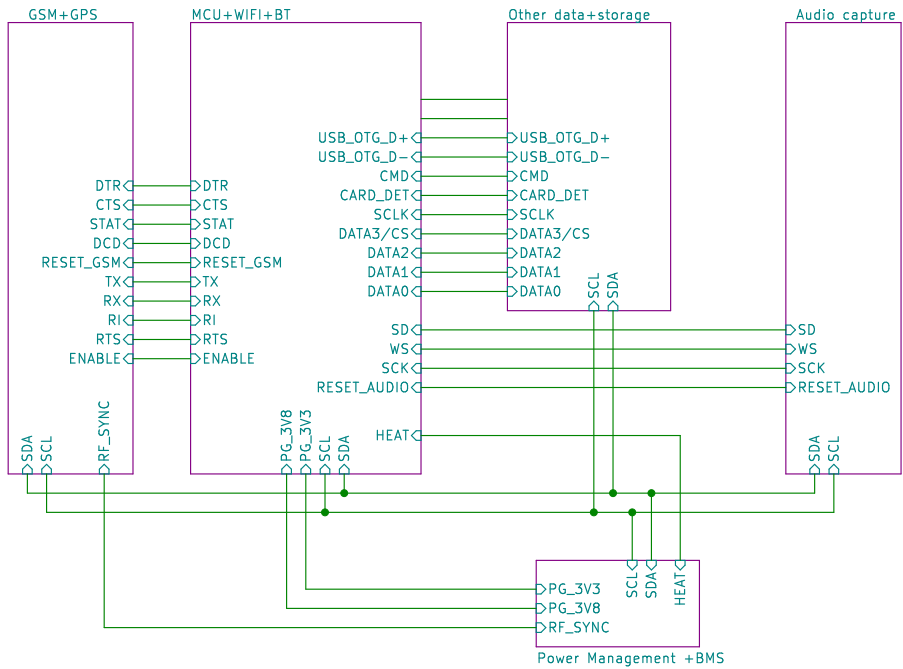
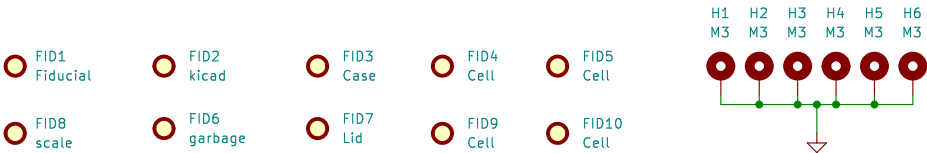


All SMD caps ceramic are 0603 16V X7R or better unless other notes are made
All SMD resistors are 0603
Stack up:
4 layer FR4 sig gnd gnd+sig sig
All non power traces should aim to be 50 ohm single ended impedance
unless other requirements are in place
Delata(T) aimed for is 20C or less



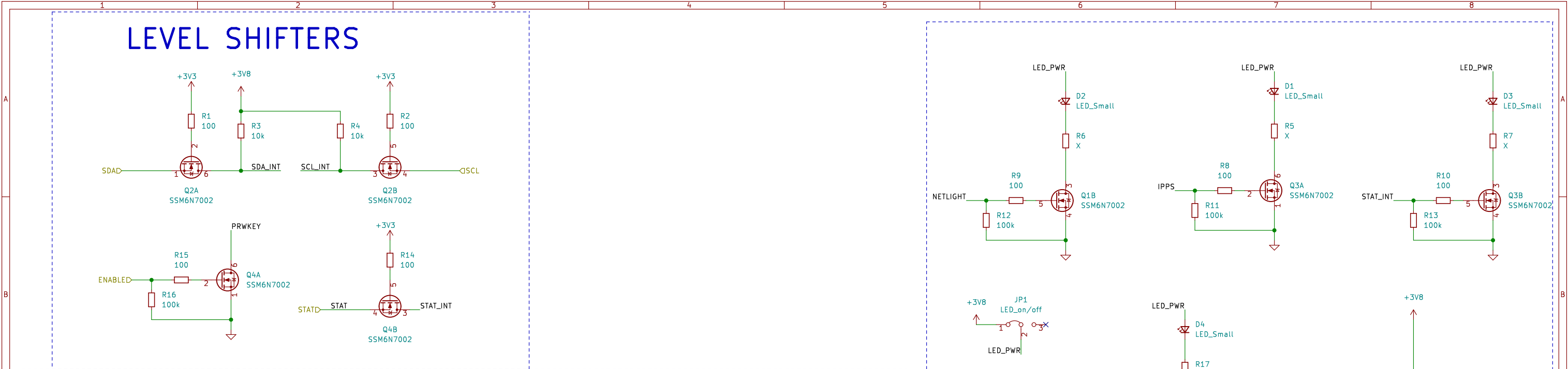
CASE+ GRAPHICS + MECHANICAL



LEVEL SHIFTERS

The image displays four circuit diagrams for level shifters using SSM6N7002 transistors. Each diagram shows the transistor's pin connections, biasing resistors, and signal paths.

- Diagram 1 (Top Left):** Shows two transistors, Q2A and Q2B. Q2A's base is connected to SDA_D through resistor R1 (100). Its emitter is grounded, and its collector is connected to +3V3. Q2B's base is connected to SDA_{INT} through resistor R3 (10k). Its emitter is connected to the collector of Q2A, and its collector is connected to +3V8. Q2B's base is also connected to SCL_{INT} through resistor R4 (10k). Its emitter is grounded, and its collector is connected to +3V3. Q2B's base is also connected to SCL_D through resistor R2 (100).
- Diagram 2 (Bottom Left):** Shows two transistors, Q4A and Q4B. Q4A's base is connected to ENABLED through resistor R15 (100). Its emitter is grounded, and its collector is connected to +3V3. Q4B's base is connected to PRWKEY through resistor R16 (100k). Its emitter is connected to the collector of Q4A, and its collector is connected to +3V3. Q4B's base is also connected to STAT_D through resistor R14 (100). Its emitter is grounded, and its collector is connected to +3V3. Q4B's base is also connected to STAT_{INT} through resistor R13 (100k).
- Diagram 3 (Top Right):** Shows transistor Q1B. Its base is connected to NETLIGHT through resistor R9 (100). Its emitter is grounded, and its collector is connected to +3V3. Q1B's base is also connected to LED_PWR through resistor R6 (X). Its emitter is grounded, and its collector is connected to +3V3. Q1B's base is also connected to LED_PWR through resistor R12 (100k).
- Diagram 4 (Bottom Right):** Shows transistor Q3B. Its base is connected to IPPS through resistor R8 (100). Its emitter is grounded, and its collector is connected to +3V3. Q3B's base is also connected to LED_PWR through resistor R5 (X). Its emitter is grounded, and its collector is connected to +3V3. Q3B's base is also connected to LED_PWR through resistor R10 (100). Its emitter is grounded, and its collector is connected to +3V3. Q3B's base is also connected to LED_PWR through resistor R17 (X).



GSM/GNSS DATA+ RF +SIM

+1V8

C1 1u

J1 SIM_Card_Shielded

D5 D5V0P4UR650-7

+3V3

I/O3 VCC I/O2 VSS I/O4 VSS I/O1

SIM_IO

SIM_CLK

SIM_RST

Add some TVS and the parasitic capacitance should not exceed 50pF.
1v8 3v3 ? TVS goes here

IC1 TXB0108PWR

+3V8

DTR DTR 1

RI RI 2

DCDD DCD 3

CTSD CTS 4

RTSD RTS 5

RXD RX 6

TXD TX 7

OE_ENABLE

RESET_GSM RESET 8

RESET 9

OE

B1 VCCA 20

B2 VCCB 19

B3 RI_INT 18

B4 DCD_INT 17

B5 CTS_INT 16

B6 RTS_INT 15

B7 RX_INT 14

B8 TX_INT 13

B9 RESET_INT 12

B10 GND 11

PWRKEY 8

DTR_INT 9

RI 10

DCD 11

CTS 12

RTS 13

RXD 14

TXD 15

RESET 16

Internal pulled up to 2.8V via 4.7KΩ

SIM_VDD 29

SIM_RST 30

SIM_CLK 31

SIM_DATA 32

SIM_DETECT 33

SCL_SCL_INT 34

SDA_SDA_INT 35

U1A SIM808

GSM_RF1

R23 0

GSM_RF2

J2 GSM

C7 DNP

C8 DNP

RF_SYNC

RF_SYNC

high is high power is used or it will soon start maybe use a led + change SMPS operation made
low when in sleep or not transmitting RF

ANT_BT

BT_RF1

R24 0

BT_RF2

J4 BT

C12 DNP

C13 DNP

GPS_RF_IN

GNSS_RF1

R25 0

GNSS_RF2

J5 GNSS

C14 DNP

C15 DNP

DATA+RF

MIC1P

MIC1N

SPK1P

SPK1N

ADC1

ADC2

USB_D+ USB_D+

USB_D- USB_D-

IPPS IPPS

PWM1

PWM2

GPI05

GPI06

PCM_SYNC

PCM_CLK

PCM_IN

PCM_OUT

STATUS

NETLIGHT

ROW3

ROW2

ROW1

COL3

COL2

COL1

COL0

LEDs

R19 100

R20 100k

Q5B SSM6N7002

R21 100

R22 100k

Q5A SSM6N7002

GNNS/GSM POWER

Spark Fun runs them at 4.137V
Adafruit directly from Li Ion/LiPo range: 3.4V - 4.4V

protection zener here 5v1 or less

super_cap?

U1B SIM808

V_RTC

VDD_EXT

VBAT

VCHG

TP1 TestPoint

5V-DIY

C9 DNP

5V-in2

VBUS

D2+ D+

D2- D-

3v3 TVS goes here

VCHG NEEDS 4.3-7V

D7 D5V0P4UR650-7

D2+ I/O2 VSS I/O1

D2- I/O3 VCC I/O4

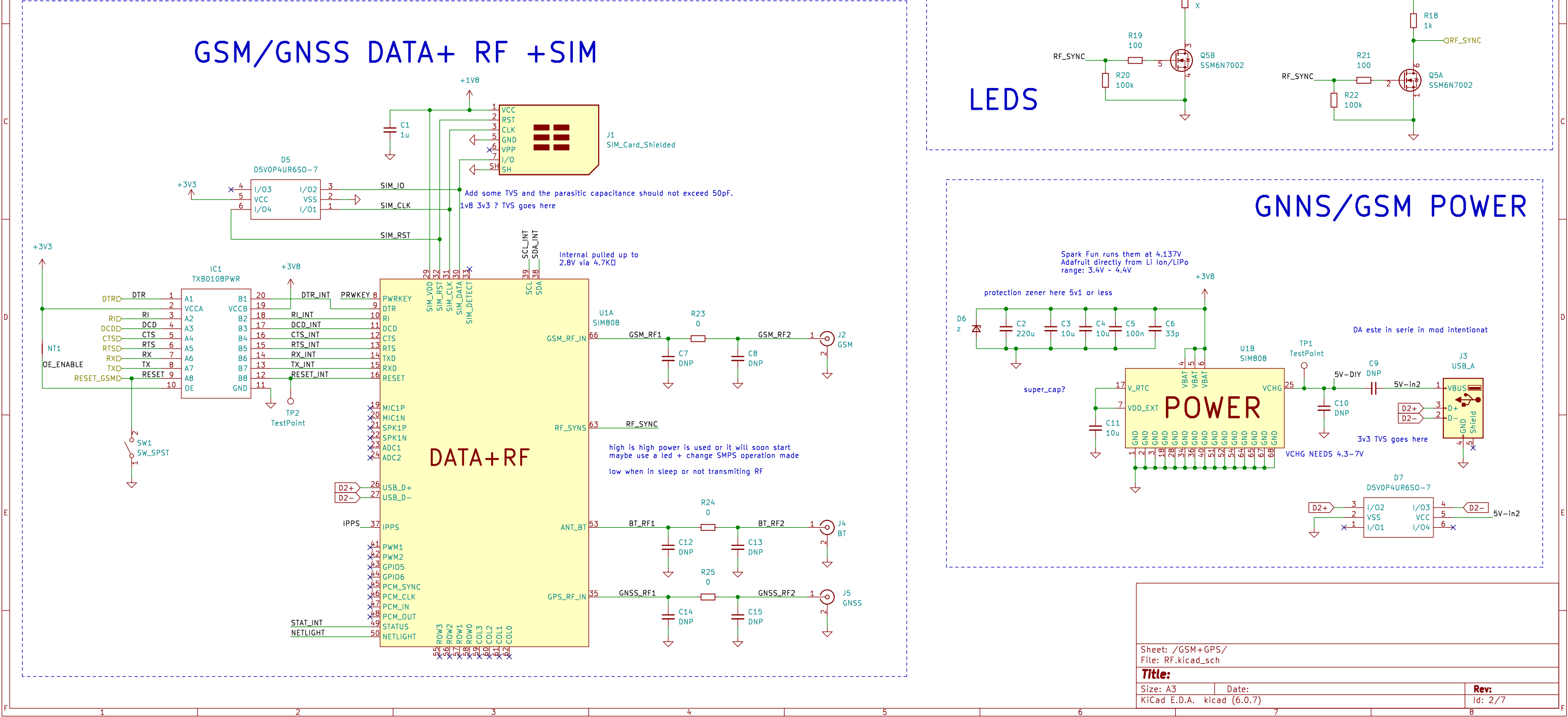
5V-in2

Sheet: /GSM+GPS/
File: RF.kicad_sch

Title:

Size: A3 Date: Rev:

KiCad E.D.A. kicad (6.0.7) Id: 2/7



The image displays five circuit diagrams for LEDs, each featuring a transistor switch (Q1B, Q3A, Q3B, Q5B, Q5A) driven by a microcontroller pin. The LEDs are labeled D2, D1, D3, D4, and D3 respectively. The resistors are labeled R6, R9, R12, R8, R11, R10, R13, R19, R20, R18, R21, and R22. A +3V8 supply and a JP1 jumper are also shown.

NETLIGHT: The circuit is driven by the NETLIGHT pin. It includes a 100Ω resistor (R9) in series with the base of Q1B (SSM6N7002). A 100kΩ resistor (R12) is connected between the base and ground. The LED (D2, LED_Small) is connected between the collector and the LED_PWR supply.

IPPS: The circuit is driven by the IPPS pin. It includes a 100Ω resistor (R8) in series with the base of Q3A (SSM6N7002). A 100kΩ resistor (R11) is connected between the base and ground. The LED (D1, LED_Small) is connected between the collector and the LED_PWR supply.

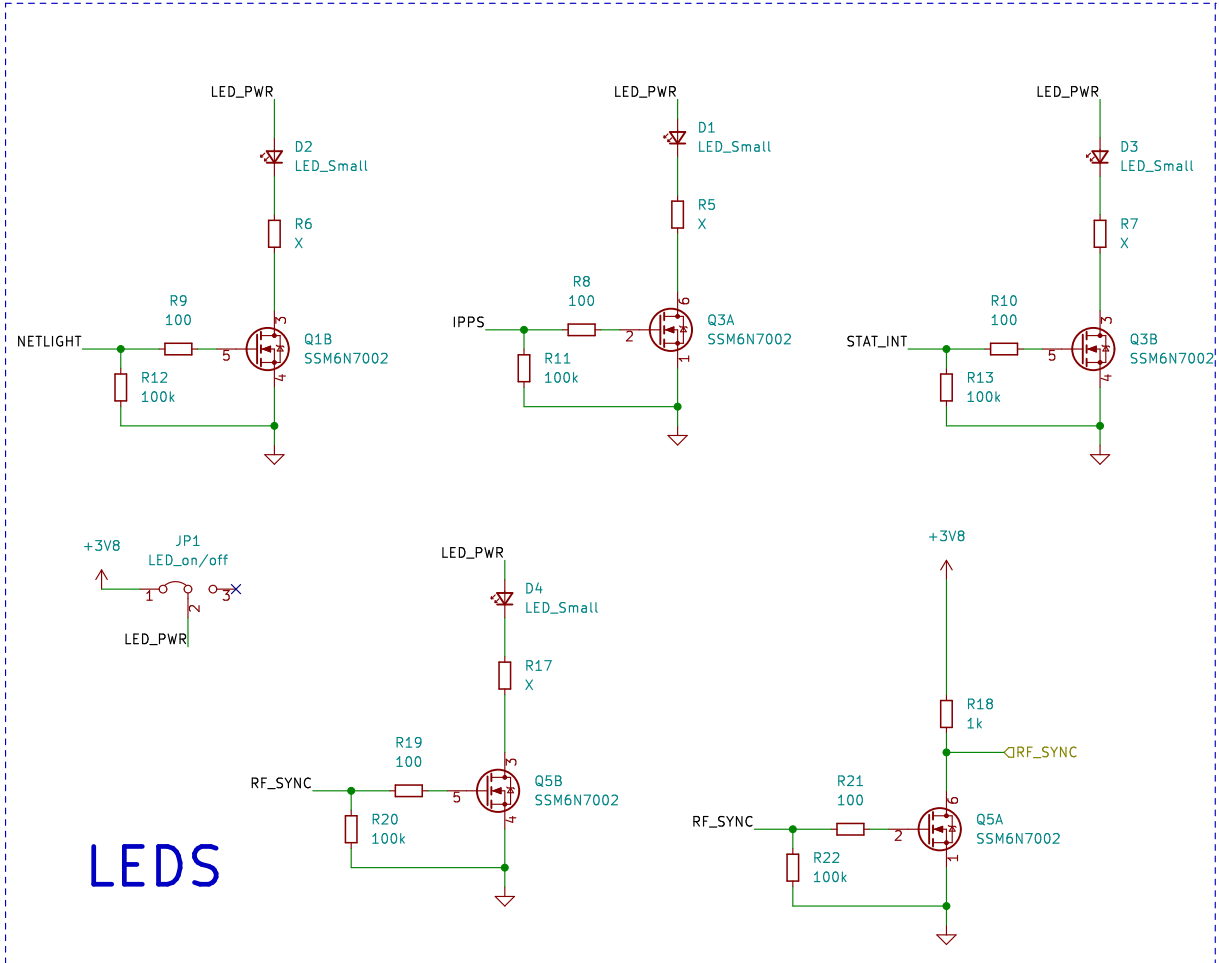
STAT_INT: The circuit is driven by the STAT_INT pin. It includes a 100Ω resistor (R10) in series with the base of Q3B (SSM6N7002). A 100kΩ resistor (R13) is connected between the base and ground. The LED (D3, LED_Small) is connected between the collector and the LED_PWR supply.

LED_PWR: The circuit is driven by the LED_PWR pin. It includes a 100Ω resistor (R19) in series with the base of Q5B (SSM6N7002). A 100kΩ resistor (R20) is connected between the base and ground. The LED (D4, LED_Small) is connected between the collector and the LED_PWR supply.

RF_SYNC: The circuit is driven by the RF_SYNC pin. It includes a 100Ω resistor (R21) in series with the base of Q5A (SSM6N7002). A 100kΩ resistor (R22) is connected between the base and ground. The LED (D3, LED_Small) is connected between the collector and the LED_PWR supply.

A +3V8 supply is connected to the LED_PWR pin. A JP1 jumper is connected between the LED_PWR pin and the LED_on/off pin.

LEDs



GNNS/GSM POWER

Spark Fun runs them at 4.137V
Adafruit directly from Li Ion/LiPo
range: 3.4V - 4.4V

protection zener here 5v1 or less

+3V8

super_cap?

U1B SIM808

TP1 TestPoint

5V-DIY

C9 DNP

5V-in2

J3 USB_A

VBUS

Shield

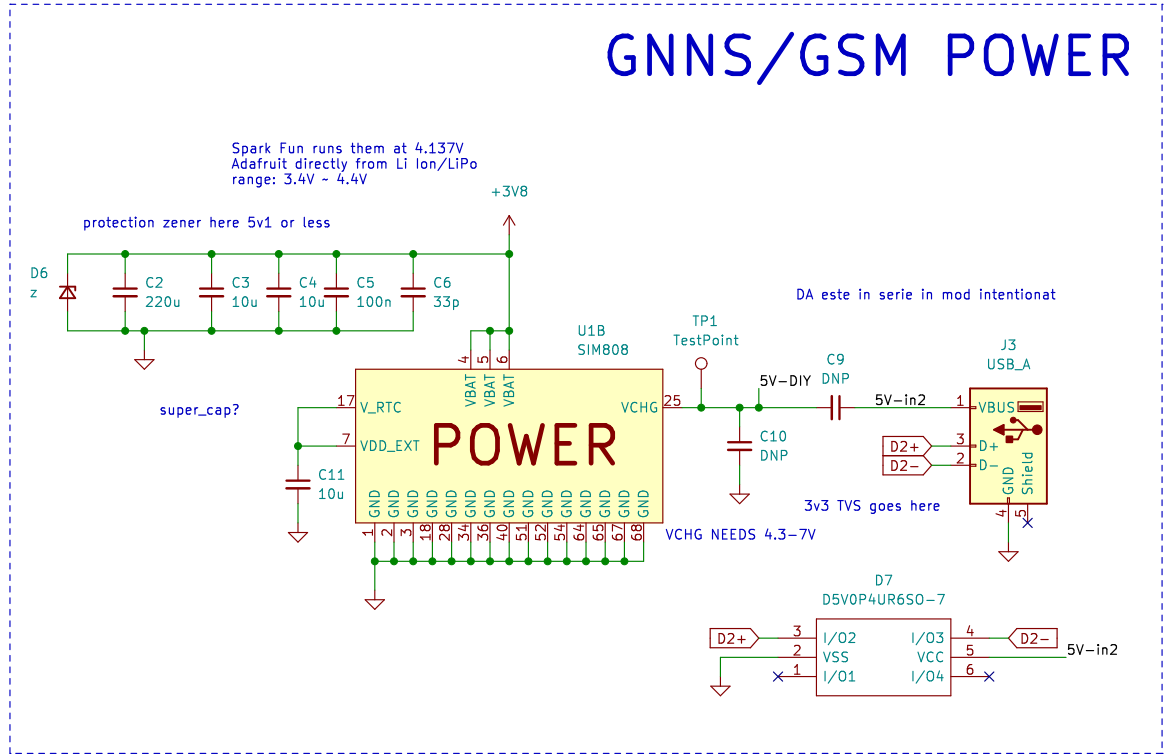
3v TVS goes here

VCHG NEEDS 4.3-7V

D7 D5V0P4UR6S0-7

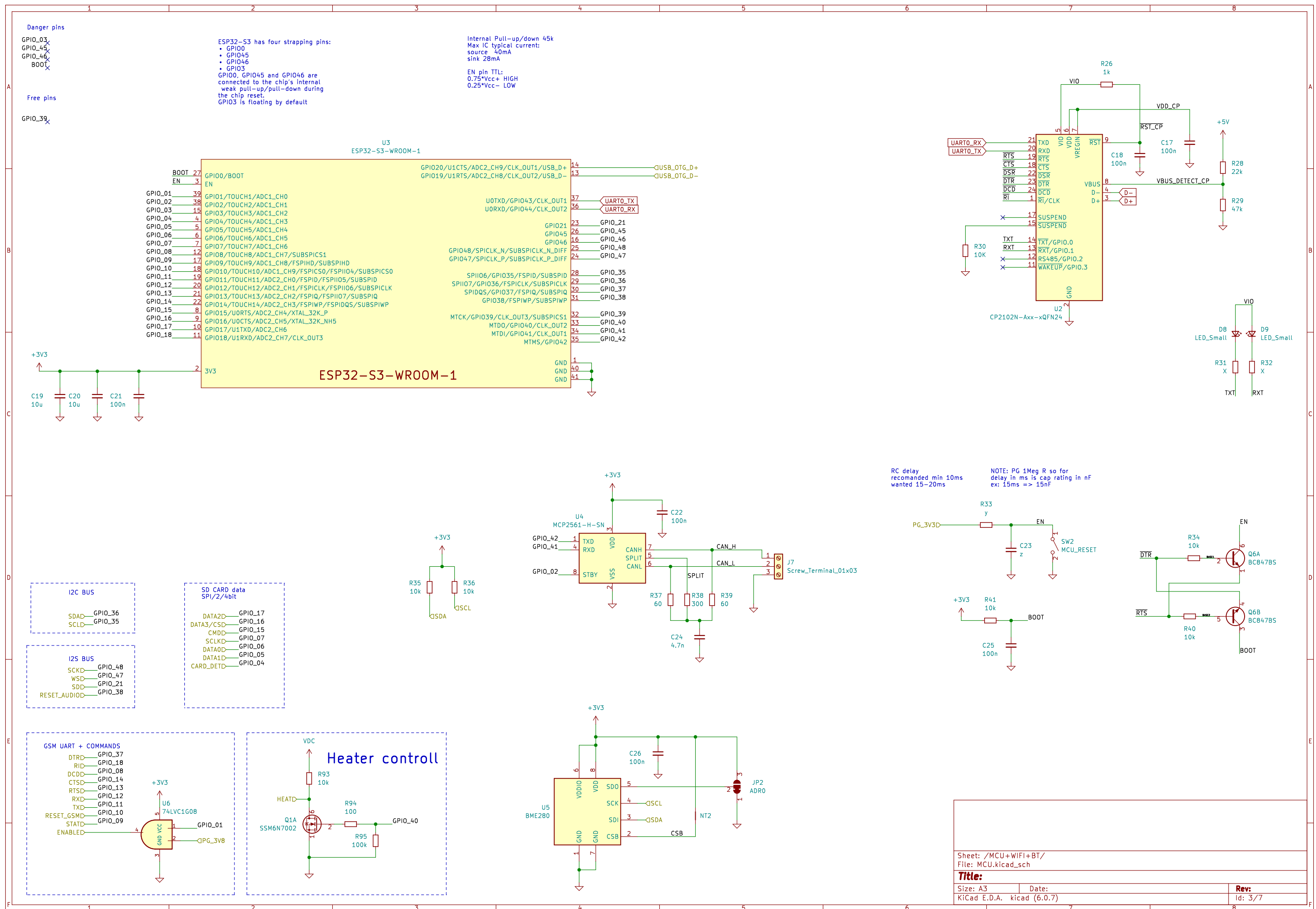
D2+ D2-

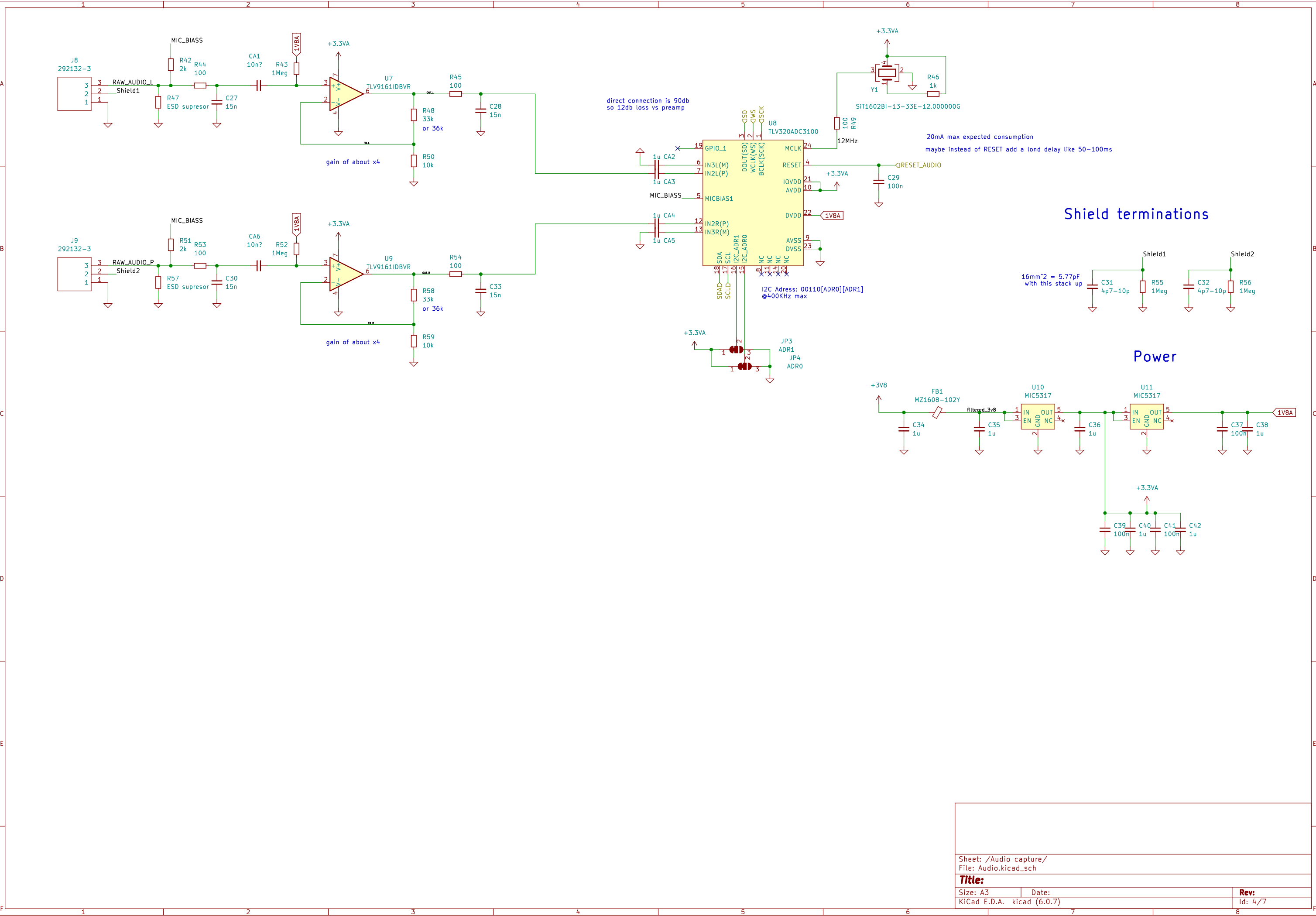
5V-in2

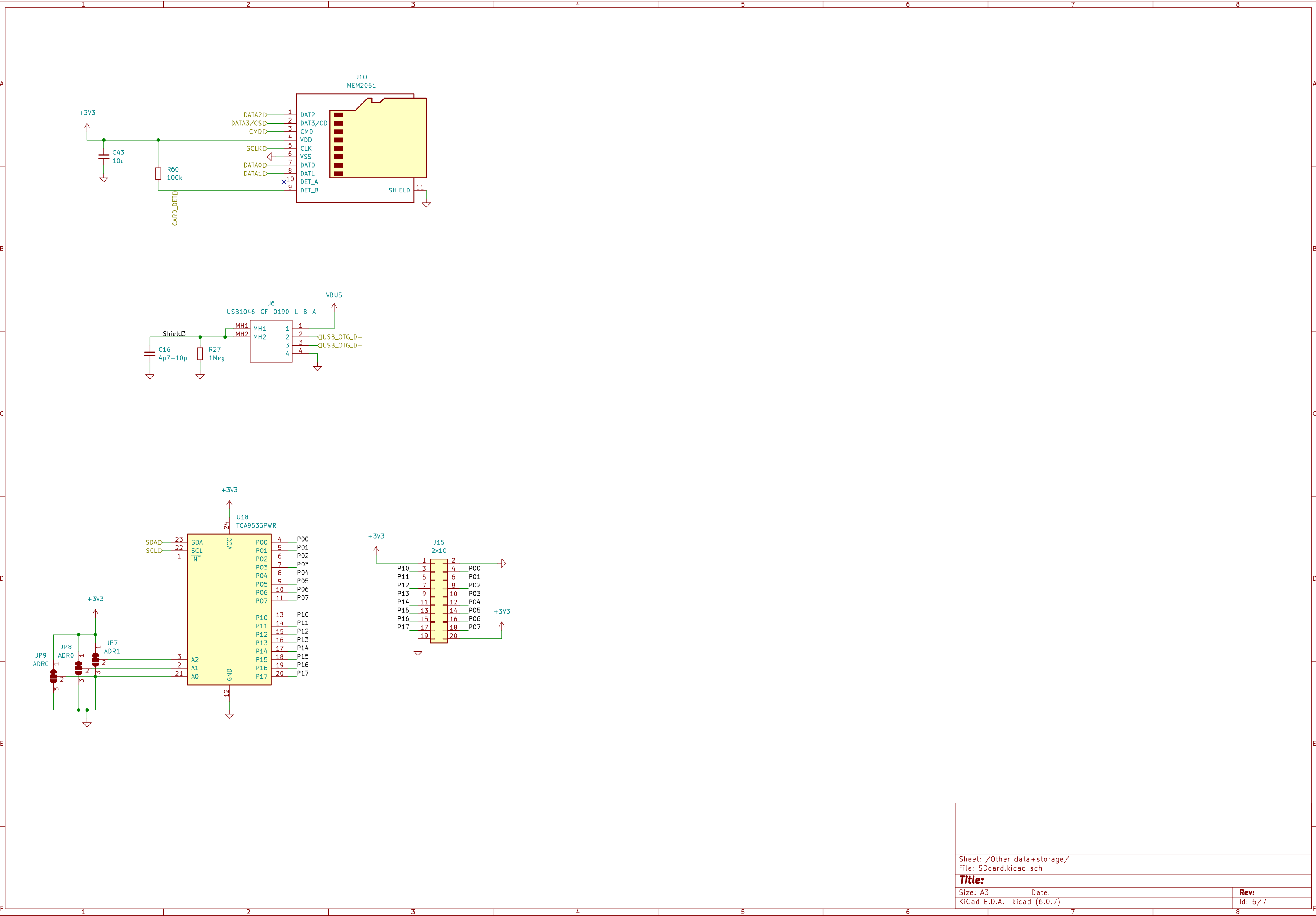


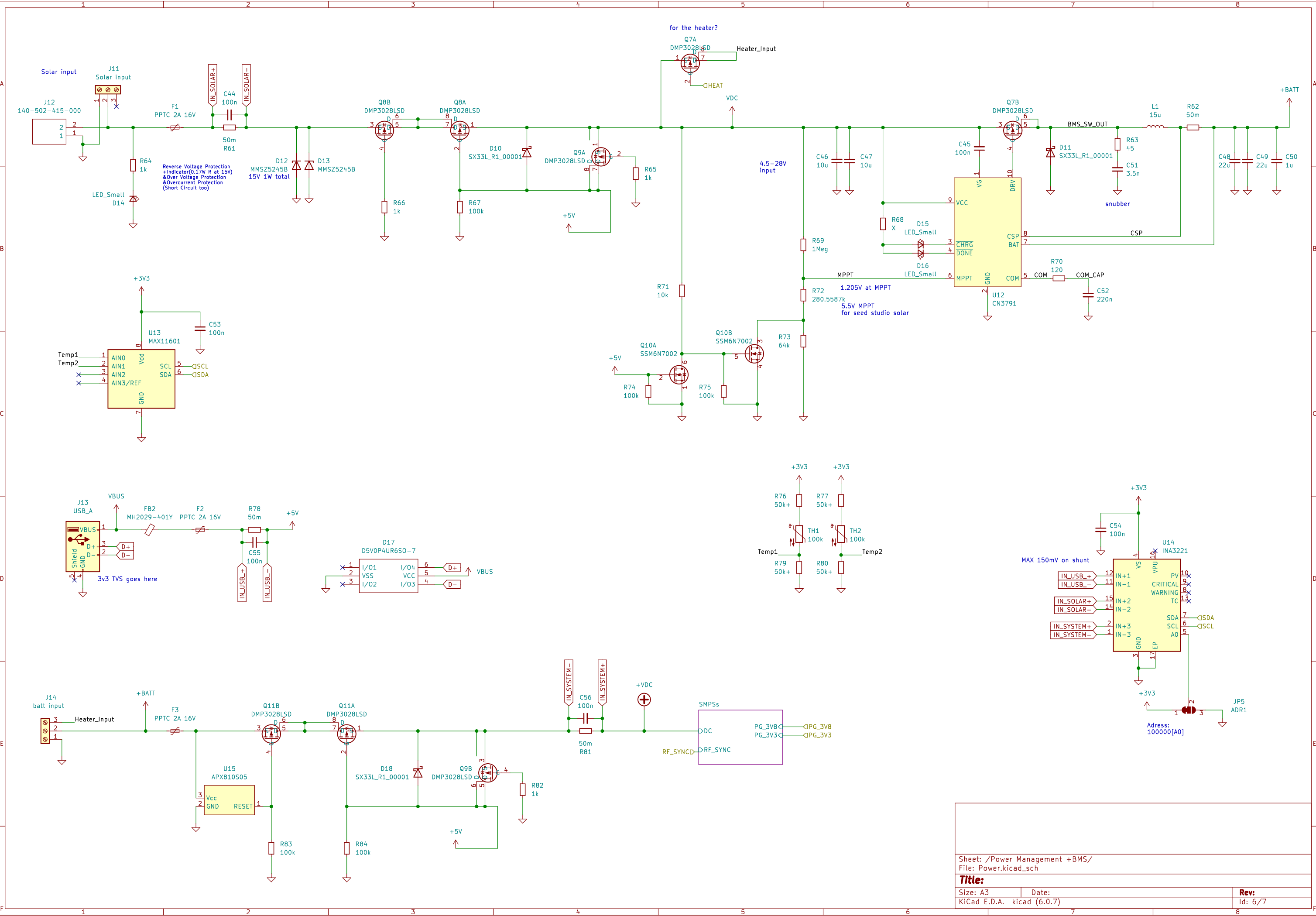
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Rev: 2/7

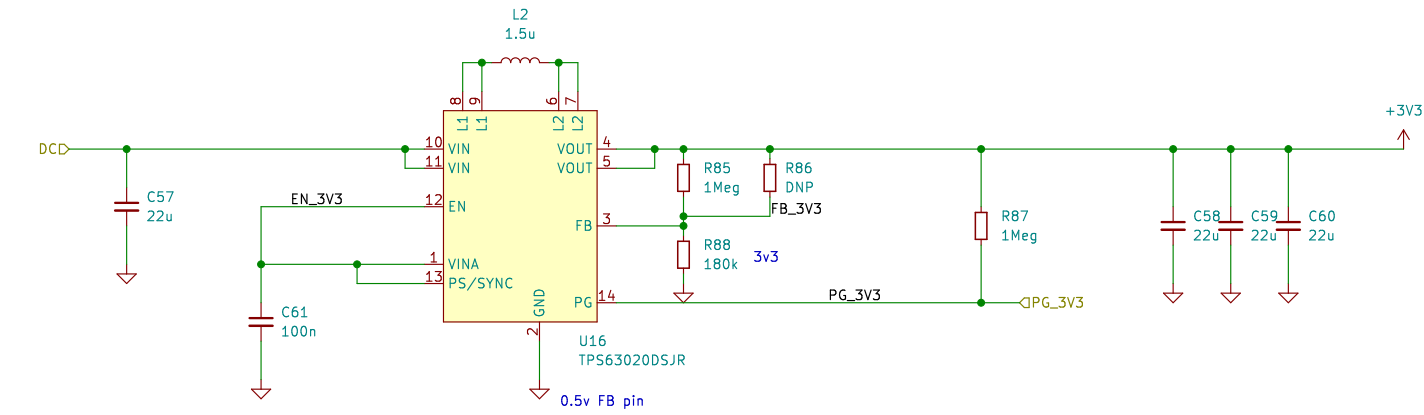








3V-3V3



3V8-4V

