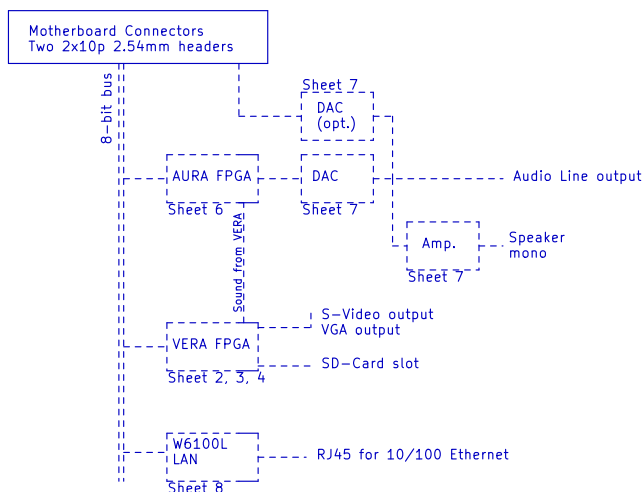


# OpenX65 Video/Audio & Ethernet Board ("V/A-B0")

## Block Diagram:



- FID101 Fiducial
- FID102 Fiducial
- FID103 Fiducial
- H101 MountingHole
- H102 MountingHole
- H103 MountingHole
- H104 MountingHole

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

## Revision History:

Rev. / Date	Description
rev01 / 28.4.2023	Initial design, PCB 100x100mm 2-layers. VERA with VGA and S-Video outputs. AURA with line-out and amp/speaker, 2 DAC. LAN by W6100L

## Sheets:

Video VERA FPGA



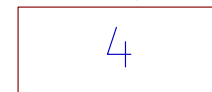
Soubor: vabo-sheet-02.kicad\_sch

Video Outputs



Soubor: vabo-sheet-03.kicad\_sch

VERA SPI-Flash, SDC



Soubor: vabo-sheet-04.kicad\_sch

Motherboard Connectors



Soubor: vabo-sheet-05.kicad\_sch

Audio AURA FPGA



Soubor: vabo-sheet-06.kicad\_sch

Audio DAC, Output



Soubor: vabo-sheet-07.kicad\_sch

Ethernet



Soubor: vabo-sheet-08.kicad\_sch

Block Diagram

FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /

File: openX65-vabo.kicad\_sch

**Title: OpenX65 – Video/Audio & Ethernet Board**

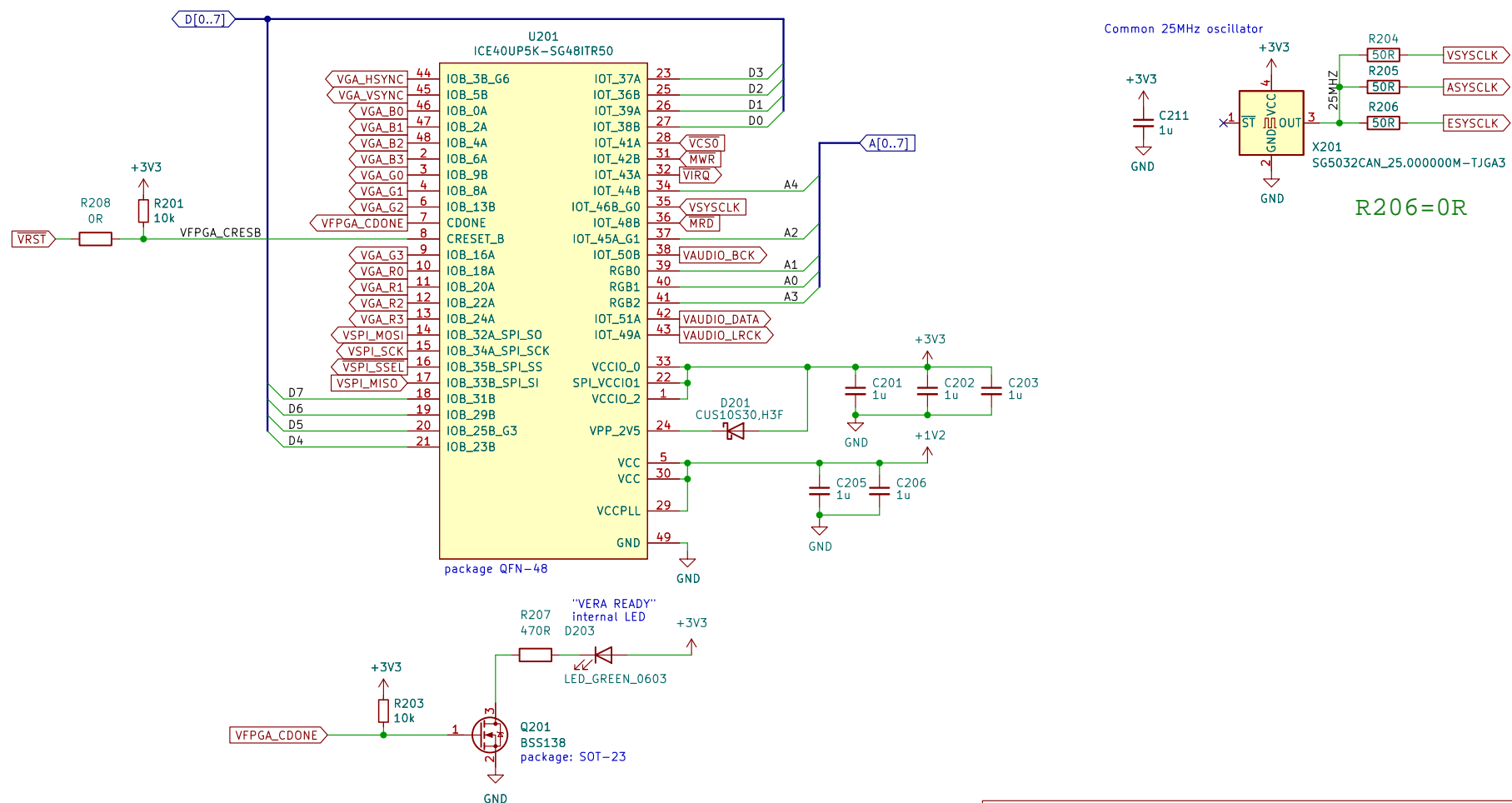
Size: A4 Date: 2023-04-28

KiCad E.D.A. kicad 6.0.11-3.fc36

Rev: rev01

Id: 1/8

# "VERA" FPGA – Video Embedded Retro Adapter



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

VERA FPGA design by Frank van den Hoe  
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Video VERA FPGA/  
File: vabo-sheet-02.kicad\_sch

**Title: OpenX65 – Video/Audio & Ethernet Board**

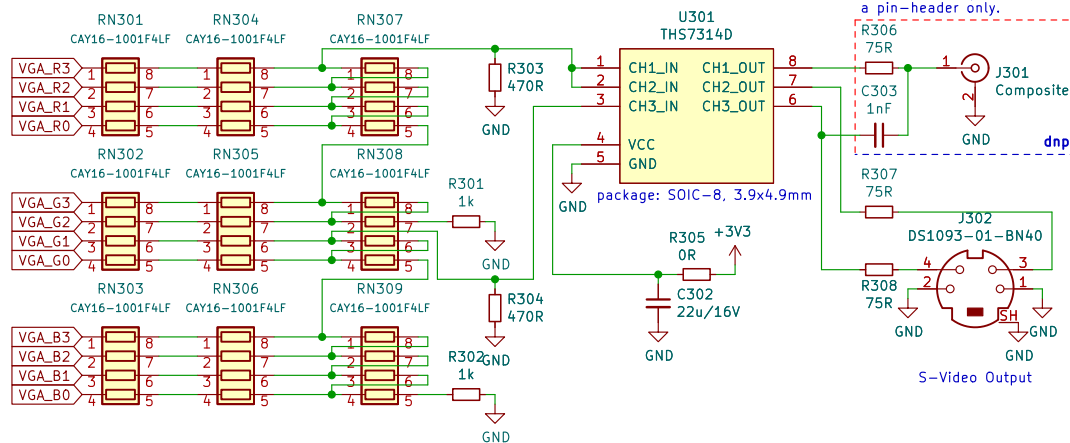
Size: A4 Date: 2023-04-28

KiCad E.D.A. kicad 6.0.11-3.fc36

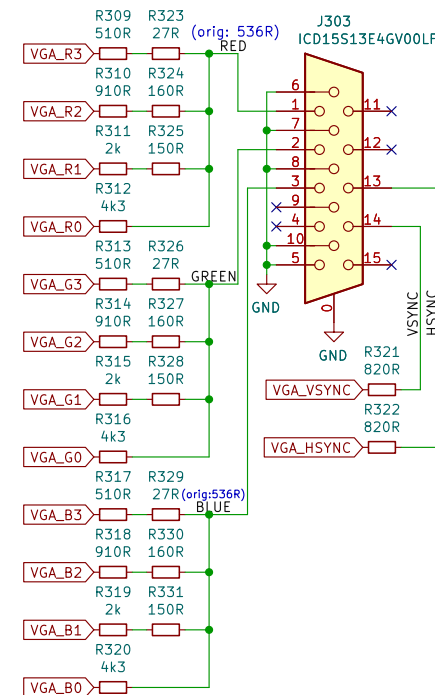
Rev: rev01

Id: 2/8

## Composite / S-video interface



## VGA interface



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

Video outputs from VERA

FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Video Outputs/

File: vabo-sheet-03.kicad\_sch

**Title: OpenX65 – Video/Audio & Ethernet Board**

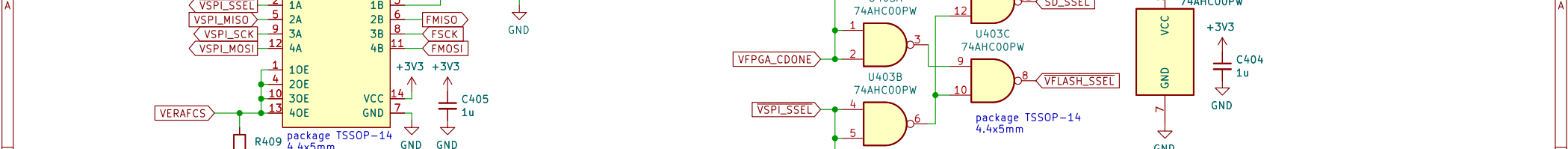
Size: A4 Date: 2023-04-28

KiCad E.D.A. kicad 6.0.11-3.fc36

Rev: rev01

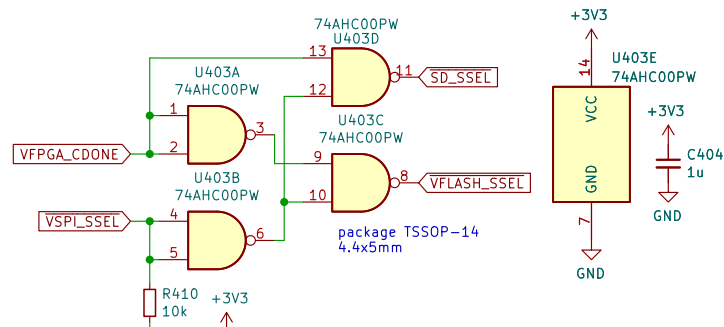
Id: 3/8

1	2	3	4	5	6
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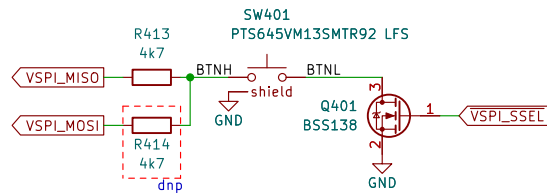
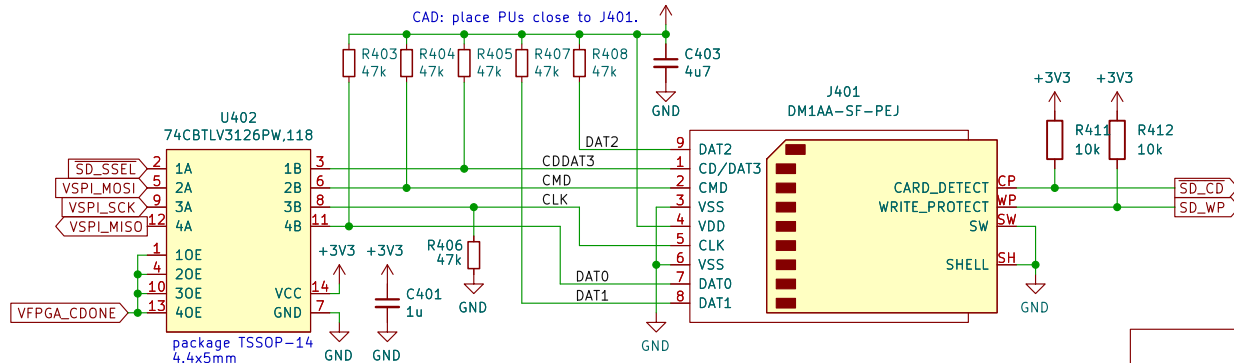
\* R409 -> 2k2

## VERA SPI pins multiplexing

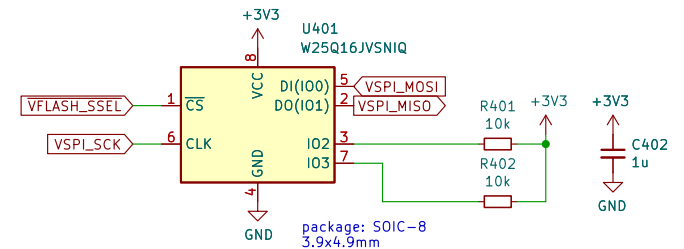


Inputs		Outputs		Description
VFPGA_CDONE	VSPI_SSEL	SD_SSEL	VELASH_SSEL	
0	0	1	0	FPGA configuring from the SPI-Flash, or FTDI/ICD accessing.
0	1	1	1	FPGA empty/in-reset
1	0	0	1	FPGA loaded; User Design r/w to SDC
1	1	1	1	FPGA loaded; idle

B	R413	PTS645VM13SMTR92 LFS	1	1	1	1	FPGA loaded; idle	B
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[illegible]

## SPI flash for VERA Bitstream



\* add PD to VSPI\_SCK  
(strictly not necessary - dnp)

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

VERA SPI multiplexing, SDC interface  
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /VERA SPI-Flash, SDC/  
File: vabo-sheet-04.kicad\_sch

**Title: OpenX65 – Video/Audio & Ethernet Board**

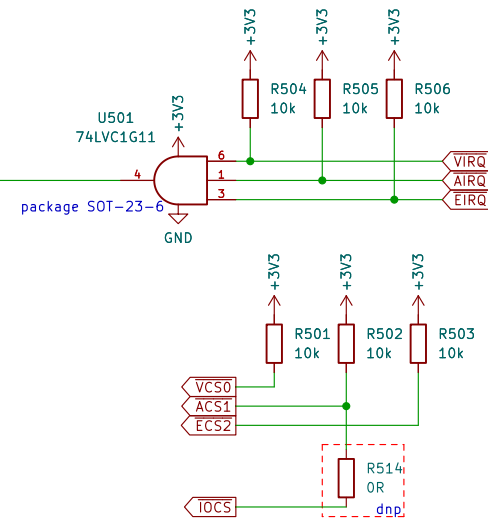
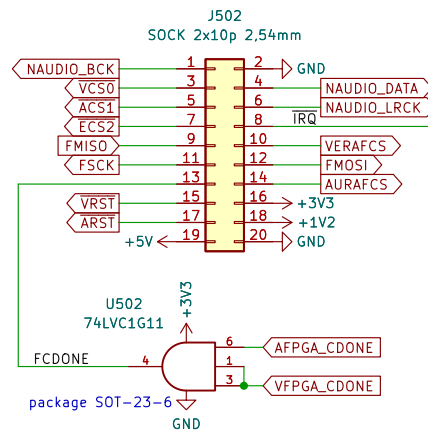
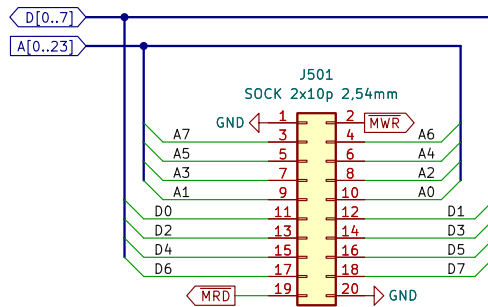
Size: A4	Date: 2023-04-28
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KiCad E.D.A.	kicad 6.0.11-3.fc36
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Rev: rev01

Id: 4/8

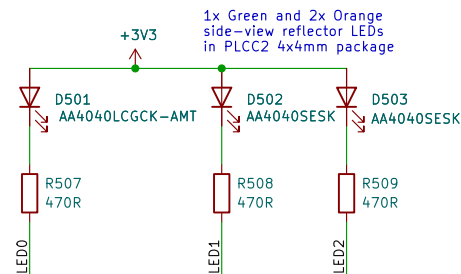
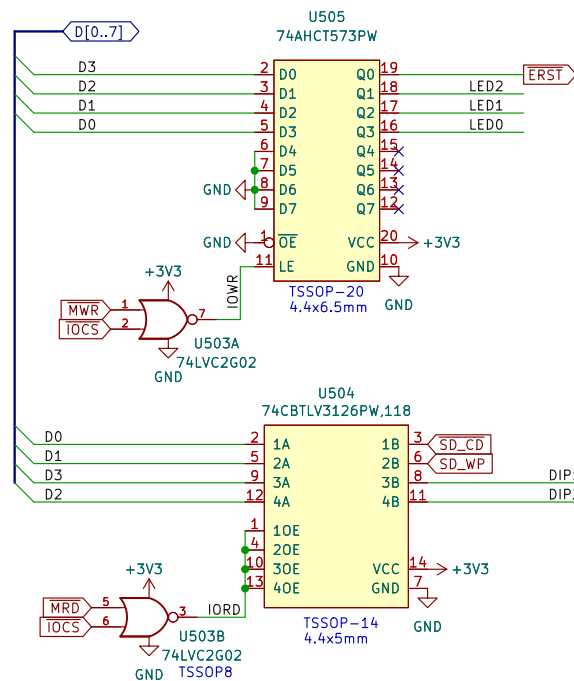
## Connectors to the Motherboard



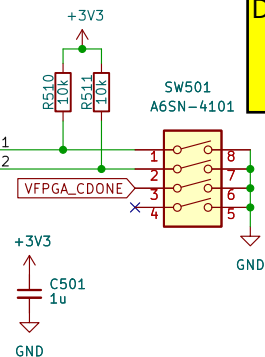
Mount R514 only if AURA  
is mounted not  
(bypass ACS directly to IOCS).



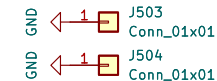
## I/O: LEDs & DIP Switches



LED out works OK.  
DIP in - does not?! reads always 0x00



Ground pins for measurements



Motherboard Connectors, simple I/O  
**FOR X65.EU DESIGNED BY JSYKORA.INFO**

Sheet: /Motherboard Connector  
File: vabo-sheet-05.kicad\_sch

**Title: OpenX65 – Video/Audio & Ethernet Board**

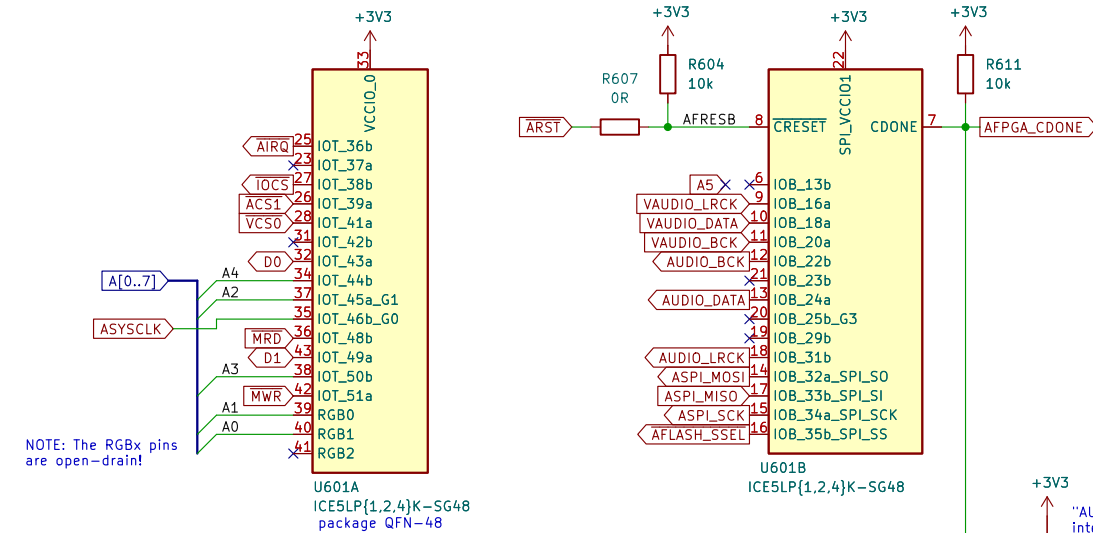
Size: A4	Date: 2023-04-28
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Rev: rev01

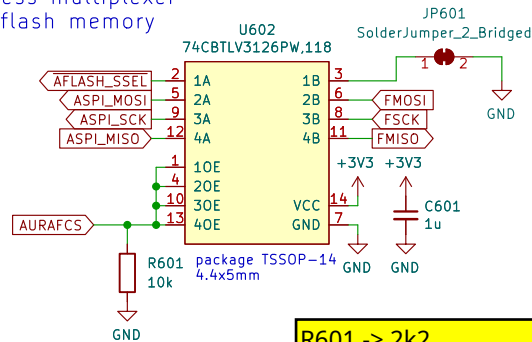
Id: 5/8

# "AURA" FPGA – Audio Retro Adapter

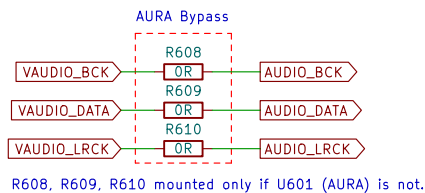
For X16 compatibility, AURA will implement the YM2151 FM-Synthesis (the chip is long out of production).  
One possible design is JT51 at <https://github.com/jotego/jt51>  
which requires about 2K gates (i.e. ICE5LP2K-SG48 – to be validated)



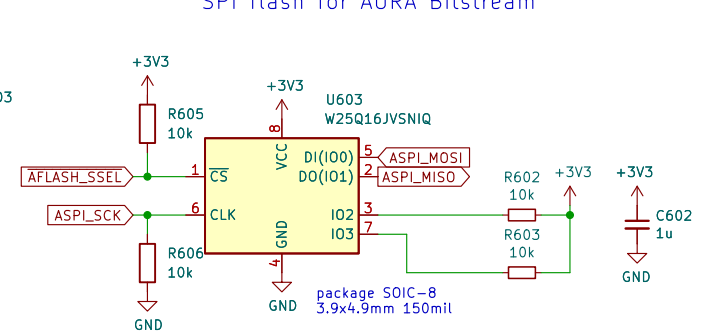
FTDI/ICD access multiplexer  
to AURA SPI flash memory



R601 -> 2k2



SPI flash for AURA Bitstream



AURA FPGA

FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Audio AURA FPGA/

File: vabo-sheet-06.kicad\_sch

Title: OpenX65 – Video/Audio & Ethernet Board

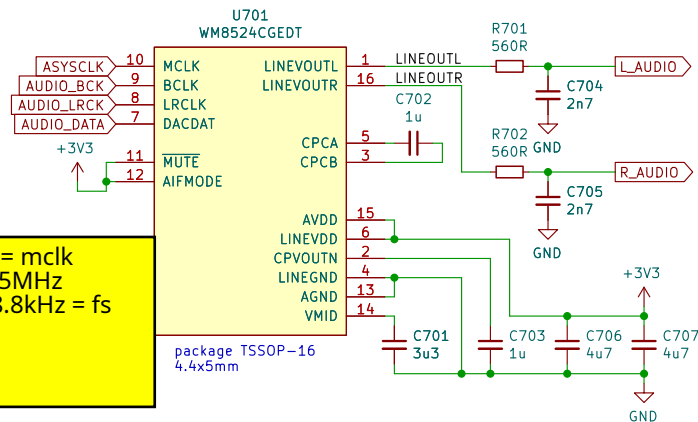
Size: A4 Date: 2023-04-28

KiCad E.D.A. kicad 6.0.11-3.fc36

Rev: rev01

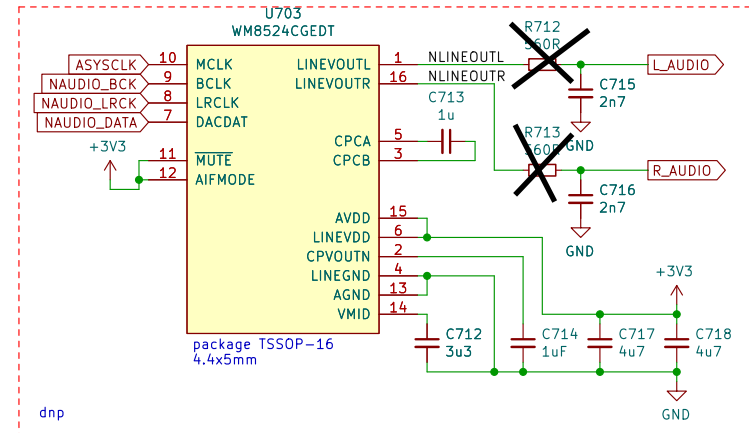
Id: 6/8

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

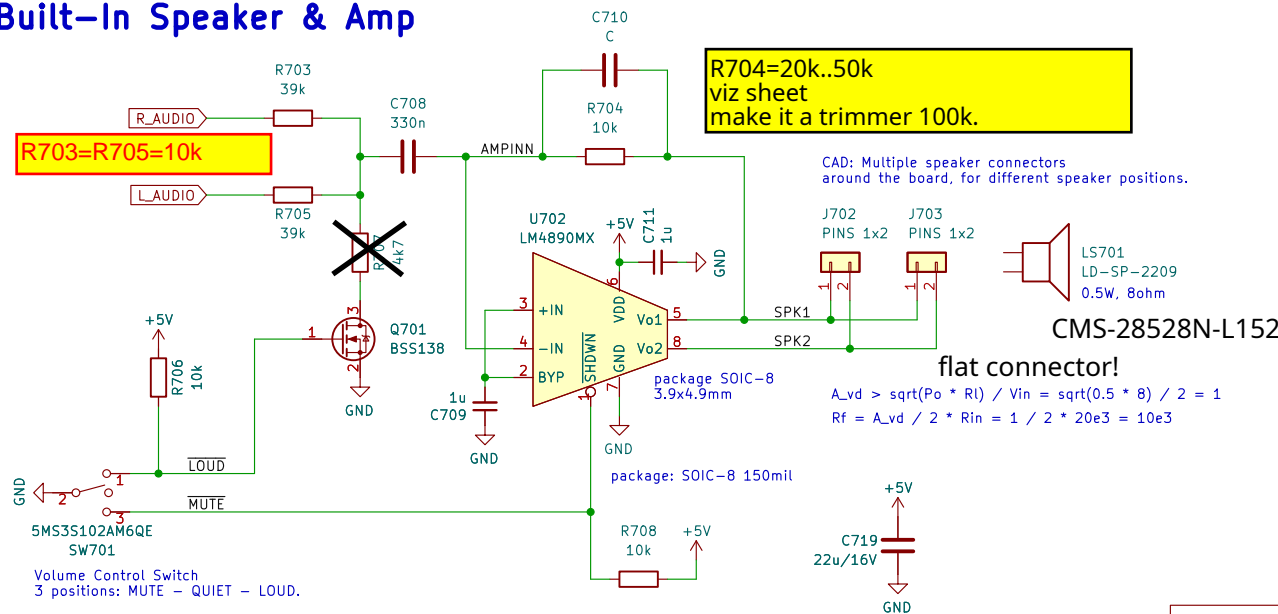


ASYCLK=25MHz = mclk  
AUDIO\_BCLK=12.5MHz  
AUDIO\_LRCLK=48.8kHz = fs  
=> mclk = 512\*fs

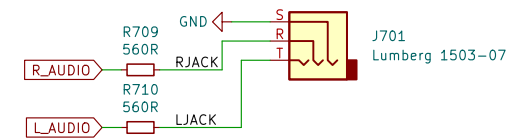
## Audio DAC (Sound from NORA) – optional.



## Built-In Speaker & Amp



## 3.5mm jack – AUDIO LINE output



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

Audio DAC, Speaker Amplifier, and Line Output  
FOR X65.EU DESIGNED BY JSYKORA.INFO

Sheet: /Audio DAC, Output/  
File: vabo-sheet-07.kicad\_sch

Title: OpenX65 – Video/Audio & Ethernet Board

Size: A4 Date: 2023-04-28

KiCad E.D.A. kicad 6.0.11-3.fc36

Rev: rev01

Id: 7/8

# 10/100Mbit Ethernet Interface

The schematic shows a central microcontroller (U801) connected to various components. Power supply rails (+3V3, GND) are shown at the top. The microcontroller has multiple pins for data (D[0..7]), control (MRD, MWR, CS, SCLK, MOSI/AO, MISO/A1, INT, RST), status (LNK\_LED, SPD\_LED, DPX\_LED, ACT\_LED, COL\_LED), and other functions (MOD3, MOD2, MOD1, MOD0, RSET\_BG). It is connected to a network PHY (J801) via TXOP, TXON, RXIP, RXIN, TDP, TDN, RDP, RDN, LEDG\_K, LEDY\_K, and LANSH. Various resistors (R801-R821) and capacitors (C801-C819) are used for timing and signal conditioning. A crystal oscillator (Y801) provides a 25.000MHz clock. A red dashed box highlights the XSCI pin configuration.

CAD: resistor termination on MDI should be placed close to U801.

R813..R816=0R  
R801=12k1, R802=200R

XSCI requires 25MHz @ 1.2V levels,  
rise/fall time <8ns

R820=330R  
R821=200R  
R206=0R  
=> rise/fall=5.2ns, top=1.14V

Ethernet LAN Interface (Wiznet) FOR X65.EU DESIGNED BY JSYKORA.INFO		
Sheet: /Ethernet/ File: vabo-sheet-08.kicad_sch		
Title: OpenX65 – Video/Audio & Ethernet Board		
Size: A4	Date: 2023-04-28	Rev: rev01
KiCad E.D.A. kicad 6.0.11-3.fc36		Id: 8/8

$$R_{801}=12k\Omega, \quad R_{802}=200\Omega$$

Id: 8/8