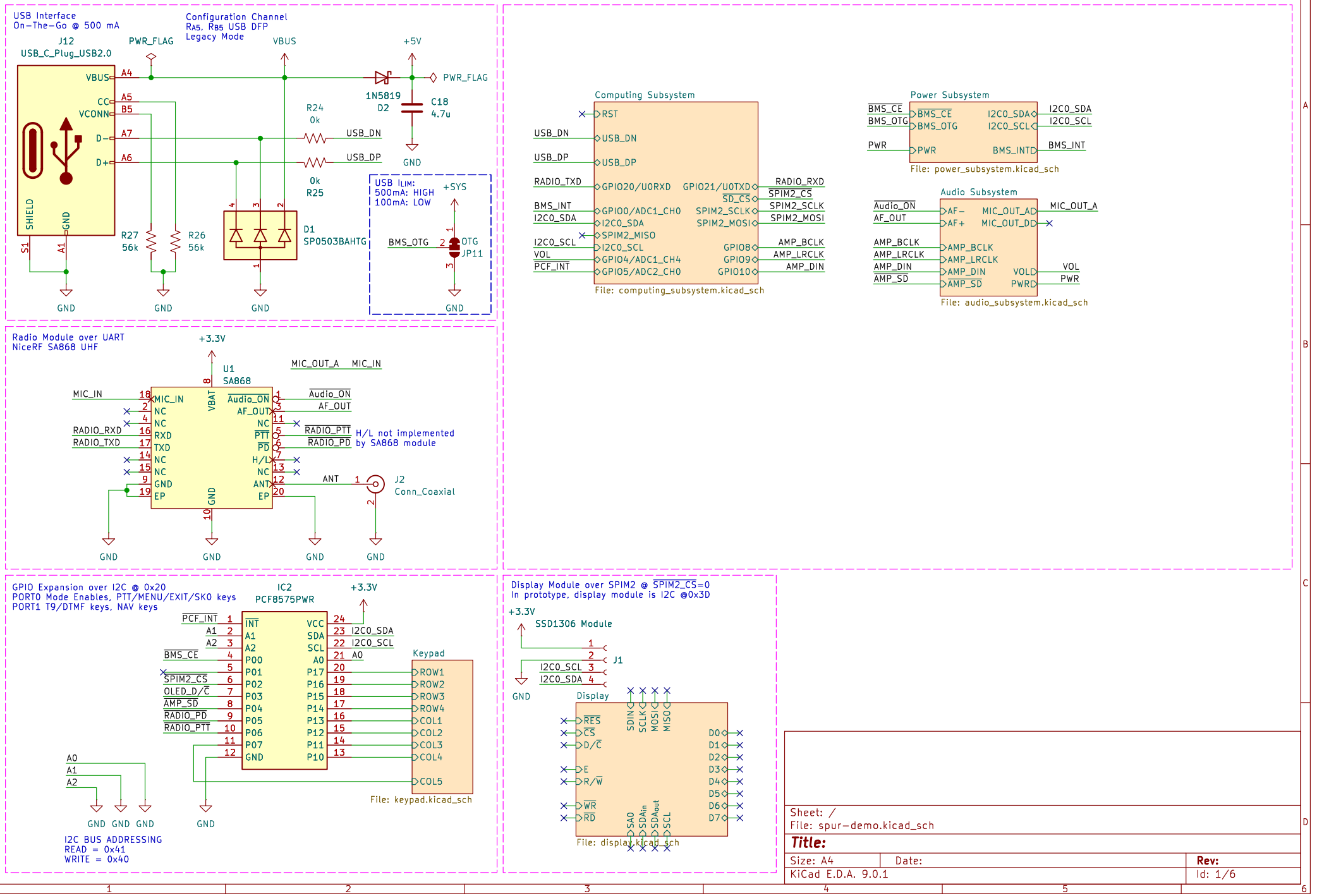
USB Interface
On-The-Go @ 500 mA
Configuration Channel
RA5, RB5 USB DFP
Legacy Mode
J12
USB_C_Plug_USB2.0
PWR_FLAG
VBUS
+5V
1N5819
D2
C18
4.7u
R24
0k
USB_DN
USB_DP
R25
0k
R27
56k
R26
56k
D1
SP0503BAHTG
USB Ilim:
500mA: HIGH
100mA: LOW
+SYS
BMS_OTG
OTG
JP11
SHIELD
GND
Computing Subsystem
RST
USB_DN
USB_DP
RADIO_TXD
GPIO20/U0RXD
GPIO21/U0TXD
RADIO_RXD
SD_CS
SPIM2_CS
BMS_INT
GPIO0/ADC1_CH0
SPIM2_SCLK
I2C0_SDA
SPIM2_MOSI
SPIM2_MISO
I2C0_SCL
AMP_BCLK
VOL
GPIO4/ADC1_CH4
GPIO9
AMP_LRCLK
PCF_INT
GPIO5/ADC2_CH0
GPIO10
AMP_DIN
File: computing_subsystem.kicad_sch
Power Subsystem
BMS_CE
BMS_OTG
PWR
I2C0_SDA
I2C0_SCL
BMS_INT
File: power_subsystem.kicad_sch
Audio Subsystem
Audio_ON
AF_OUT
AMP_BCLK
AMP_LRCLK
AMP_DIN
AMP_SD
AF-
AF+
MIC_OUT_A
MIC_OUT_D
VOL
PWR
File: audio_subsystem.kicad_sch
Radio Module over UART
NiceRF SA868 UHF
+3.3V
U1
SA868
MIC_OUT_A
MIC_IN
Audio_ON
AF_OUT
RADIO_RXD
RADIO_TXD
RADIO_PTT
RADIO_PD
H/L not implemented
by SA868 module
ANT
J2
Conn_Coaxial
GPIO Expansion over I2C @ 0x20
PORT0 Mode Enables, PTT/MENU/EXIT/SK0 keys
PORT1 T9/DTMF keys, NAV keys
IC2
PCF8575PWR
+3.3V
Keypad
ROW1
ROW2
ROW3
ROW4
COL1
COL2
COL3
COL4
COL5
File: keypad.kicad_sch
I2C BUS ADDRESSING
READ = 0x41
WRITE = 0x40
Display Module over SPIM2 @ SPIM2_CS=0
In prototype, display module is I2C @0x3D
SSD1306 Module
J1
Display
File: display.kicad_sch
Sheet: /
File: spur-demo.kicad_sch
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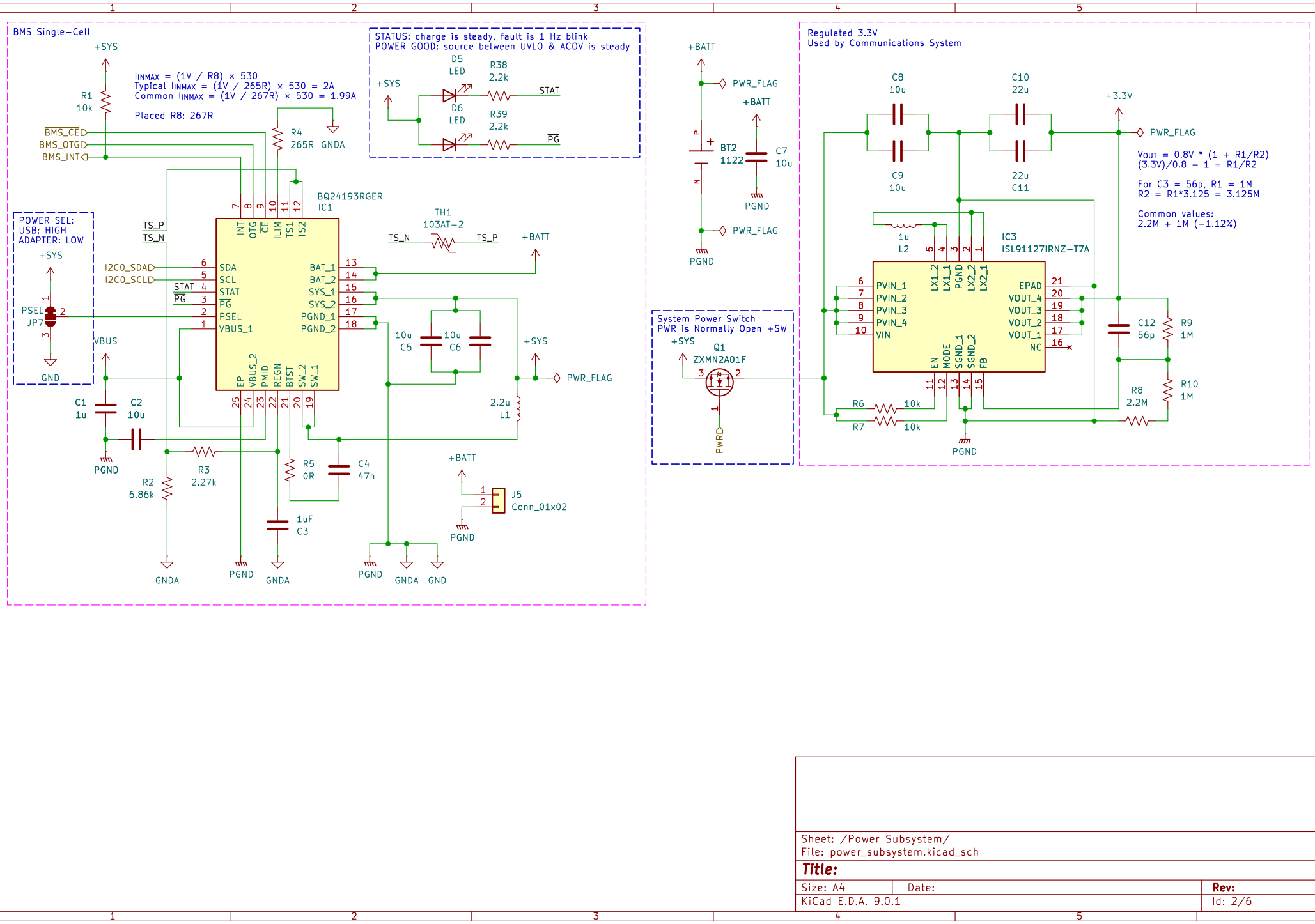
BMS Single-Cell
+SYS
R1
10k
IINMAX = (1V / R8) × 530
Typical IINMAX = (1V / 265R) × 530 = 2A
Common IINMAX = (1V / 267R) × 530 = 1.99A
Placed R8: 267R
BMS_CE
BMS_OTG
BMS_INT
R4
265R
GNDA
STATUS: charge is steady, fault is 1 Hz blink
POWER GOOD: source between UVLO & ACOV is steady
D5
LED
R38
2.2k
STAT
D6
LED
R39
2.2k
PG
BQ24193RGER
IC1
INT
OTG
CE
ILIM
TS1
TS2
TS_P
TS_N
TH1
103AT-2
+BATT
POWER SEL:
USB: HIGH
ADAPTER: LOW
PSEL
JP7
GND
I2C0_SDA
I2C0_SCL
SDA
SCL
STAT
PG
PSEL
VBUS_1
BAT_1
BAT_2
SYS_1
SYS_2
PGND_1
PGND_2
VBUS
C1
1u
C2
10u
C5
10u
C6
10u
+SYS
PWR_FLAG
2.2u
L1
EP
VBUS_2
PMID
REGN
BTST
SW_2
SW_1
R2
6.86k
R3
2.27k
R5
0R
C4
47n
1uF
C3
PGND
GNDA
GND
+BATT
J5
Conn_01x02
+BATT
PWR_FLAG
BT2
1122
C7
10u
PGND
PWR_FLAG
System Power Switch
PWR is Normally Open +SW
+SYS
Q1
ZXMN2A01F
PWRD
Regulated 3.3V
Used by Communications System
C8
10u
C9
10u
C10
22u
C11
22u
+3.3V
PWR_FLAG
VOUT = 0.8V * (1 + R1/R2)
(3.3V)/0.8 - 1 = R1/R2
For C3 = 56p, R1 = 1M
R2 = R1*3.125 = 3.125M
Common values:
2.2M + 1M (-1.12%)
1u
L2
IC3
ISL91127IRNZ-T7A
PVIN_1
PVIN_2
PVIN_3
PVIN_4
VIN
LX1_2
LX1_1
PGND
LX2_2
LX2_1
EPAD
VOUT_4
VOUT_3
VOUT_2
VOUT_1
NC
EN
MODE
SGND_1
SGND_2
FB
C12
56p
R9
1M
R10
1M
R8
2.2M
R6
10k
R7
10k
PGND
Sheet: /Power Subsystem/
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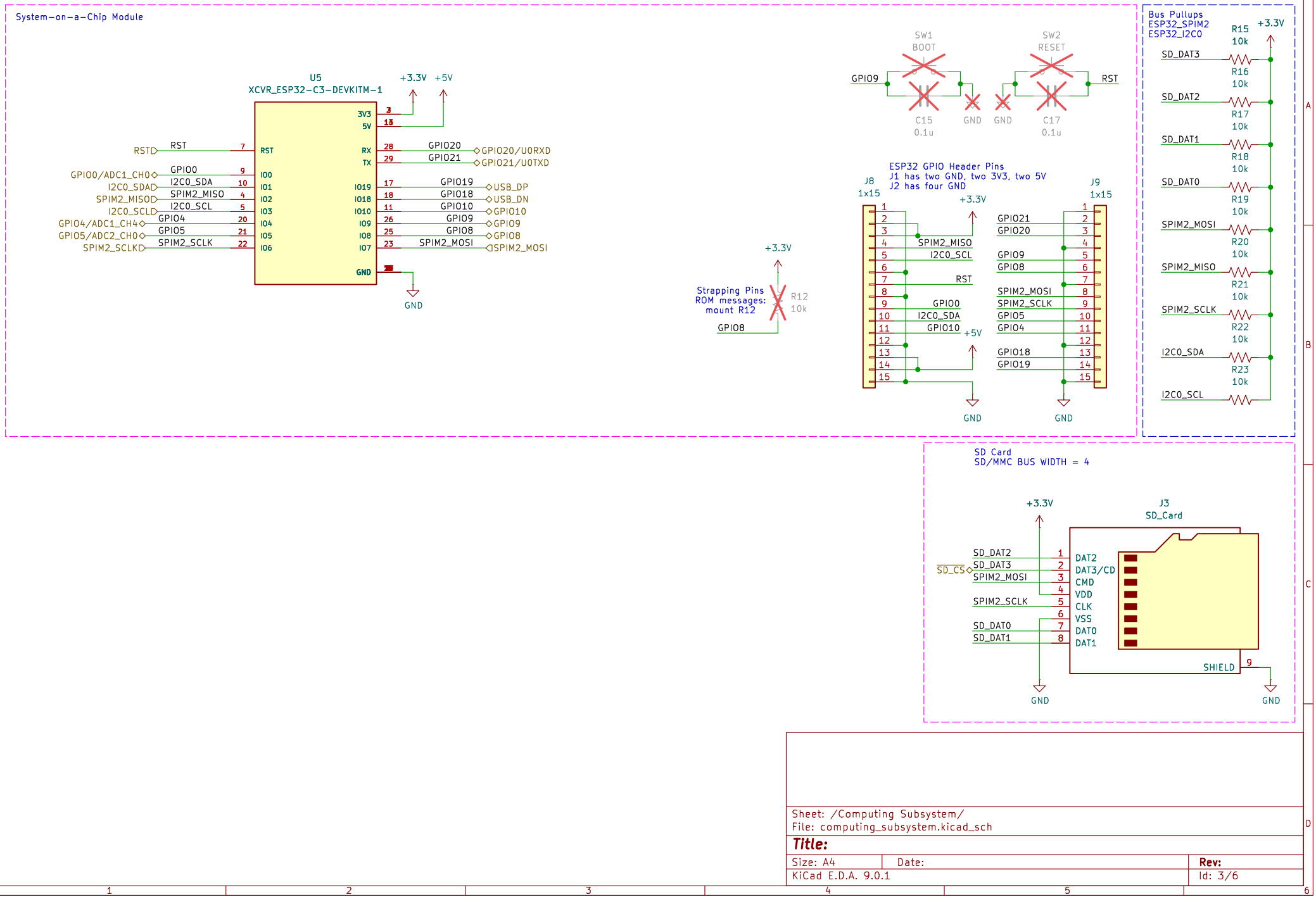
System-on-a-Chip Module
U5
XCVR_ESP32-C3-DEVKITM-1
3V3
5V
RST
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO19
IO18
IO10
IO9
IO8
IO7
RX
TX
GND
+3.3V
+5V
RST
GPIO0/ADC1_CH0
I2C0_SDA
SPIM2_MISO
I2C0_SCL
GPIO4/ADC1_CH4
GPIO5/ADC2_CH0
SPIM2_SCLK
GPIO20
GPIO21
GPIO19
GPIO18
GPIO10
GPIO9
GPIO8
SPIM2_MOSI
GPIO20/U0RXD
GPIO21/U0TXD
USB_DP
USB_DN
GPIO10
GPIO9
GPIO8
SPIM2_MOSI
SW1
BOOT
SW2
RESET
GPIO9
RST
C15
0.1u
C17
0.1u
GND
ESP32 GPIO Header Pins
J1 has two GND, two 3V3, two 5V
J2 has four GND
J8
1x15
J9
1x15
SPIM2_MISO
I2C0_SCL
RST
GPIO0
I2C0_SDA
GPIO10
GPIO21
GPIO20
GPIO9
GPIO8
SPIM2_MOSI
SPIM2_SCLK
GPIO5
GPIO4
GPIO18
GPIO19
Strapping Pins
ROM messages:
mount R12
R12
10k
Bus Pullups
ESP32_SPIM2
ESP32_I2C0
R15
10k
R16
10k
R17
10k
R18
10k
R19
10k
R20
10k
R21
10k
R22
10k
R23
10k
SD_DAT3
SD_DAT2
SD_DAT1
SD_DAT0
SPIM2_MOSI
SPIM2_MISO
SPIM2_SCLK
I2C0_SDA
I2C0_SCL
SD Card
SD/MMC BUS WIDTH = 4
J3
SD_Card
SD_CS
SD_DAT2
SD_DAT3
SPIM2_MOSI
SPIM2_SCLK
SD_DAT0
SD_DAT1
DAT2
DAT3/CD
CMD
VDD
CLK
VSS
DAT0
DAT1
SHIELD
Sheet: /Computing Subsystem/
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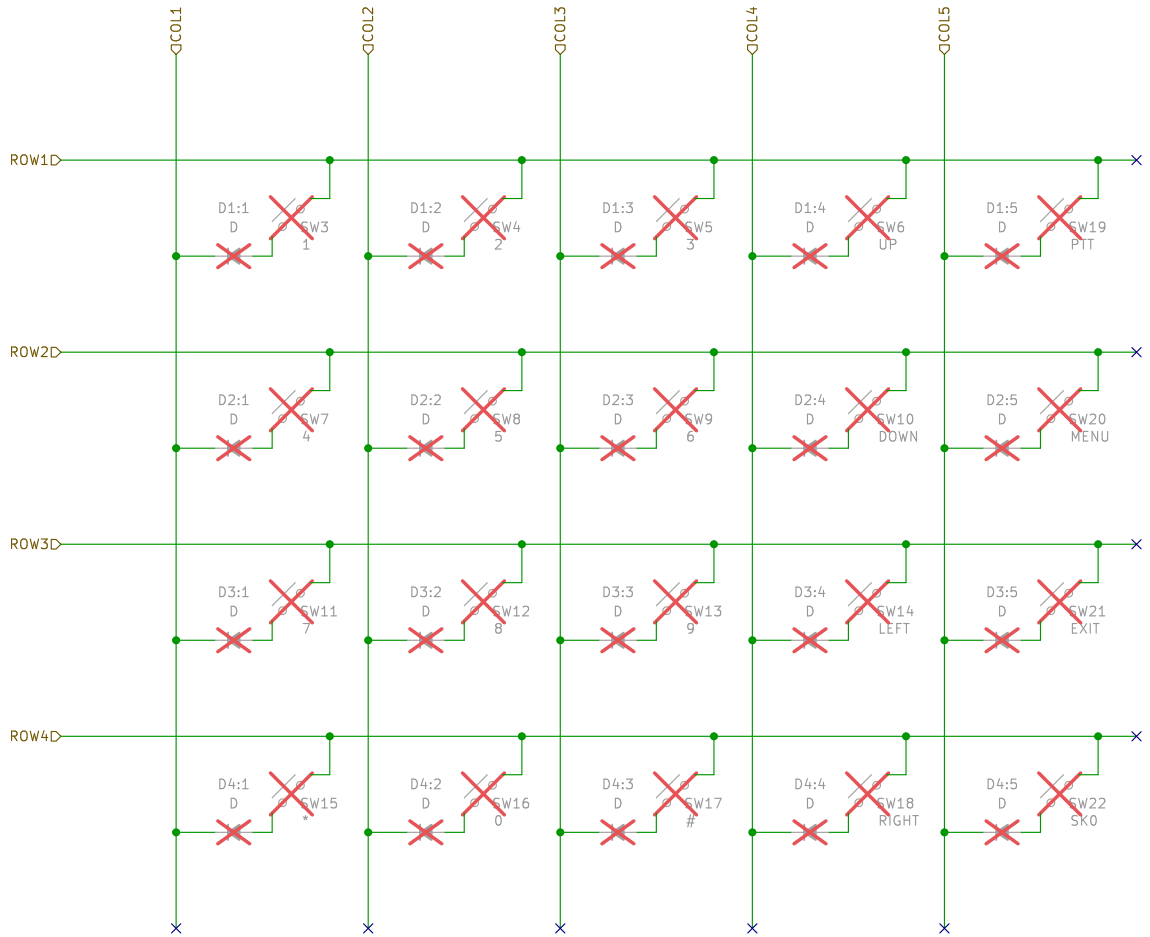
Keypad Matrix
Application Note: The ROW pins get pulled up by the GPIO expander, with one ROW being pulled down.
The scanner relies on the COL pins being read in as a logic swing to low.
Remarked as Domino Logic, a rail-to-rail logic swing occurs.



Keypad Daugherboard

Conn_01x08_Socket

J6

ROW4	1
ROW3	2
ROW2	3
ROW1	4
COL1	5
COL2	6
COL3	7
COL4	8

H1
MountingHole_2.2mm_M2_Pad_Via

H2
MountingHole_2.2mm_M2_Pad_Via

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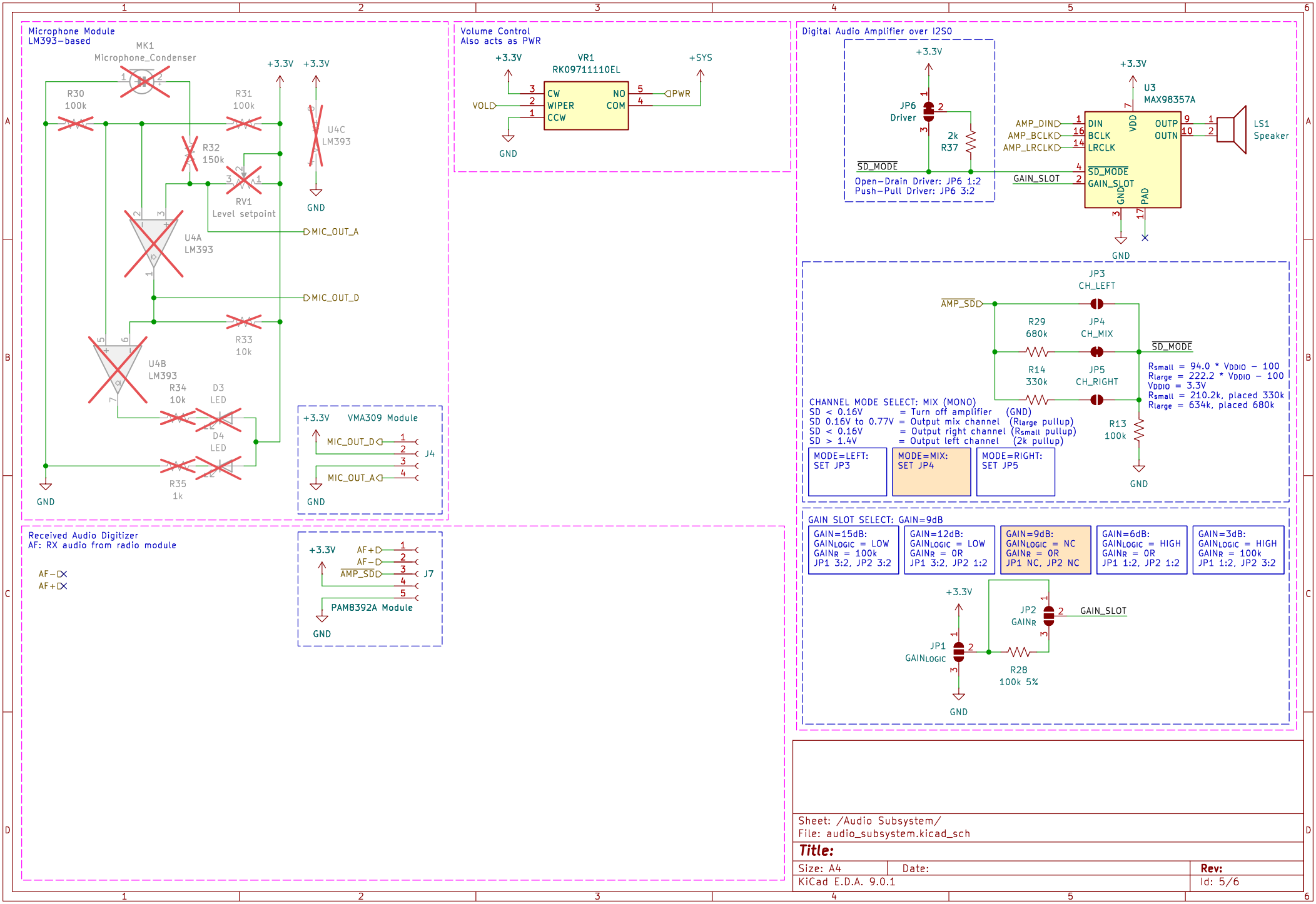
Microphone Module
LM393-based
MK1
Microphone_Condenser
+3.3V
+3.3V
R30
100k
R31
100k
U4C
LM393
R32
150k
RV1
Level setpoint
GND
U4A
LM393
MIC_OUT_A
MIC_OUT_D
R33
10k
U4B
LM393
R34
10k
D3
LED
D4
LED
R35
1k
GND
+3.3V
VMA309 Module
MIC_OUT_D
J4
MIC_OUT_A
GND
Volume Control
Also acts as PWR
+3.3V
VR1
RK09711110EL
+SYS
VOL
CW
WIPER
CCW
NO
COM
PWR
GND
Digital Audio Amplifier over I2S0
+3.3V
JP6
Driver
2k
R37
SD_MODE
Open-Drain Driver: JP6 1:2
Push-Pull Driver: JP6 3:2
+3.3V
U3
MAX98357A
AMP_DIN
AMP_BCLK
AMP_LRCLK
DIN
BCLK
LRCLK
VDD
OUTP
OUTN
LS1
Speaker
SD_MODE
GAIN_SLOT
GND
PAD
GND
JP3
CH_LEFT
AMP_SD
R29
680k
JP4
CH_MIX
SD_MODE
R14
330k
JP5
CH_RIGHT
Rsmall = 94.0 * VDDIO - 100
Rlarge = 222.2 * VDDIO - 100
VDDIO = 3.3V
Rsmall = 210.2k, placed 330k
Rlarge = 634k, placed 680k
CHANNEL MODE SELECT: MIX (MONO)
SD < 0.16V = Turn off amplifier (GND)
SD 0.16V to 0.77V = Output mix channel (Rlarge pullup)
SD < 0.16V = Output right channel (Rsmall pullup)
SD > 1.4V = Output left channel (2k pullup)
R13
100k
GND
MODE=LEFT:
SET JP3
MODE=MIX:
SET JP4
MODE=RIGHT:
SET JP5
GAIN SLOT SELECT: GAIN=9dB
GAIN=15dB:
GAINLOGIC = LOW
GAINR = 100k
JP1 3:2, JP2 3:2
GAIN=12dB:
GAINLOGIC = LOW
GAINR = 0R
JP1 3:2, JP2 1:2
GAIN=9dB:
GAINLOGIC = NC
GAINR = 0R
JP1 NC, JP2 NC
GAIN=6dB:
GAINLOGIC = HIGH
GAINR = 0R
JP1 1:2, JP2 1:2
GAIN=3dB:
GAINLOGIC = HIGH
GAINR = 100k
JP1 1:2, JP2 3:2
+3.3V
JP2
GAINR
GAIN_SLOT
JP1
GAINLOGIC
R28
100k 5%
GND
Received Audio Digitizer
AF: RX audio from radio module
AF-
AF+
+3.3V
AF+
AF-
AMP_SD
J7
PAM8392A Module
GND
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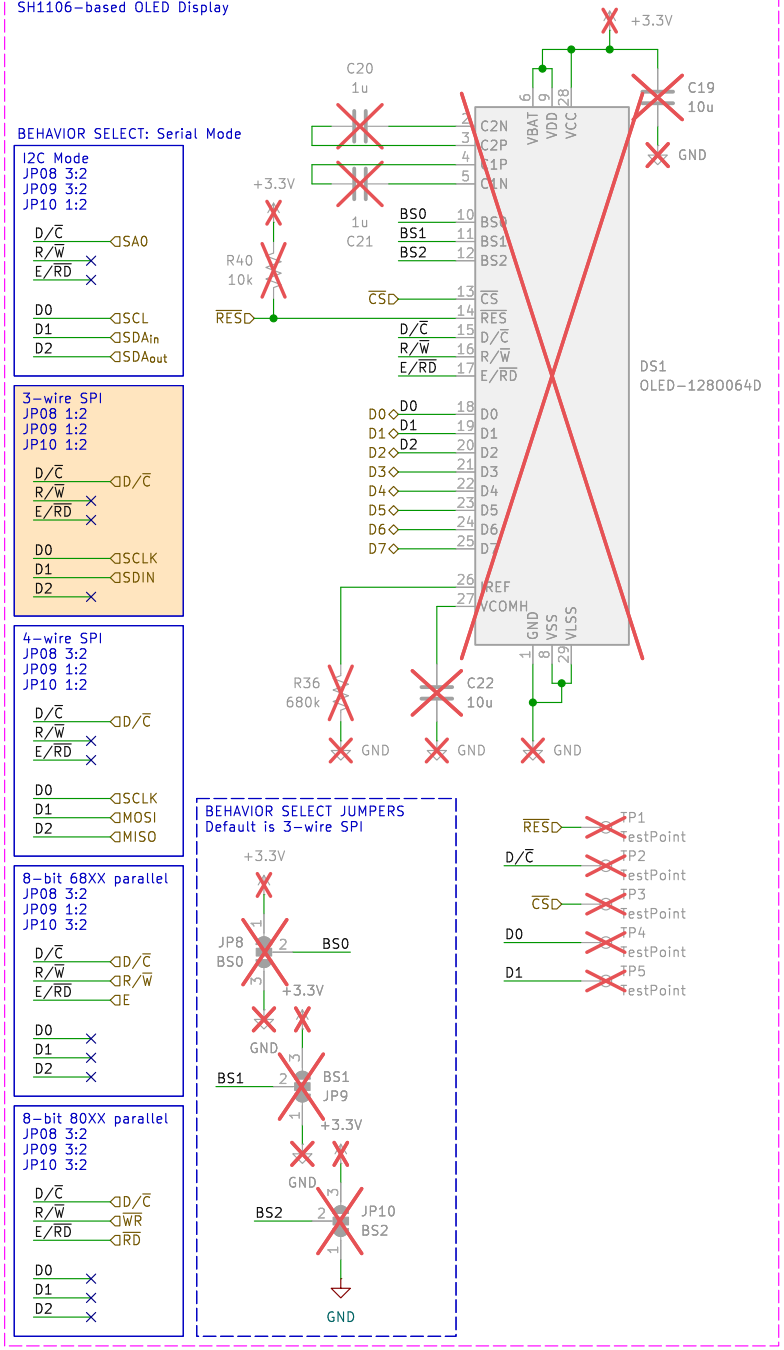

Sheet: /Display/		
File: display.kicad_sch		
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