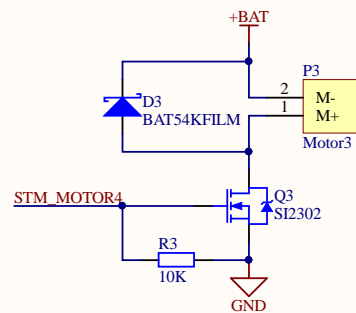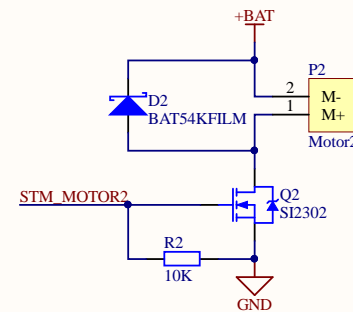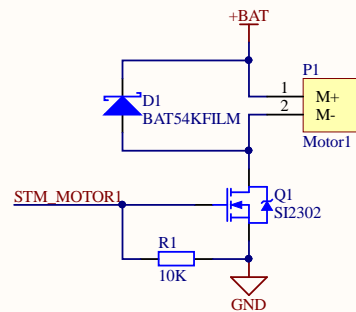1 3 STM_SWDIO
5 NRF_SWCLK
4 6 STM_SWCLK

The contents of the dotted box indicate the other functions of the pin, which can be set by the program.

Title **Breeze Quadcopter**

Size: A4   Author: myyerrol   Revision: V0.1
Date: 3/5/2017   Time: 19:38:22   Sheet 1 of 5
File: breeze_controller.SchDoc

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$>{MD}

+BAT

D1
BAT54KFILM

P1
1 M+
2 M-

Motor1

STM_MOTOR1

Q1
SI2302

R1
10K

GND

+BAT

D2
BAT54KFILM

P2
2 M-
1 M+

Motor2

STM_MOTOR2

Q2
SI2302

R2
10K

GND

+BAT

D3
BAT54KFILM

P3
2 M-
1 M+

Motor3

STM_MOTOR4

Q3
SI2302

R3
10K

GND

+BAT

D4
BAT54KFILM

P4
1 M+
2 M-

Motor4

STM_MOTOR3

Q4
SI2302

R4
10K

GND

LF_M1   RF_M2

LB_M3   RB_M4
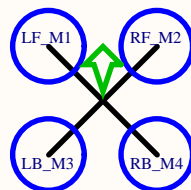
According to the upper image, Breeze Quadcopter
's motors have their own special number. The LF,
LB, RF and RB represent the relative location of
motor. L and R imply the Left and Right, F and B
imply the Front and Black.
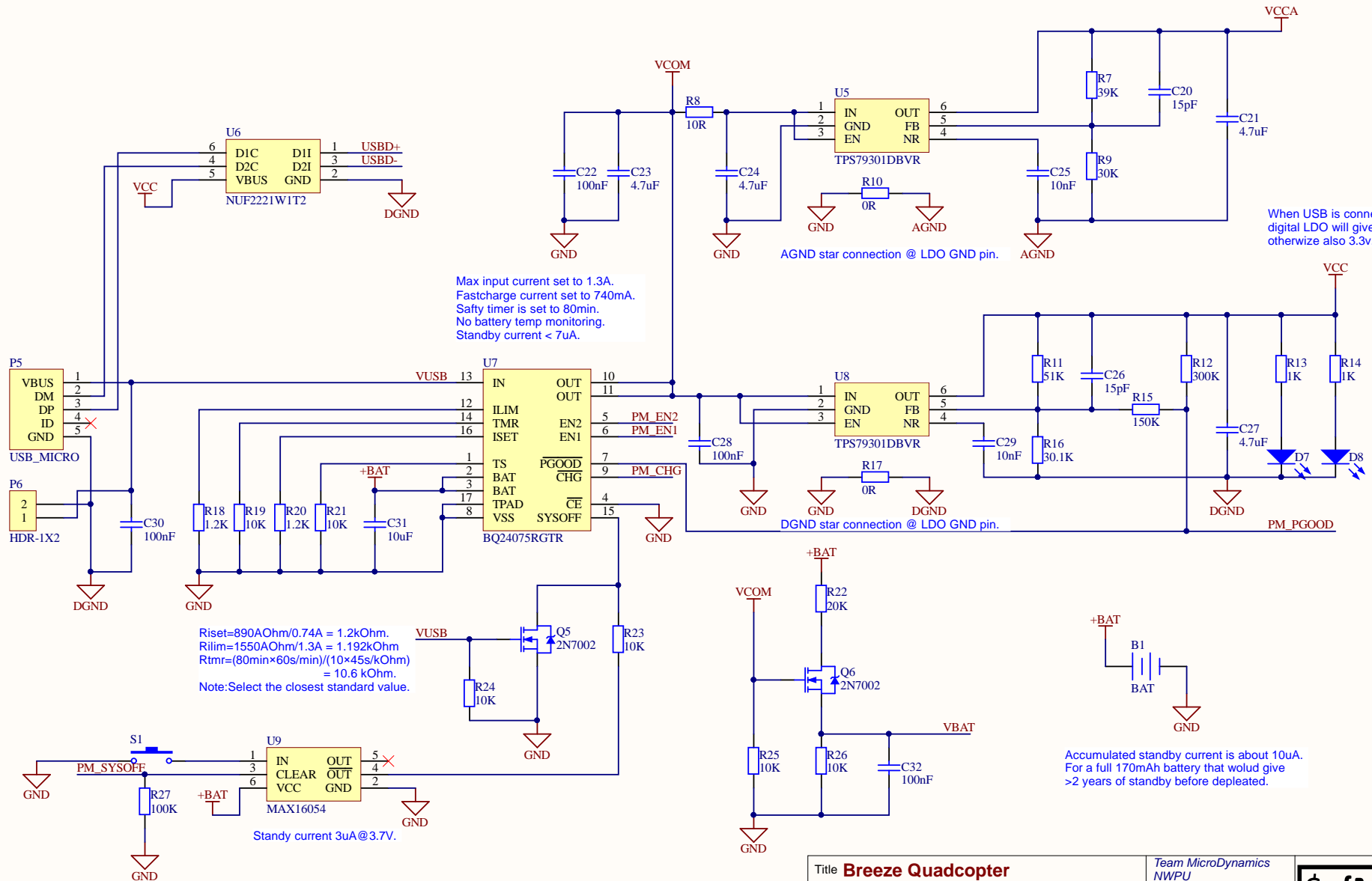
Title **Breeze Quadcopter**

Size: A4   Author: myyerrol   Revision: V0.1

Date: 3/5/2017   Time: 19:38:22   Sheet 2 of 5
File: breeze_motor.SchDoc

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Analog LDO configured to 2.8V.

VCCA

VCOM

U6
D1C D1I   USBD+
D2C D2I   USBD-
VBUS GND
NUF2221W1T2
DGND

VCC

R8
10R

U5
IN   OUT
GND FB
EN   NR
TPS79301DBVR

R7 39K   C20 15pF   C21 4.7uF
R9 30K
C25 10nF

C22 100nF   C23 4.7uF
C24 4.7uF

GND   GND

R10 0R
GND   AGND

AGND star connection @ LDO GND pin.

AGND

When USB is connected,
digital LDO will give 3.3V,
otherwize also 3.3v.

VCC

Max input current set to 1.3A.
Fastcharge current set to 740mA.
Safty timer is set to 80min.
No battery temp monitoring.
Standby current < 7uA.

P5
VBUS
DM
DP
ID
GND
USB_MICRO

U7
VUSB 13 IN   OUT 10
              OUT 11
12 ILIM
14 TMR   EN2 5   PM_EN2
16 ISET   EN1 6   PM_EN1
1   TS   PGOOD 7 PM_CHG
2   BAT   CHG 9
3   BAT
17 TPAD   CE   4
8   VSS   SYSOFF 15
BQ24075RGTR

U8
IN   OUT
GND FB
EN   NR
TPS79301DBVR

R11 51K   C26 15pF
R15 150K
C29 10nF   R16 30.1K

R12 300K   R13 1K   R14 1K
C27 4.7uF
D7   D8

GND   GND   DGND

DGND star connection @ LDO GND pin.

PM_PGOOD

C28 100nF

R17 0R
GND   DGND

+BAT

P6
2
1
HDR-1X2

C30 100nF

R18 1.2K R19 10K R20 1.2K R21 10K   C31 10uF

DGND   GND

Riset=890AOhm/0.74A = 1.2kOhm.
Rilim=1550AOhm/1.3A = 1.192kOhm
Rtmr=(80min×60s/min)/(10×45s/kOhm)
     = 10.6 kOhm.
Note:Select the closest standard value.

VUSB

Q5 2N7002   R23 10K

R24 10K

GND

VCOM

+BAT
R22 20K

Q6 2N7002

R25 10K   R26 10K   C32 100nF

VBAT

GND

+BAT

B1
BAT
GND

Accumulated standby current is about 10uA.
For a full 170mAh battery that wold give
>2 years of standby before depleated.

S1
PM_SYSOFF
GND

R27 100K

U9
IN   OUT 5
CLEAR OUT 4
VCC   GND 2
MAX16054

+BAT

GND

Standy current 3uA@3.7V.

GND

Title **Breeze Quadcopter**
Size: A4   Author: myyerrol   Revision: V0.1
Date: 3/5/2017   Time: 19:38:22   Sheet 3 of 5
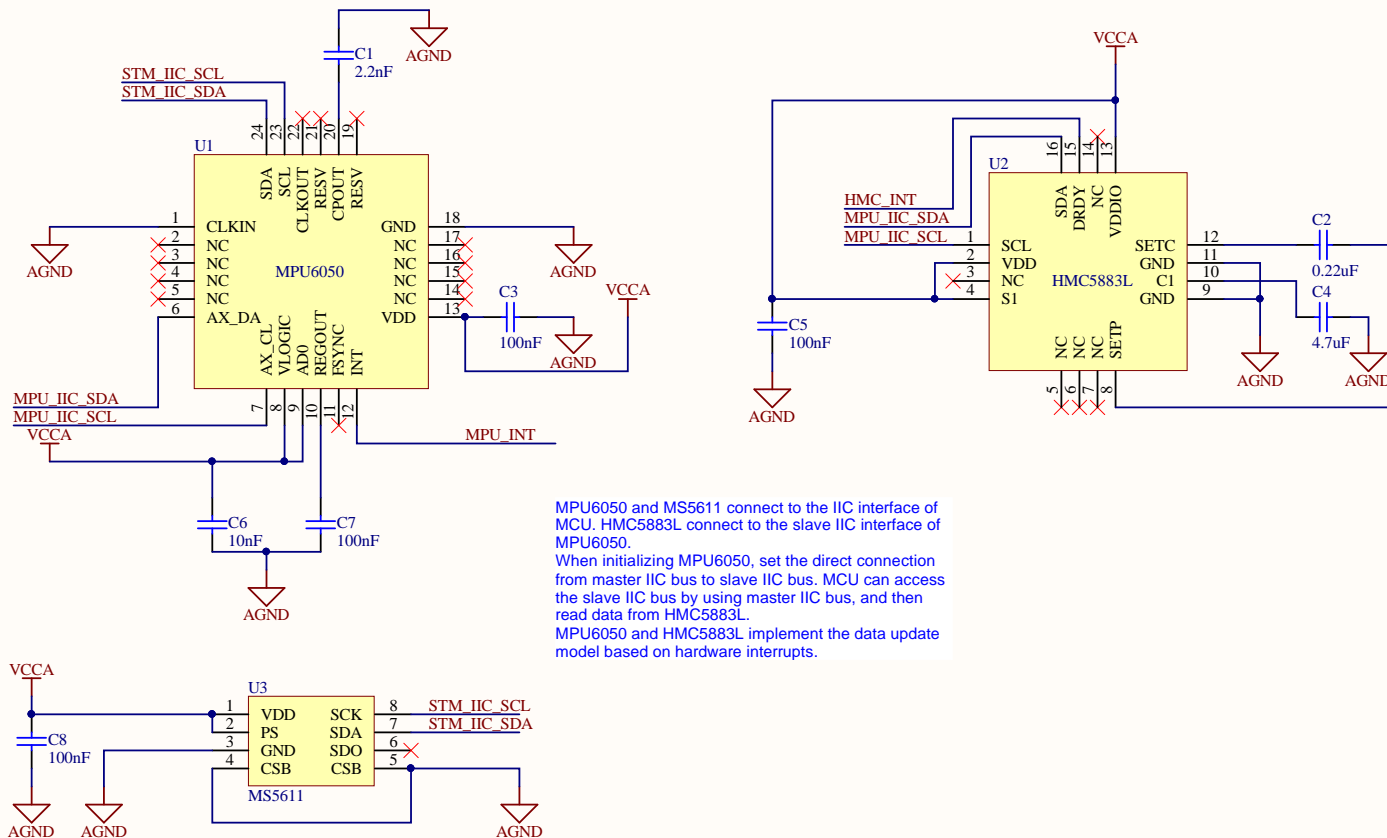File: breeze_power.SchDoc
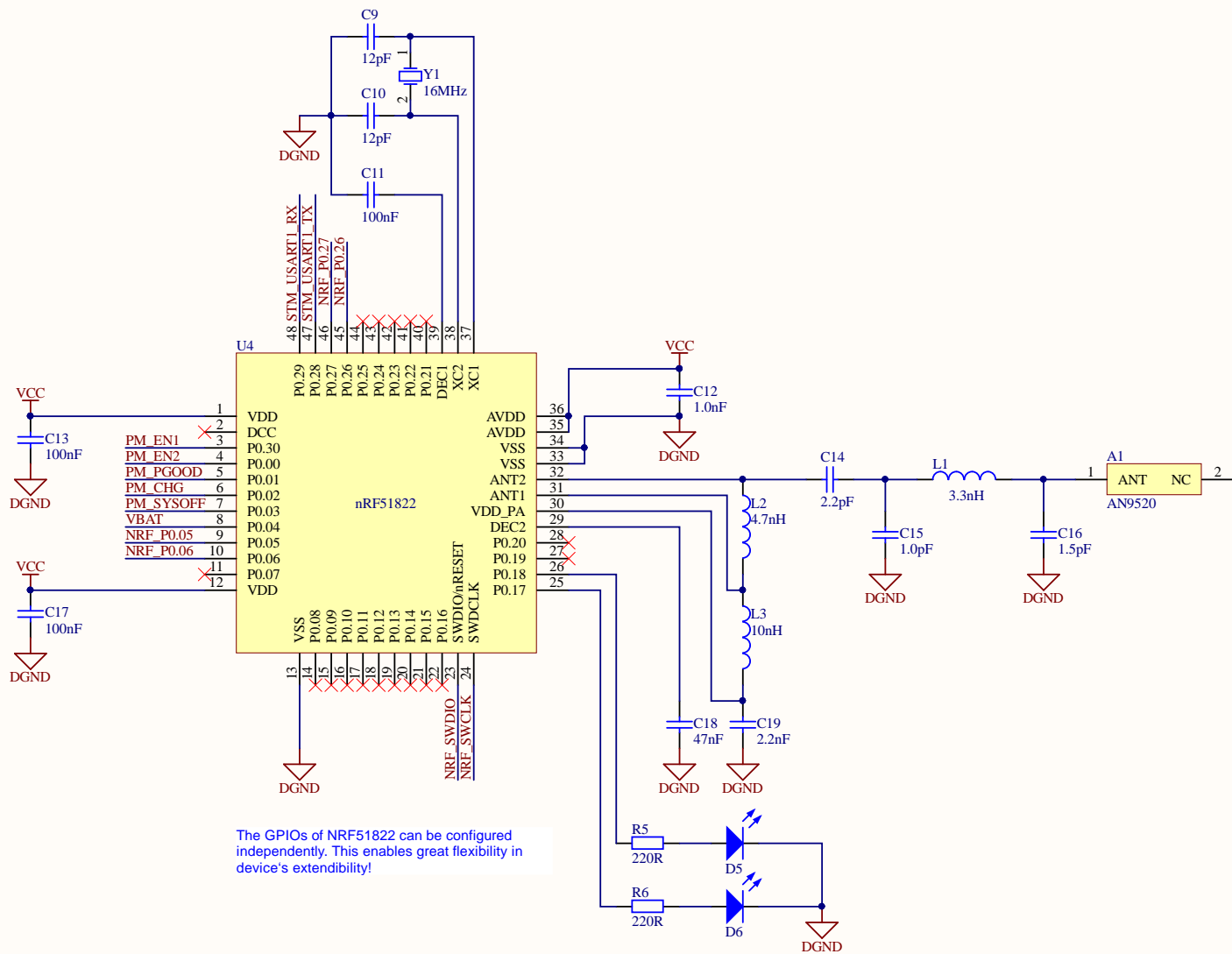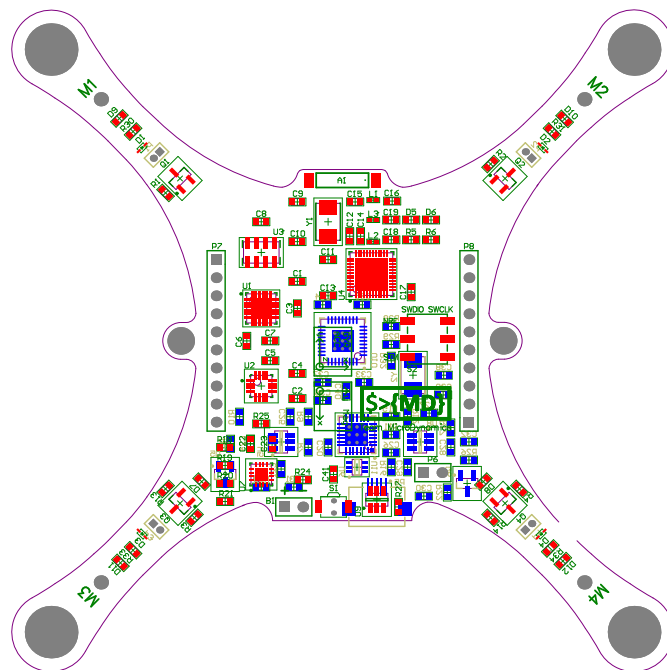
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MPU6050 and MS5611 connect to the IIC interface of MCU. HMC5883L connect to the slave IIC interface of MPU6050.
When initializing MPU6050, set the direct connection from master IIC bus to slave IIC bus. MCU can access the slave IIC bus by using master IIC bus, and then read data from HMC5883L.
MPU6050 and HMC5883L implement the data update model based on hardware interrupts.

Title **Breeze Quadcopter**			*Team MicroDynamics* *NWPU* *Xi'an* *Shannxi* *China*
Size: A4	Author: myyerrol	Revision: V0.1	
Date: 3/5/2017	Time: 19:38:23	Sheet 4 of 5	
File: breeze_sensor.SchDoc			

$>{MD}

C9
12pF
Y1
16MHz
DGND
C10
12pF
C11
100nF

48 STM_USART1_RX
47 STM_USART1_TX
46 NRF_P0.27
45 NRF_P0.26
44
43
42
41
40
39
38 DEC1
37 XC1
XC2

U4
P0.29
P0.28
P0.27
P0.26
P0.25
P0.24
P0.23
P0.22
P0.21

VCC
C12
1.0nF
DGND

VCC
C13
100nF
DGND

PM_EN1
PM_EN2
PM_PGOOD
PM_CHG
PM_SYSOFF
VBAT
NRF_P0.05
NRF_P0.06

1 VDD
2 DCC
3 P0.30
4 P0.00
5 P0.01
6 P0.02
7 P0.03
8 P0.04
9 P0.05
10 P0.06
11 P0.07
12 VDD

nRF51822

AVDD 36
AVDD 35
VSS 34
VSS 33
ANT2 32
ANT1 31
VDD_PA 30
DEC2 29
P0.20 28
P0.19 27
P0.18 26
P0.17 25

C14
2.2pF
L1
3.3nH

A1
ANT NC
AN9520
2

L2
4.7nH

C15
1.0pF
DGND

C16
1.5pF
DGND

VCC
C17
100nF
DGND

VSS
P0.08
P0.09
P0.10
P0.11
P0.12
P0.13
P0.14
P0.15
P0.16
SWDIO/nRESET
SWDCLK

13
14
15
16
17
18
19
20
21
22
23
24

NRF_SWDIO
NRF_SWCLK

DGND

L3
10nH

C18
47nF
C19
2.2nF
DGND DGND

The GPIOs of NRF51822 can be configured
independently. This enables great flexibility in
device's extendibility!

R5
220R
D5

R6
220R
D6
DGND

Title Breeze Quadcopter
Size: A4   Author: myyerrol   Revision: V0.1
Date: 3/5/2017   Time: 19:38:23   Sheet 5 of 5
File: breeze_wireless.SchDoc

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$>{MD}

Author: myyerrol	Title:
Time: 19:38:23	**Breeze Quadcopter**
Date: 3/5/2017	File Content: Cheap, easy-to-use and intelligent quadcopter.
Revison: V0.1	File Name: breeze_pcb.PcbDoc

Bill of Materials

Breeze Quadcopter

Source Data From:	**breeze_electronics_design.PrjPcb**
Project:	**breeze_electronics_design.PrjPcb**
Variant:	**None**

Creation Date:	3/5/2017	19:38:25
Print Date:	05-Mar-17	7:38:30 PM

Footprint	Comment	LibRef	Designator	Description	Quantity
AN9520	AN9520	AN9520	A1	2.4GHz Wireless Communication Antenna	1
HDR-1X2	BAT	BAT	B1	Battery	1
SMD-0603	CAP-0603	CAP-0603	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41	Capacitor	41
SOD-523	BAT54KFILM	BAT54KFILM	D1, D2, D3, D4	Schottky Diode	4
SMD-0603	LED-0603	LED-0603	D5, D6, D7, D8, D9, D10, D11, D12	LED	8
SMD-0402	IND-0402	IND-0402	L1, L2, L3	Inductor	3
HDRM-1X2	Motor1	Motor_A	P1	Motor Header	1
HDRM-1X2	Motor2	Motor_B	P2	Motor Header	1
HDRM-1X2	Motor3	Motor_B	P3	Motor Header	1
HDRM-1X2	Motor4	Motor_A	P4	Motor Header	1
USB_MICRO	USB_MICRO	USB_MICRO	P5	Micro USB	1
HDR-1X2	HDR-1X2	HDR-1X2	P6	Header 1X2	1
HDR-1X10	HDR-1X10	HDR-1X10	P7, P8	Header 1X10	2
SOT-23	SI2302	SI2302	Q1, Q2, Q3, Q4	N-Channel Enhancement Mode Field Effect Transistor	4
SOT-23	2N7002	2N7002	Q5, Q6	N-Channel Enhancement Mode Field Effect Transistor	2
SMD-0603	RES-0603	RES-0603	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34	Resistor	34
SKRELGE010	SKRELGE010	SKRELGE010	S1	Switch	1
MSS-22D18G2	MSS-22D18G2	MSS-22D18G2	S2	Double-Pole, Double-Throw Switch	1
QFN-24	MPU6050	MPU6050	U1	6-axis Motion Tracking IC	1
LPCC-16	HMC5883L	HMC5883L	U2	3-Axis Digital Compass IC	1
MS5611	MS5611	MS5611	U3	High Resolution Altimeter IC	1
QFN-48	nRF51822	nRF51822	U4	Multiprotocol Bluetooth 4.0 low energy/2.4 GHz RF SoC	1
SOT-23-6	TPS79301DBVR	TPS79301DBVR	U5, U8	200-mA RF Low-Dropout Regulator	2
SOT-363	NUF2221W1T2	NUF2221W1T2	U6	USB Upstream Terminator with ESD Protection	1
VQFN-16	BQ24075RGTR	BQ24075RGTR	U7	1.5-A USB-Friendly Li-Ion Battery Charger and Power-Path Management IC	1
SOT-23-6	MAX16054	MAX16054	U9	On/Off Controller with Debounce and ±15kV ESD Protection	1
VFQFPN-36	STM32F103T6U6	STM32F103T6U6	U10	ARM Cortex-M3 MCU	1
QFN-28	CP2102	CP2102	U11	Highly-integrated USB-to-UART Bridge Controller	1
SMD-5032	XTAL-5032	XTAL-5032	Y1, Y2	Passive Crystal Oscillator	2
					121

Approved	**Notes**	