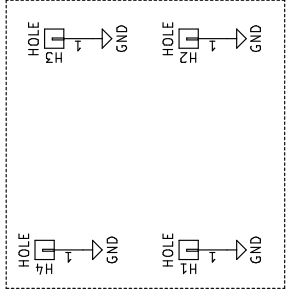


A	A	B	C	D	6
1					6
2					5
3					4
4					3
5					2
6					1

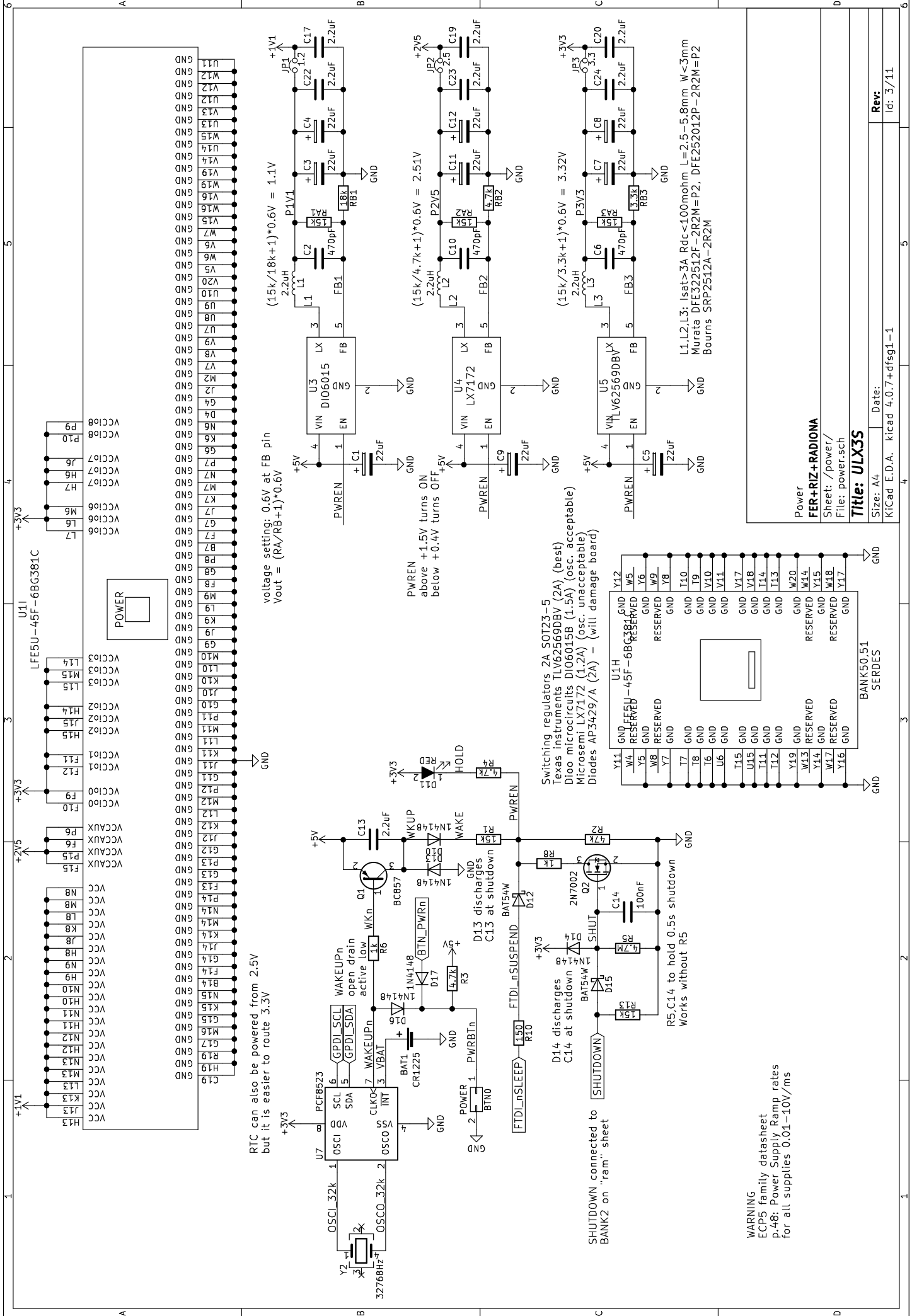


click on mouse pointer arrow on top of right toolbar and double-click on sheet to open

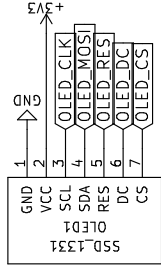
- Sheet: power
- File: power.sch
- Sheet: gpio
- File: usb.sch
- Sheet: gpio
- File: gpio.sch
- Sheet: blinky
- File: blinky.sch
- Sheet: analog
- File: analog.sch
- Sheet: ram
- File: ram.sch
- Sheet: wifi
- File: wifi.sch
- Sheet: sdcard
- File: sdcard.sch
- Sheet: flash
- File: flash.sch

Root sheet  
**FER+RIZ+RADIONA**  
 Sheet: /  
 File: ulx3s.sch  
**Title: ULX3S**  
 Size: A4 Date:  
 KiCad E.D.A. kicad 4.0.7+dfsg1-1  
**Rev: 1.7.8**  
 Id: 1/11

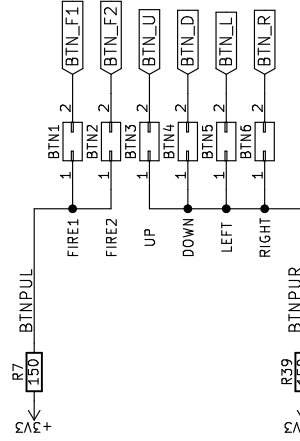




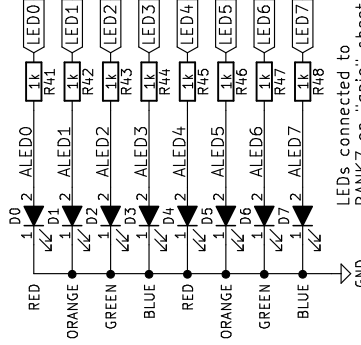
SSD1306 B/W or SSD1331 COLOR  
compatible OLED 0.96" or 1.3" PCB  
14x14 units  
1 unit = 2.54 mm



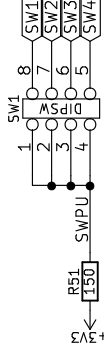
OLED connected to  
BANK6 on "usb" sheet



BTN\_R,U to BANK2,3 on "ram" sheet  
BTN\_F1,F2,D,L to BANK8 on "flash" sheet

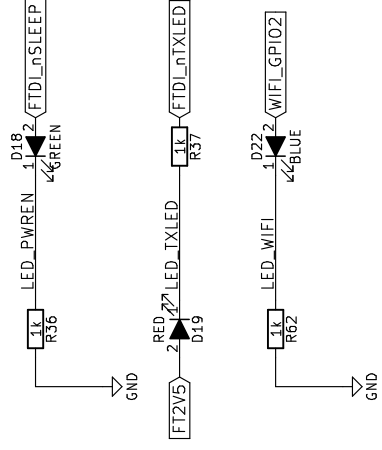


LEDs connected to  
BANK7 on "gpio" sheet



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



TXLED blinks when FPGA sends data to FTDI

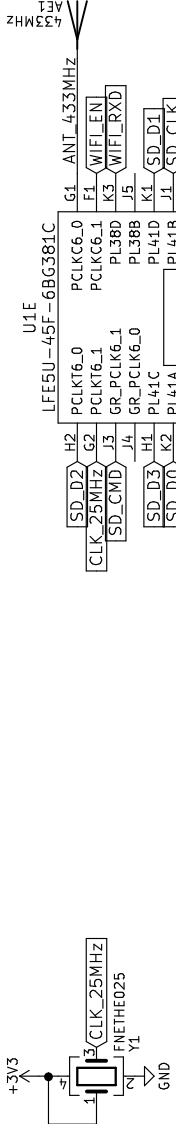
Buttons, LEDs, OLED display  
**FER+RIZ+RADIONA**  
Sheet: /blinky/  
File: blinky.sch

**Title: ULX3S**

Size: A4 | Date:  
KICad E.D.A. kicad 4.0.7+dfsg1-1

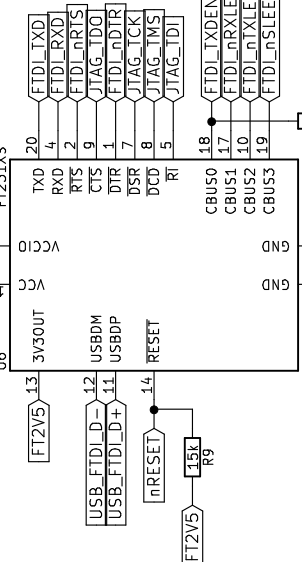
Rev: 0.0.1  
Id: 4/11





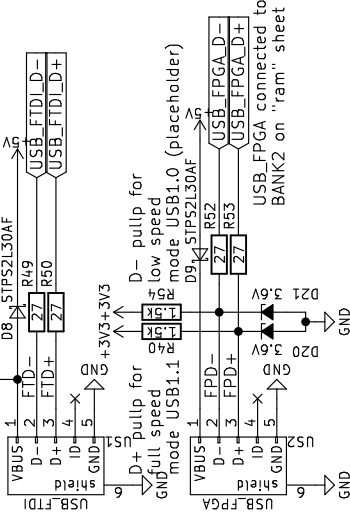
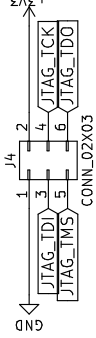
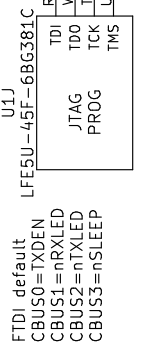
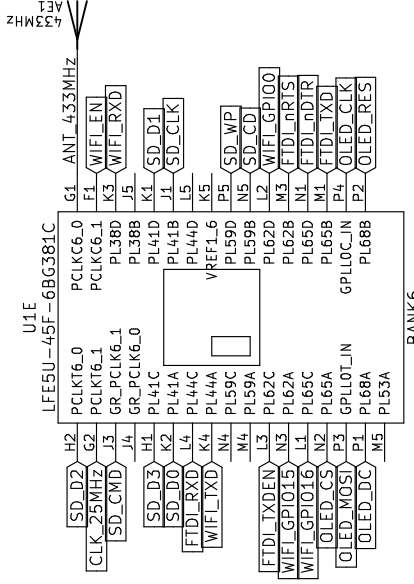
WiFi programming pins:  
TXD RXD RTS DIR

VNC2 programming pins:  
TXD RXD TXDEN



Short circuit R56  
for chip rev A,B,C  
workaround in  
TN140\_FT232X Errata

warning:  
ULX3S has different pinout  
for simpler PCB routing and  
because FT232X has weak CTS  
drive capability. (Undocumented,  
FLEAPga mail from 13-Nov-2015)  
ULX2S pinout was:  
TCK = DSR  
TMS = RI  
TDI = CTS  
TDO = DCD



D8,D9: Schottky 2A/30V  
Low drop V<sub>fmax</sub>=0.375V

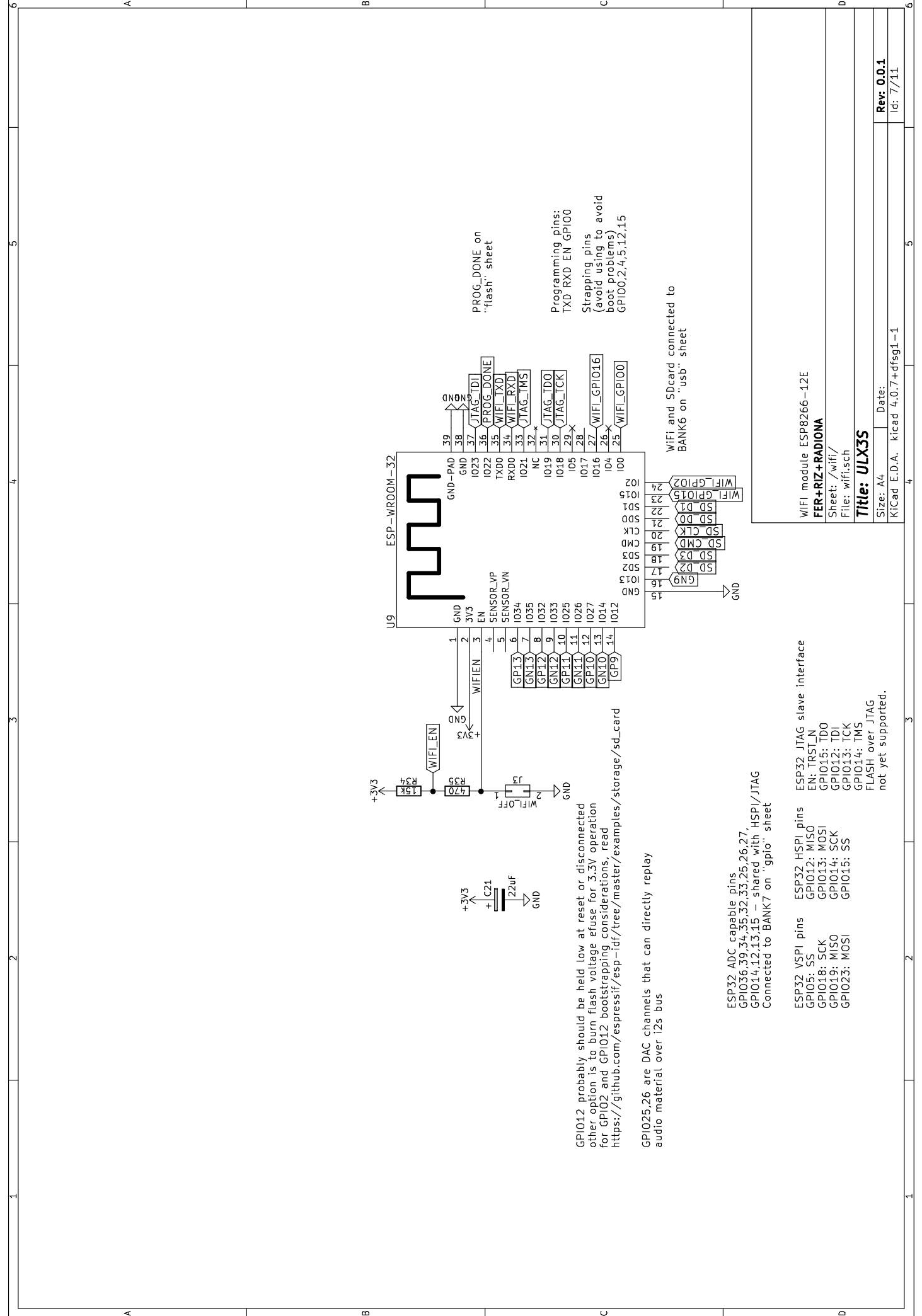
Root sheet  
**FER+RIZ+RADIONA**

Sheet: /usb/  
File: usb.sch

**Title: ULX3S**

Size: A4 Date:  
KiCad E.D.A. kicad 4.0.7+dfsg1-1

Rev: 0.0.1  
Id: 6/11



PROG\_DONE on "flash" sheet

Programming pins:  
TXD RXD EN GPIO0

Strapping pins  
(avoid using to avoid boot problems)  
GPIO0,2,4,5,12,15

WIFI and SDcard connected to BANK6 on "usb" sheet

GPIO12 probably should be held low at reset or disconnected other option is to burn flash voltage efuse for 3.3V operation for GPIO2 and GPIO12 bootstrapping considerations, read [https://github.com/espressif/esp-idf/tree/master/examples/storage/sd\\_card](https://github.com/espressif/esp-idf/tree/master/examples/storage/sd_card)

GPIO25,26 are DAC channels that can directly replay audio material over I2S bus

ESP32 ADC capable pins  
GPIO36,39,34,35,32,33,25,26,27,  
GPIO14,12,13,15 - shared with HSPI/JTAG  
Connected to BANK7 on "gpio" sheet

ESP32 VSP1 pins  
GPIO5: SS  
GPIO18: SCK  
GPIO19: MISO  
GPIO23: MOSI

ESP32 JTAG slave interface  
EN: TRST\_N  
GPIO15: TDO  
GPIO12: TDI  
GPIO13: TCK  
GPIO14: TMS  
FLASH over JTAG  
not yet supported.

WIFI module ESP8266-12E  
**FER+RIZ+RADIONA**  
Sheet: /wifi/  
File: wifi.sch

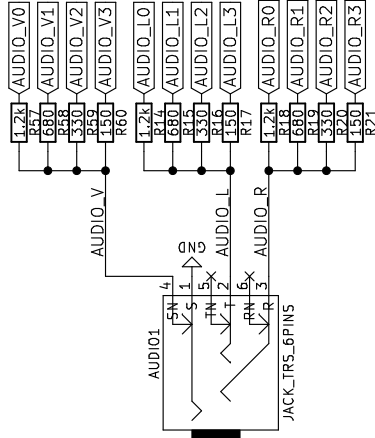
**Title: ULX3S**

Size: A4 Date:  
KiCad E.D.A. kicad 4.0.7+dfsg1-1

**Rev. 0.0.1**  
Id: 77/11

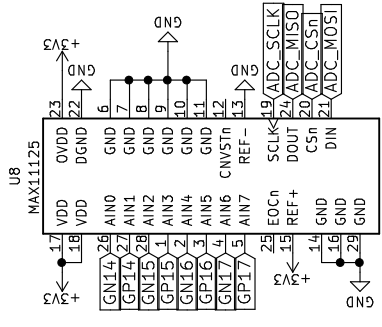






JACK pinout for SJ-43516-SMT-TR  
<http://www.cui.com/product/resource/sj-4351x-smt-series.pdf>  
 pin 1 - sleeve (GND)  
 pin 2 - tip (left channel)  
 pin 3 - ring1 (right channel)  
 pin 4 - ring2 (video)  
 pin 5 - tip switch  
 pin 6 - ring1 switch

Audio connected to  
 BANK7 on "gpio" sheet



ADC SPI connected to  
 BANK3 of "ram" sheet

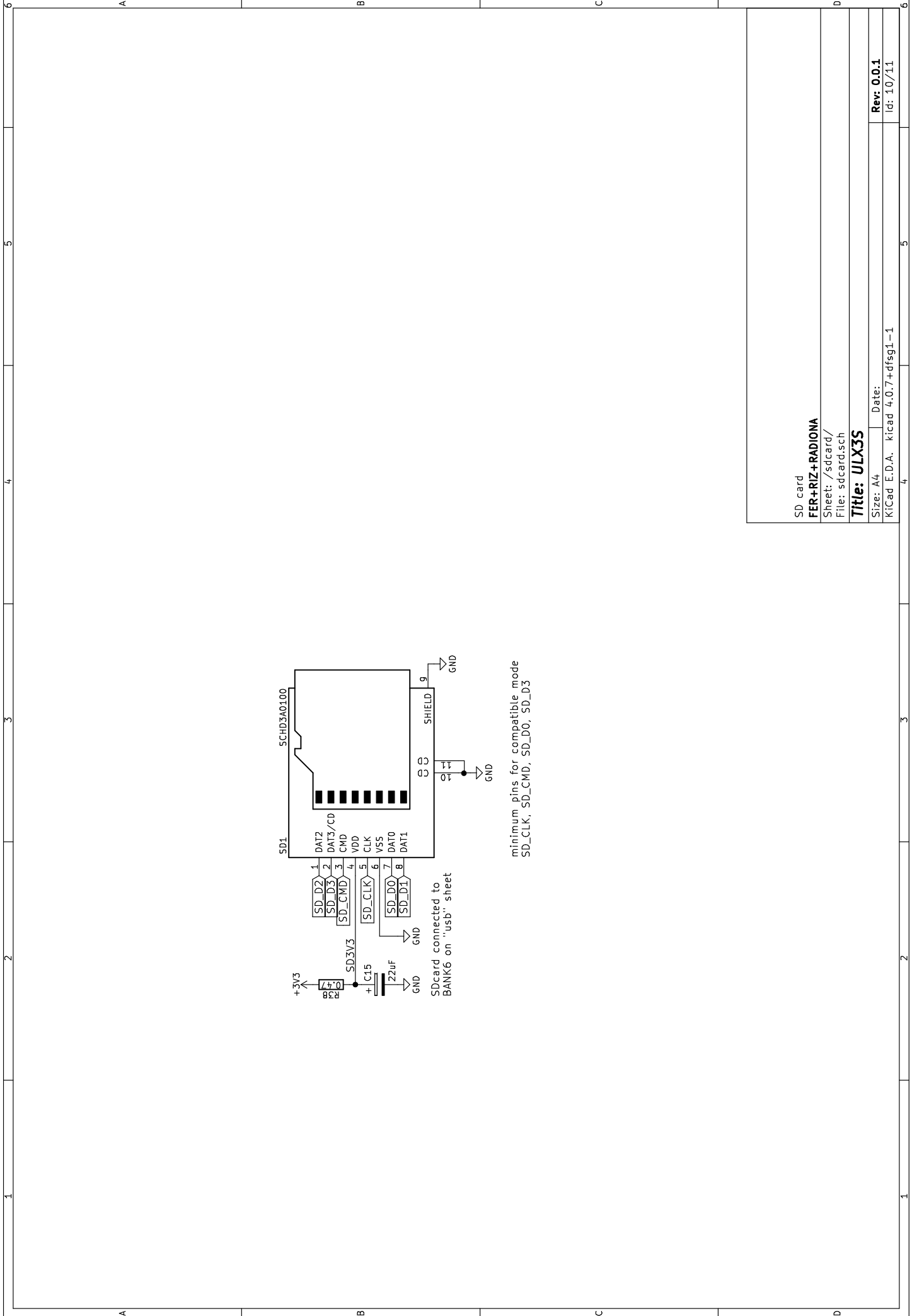
Analog audio and video  
**FER+RIZ+RADIONA**

Sheet: /analog/  
 File: analog.sch

**Title:**

Size: A4 | Date:  
 KiCad E.D.A. kicad 4.0.7+dfsg1-1

Rev:  
 Id: 9/11



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

SD card  
**FER+RIZ+RADIONA**

Sheet: /sdcard/  
File: sdcard.sch

**Title: ULX3S**

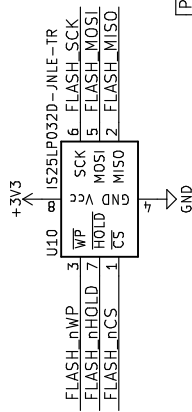
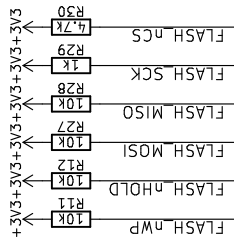
Size: A4 Date:

KiCad E.D.A. kicad 4.0.7+dfsg1-1

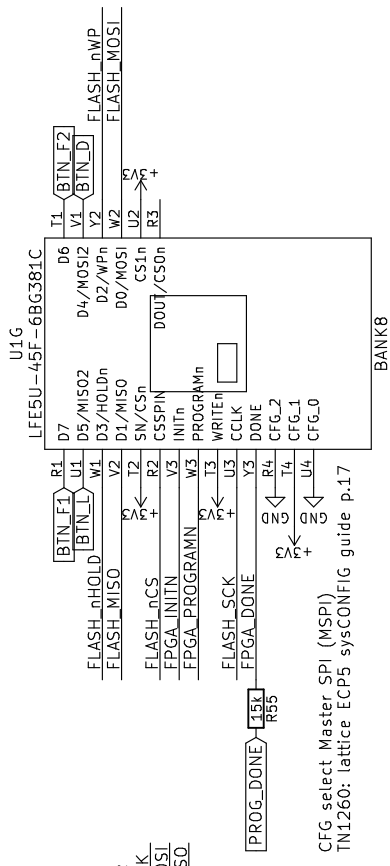
Rev: 0.0.1

Id: 10/11

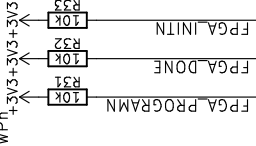
pullups for Master SPI (MSPi) required by  
TN1260: lattice sysCONFIG guide p.6



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



pullups to allow entering USER mode  
TN1260: lattice ECP5 sysCONFIG guide p.6, p.8, p.13



Sheet: /flash/  
File: flash.sch  
**Title:**  
Size: A4 Date:  
KICad E.D.A. kicad 4.0.7+dfsg1-1  
Id: 11/11