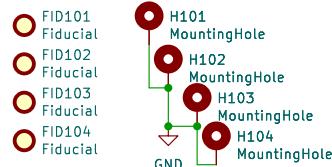
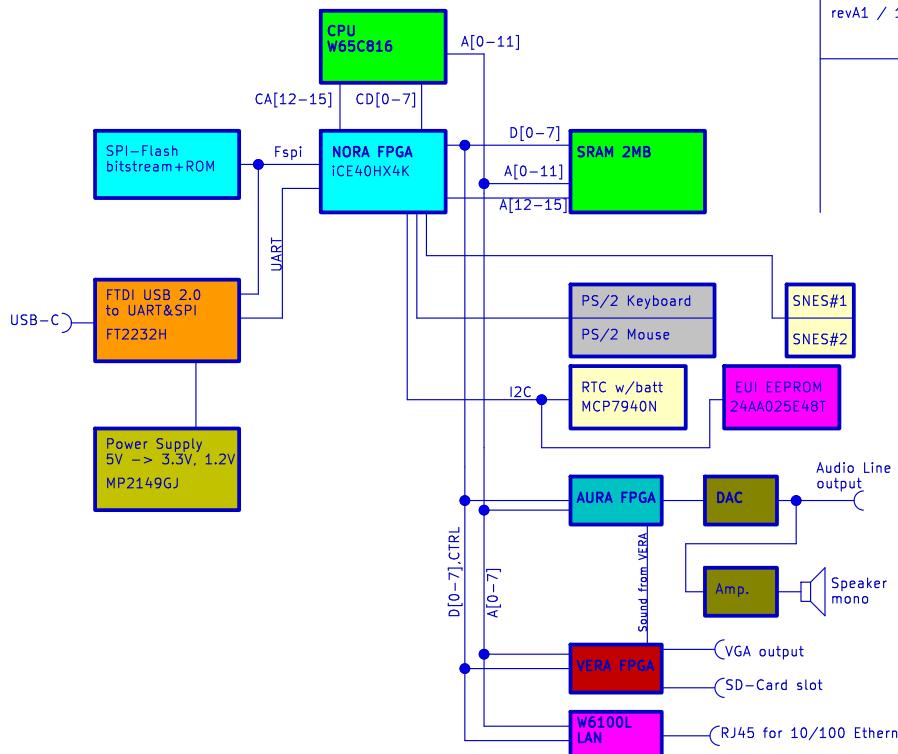


X65 SBC rev.A1

Single-Board-Computer WITH THE 65816 (6502) CPU,
2MB RAM, VGA, Sound, 2x PS/2, 2x SNES Joypad, Ethernet LAN

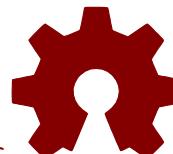
Block Diagram:



Important Links:
x65.eu
www.jsykora.info
github.com/jsyk/x65

Revision History:

revA1 / 13.1.2024	Initial design based on MOBO+VABO rev001. PCB 180x100mm, 4-L.
	which 1u can be converted to 100n?
	minimize types of res, caps
	define exact type of green and yellow LEDs



X65 IS
OPEN SOURCE:

- + CIRCUIT SCHEMATIC
- + PCB LAYOUT
- + VERILOG FPGA DESIGN
- + TOOLS USED
- + ORIGINAL SOFTWARE

X65 Single Board Computer
FOR X65.EU DESIGNED BY JSYKORA.INFO

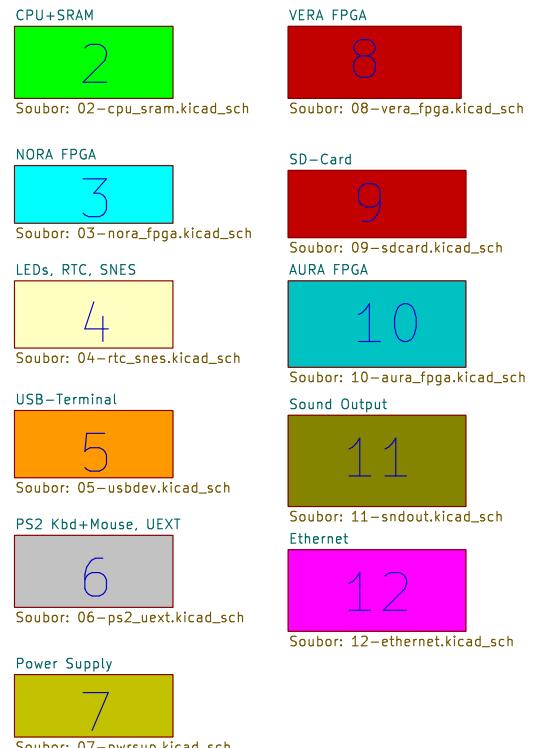
Sheet: /
File: x65-sbc-revA1.kicad_sch

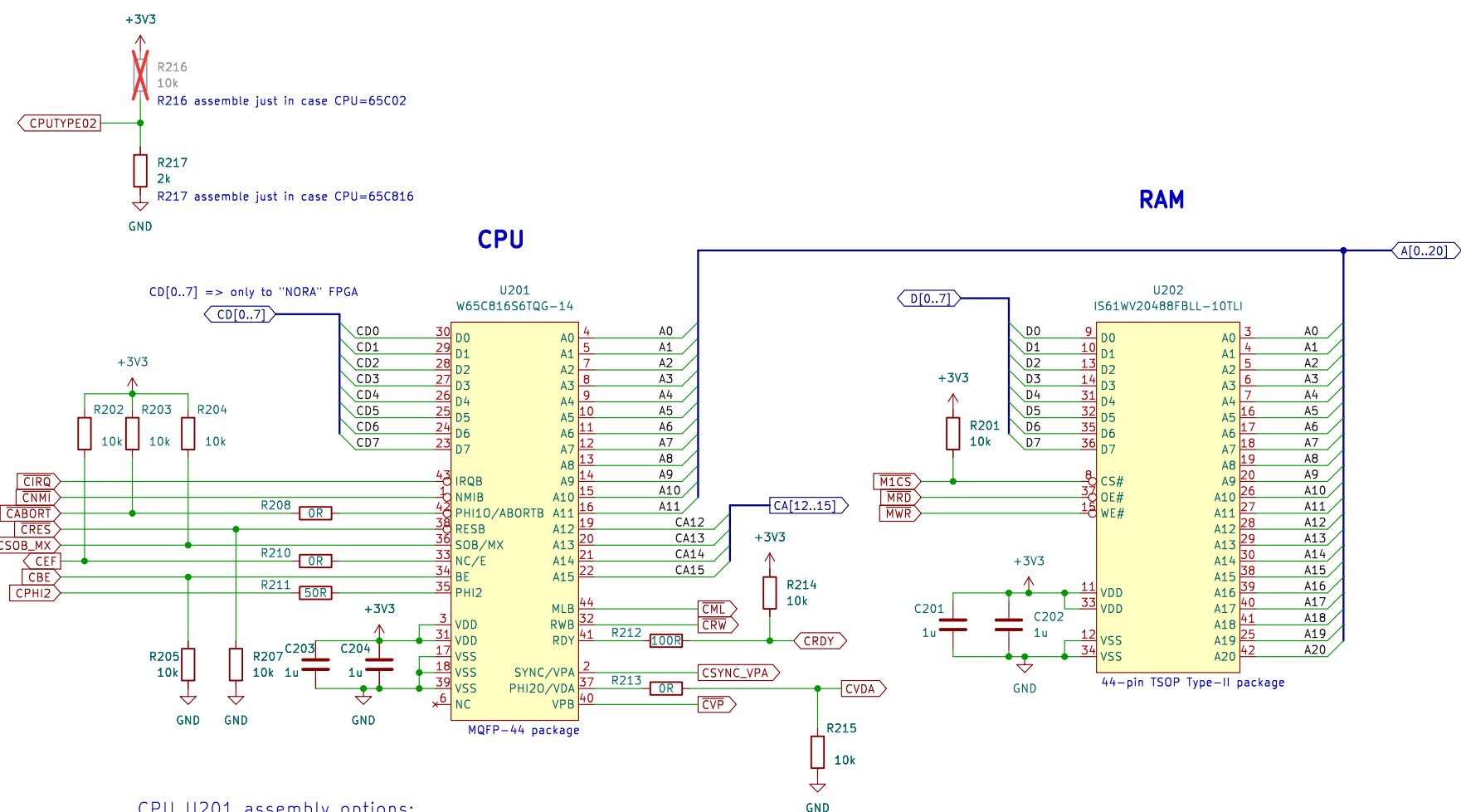
Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1
Id: 1/12

Schematic sheets:





65816 CPU, 2MB SRAM
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /CPU+SRAM/
File: 02-cpu_sram.kicad_sch

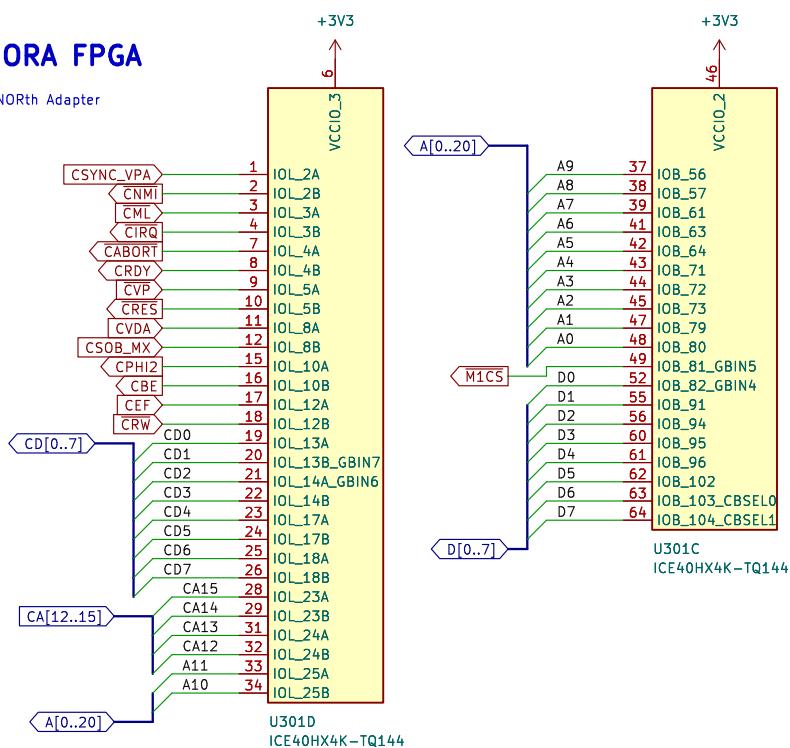
Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1
Id: 2/12

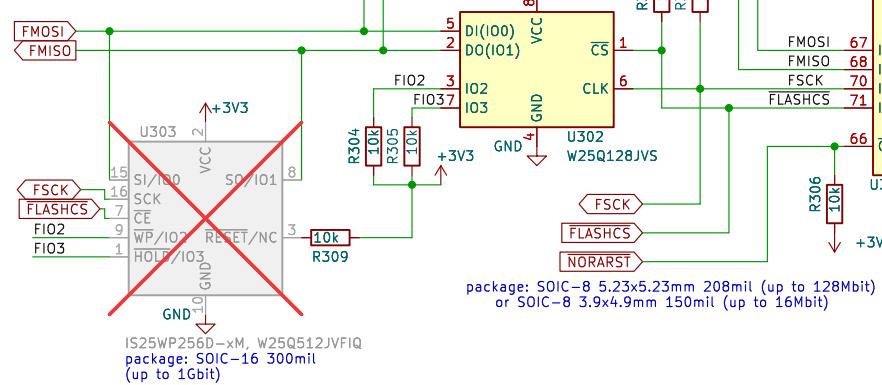
NORA FPGA

= NORth Adapter



ICE40HX DS: VPP_FAST, used only for fast production programming,
must be left floating or unconnected in applications.

UNIFIED ROM



NORA FPGA with UNIFIED ROM SPI-Flash
FOR X65.EU DESIGNED BY JSYKORA.INFO

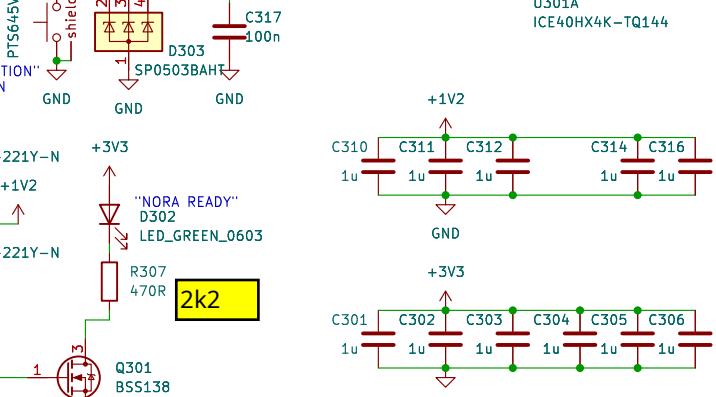
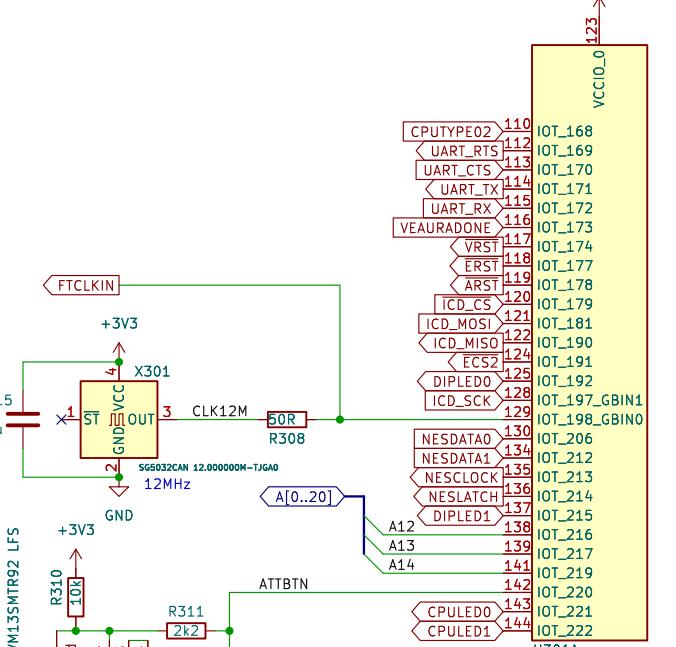
Sheet: /NORA_FPGA/
File: 03-nora_fpga.kicad_sch

Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1

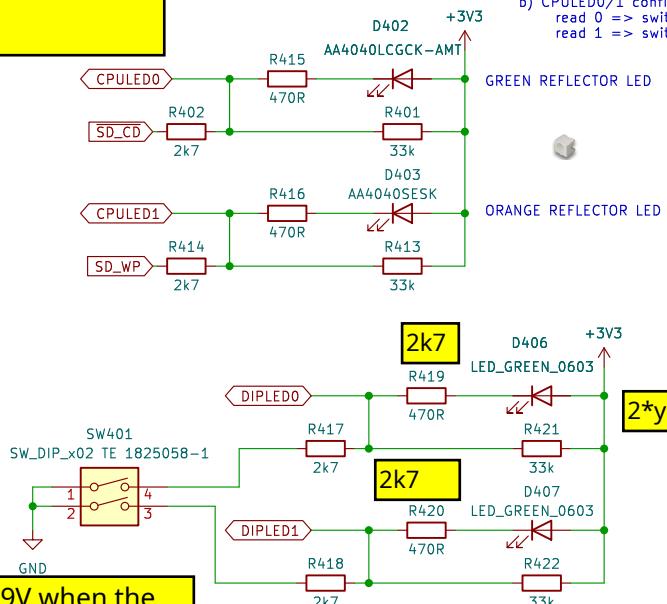
Id: 3/12



CPULEDx is cca 1.3V when the switch is closed => not enough drive from the switch!!
Change R417, R418 to cca 270R

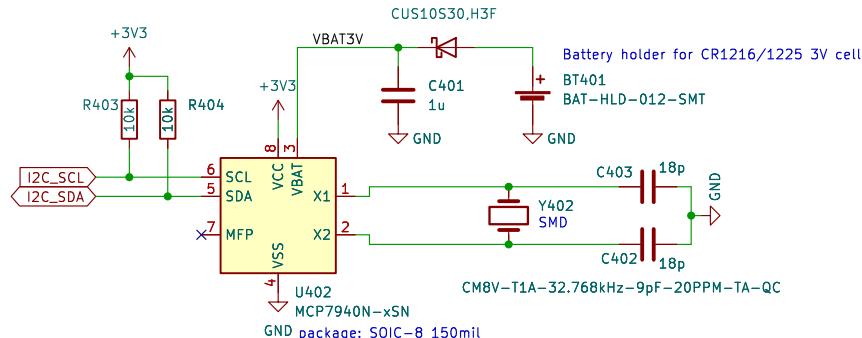
go back to the flat LEDs in MOBO.
Reflector LEDs are fragile/expensive.

User LEDs



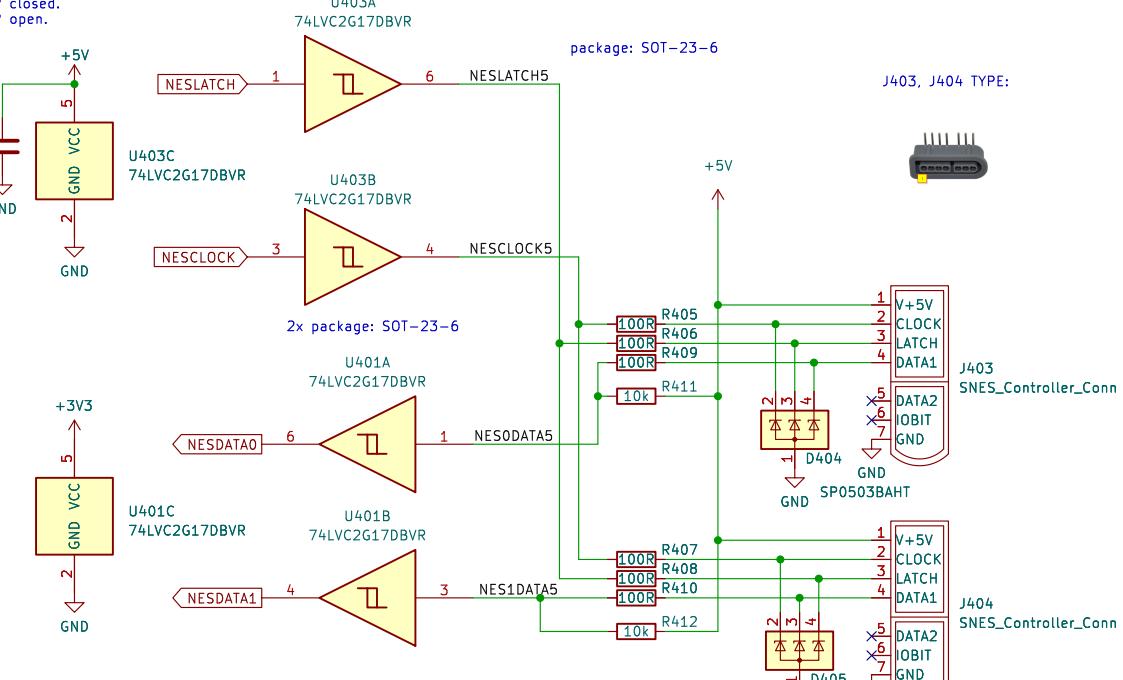
DIPLED is cca 0.9V when the DIP is ON !!
Reduce R417, R418

RTC



RTC/MCP7940N I2C DEVICE ADDRESS (8b-shifted) = 0b1101_111W = 0xDE, that is 7-bit addr 0x6F
PS2 CONTROLLER (IN NORA) I2C DEVICE ADDRESS (8b-shifted) = 0b1000010W = 0x84, that is 7-bit addr 0x42

2x SNES JOYPAD CONTROLLER PORTS



User LEDs, SNES Joystick, RTC
FOR X65.EU DESIGNED BY JSYKORA.INFO

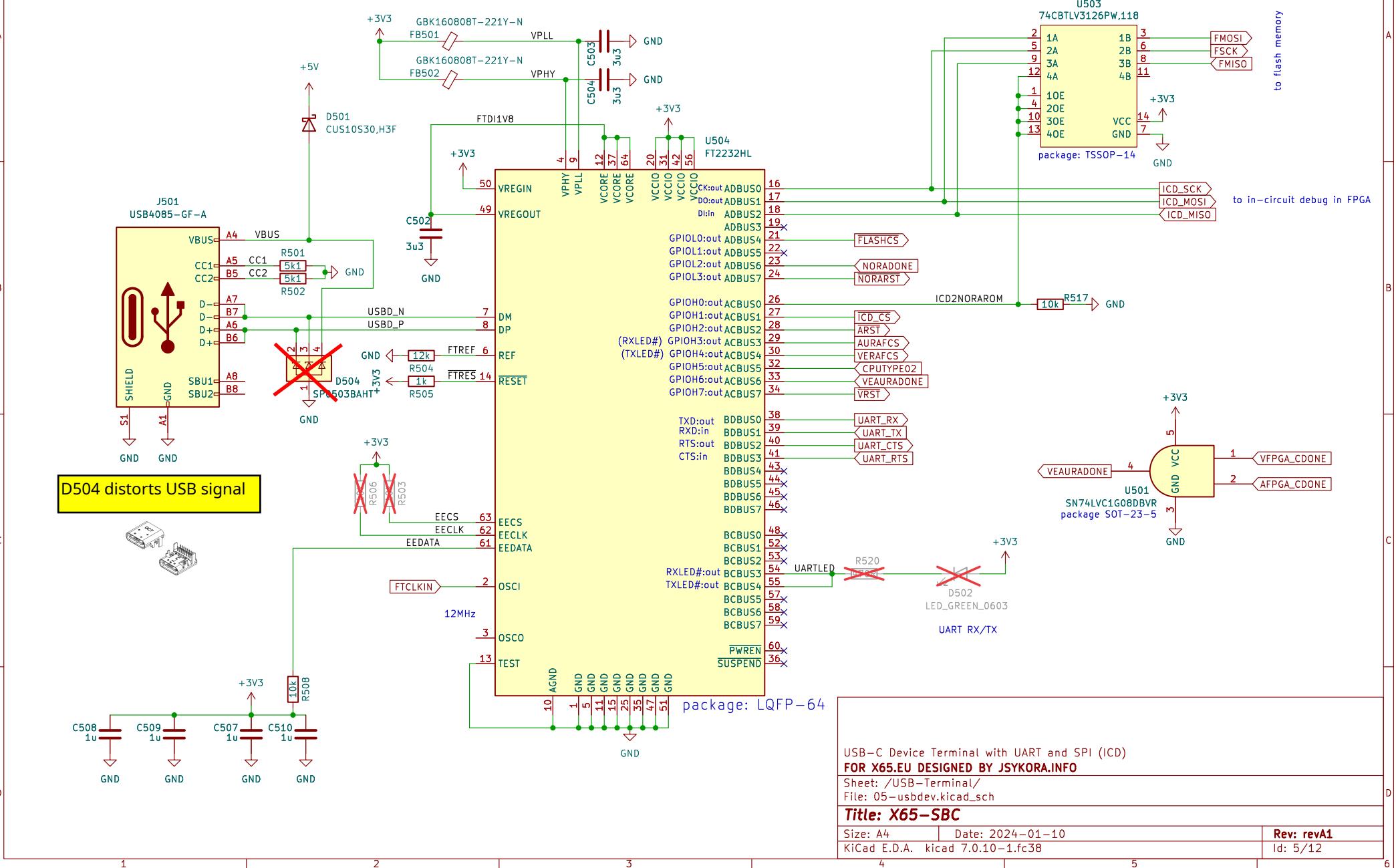
Sheet: /LEDs, RTC, SNES/
File: 04-rtc_snes.kicad_sch

Title: X65-SBC

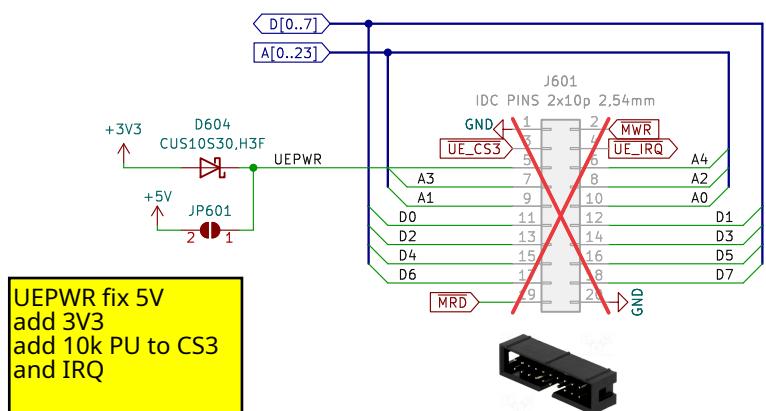
Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1
Id: 4/12

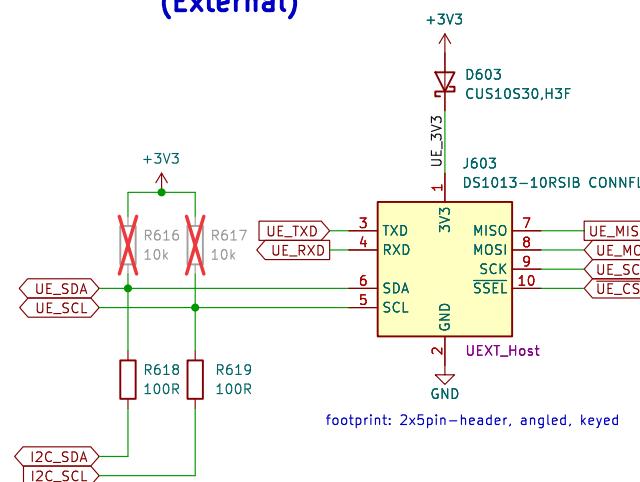
USB 2.0 WITH USB-C / UART TERMINAL AND ICD (In-Circuit Debugger)



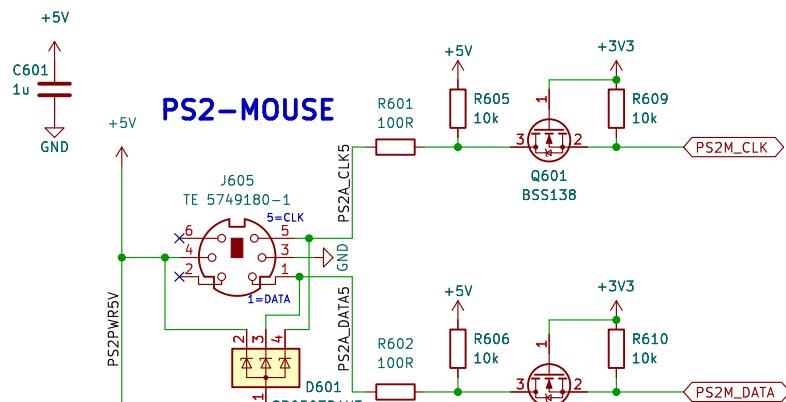
Extension Connector (Internal)



UEXT HOST Connector (External)

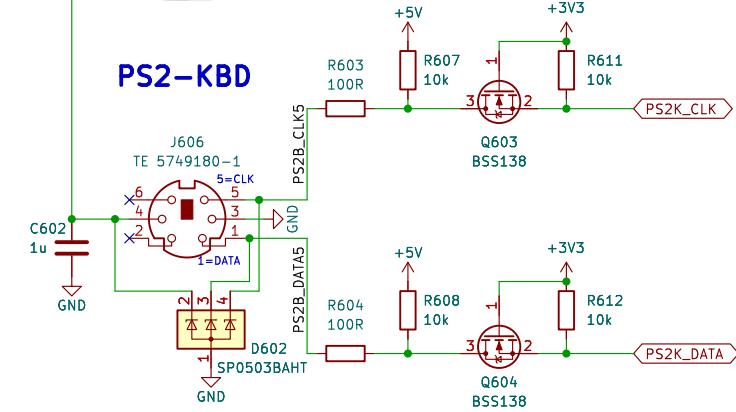


PS2-MOUSE



ps2 conn add: KMDGX-6S-BS

PS2-KBD



Extension Connectors, PS2 KBD and Mouse ports
FOR X65.EU DESIGNED BY JSYKORA.INFO

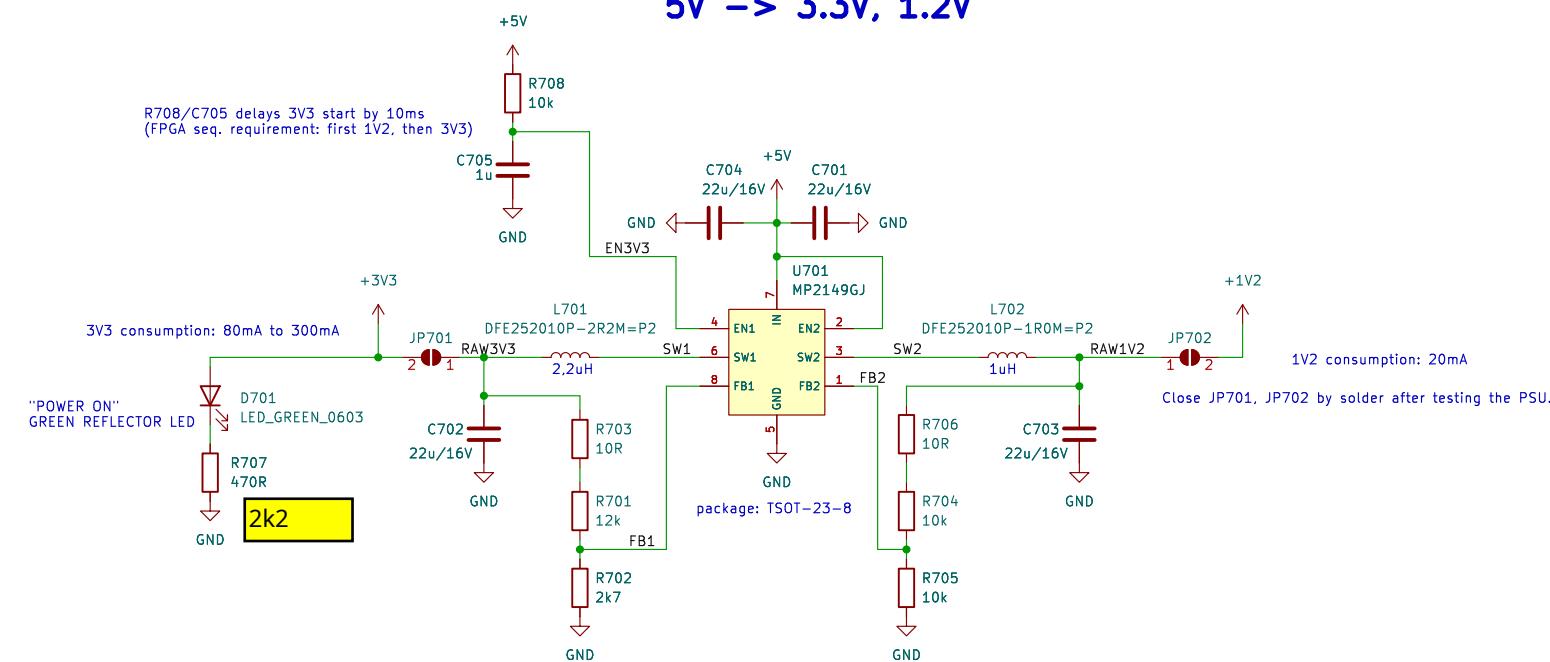
Sheet: /PS2_Kbd+Mouse, UEXT/
File: 06-ps2_uext.kicad_sch

Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1
Id: 6/12

POWER SUPPLY 5V → 3.3V, 1.2V



Alternative power input connector



GND testpoints

- GND ↗ J702 Conn_01x01
- GND ↗ J703 Conn_01x01
- GND ↗ J704 Conn_01x01

Power supplies 3.3V and 1.2V
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Power Supply/
File: 07-pwrsup.kicad_sch

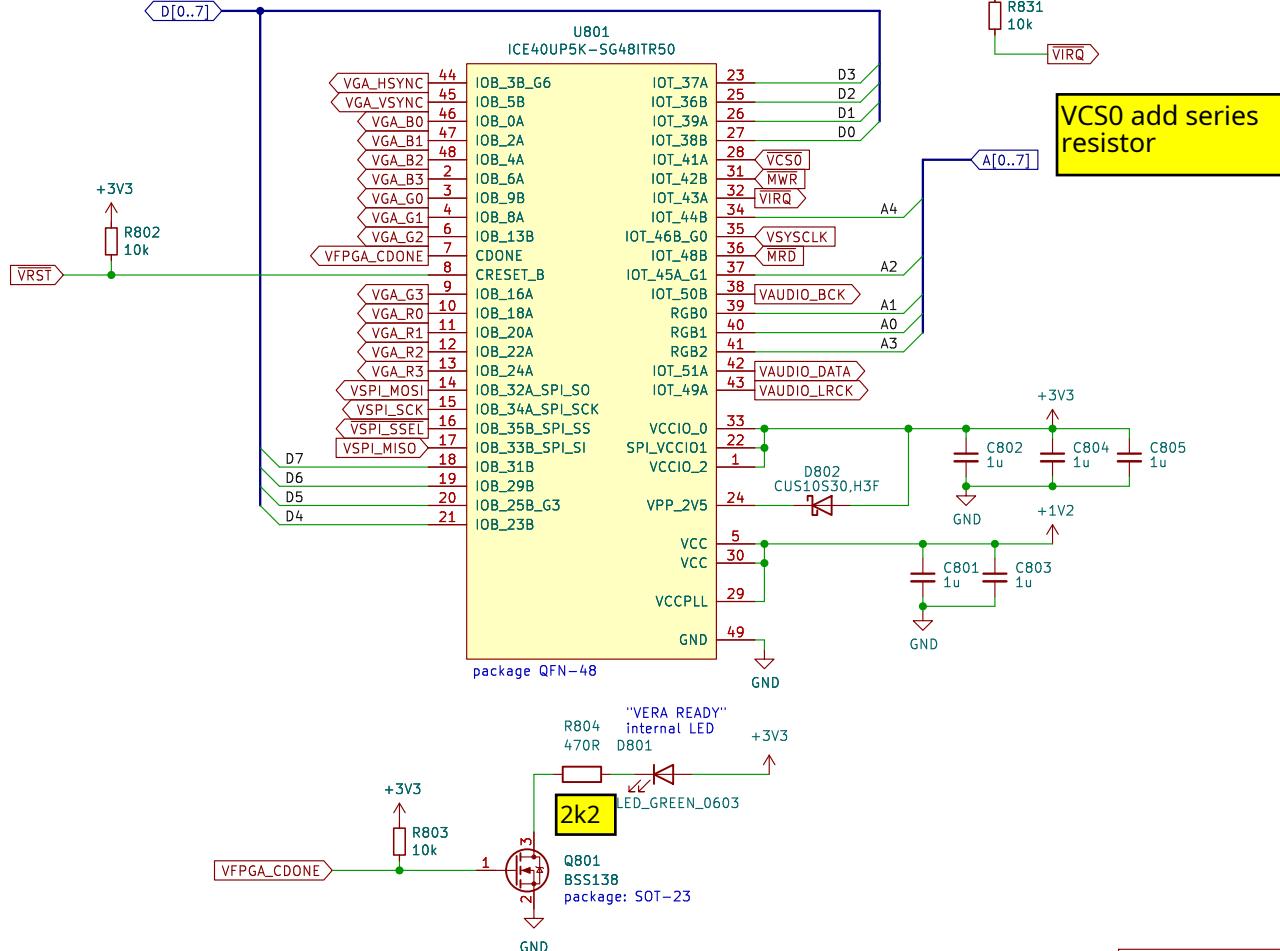
Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

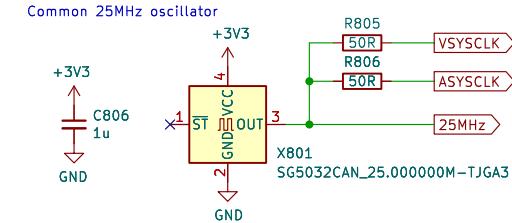
Rev: revA1
Id: 7/12

"VERA" FPGA – Video Embedded Retro Adapter

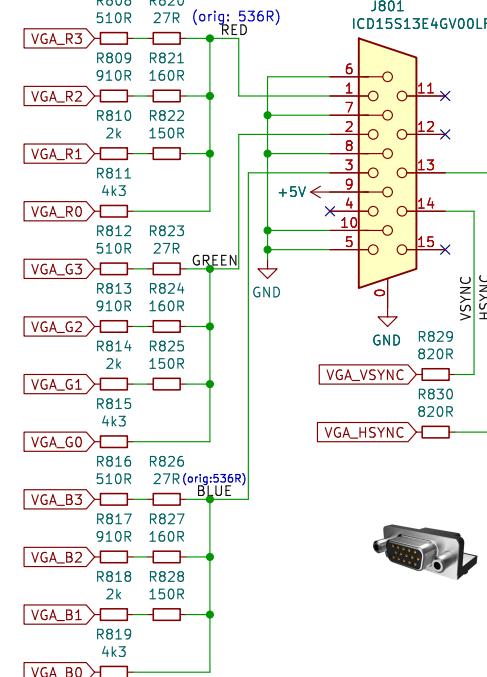
A

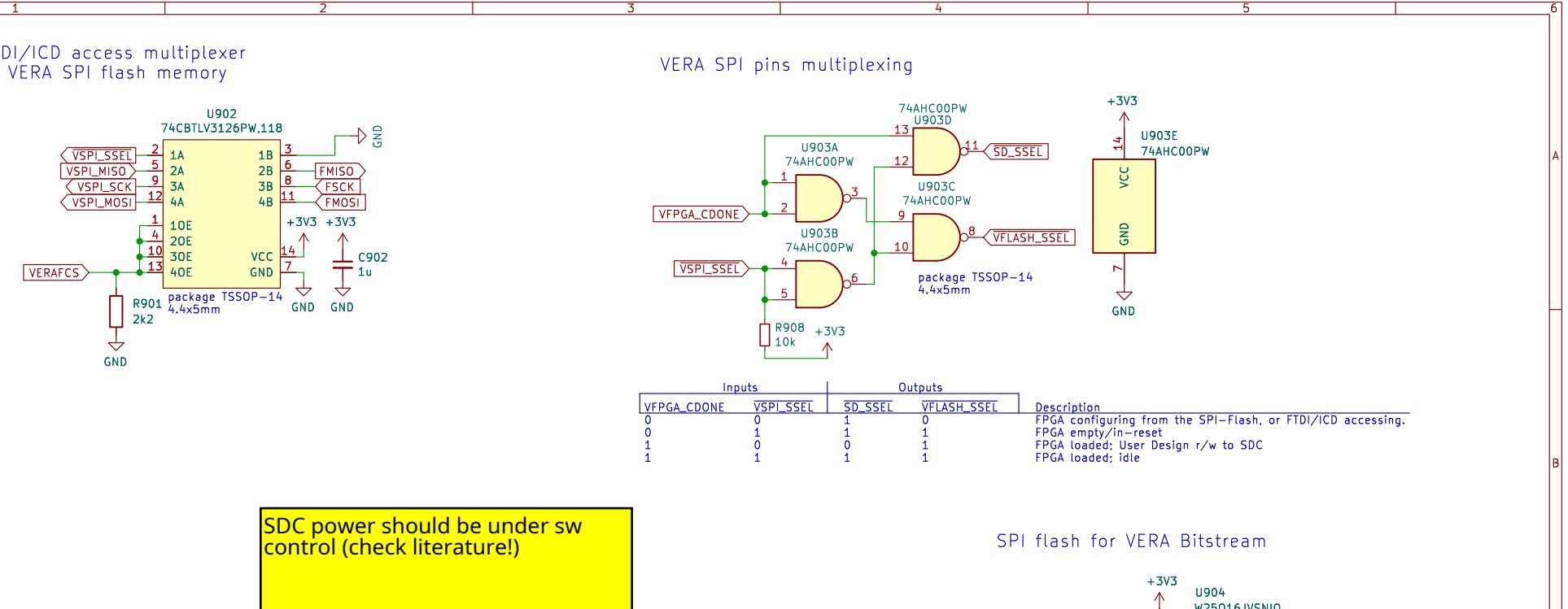


B

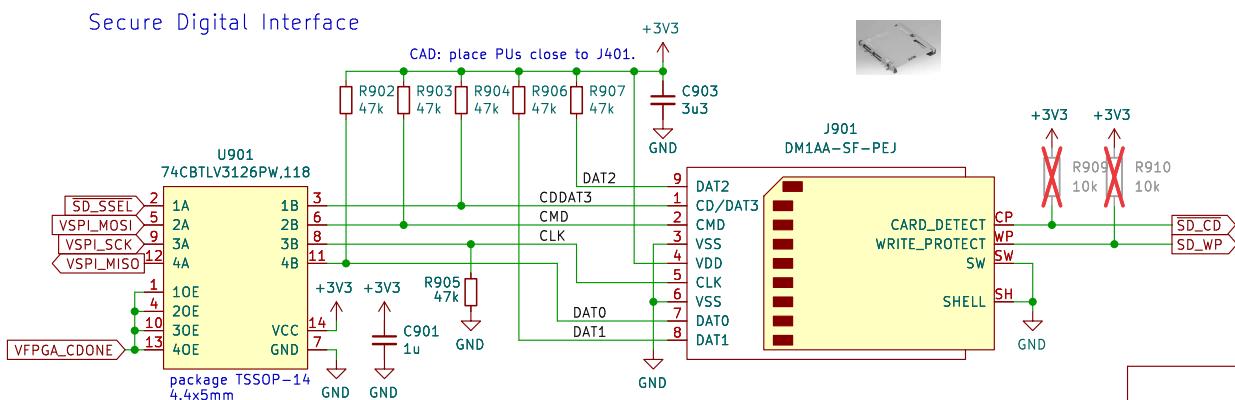


VGA interface

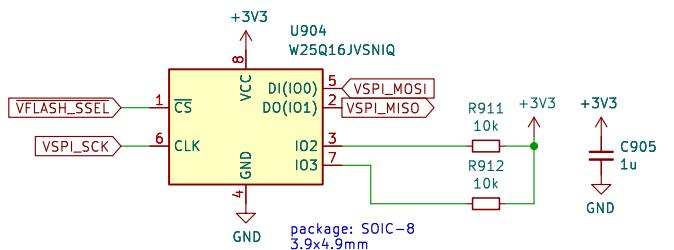




SDC power should be under sw control (check literature!)



SPI flash for VERA Bitstream



This schematic contains portions of work done by Frank van den Hoe for the project VERA: <https://github.com/fvdhoef/vera-module>

SD-Card slot, SPI-Flash for VERA
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /SD-Card/
File: 09-sdcard.kicad_sch

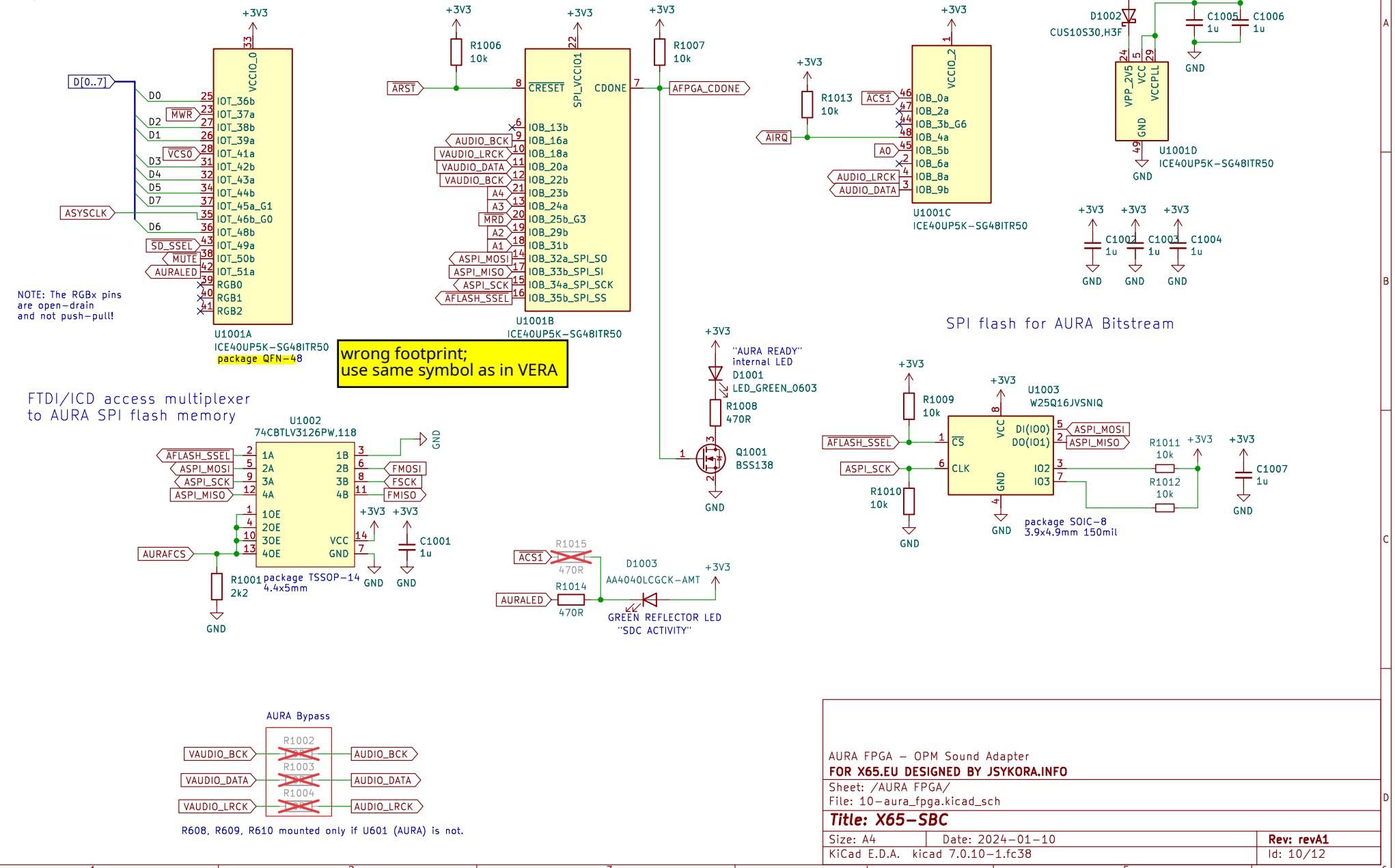
Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

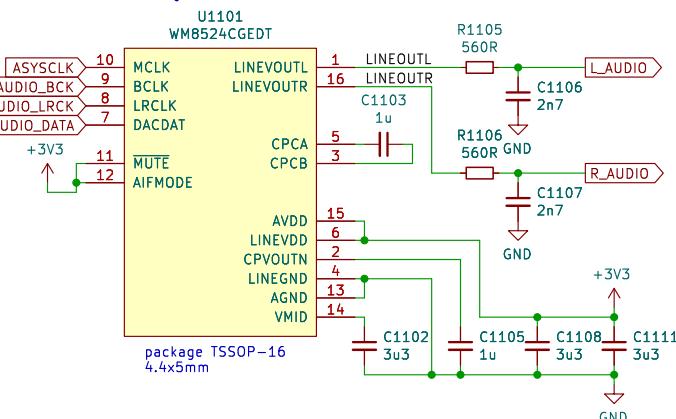
Rev: revA1
Id: 9/12

"AURA" FPGA – Audio Retro Adapter

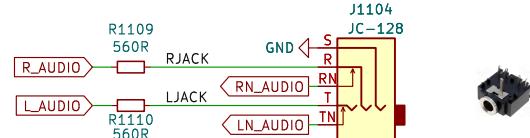
AURA implements the YM2151 FM-Synthesis (the chip is long out of production).
Design is based on IKAOPM core.



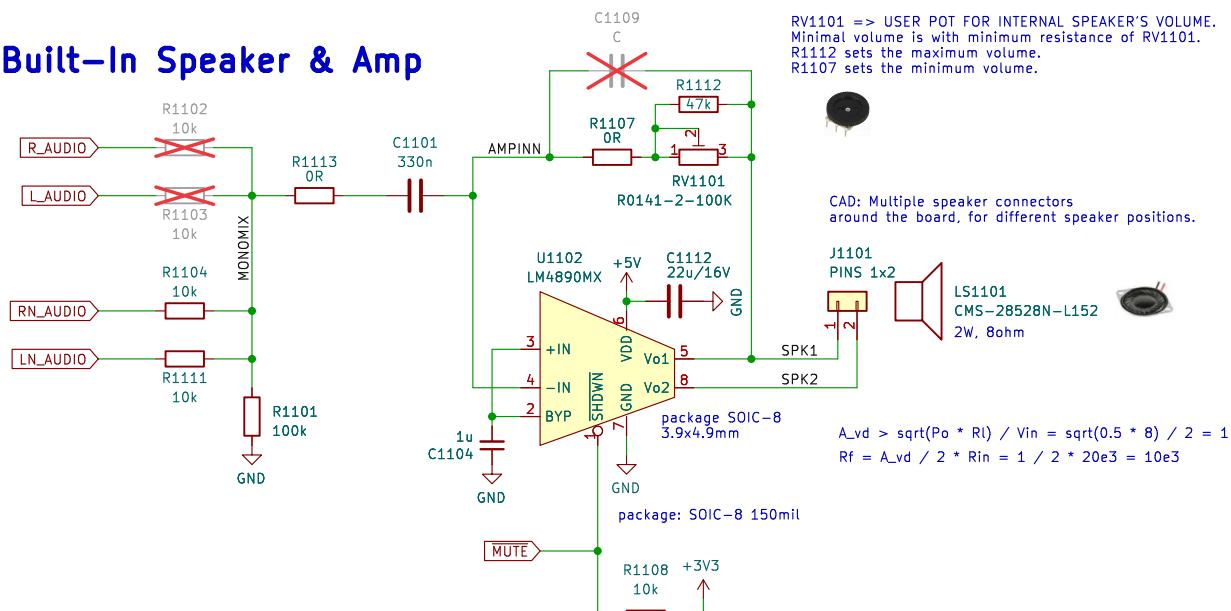
Audio DAC (PCM/PSG in VERA, FM in AURA)



3.5mm jack – AUDIO LINE output



Built-in Speaker & Amp



move J1101 on the PCB, need more room;

Sound DAC and output port
FOR X65.EU DESIGNED BY JSYKORA.INFO

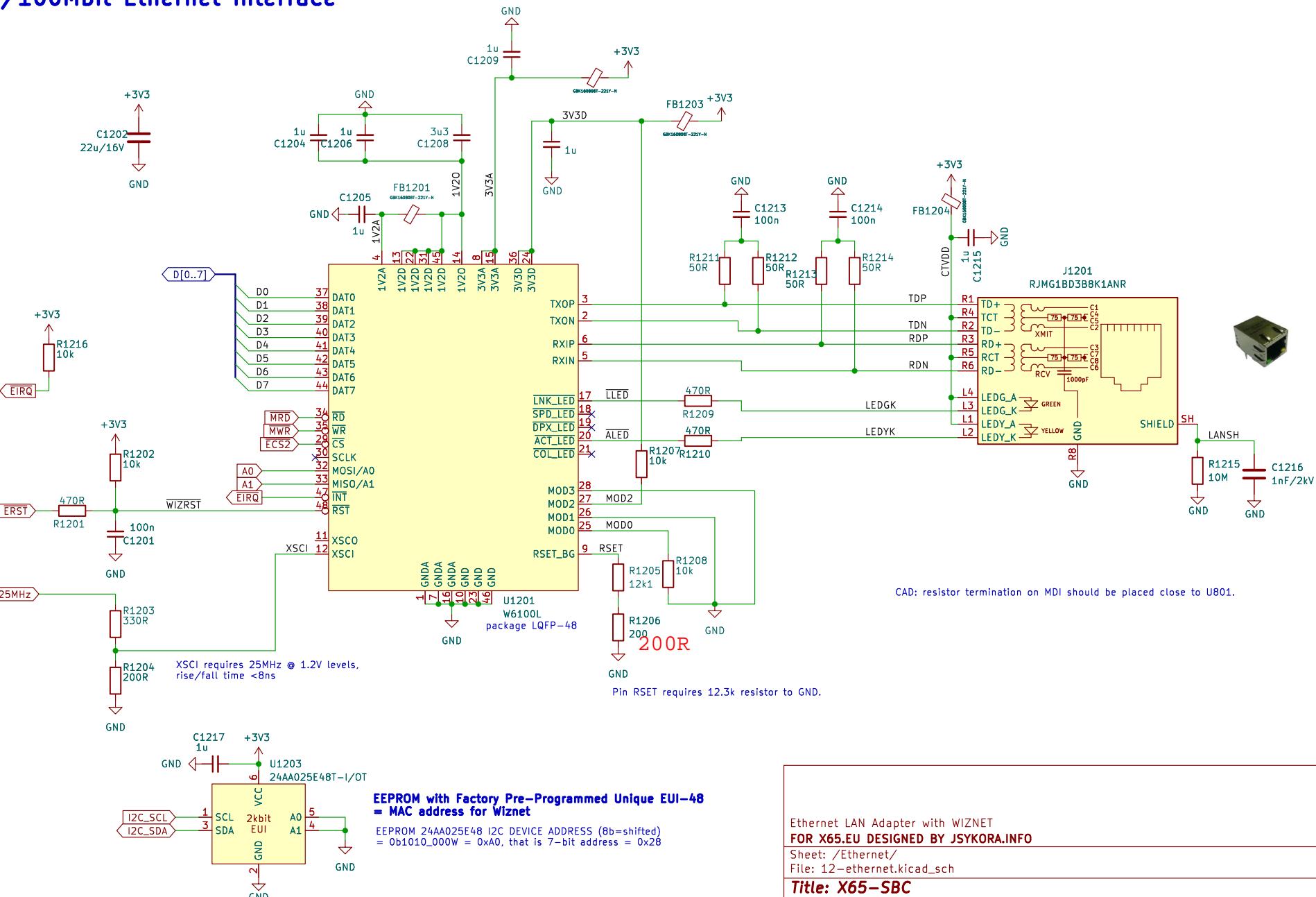
Sheet: /Sound Output/
File: 11-sndout.kicad_sch

Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38

Rev: revA1
Id: 11/12

10/100Mbit Ethernet Interface



EEPROM with Factory Pre-Programmed Unique EUI-48
= MAC address for Wiznet

EEPROM 24AA025E48 I²C DEVICE ADDRESS (8b=shifted)
= 0b1010_000W = 0xA0, that is 7-bit address = 0x28

Ethernet LAN Adapter with WIZNET
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Ethernet/
File: 12-ethernet.kicad_sch

Title: X65-SBC

Size: A4 Date: 2024-01-10
KiCad E.D.A. kicad 7.0.10-1.fc38



Rev: revA1
Id: 12/12