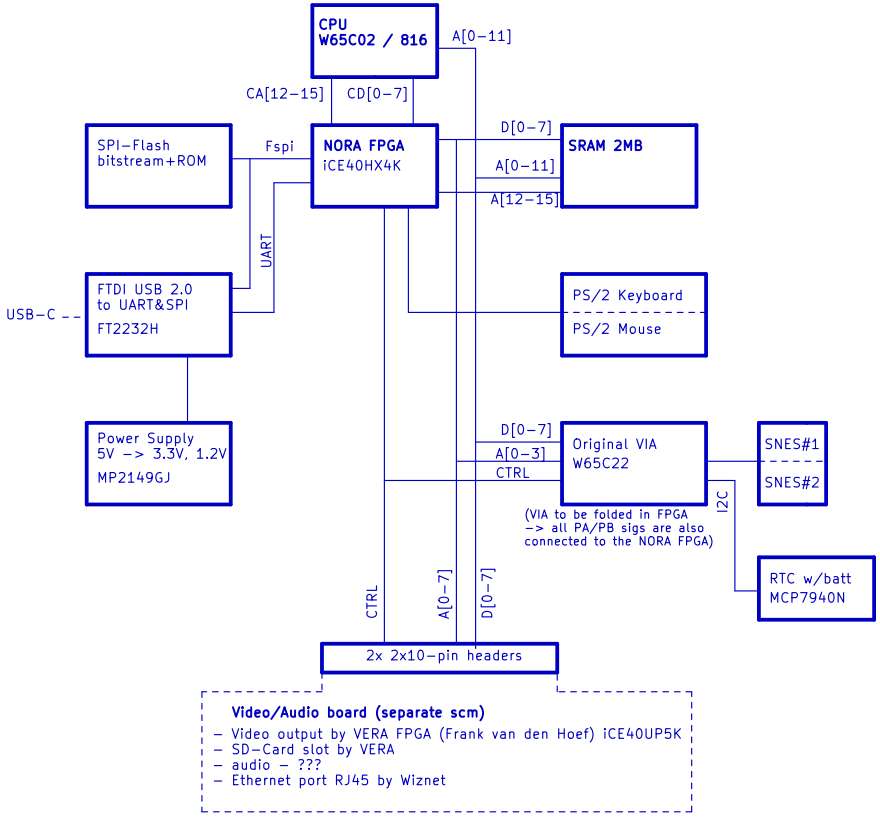
# Computer OpenX65 by X65.EU

## MOTHERBOARD (MO-BO) WITH THE CPU W65Cxx

### Block Diagram:




### Revision History:

| | |
|---|---|
| rev01 / 30.3.2023 | Initial design. PCB 100x100mm, 2-L.<br>First PCB production: PCBWAY on 29.3.2023<br>file: openx65-mobo-rev01b-grb.zip |

### Schematic sheets:

CPU+SRAM
2
File: cpu_sram.kicad_sch

FPGA
3
File: fpga.kicad_sch

VIA, RTC, SNES
4
File: via_rtc.kicad_sch

USB-Terminal
5
File: usbdev.kicad_sch

VA-Board, PS2
6
File: b2b-conns.kicad_sch

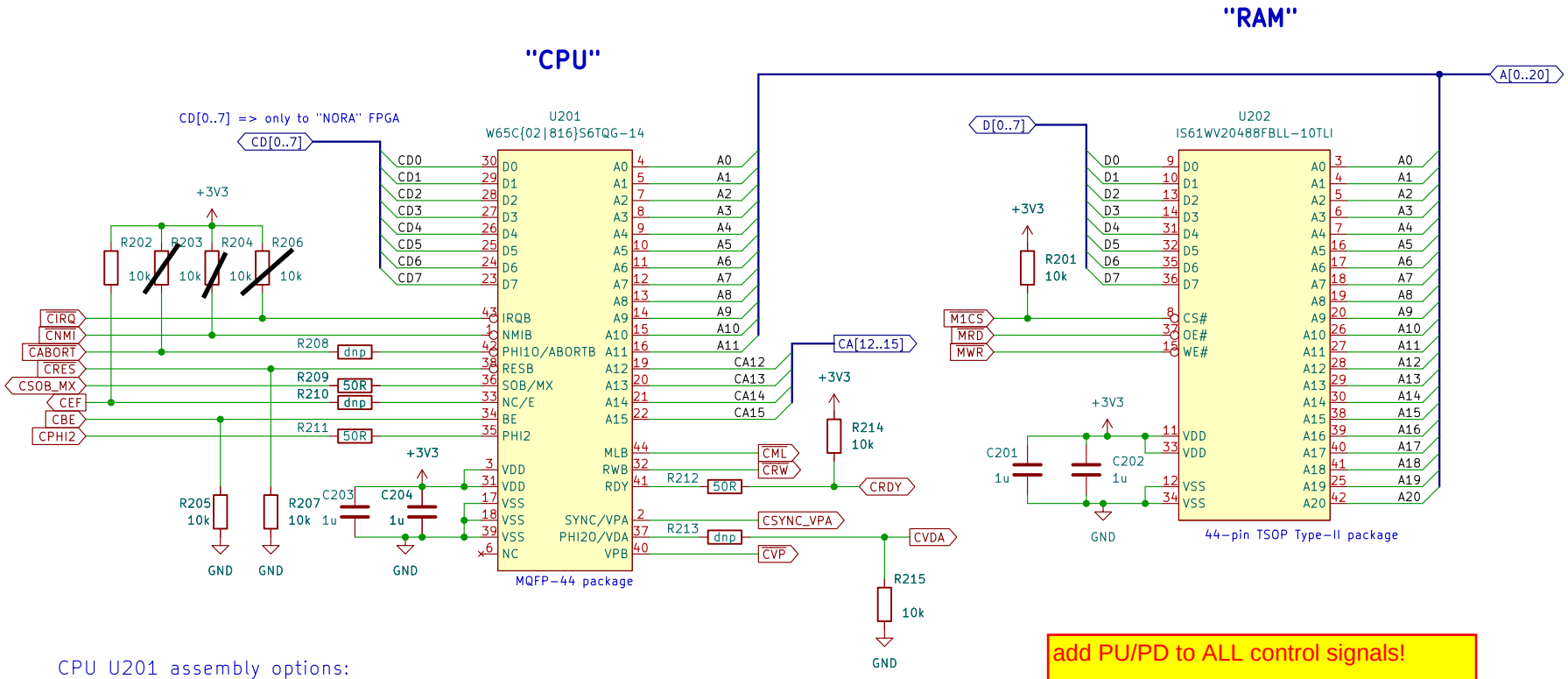
Power Supply
7
File: pwrsup.kicad_sch

FID101 Fiducial
FID102 Fiducial
FID103 Fiducial
FID104 Fiducial

H101 MountingHole
H102 MountingHole
H103 MountingHole
H104 MountingHole

connect holes to GND

OpenX65 MOTHERBOARD
**FOR X65.EU DESIGNED BY JSYKORA.INFO**
Sheet: /
File: open65.kicad_sch
***Title: OpenX65***
Size: A4 | Date: 2023-03-30 | **Rev: rev01**
KiCad E.D.A. kicad (6.0.7) | Id: 1/7




add PU/PD to ALL control signals!

CPU U201 assembly options:

a) W65C02S6TQG-14 => 8-bit CPU
=> do not populate R208, R210, R213

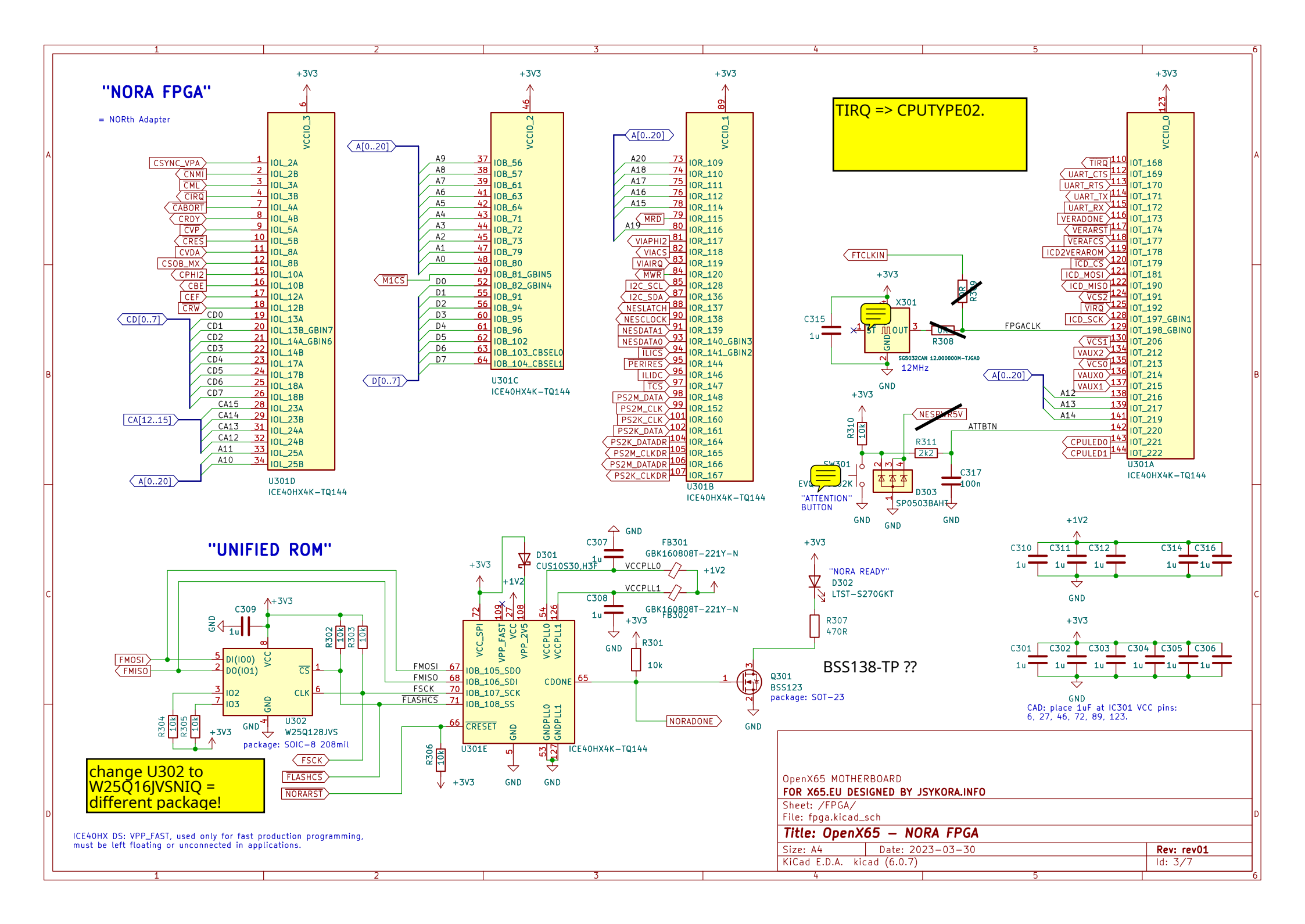
b) W65C816S6TQG-14 => 16-bit CPU (not 100% compatible with the 8-bit!!)
=> R208=R210=R213=50ohm

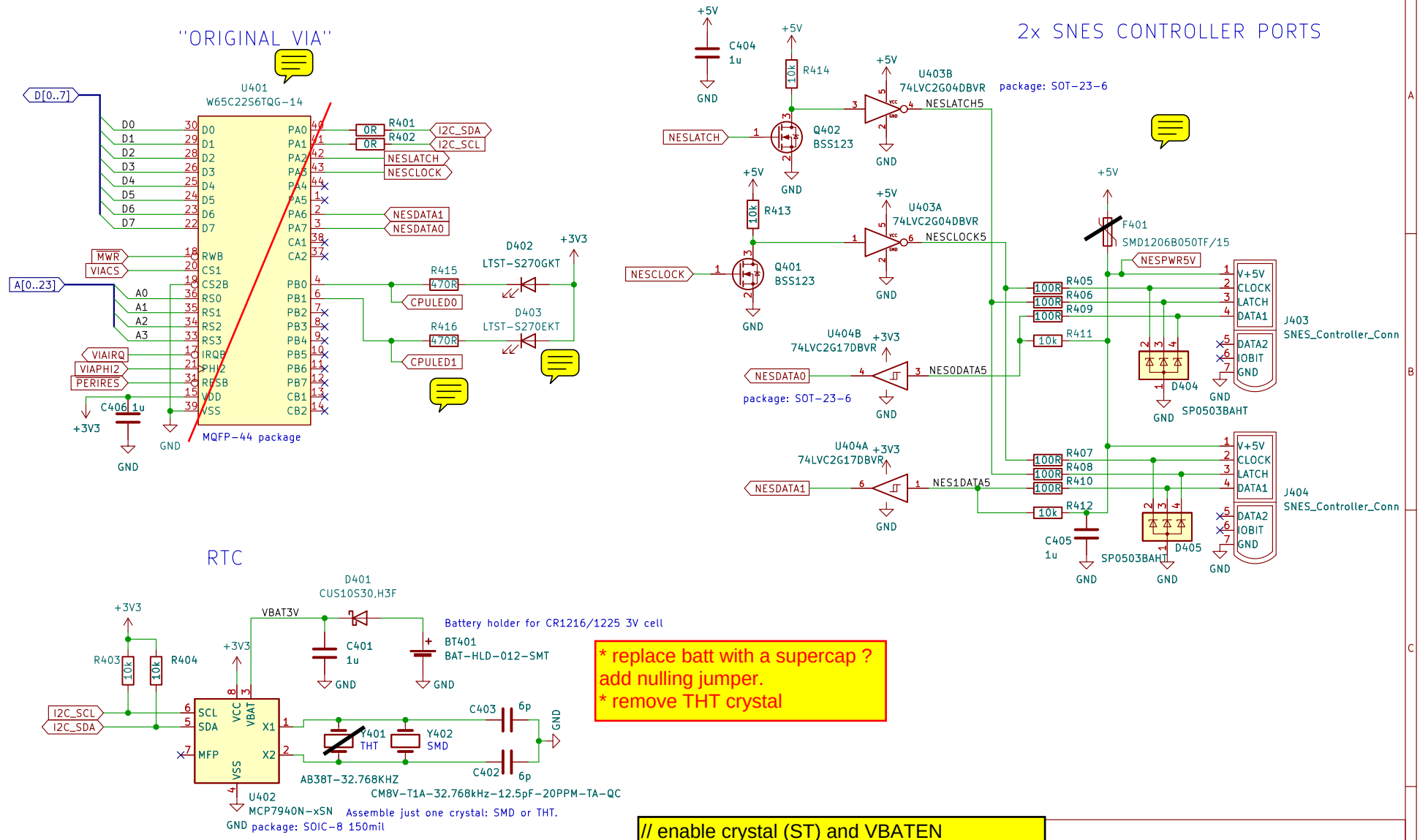
OpenX65 MOTHERBOARD
**FOR X65.EU DESIGNED BY JSYKORA.INFO**

Sheet: /CPU+SRAM/
File: cpu_sram.kicad_sch

***Title: OpenX65 – CPU and SRAM***

| | | |
|---|---|---|
| Size: A4 | Date: 2023-03-30 | **Rev: rev01** |
| KiCad E.D.A. kicad (6.0.7) | | Id: 2/7 |


"NORA FPGA"
= NORth Adapter
TIRQ => CPUTYPE02.
"UNIFIED ROM"
change U302 to W25Q16JVSNIQ = different package!
BSS138-TP ??
ICE40HX DS: VPP_FAST, used only for fast production programming, must be left floating or unconnected in applications.
CAD: place 1uF at IC301 VCC pins: 6, 27, 46, 72, 89, 123.
OpenX65 MOTHERBOARD
FOR X65.EU DESIGNED BY JSYKORA.INFO
Sheet: /FPGA/
File: fpga.kicad_sch
Title: OpenX65 – NORA FPGA
Size: A4
Date: 2023-03-30
Rev: rev01
KiCad E.D.A. kicad (6.0.7)
Id: 3/7


''ORIGINAL VIA''
U401
W65C22S6TQG-14
MQFP-44 package
D[0..7]
A[0..23]
MWR
VIACS
VIAIRQ
VIAPHI2
PERIRES
R401
R402
0R
I2C_SDA
I2C_SCL
NESLATCH
NESCLOCK
NESDATA1
NESDATA0
R415
470R
CPULED0
R416
CPULED1
D402
LTST-S270GKT
D403
LTST-S270EKT
+3V3
C406 1u
2x SNES CONTROLLER PORTS
C404
1u
R414
10k
U403B
74LVC2G04DBVR
package: SOT-23-6
NESLATCH5
Q402
BSS123
R413
U403A
NESCLOCK5
Q401
F401
SMD1206B050TF/15
NESPWR5V
R405
R406
R409
100R
R411
J403
SNES_Controller_Conn
V+5V
CLOCK
LATCH
DATA1
DATA2
IOBIT
GND
D404
SP0503BAHT
U404B
74LVC2G17DBVR
NES0DATA5
U404A
NES1DATA5
R407
R408
R410
R412
C405
J404
D405
RTC
D401
CUS10S30,H3F
VBAT3V
Battery holder for CR1216/1225 3V cell
BT401
BAT-HLD-012-SMT
C401
R403
R404
C403
6p
C402
Y401
THT
Y402
SMD
AB38T-32.768KHZ
CM8V-T1A-32.768kHz-12.5pF-20PPM-TA-QC
U402
MCP7940N-xSN
Assemble just one crystal: SMD or THT.
package: SOIC-8 150mil
* replace batt with a supercap ?
add nulling jumper.
* remove THT crystal
* crystal loading shall be 6-9pf; 12pf not recommended!
* CX should be 2* Xloading
* layout must be corrected - see DS
// enable crystal (ST) and VBATEN
I2CPOKE $6F, 0, 128
I2CPOKE $6F, 3, 8
Title: OpenX65 – VIA, SNES Controller, RTC
Size: A4
Date: 2023-03-30
Rev: rev01
KiCad E.D.A. kicad (6.0.7)
Id: 4/7

# USB 2.0 WITH USB-C / UART TERMINAL AND ICD (In-Circuit Debugger)

fuse F501 = remove

R503 - 0R, resp. usb shield to gnd

* vymazat vsechny 0R, az bude obvod potvrzen!
* pridat PU/PD pro definovani stavu

add TYPE02 strapping:
65C02 => pull-up 10k
65C816 => pull-down 1k

nVERAFCS -> active high;
nVERA2FCS -> AURAFCS;
nVERARST -> nVRST;
ICD2VERAROM -> nARST

ICD2NORAROM -> ICD2FLASH

U503 74CBTLV3126PW,118 — package: TSSOP-14

U501 FT2232H-56Q — package: VQFN-56 (!!)

U504 FT2232HL — package: LQFP-64

Alternative assembly: FT2232HL in LQFP-64 package

U502 93LC56BT-I/SN — ORG16 - B option - necessary — package: SOIC-8 150mil

J501 USB4085-GF-A

D501 CUS10S30,H3F

D503 SD05_SOD323 (dnp)

F501 SMD1206B050TF/15

D504 SP0503BAHT

JP501 Jumper_2_Open

Y501 ABLS-12.000MHZ-B4-T 12MHz

D502 LTST-S270GKT UART RX/TX

to flash memory

to in-circuit debug in FPGA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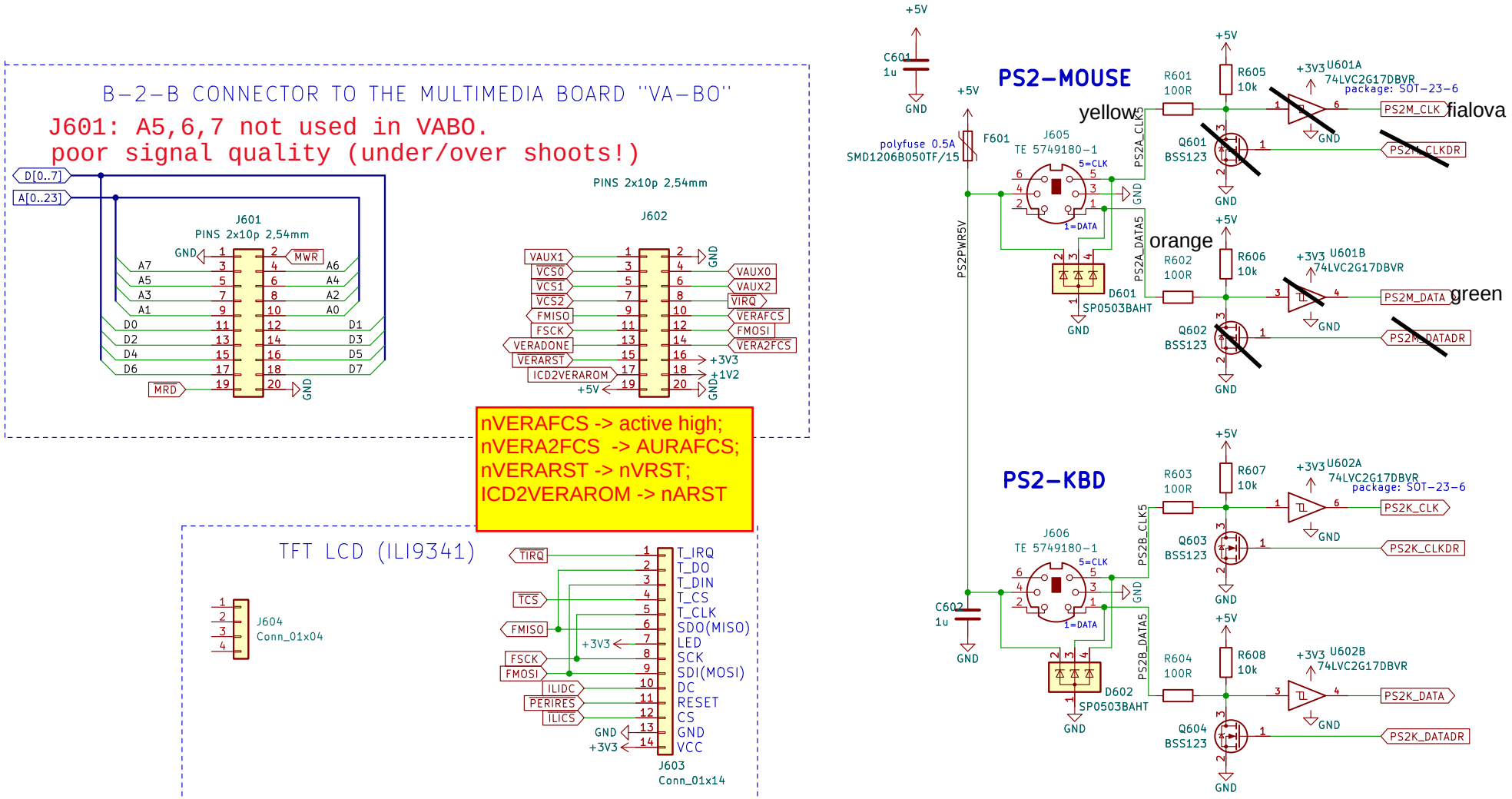
Sheet: /USB-Terminal/
File: usbdev.kicad_sch

**Title: OpenX65 - USB Terminal with UART and ICD**

| Size: A3 | Date: 2023-03-30 | Rev: rev01 |
|---|---|---|
| KiCad E.D.A. kicad (6.0.7) | | Id: 5/7 |




OpenX65 MOTHERBOARD

**FOR X65.EU DESIGNED BY JSYKORA.INFO**

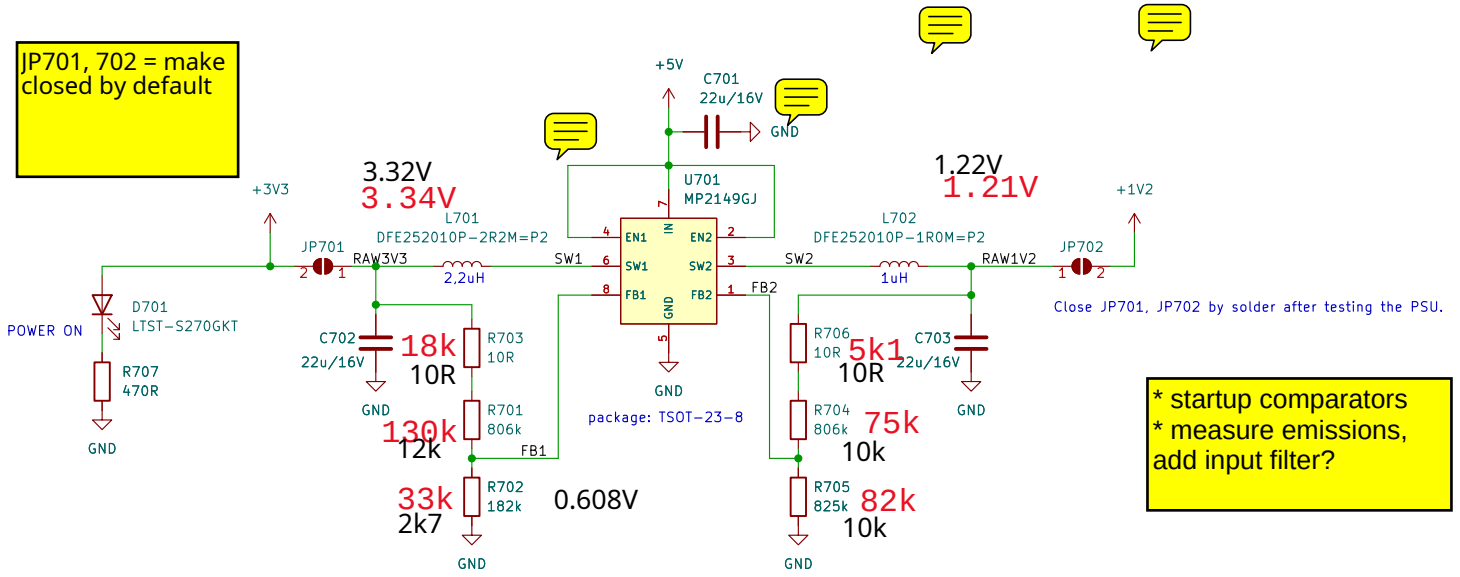
Sheet: /VA-Board, PS2/

File: b2b-conns.kicad_sch

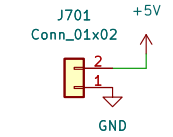
***Title: OpenX65 – PS/2 and Multimedia Connector***

| Size: A4 | Date: 2023-03-30 | **Rev: rev01** |
|---|---|---|
| KiCad E.D.A. kicad (6.0.7) | | Id: 6/7 |

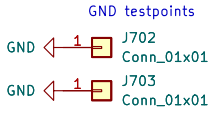
# POWER SUPPLY
## 5V -> 3.3V, 1.2V




Alternative power input connector




GND testpoints




Consumption:
@3V3: mobo alone = 80mA,
whole computer = 170-200mA (VGA, CX16 rom runs), with LAN = 230mA, +calliope=250mA
@1V2: 17mA

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Sheet: /Power Supply/
File: pwrsup.kicad_sch

***Title: OpenX65 – Power Supply***

| | | |
|---|---|---|
| Size: A4 | Date: 2023-03-30 | **Rev: rev01** |
| KiCad E.D.A. kicad (6.0.7) | | Id: 7/7 |