

mCHF - HF SDR QRP transceiver

S53DZ Status Report

Rev 16

Project: **mCHF** - HF SDR QRP RTX by Chris M0NKA

Modifications: FW: Chris M0NKA, Clint KA7OEI, Andreas DF8OE
HW: Clint KA7OEI, Paolo IZ6MAF, Andreas DF8OE

Date: 26. 9. 2017
Noted by: Bojan S53DZ

1. mCHF basic specifications (from KA7OEI)

- Frequency range: (1.8) 2.5 to 30MHz
- TX max RF power: nominal 5W, max.10W
- RX sensitivity: -126dBm (0,11uV) at BW 300Hz
- RX A/D clipping: -18dBm (co-channel)
- UI noise floor: -144dBm
- Modes: CW, SSB, PSK, AM, FM
- DC supply range: 11V - 16V
- DC consumption: rx/tx - 360mA/3A at 12V

2. HW (by M0NKA)

- RF PCB: rev0.4
- UI PCB: rev0.4 (for ARM Cortex M4 STM32f4xx)
- LCD HY28B: paralell (jumpers **010** for 16-bit paralell LCD) with SPI TouchScreen
- LCD HY28B: SPI (jumpers **100** for SPI LCD) with SPI TouchScreen

3. FW (M0NKA, KA7OEI, DF8OE)

- version: xxx_0_0_219_26_4 (KA7OEI)
xxx_0.0.219.27.10 (DF8OE – github-devel)
BL 3.4.1 (DF8OE github)
FW 2.5.106 (DF8OE github)
- making .bin from source: Eclipse, gccarm, make
- flashing: with **mCHFManager**, **DfuSeDemo**

4. BOOT, FW Upgrade (M0NKA)

- DfuSeDemo.exe: BOOTLOADER "mCHF_boot_0.0.0.14.dfu", J6=on
- mCHF Windows driver: Device Manager "/Driver/mCHFb.inf"
- mCHFManager.exe: "mchf_firm_x_x_xxx_xx.bin" – Upgrade

4a. BOOT, FW Upgrade (DF8OE)

- DfuSeDemo.exe: BOOTLOADER "bl-mCHF3.4.1.dfu", J6=on
- DfuSeDemo.exe or USB-A stick: "fw-mchf-2.5.106.bin" – Upgrade

5. Metal enclosure (from Artur SP3OSJ)

- with buttons and knobs
- for use with higher (7mm) SMD switches
- bottom metal half turned around to get deeper enclosure

6. mCHF modifications - HW RF/UI board

6.a Clint KA7OEI:

ok	RF	RX_sensitivity: no Q2 , no R40, C64-->0R
ok	RF	TCXO: thermal couple the top of U8 and U10
todo	RF/UI	Interference: metal shield between RF/UI
ok	RF	LF_PA_osc: added 10uF/16V Tantal! C106
ok	RF	RX/TX: R53--> 220R , R54--> 3k9
ok	RF	DC_float: C71=C73--> 0R
ok	RF	PA_stability: C94=C95 remain 47nF!
ok	RF	Regulator_bias_floating: 2k2 C96, C96 --> 2x22uF/16V (33uF ta)
ok	RF	P/SWR: R59=R60--> 0R , R58=R62--> 2k2 , C82=C83--> 2u2 , R55=R56--> 47uH
ok	RF	P/SWR: T2, T3 changed primary to coax (RG-178), sec. T2 c-clockwise!!!, sec. T3 clockwise
ok	RF	TX_Pwr: T5 changed to core BN43-2402 (by KA7OEI)
ok	RF	TX: T6, bifilar
ok	RF	TX_Pwr: T7 changed/modified - 2x core BN43-202 , PRIM=2x1T, SEC=2x3T, 270pF across prim., 100nF from +Vcc to GND (by S54AM)
ok	RF	PA_Bias_reduction_in_RX_mode: R74=R76-->2k2, R73=R75-->from base of Q3,4 up and C=100nF to GND, this junction to near PTT_5V at R7
ok	RF	Drivers R77=R79= 47R
ok	UI	U1 pin23,24 – R6,R7 --> UI_3V_MCU (C86+)
ok	RF	C104 10uF/16V
ok	UI	PB1 --> R14 100nF, Q1 source --> A_3V (C13+)
ok	UI	Blocking ADC: PA2,3,6 on P1 pin9,10,11 --> 1nF to GND
ok	UI	RFC1,2,3 --> 47uH (15uH)
ok	UI	U6 --> KA78RM33 (LDO 0,6V)
ok	RF	U5 --> KA78RM33 (LDO 0,6V)
-	RF	To avoid PA osc.: RFC8 10R

6.b Aleksandr LY3BD:

ok	UI	To avoid floating DC: C18=C19=C7a=C8a ---> 0R
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6.c Paolo IZ6MAF:

ok	RF	RFC5=RFC6=47uH: change to 6 turns on core BN43-2402
ok	UI	LCD_noise: 2 x 150uF tantal + 100nF in parallel to LCD pins 1-2, 100nF to LCD pins 39-40
ok	RF	CMOS_switch_bias, lower Rs: R1a=R1c=R2b=R2d=1k8, R50=390, R69-->2k2
ok	RF	SWR: move T3 primary cold tap to the RF output

6.d Andreas DF8OE:

ok	RF	TX_Pwr: changed driver transistors to BFQ18A
ok	RF/UI	MCU_ESD: add 2 x Zener 3V3 from P1 pin 12, 13 to GND for paddle conector J2
ok	UI	LCD: removed R30, R31, R32
ok	UI	LCD: added 5 lines for Touchscreen SPI LCD
ok	UI	LCD: added 3 lines for LCD in SPI mode
-	UI	AF AMP: from +8Vreg to +12V via FET
ok	RF	Additional tantal C=10uF C106
ok	UI	RTC clock: HW mod, 32kHz XTAL, rewired 2 buttons
ok	RF	Changed RX/TX switch from PIN to a relay
ok	RF	Removed U9, wire pin2-4, R19=0R
ok	RF	Removed U12,13, wire pin1-6 and 3-4
ok	RF	Remove U20,21,22,23 and C109,110,111,112, wire +C109-pin5, ...
ok	RF	Change U11 74AC74 to Potato 74G74
ok	RF	Remove C38, 39
todo	RF	Additional tantal C=10uF C65

6.e Bojan S53DZ:

ok	RF	TX_Pwr: additional 10uF/35V tantal to the middle tap of T7
ok	RF	RX_10m_mirror: 100nF from the center pad of T1 to GND
ok	RF	RX_10m_mirror: additional wire from U15 pin 8 GND to C65 GND pad
ok	UI	STM32F407VET6 --> STM32F429VGT6

7. mCHF SW Recomendded setup for better S/N (around DC)

(ok) SW: +12kHz Frequency Translate ON / set to "RX LO LOW"

References:

1. MONKA mCHF home page
http://www.m0nka.co.uk/?page_id=2
http://www.m0nka.co.uk/?page_id=569
2. KA7OEI mCHF FW and HW modifications
<http://ka7oei.blogspot.si/>
<http://ka7oei.blogspot.si/2015/11/adding-fm-to-mchf-sdr-transceiver.html>
3. MONKA-mCHF yahoo group
<https://uk.groups.yahoo.com/neo/groups/MONKA-mCHF/info>
4. DF8OE git-hub mCHF development
<https://github.com/df8oe/UHSDR/>
<http://df8oe.github.io/UHSDR/>

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