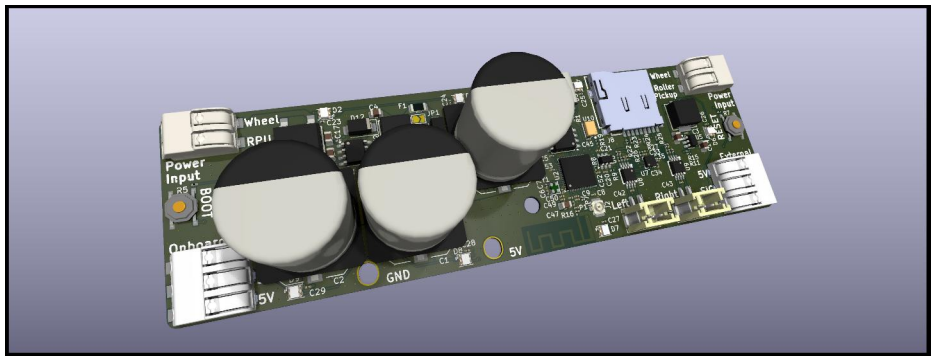
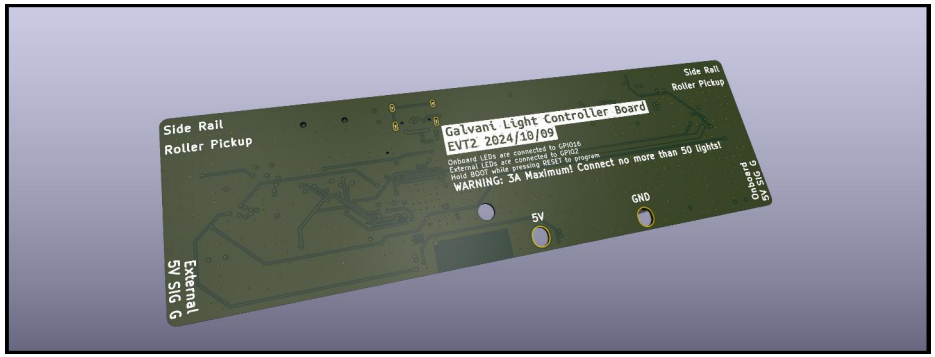
Galvani

LED Controller for Model Railroads

2: Block Diagram
3: Heirarchy
4: Power
5: Audio
6: CPU
7: LEDs
8: SD Card





Default SSID: WLED
Default Password: wled1234
Scan to connect:

Sheet: /
File: Galvani.kicad_sch

Title:

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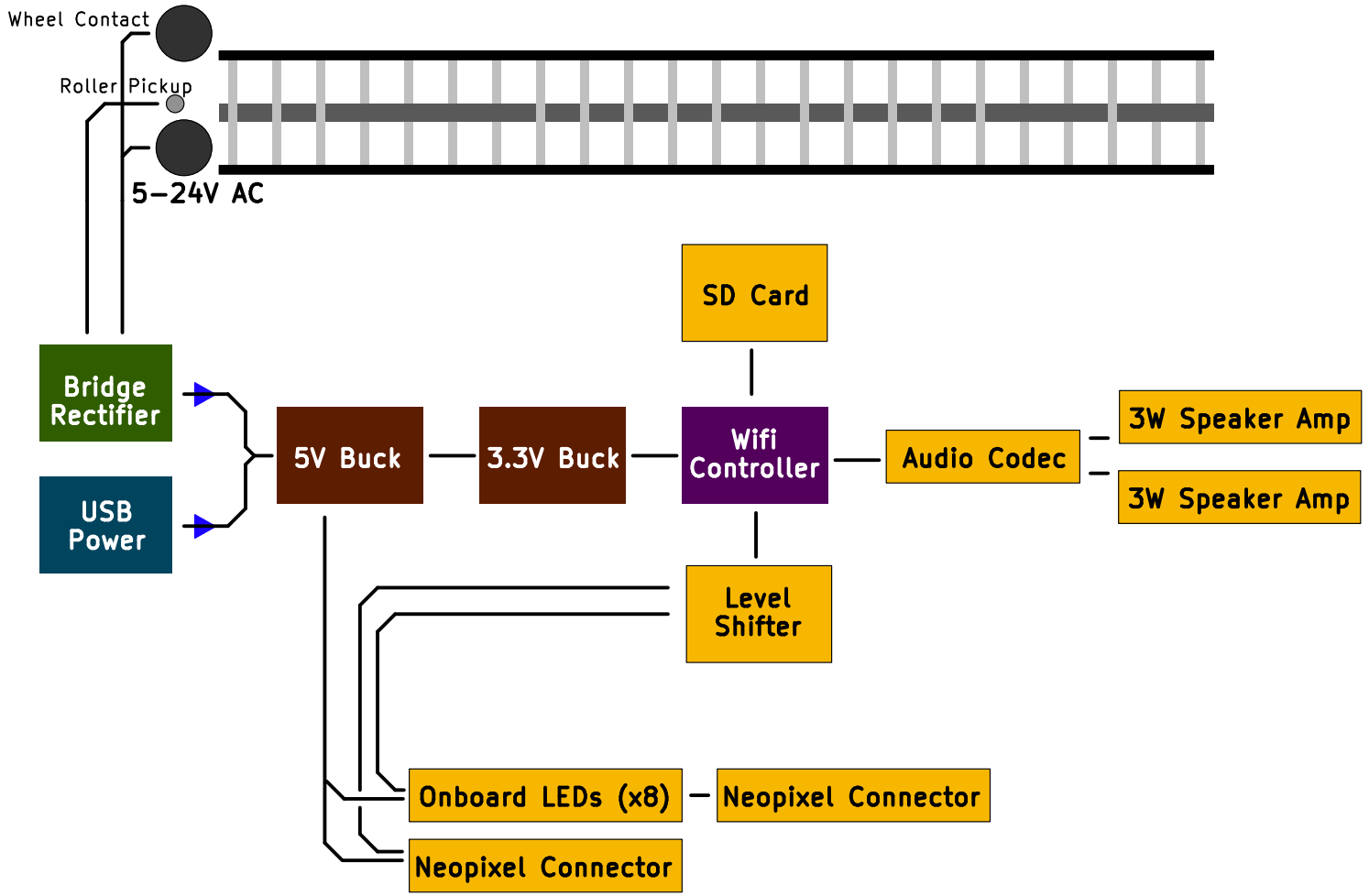
Heirarchy

Block Diagram



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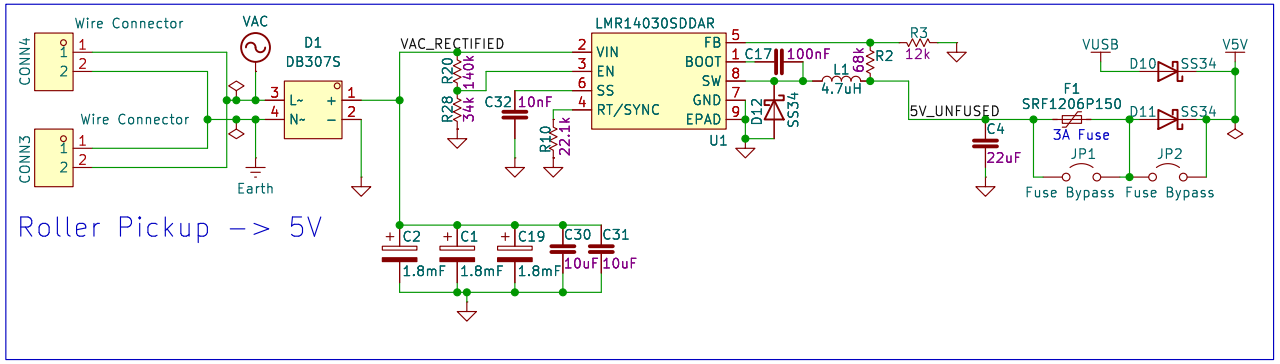
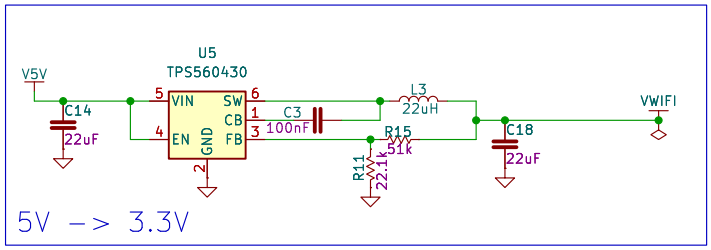


VSTART=6.0 V
VSTOP=5.6 V
VEN=1.2 V
IEN=0.000001 A
IHYS=0.0000036 A

$$R_{ENT} = \frac{V_{START} - V_{STOP}}{I_{HYS}} = 110k$$

$$R_{ENB} = \frac{V_{EN}}{\frac{V_{START} - V_{EN}}{R_{ENT}} + I_{EN}} = 27k$$

Enable Circuit



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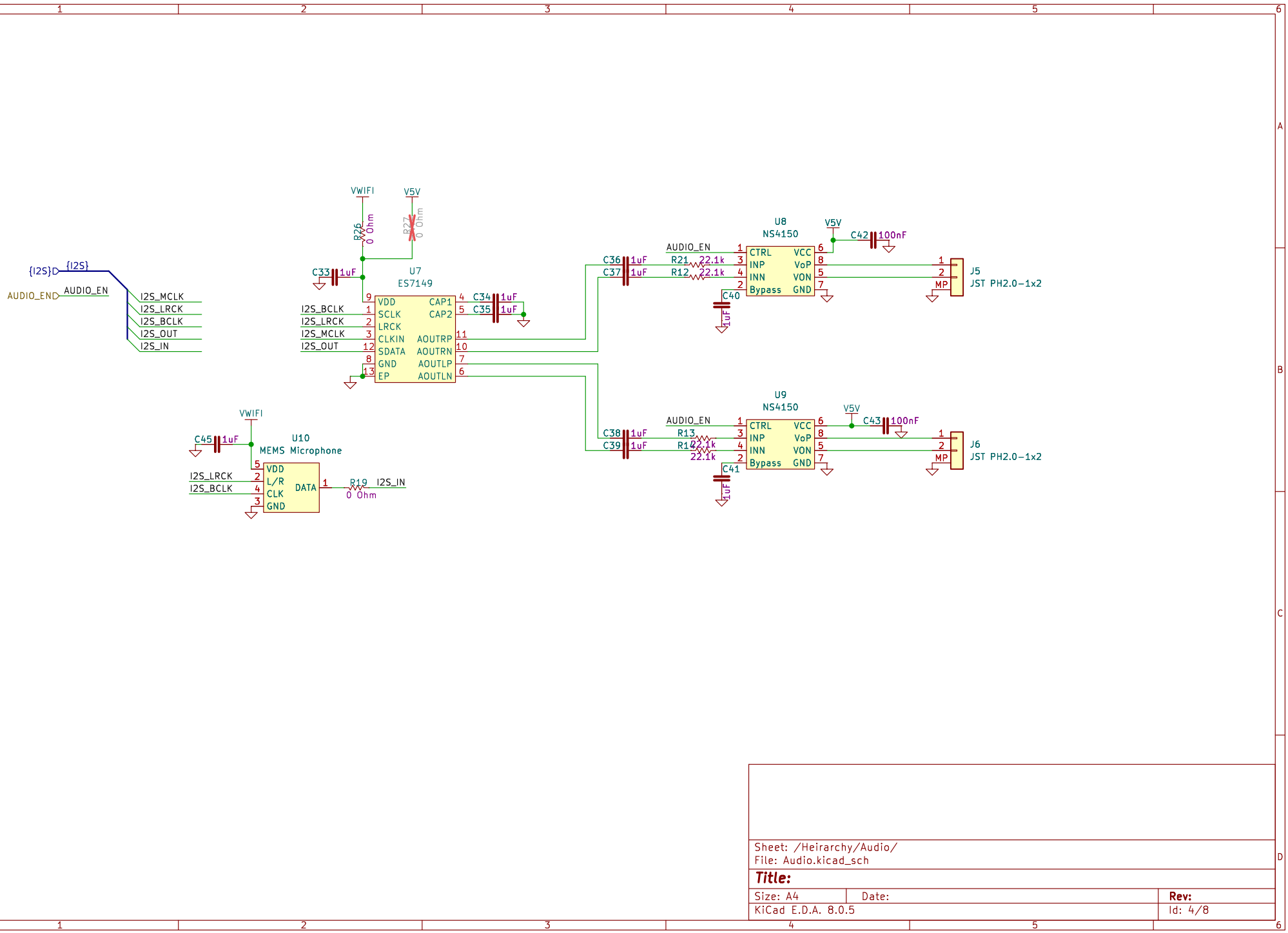

Sheet: /Heirarchy/Audio/
File: Audio.kicad_sch

Title:

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Power

File: Power.kicad_sch

CPU

LED_EXTERNAL
LED_INTERNAL
{I2S}
AUDIO_EN
{SD}

File: CPU.kicad_sch

LEDs

LED_EXTERNAL
LED_INTERNAL

File: LEDs.kicad_sch

Audio

{I2S}
AUDIO_EN

File: Audio.kicad_sch

SD Card

{SD}

File: SDCard.kicad_sch

Mounting Hole

TP1
5V

V5V

TP2
GND

Test Points and Mounting Holes

Sheet: /Heirarchy/
File: Heirarchy.kicad_sch

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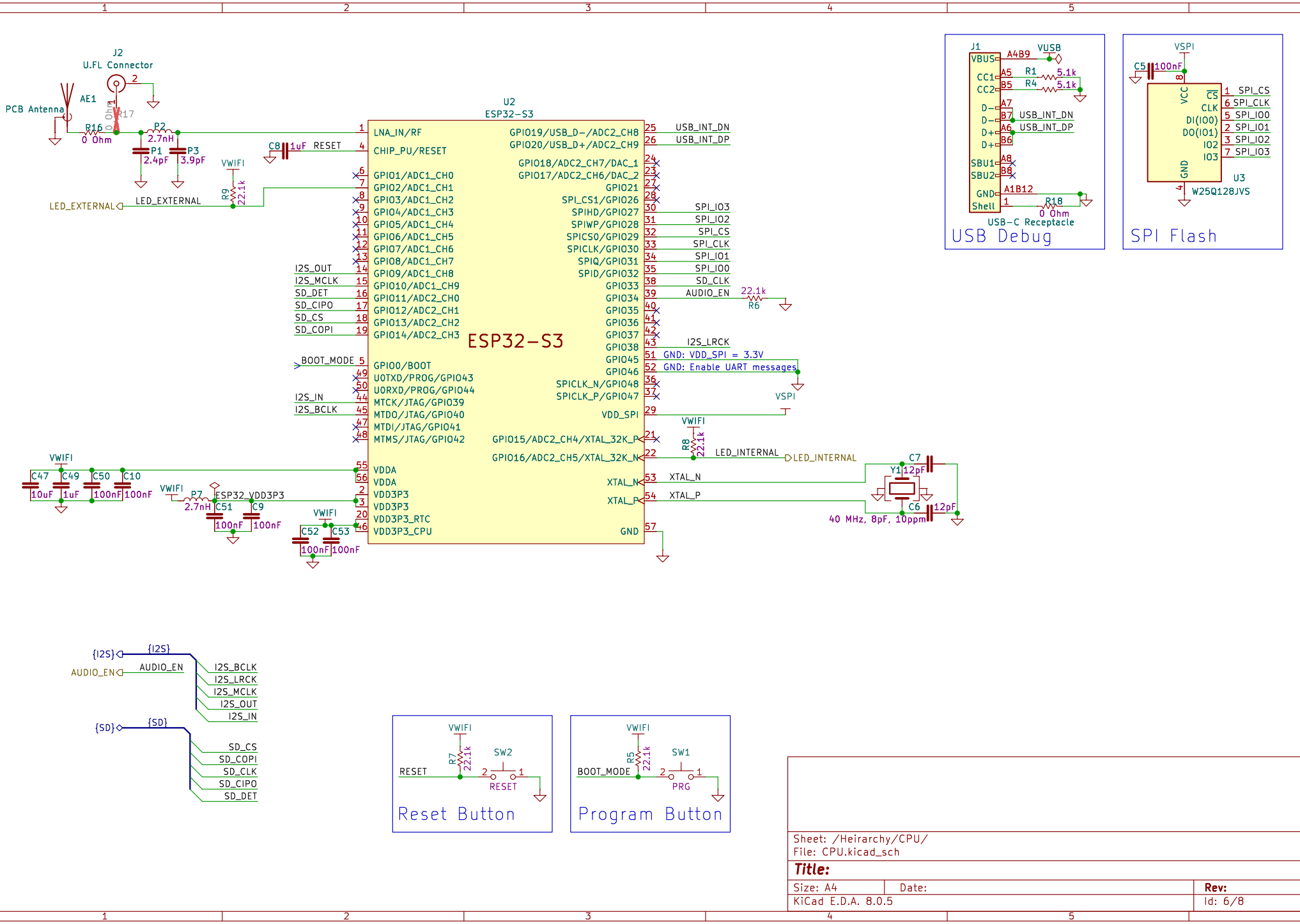
J2
U.FL Connector
AE1
PCB Antenna
R17
0 Ohm
R16
0 Ohm
P2
2.7nH
P1
2.4pF
P3
3.9pF
VWIFI
R9
22.1k
LED_EXTERNAL
LED_EXTERNAL
C8
1uF
RESET
U2
ESP32-S3
LNA_IN/RF
CHIP_PU/RESET
GPIO1/ADC1_CH0
GPIO2/ADC1_CH1
GPIO3/ADC1_CH2
GPIO4/ADC1_CH3
GPIO5/ADC1_CH4
GPIO6/ADC1_CH5
GPIO7/ADC1_CH6
GPIO8/ADC1_CH7
GPIO9/ADC1_CH8
GPIO10/ADC1_CH9
GPIO11/ADC2_CH0
GPIO12/ADC2_CH1
GPIO13/ADC2_CH2
GPIO14/ADC2_CH3
GPIO0/BOOT
U0TXD/PROG/GPIO43
U0RXD/PROG/GPIO44
MTCK/JTAG/GPIO39
MTDO/JTAG/GPIO40
MTDI/JTAG/GPIO41
MTMS/JTAG/GPIO42
VDDA
VDDA
VDD3P3
VDD3P3
VDD3P3_RTC
VDD3P3_CPU
GPIO19/USB_D-/ADC2_CH8
GPIO20/USB_D+/ADC2_CH9
GPIO18/ADC2_CH7/DAC_1
GPIO17/ADC2_CH6/DAC_2
GPIO21
SPI_CS1/GPIO26
SPIHD/GPIO27
SPIWP/GPIO28
SPICS0/GPIO29
SPICLK/GPIO30
SPIQ/GPIO31
SPID/GPIO32
GPIO33
GPIO34
GPIO35
GPIO36
GPIO37
GPIO38
GPIO45
GPIO46
SPICLK_N/GPIO48
SPICLK_P/GPIO47
VDD_SPI
GPIO15/ADC2_CH4/XTAL_32K_P
GPIO16/ADC2_CH5/XTAL_32K_N
XTAL_N
XTAL_P
GND
ESP32-S3
USB_INT_DN
USB_INT_DP
SPI_IO3
SPI_IO2
SPI_CS
SPI_CLK
SPI_IO1
SPI_IO0
SD_CLK
AUDIO_EN
22.1k
R6
I2S_LRCK
GND: VDD_SPI = 3.3V
GND: Enable UART messages
VSPI
VWIFI
R8
22.1k
LED_INTERNAL
LED_INTERNAL
XTAL_N
XTAL_P
I2S_OUT
I2S_MCLK
SD_DET
SD_CIPO
SD_CS
SD_COPI
BOOT_MODE
I2S_IN
I2S_BCLK
VWIFI
C47
10uF
C49
1uF
C50
100nF
C10
100nF
VWIFI
P7
2.7nH
ESP32_VDD3P3
C51
100nF
C9
100nF
VWIFI
C52
100nF
C53
100nF
C7
12pF
Y1
40 MHz, 8pF, 10ppm
C6
12pF
J1
USB-C Receptacle
VBUS
CC1
CC2
D-
D-
D+
D+
SBU1
SBU2
GND
Shell
A4B9
A5
B5
A7
B7
A6
B6
A8
B8
A1B12
1
VUSB
R1
5.1k
R4
5.1k
USB_INT_DN
USB_INT_DP
R18
0 Ohm
USB Debug
VSPI
C5
100nF
VCC
GND
CS
CLK
DI(IO0)
DO(IO1)
IO2
IO3
U3
W25Q128JVS
1 SPI_CS
6 SPI_CLK
5 SPI_IO0
2 SPI_IO1
3 SPI_IO2
7 SPI_IO3
SPI Flash
{I2S}
AUDIO_EN
I2S_BCLK
I2S_LRCK
I2S_MCLK
I2S_OUT
I2S_IN
{SD}
SD_CS
SD_COPI
SD_CLK
SD_CIPO
SD_DET
VWIFI
R7
22.1k
SW2
RESET
RESET
Reset Button
VWIFI
R5
22.1k
SW1
BOOT_MODE
PRG
Program Button
Sheet: /Heirarchy/CPU/
File: CPU.kicad_sch
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Size: A4
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Rev:
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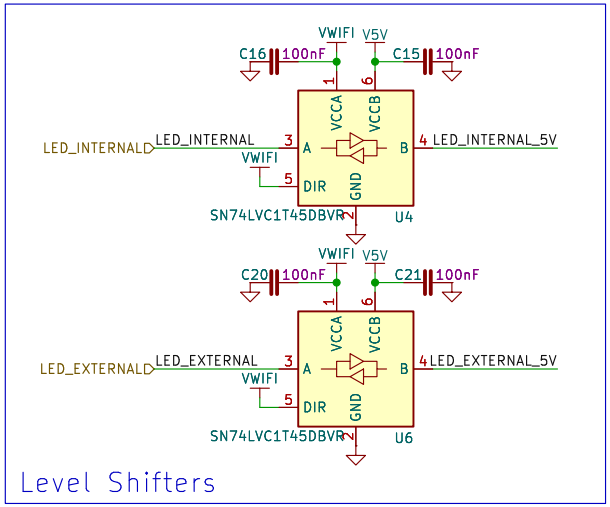

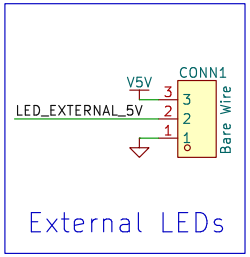

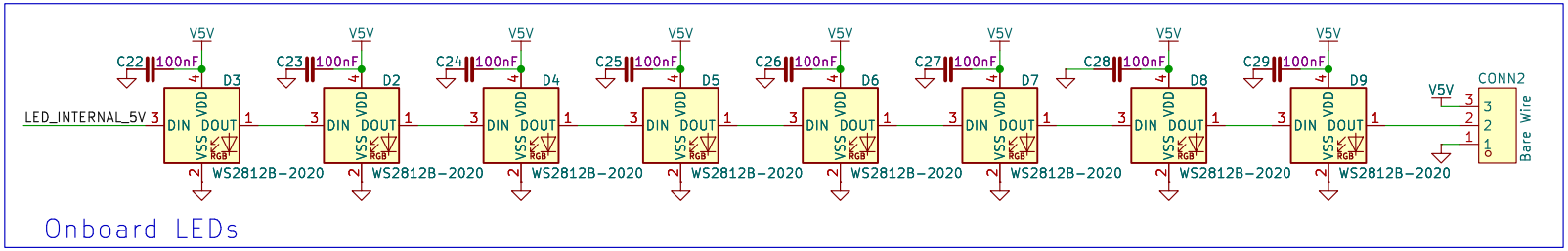

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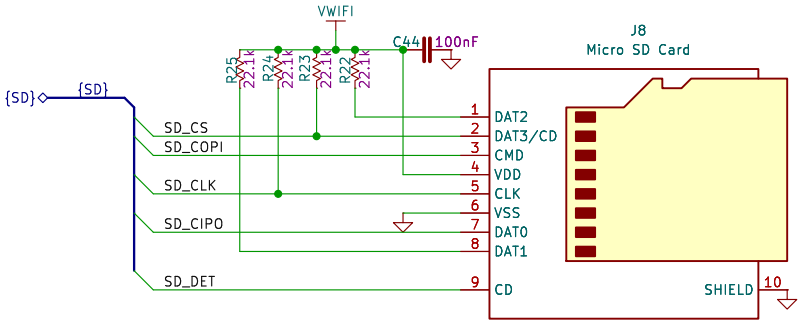

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