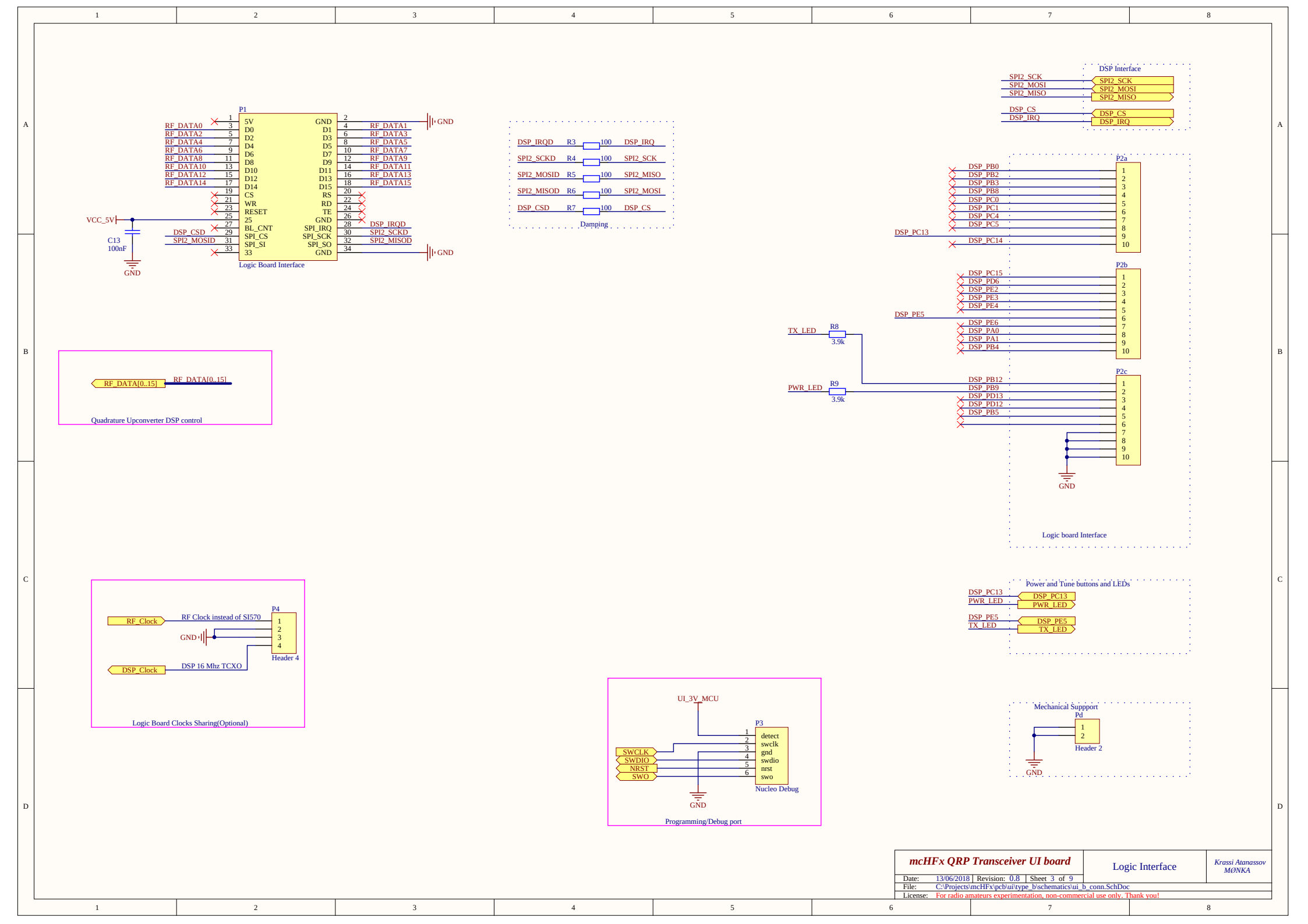

mcHFx QRP Transceiver UI board	Logic Interface	*Krassi Atanassov MØNKA*
Date: 13/06/2018 | Revision: 0.8 | Sheet 3 of 9		
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_conn.SchDoc		
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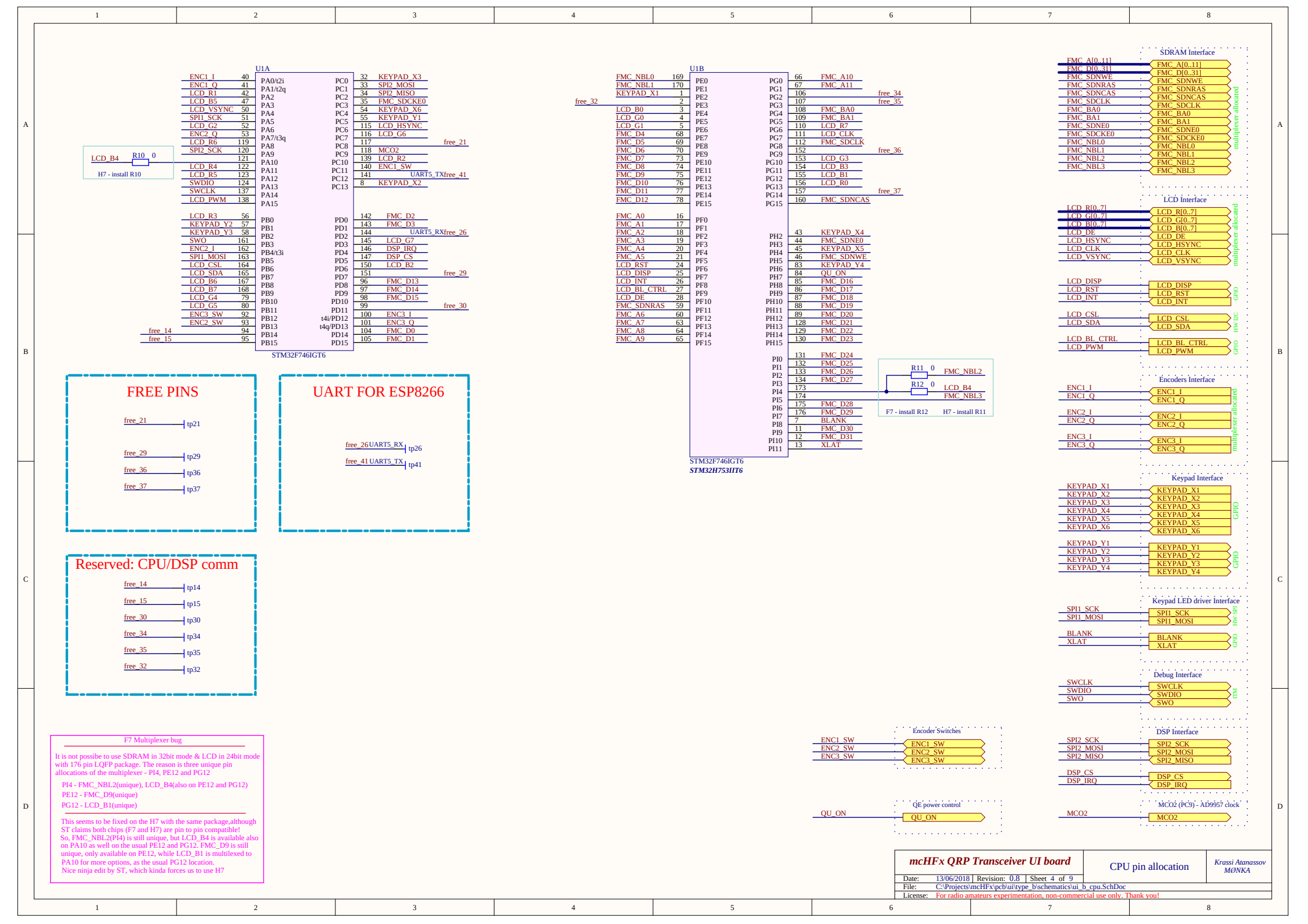
U1A
ENC1_I 40
ENC1_Q 41
LCD_R1 42
LCD_B5 47
LCD_VSYNC 50
SPI1_SCK 51
LCD_G2 52
ENC2_Q 53
LCD_R6 119
SPI2_SCK 120
121
LCD_R4 122
LCD_R5 123
SWDIO 124
SWCLK 137
LCD_PWM 138
LCD_R3 56
KEYPAD_Y2 57
KEYPAD_Y3 58
SWO 161
ENC2_I 162
SPI1_MOSI 163
LCD_CSL 164
LCD_SDA 165
LCD_B6 167
LCD_B7 168
LCD_G4 79
LCD_G5 80
ENC3_SW 92
ENC2_SW 93
free_14 94
free_15 95
PA0/t2i
PA1/t2q
PA2
PA3
PA4
PA5
PA6
PA7/t3q
PA8
PA9
PA10
PA11
PA12
PA13
PA14
PA15
PB0
PB1
PB2
PB3
PB4/t3i
PB5
PB6
PB7
PB8
PB9
PB10
PB11
PB12
PB13
PB14
PB15
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8
PC9
PC10
PC11
PC12
PC13
PD0
PD1
PD2
PD3
PD4
PD5
PD6
PD7
PD8
PD9
PD10
PD11
t4i/PD12
t4q/PD13
PD14
PD15
32 KEYPAD_X3
33 SPI2_MOSI
34 SPI2_MISO
35 FMC_SDCKE0
54 KEYPAD_X6
55 KEYPAD_Y1
115 LCD_HSYNC
116 LCD_G6
117 free_21
118 MCO2
139 LCD_R2
140 ENC1_SW
141 UART5_TX free_41
8 KEYPAD_X2
142 FMC_D2
143 FMC_D3
144 UART5_RX free_26
145 LCD_G7
146 DSP_IRQ
147 DSP_CS
150 LCD_B2
151 free_29
96 FMC_D13
97 FMC_D14
98 FMC_D15
99 free_30
100 ENC3_I
101 ENC3_Q
104 FMC_D0
105 FMC_D1
STM32F746IGT6
LCD_B4 R10 0
H7 - install R10
U1B
FMC_NBL0 169
FMC_NBL1 170
KEYPAD_X1 1
free_32 2
LCD_B0 3
LCD_G0 4
LCD_G1 5
FMC_D4 68
FMC_D5 69
FMC_D6 70
FMC_D7 73
FMC_D8 74
FMC_D9 75
FMC_D10 76
FMC_D11 77
FMC_D12 78
FMC_A0 16
FMC_A1 17
FMC_A2 18
FMC_A3 19
FMC_A4 20
FMC_A5 21
LCD_RST 24
LCD_DISP 25
LCD_INT 26
LCD_BL_CTRL 27
LCD_DE 28
FMC_SDNRAS 59
FMC_A6 60
FMC_A7 63
FMC_A8 64
FMC_A9 65
PE0
PE1
PE2
PE3
PE4
PE5
PE6
PE7
PE8
PE9
PE10
PE11
PE12
PE13
PE14
PE15
PF0
PF1
PF2
PF3
PF4
PF5
PF6
PF7
PF8
PF9
PF10
PF11
PF12
PF13
PF14
PF15
PI0
PI1
PI2
PI3
PI4
PI5
PI6
PI7
PI8
PI9
PI10
PI11
PG0
PG1
PG2
PG3
PG4
PG5
PG6
PG7
PG8
PG9
PG10
PG11
PG12
PG13
PG14
PG15
66 FMC_A10
67 FMC_A11
106 free_34
107 free_35
108 FMC_BA0
109 FMC_BA1
110 LCD_R7
111 LCD_CLK
112 FMC_SDCLK
152 free_36
153 LCD_G3
154 LCD_B3
155 LCD_B1
156 LCD_R0
157 free_37
160 FMC_SDNCAS
43 KEYPAD_X4
44 FMC_SDNE0
45 KEYPAD_X5
46 FMC_SDNWE
83 KEYPAD_Y4
84 QU_ON
85 FMC_D16
86 FMC_D17
87 FMC_D18
88 FMC_D19
89 FMC_D20
128 FMC_D21
129 FMC_D22
130 FMC_D23
131 FMC_D24
132 FMC_D25
133 FMC_D26
134 FMC_D27
173
174
175 FMC_D28
176 FMC_D29
7 BLANK
11 FMC_D30
12 FMC_D31
13 XLAT
STM32F746IGT6
STM32H753IIT6
R11 0 FMC_NBL2
R12 0 LCD_B4
FMC_NBL3
F7 - install R12
H7 - install R11
FREE PINS
free_21 tp21
free_29 tp29
free_36 tp36
free_37 tp37
UART FOR ESP8266
free_26 UART5_RX tp26
free_41 UART5_TX tp41
Reserved: CPU/DSP comm
free_14 tp14
free_15 tp15
free_30 tp30
free_34 tp34
free_35 tp35
free_32 tp32
F7 Multiplexer bug
It is not possibe to use SDRAM in 32bit mode & LCD in 24bit mode with 176 pin LQFP package. The reason is three unique pin allocations of the multiplexer - PI4, PE12 and PG12
PI4 - FMC_NBL2(unique), LCD_B4(also on PE12 and PG12)
PE12 - FMC_D9(unique)
PG12 - LCD_B1(unique)
This seems to be fixed on the H7 with the same package,although ST claims both chips (F7 and H7) are pin to pin compatible!
So, FMC_NBL2(PI4) is still unique, but LCD_B4 is available also on PA10 as well on the usual PE12 and PG12. FMC_D9 is still unique, only available on PE12, while LCD_B1 is multilexed to PA10 for more options, as the usual PG12 location.
Nice ninja edit by ST, which kinda forces us to use H7
SDRAM Interface
FMC_A[0..11]
FMC_D[0..31]
FMC_SDNWE
FMC_SDNRAS
FMC_SDNCAS
FMC_SDCLK
FMC_BA0
FMC_BA1
FMC_SDNE0
FMC_SDCKE0
FMC_NBL0
FMC_NBL1
FMC_NBL2
FMC_NBL3
multiplexer allocated
LCD Interface
LCD_R[0..7]
LCD_G[0..7]
LCD_B[0..7]
LCD_DE
LCD_HSYNC
LCD_CLK
LCD_VSYNC
multiplexer allocated
LCD_DISP
LCD_RST
LCD_INT
GPIO
LCD_CSL
LCD_SDA
HW I2C
LCD_BL_CTRL
LCD_PWM
GPIO
Encoders Interface
ENC1_I
ENC1_Q
ENC2_I
ENC2_Q
ENC3_I
ENC3_Q
multiplexer allocated
Keypad Interface
KEYPAD_X1
KEYPAD_X2
KEYPAD_X3
KEYPAD_X4
KEYPAD_X5
KEYPAD_X6
GPIO
KEYPAD_Y1
KEYPAD_Y2
KEYPAD_Y3
KEYPAD_Y4
GPIO
Keypad LED driver Interface
SPI1_SCK
SPI1_MOSI
HW SPI
BLANK
XLAT
GPIO
Debug Interface
SWCLK
SWDIO
SWO
ITM
Encoder Switches
ENC1_SW
ENC2_SW
ENC3_SW
DSP Interface
SPI2_SCK
SPI2_MOSI
SPI2_MISO
DSP_CS
DSP_IRQ
QE power control
QU_ON
MCO2 (PC9) - AD9957 clock
MCO2
mcHFx QRP Transceiver UI board
CPU pin allocation
Krassi Atanassov
MØNKA
Date: 13/06/2018 | Revision: 0.8 | Sheet 4 of 9
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_cpu.SchDoc
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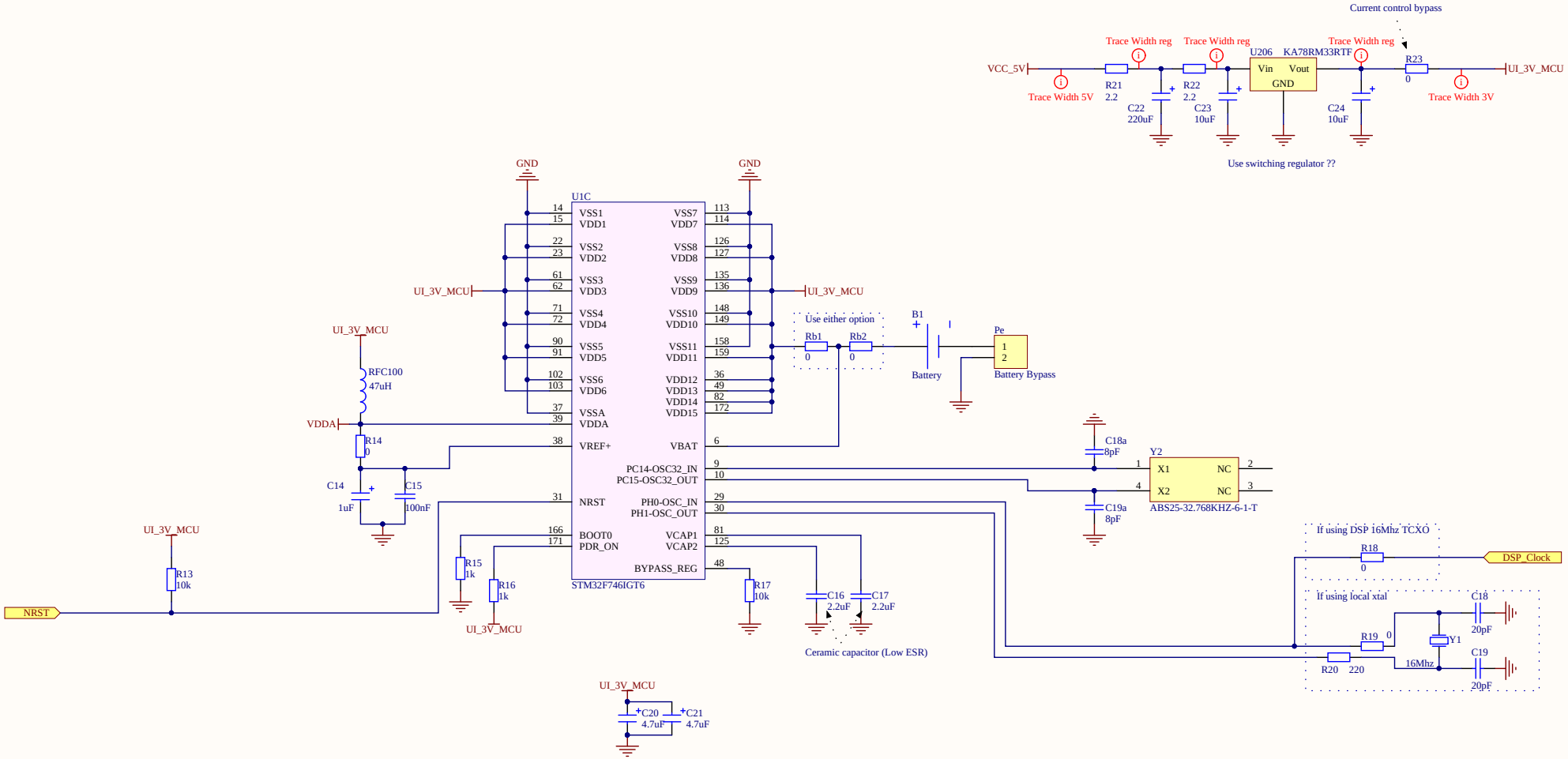
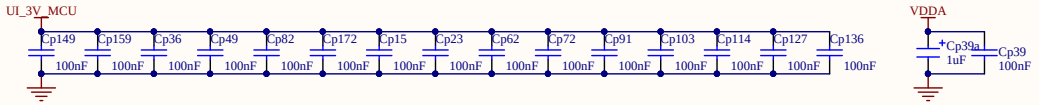


Decoupling (cap names reflect pins they need to be close to)



mcHFx QRP Transceiver UI board		CPU power and clock	*Krassi Atanassov MØNKA*
Date: 13/06/2018	Revision: 0.8	Sheet 5 of 9	
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_cpu_power.SchDoc			
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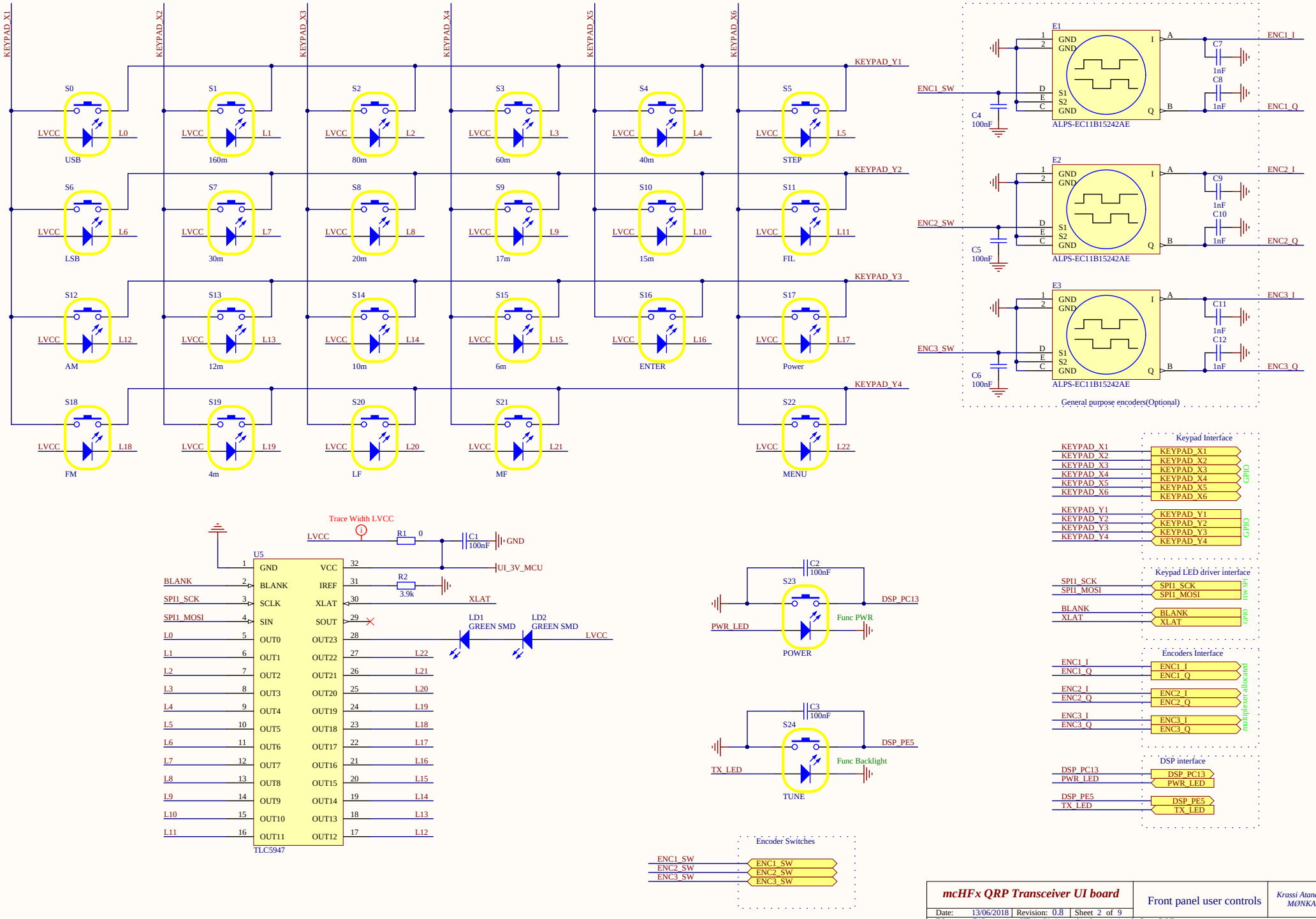

mcHFx QRP Transceiver UI board	Front panel user controls	*Krassi Atanassov MØNKA*
Date: 13/06/2018 | Revision: 0.8 | Sheet 2 of 9		
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_front.SchDoc		
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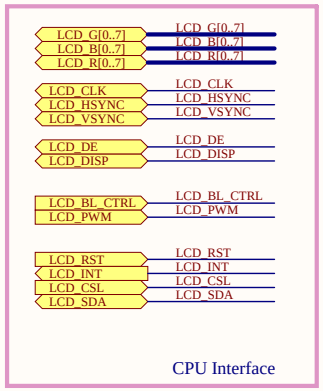

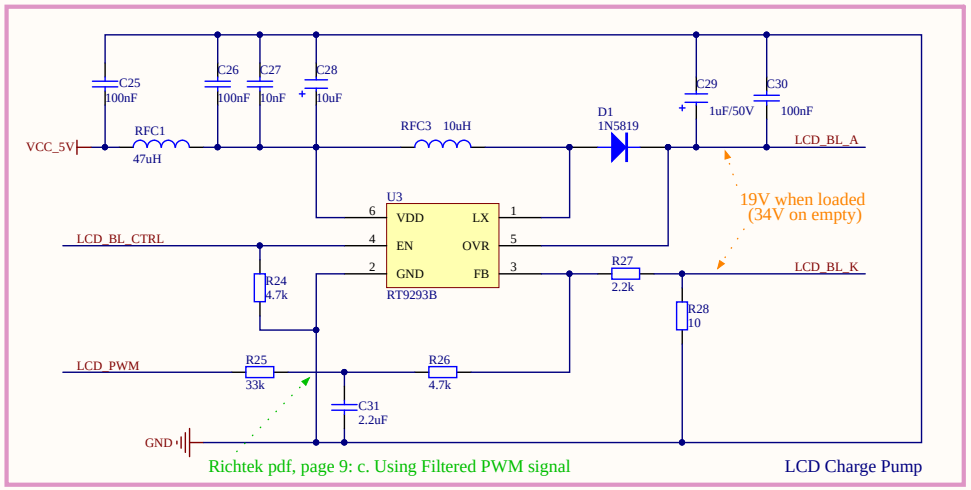

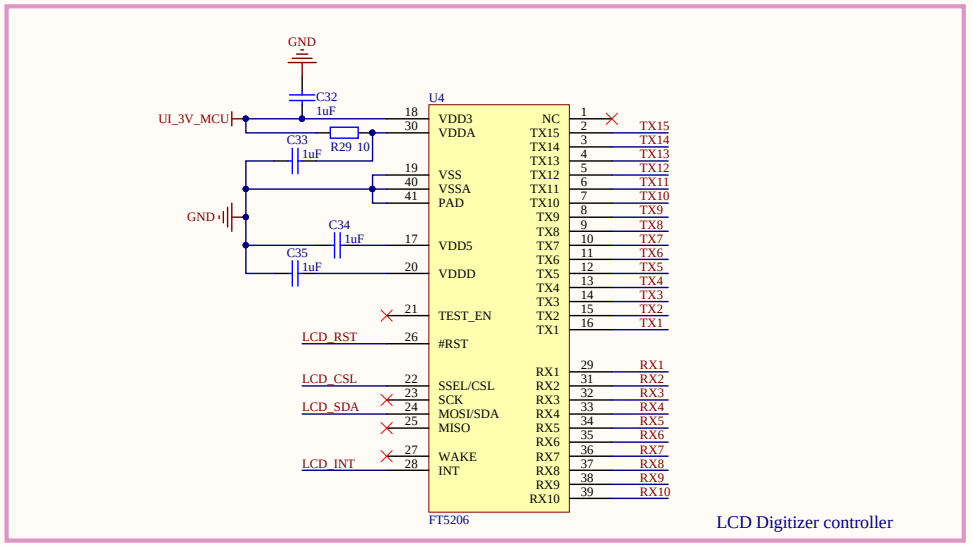

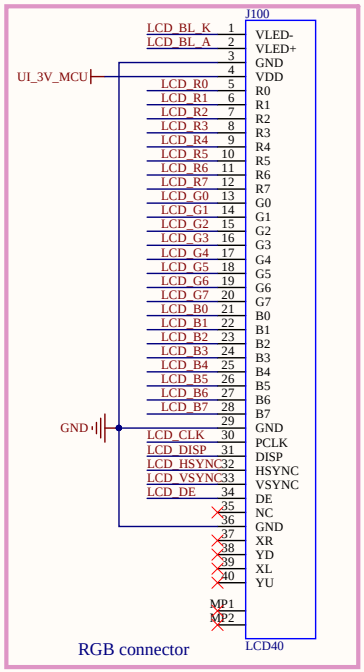

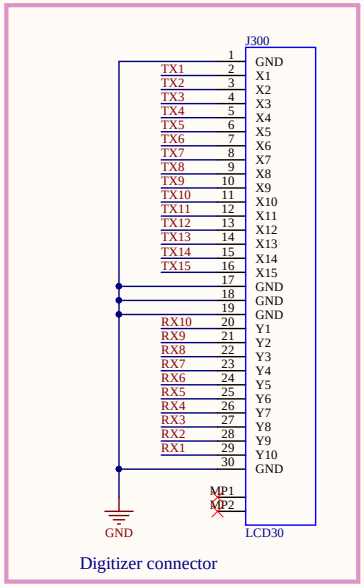

mcHFx QRP Transceiver UI board	LCD Interface	*Krassi Atanassov MØNKA*
Date: 13/06/2018 | Revision: 0.8 | Sheet 7 of 9		
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_lcd.SchDoc		
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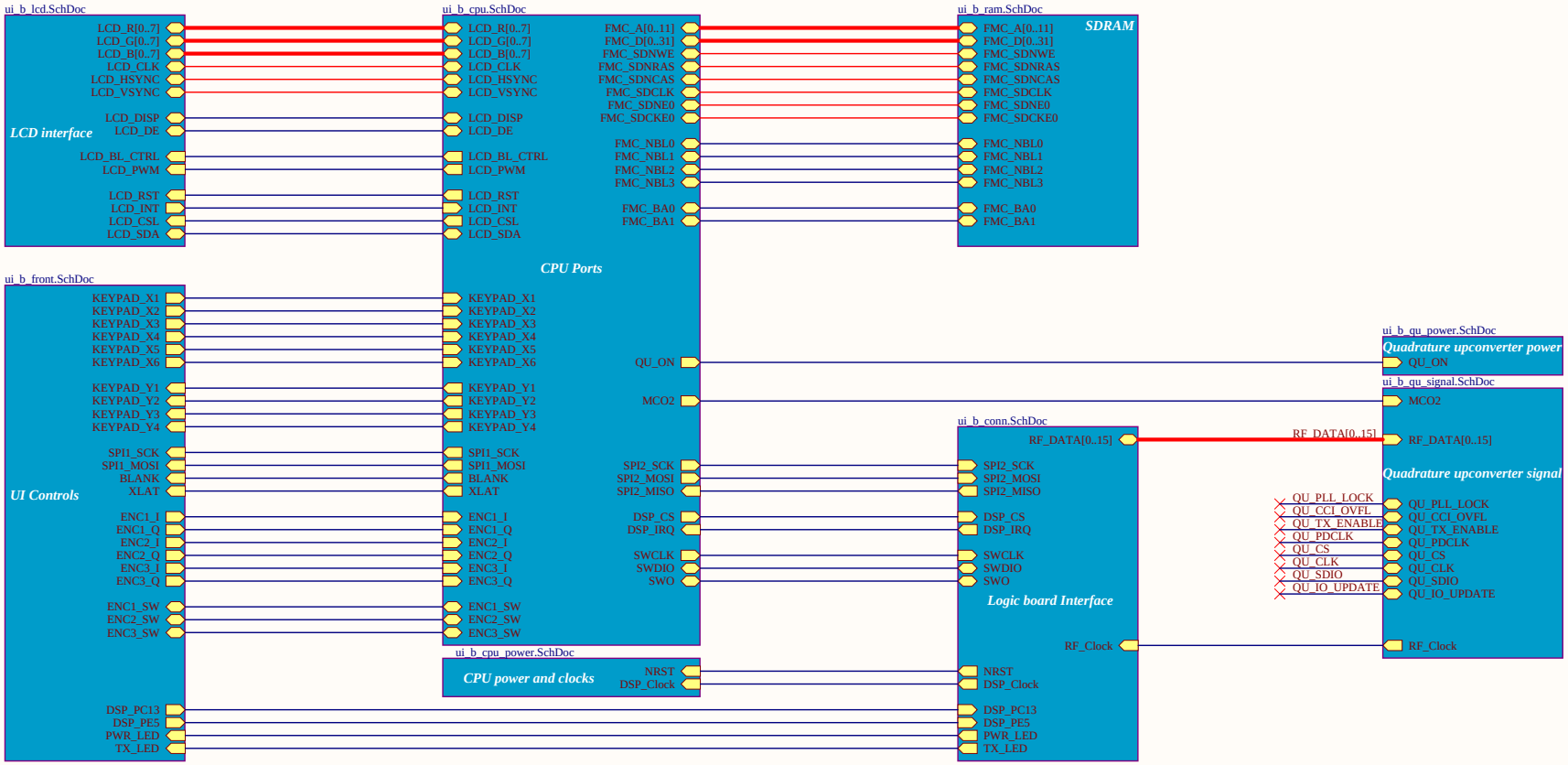

mcHFx QRP Transceiver UI board	Block diagram	*Krassi Atanassov MØNKA*
Date: 13/06/2018 | Revision: 0.8 | Sheet 1 of 9		
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_main.SchDoc		
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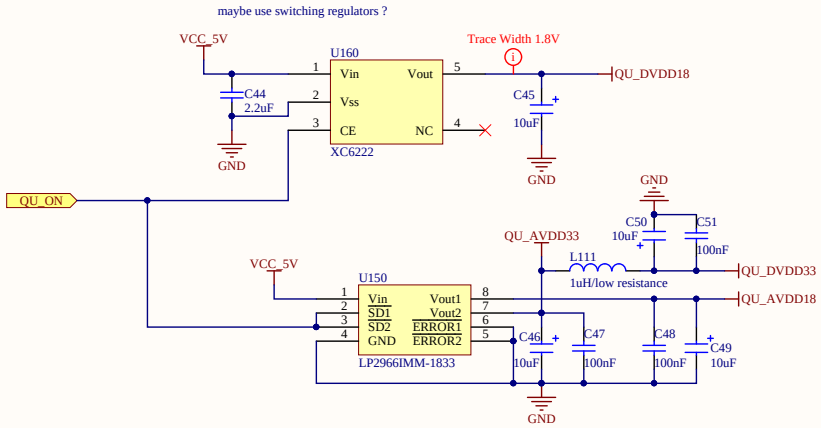

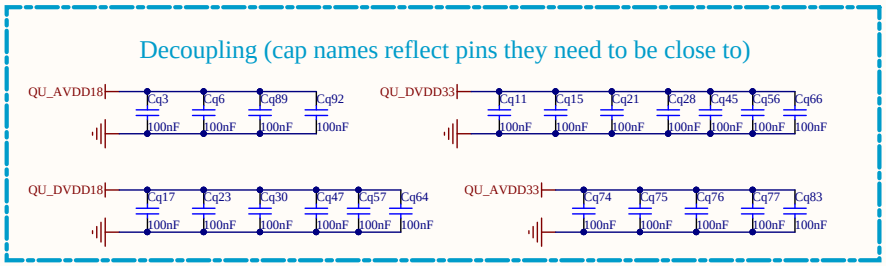

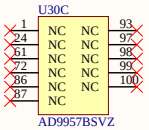

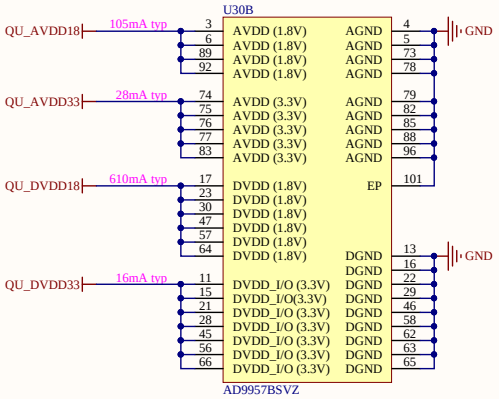

Quadrature Upconverter Power

7

mcHFx QRP Transceiver UI board	QU Power	*Krassi Atanassov MØNKA*
Date: 13/06/2018 | Revision: 0.8 | Sheet 9 of 9		
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_qu_power.SchDoc		
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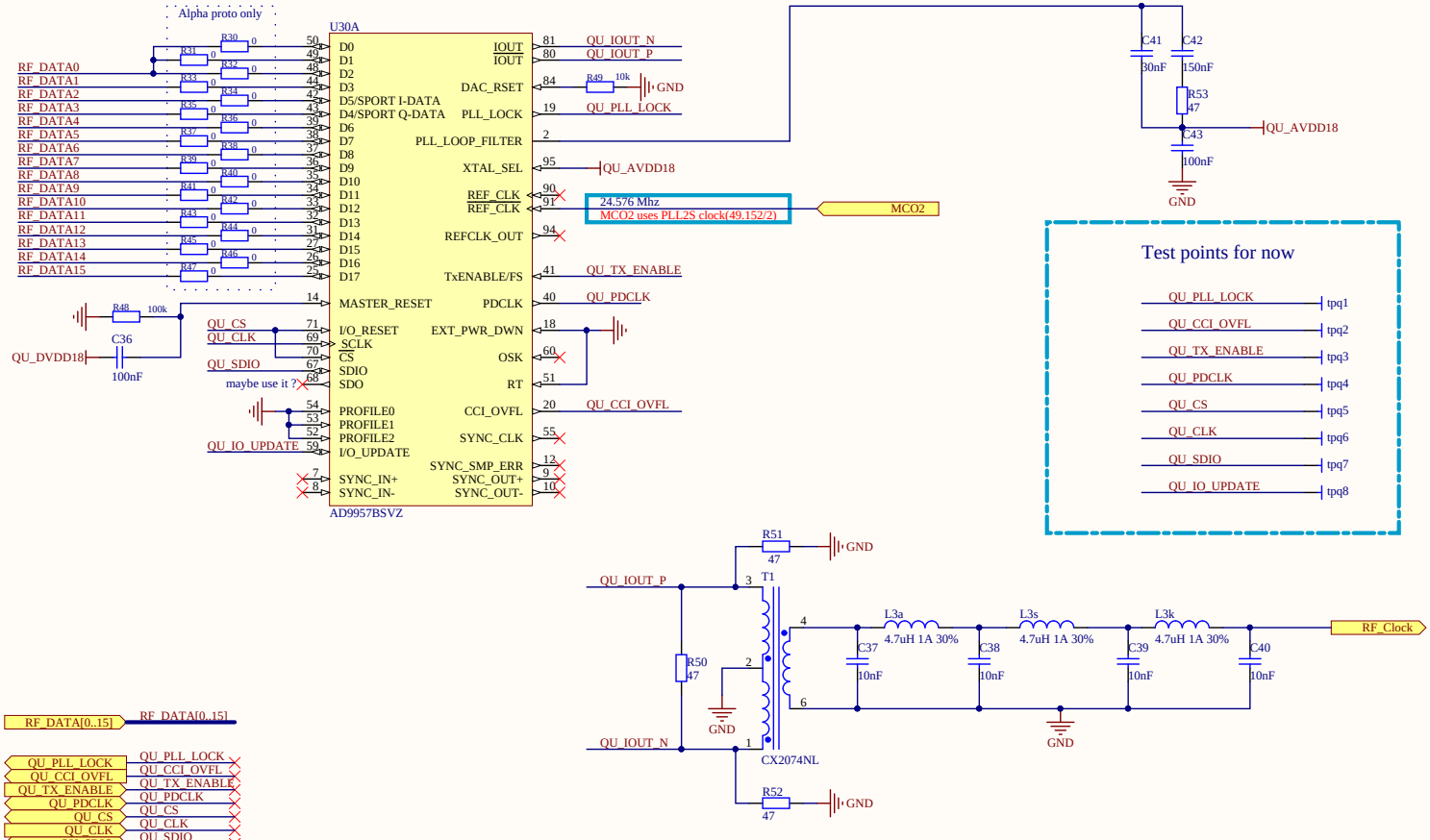

Quadrature Upconverter
Data and Output

mcHFx QRP Transceiver UI board		Quadrature Upconverter	*Krassi Atanassov MØNKA*
Date: 13/06/2018	Revision: 0.8	Sheet 8 of 9	
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_qu_signal.SchDoc			
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Note: SDRAM wired for 32 bit mode, but on F7 could be used in 16 bit mode, regardless

FMC_D[0..31] FMC_D[0..31]

FMC_A[0..11] FMC_A[0..11]

FMC_BA1 FMC_BA1

FMC_BA0 FMC_BA0

FMC_SDNWE FMC_SDNWE

FMC_SDNCAS FMC_SDNCAS

FMC_SDNRAS FMC_SDNRAS

FMC_SDNE0 FMC_SDNE0

FMC_SDCKE0 FMC_SDCKE0

FMC_SDCLK FMC_SDCLK

FMC_NBL0 FMC_NBL0

FMC_NBL1 FMC_NBL1

FMC_NBL2 FMC_NBL2

FMC_NBL3 FMC_NBL3

U2A

FMC_A0	25	A0	DQ0	2	FMC_D0
FMC_A1	26	A1	DQ1	4	FMC_D1
FMC_A2	27	A2	DQ2	5	FMC_D2
FMC_A3	60	A3	DQ3	7	FMC_D3
FMC_A4	61	A4	DQ4	8	FMC_D4
FMC_A5	62	A5	DQ5	10	FMC_D5
FMC_A6	63	A6	DQ6	11	FMC_D6
FMC_A7	64	A7	DQ7	13	FMC_D7
FMC_A8	65	A8	DQ8	74	FMC_D8
FMC_A9	66	A9	DQ9	76	FMC_D9
FMC_A10	24	A10	DQ10	77	FMC_D10
FMC_A11	21	A11	DQ11	79	FMC_D11
			DQ12	80	FMC_D12
			DQ13	82	FMC_D13
			DQ14	83	FMC_D14
FMC_BA0	22	BA0	DQ15	85	FMC_D15
FMC_BA1	23	BA1	DQ16	31	FMC_D16
			DQ17	33	FMC_D17
			DQ18	34	FMC_D18
FMC_SDCLK	68	CLK	DQ19	36	FMC_D19
			DQ20	37	FMC_D20
FMC_SDCKE0	67	CKE	DQ21	39	FMC_D21
			DQ22	40	FMC_D22
			DQ23	42	FMC_D23
FMC_SDNWE	17	WE#	DQ24	45	FMC_D24
FMC_SDNCAS	18	CAS#	DQ25	47	FMC_D25
FMC_SDNRAS	19	RAS#	DQ26	48	FMC_D26
FMC_SDNE0	20	CS#	DQ27	50	FMC_D27
			DQ28	51	FMC_D28
			DQ29	53	FMC_D29
FMC_NBL0	16	DQM0	DQ30	54	FMC_D30
FMC_NBL1	71	DQM1	DQ31	56	FMC_D31
FMC_NBL2	28	DQM2			
FMC_NBL3	59	DQM3			

MT48LC4M32B2P-6A

U2C

14	NC	NC	73
57	NC	NC	30
69	NC	NU	70

MT48LC4M32B2P-6A

UI_3V_MCU

GND

U2B

3	VDDQ	VSSQ	6
9	VDDQ	VSSQ	12
35	VDDQ	VSSQ	32
41	VDDQ	VSSQ	38
49	VDDQ	VSSQ	46
55	VDDQ	VSSQ	52
75	VDDQ	VSSQ	78
81	VDDQ	VSSQ	84
1	VDD	VSS	44
15	VDD	VSS	58
29	VDD	VSS	72
43	VDD	VSS	86

MT48LC4M32B2P-6A

Decoupling (cap names reflect pins they need to be close to)

UI_3V_MCU

Cr3 100nF Cr9 100nF Cr35 100nF Cr41 100nF Cr49 100nF Cr55 100nF Cr75 100nF Cr81 100nF Cr1 100nF Cr15 100nF Cr29 100nF Cr43 100nF

mcHFx QRP Transceiver UI board		SDRAM	*Krassi Atanassov MØNKA*
Date: 13/06/2018	Revision: 0.8	Sheet 6 of 9	
File: C:\Projects\mcHFx\pcb\ui\type_b\schematics\ui_b_ram.SchDoc			
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