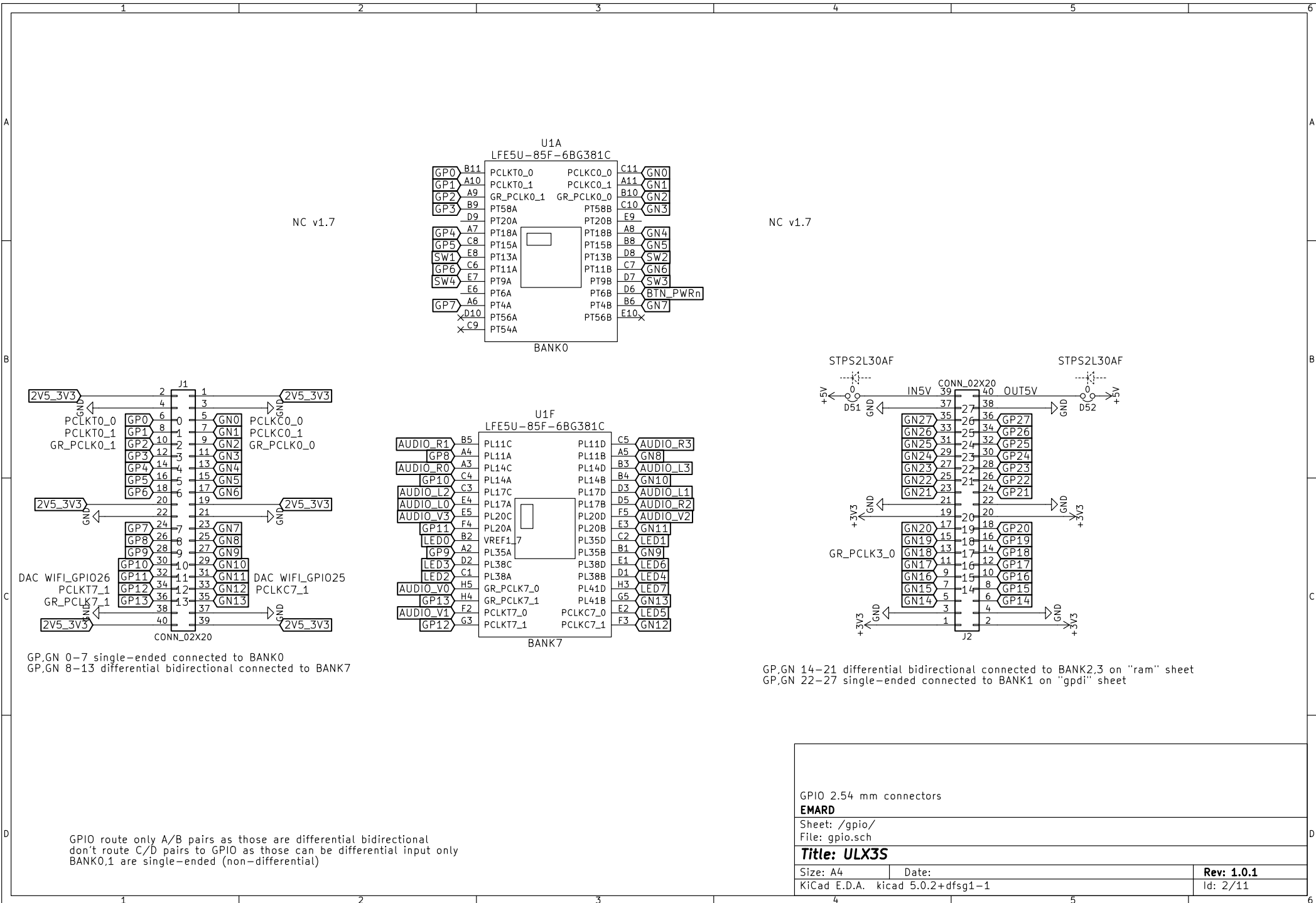


click on mouse pointer arrow on top of right toolbar  
and double-click on sheet to open

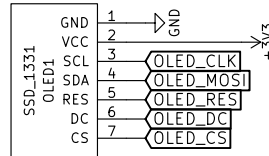
power	usb	blinky	ram	sdcard
power.sch	usb.sch	blinky.sch	ram.sch	sdcard.sch
gpio	gpd	analog	wifi	flash
gpio.sch	gpd.sch	analog.sch	wifi.sch	flash.sch

Root sheet	
<b>EMARD</b>	
Sheet: /	
File: ulx3s.sch	
<b>Title: ULX3S</b>	
Size: A4	Date:
KiCad E.D.A. kicad 5.0.2+dfsg1-1	<b>Rev: 3.0.5</b>
	Id: 1/11

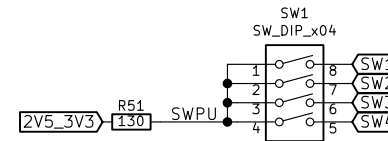
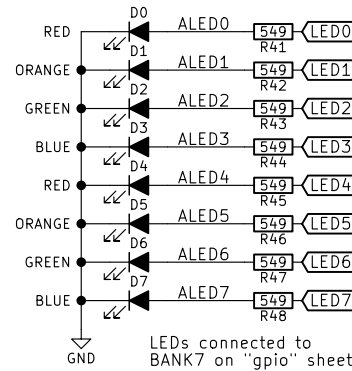
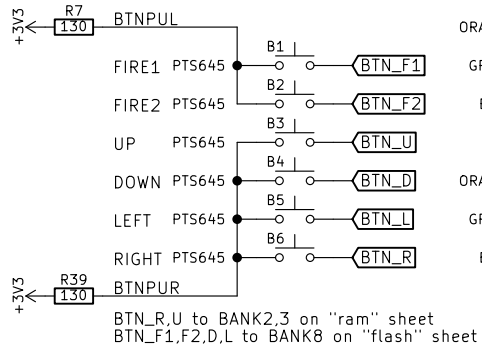
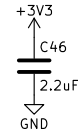




SSD1306 B/W or SSD1331 COLOR  
compatible OLED 0.96" or 1.3" PCB  
14x14 units  
1 unit = 2.54 mm

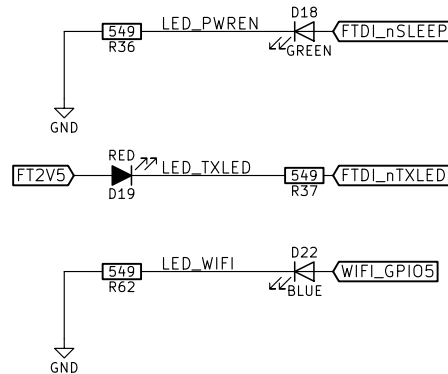


OLED connected to  
BANK6 on "usb" sheet



DIP switch connected to  
BANK0 on "gpio" sheet

To fix issues with FT231XS rev A,B,C  
Short-circuit D18 LED, but then  
board cannot keep awake by USB.  
chip rev D works properly  
See TN140\_FT231X Errata



Buttons, LEDs, OLED display

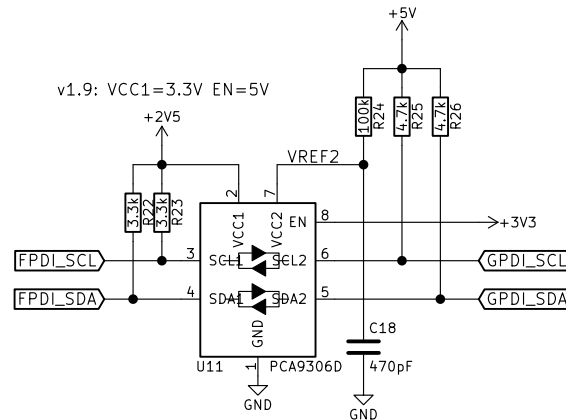
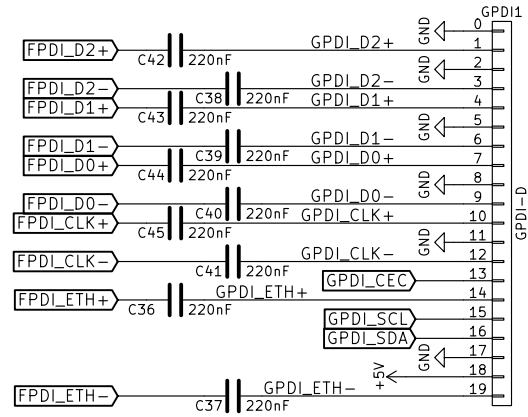
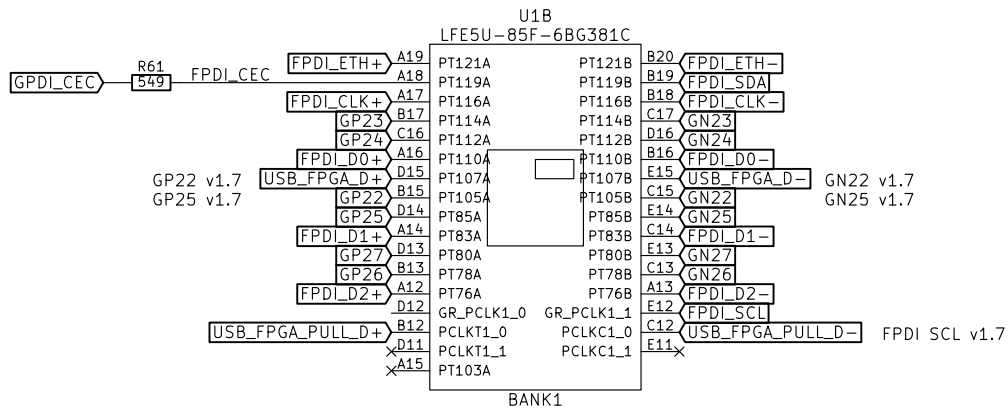
**EMARD**

Sheet: /blinky/  
File: blinky.sch

**Title: ULX3S**

Size: A4 Date:  
KiCad E.D.A. kicad 5.0.2+dfsg1-1

**Rev: 1.0.0**  
Id: 4/11



i2c shared with RTC on "power" sheet

PCB v1.8.1 and higher accept FCI 10029449-111RLF  
[www.amphenol-icc.com](http://portal.fciconnect.com/Comergent/fci/drawing/10029449.pdf)  
 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](https://www.molex.com/pdm_docs/sd/471511001_sd.pdf)  
 mouser PN: 710-685119134923 (Würth)  
<https://katalog.we-online.com/em/datasheet/685119134923.pdf>

Digital Video and Ethernet  
 General Purpose Differential Interface

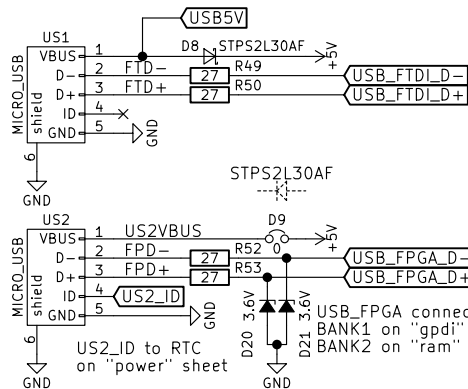
**EMARD**

Sheet: /gpd/  
 File: gpd.sch

**Title: ULX3S**

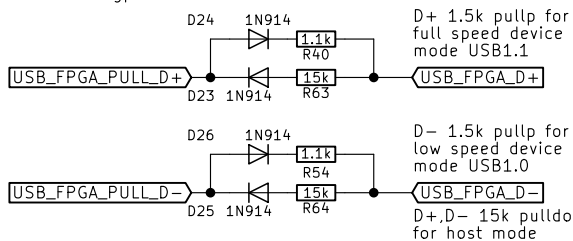
Size: A4 Date:  
 KiCad E.D.A. kicad 5.0.2+dfsg1-1

Rev: 1.0.2  
 Id: 5/11

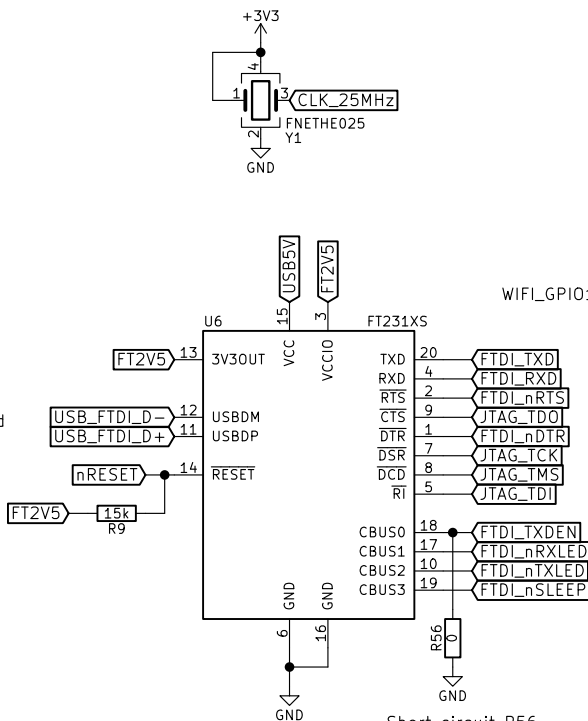


D8,D9: Schottky 2A/30V  
 Low drop V<sub>fmax</sub>=0.375V  
 Parts reduction: Only D8 is required.  
 D9 D51 D52 can be 1206  
 1A polyfuses or 0-ohm/2A jumpers

USB pull lines connected to BANK1 on "gpd1" sheet

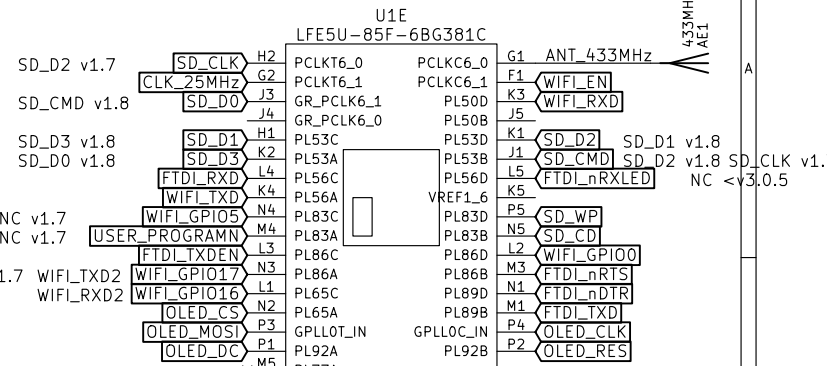


Deviation from USB specification in pulldowns for BOM simplification. With series diode, correct value R63 R64 should be 12k but 15k is used.



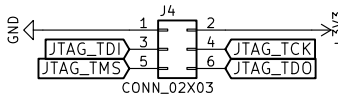
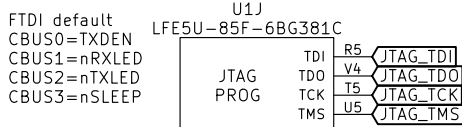
warning:  
 ULX35 has different pinout for simpler PCB routing and because FT230X has weak CTS drive capability. (Undocumented, FLEAfpga mail from 13-Nov-2015)  
 ULX25 pinout was:  
 TCK = DSR  
 TMS = RI  
 TDI = CTS  
 TDO = DCD

Short circuit R56 for chip rev A,B,C workaround in TN140\_FT231X Errata



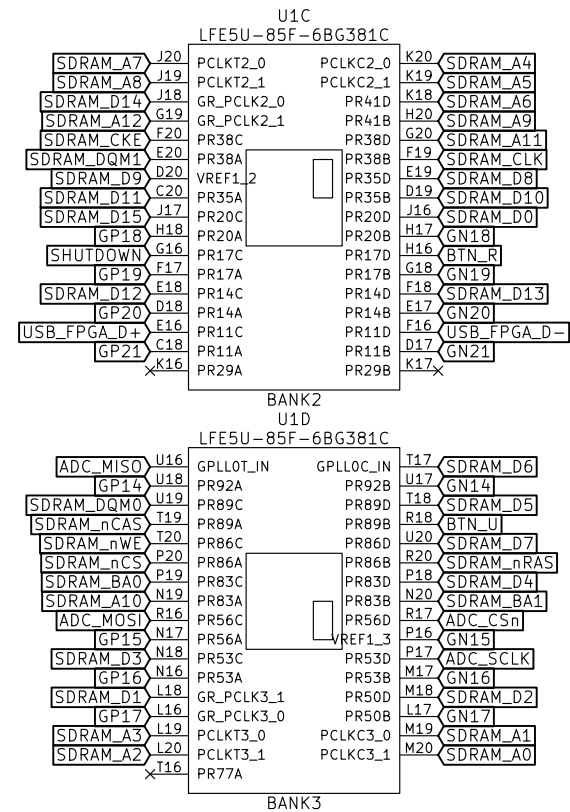
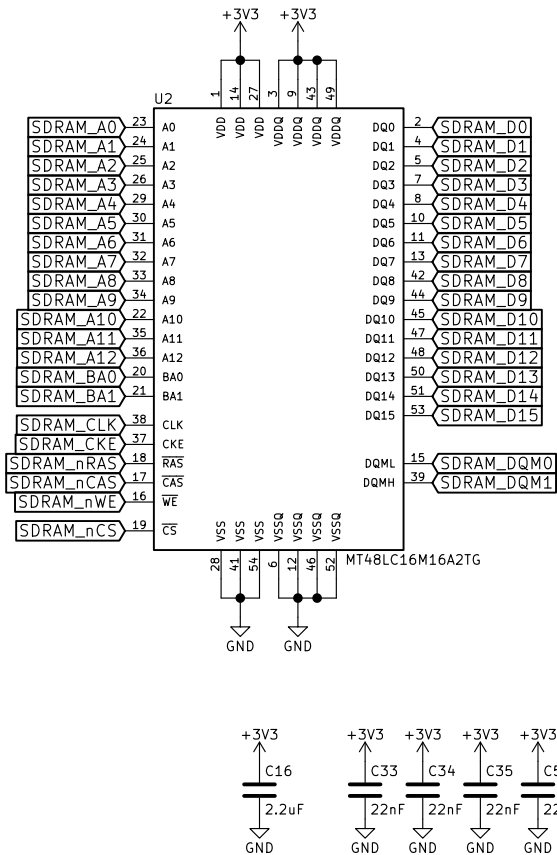
WiFi programming pins:  
 TXD RXD RTS DTR

VNC2 programming pins:  
 TXD RXD TXDEN



USB serial and JTAG	
<b>EMARD</b>	
Sheet: /usb/	
File: usb.sch	
<b>Title: ULX35</b>	
Size: A4	Date:
KiCad E.D.A. kicad 5.0.2+dfsg1-1	
<b>Rev: 1.0.3</b>	
Id: 6/11	





SDRAM memory

**EMARD**

Sheet: /ram/

File: ram.sch

**Title: ULX3S**

Size: A4

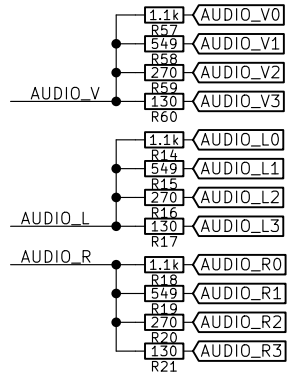
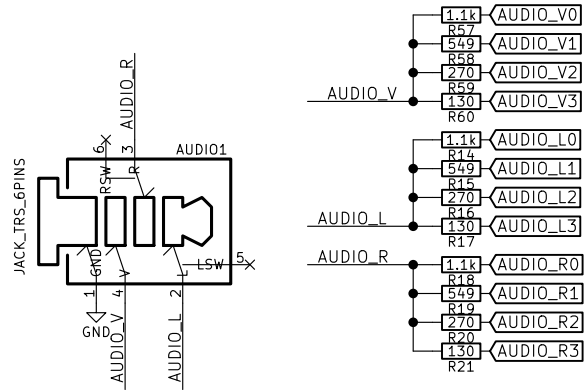
Date:

**Rev: 1.0.0**

KiCad E.D.A. kicad 5.0.2+dfsg1-1

Id: 8/11

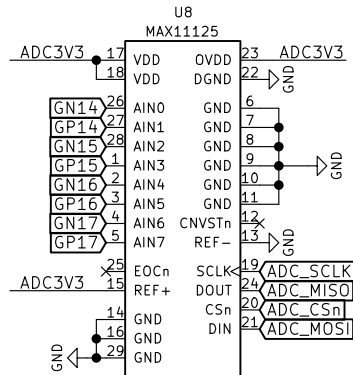
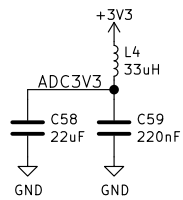




JACK pinout for SJ-43516-SMT-TR  
<http://www.cui.com/product/resource/sj-4351x-smt-series.pdf>  
 pin 1 - sleeve (GND)  
 pin 2 - tip (left channel)  
 pin 3 - ring1 (right channel)  
 pin 4 - ring2 (video)  
 pin 5 - tip switch  
 pin 6 - ring1 switch

Audio connected to BANK7 on "gpio" sheet

Output resistance: 75 ohm  
 Internal resistance of FPGA pin: 10 ohm  
 $1/(1/(130+10)+1/(270+10)+1/(549+10)+1/(1100+10))=74.6$



ADC SPI connected to BANK3 of "ram" sheet

Analog audio and video

**EMARD**

Sheet: /analog/

File: analog.sch

**Title: ULX3S**

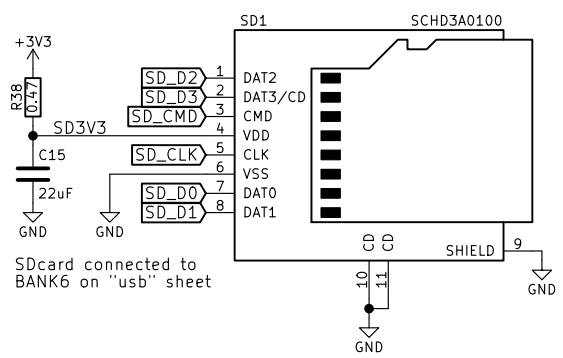
Size: A4

Date:

KiCad E.D.A. kicad 5.0.2+dfsg1-1

**Rev: 1.0.3**

Id: 9/11



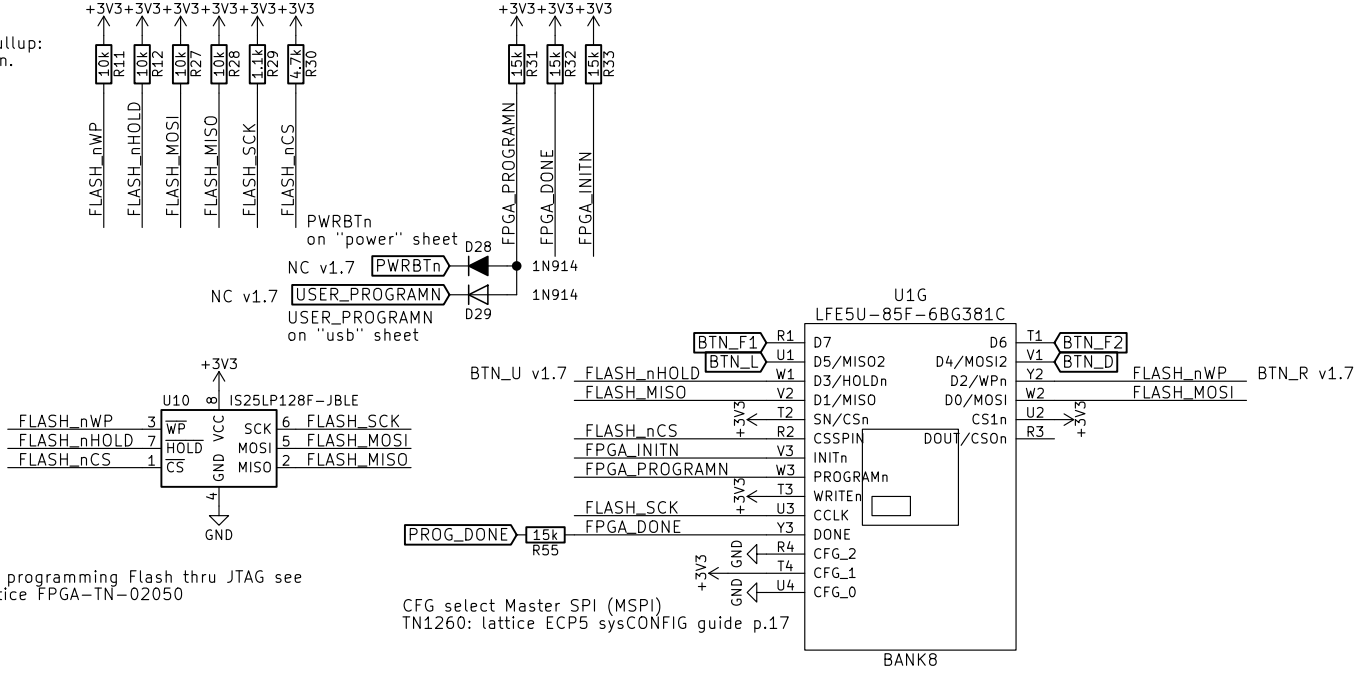
SDcard connected to BANK6 on "usb" sheet

minimum pins for compatible mode  
SD\_CLK, SD\_CMD, SD\_D0, SD\_D3

SD card	
<b>EMARD</b>	
Sheet: /sdcards/ File: sdcards.sch	
<b>Title: ULX3S</b>	
Size: A4	Date:
KiCad E.D.A. kicad 5.0.2+dfsg1-1	Rev: 1.0.0 Id: 10/11

Deviation from TN1260 in pullup values for BOM simplification. Correct values should be 1k but 1.1k is used.

pullups for Master SPI (MSPI) required by TN1260: lattice ECP5 sysCONFIG guide p.6  
 pullups to allow entering USER mode TN1260: lattice ECP5 sysCONFIG guide p.6, p.8, p.13



For programming Flash thru JTAG see Lattice FPGA-TN-02050

CFG select Master SPI (MSPI) TN1260: lattice ECP5 sysCONFIG guide p.17

SPI flash	
<b>EMARD</b>	
Sheet: /flash/ File: flash.sch	
<b>Title: ULX3S</b>	
Size: A4	Date:
KiCad E.D.A. kicad 5.0.2+dfsg1-1	Rev: 1.0.5 Id: 11/11