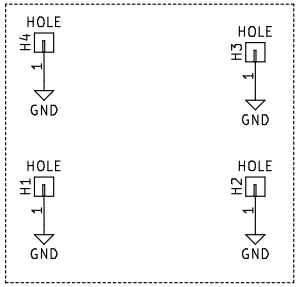


click on mouse pointer arrow on top of right toolbar
and double-click on sheet to open

Sheet: power	Sheet: usb	Sheet: blinkey	Sheet: ram	Sheet: sdcard
File: power.sch	File: usb.sch	File: blinkey.sch	File: ram.sch	File: sdcard.sch
Sheet: gpio	**Sheet: gpdi**	**Sheet: analog**	**Sheet: wifi**	**Sheet: flash**
File: gpio.sch	File: gpdi.sch	File: analog.sch	File: wifi.sch	File: flash.sch

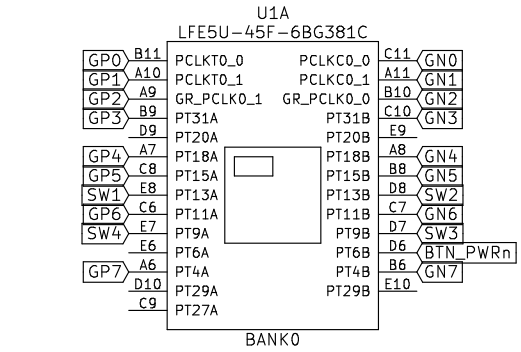
Root sheet
FER+RIZ+RADIONA

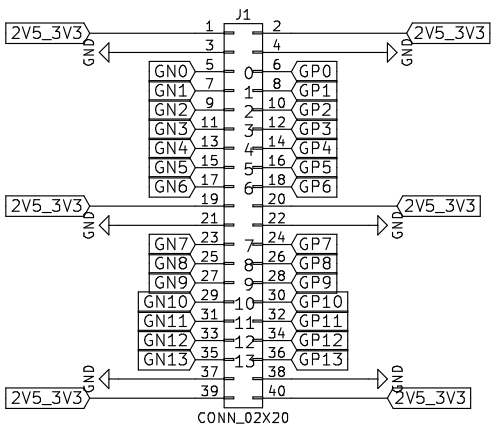
Sheet: /
File: ulx3s.sch

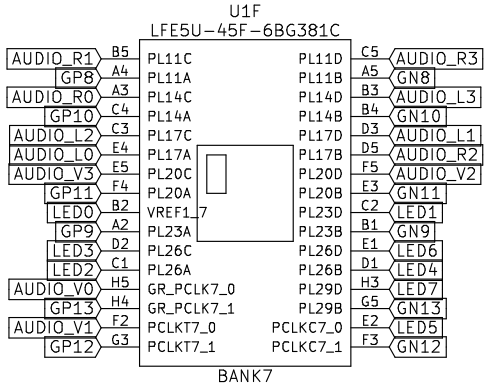
Title: ULX3S

Size: A4	Date:	**Rev: 1.7.16**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 1/11

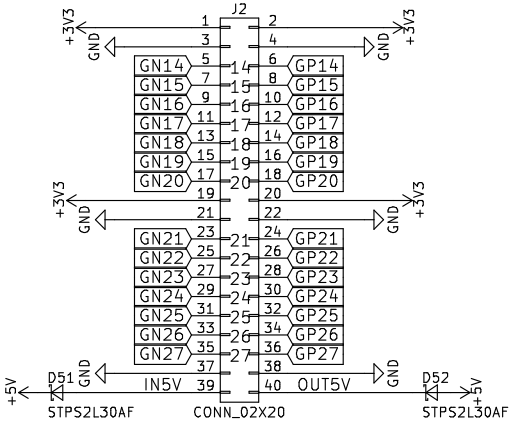
NC v1.7







NC v1.7



GP,GN 14-21 connected to BANK2,3 on "ram" sheet
J2_25-J2_35 connected to BANK1 on "gpdi" sheet

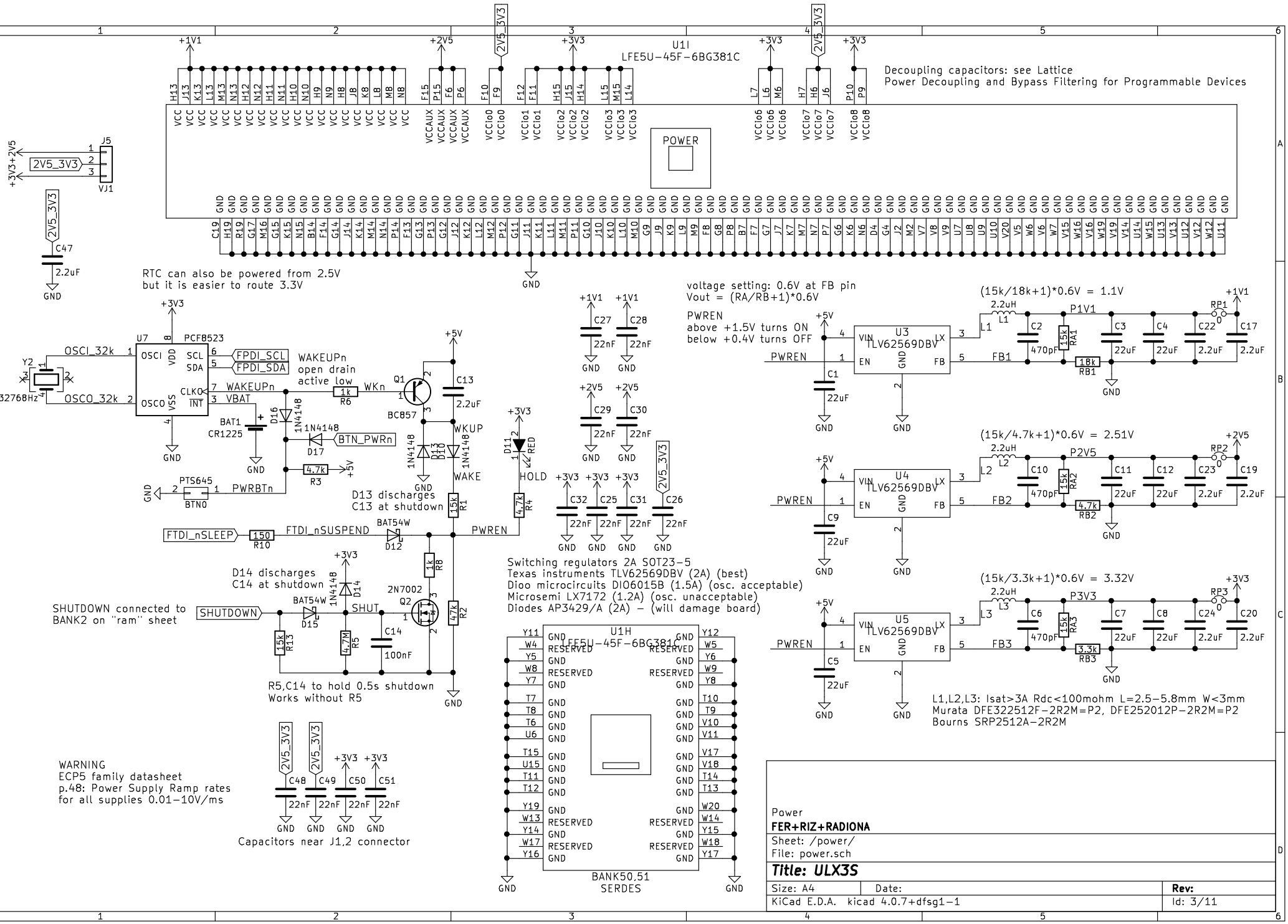
GPIO route only A/B pairs as those are differential bidirectional
don't route C/D pairs to GPIO as those can be differential input only

2.54 mm connectors
FER+RIZ+RADIONA

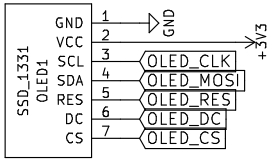
Sheet: /gpio/
File: gpio.sch

Title: ULX3S

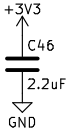
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 2/11

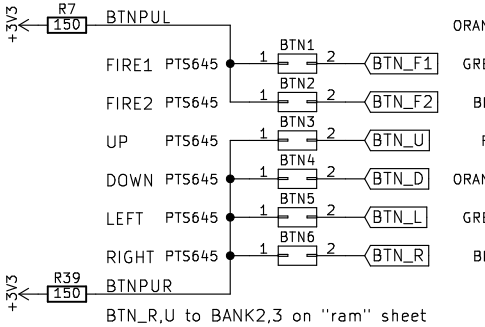

U1I
LFE5U-45F-6BG381C
Decoupling capacitors: see Lattice
Power Decoupling and Bypass Filtering for Programmable Devices
POWER
RTC can also be powered from 2.5V
but it is easier to route 3.3V
U7 PCF8523
OSCI_32k
OSCO_32k
32768Hz
FPDI_SCL
FPDI_SDA
WAKEUPn
open drain
active low
WKn
VBAT
BAT1
CR1225
BC857
WKUP
WAKE
BTN_PWRn
PTS645
BTN0
PWRBTn
D13 discharges
C13 at shutdown
HOLD
FTDI_nSLEEP
FTDI_nSUSPEND
BAT54W
PWREN
D14 discharges
C14 at shutdown
SHUTDOWN
SHUTDOWN connected to
BANK2 on "ram" sheet
2N7002
SHUT
R5,C14 to hold 0.5s shutdown
Works without R5
WARNING
ECP5 family datasheet
p.48: Power Supply Ramp rates
for all supplies 0.01–10V/ms
Capacitors near J1,2 connector
U1H
LFE5U-45F-6BG381C
BANK50,51
SERDES
voltage setting: 0.6V at FB pin
Vout = (RA/RB+1)*0.6V
PWREN
above +1.5V turns ON
below +0.4V turns OFF
TLV62569DBV
(15k/18k+1)*0.6V = 1.1V
(15k/4.7k+1)*0.6V = 2.51V
(15k/3.3k+1)*0.6V = 3.32V
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)
L1,L2,L3: Isat>3A Rdc<100mohm L=2.5–5.8mm W<3mm
Murata DFE322512F-2R2M=P2, DFE252012P-2R2M=P2
Bourns SRP2512A-2R2M
Power
FER+RIZ+RADIONA
Sheet: /power/
File: power.sch
Title: ULX3S
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 4.0.7+dfsg1-1
Id: 3/11

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

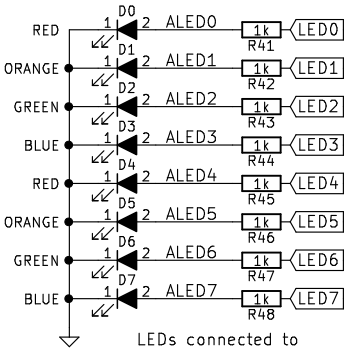


OLED connected to
BANK6 on "usb" sheet

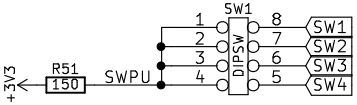




BTN_R,U to BANK2,3 on "ram" sheet
BTN_F1,F2,D,L to BANK8 on "flash" sheet

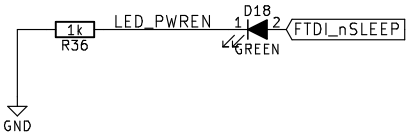


LEDs connected to
BANK7 on "gpio" sheet

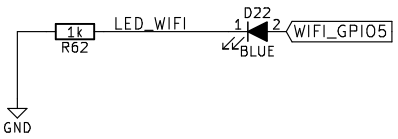


DIP switch connected to
BANK0 on 'gpio' sheet

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



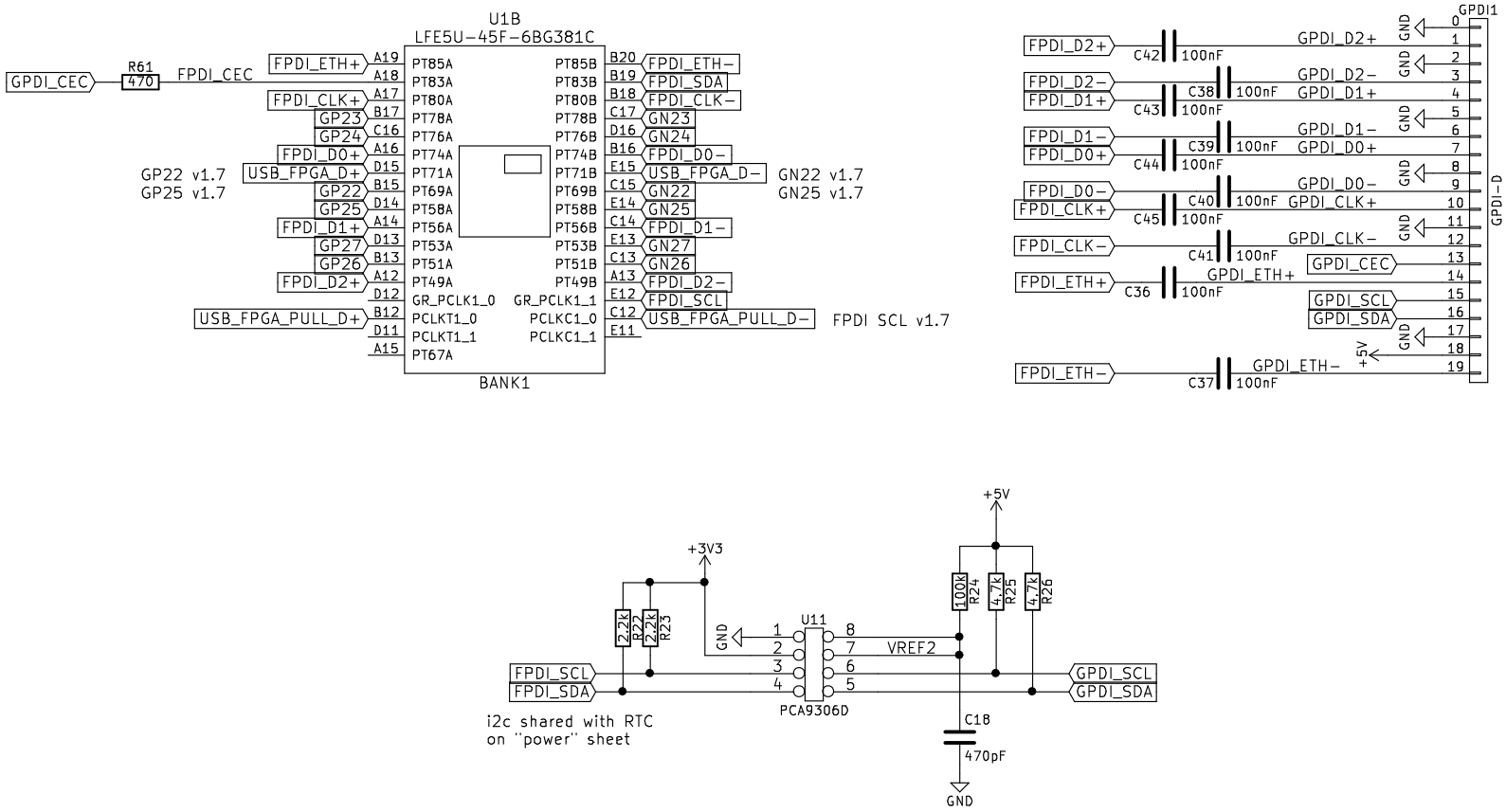
GPIO2 on PCB v1.7

Buttons, LEDs, OLED display
FER+RIZ+RADIONA

Sheet: /blinkey/
File: blinkey.sch

Title: ULX3S

Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 4/11

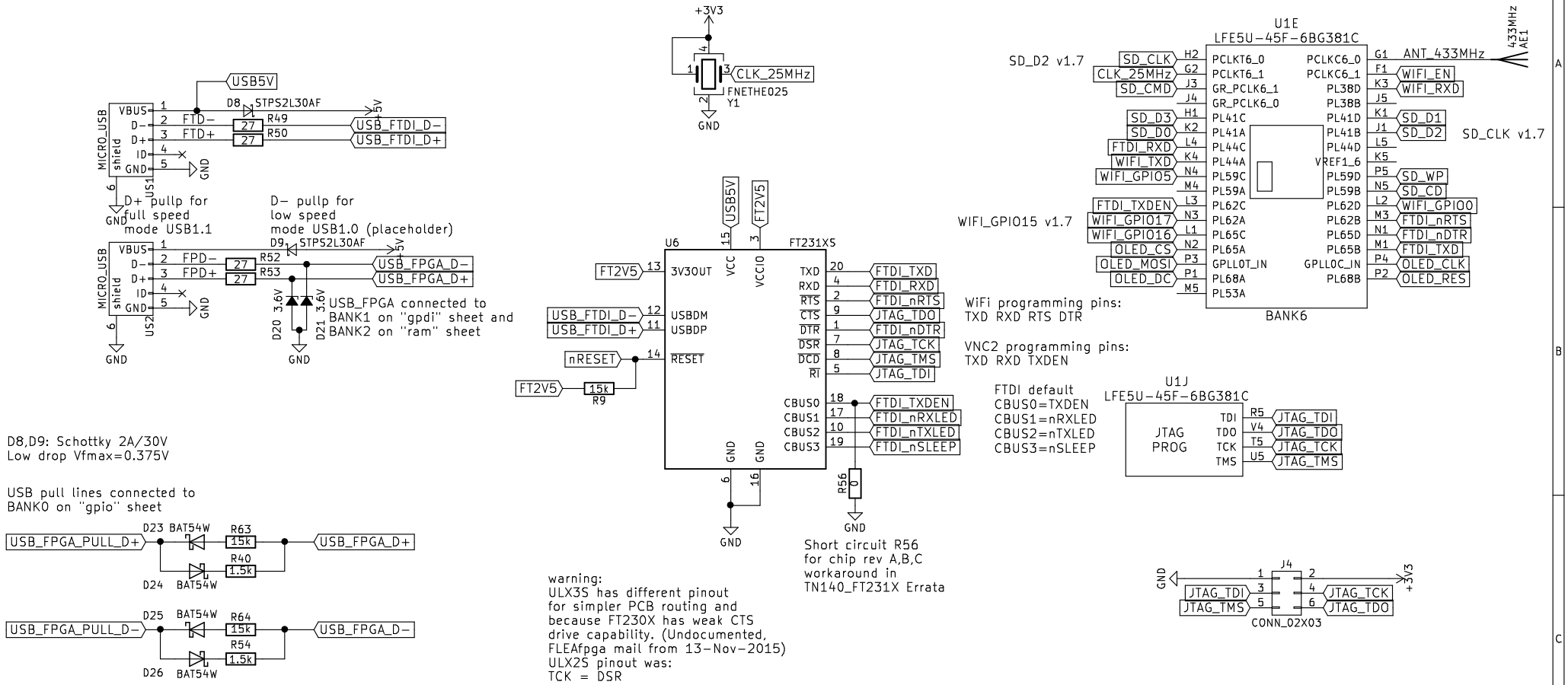


Digital Video and Ethernet
General Purpose Differential Interface
FER+RIZ+RADIONA

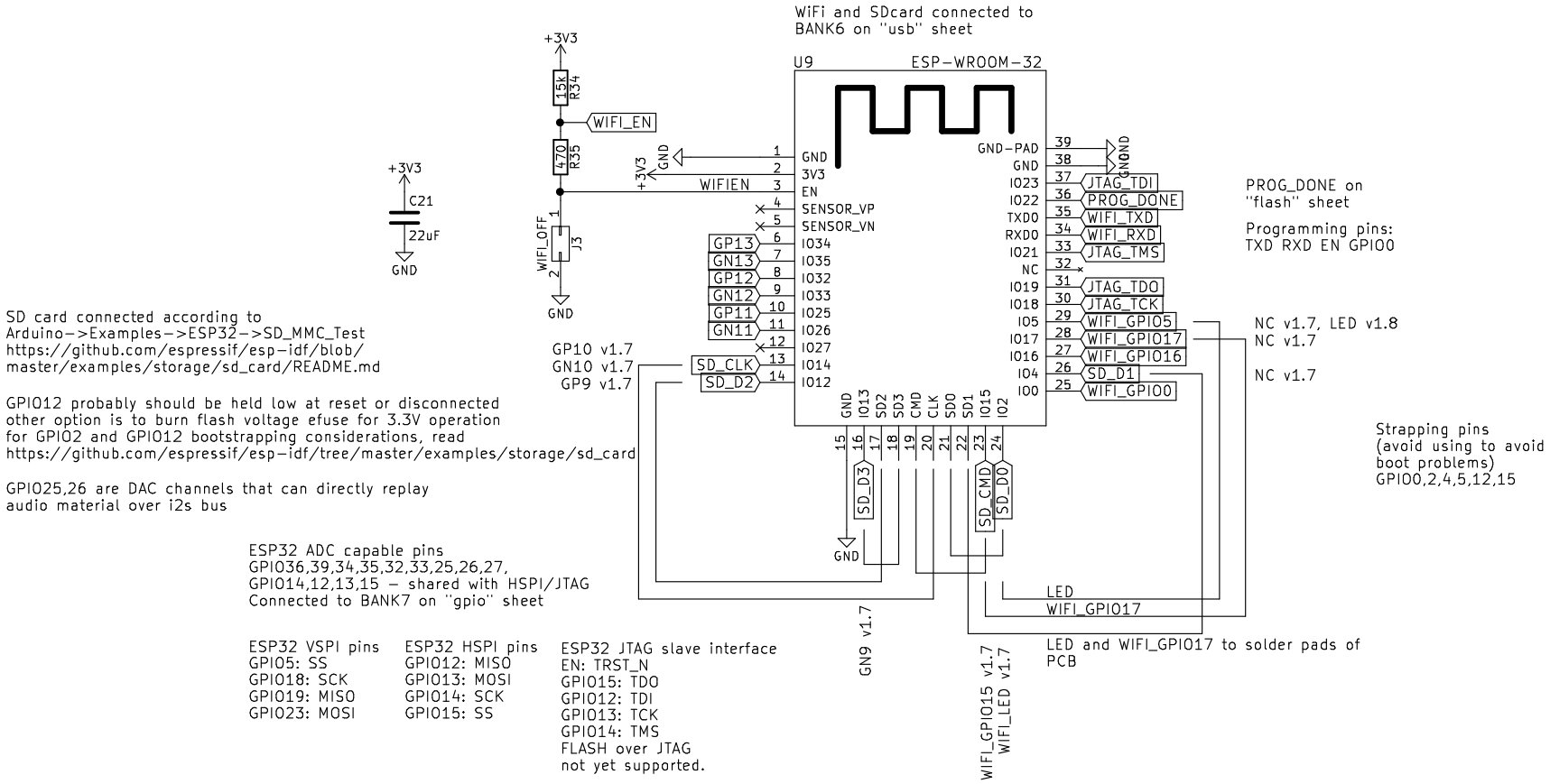
Sheet: /gpdi/
File: gpdi.sch

Title: ULX3S

Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 5/11



Root sheet		
FER+RIZ+RADIONA		
Sheet: /usb/		
File: usb.sch		
Title: ULX3S		
Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+dfsg1−1		Id: 6/11



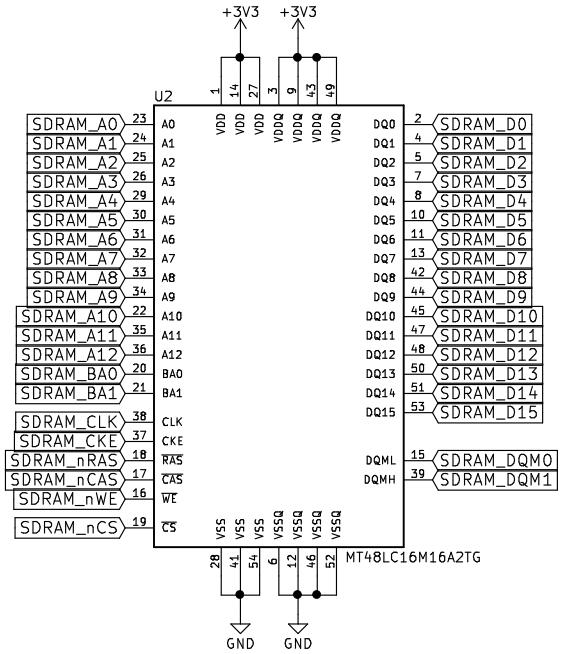
WIFI module ESP8266-12E

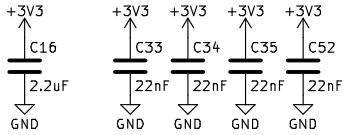
FER+RIZ+RADIONA

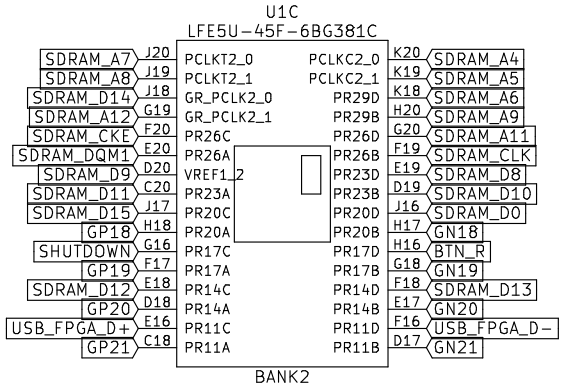
Sheet: /wifi/
File: wifi.sch

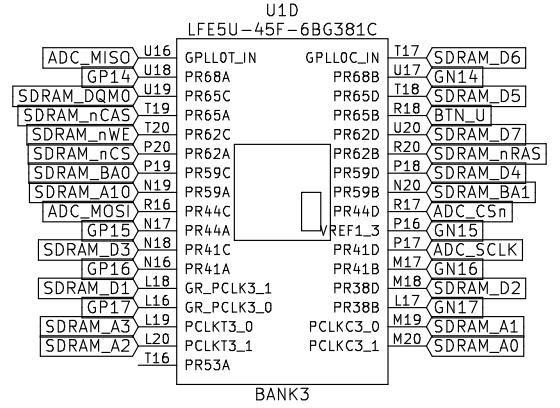
Title: ULX3S

Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 7/11









SDRAM memory

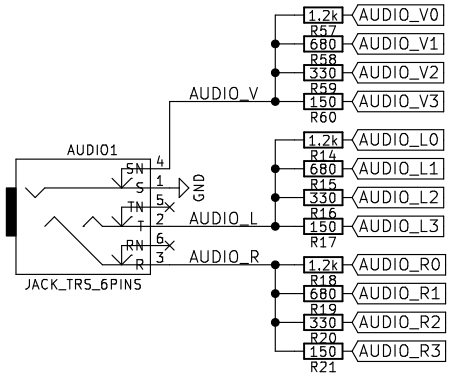
FER+RIZ+RADIONA

Sheet: /ram/

File: ram.sch

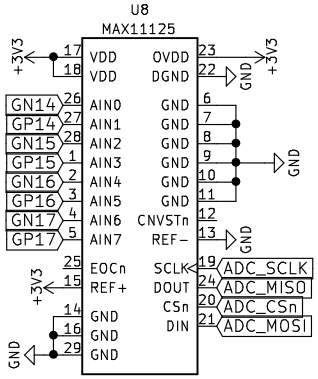
Title: ULX3S

Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+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



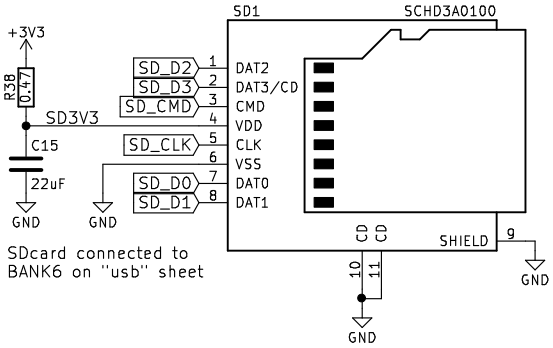
ADC SPI connected to
BANK3 of "ram" sheet

Analog audio and video
FER+RIZ+RADIONA

Sheet: /analog/
File: analog.sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 9/11



minimum pins for compatible mode
SD_CLK, SD_CMD, SD_D0, SD_D3

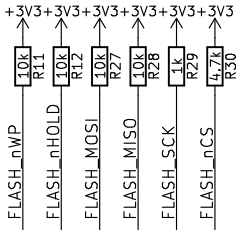
SD card
FER+RIZ+RADIONA

Sheet: /sdcard/
File: sdcard.sch

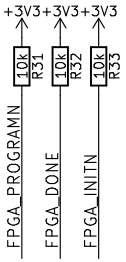
Title: ULX3S

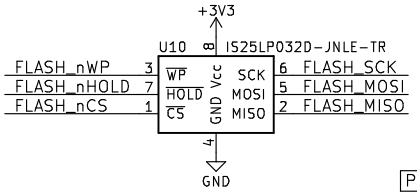
Size: A4	Date:	**Rev: 0.0.1**
KiCad E.D.A. kicad 4.0.7+dfsg1-1		Id: 10/11

pullups for Master SPI (MSPI) required by
TN1260: lattice ECP5 sysCONFIG guide p.6

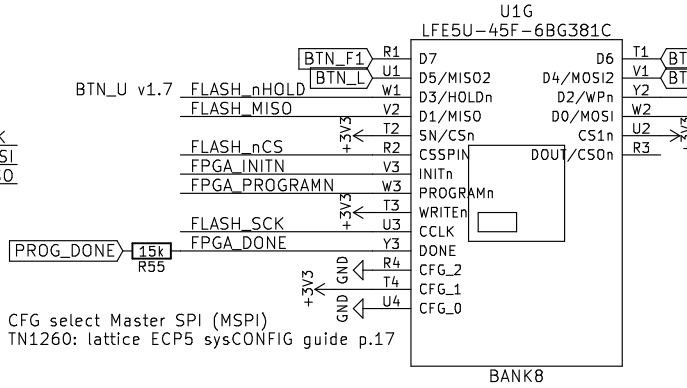


pullups to allow entering USER mode
TN1260: lattice ECP5 sysCONFIG guide p.6, p.8, p.13





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



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

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