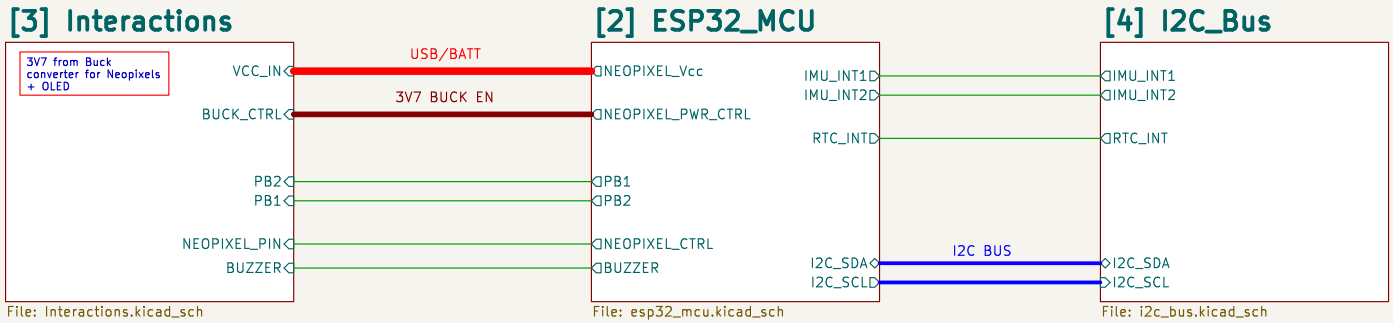
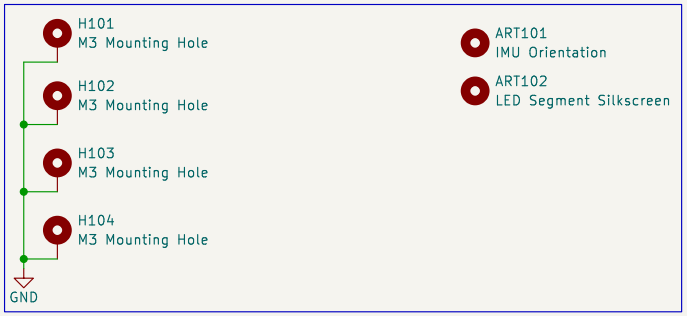


[1] Mechanical & Misc

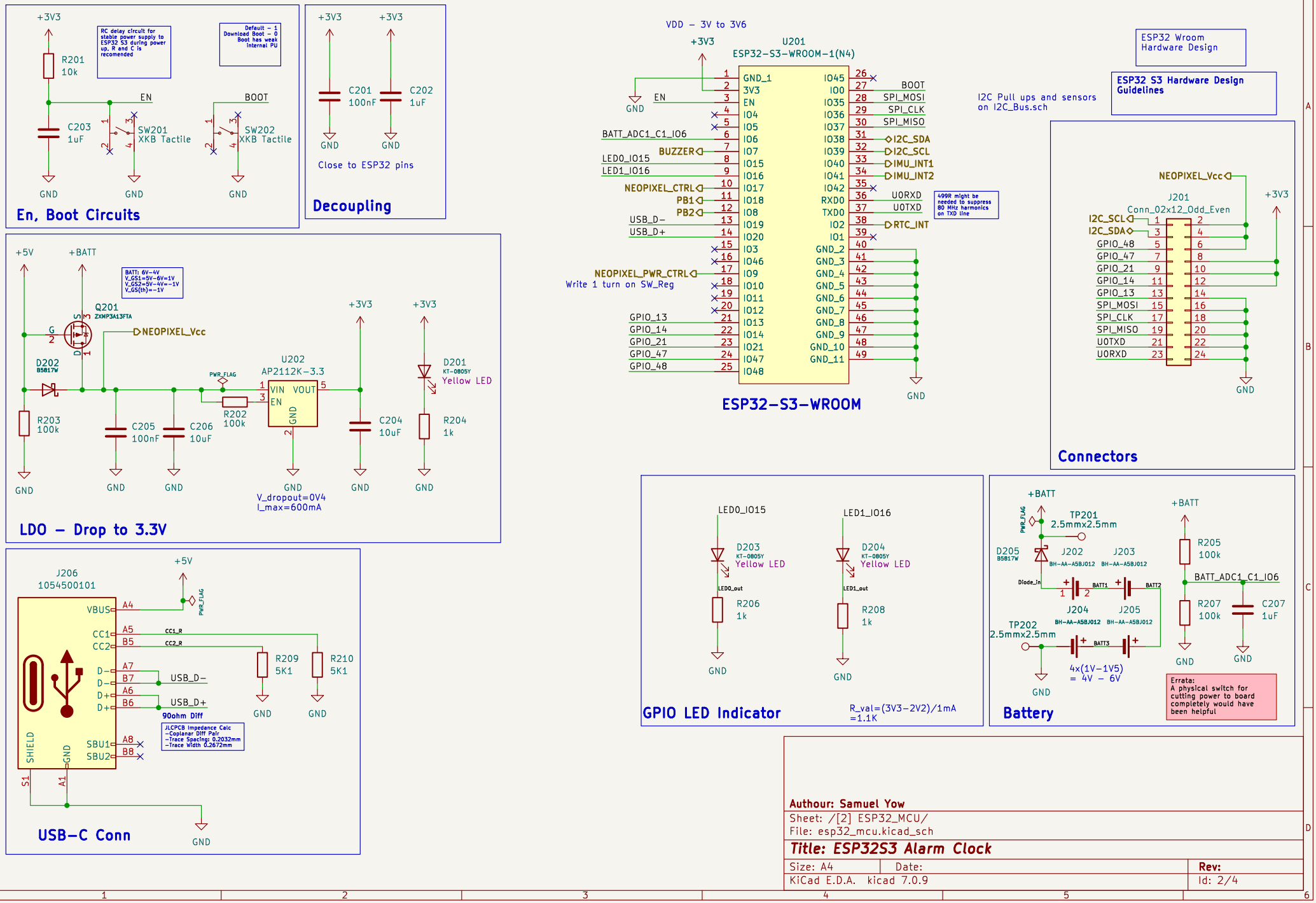


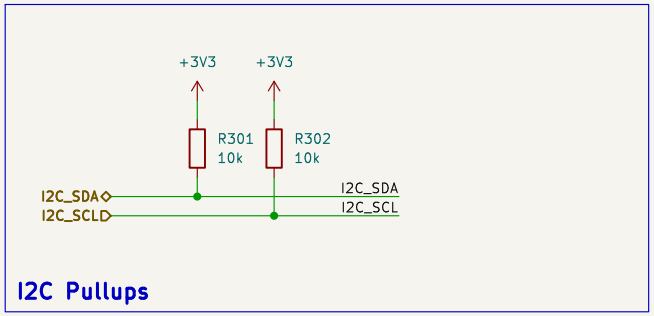
Authour: Samuel Yow

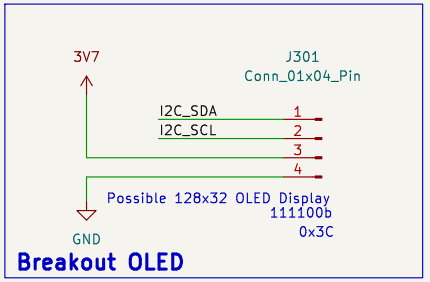
Sheet: /
File: AlarmClockProjV1.kicad_sch

Title: ESP32S3 Alarm Clock

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.9		Id: 1/4


En, Boot Circuits
RC delay circuit for stable power supply to ESP32 S3 during power up, R and C is recomended
Default = 1
Download Boot = 0
Boot has weak internal PU
+3V3
R201
10k
EN
BOOT
C203
1uF
SW201
XKB Tactile
SW202
XKB Tactile
GND
Decoupling
C201
100nF
C202
1uF
Close to ESP32 pins
LDO – Drop to 3.3V
+5V
+BATT
BATT: 6V–4V
V_GS1=5V–6V=1V
V_GS2=5V–4V=–1V
V_GS(th)=–1V
Q201
ZXMP3A13FTA
NEOPIXEL_Vcc
D202
B5817W
PWR_FLAG
U202
AP2112K–3.3
VIN
VOUT
EN
R203
100k
C205
100nF
C206
10uF
R202
100k
C204
10uF
D201
KT–0805Y
Yellow LED
R204
1k
V_dropout=0V4
I_max=600mA
USB–C Conn
J206
1054500101
VBUS
CC1
CC2
D–
D+
SHIELD
GND
SBU1
SBU2
CC1_R
CC2_R
USB_D–
USB_D+
90ohm Diff
R209
5K1
R210
5K1
JLCPCB Impedance Calc
–Coplanar Diff Pair
–Trace Spacing: 0.2032mm
–Trace Width 0.2672mm
VDD – 3V to 3V6
U201
ESP32–S3–WROOM–1(N4)
ESP32–S3–WROOM
BATT_ADC1_C1_IO6
BUZZER
LED0_IO15
LED1_IO16
NEOPIXEL_CTRL
PB1
PB2
USB_D–
USB_D+
NEOPIXEL_PWR_CTRL
Write 1 turn on SW_Reg
GPIO_13
GPIO_14
GPIO_21
GPIO_47
GPIO_48
BOOT
SPI_MOSI
SPI_CLK
SPI_MISO
I2C_SDA
I2C_SCL
IMU_INT1
IMU_INT2
U0RXD
U0TXD
RTC_INT
499R might be needed to suppress 80 MHz harmonics on TXD line
I2C Pull ups and sensors on I2C_Bus.sch
ESP32 Wroom Hardware Design
ESP32 S3 Hardware Design Guidelines
Connectors
J201
Conn_02x12_Odd_Even
GPIO_48
GPIO_47
GPIO_21
GPIO_14
GPIO_13
SPI_MOSI
SPI_CLK
SPI_MISO
U0TXD
U0RXD
GPIO LED Indicator
D203
KT–0805Y
Yellow LED
D204
KT–0805Y
Yellow LED
R206
1k
R208
1k
R_val=(3V3–2V2)/1mA
=1.1K
Battery
TP201
2.5mmx2.5mm
TP202
2.5mmx2.5mm
D205
B5817W
J202
J203
J204
J205
BH–AA–A5BJ012
R205
100k
R207
100k
C207
1uF
BATT_ADC1_C1_IO6
4x(1V–1V5)
= 4V – 6V
Errata:
A physical switch for cutting power to board completely would have been helpful
Authour: Samuel Yow
Sheet: /[2] ESP32_MCU/
File: esp32_mcu.kicad_sch
Title: ESP32S3 Alarm Clock
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 7.0.9
Id: 2/4

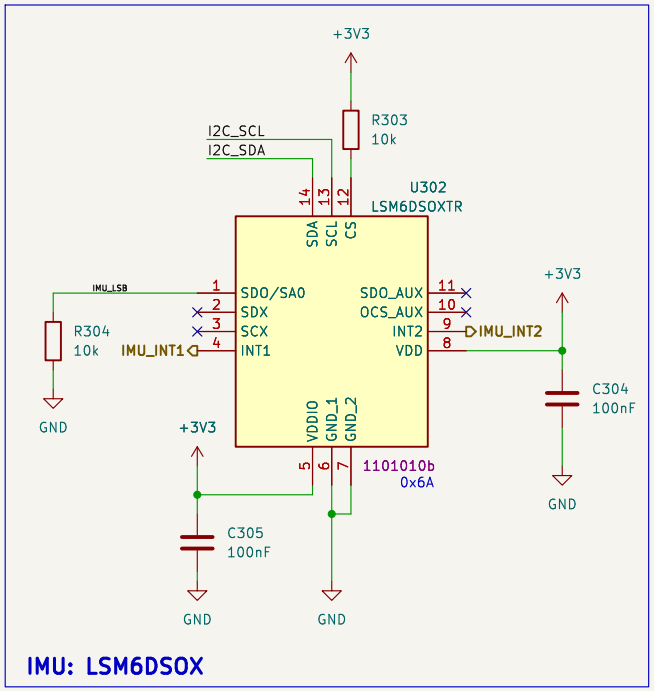


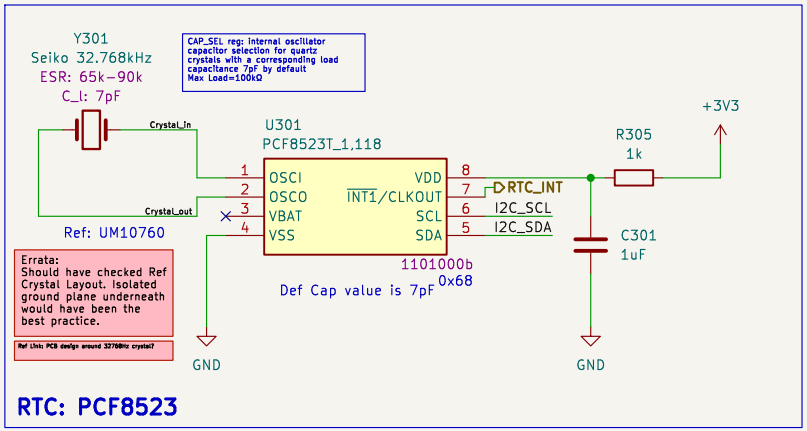


Errata:
When the OLED screen is connected but unpowered, the I2C bus stops working, because the SDA and SCL lines are pulled low. So there is no way of turning off the I2C OLED screen without affecting the bus.

Ref Link: Unpowered devices on I2c spi bus

Ref Link: Keep I2c working when a connected device is not powered





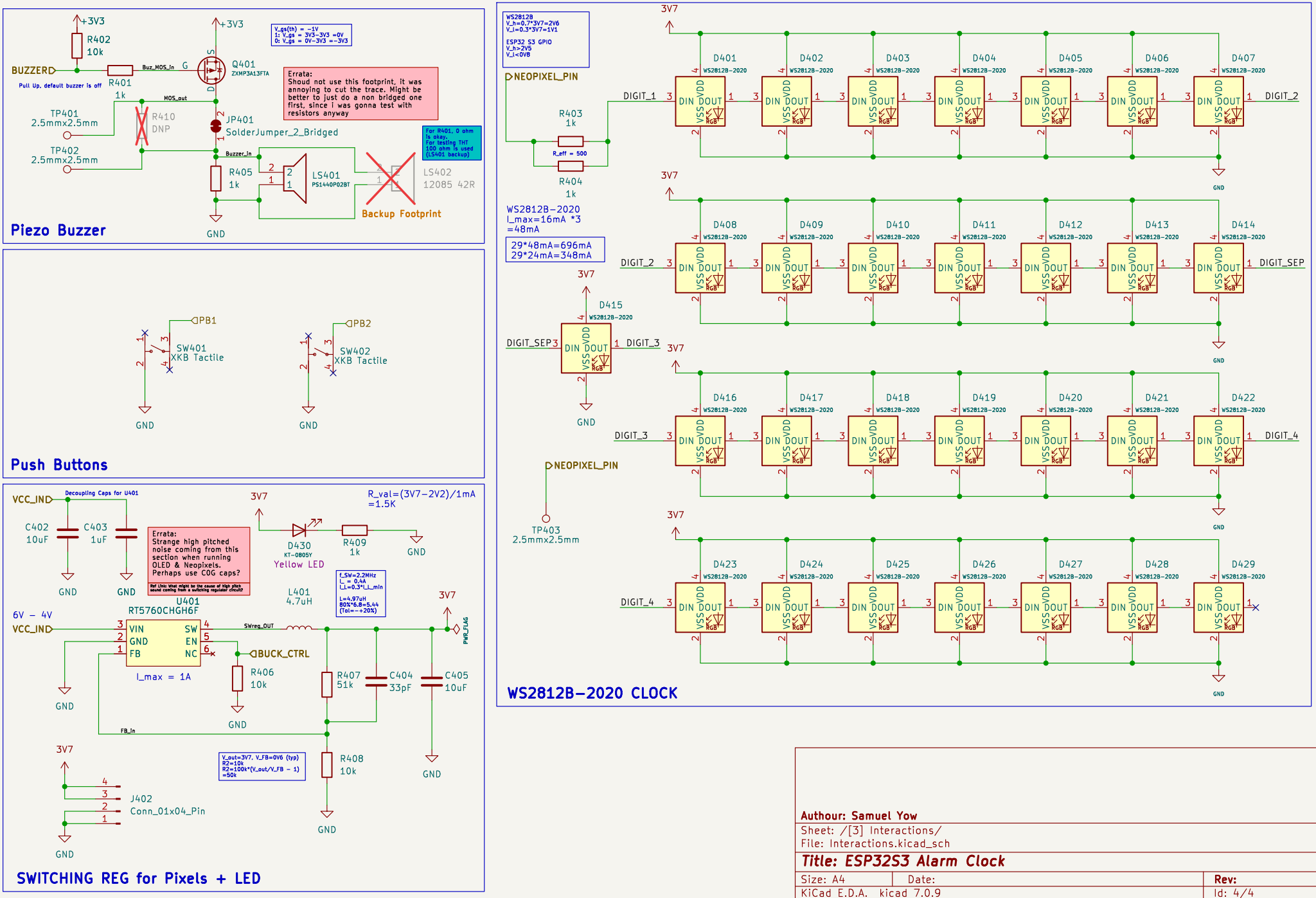
Errata:
Should have checked Ref Crystal Layout. Isolated ground plane underneath would have been the best practice.

Ref Link: PCB design around 32768Hz crystal

Authour: Samuel Yow
Sheet: /[4] I2C_Bus/
File: i2c_bus.kicad_sch

Title: ESP32S3 Alarm Clock

Size: A4	Date:	Rev:
KiCad E.D.A. kicad 7.0.9		Id: 3/4


Piezo Buzzer
+3V3
R402
10k
BUZZER
Buz_MOS_In
R401
1k
Pull Up, default buzzer is off
Q401
ZXMP3A13FTA
MOS_out
TP401
2.5mmx2.5mm
R410
DNP
JP401
SolderJumper_2_Bridged
TP402
2.5mmx2.5mm
Buzzer_In
R405
1k
LS401
PS1440P02BT
LS402
12085 42R
Backup Footprint
GND
V_gs(th) = -1V
1: V_gs = 3V3-3V3 =0V
0: V_gs = 0V-3V3 =-3V3
Errata:
Shoud not use this footprint, it was annoying to cut the trace. Might be better to just do a non bridged one first, since i was gonna test with resistors anyway
For R401, 0 ohm is okay.
For testing THT 100 ohm is used (LS401 backup)
Push Buttons
PB1
SW401
XKB Tactile
PB2
SW402
XKB Tactile
GND
SWITCHING REG for Pixels + LED
VCC_IND
Decoupling Caps for U401
C402
10uF
C403
1uF
Errata:
Strange high pitched noise coming from this section when running OLED & Neopixels.
Perhaps use COG caps?
Ref Link: What might be the cause of high pitch sound coming from a switching regulator circuit?
U401
RT5760CHGH6F
6V - 4V
VIN
GND
FB
SW
EN
NC
I_max = 1A
SWreg_OUT
L401
4.7uH
f_SW=2.2MHz
I_= 0.4A
I_L=0.3*I_min
L=4.97uH
80%*6.8=5.44
(Tol=-+20%)
BUCK_CTRL
R406
10k
R407
51k
C404
33pF
C405
10uF
PWR_FLAG
FB_In
R408
10k
V_out=3V7, V_FB=0V6 (typ)
R2=10k
R2=100k*(V_out/V_FB - 1)
=50k
J402
Conn_01x04_Pin
3V7
R_val=(3V7-2V2)/1mA
=1.5K
D430
KT-0805Y
Yellow LED
R409
1k
WS2812B-2020 CLOCK
WS2812B
V_h=0.7*3V7=2V6
V_l=0.3*3V7=1V1
ESP32 S3 GPIO
V_h>2V6
V_l<0V8
NEOPIXEL_PIN
R403
1k
R_eff = 500
R404
1k
WS2812B-2020
I_max=16mA *3
=48mA
29*48mA=696mA
29*24mA=348mA
TP403
2.5mmx2.5mm
D401
D402
D403
D404
D405
D406
D407
D408
D409
D410
D411
D412
D413
D414
D415
D416
D417
D418
D419
D420
D421
D422
D423
D424
D425
D426
D427
D428
D429
WS2812B-2020
DIN
DOUT
VDD
VSS
RGB
DIGIT_1
DIGIT_2
DIGIT_3
DIGIT_4
DIGIT_SEP
DIGIT_SEP3
Authour: Samuel Yow
Sheet: /[3] Interactions/
File: Interactions.kicad_sch
Title: ESP32S3 Alarm Clock
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 7.0.9
Id: 4/4