Sheet: Envox_STM32

File: STM32F7_MCU.sch

Sheet: Envox_SDRAM

File: SDRAM_JTAG_SD_card_EEPROM.sch

Sheet: TFT_LCD

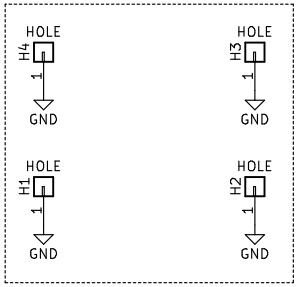
File: TFT_LCD_Audio_USB.sch

Sheet: IO_Connectors

File: IO_connectors_Encoder_user_SW.sch

Sheet: Ethernet

File: Ethernet_PHY.sch



click on mouse pointer arrow on top of right toolbar
and double-click on sheet to open

Sheet: power

File: power.sch

Sheet: usb

File: usb.sch

Sheet: blinkey

File: blinkey.sch

Sheet: ram

File: ram.sch

Sheet: serdes

File: serdes.sch

Sheet: gpio

File: gpio.sch

Sheet: gpdi

File: gpdi.sch

Sheet: analog

File: analog.sch

Sheet: wifi

File: wifi.sch

Sheet: flash

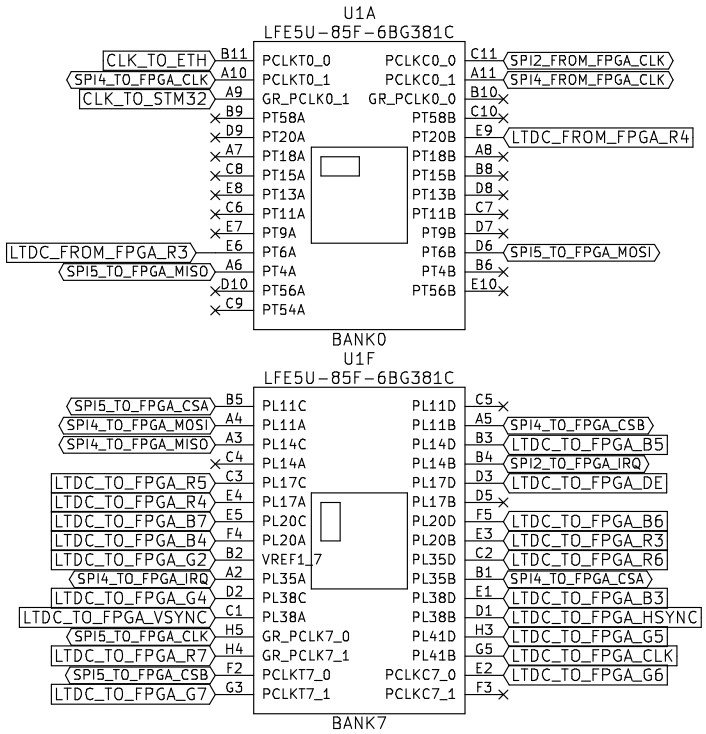
File: flash.sch

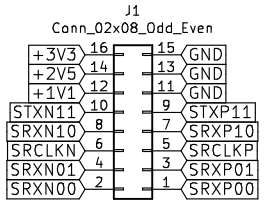
Root sheet
EMARD

Sheet: /
File: ulx3s.sch

Title: ULX3S

Size: A4	Date:	**Rev: 3.1.2**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 1/16





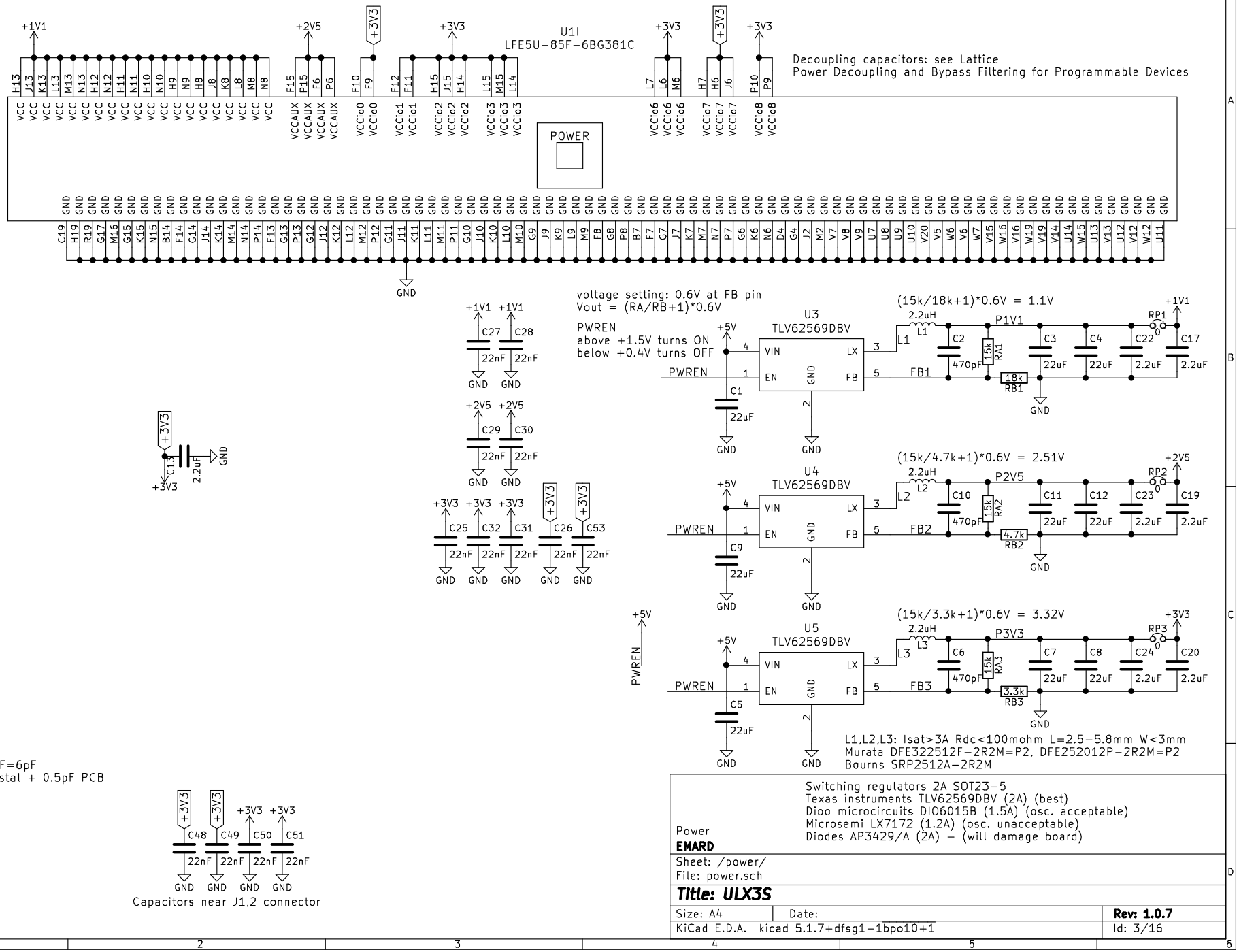
GPIO route only A/B pairs as those are differential bidirectional
don't route C/D pairs to GPIO as those can be differential input only
BANK0,1 are single-ended (non-differential)

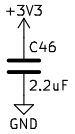
GPIO 2.54 mm connectors
EMARD

Sheet: /gpio/
File: gpio.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.2**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 2/16


U1I
LFE5U-85F-6BG381C
POWER
Decoupling capacitors: see Lattice
Power Decoupling and Bypass Filtering for Programmable Devices
voltage setting: 0.6V at FB pin
Vout = (RA/RB+1)*0.6V
PWREN
above +1.5V turns ON
below +0.4V turns OFF
U3
TLV62569DBV
(15k/18k+1)*0.6V = 1.1V
P1V1
U4
TLV62569DBV
(15k/4.7k+1)*0.6V = 2.51V
P2V5
U5
TLV62569DBV
(15k/3.3k+1)*0.6V = 3.32V
P3V3
L1,L2,L3: Isat>3A Rdc<100mohm L=2.5-5.8mm W<3mm
Murata DFE322512F-2R2M=P2, DFE252012P-2R2M=P2
Bourns SRP2512A-2R2M
C56*C57/(C56+C57)+4.5pF=6pF
4.5pF=3pF chip + 1pF crystal + 0.5pF PCB
Capacitors near J1,2 connector
Switching regulators 2A SOT23-5
Texas instruments TLV62569DBV (2A) (best)
Dioo microcircuits DIO6015B (1.5A) (osc. acceptable)
Microsemi LX7172 (1.2A) (osc. unacceptable)
Diodes AP3429/A (2A) - (will damage board)
Power
EMARD
Sheet: /power/
File: power.sch
Title: ULX3S
Size: A4
Date:
Rev: 1.0.7
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1
Id: 3/16



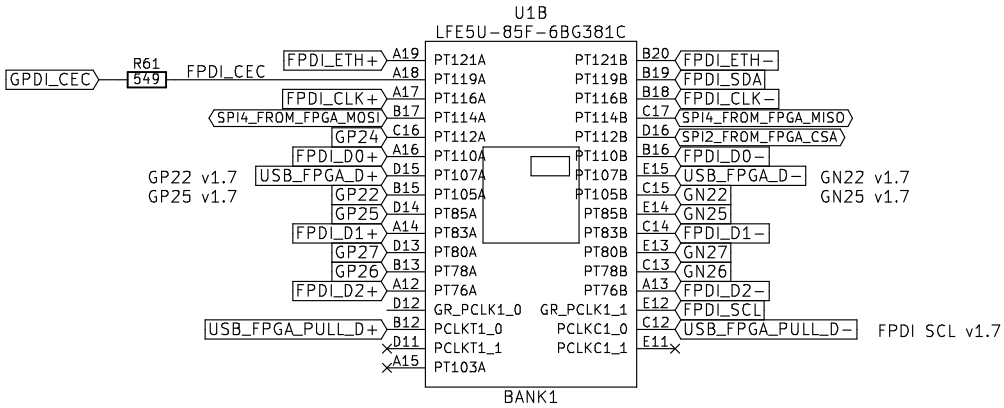
Buttons, LEDs, OLED display

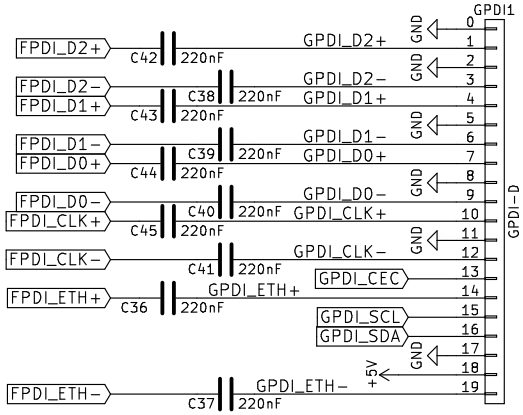
EMARD

Sheet: /blinkey/
File: blinkey.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.3**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 4/16





PCB v1.8.1 and higher accept FCI 10029449-111RLF
www.amphenol-icc.com
mouser PN: 649-10029449-111RLF
http://portal.fciconnect.com/Comergent/fci/drawing/10029449.pdf

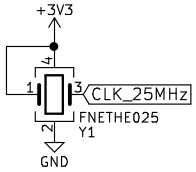
PCB v1.7 and v1.8 accept
mouser PN: 538-47151-1001 (Molex)
https://www.molex.com/pdm_docs/sd/471511001_sd.pdf
mouser PN: 710-685119134923 (Wurth)
https://katalog.we-online.com/em/datasheet/685119134923.pdf

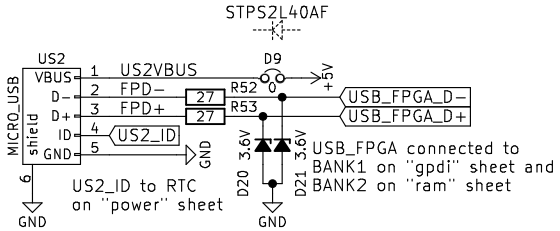
Digital Video and Ethernet
General Purpose Differential Interface
EMARD

Sheet: /gpdi/
File: gpdi.sch

Title: ULX3S

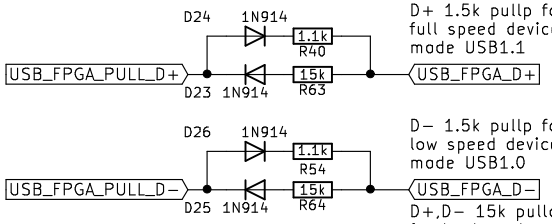
Size: A4	Date:	**Rev: 1.0.2**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 5/16





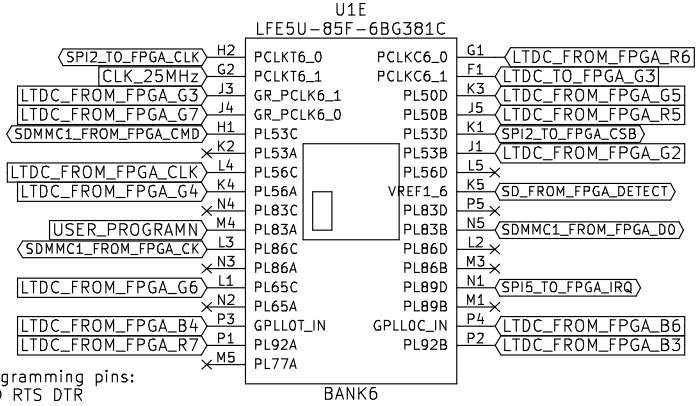
D8,D9: Schottky 2A/30V
Low drop Vfmax=0.375V
Parts reduction: Only D8 is required.
D9 D51 D52 can be 1206
1A polyfuses or 0-ohm/2A jumpers

USB pull lines connected to
BANK1 on "gpdi" sheet



Deviation from USB specification in
pulldowns for BOM simplificaton.
With series diode, correct value R63 R64
should be 12k but 15k is used.

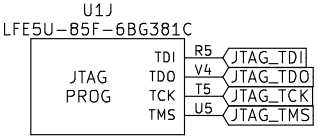
warning:
ULX3S has different pinout
for simpler PCB routing and
because FT230X has weak CTS
drive capability. (Undocumented,
FLEAfpga mail from 13-Nov-2015)
ULX2S pinout was:
TCK = DSR
TMS = RI
TDI = CTS
TDO = DCD

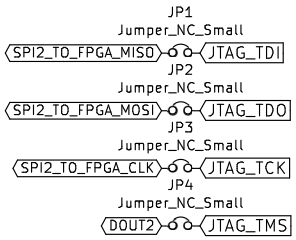


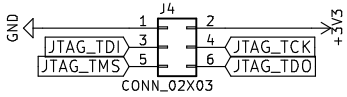
WiFi programming pins:
TXD RXD RTS DTR

VNC2 programming pins:
TXD RXD TXDEN

FTDI default
CBUS0=TXDEN
CBUS1=nRXLED
CBUS2=nTXLED
CBUS3=nSLEEP







USB serial and JTAG
EMARD

Sheet: /usb/
File: usb.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.6**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 6/16

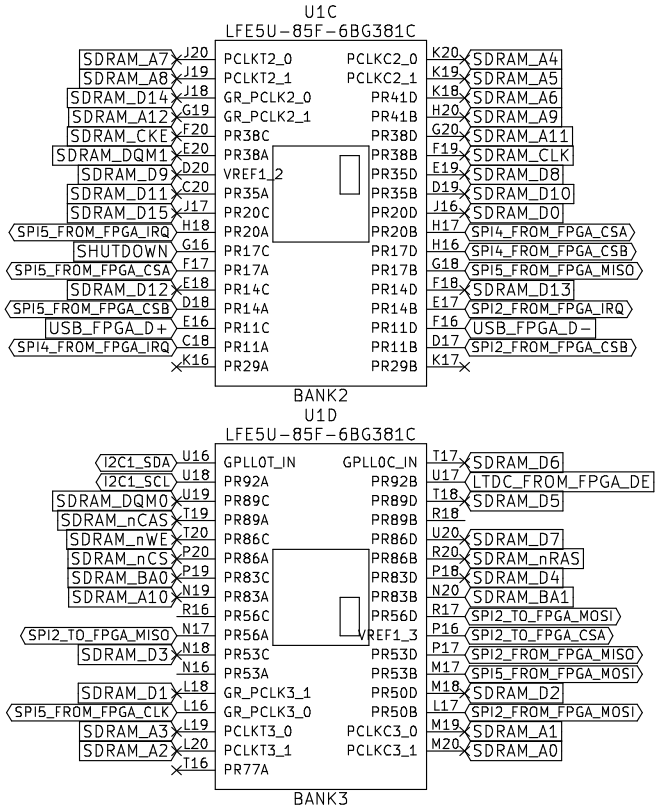
WIFI module ESP32

EMARD

Sheet: /wifi/
File: wifi.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.8**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 7/16



SDRAM memory

EMARD

Sheet: /ram/

File: ram.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.0**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 8/16

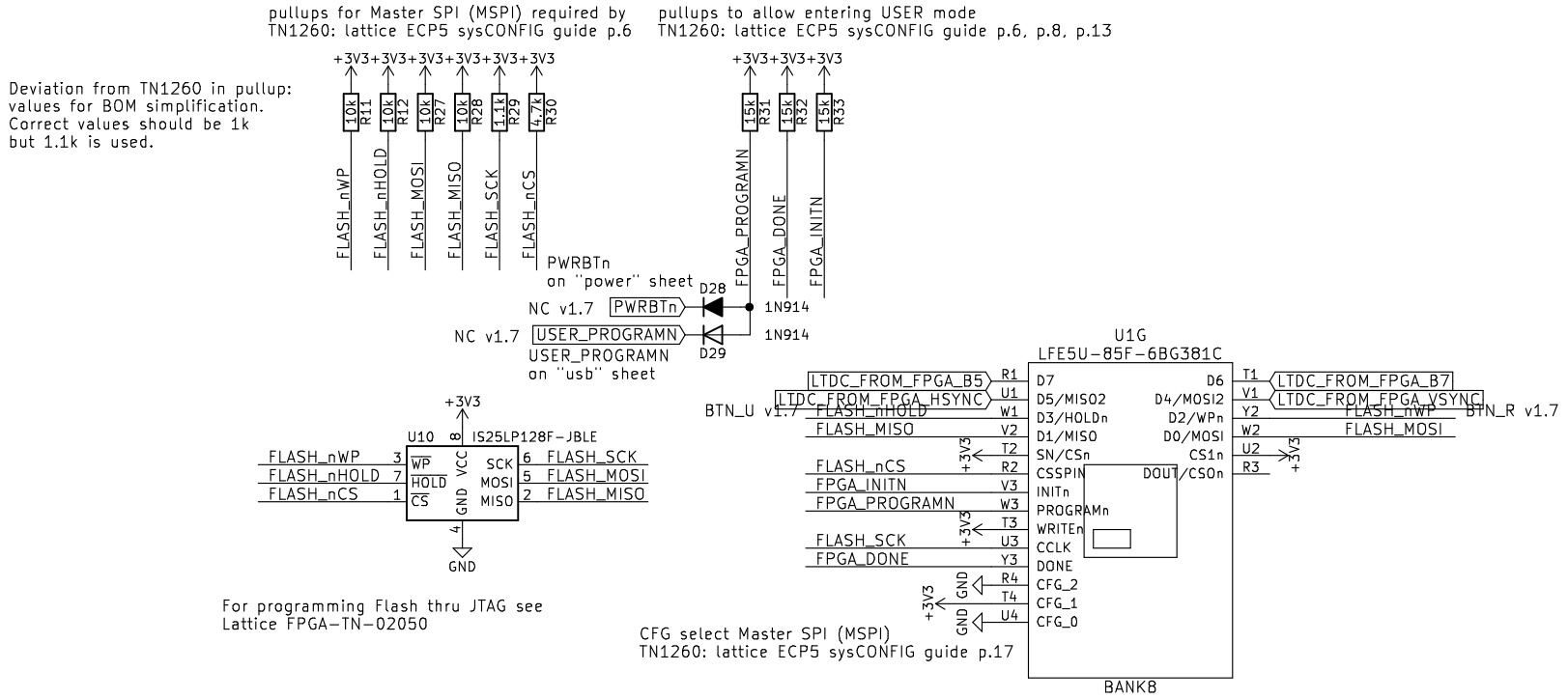
Analog audio and video

EMARD

Sheet: /analog/
File: analog.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.4**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 9/16



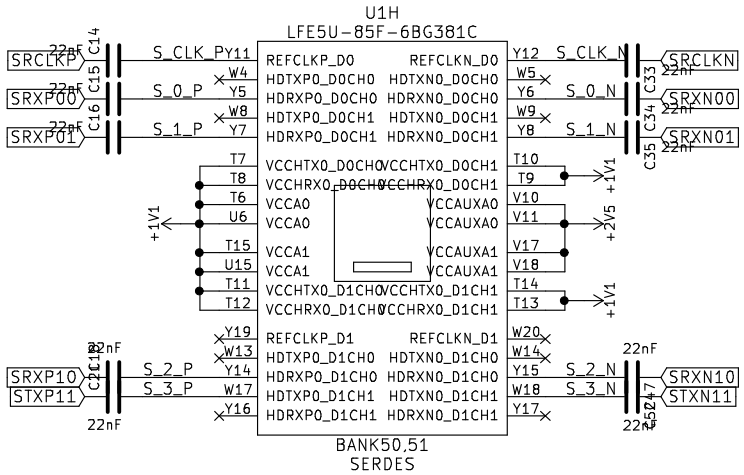
SPI flash

EMARD

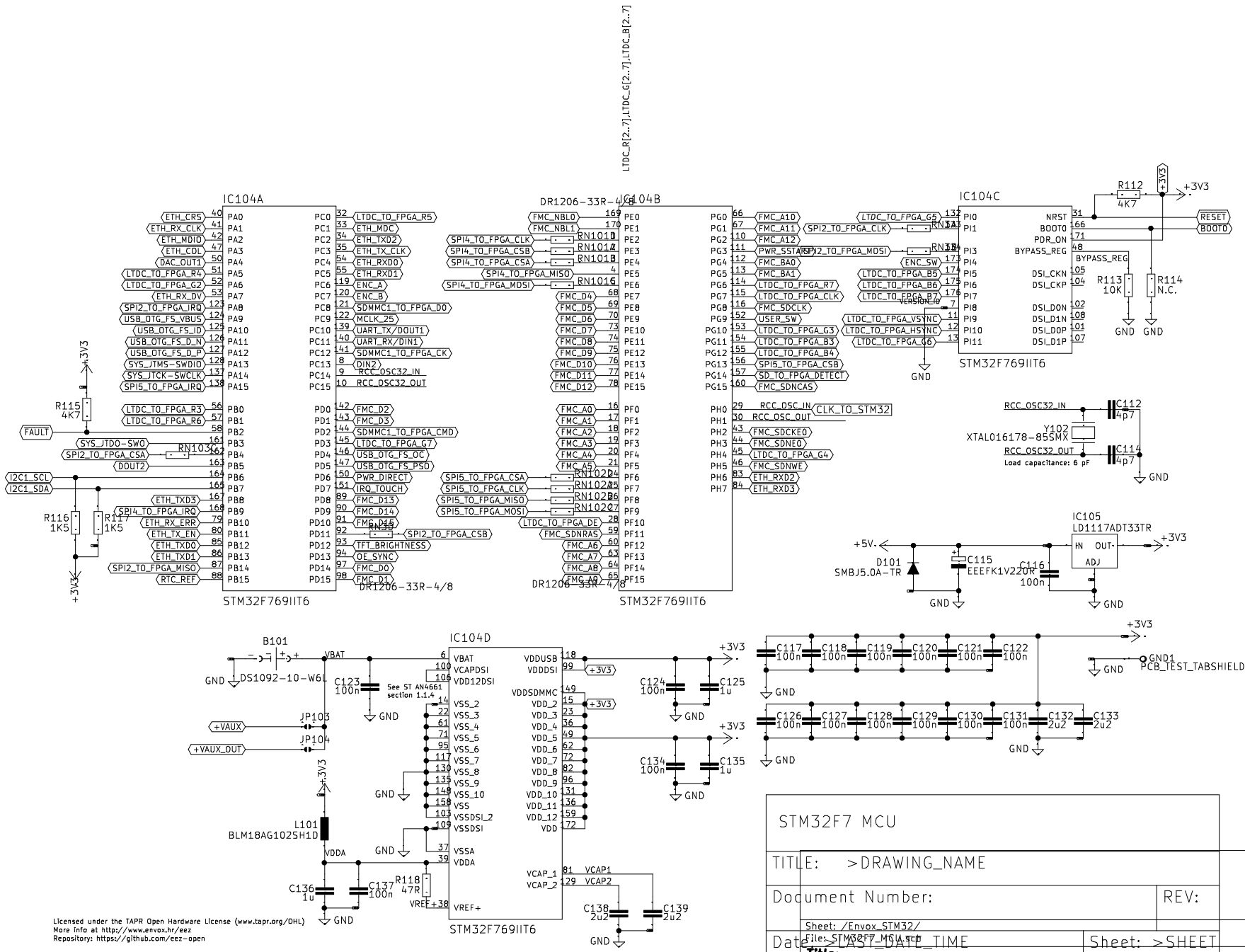
Sheet: /flash/
File: flash.sch

Title: ULX3S

Size: A4	Date:	**Rev: 1.0.6**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 10/16

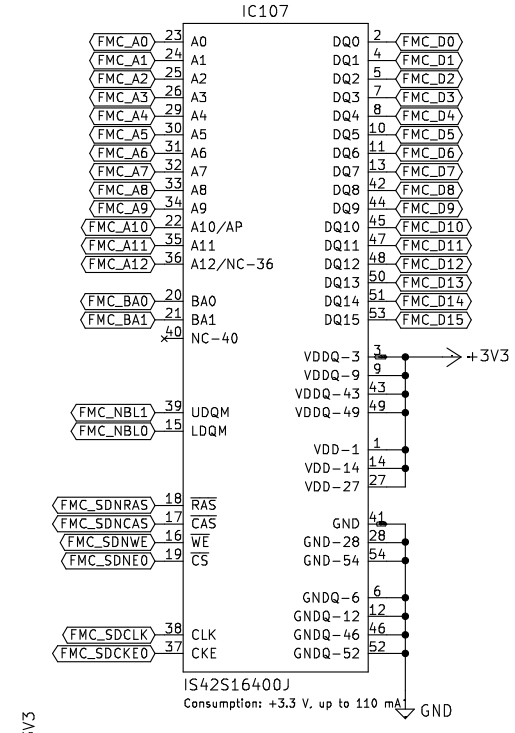


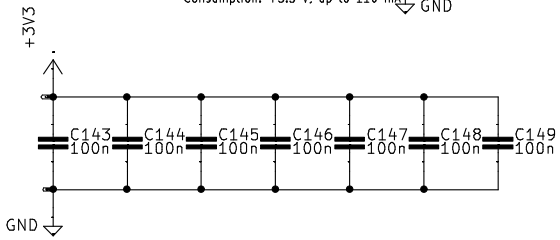
serdes		
EMARD		
Sheet: /serdes/		
File: serdes.sch		
Title: ULX3S		
Size: A4	Date:	**Rev: 1.0.1**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 11/16


IC104A
STM32F769IIT6
IC104B
DR1206-33R-4/8
STM32F769IIT6
IC104C
STM32F769IIT6
IC104D
STM32F769IIT6
IC105
LD1117ADT33TR
B101
DS1092-10-W61
Y102
XTAL016178-85SMX
Load capacitance: 6 pF
D101
SMBJ5.0A-TR
C115
EEEFK1V220R
R112
4K7
R113
10K
R114
N.C.
R115
4K7
R116
1K5
R117
1K5
R118
47R
L101
BLM18AG102SH1D
JP103
JP104
+VAUX
+VAUX_OUT
GND1
PCB_TEST_TABSHIELD
See ST AN4661
section 1.1.4
STM32F7 MCU
TITLE: >DRAWING_NAME
Document Number:
REV:
Sheet: /Envox_STM32/
File: STM32F7_MCU.sch
Date: >LAST_DATE_TIME
Sheet: >SHEET
Title:
Size: User
Date:
Rev:
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1
Id: 12/16
Licensed under the TAPR Open Hardware License (www.tapr.org/OHL)
More info at http://www.envox.hr/eez
Repository: https://github.com/eez-open

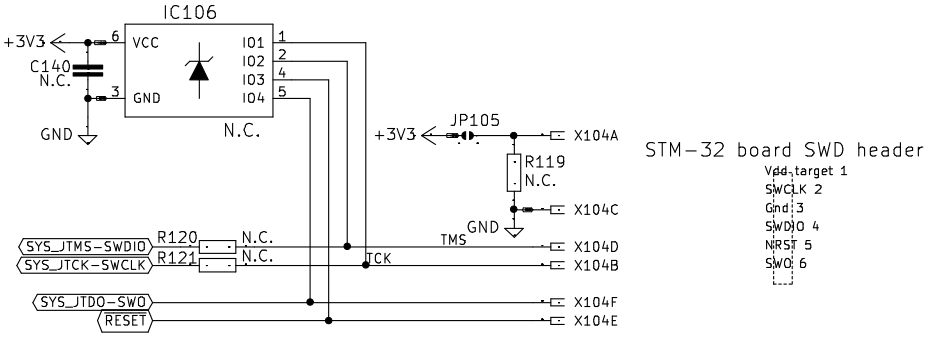
SDRAM

IMPORTANT: For PCB layout
consult ST AN4661 section 8.4.2

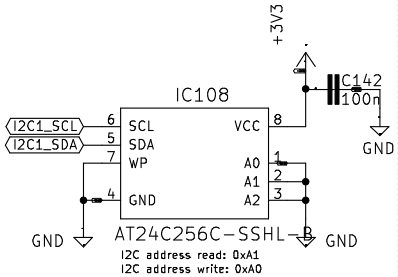




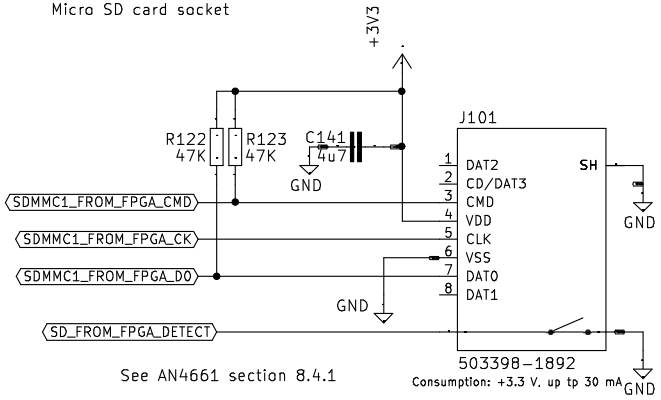
JTAG/SWD (optional)



I2C EEPROM



Micro SD card socket



See AN4661 section 8.4.1

SDRAM, JTAG, I2C EEPROM, SD Card

TITLE: >DRAWING_NAME

Document Number: REV:

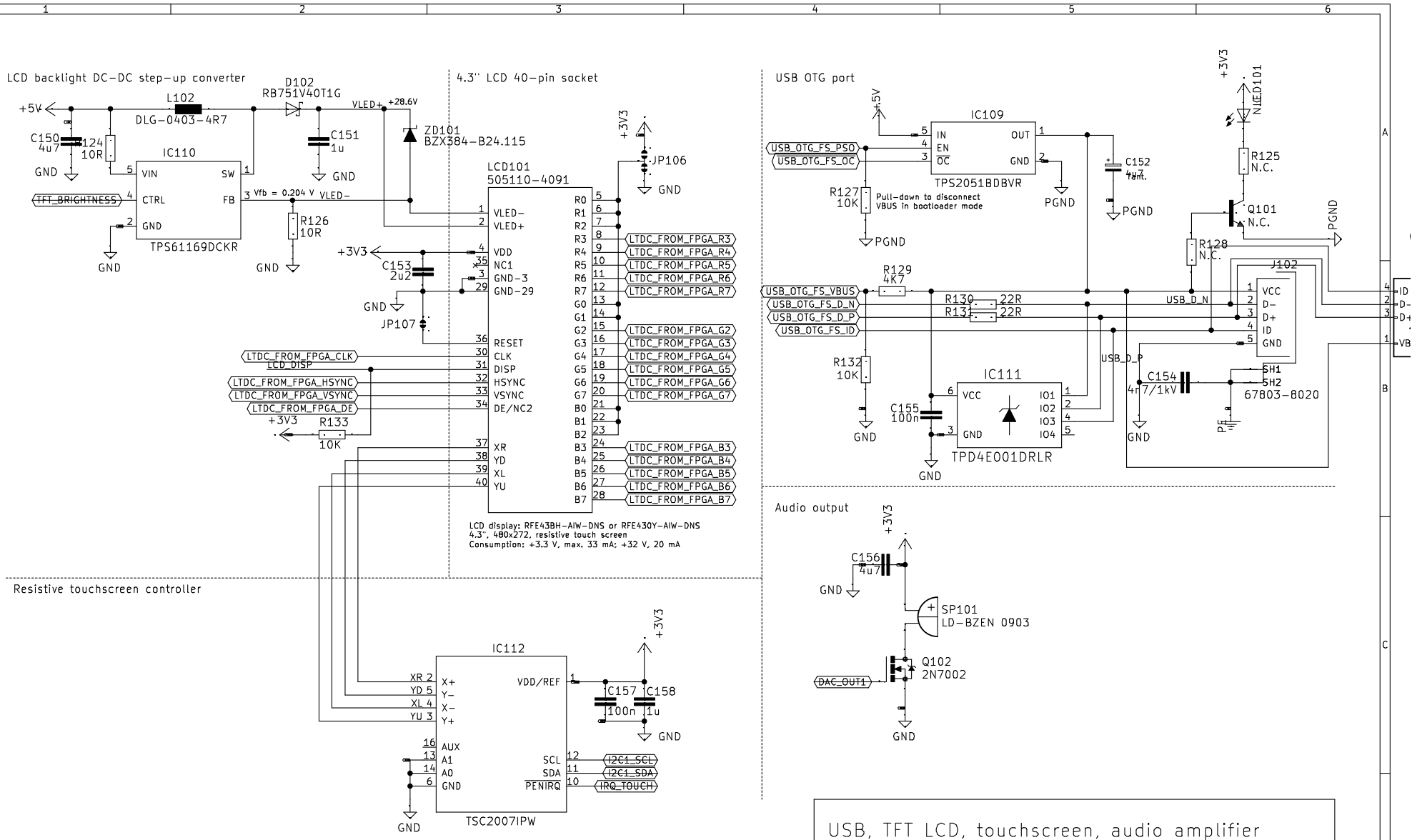
Sheet: /Envox SDRAM/
File: SDRAM_JTAG_I2C_SD_Card_EEPROM.sch

Date: >DATE_TIME Sheet: >SHEET

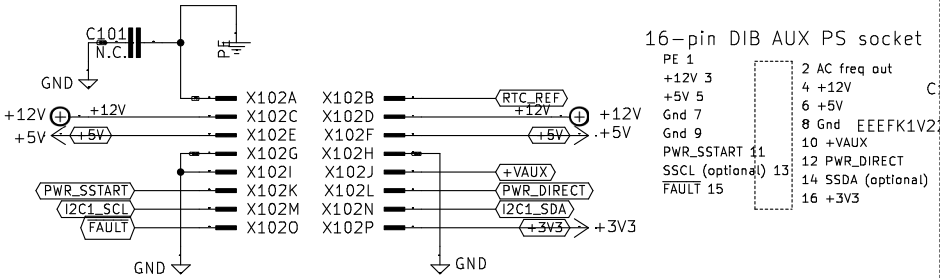
Title:

Size: User Date: **Rev:**

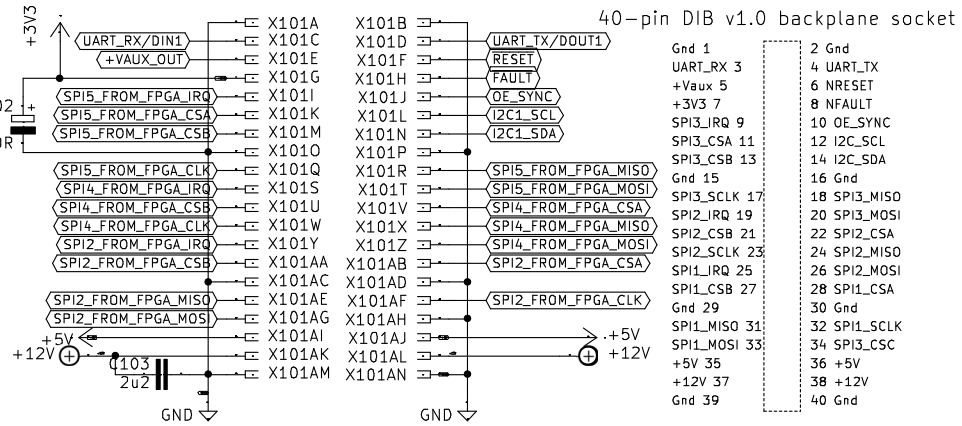
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1 Id: 13/16



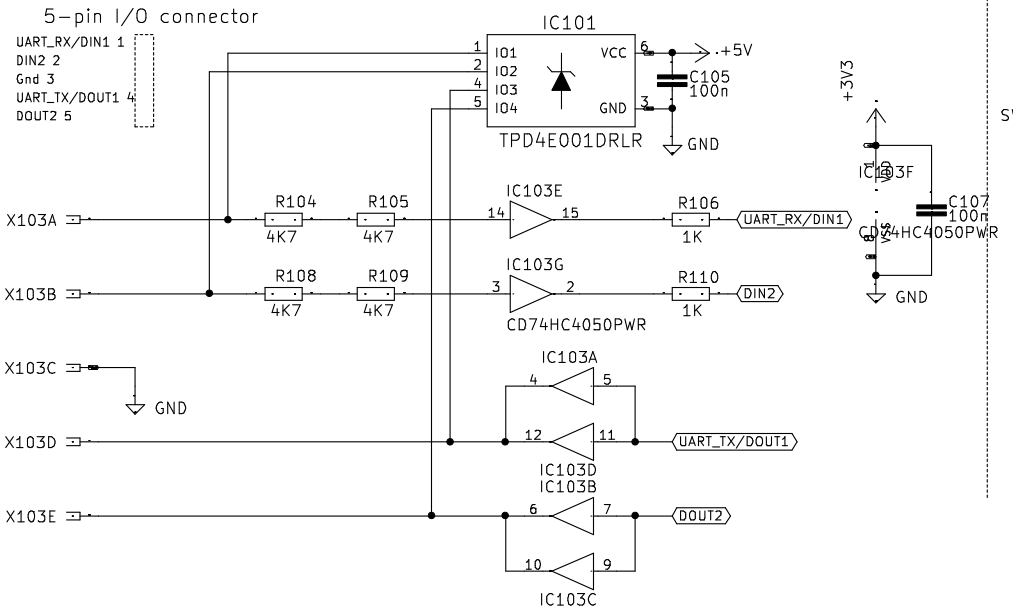
Input connector (power, soft start, fan controller)



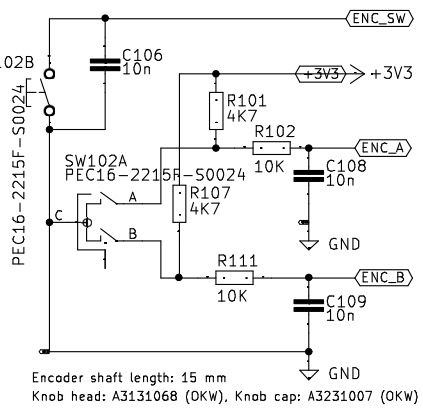
Output connector (3 x SPI modules)



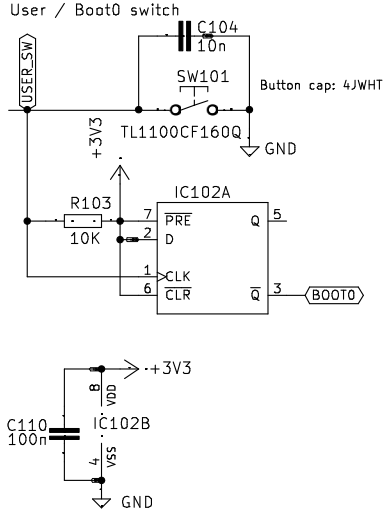
Digital I/O with protections



Encoder with switch



User / Boot0 switch



I/O connectors, User SW, Encoder, Digital I/O

TITLE: >DRAWING_NAME

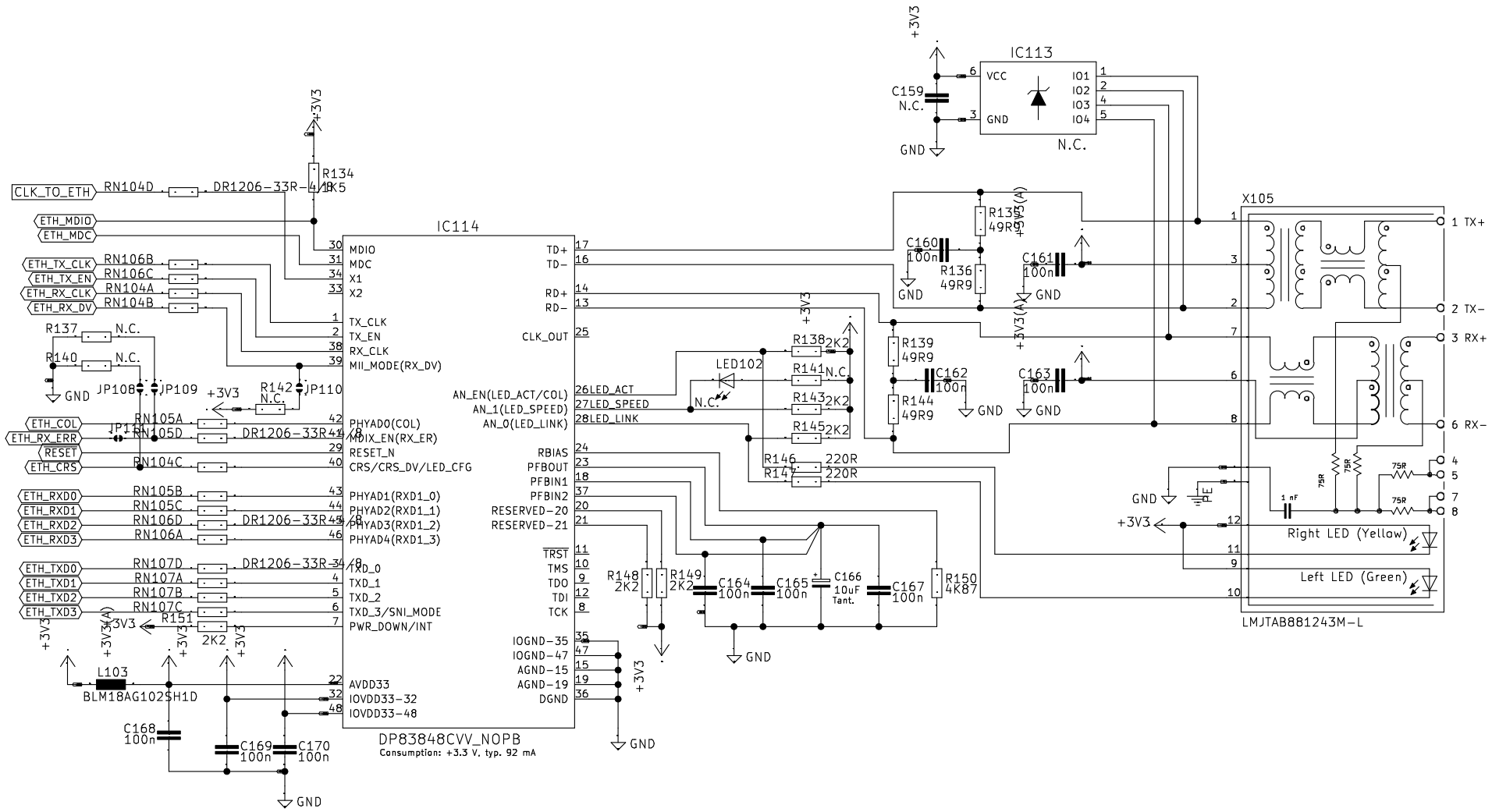
Document Number: REV:

Sheet: /IO_Connectors/
File: IO_connectors_Encoder_user_SW.sch

Date: >LAST_DATE_TIME Sheet: >SHEET

Title:

Size: User	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 15/16



Licensed under the TAPR Open Hardware License (www.tapr.org/OHL)
More info at http://www.envox.hr/eez
Repository: https://github.com/eez-open

Ethernet PHY		
TITLE: >DRAWING_NAME		
Document Number:		REV:
Sheet: /Ethernet/		
File: Ethernet.PHY.sch		
Date: >LAST_DATE_TIME	Sheet: >SHEET	
Title:		
Size: User	Date:	Rev:
KiCad E.D.A. kicad 5.1.7+dfsg1-1bpo10+1		Id: 16/16