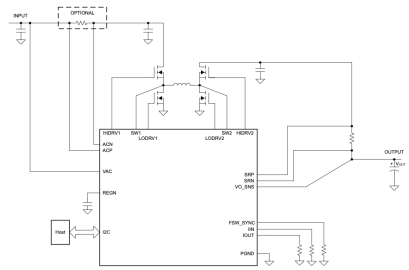
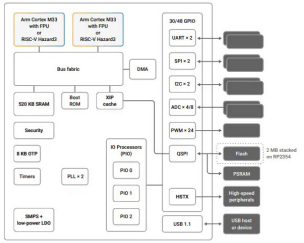
Converter



File: Converter.kicad_sch

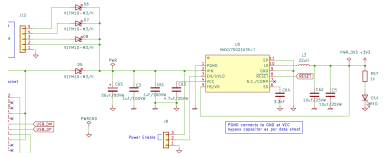
Microcontroller

RP2350
* Dual core
* FPU
* Large external flash
* MicroPython capable



File: Microcontroller.kicad_sch

Power & Connectors

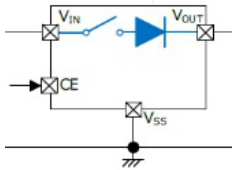


Conventionsl diodes feeding a Buck converter to power microcontroller. The diodes are connected to the various system voltage sources that will provide redundancy for the microcontroller power.

File: connectors.kicad_sch

Ideal Diode Switch

Four independant ideal diodes with load switching controlled by microcontroller.
Input voltage feedback to microcontroller via resistive divider.



File: Ideal Diode Switch.kicad_sch

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Sheet: /
File: BidirectionalSupply.kicad_sch

Title:

Size: A4	Date: 2025-11-07	**Rev: 1.0**
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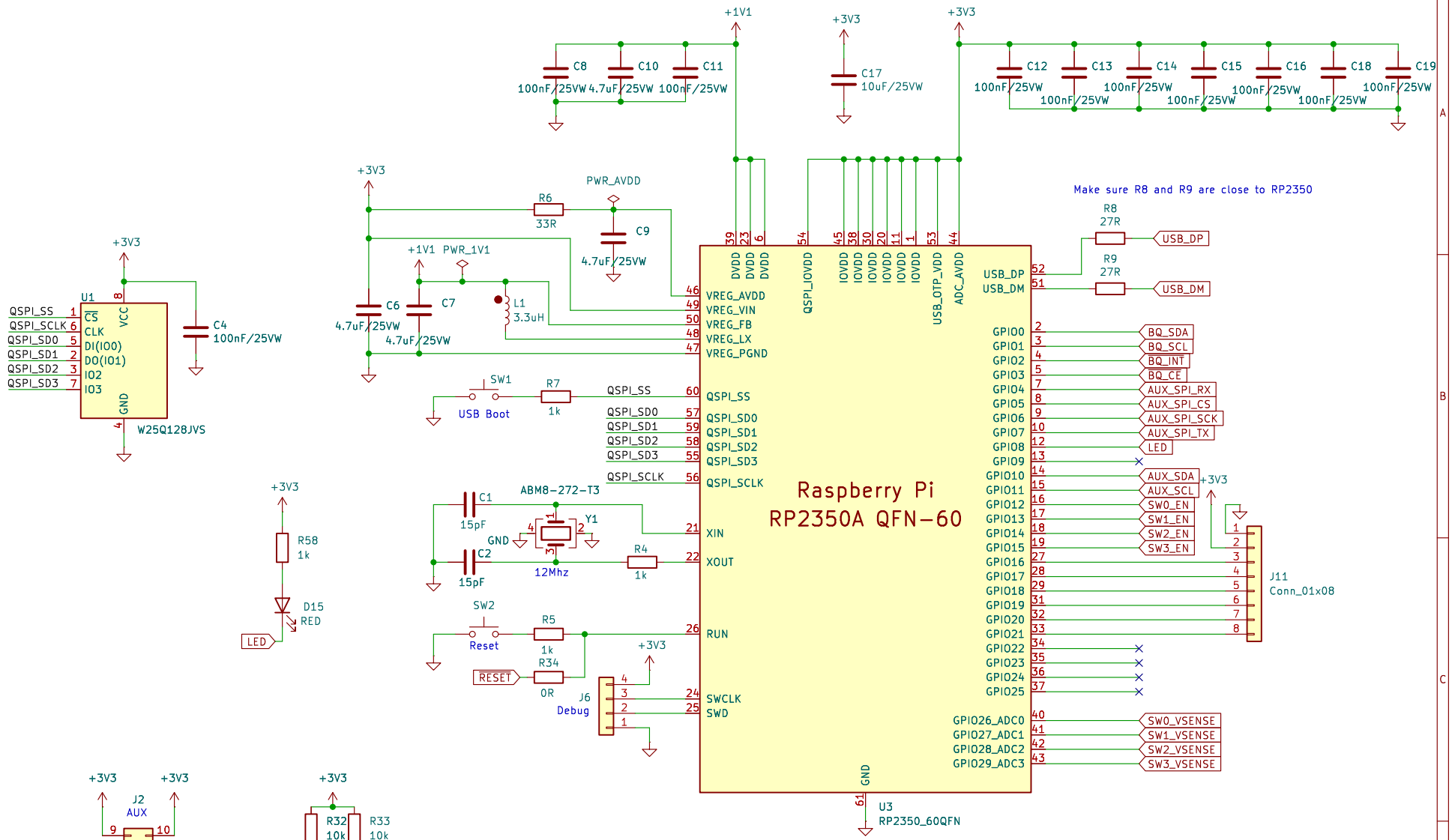
Raspberry Pi
RP2350A QFN-60
U3
RP2350_60QFN
W25Q128JVS
U1
Make sure R8 and R9 are close to RP2350
ABM8-272-T3
12Mhz
USB Boot
Reset
Debug
J2
AUX
J6
J11
Conn_01x08
D15
RED
+1V1
+3V3
PWR_AVDD
PWR_1V1
C8 100nF/25VW
C10 4.7uF/25VW
C11 100nF/25VW
C17 10uF/25VW
C12 100nF/25VW
C13 100nF/25VW
C14 100nF/25VW
C15 100nF/25VW
C16 100nF/25VW
C18 100nF/25VW
C19 100nF/25VW
C4 100nF/25VW
C6 4.7uF/25VW
C7 4.7uF/25VW
C9 4.7uF/25VW
C1 15pF
C2 15pF
L1 3.3uH
R6 33R
R7 1k
R8 27R
R9 27R
R4 1k
R5 1k
R34 0R
R58 1k
R32 10k
R33 10k
Y1
SW1
SW2
QSPI_SS
QSPI_SCLK
QSPI_SD0
QSPI_SD1
QSPI_SD2
QSPI_SD3
USB_DP
USB_DM
BQ_SDA
BQ_SCL
BQ_INT
BQ_CE
AUX_SPI_RX
AUX_SPI_CS
AUX_SPI_SCK
AUX_SPI_TX
LED
AUX_SDA
AUX_SCL
SW0_EN
SW1_EN
SW2_EN
SW3_EN
SW0_VSENSE
SW1_VSENSE
SW2_VSENSE
SW3_VSENSE
RESET
SWCLK
SWD
XIN
XOUT
RUN
GND
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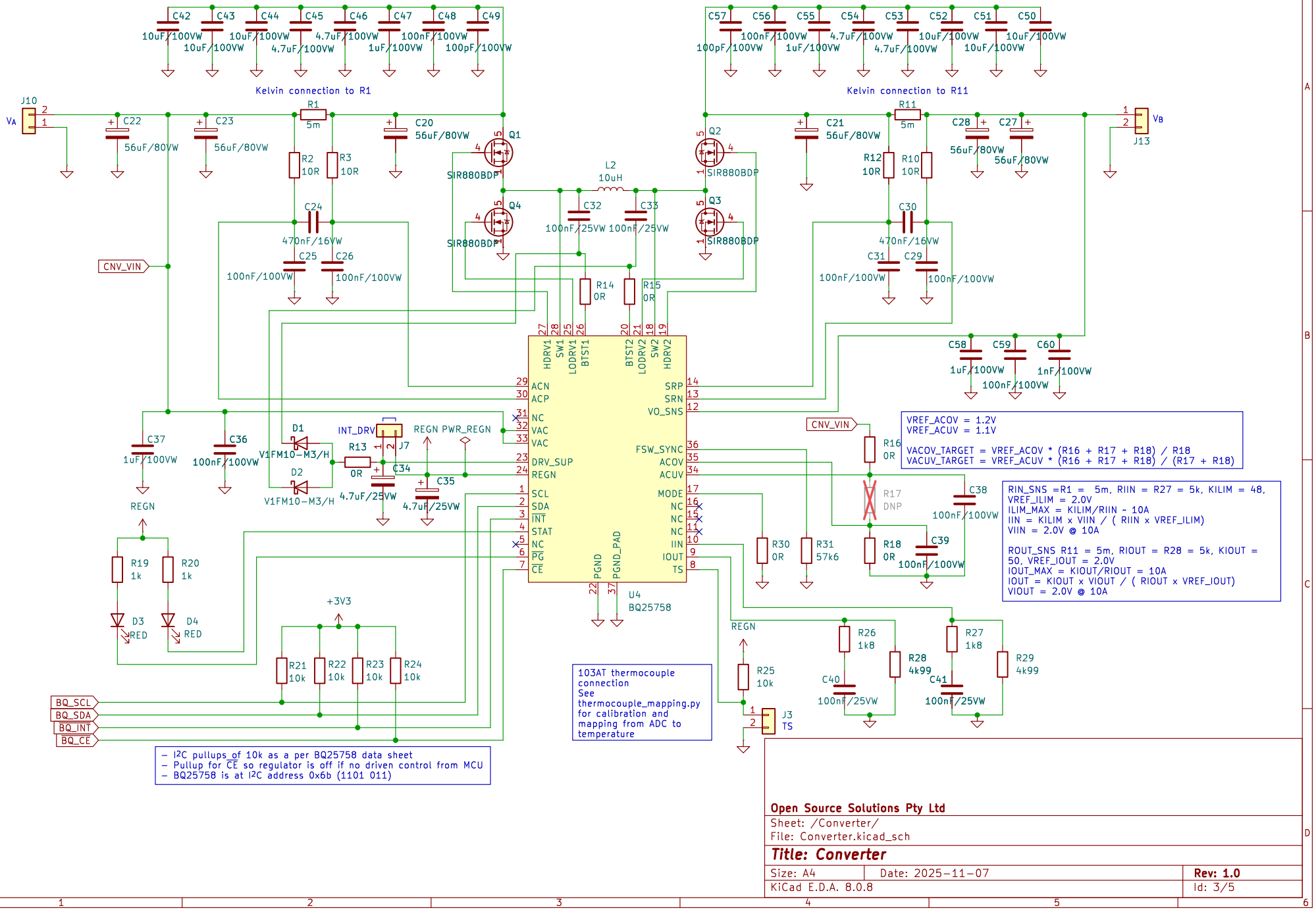
Sheet: /Microcontroller/
File: Microcontroller.kicad_sch
Title: Microcontroller
Size: A4
Date: 2025-11-07
Rev: 1.0
KiCad E.D.A. 8.0.8
Id: 2/5


C42 10uF/100VW
C43 10uF/100VW
C44 4.7uF/100VW
C45 4.7uF/100VW
C46 1uF/100VW
C47 100nF/100VW
C48 100pF/100VW
C49
Kelvin connection to R1
C57 100pF/100VW
C56 100nF/100VW
C55 1uF/100VW
C54 4.7uF/100VW
C53 4.7uF/100VW
C52 10uF/100VW
C51 10uF/100VW
C50
Kelvin connection to R11
J10
VA
C22 56uF/80VW
C23 56uF/80VW
R1 5m
C20 56uF/80VW
R2 10R
R3 10R
Q1 SIR880BDP
Q4 SIR880BDP
L2 10uH
C32 100nF/25VW
C33 100nF/25VW
Q2 SIR880BDP
Q3 SIR880BDP
C21 56uF/80VW
R11 5m
C28 56uF/80VW
C27 56uF/80VW
J13
VB
R12 10R
R10 10R
C30 470nF/16VW
C31 100nF/100VW
C29 100nF/100VW
C24 470nF/16VW
C25 100nF/100VW
C26 100nF/100VW
CNV_VIN
R14 0R
R15 0R
C58 1uF/100VW
C59 100nF/100VW
C60 1nF/100VW
HDRV1
SW1
LODRV1
BTST1
BTST2
LODRV2
SW2
HDRV2
ACN
ACP
NC
VAC
VAC
DRV_SUP
REGN
SCL
SDA
INT
STAT
NC
PG
CE
SRP
SRN
VO_SNS
FSW_SYNC
ACOV
ACUV
MODE
NC
NC
NC
IIN
IOUT
TS
PGND
PGND_PAD
U4
BQ25758
C37 1uF/100VW
C36 100nF/100VW
D1 V1FM10-M3/H
D2 V1FM10-M3/H
INT_DRV
J7
R13 0R
C34 4.7uF/25VW
C35 4.7uF/25VW
REGN PWR_REGN
CNV_VIN
R16 0R
R17 DNP
R18 0R
R30 0R
R31 57k6
C38 100nF/100VW
C39 100nF/100VW
VREF_ACOV = 1.2V
VREF_ACUV = 1.1V
VACOV_TARGET = VREF_ACOV * (R16 + R17 + R18) / R18
VACUV_TARGET = VREF_ACUV * (R16 + R17 + R18) / (R17 + R18)
RIN_SNS =R1 = 5m, RIIN = R27 = 5k, KILIM = 48,
VREF_ILIM = 2.0V
ILIM_MAX = KILIM/RIIN ~ 10A
IIN = KILIM x VIIN / (RIIN x VREF_ILIM)
VIIN = 2.0V @ 10A
ROUT_SNS R11 = 5m, RIOUT = R28 = 5k, KIOUT = 50, VREF_IOUT = 2.0V
IOUT_MAX = KIOUT/RIOUT = 10A
IOUT = KIOUT x VIOUT / (RIOUT x VREF_IOUT)
VIOUT = 2.0V @ 10A
REGN
R19 1k
R20 1k
D3 RED
D4 RED
+3V3
R21 10k
R22 10k
R23 10k
R24 10k
BQ_SCL
BQ_SDA
BQ_INT
BQ_CE
– I2C pullups of 10k as a per BQ25758 data sheet
– Pullup for CE so regulator is off if no driven control from MCU
– BQ25758 is at I2C address 0x6b (1101 011)
103AT thermocouple connection
See thermocouple_mapping.py for calibration and mapping from ADC to temperature
REGN
R25 10k
J3
TS
R26 1k8
C40 100nF/25VW
R28 4k99
R27 1k8
C41 100nF/25VW
R29 4k99
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Sheet: /Converter/
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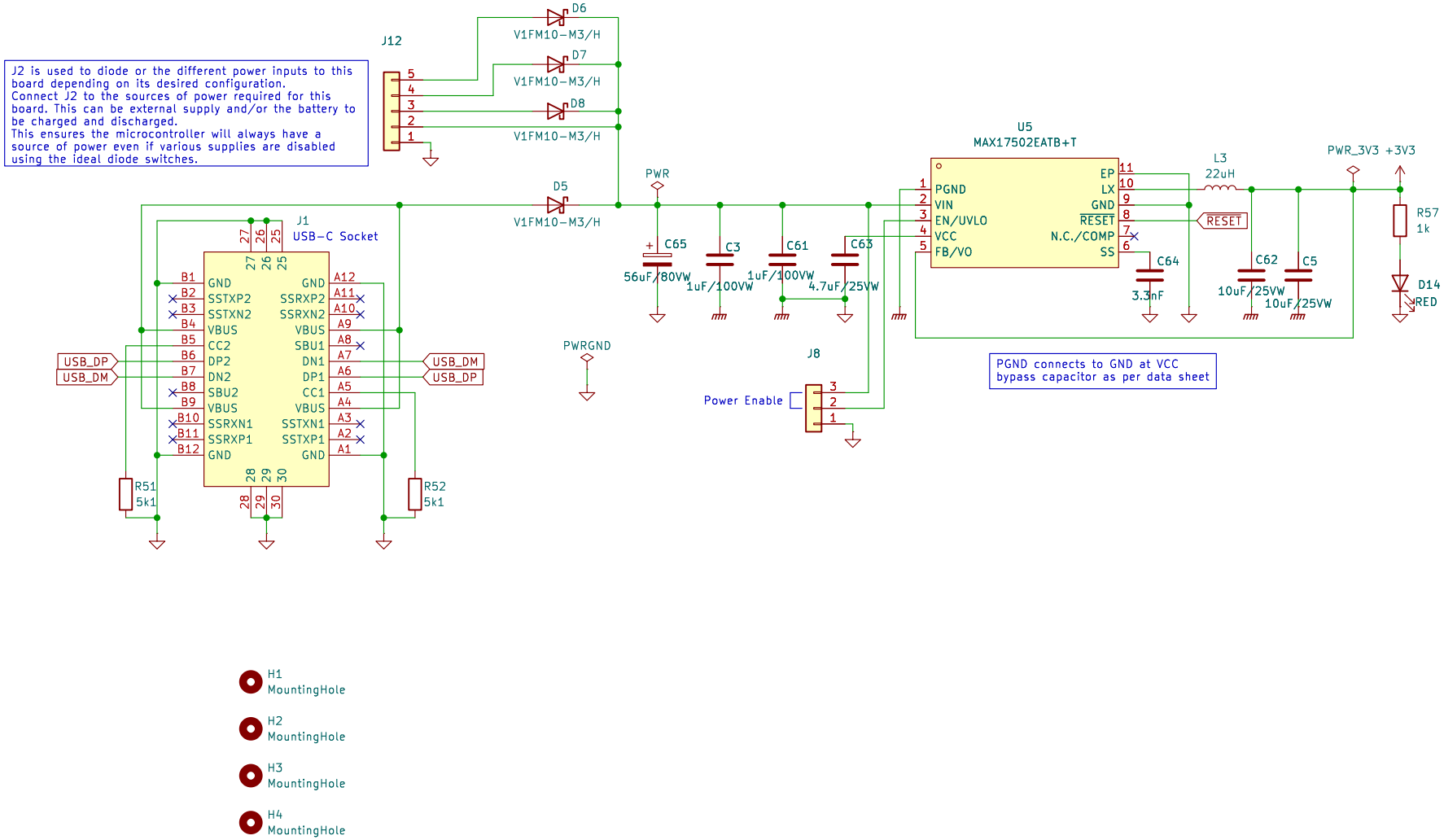
KiCad E.D.A. 8.0.8
Id: 3/5



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Sheet: /Power & Connectors/		
File: connectors.kicad_sch		
Title: Power & Connectors		
Size: A4	Date: 2025-11-07	**Rev: 1.0**
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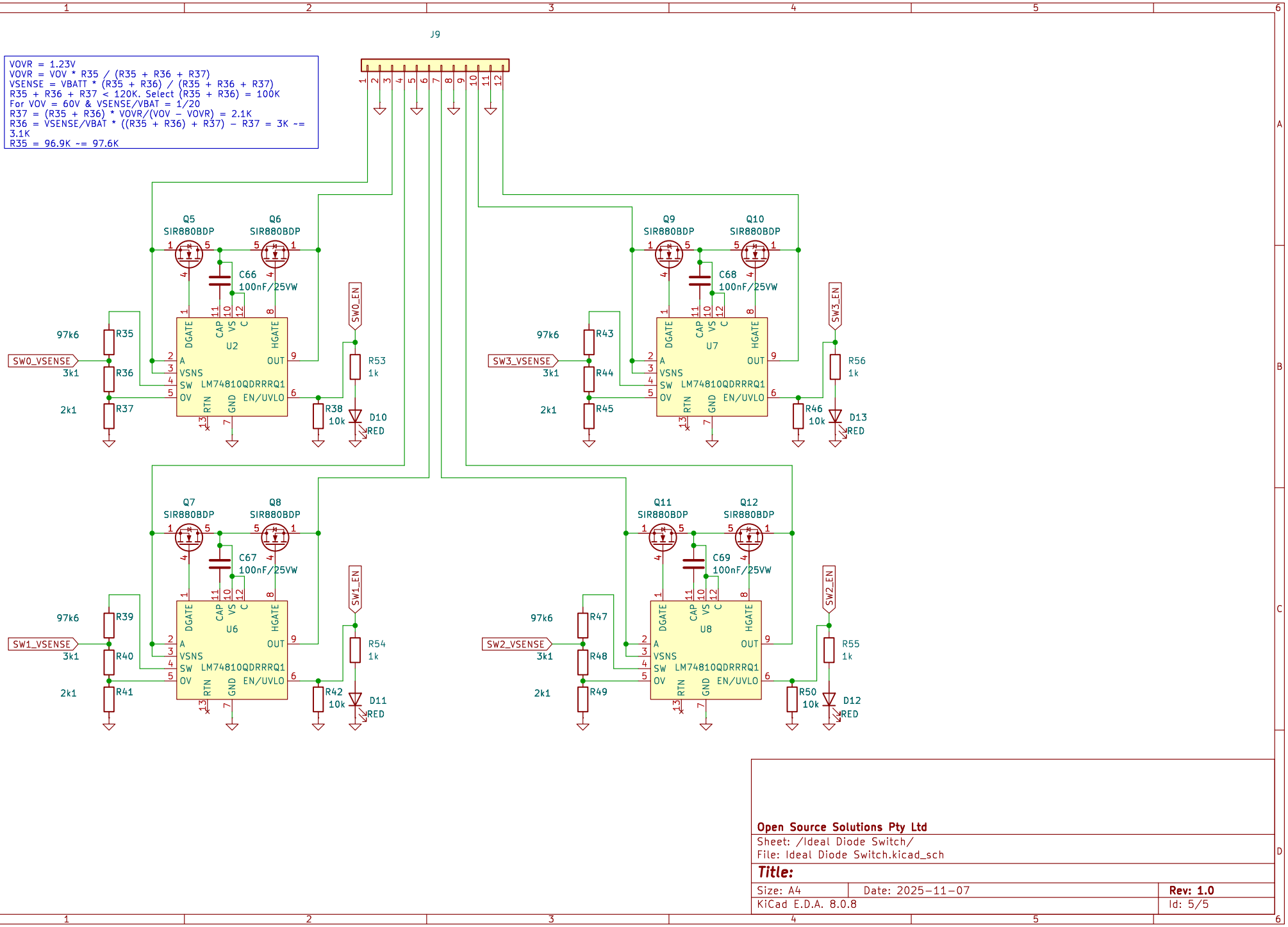
VOVR = 1.23V
VOVR = VOV * R35 / (R35 + R36 + R37)
VSENSE = VBATT * (R35 + R36) / (R35 + R36 + R37)
R35 + R36 + R37 < 120K. Select (R35 + R36) = 100K
For VOV = 60V & VSENSE/VBAT = 1/20
R37 = (R35 + R36) * VOVR/(VOV − VOVR) = 2.1K
R36 = VSENSE/VBAT * ((R35 + R36) + R37) − R37 = 3K ~= 3.1K
R35 = 96.9K ~= 97.6K
J9
Q5 SIR880BDP
Q6 SIR880BDP
C66 100nF/25VW
U2 LM74810QDRRRQ1
DGATE CAP VS C HGATE A OUT VSNS SW OV RTN GND EN/UVLO
SW0_EN
SW0_VSENSE
97k6 R35
3k1 R36
2k1 R37
R53 1k
R38 10k
D10 RED
Q9 SIR880BDP
Q10 SIR880BDP
C68 100nF/25VW
U7 LM74810QDRRRQ1
SW3_EN
SW3_VSENSE
97k6 R43
3k1 R44
2k1 R45
R56 1k
R46 10k
D13 RED
Q7 SIR880BDP
Q8 SIR880BDP
C67 100nF/25VW
U6 LM74810QDRRRQ1
SW1_EN
SW1_VSENSE
97k6 R39
3k1 R40
2k1 R41
R54 1k
R42 10k
D11 RED
Q11 SIR880BDP
Q12 SIR880BDP
C69 100nF/25VW
U8 LM74810QDRRRQ1
SW2_EN
SW2_VSENSE
97k6 R47
3k1 R48
2k1 R49
R55 1k
R50 10k
D12 RED
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Sheet: /Ideal Diode Switch/
File: Ideal Diode Switch.kicad_sch
Title:
Size: A4
Date: 2025-11-07
Rev: 1.0
KiCad E.D.A. 8.0.8
Id: 5/5