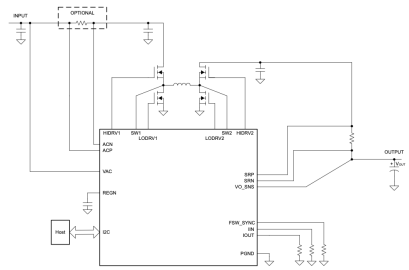
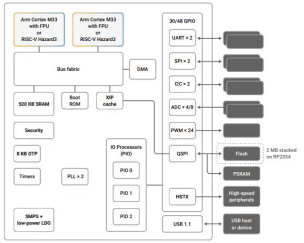
Converter



File: Converter.kicad_sch

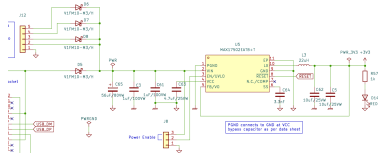
Microcontroller

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



File: Microcontroller.kicad_sch

Power & Connectors

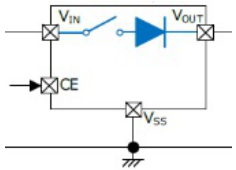


Conventionsl diodes feeding a Buck converter to power microcontroller. The diodes are connected to the various system voltage sources that will provide redundancy for the microcontroller power.

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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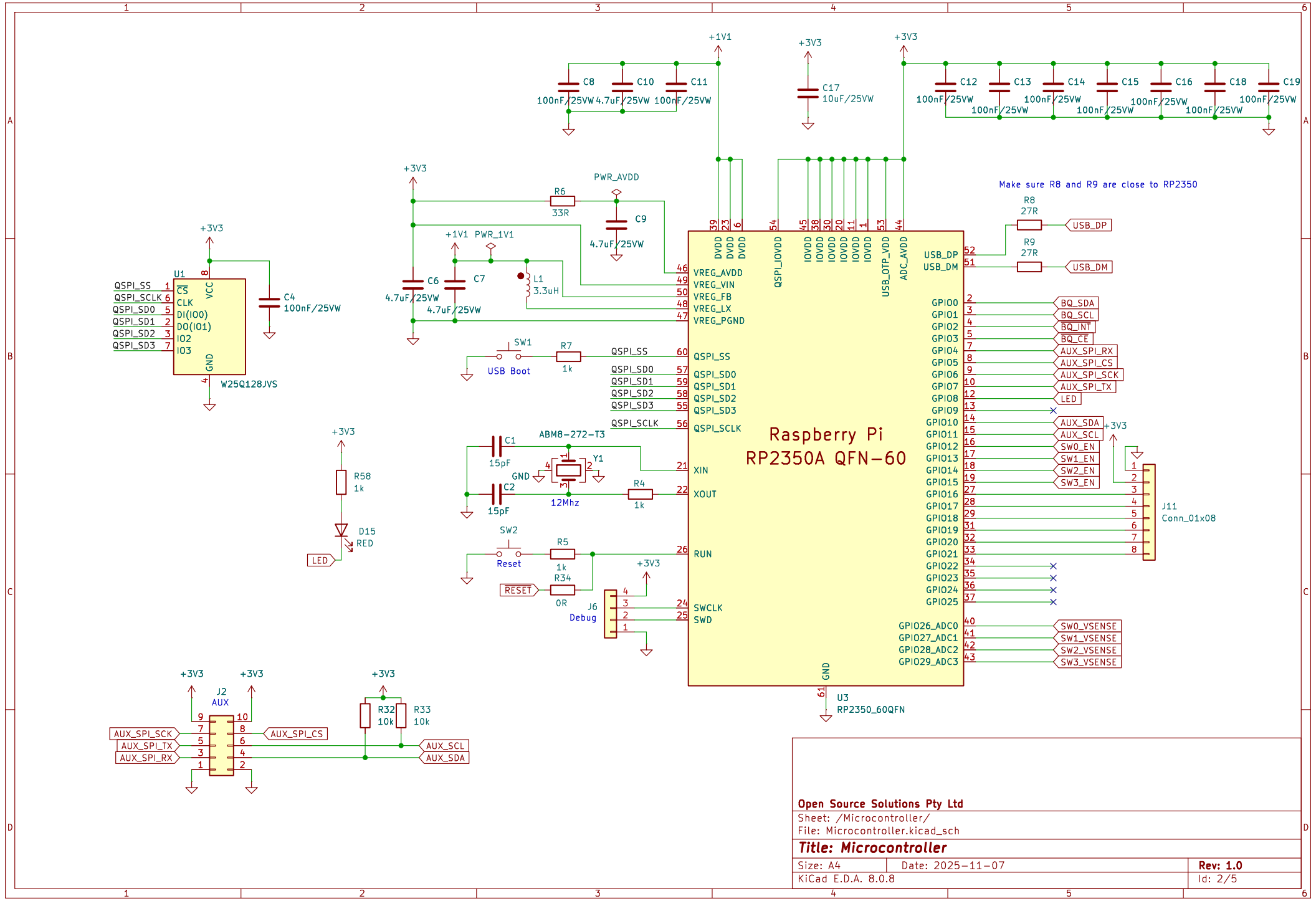
Make sure R8 and R9 are close to RP2350
Raspberry Pi
RP2350A QFN-60
U3
RP2350_60QFN
U1
W25Q128JVS
J2
AUX
J6
Debug
J11
Conn_01x08
ABM8-272-T3
12Mhz
USB Boot
Reset
LED
D15
RED
Open Source Solutions Pty Ltd
Sheet: /Microcontroller/
File: Microcontroller.kicad_sch
Title: Microcontroller
Size: A4
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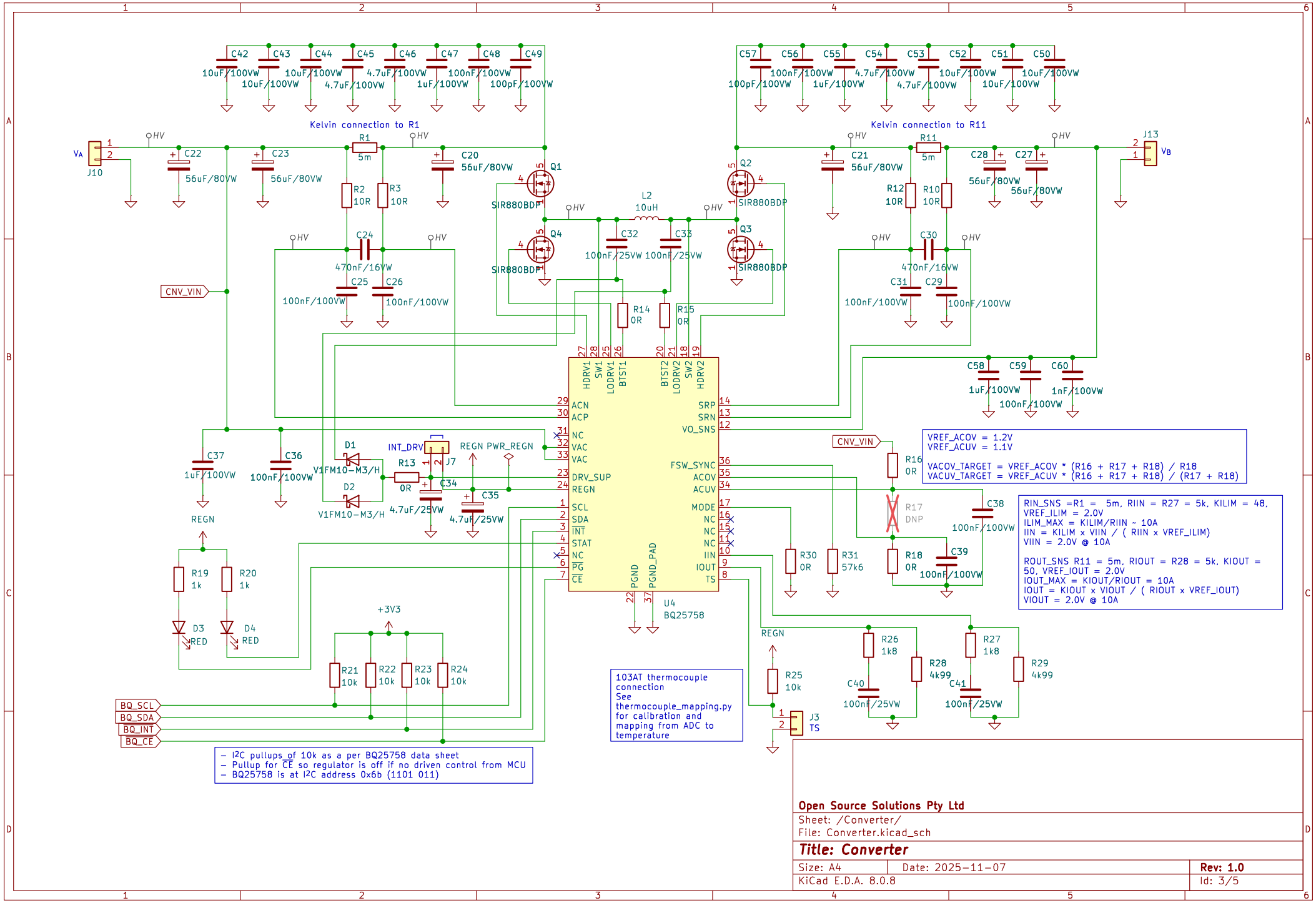
C42 10uF/100VW
C43 10uF/100VW
C44 4.7uF/100VW
C45 4.7uF/100VW
C46 1uF/100VW
C47 100nF/100VW
C48 100pF/100VW
C49
C57 100pF/100VW
C56 100nF/100VW
C55 1uF/100VW
C54 4.7uF/100VW
C53 4.7uF/100VW
C52 10uF/100VW
C51 10uF/100VW
C50
Kelvin connection to R1
Kelvin connection to R11
VA
J10
HV
C22 56uF/80VW
C23 56uF/80VW
R1 5m
C20 56uF/80VW
Q1 SIR880BDP
Q2 SIR880BDP
Q3 SIR880BDP
Q4 SIR880BDP
L2 10uH
C21 56uF/80VW
R11 5m
C28 56uF/80VW
C27 56uF/80VW
J13
VB
R2 10R
R3 10R
R12 10R
R10 10R
C24 470nF/16VW
C25 100nF/100VW
C26 100nF/100VW
C32 100nF/25VW
C33 100nF/25VW
C30 470nF/16VW
C31 100nF/100VW
C29 100nF/100VW
CNV_VIN
R14 0R
R15 0R
C58 1uF/100VW
C59 100nF/100VW
C60 1nF/100VW
U4
BQ25758
HDRV1
SW1
LODRV1
BTST1
BTST2
LODRV2
SW2
HDRV2
ACN
ACP
NC
VAC
VAC
DRV_SUP
REGN
SCL
SDA
INT
STAT
NC
PG
CE
PGND
PGND_PAD
SRP
SRN
VO_SNS
FSW_SYNC
ACOV
ACUV
MODE
NC
NC
NC
IIN
IOUT
TS
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
C38 100nF/100VW
C39 100nF/100VW
R30 0R
R31 57k6
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
R25 10k
J3
TS
R26 1k8
R28 4k99
C40 100nF/25VW
R27 1k8
R29 4k99
C41 100nF/25VW
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Sheet: /Converter/
File: Converter.kicad_sch
Title: Converter
Size: A4
Date: 2025-11-07
Rev: 1.0
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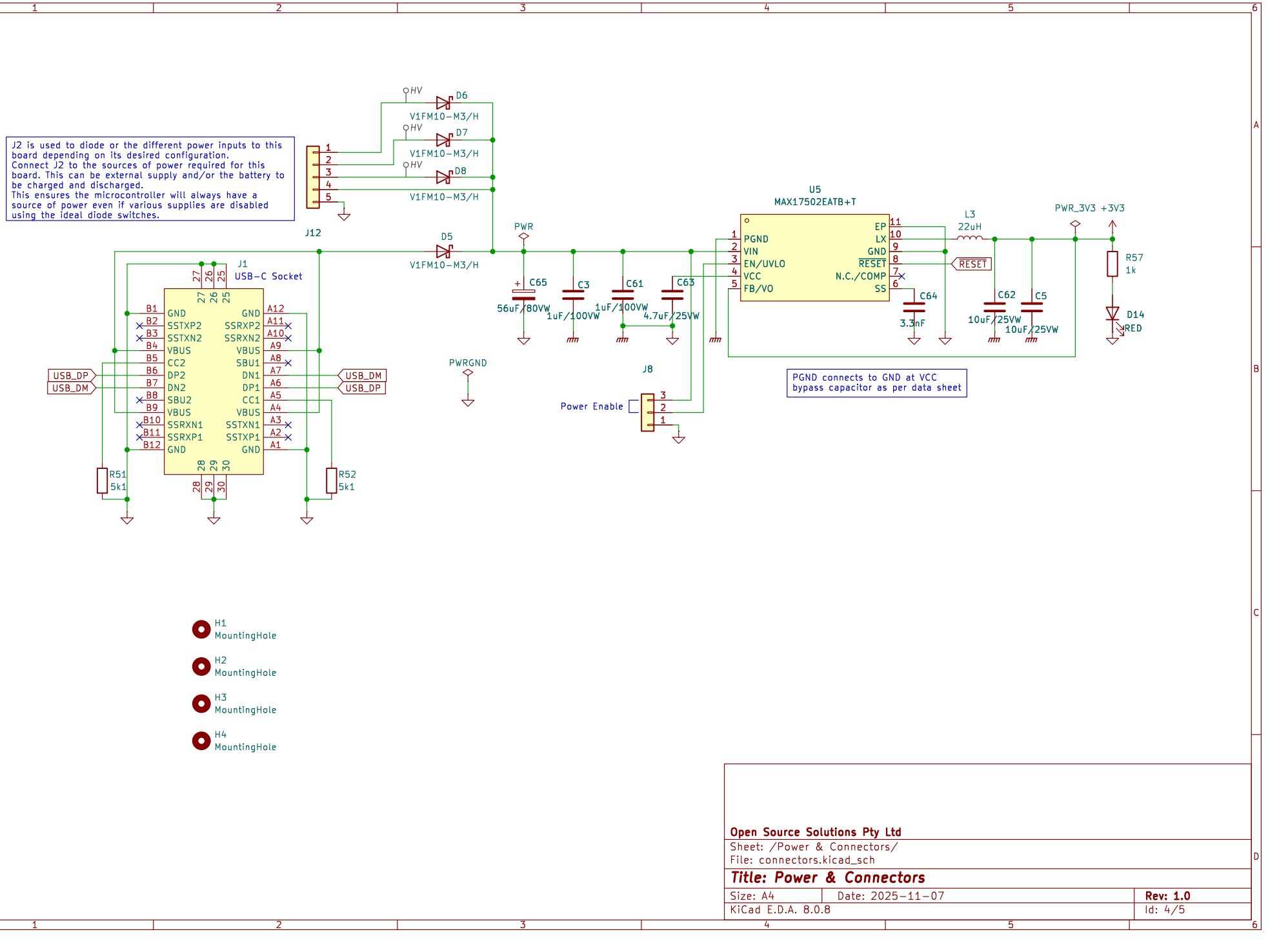
Id: 3/5



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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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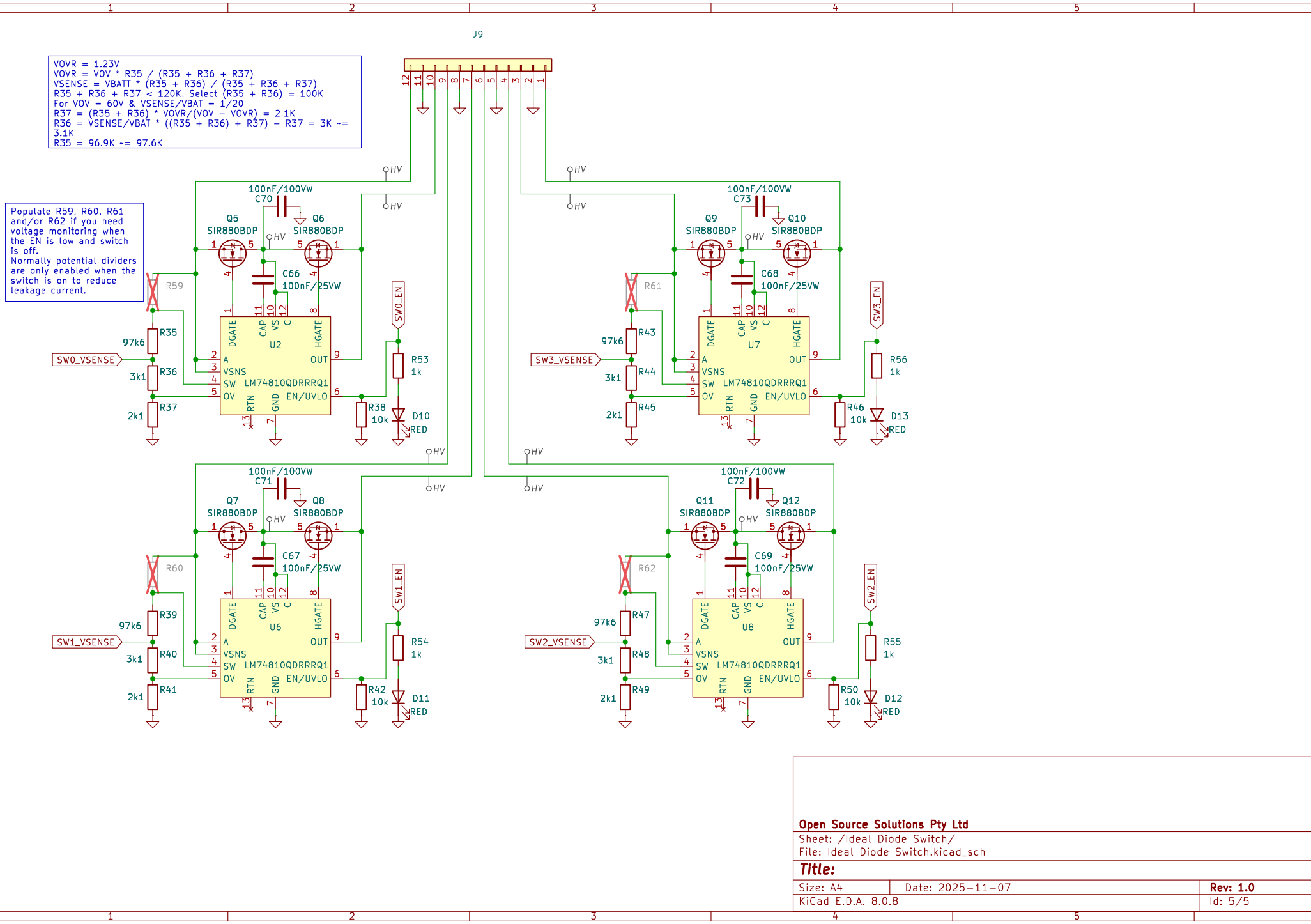
VOVR = 1.23V
VOVR = VOV * R35 / (R35 + R36 + R37)
VSENSE = VBATT * (R35 + R36) / (R35 + R36 + R37)
R35 + R36 + R37 < 120K. Select (R35 + R36) = 100K
For VOV = 60V & VSENSE/VBAT = 1/20
R37 = (R35 + R36) * VOVR/(VOV − VOVR) = 2.1K
R36 = VSENSE/VBAT * ((R35 + R36) + R37) − R37 = 3K ~= 3.1K
R35 = 96.9K ~= 97.6K
Populate R59, R60, R61 and/or R62 if you need voltage monitoring when the EN is low and switch is off.
Normally potential dividers are only enabled when the switch is on to reduce leakage current.
J9
HV
100nF/100VW
C70
Q5
SIR880BDP
Q6
SIR880BDP
C66
100nF/25VW
R59
R35
97k6
R36
3k1
R37
2k1
SW0_VSENSE
U2
LM74810QDRRRQ1
SW0_EN
R53
1k
R38
10k
D10
RED
C71
Q7
SIR880BDP
Q8
SIR880BDP
C67
100nF/25VW
R60
R39
97k6
R40
3k1
R41
2k1
SW1_VSENSE
U6
LM74810QDRRRQ1
SW1_EN
R54
1k
R42
10k
D11
RED
C73
Q9
SIR880BDP
Q10
SIR880BDP
C68
100nF/25VW
R61
R43
97k6
R44
3k1
R45
2k1
SW3_VSENSE
U7
LM74810QDRRRQ1
SW3_EN
R56
1k
R46
10k
D13
RED
C72
Q11
SIR880BDP
Q12
SIR880BDP
C69
100nF/25VW
R62
R47
97k6
R48
3k1
R49
2k1
SW2_VSENSE
U8
LM74810QDRRRQ1
SW2_EN
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
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