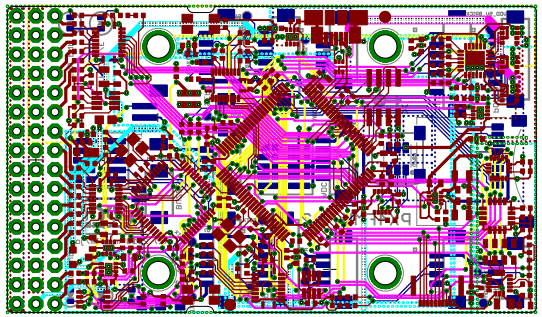
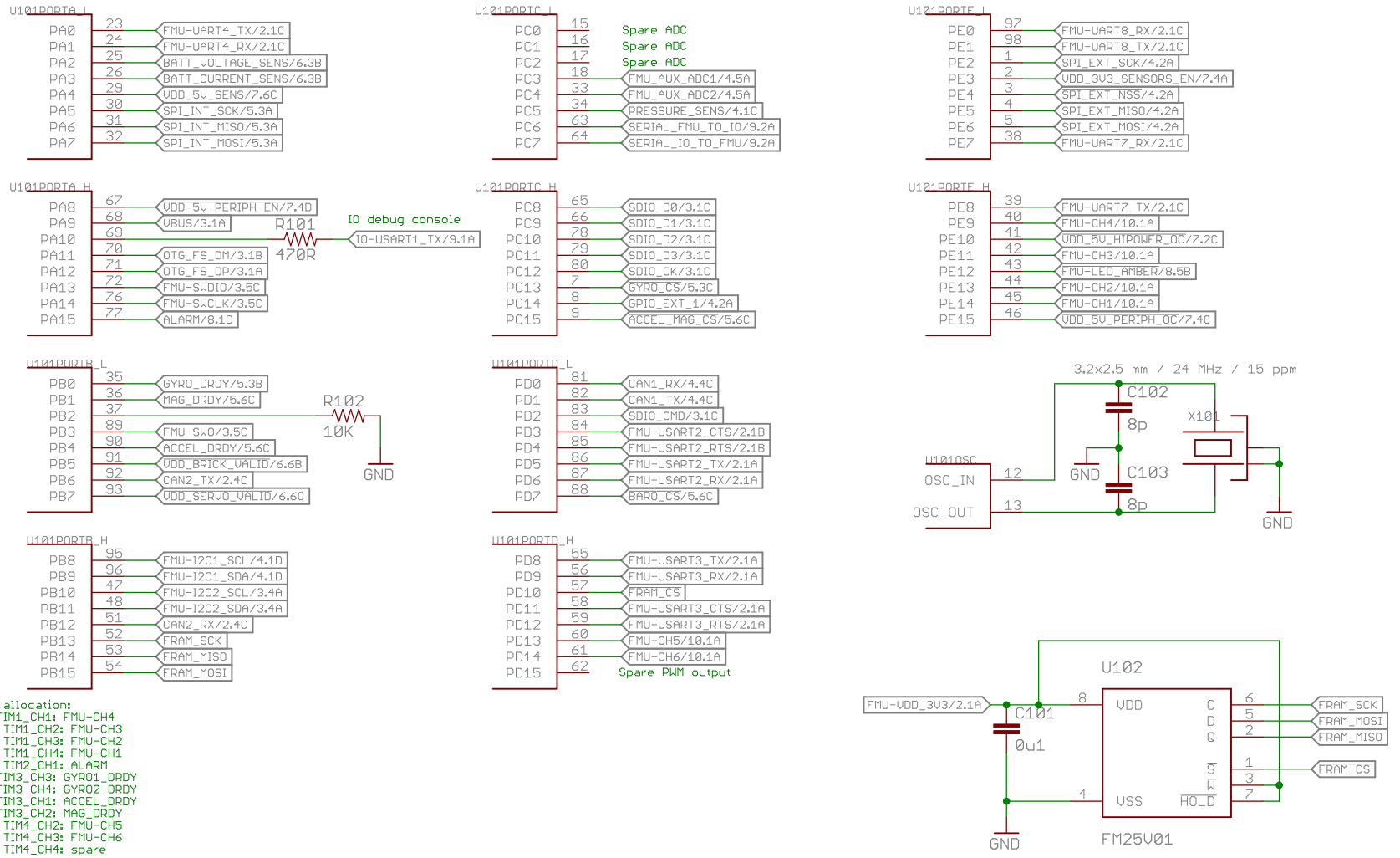




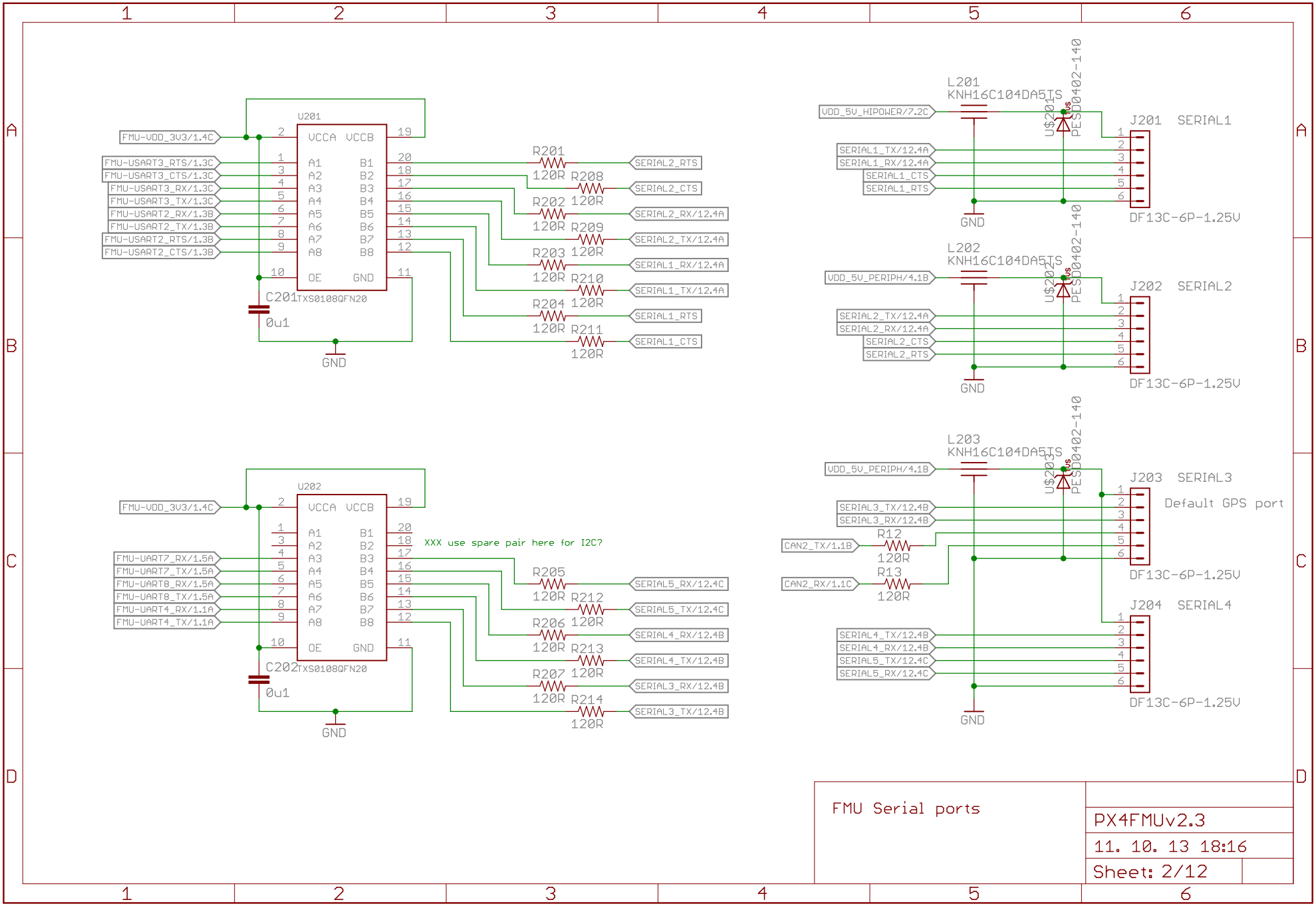
Timer allocation:
PE9: TIM1_CH1: FMU-CH4
PE11: TIM1_CH2: FMU-CH3
PE13: TIM1_CH3: FMU-CH2
PE14: TIM1_CH4: FMU-CH1
PA15: TIM2_CH1: ALARM
PB0: TIM3_CH3: GYRO1_DRDY
PB1: TIM3_CH4: GYRO2_DRDY
PB4: TIM3_CH1: ACCEL_DRDY
PB5: TIM3_CH2: MAG_DRDY
PD13: TIM4_CH2: FMU-CH5
PD14: TIM4_CH3: FMU-CH6
PD15: TIM4_CH4: spare

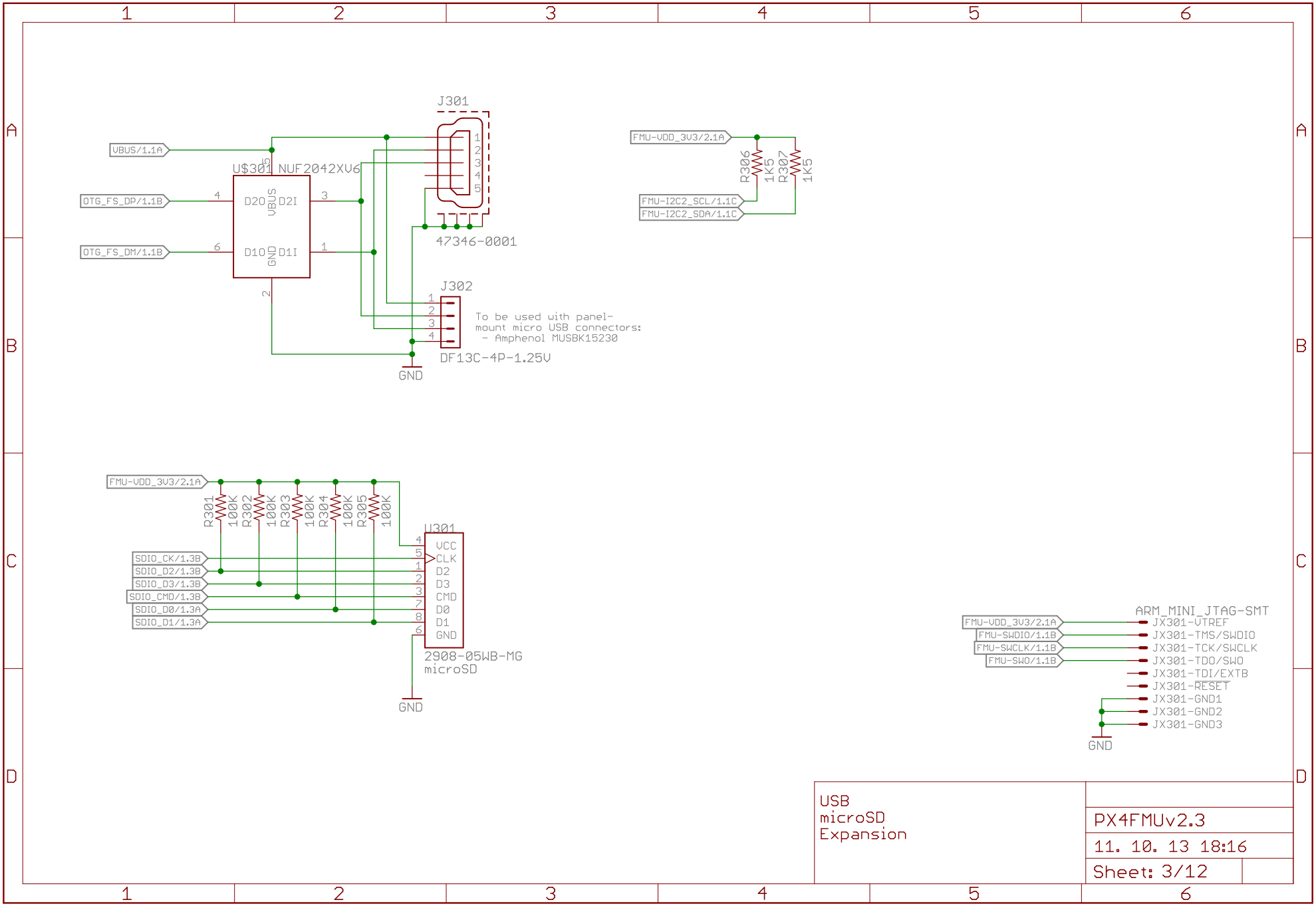
Note: MAG/ACCEL/GYRO_DRDY pins chosen
for both timer capture and separate
EXTI operaton.

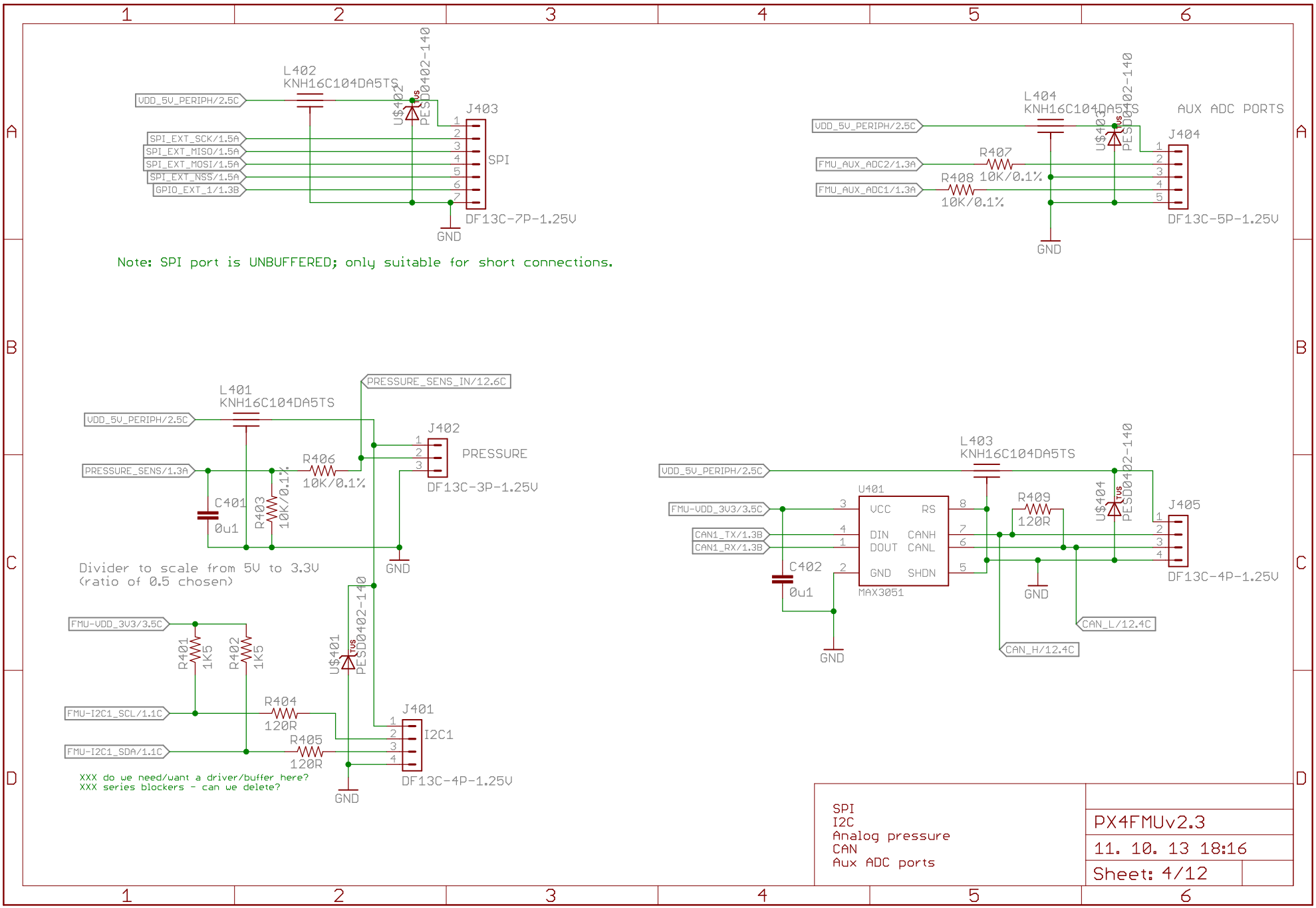
EXTI0 - TIM3_CH3 - GYRO1
EXTI1 - <free>
EXTI2 - <free>
EXTI3 - <free>
EXTI4 - TIM3_CH1 - ACCEL
EXTI5-9 - TIM3_CH2 - MAG

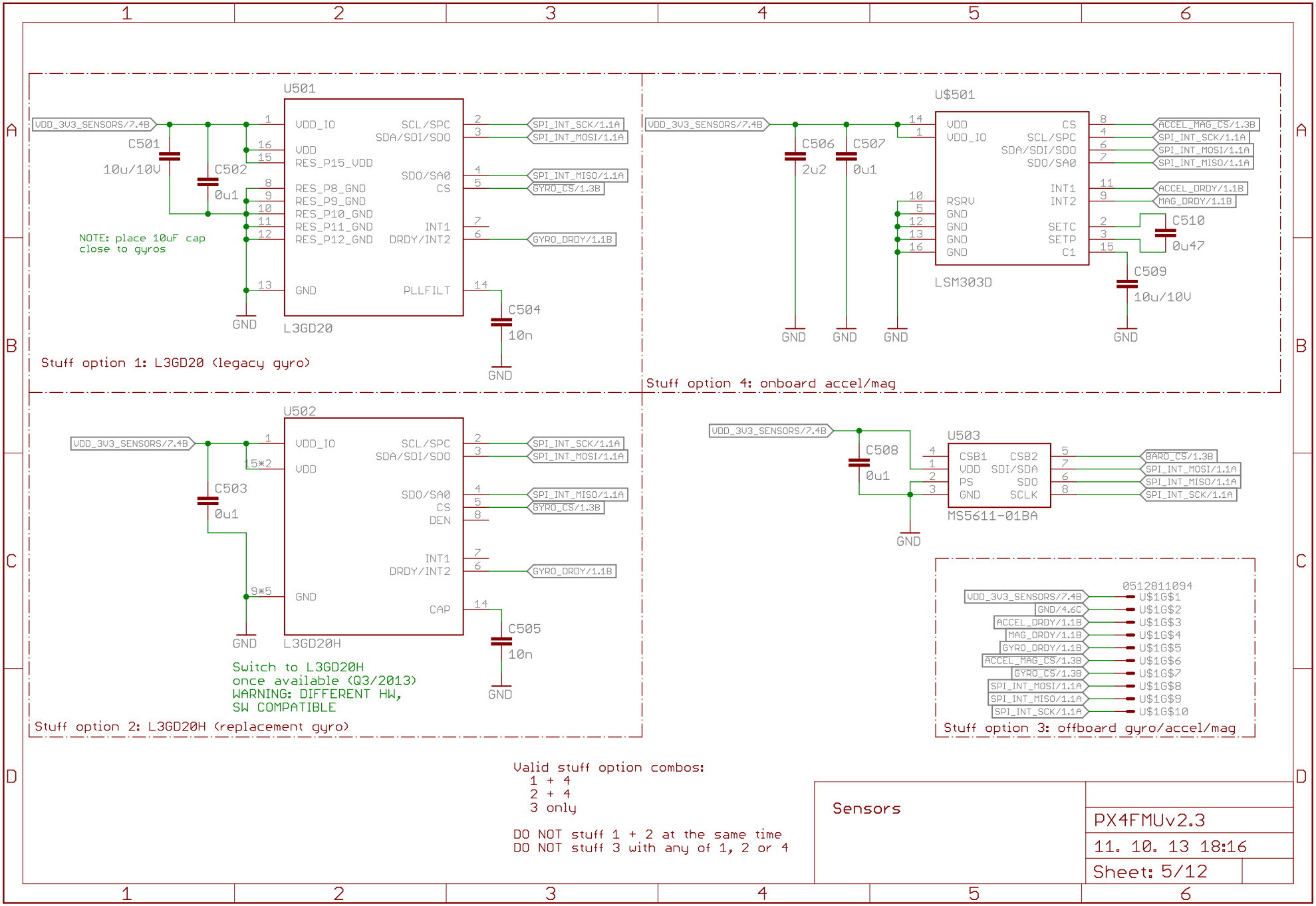
FMU SoC Ports
FRAM

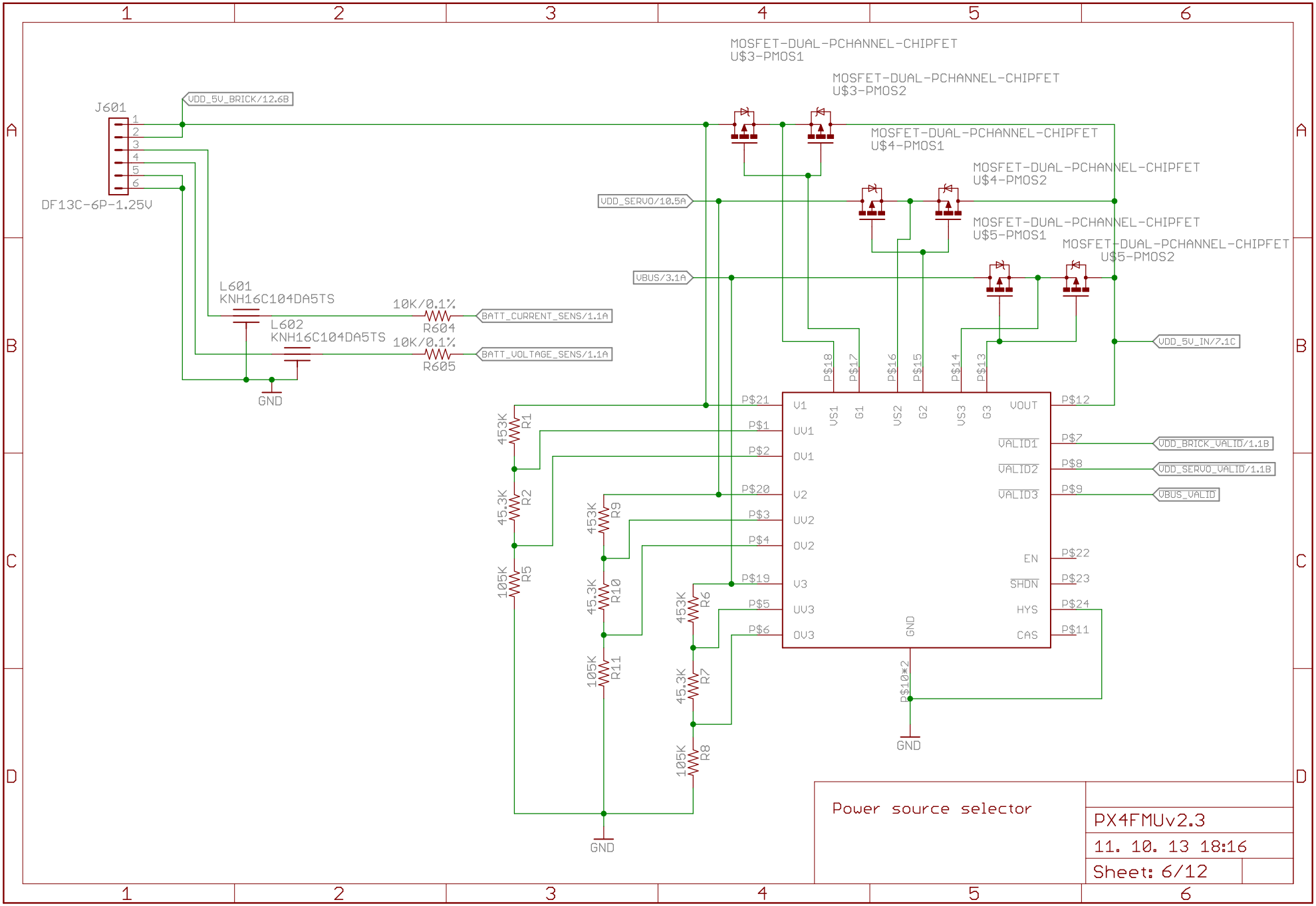
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 1/12

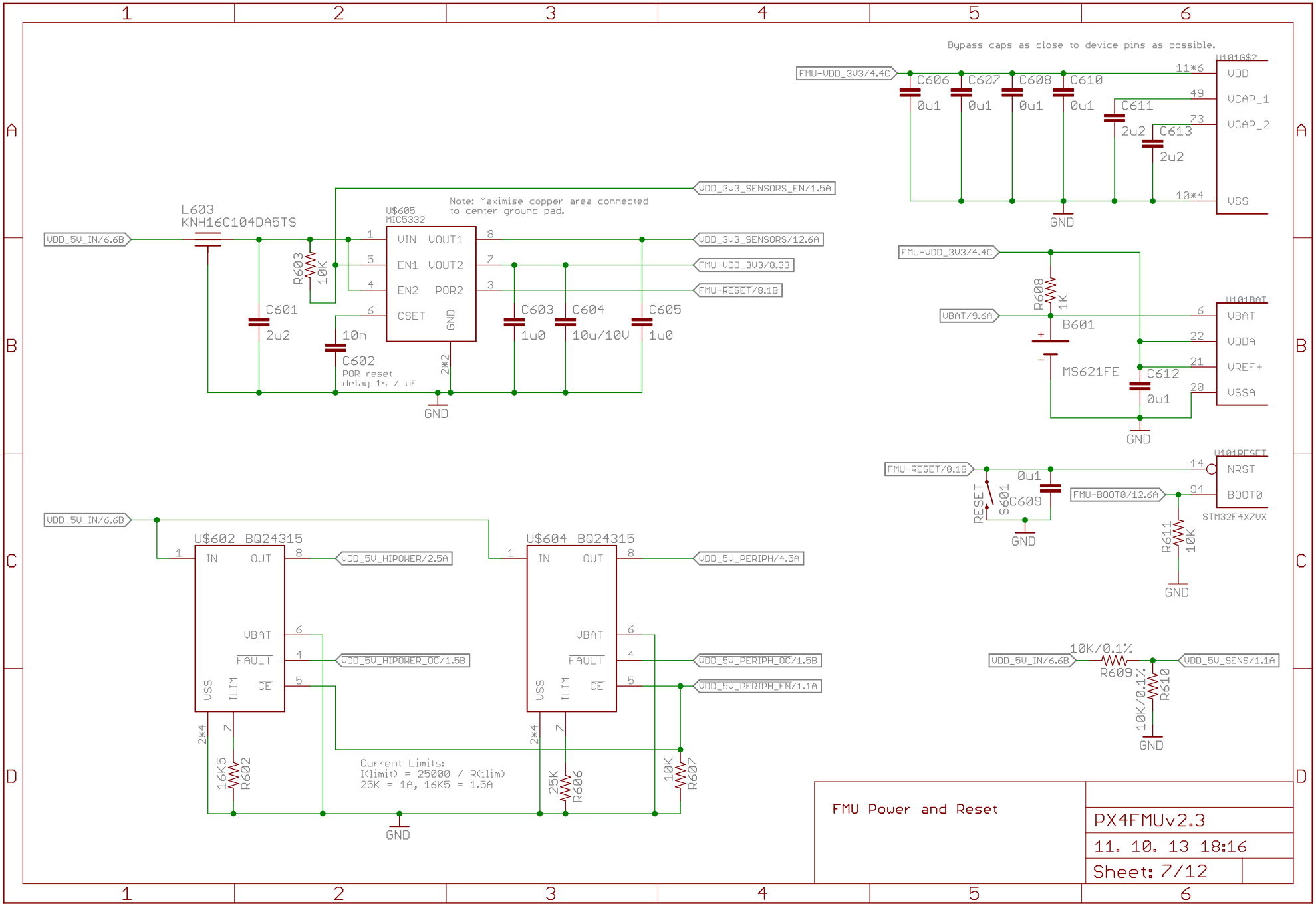

U201
FMU-VDD_3V3/1.4C
FMU-USART3_RTS/1.3C
FMU-USART3_CTS/1.3C
FMU-USART3_RX/1.3C
FMU-USART3_TX/1.3C
FMU-USART2_RX/1.3B
FMU-USART2_TX/1.3B
FMU-USART2_RTS/1.3B
FMU-USART2_CTS/1.3B
VCCA VCCB
A1 A2 A3 A4 A5 A6 A7 A8
B1 B2 B3 B4 B5 B6 B7 B8
OE GND
C201 TXS0108GFN20
0u1
GND
R201 120R
R208 120R
R202 120R
R209 120R
R203 120R
R210 120R
R204 120R
R211 120R
SERIAL2_RTS
SERIAL2_CTS
SERIAL2_RX/12.4A
SERIAL2_TX/12.4A
SERIAL1_RX/12.4A
SERIAL1_TX/12.4A
SERIAL1_RTS
SERIAL1_CTS
U202
FMU-VDD_3V3/1.4C
FMU-UART7_RX/1.5A
FMU-UART7_TX/1.5A
FMU-UART8_RX/1.5A
FMU-UART8_TX/1.5A
FMU-UART4_RX/1.1A
FMU-UART4_TX/1.1A
XXX use spare pair here for I2C?
C202 TXS0108GFN20
0u1
GND
R205 120R
R212 120R
R206 120R
R213 120R
R207 120R
R214 120R
SERIAL5_RX/12.4C
SERIAL5_TX/12.4C
SERIAL4_RX/12.4B
SERIAL4_TX/12.4B
SERIAL3_RX/12.4B
SERIAL3_TX/12.4B
L201 KNH16C104DA5TS
U$201 PESD0402-140
VDD_5V_HIPOWER/7.2C
SERIAL1_TX/12.4A
SERIAL1_RX/12.4A
SERIAL1_CTS
SERIAL1_RTS
GND
J201 SERIAL1
DF13C-6P-1.25V
L202 KNH16C104DA5TS
U$202 PESD0402-140
VDD_5V_PERIPH/4.1B
SERIAL2_TX/12.4A
SERIAL2_RX/12.4A
SERIAL2_CTS
SERIAL2_RTS
GND
J202 SERIAL2
DF13C-6P-1.25V
L203 KNH16C104DA5TS
U$203 PESD0402-140
VDD_5V_PERIPH/4.1B
SERIAL3_TX/12.4B
SERIAL3_RX/12.4B
R12 120R
R13 120R
CAN2_TX/1.1B
CAN2_RX/1.1C
GND
J203 SERIAL3
Default GPS port
DF13C-6P-1.25V
J204 SERIAL4
SERIAL4_TX/12.4B
SERIAL4_RX/12.4B
SERIAL5_TX/12.4C
SERIAL5_RX/12.4C
DF13C-6P-1.25V
FMU Serial ports
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 2/12

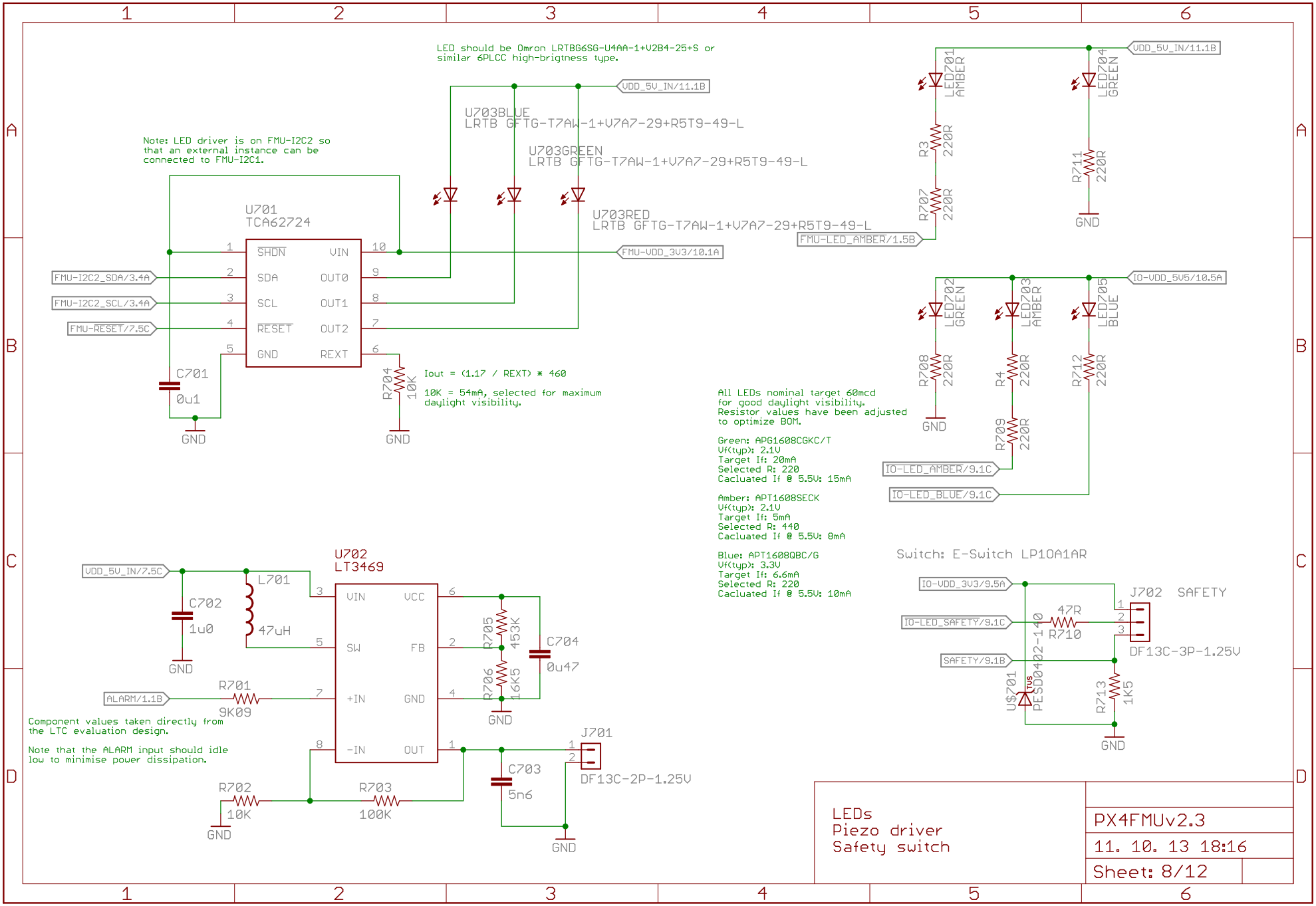

J301
VBUS/1.1A
U$301 NUF2042XV6
OTG_FS_DP/1.1B
OTG_FS_DM/1.1B
D2O
D2I
D1O
D1I
VBUS
GND
47346-0001
J302
To be used with panel-mount micro USB connectors:
- Amphenol MUSBK15230
DF13C-4P-1.25V
GND
FMU-VDD_3V3/2.1A
R306 1K5
R307 1K5
FMU-I2C2_SCL/1.1C
FMU-I2C2_SDA/1.1C
FMU-VDD_3V3/2.1A
R301 100K
R302 100K
R303 100K
R304 100K
R305 100K
U301
SDIO_CK/1.3B
SDIO_D2/1.3B
SDIO_D3/1.3B
SDIO_CMD/1.3B
SDIO_D0/1.3A
SDIO_D1/1.3A
VCC
CLK
D2
D3
CMD
D0
D1
GND
2908-05WB-MG
microSD
GND
ARM_MINI_JTAG-SMT
FMU-VDD_3V3/2.1A
FMU-SWDIO/1.1B
FMU-SWCLK/1.1B
FMU-SWO/1.1B
JX301-VTREF
JX301-TMS/SWDIO
JX301-TCK/SWCLK
JX301-TDO/SWO
JX301-TDI/EXTB
JX301-RESET
JX301-GND1
JX301-GND2
JX301-GND3
GND
USB
microSD
Expansion
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 3/12

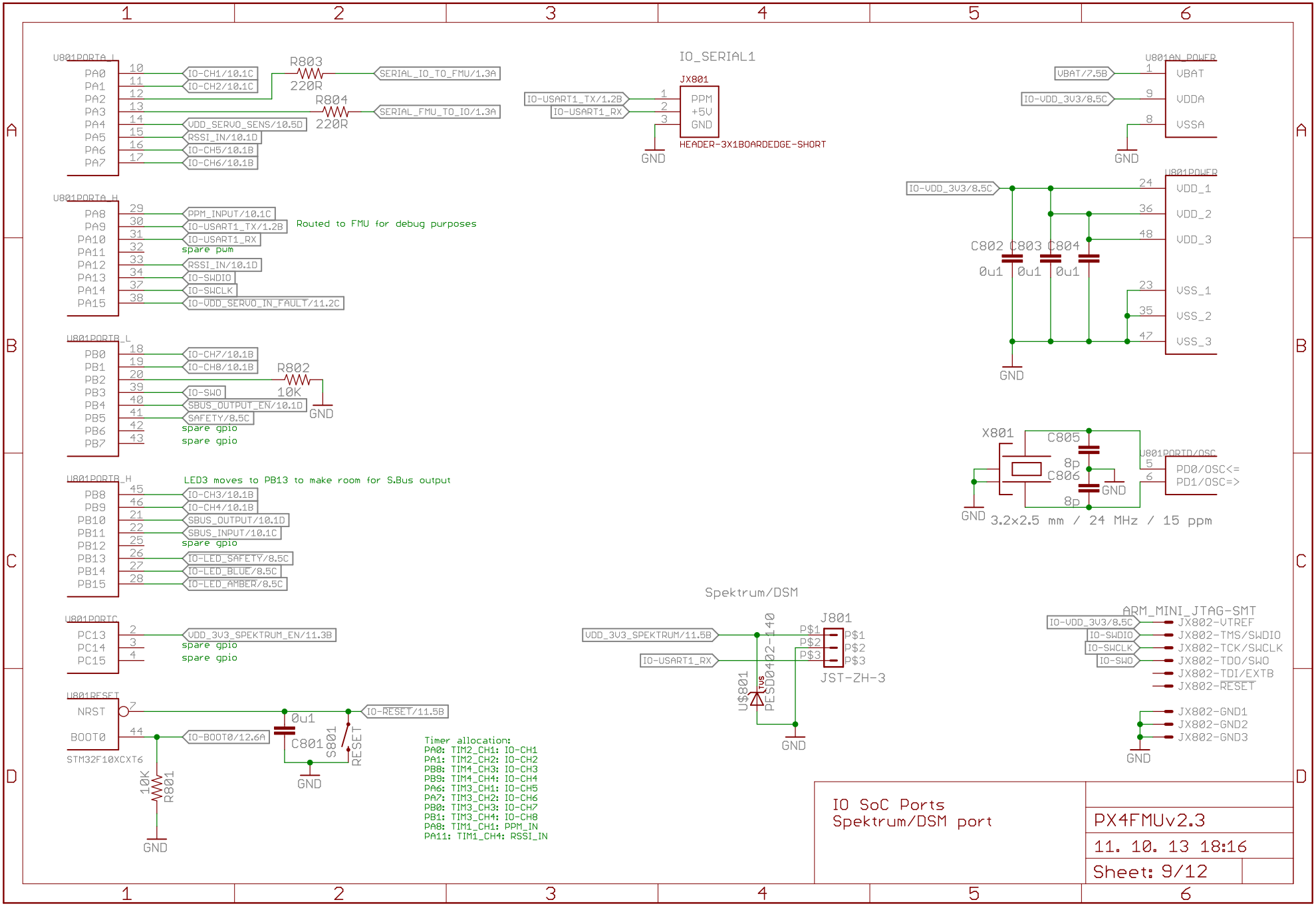

L402
KNH16C104DA5TS
U$402
PESD0402-140
VDD_5V_PERIPH/2.5C
SPI_EXT_SCK/1.5A
SPI_EXT_MISO/1.5A
SPI_EXT_MOSI/1.5A
SPI_EXT_NSS/1.5A
GPIO_EXT_1/1.3B
J403
SPI
DF13C-7P-1.25V
GND
Note: SPI port is UNBUFFERED; only suitable for short connections.
L404
KNH16C104DA5TS
U$403
PESD0402-140
AUX ADC PORTS
VDD_5V_PERIPH/2.5C
FMU_AUX_ADC2/1.3A
FMU_AUX_ADC1/1.3A
R407
10K/0.1%
R408
10K/0.1%
J404
DF13C-5P-1.25V
GND
L401
KNH16C104DA5TS
PRESSURE_SENS_IN/12.6C
VDD_5V_PERIPH/2.5C
PRESSURE_SENS/1.3A
R406
10K/0.1%
J402
PRESSURE
DF13C-3P-1.25V
C401
0u1
R403
10K/0.1%
GND
Divider to scale from 5V to 3.3V
(ratio of 0.5 chosen)
L403
KNH16C104DA5TS
U$404
PESD0402-140
VDD_5V_PERIPH/2.5C
FMU-VDD_3V3/3.5C
CAN1_TX/1.3B
CAN1_RX/1.3B
U401
VCC
RS
DIN
CANH
DOUT
CANL
GND
SHDN
MAX3051
C402
0u1
R409
120R
J405
DF13C-4P-1.25V
GND
CAN_L/12.4C
CAN_H/12.4C
FMU-VDD_3V3/3.5C
R401
1K5
R402
1K5
U$401
PESD0402-140
FMU-I2C1_SCL/1.1C
FMU-I2C1_SDA/1.1C
R404
120R
R405
120R
J401
I2C1
DF13C-4P-1.25V
GND
XXX do we need/want a driver/buffer here?
XXX series blockers - can we delete?
SPI
I2C
Analog pressure
CAN
Aux ADC ports
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 4/12


U501
VDD_3V3_SENSORS/7.4B
C501
10u/10V
C502
0u1
NOTE: place 10uF cap close to gyros
VDD_IO
VDD
RES_P15_VDD
RES_P8_GND
RES_P9_GND
RES_P10_GND
RES_P11_GND
RES_P12_GND
GND
SCL/SPC
SDA/SDI/SDO
SDO/SA0
CS
INT1
DRDY/INT2
PLLFILT
SPI_INT_SCK/1.1A
SPI_INT_MOSI/1.1A
SPI_INT_MISO/1.1A
GYRO_CS/1.3B
GYRO_DRDY/1.1B
C504
10n
L3GD20
Stuff option 1: L3GD20 (legacy gyro)
U$501
C506
2u2
C507
0u1
VDD
VDD_IO
RSRV
GND
CS
SCL/SPC
SDA/SDI/SDO
SDO/SA0
INT1
INT2
SETC
SETP
C1
ACCEL_MAG_CS/1.3B
SPI_INT_SCK/1.1A
SPI_INT_MOSI/1.1A
SPI_INT_MISO/1.1A
ACCEL_DRDY/1.1B
MAG_DRDY/1.1B
C510
0u47
C509
10u/10V
LSM303D
Stuff option 4: onboard accel/mag
U502
C503
0u1
15*2
9*5
CAP
C505
10n
L3GD20H
Switch to L3GD20H
once available (Q3/2013)
WARNING: DIFFERENT HW,
SW COMPATIBLE
Stuff option 2: L3GD20H (replacement gyro)
U503
C508
0u1
CSB1
CSB2
PS
SDI/SDA
SDO
SCLK
BARO_CS/1.3B
MS5611-01BA
0512811094
U$1G$1
U$1G$2
U$1G$3
U$1G$4
U$1G$5
U$1G$6
U$1G$7
U$1G$8
U$1G$9
U$1G$10
Stuff option 3: offboard gyro/accel/mag
Valid stuff option combos:
1 + 4
2 + 4
3 only
DO NOT stuff 1 + 2 at the same time
DO NOT stuff 3 with any of 1, 2 or 4
Sensors
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 5/12


MOSFET-DUAL-PCHANNEL-CHIPFET
U$3-PMOS1
MOSFET-DUAL-PCHANNEL-CHIPFET
U$3-PMOS2
MOSFET-DUAL-PCHANNEL-CHIPFET
U$4-PMOS1
MOSFET-DUAL-PCHANNEL-CHIPFET
U$4-PMOS2
MOSFET-DUAL-PCHANNEL-CHIPFET
U$5-PMOS1
MOSFET-DUAL-PCHANNEL-CHIPFET
U$5-PMOS2
J601
DF13C-6P-1.25V
VDD_5V_BRICK/12.6B
VDD_SERVO/10.5A
VBUS/3.1A
VDD_5V_IN/7.1C
L601
KNH16C104DA5TS
L602
KNH16C104DA5TS
10K/0.1%
R604
10K/0.1%
R605
BATT_CURRENT_SENS/1.1A
BATT_VOLTAGE_SENS/1.1A
GND
453K
R1
45.3K
R2
105K
R5
453K
R9
45.3K
R10
105K
R11
453K
R6
45.3K
R7
105K
R8
P$21
P$1
P$2
P$20
P$3
P$4
P$19
P$5
P$6
P$18
P$17
P$16
P$15
P$14
P$13
V1
UV1
OV1
V2
UV2
OV2
V3
UV3
OV3
VS1
G1
VS2
G2
VS3
G3
VOUT
VALID1
VALID2
VALID3
EN
SHDN
HYS
CAS
GND
P$12
P$7
P$8
P$9
P$22
P$23
P$24
P$11
VDD_BRICK_VALID/1.1B
VDD_SERVO_VALID/1.1B
VBUS_VALID
P$10*2
GND
Power source selector
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 6/12


Bypass caps as close to device pins as possible.
FMU-VDD_3V3/4.4C
C606 0u1
C607 0u1
C608 0u1
C610 0u1
C611 2u2
C613 2u2
U101G$2
11*6 VDD
49 VCAP_1
73 VCAP_2
10*4 VSS
GND
L603
KNH16C104DA5TS
VDD_5V_IN/6.6B
U$605
MIC5332
Note: Maximise copper area connected
to center ground pad.
VIN VOUT1
EN1 VOUT2
EN2 POR2
CSET GND
R603 10K
C601 2u2
10n
C602
POR reset
delay 1s / uF
2*2
C603 1u0
C604 10u/10V
C605 1u0
VDD_3V3_SENSORS_EN/1.5A
VDD_3V3_SENSORS/12.6A
FMU-VDD_3V3/8.3B
FMU-RESET/8.1B
GND
FMU-VDD_3V3/4.4C
R608 1K
VBAT/9.6A
B601
MS621FE
C612 0u1
U101BAT
6 VBAT
22 VDDA
21 VREF+
20 VSSA
GND
FMU-RESET/8.1B
RESET
S601
C609 0u1
U101RESET
14 NRST
FMU-BOOT0/12.6A
94 BOOT0
STM32F4X7VX
R611 10K
GND
VDD_5V_IN/6.6B
U$602 BQ24315
IN OUT
VBAT
FAULT
VSS ILIM CE
VDD_5V_HIPOWER/2.5A
VDD_5V_HIPOWER_OC/1.5B
2*4
16K5 R602
U$604 BQ24315
IN OUT
VBAT
FAULT
VSS ILIM CE
VDD_5V_PERIPH/4.5A
VDD_5V_PERIPH_OC/1.5B
VDD_5V_PERIPH_EN/1.1A
25K R606
10K R607
Current Limits:
I(limit) = 25000 / R(ilim)
25K = 1A, 16K5 = 1.5A
GND
10K/0.1%
VDD_5V_IN/6.6B
R609
VDD_5V_SENS/1.1A
10K/0.1% R610
GND
FMU Power and Reset
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 7/12


LED should be Omron LRTBG6SG-U4AA-1+V2B4-25+S or similar 6PLCC high-brigtness type.
U703BLUE
LRTB GFTG-T7AW-1+V7A7-29+R5T9-49-L
U703GREEN
LRTB GFTG-T7AW-1+V7A7-29+R5T9-49-L
U703RED
LRTB GFTG-T7AW-1+V7A7-29+R5T9-49-L
VDD_5V_IN/11.1B
FMU-VDD_3V3/10.1A
Note: LED driver is on FMU-I2C2 so that an external instance can be connected to FMU-I2C1.
U701
TCA62724
SHDN
VIN
SDA
OUT0
SCL
OUT1
RESET
OUT2
GND
REXT
FMU-I2C2_SDA/3.4A
FMU-I2C2_SCL/3.4A
FMU-RESET/7.5C
C701
0u1
R704
10K
Iout = (1.17 / REXT) * 460
10K = 54mA, selected for maximum daylight visibility.
LED701
AMBER
LED704
GREEN
R3
220R
R707
220R
R711
220R
FMU-LED_AMBER/1.5B
IO-VDD_5V5/10.5A
LED702
GREEN
LED703
AMBER
LED705
BLUE
R708
220R
R4
220R
R709
220R
R712
220R
IO-LED_AMBER/9.1C
IO-LED_BLUE/9.1C
All LEDs nominal target 60mcd for good daylight visibility. Resistor values have been adjusted to optimize BOM.
Green: APG1608CGKC/T
Vf(typ): 2.1V
Target If: 20mA
Selected R: 220
Cacluated If @ 5.5V: 15mA
Amber: APT1608SECK
Vf(typ): 2.1V
Target If: 5mA
Selected R: 440
Cacluated If @ 5.5V: 8mA
Blue: APT1608QBC/G
Vf(typ): 3.3V
Target If: 6.6mA
Selected R: 220
Cacluated If @ 5.5V: 10mA
U702
LT3469
VDD_5V_IN/7.5C
C702
1u0
L701
47uH
VIN
VCC
SW
FB
+IN
GND
-IN
OUT
R705
453K
R706
16K5
C704
0u47
R701
9K09
ALARM/1.1B
Component values taken directly from the LTC evaluation design.
Note that the ALARM input should idle low to minimise power dissipation.
R702
10K
R703
100K
C703
5n6
J701
DF13C-2P-1.25V
Switch: E-Switch LP10A1AR
IO-VDD_3V3/9.5A
IO-LED_SAFETY/9.1C
SAFETY/9.1B
47R
R710
J702 SAFETY
DF13C-3P-1.25V
U$701
PESD0402-140
R713
1K5
LEDs
Piezo driver
Safety switch
PX4FMUv2.3
11. 10. 13 18:16
Sheet: 8/12


U801PORTA_L
PA0 10 IO-CH1/10.1C
PA1 11 IO-CH2/10.1C
PA2 12
PA3 13
PA4 14 VDD_SERVO_SENS/10.5D
PA5 15 RSSI_IN/10.1D
PA6 16 IO-CH5/10.1B
PA7 17 IO-CH6/10.1B
R803 220R SERIAL_IO_TO_FMU/1.3A
R804 220R SERIAL_FMU_TO_IO/1.3A
IO_SERIAL1
JX801
IO-USART1_TX/1.2B 1 PPM
IO-USART1_RX 2 +5V
3 GND
GND
HEADER-3X1BOARDEDGE-SHORT
U801AN_POWER
VBAT/7.5B 1 VBAT
IO-VDD_3V3/8.5C 9 VDDA
8 VSSA
GND
U801PORTA_H
PA8 29 PPM_INPUT/10.1C
PA9 30 IO-USART1_TX/1.2B
PA10 31 IO-USART1_RX
PA11 32 spare pwm
PA12 33 RSSI_IN/10.1D
PA13 34 IO-SWDIO
PA14 37 IO-SWCLK
PA15 38 IO-VDD_SERVO_IN_FAULT/11.2C
Routed to FMU for debug purposes
U801POWER
IO-VDD_3V3/8.5C
C802 C803 C804
0u1 0u1 0u1
24 VDD_1
36 VDD_2
48 VDD_3
23 VSS_1
35 VSS_2
47 VSS_3
GND
U801PORTB_L
PB0 18 IO-CH7/10.1B
PB1 19 IO-CH8/10.1B
PB2 20
PB3 39 IO-SWO
PB4 40 SBUS_OUTPUT_EN/10.1D
PB5 41 SAFETY/8.5C
PB6 42 spare gpio
PB7 43 spare gpio
R802 10K GND
X801
C805 8p
C806 8p
GND
U801PORTD/OSC
5 PD0/OSC<=
6 PD1/OSC=>
3.2x2.5 mm / 24 MHz / 15 ppm
U801PORTB_H
LED3 moves to PB13 to make room for S.Bus output
PB8 45 IO-CH3/10.1B
PB9 46 IO-CH4/10.1B
PB10 21 SBUS_OUTPUT/10.1D
PB11 22 SBUS_INPUT/10.1C
PB12 25 spare gpio
PB13 26 IO-LED_SAFETY/8.5C
PB14 27 IO-LED_BLUE/8.5C
PB15 28 IO-LED_AMBER/8.5C
Spektrum/DSM
VDD_3V3_SPEKTRUM/11.5B
IO-USART1_RX
J801
P$1 P$1
P$2 P$2
P$3 P$3
JST-ZH-3
U$801
PESD0402-140
GND
ARM_MINI_JTAG-SMT
IO-VDD_3V3/8.5C JX802-VTREF
IO-SWDIO JX802-TMS/SWDIO
IO-SWCLK JX802-TCK/SWCLK
IO-SWO JX802-TDO/SWO
JX802-TDI/EXTB
JX802-RESET
JX802-GND1
JX802-GND2
JX802-GND3
GND
U801PORTC
PC13 2 VDD_3V3_SPEKTRUM_EN/11.3B
PC14 3 spare gpio
PC15 4 spare gpio
U801RESET
NRST 7 IO-RESET/11.5B
BOOT0 44 IO-BOOT0/12.6A
STM32F10XCXT6
0u1 C801
S801 RESET
10K R801
GND
Timer allocation:
PA0: TIM2_CH1: IO-CH1
PA1: TIM2_CH2: IO-CH2
PB8: TIM4_CH3: IO-CH3
PB9: TIM4_CH4: IO-CH4
PA6: TIM3_CH1: IO-CH5
PA7: TIM3_CH2: IO-CH6
PB0: TIM3_CH3: IO-CH7
PB1: TIM3_CH4: IO-CH8
PA8: TIM1_CH1: PPM_IN
PA11: TIM1_CH4: RSSI_IN
IO SoC Ports
Spektrum/DSM port
PX4FMUv2.3
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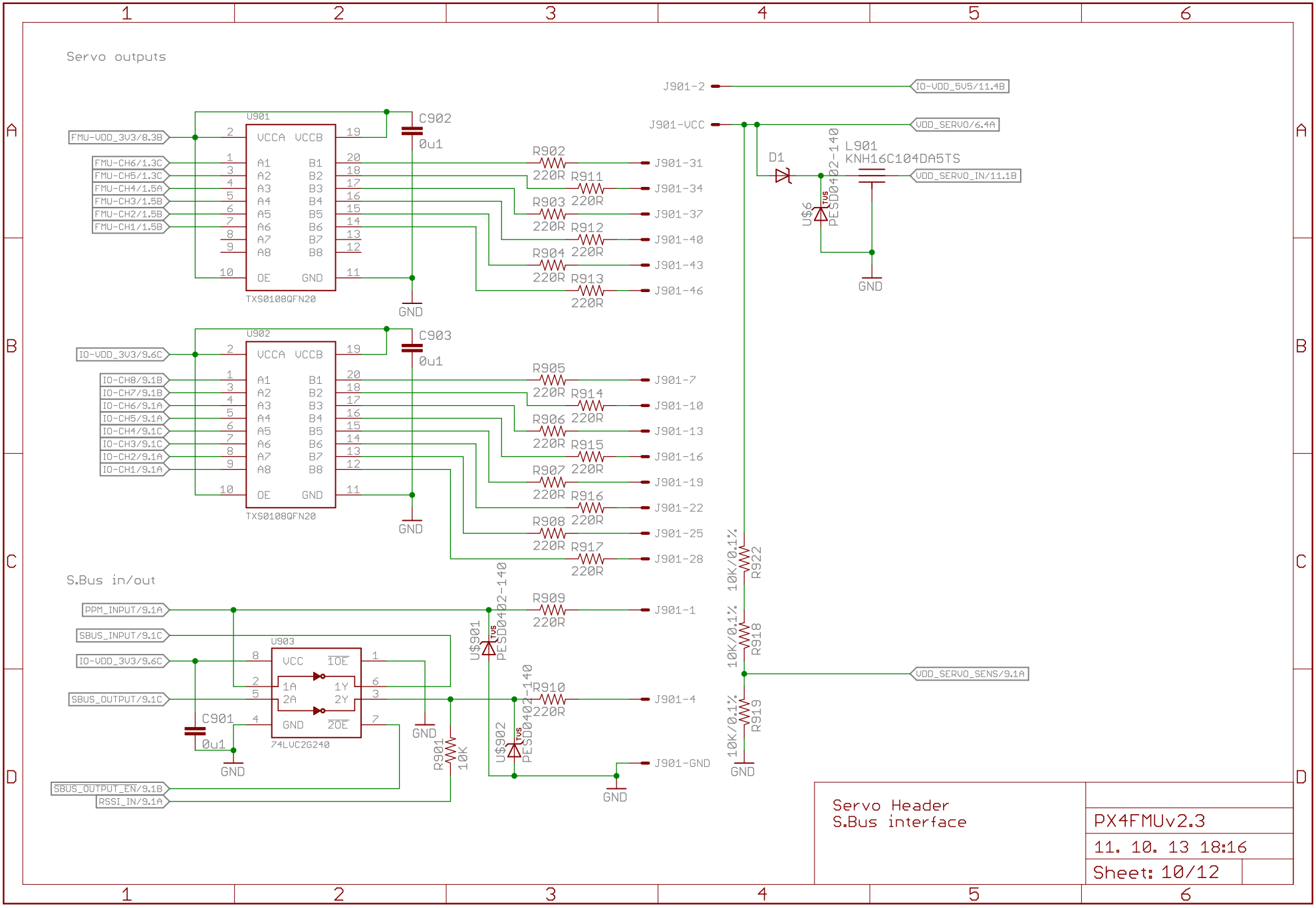
Servo outputs
U901
TXS0108QFN20
C902
0u1
FMU-VDD_3V3/8.3B
FMU-CH6/1.3C
FMU-CH5/1.3C
FMU-CH4/1.5A
FMU-CH3/1.5B
FMU-CH2/1.5B
FMU-CH1/1.5B
R902 220R
R911 220R
R903 220R
R912 220R
R904 220R
R913 220R
J901-31
J901-34
J901-37
J901-40
J901-43
J901-46
U902
TXS0108QFN20
C903
0u1
IO-VDD_3V3/9.6C
IO-CH8/9.1B
IO-CH7/9.1B
IO-CH6/9.1A
IO-CH5/9.1A
IO-CH4/9.1C
IO-CH3/9.1C
IO-CH2/9.1A
IO-CH1/9.1A
R905 220R
R914 220R
R906 220R
R915 220R
R907 220R
R916 220R
R908 220R
R917 220R
J901-7
J901-10
J901-13
J901-16
J901-19
J901-22
J901-25
J901-28
S.Bus in/out
PPM_INPUT/9.1A
SBUS_INPUT/9.1C
IO-VDD_3V3/9.6C
SBUS_OUTPUT/9.1C
U903
74LVC2G240
C901
0u1
SBUS_OUTPUT_EN/9.1B
RSSI_IN/9.1A
R901 10K
U$901 PESD0402-140
U$902 PESD0402-140
R909 220R
R910 220R
J901-1
J901-4
J901-GND
J901-2
J901-VCC
IO-VDD_5V5/11.4B
VDD_SERVO/6.4A
D1
L901 KNH16C104DA5TS
U$6 PESD0402-140
VDD_SERVO_IN/11.1B
R922 10K/0.1%
R918 10K/0.1%
R919 10K/0.1%
VDD_SERVO_SENS/9.1A
GND
Servo Header
S.Bus interface
PX4FMUv2.3
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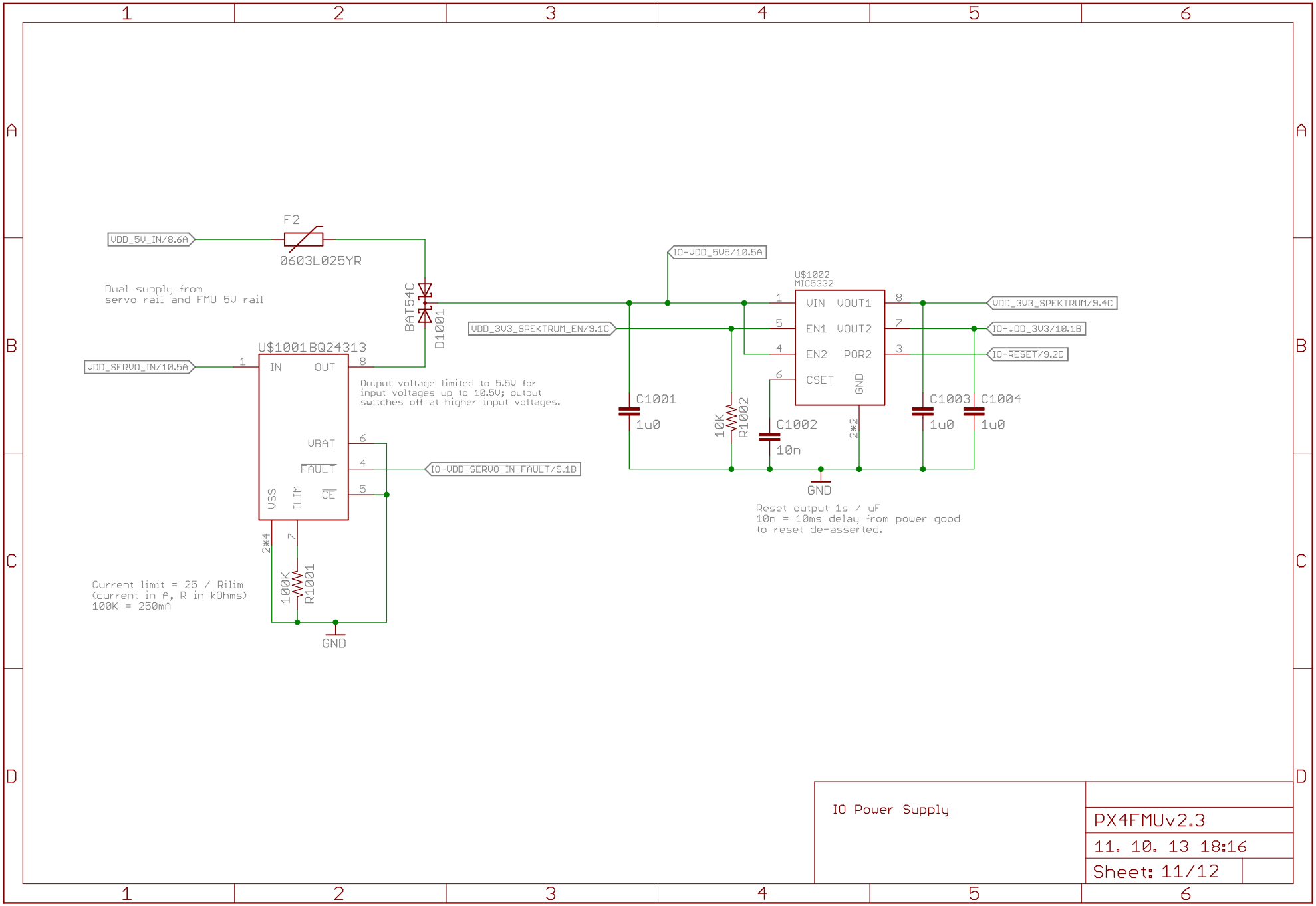
F2
VDD_5V_IN/8.6A
0603L025YR
Dual supply from
servo rail and FMU 5V rail
BAT54C
D1001
IO-VDD_5V5/10.5A
U$1002
MIC5332
VIN
VOUT1
EN1
VOUT2
EN2
POR2
CSET
GND
VDD_3V3_SPEKTRUM/9.4C
IO-VDD_3V3/10.1B
IO-RESET/9.2D
VDD_3V3_SPEKTRUM_EN/9.1C
U$1001 BQ24313
VDD_SERVO_IN/10.5A
IN
OUT
VBAT
FAULT
VSS
ILIM
CE
IO-VDD_SERVO_IN_FAULT/9.1B
Output voltage limited to 5.5V for
input voltages up to 10.5V; output
switches off at higher input voltages.
C1001
1u0
10K
R1002
C1002
10n
2*2
C1003
1u0
C1004
1u0
GND
Reset output 1s / uF
10n = 10ms delay from power good
to reset de-asserted.
2*4
100K
R1001
Current limit = 25 / Rilim
(current in A, R in kOhms)
100K = 250mA
GND
IO Power Supply
PX4FMUv2.3
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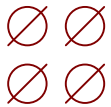
PX4 LOGO

open hardware

Mounting holes to suit M3 fastener
and Richco R908 series spacer.
Use R908-5 spacers to stack with
other PX4 series boards (7.95 mm).



Minimum drill: 0.3 mm
Minimum trace width (use mm for traces): 0.15 mm
Minimum copper distance (all signals): 0.15 mm
Dimension / hole minimum distance: 0.2 mm
Layout grid: 4 mil, part grid: 4 mil. Dimensions / hole positions: 0.5 mm

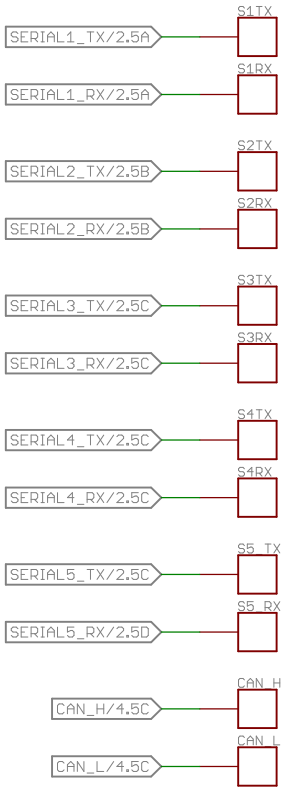
Board: FR4 black, 1.0 mm. Solder stop on vias < 0.6 mm.

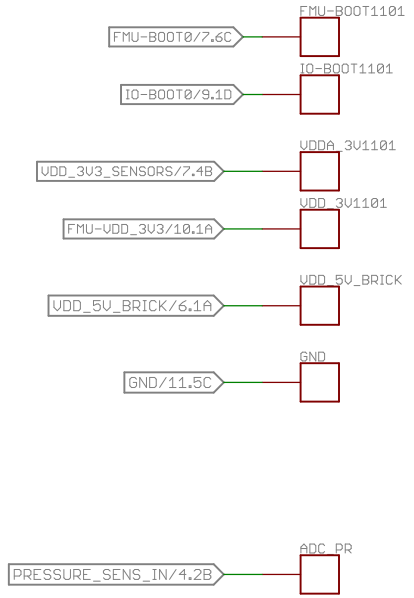
Signoff rules: Footprint checked,
pinmap checked,
schematic checked,
cross-references to
other pages checked.

Routing:
1: general/escape
2: ground
3: horizontal
4: vertical
5: power
6: general/escape

⊗ Fiducials for machine
⊗ vision alignment.

Production Testing Pads





Test and Fiducials

PX4FMUv2.3

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