Input_&_Power

File: Input_&_Power.kicad_sch

Voltage_Converter

File: Voltage_Converter.kicad_sch

uC_Control_section

File: Control_section.kicad_sch

I = Internal
E = External

Sheet: /
File: PSU.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 1/22

Rectified—Input_CH1_CH2

File: untitled.kicad_sch

Supply_voltages

File: Supply_voltages.kicad_sch

Input_control_CH1

File: input_control_CH1.kicad_sch

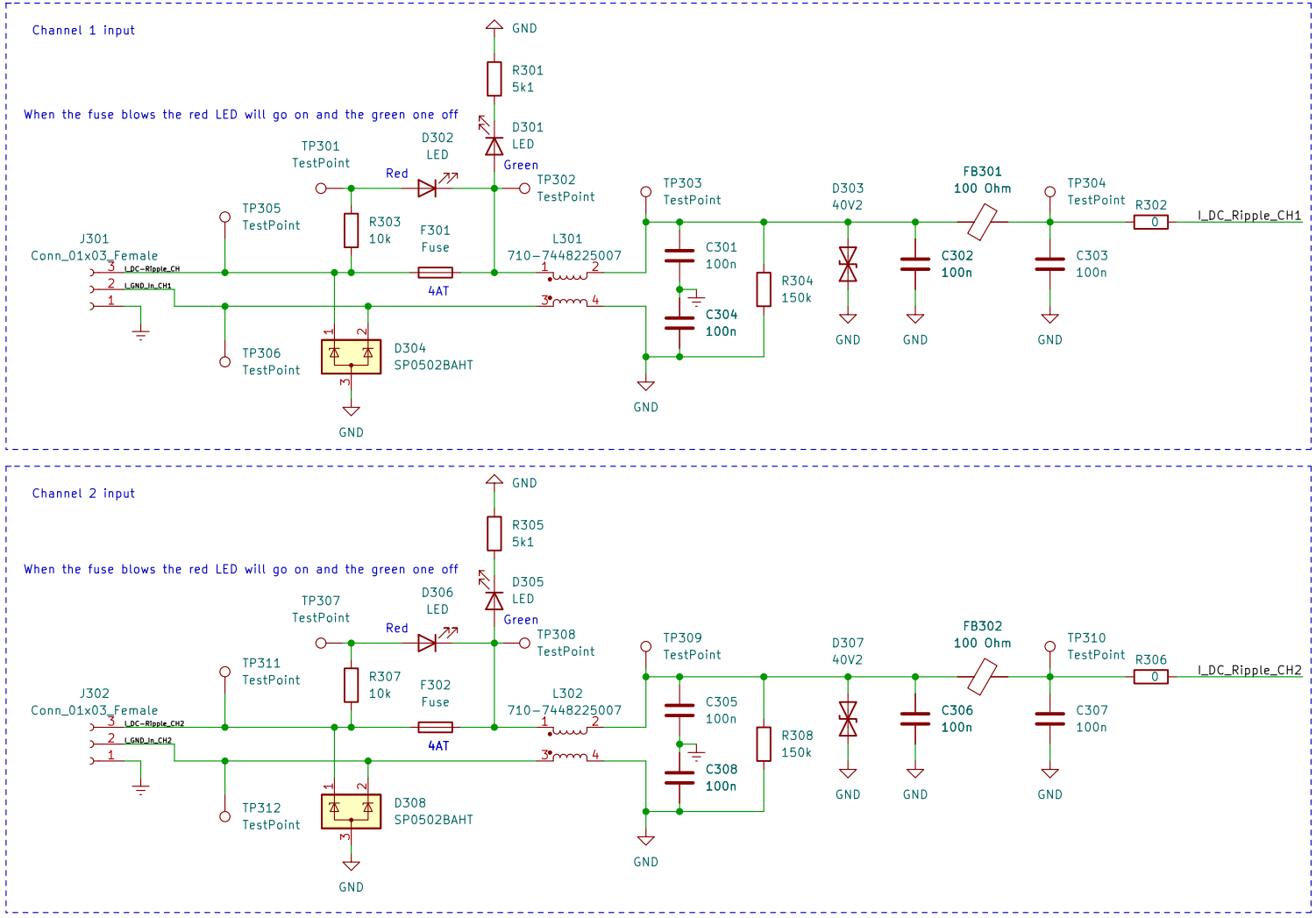
Input_control_CH2

File: input_controlCH2.kicad_sch

Sheet: /Input_&_Power/
File: Input_&_Power.kicad_sch

Title:

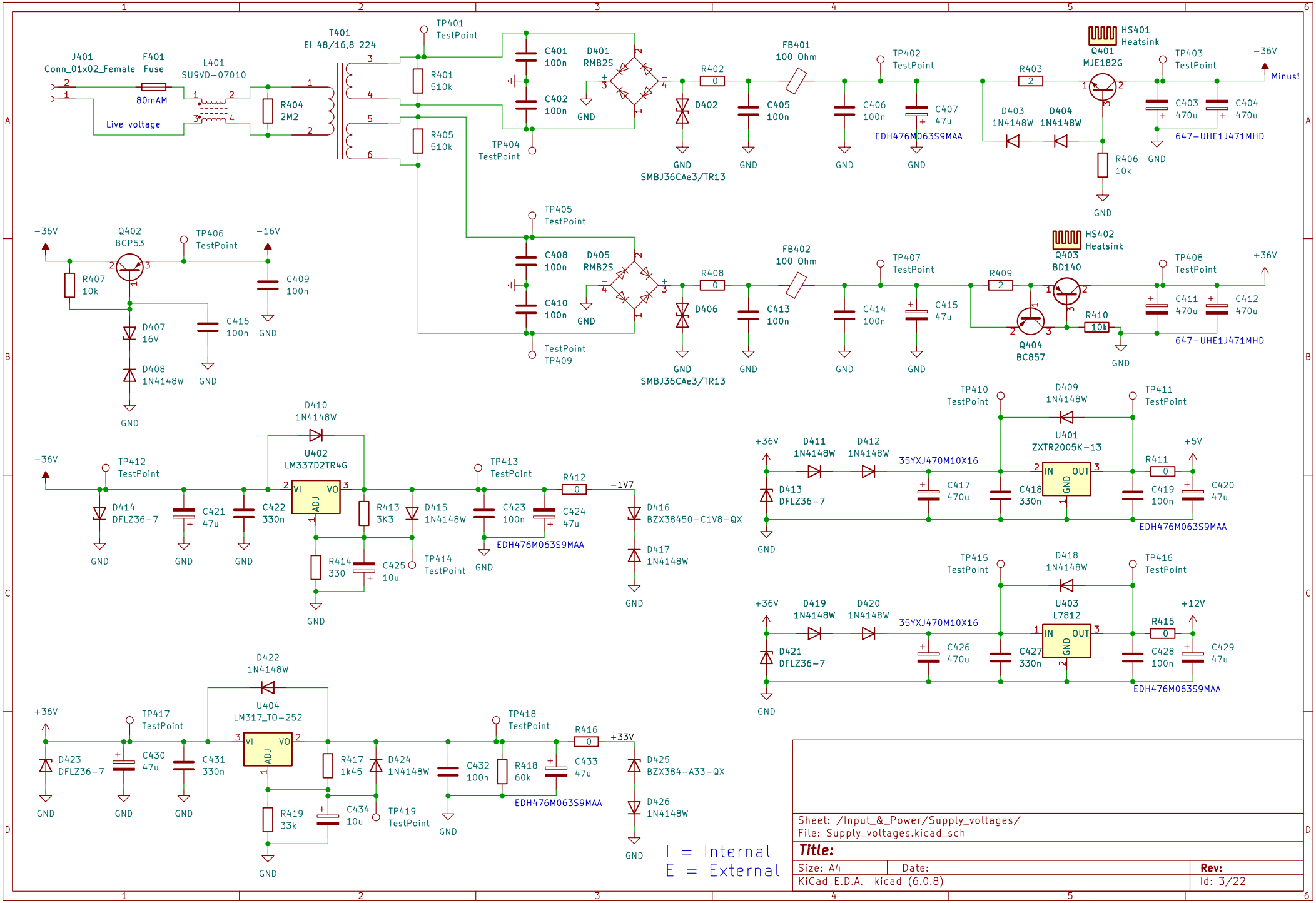
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 1/22

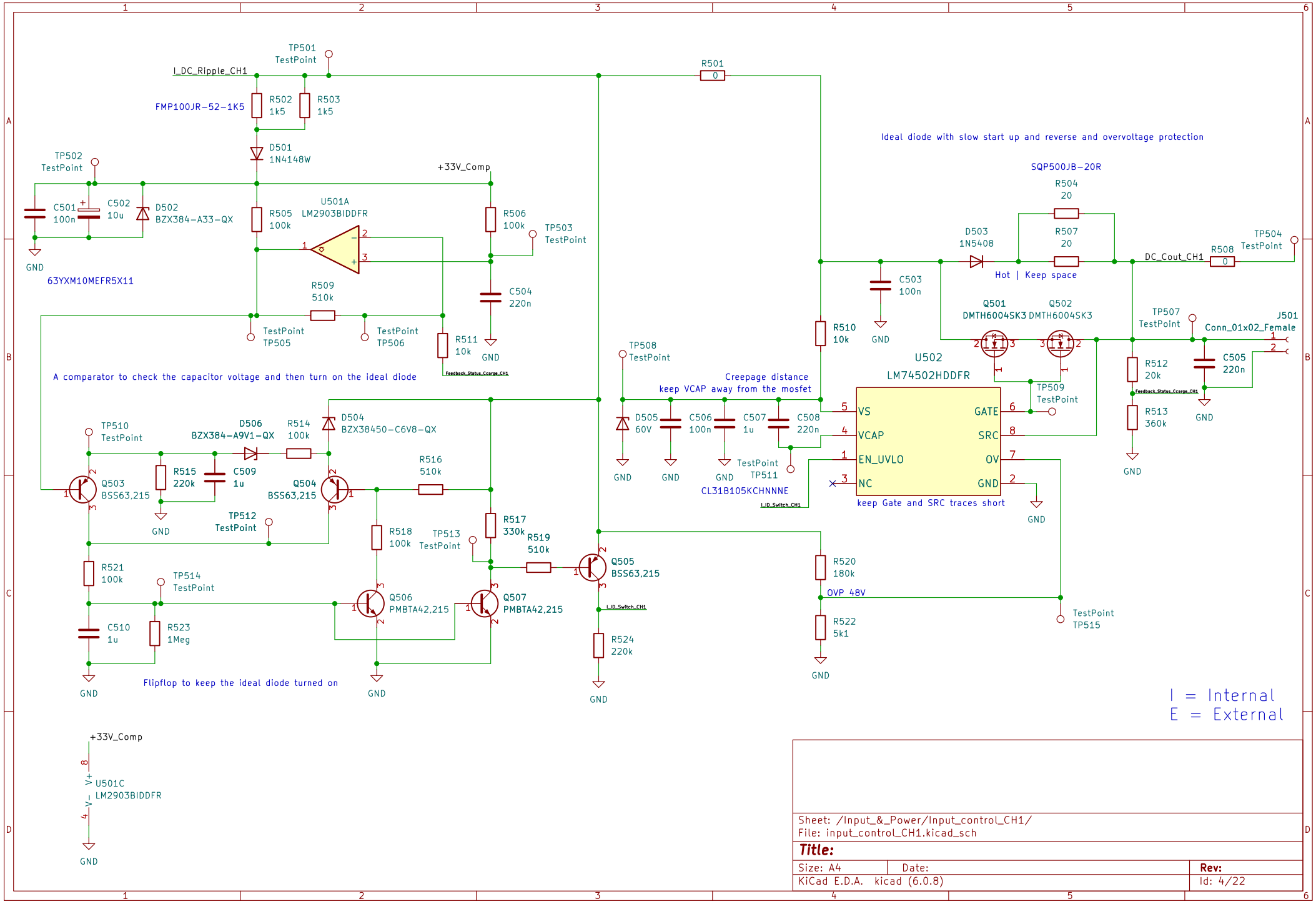


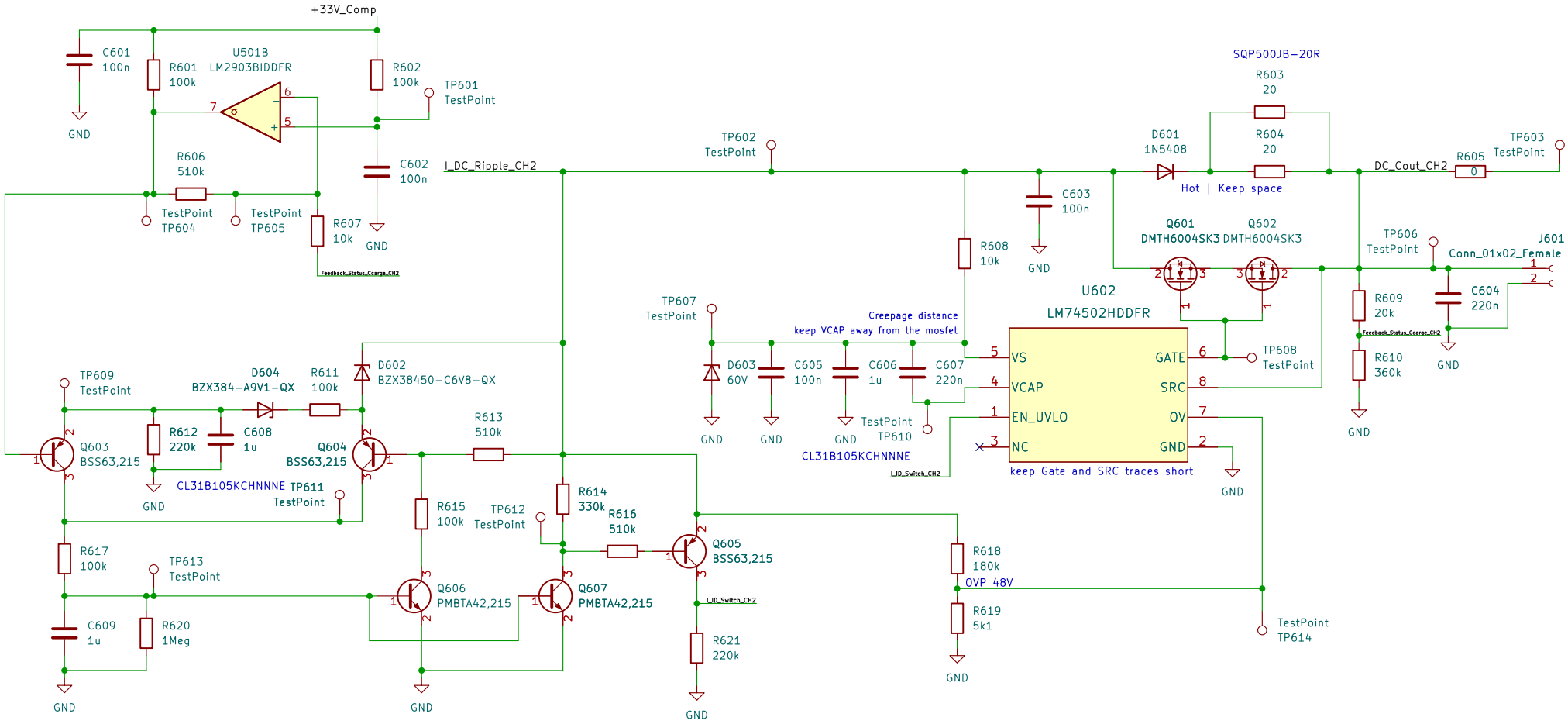
Sheet: /Input_&_Power/Rectified-Input_CH1_CH2/
File: untitled.kicad_sch

Title: DC_Ripple_Input_Section

Size: A4	Date: 2022-09-24	**Rev: 1.0.0**
KiCad E.D.A. kicad (6.0.8)		Id: 2/22


J401
Conn_01x02_Female
F401
Fuse
80mAM
Live voltage
L401
SU9VD-07010
T401
EI 48/16,8 224
R404
2M2
TP401
TestPoint
R401
510k
R405
510k
C401
100n
C402
100n
D401
RMB2S
TP404
TestPoint
GND
R402
0
D402
SMBJ36CAe3/TR13
FB401
100 Ohm
C405
100n
TP402
TestPoint
C406
100n
C407
47u
EDH476M063S9MAA
R403
2
D403
1N4148W
D404
1N4148W
HS401
Heatsink
Q401
MJE182G
TP403
TestPoint
-36V
Minus!
C403
470u
C404
470u
647-UHE1J471MHD
R406
10k
Q402
BCP53
TP406
TestPoint
-16V
R407
10k
C409
100n
D407
16V
C416
100n
D408
1N4148W
TP405
TestPoint
C408
100n
C410
100n
D405
RMB2S
TestPoint
TP409
R408
0
D406
SMBJ36CAe3/TR13
FB402
100 Ohm
TP407
TestPoint
C413
100n
C414
100n
C415
47u
R409
2
HS402
Heatsink
Q403
BD140
Q404
BC857
R410
10k
TP408
TestPoint
+36V
C411
470u
C412
470u
647-UHE1J471MHD
D410
1N4148W
U402
LM337D2TR4G
TP412
TestPoint
D414
DFLZ36-7
C421
47u
C422
330n
R413
3K3
D415
1N4148W
R414
330
C425
10u
TP414
TestPoint
TP413
TestPoint
C423
100n
C424
47u
EDH476M063S9MAA
R412
0
-1V7
D416
BZX38450-C1V8-QX
D417
1N4148W
TP410
TestPoint
D409
1N4148W
TP411
TestPoint
+36V
D411
1N4148W
D412
1N4148W
35YXJ470M10X16
U401
ZXTR2005K-13
D413
DFLZ36-7
C417
470u
C418
330n
R411
0
+5V
C419
100n
C420
47u
EDH476M063S9MAA
D422
1N4148W
U404
LM317_TO-252
TP417
TestPoint
D423
DFLZ36-7
C430
47u
C431
330n
R417
1k45
D424
1N4148W
R419
33k
C434
10u
TP419
TestPoint
TP418
TestPoint
C432
100n
R418
60k
C433
47u
EDH476M063S9MAA
R416
0
+33V
D425
BZX384-A33-QX
D426
1N4148W
TP415
TestPoint
D418
1N4148W
TP416
TestPoint
+36V
D419
1N4148W
D420
1N4148W
35YXJ470M10X16
U403
L7812
D421
DFLZ36-7
C426
470u
C427
330n
R415
0
+12V
C428
100n
C429
47u
EDH476M063S9MAA
I = Internal
E = External
Sheet: /Input_&_Power/Supply_voltages/
File: Supply_voltages.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 3/22


I_DC_Ripple_CH1
TP501
TestPoint
R501
0
FMP100JR-52-1K5
R502
1k5
R503
1k5
D501
1N4148W
TP502
TestPoint
C501
100n
C502
10u
D502
BZX384-A33-QX
63YXM10MEFR5X11
GND
+33V_Comp
U501A
LM2903BIDDFR
R505
100k
R506
100k
TP503
TestPoint
R509
510k
C504
220n
TestPoint
TP505
TestPoint
TP506
R511
10k
GND
Feedback_Status_Ccarge_CH1
A comparator to check the capacitor voltage and then turn on the ideal diode
Ideal diode with slow start up and reverse and overvoltage protection
SQP500JB-20R
R504
20
D503
1N5408
R507
20
Hot | Keep space
DC_Cout_CH1
R508
0
TP504
TestPoint
C503
100n
GND
R510
10k
Q501
DMTH6004SK3
Q502
DMTH6004SK3
TP507
TestPoint
J501
Conn_01x02_Female
U502
LM74502HDDFR
TP508
TestPoint
Creepage distance
keep VCAP away from the mosfet
D505
60V
C506
100n
C507
1u
C508
220n
TestPoint
TP511
CL31B105KCHNNNE
I_ID_Switch_CH1
VS
VCAP
EN_UVLO
NC
GATE
SRC
OV
GND
keep Gate and SRC traces short
TP509
TestPoint
R512
20k
R513
360k
C505
220n
TP510
TestPoint
D506
BZX384-A9V1-QX
R514
100k
D504
BZX38450-C6V8-QX
R515
220k
C509
1u
Q503
BSS63,215
Q504
BSS63,215
R516
510k
TP512
TestPoint
R518
100k
TP513
TestPoint
R517
330k
R519
510k
Q505
BSS63,215
R521
100k
TP514
TestPoint
Q506
PMBTA42,215
Q507
PMBTA42,215
C510
1u
R523
1Meg
R524
220k
R520
180k
OVP 48V
R522
5k1
TestPoint
TP515
Flipflop to keep the ideal diode turned on
+33V_Comp
U501C
LM2903BIDDFR
I = Internal
E = External
Sheet: /Input_&_Power/Input_control_CH1/
File: input_control_CH1.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 4/22



I = Internal
E = External

Sheet: /Input_&_Power/Input_control_CH2/		
File: input_controlCH2.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 5/22

DAC

File: Analog_switcher.kicad_sch

Diff_to_single_ended

File: Diff_to_single_ended.kicad_sch

Voltage_regulator_CH1

File: Voltage_regulator.kicad_sch

Voltage_Regulator_CH2

File: Voltage_Regulator_CH2_sch.kicad_sch

Sense

File: Sense.kicad_sch

ADC

File: ADC.kicad_sch

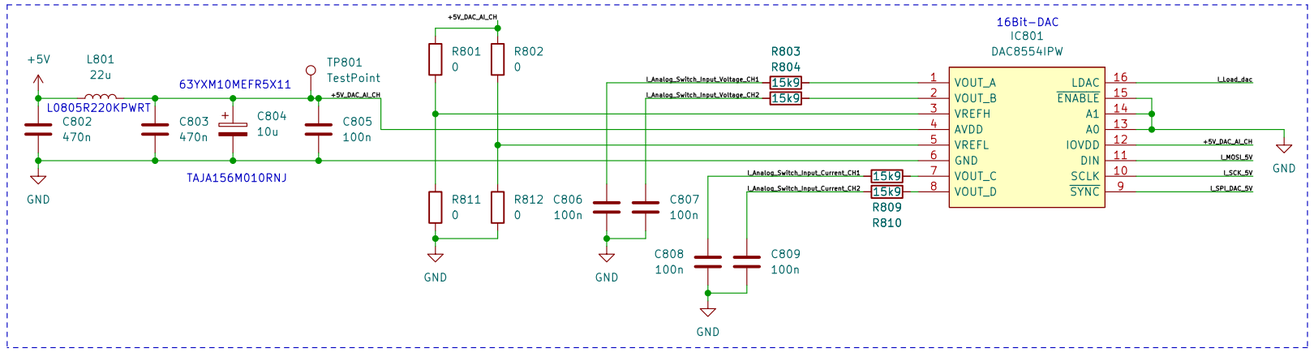
Temp_Fan

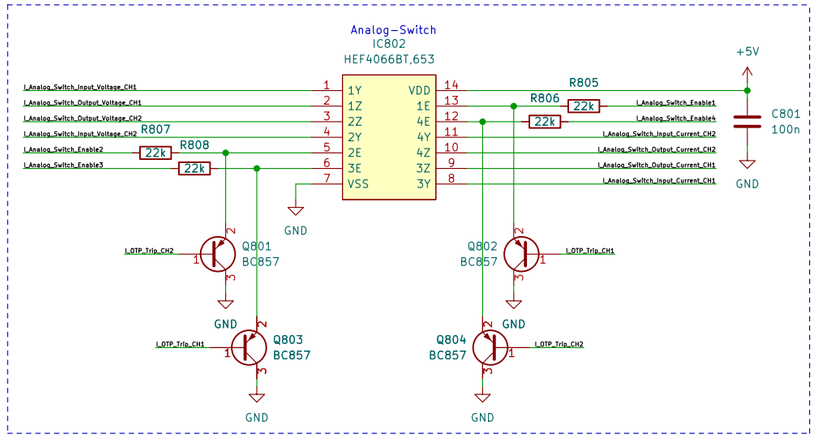
File: Temp_Fan.kicad_sch

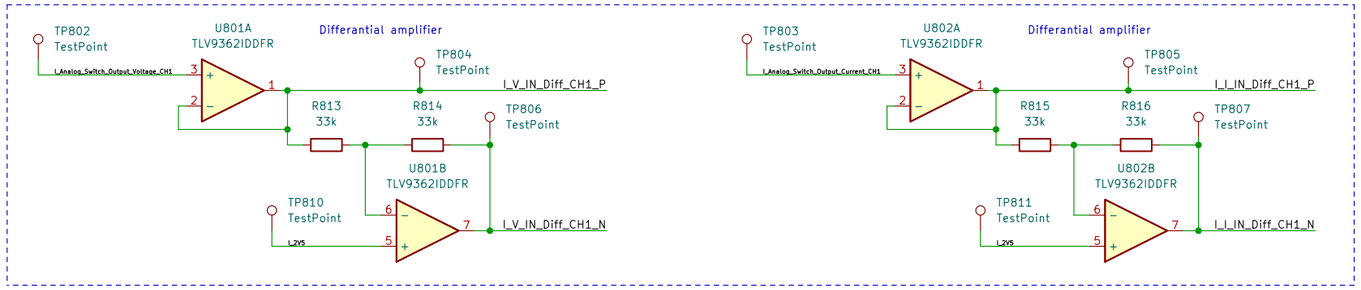
Sheet: /Voltage_Converter/
File: Voltage_Converter.kicad_sch

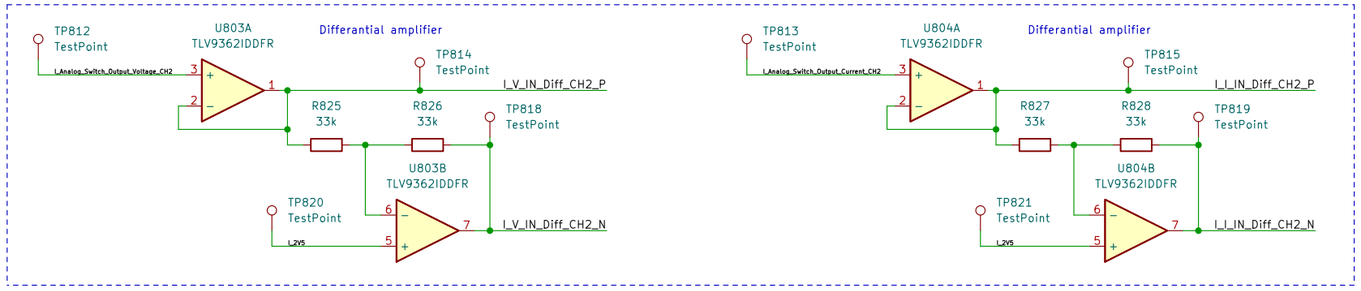
Title:

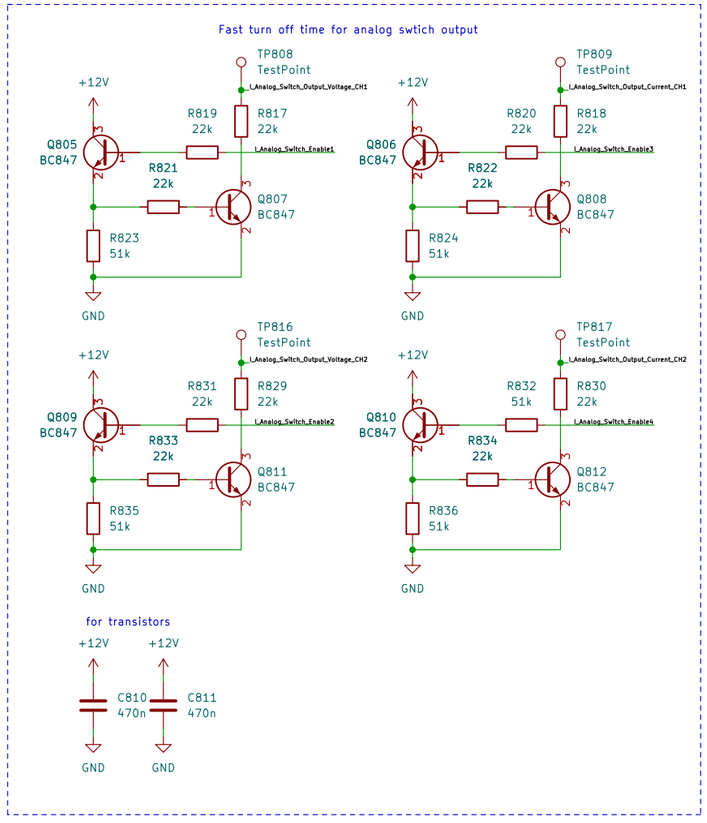
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 6/22

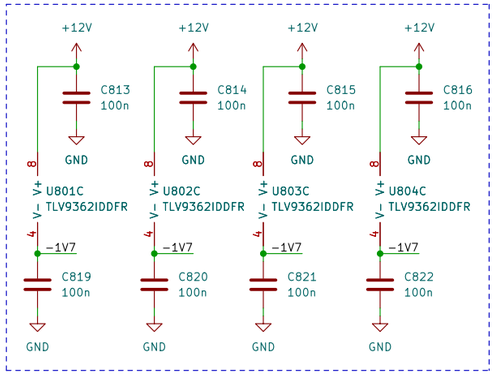


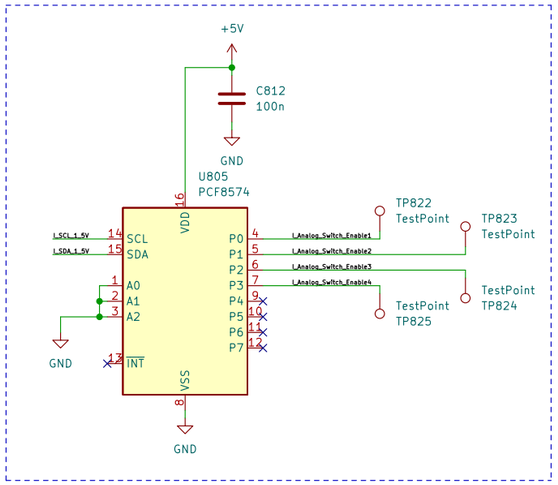


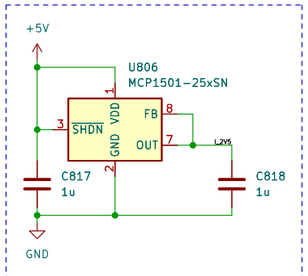






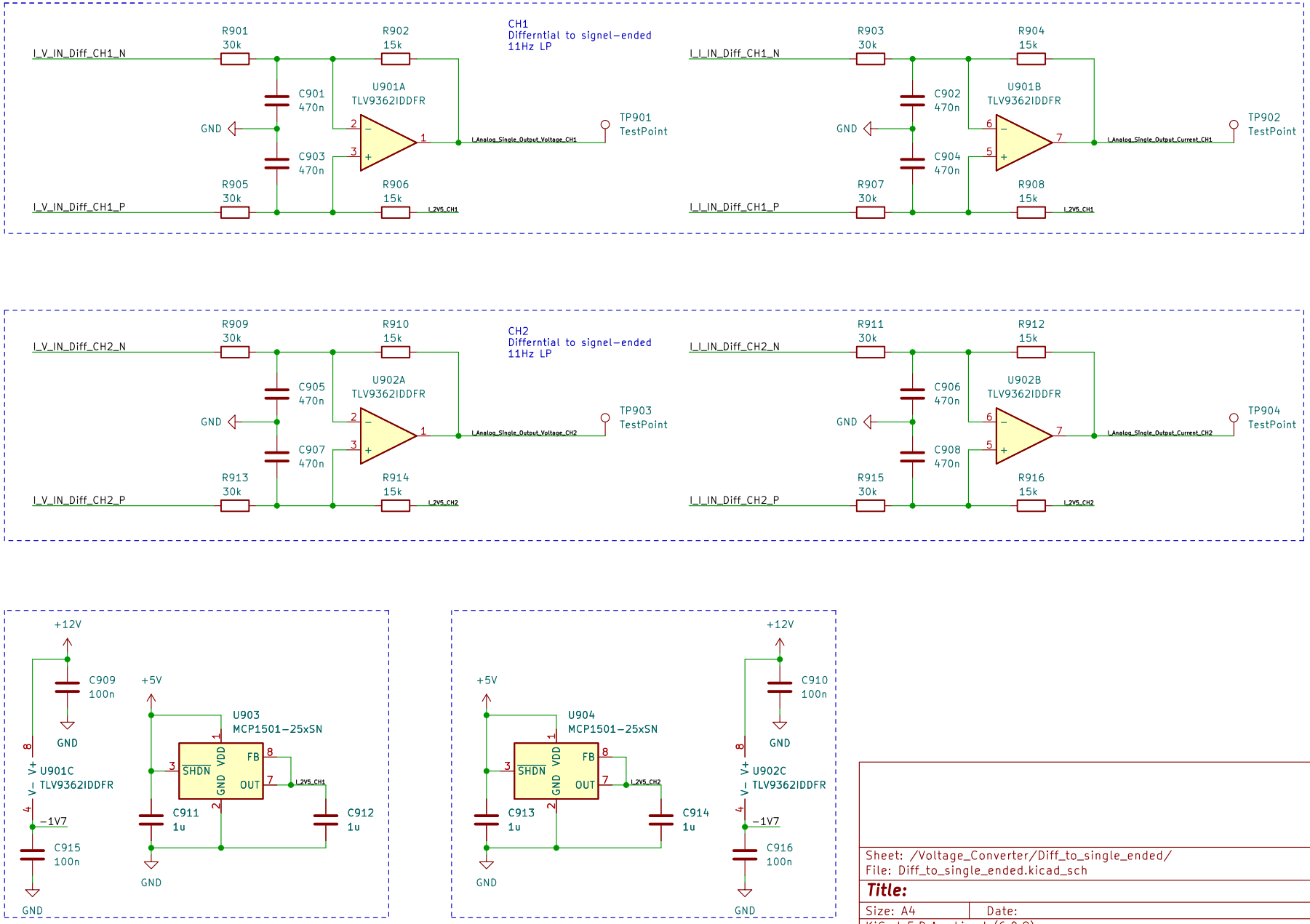






I = Internal
E = External

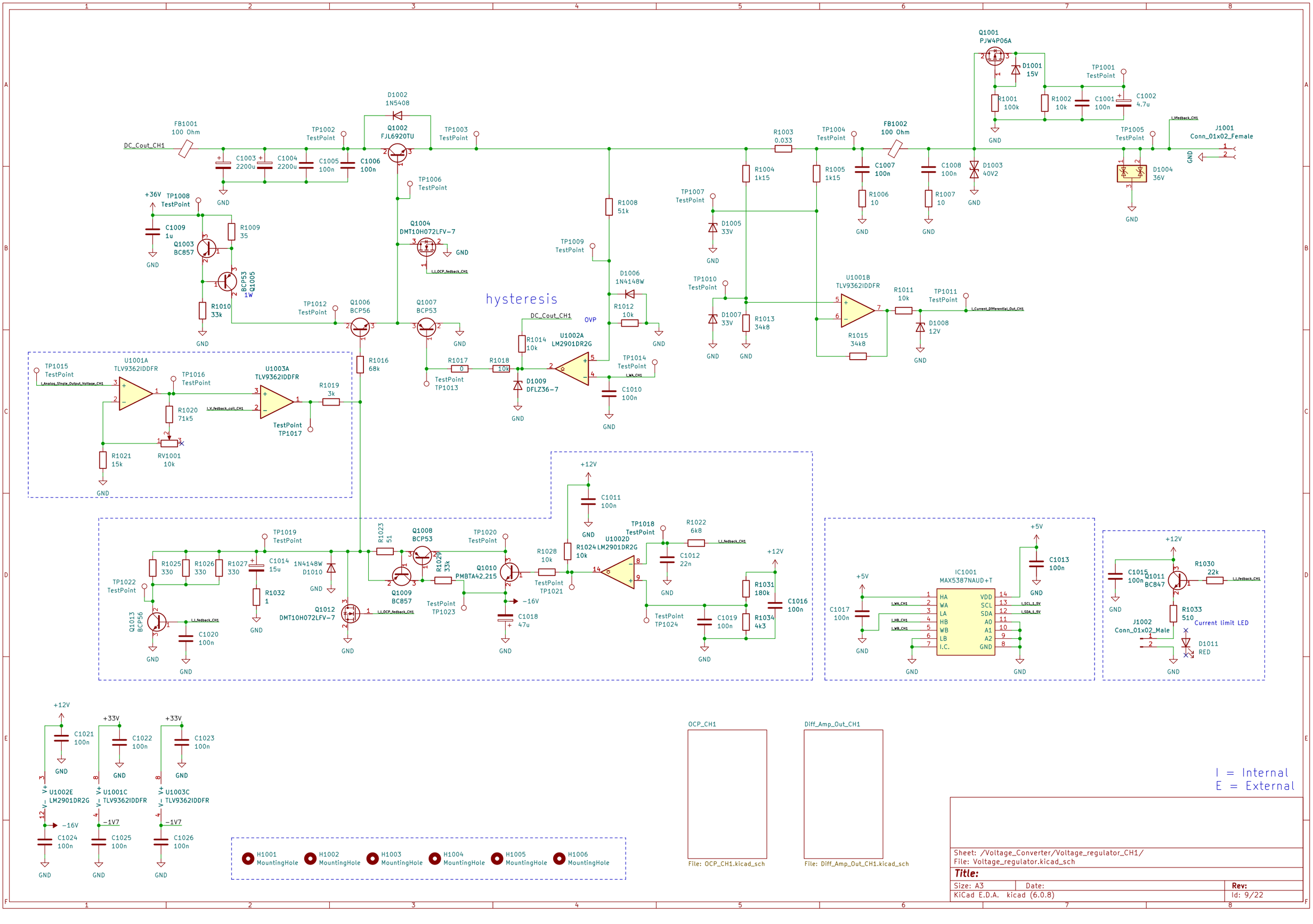
Sheet: /Voltage_Converter/DAC/		
File: Analog_switcher.kicad_sch		
Title:		
Size: A3	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 7/22

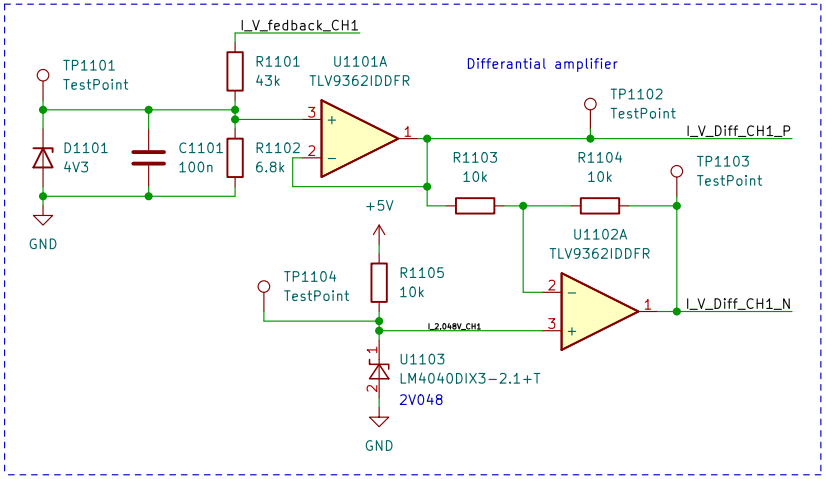


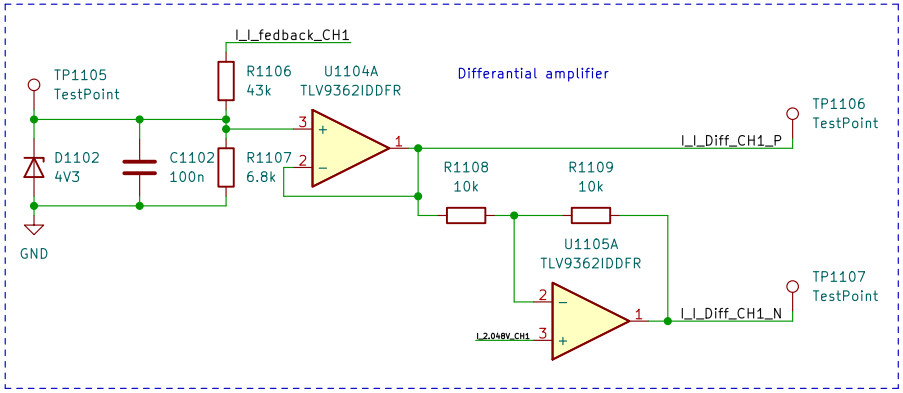
Sheet: /Voltage_Converter/Diff_to_single_ended/
File: Diff_to_single_ended.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 8/22


DC_Cout_CH1
FB1001
100 Ohm
C1003
2200u
C1004
2200u
C1005
100n
C1006
100n
TP1002
TestPoint
D1002
1N5408
Q1002
FJL6920TU
TP1003
TestPoint
TP1006
TestPoint
GND
+36V
TP1008
TestPoint
C1009
1u
Q1003
BC857
R1009
35
BCP53
1W
Q1005
R1010
33k
Q1004
DMT10H072LFV-7
I_OCP_fedback_CH1
TP1012
TestPoint
Q1006
BCP56
Q1007
BCP53
R1016
68k
R1017
0
TestPoint
TP1013
R1018
10k
TP1009
TestPoint
R1008
51k
D1006
1N4148W
R1012
10k
OVP
hysteresis
DC_Cout_CH1
R1014
10k
U1002A
LM2901DR2G
D1009
DFLZ36-7
TP1014
TestPoint
I_WA_CH1
C1010
100n
R1003
0.033
TP1004
TestPoint
R1004
1k15
R1005
1k15
FB1002
100 Ohm
C1007
100n
R1006
10
C1008
100n
R1007
10
D1003
40V2
Q1001
PJW4P06A
D1001
15V
R1001
100k
R1002
10k
C1001
100n
C1002
4.7u
TP1001
TestPoint
TP1005
TestPoint
D1004
36V
I_Vfedback_CH1
J1001
Conn_01x02_Female
TP1007
TestPoint
D1005
33V
TP1010
TestPoint
D1007
33V
R1013
34k8
U1001B
TLV9362IDDFR
R1015
34k8
R1011
10k
TP1011
TestPoint
I_Current_Differential_Out_CH1
D1008
12V
TP1015
TestPoint
I_Analog_Single_Output_Voltage_CH1
U1001A
TLV9362IDDFR
TP1016
TestPoint
R1020
71k5
U1003A
TLV9362IDDFR
I_V_fedback_coil_CH1
R1019
3k
TestPoint
TP1017
R1021
15k
RV1001
10k
+12V
C1011
100n
TP1019
TestPoint
R1025
330
R1026
330
R1027
330
C1014
15u
R1032
1
TP1022
TestPoint
Q1013
BCP56
I_I_fedback_CH1
C1020
100n
1N4148W
D1010
Q1012
DMT10H072LFV-7
I_I_OCP_fedback_CH1
R1023
51
Q1008
BCP53
Q1009
BC857
R1029
33k
TestPoint
TP1023
TP1020
TestPoint
Q1010
PMBTA42,215
−16V
C1018
47u
R1028
10k
R1024
10k
TestPoint
TP1021
U1002D
LM2901DR2G
TP1018
TestPoint
R1022
6k8
C1012
22n
TestPoint
TP1024
C1019
100n
R1031
180k
R1034
4k3
C1016
100n
+5V
C1017
100n
IC1001
MAX5387NAUD+T
HA
WA
LA
HB
WB
LB
I.C.
VDD
SCL
SDA
A0
A1
A2
GND
I_WA_CH1
I_HB_CH1
I_WB_CH1
I_SCL_1.5V
I_SDA_1.5V
C1013
100n
C1015
100n
Q1011
BC847
R1030
22k
I_I_fedback_CH1
R1033
510
Current limit LED
J1002
Conn_01x02_Male
D1011
RED
+33V
C1021
100n
C1022
100n
C1023
100n
U1002E
LM2901DR2G
U1001C
TLV9362IDDFR
U1003C
TLV9362IDDFR
−1V7
C1024
100n
C1025
100n
C1026
100n
H1001
MountingHole
H1002
MountingHole
H1003
MountingHole
H1004
MountingHole
H1005
MountingHole
H1006
MountingHole
OCP_CH1
File: OCP_CH1.kicad_sch
Diff_Amp_Out_CH1
File: Diff_Amp_Out_CH1.kicad_sch
I = Internal
E = External
Sheet: /Voltage_Converter/Voltage_regulator_CH1/
File: Voltage_regulator.kicad_sch
Title:
Size: A3
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 9/22

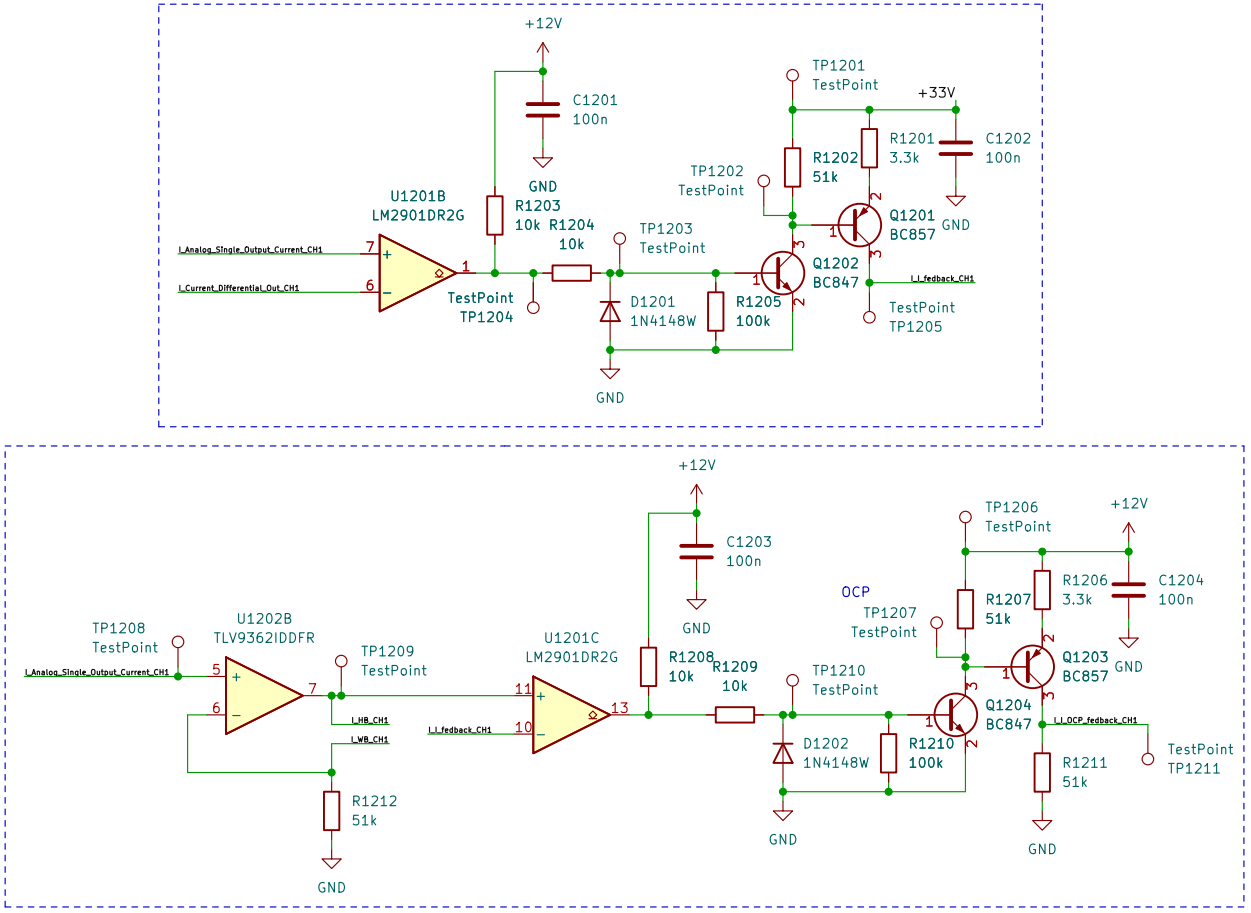




Sheet: /Voltage_Converter/Voltage_regulator_CH1/OCP_CH1/
File: OCP_CH1.kicad_sch

Title:

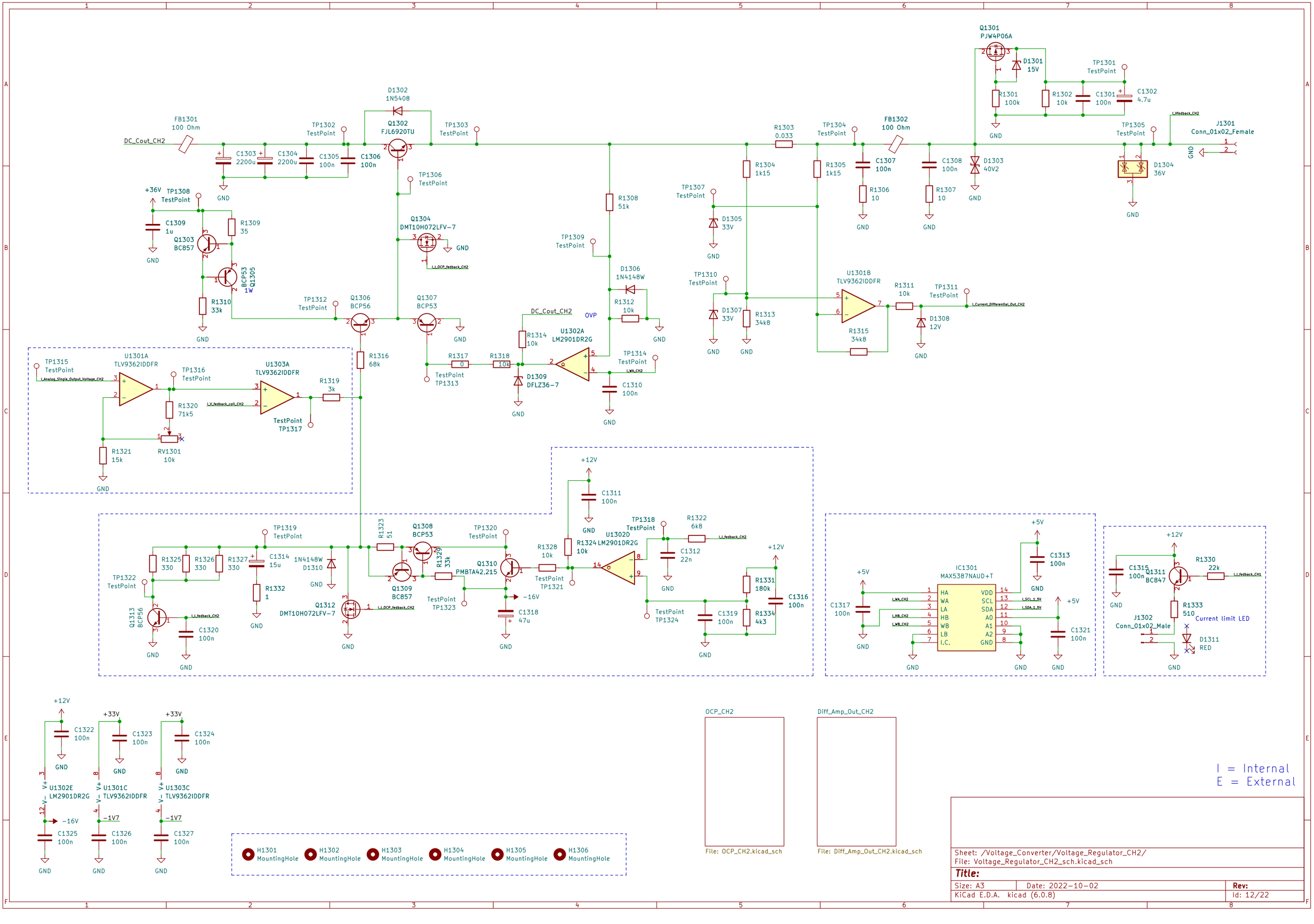
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 10/22

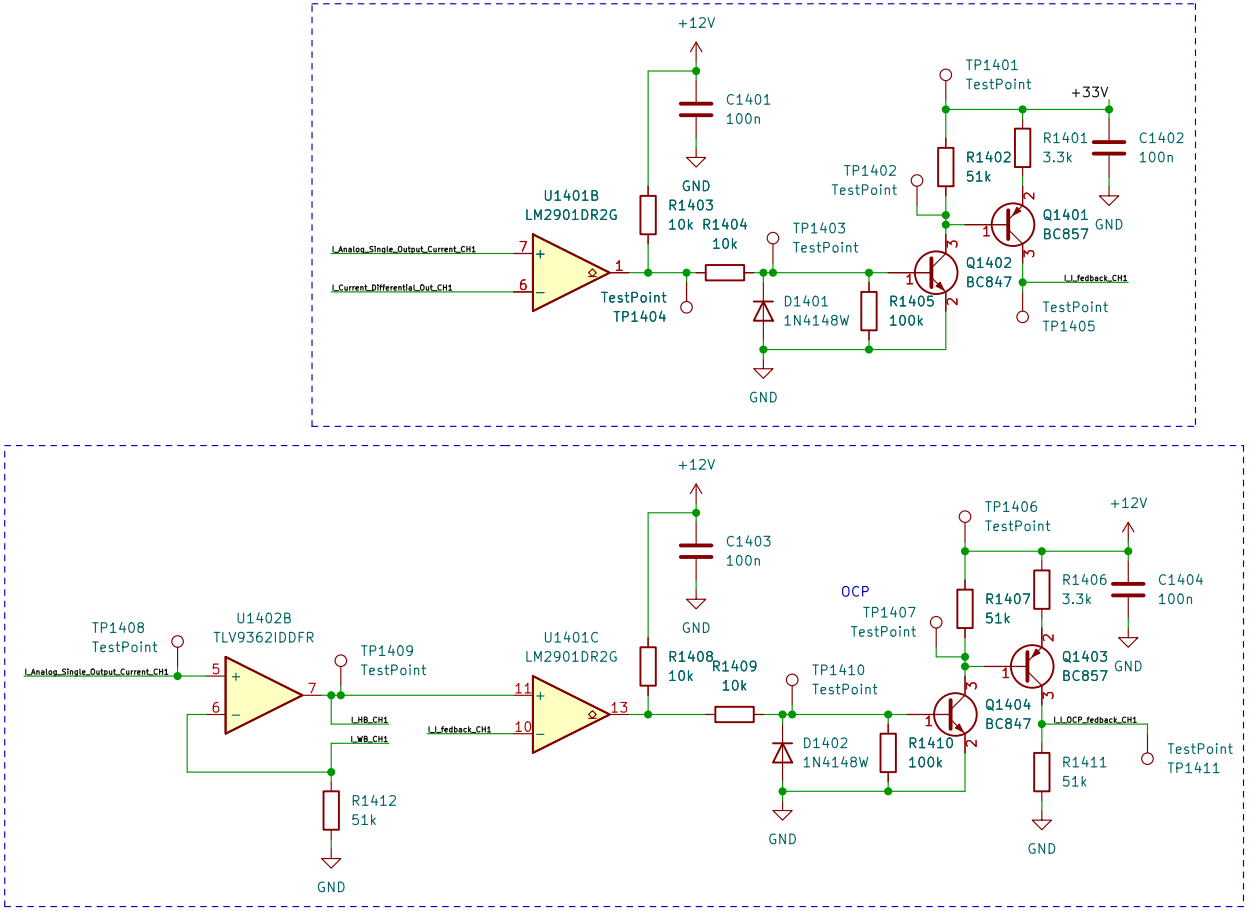


Sheet: /Voltage_Converter/Voltage_regulator_CH1/Diff_Amp_Out_CH1/
File: Diff_Amp_Out_CH1.kicad_sch

Title:

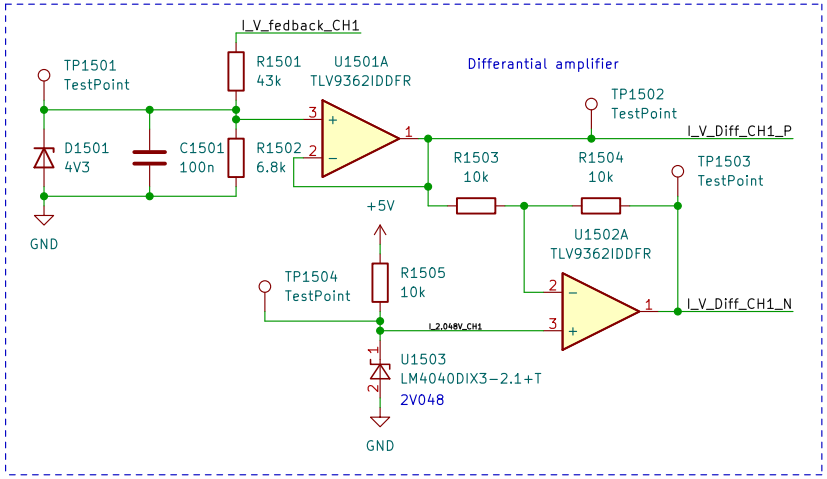
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 11/22

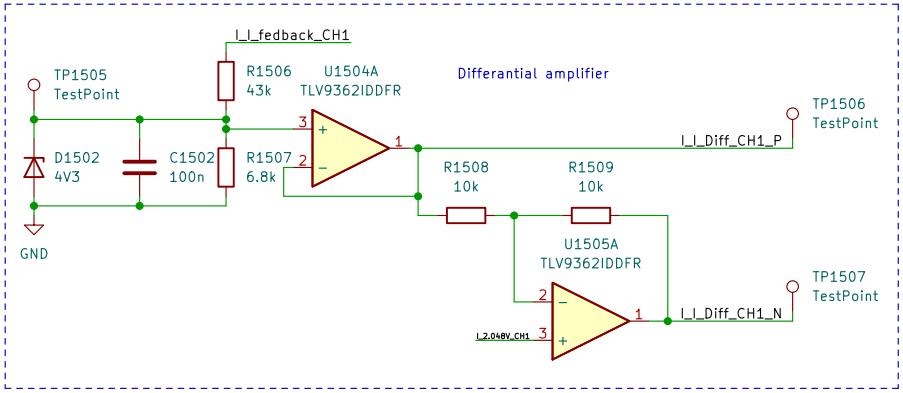

DC_Cout_CH2
FB1301
100 Ohm
C1303
2200u
C1304
2200u
C1305
100n
C1306
100n
TP1302
TestPoint
D1302
1N5408
Q1302
FJL6920TU
TP1303
TestPoint
GND
TP1306
TestPoint
+36V
TP1308
TestPoint
C1309
1u
Q1303
BC857
R1309
35
BCP53
Q1305
1W
R1310
33k
Q1304
DMT10H072LFV-7
I_I_OCP_fedback_CH2
TP1312
TestPoint
Q1306
BCP56
Q1307
BCP53
R1316
68k
R1317
0
TestPoint
TP1313
R1318
10k
R1308
51k
TP1309
TestPoint
D1306
1N4148W
R1312
10k
OVP
DC_Cout_CH2
R1314
10k
U1302A
LM2901DR2G
D1309
DFLZ36-7
TP1314
TestPoint
I_WA_CH2
C1310
100n
R1303
0.033
TP1304
TestPoint
FB1302
100 Ohm
R1304
1k15
R1305
1k15
C1307
100n
R1306
10
C1308
100n
R1307
10
D1303
40V2
TP1307
TestPoint
D1305
33V
TP1310
TestPoint
D1307
33V
R1313
34k8
U1301B
TLV9362IDDFR
R1315
34k8
R1311
10k
TP1311
TestPoint
I_Current_Differential_Out_CH2
D1308
12V
Q1301
PJW4P06A
D1301
15V
R1301
100k
R1302
10k
C1301
100n
C1302
4.7u
TP1301
TestPoint
TP1305
TestPoint
D1304
36V
I_Vfedback_CH2
J1301
Conn_01x02_Female
U1301A
TLV9362IDDFR
TP1315
TestPoint
I_Analog_Single_Output_Voltage_CH2
TP1316
TestPoint
R1320
71k5
U1303A
TLV9362IDDFR
I_V_fedback_coil_CH2
R1319
3k
TestPoint
TP1317
R1321
15k
RV1301
10k
+12V
C1311
100n
TP1319
TestPoint
R1325
330
R1326
330
R1327
330
C1314
15u
R1332
1
TP1322
TestPoint
Q1313
BCP56
I_I_fedback_CH2
C1320
100n
1N4148W
D1310
Q1312
DMT10H072LFV-7
I_I_OCP_fedback_CH2
R1323
51
Q1308
BCP53
Q1309
BC857
R1329
33k
TP1320
TestPoint
TestPoint
TP1323
Q1310
PMBTA42,215
-16V
C1318
47u
R1328
10k
R1324
10k
TestPoint
TP1321
U1302D
LM2901DR2G
TP1318
TestPoint
R1322
6k8
I_I_fedback_CH2
C1312
22n
TestPoint
TP1324
C1319
100n
+12V
R1331
180k
R1334
4k3
C1316
100n
+5V
C1313
100n
C1317
100n
IC1301
MAX5387NAUD+T
I_WA_CH2
I_HB_CH2
I_WB_CH2
I_SCL_1.5V
I_SDA_1.5V
C1321
100n
+12V
C1315
100n
Q1311
BC847
R1330
22k
I_I_fedback_CH1
R1333
510
Current limit LED
J1302
Conn_01x02_Male
D1311
RED
+12V
+33V
+33V
C1322
100n
C1323
100n
C1324
100n
U1302E
LM2901DR2G
U1301C
TLV9362IDDFR
U1303C
TLV9362IDDFR
-16V
-1V7
-1V7
C1325
100n
C1326
100n
C1327
100n
H1301
MountingHole
H1302
MountingHole
H1303
MountingHole
H1304
MountingHole
H1305
MountingHole
H1306
MountingHole
OCP_CH2
File: OCP_CH2.kicad_sch
Diff_Amp_Out_CH2
File: Diff_Amp_Out_CH2.kicad_sch
I = Internal
E = External
Sheet: /Voltage_Converter/Voltage_Regulator_CH2/
File: Voltage_Regulator_CH2_sch.kicad_sch
Title:
Size: A3
Date: 2022-10-02
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 12/22



Sheet: /Voltage_Converter/Voltage_Regulator_CH2/OCP_CH2/	
File: OCP_CH2.kicad_sch	
Title:	
Size: A4	Date:
KiCad E.D.A. kicad (6.0.8)	Id: 13/22

Rev:





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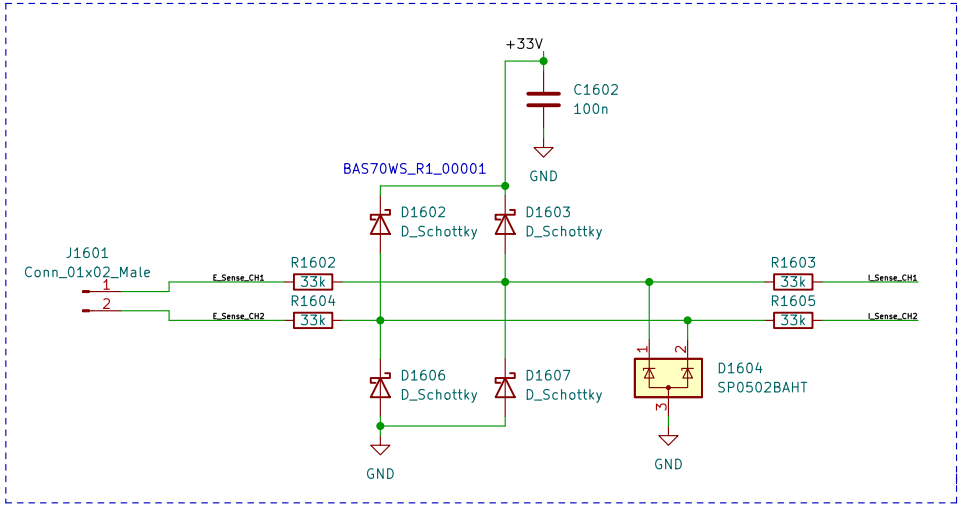
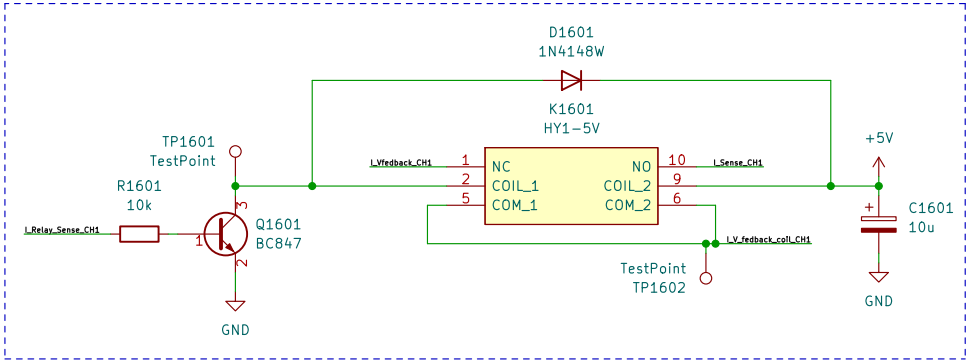
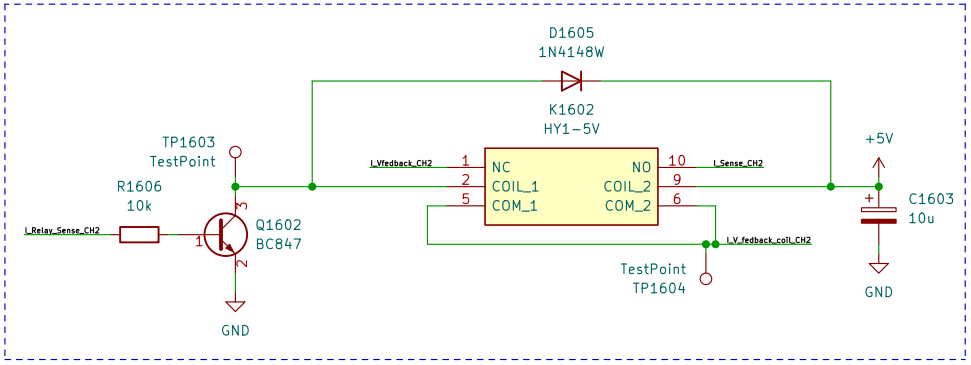
File: Diff_Amp_Out_CH2.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 14/22





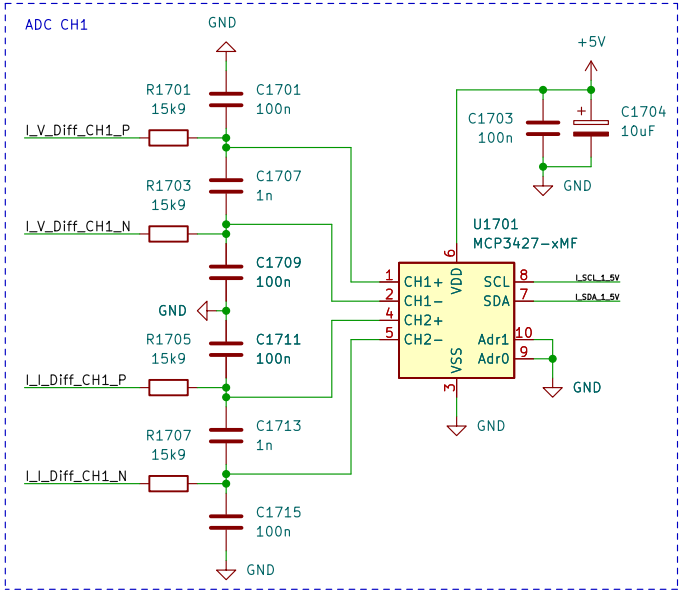


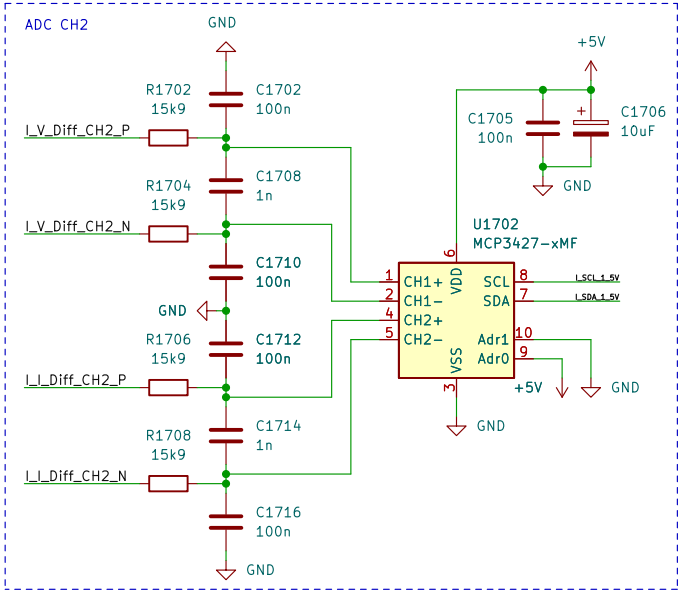
I = Internal
E = External

Sheet: /Voltage_Converter/Sense/
File: Sense.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 15/22



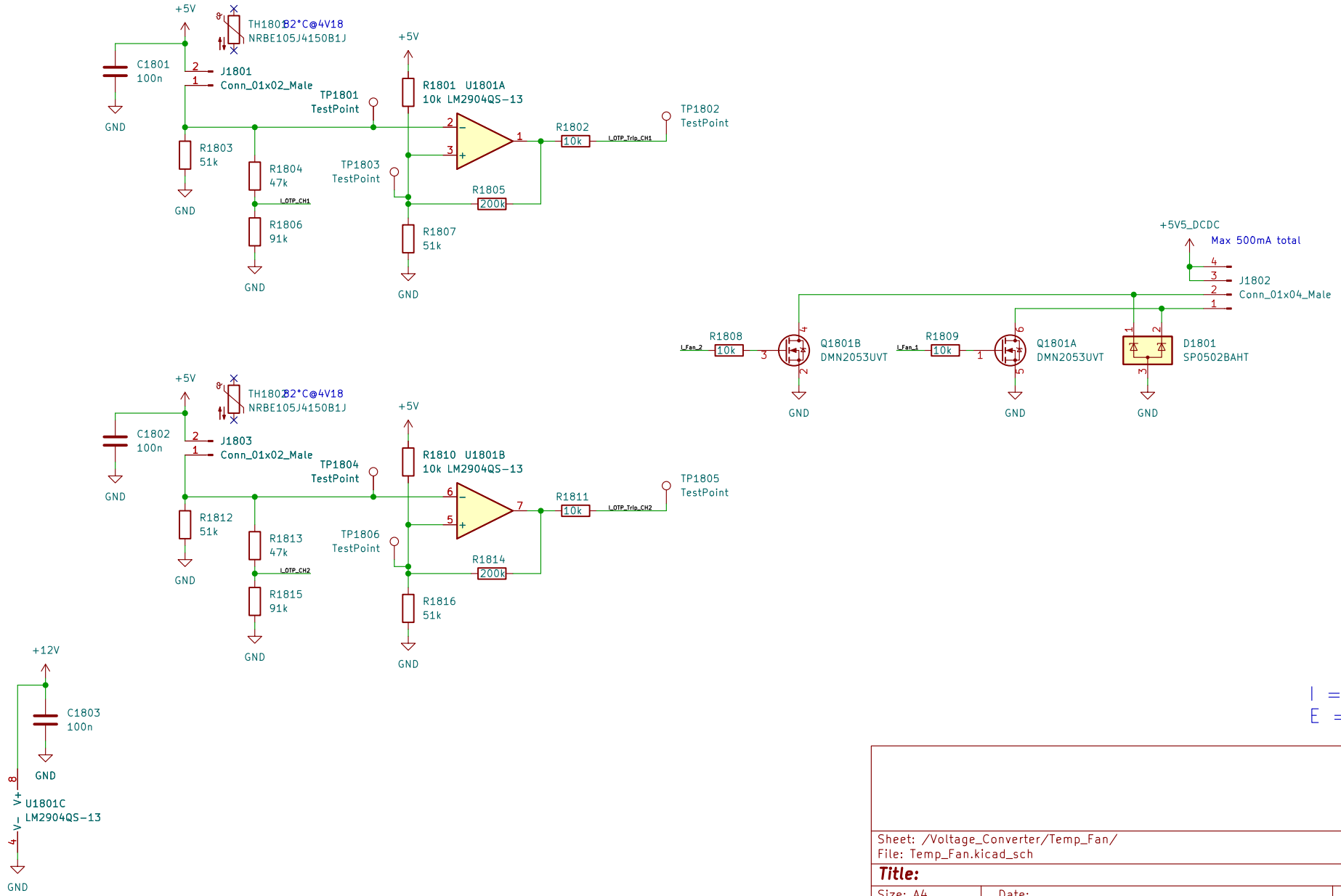


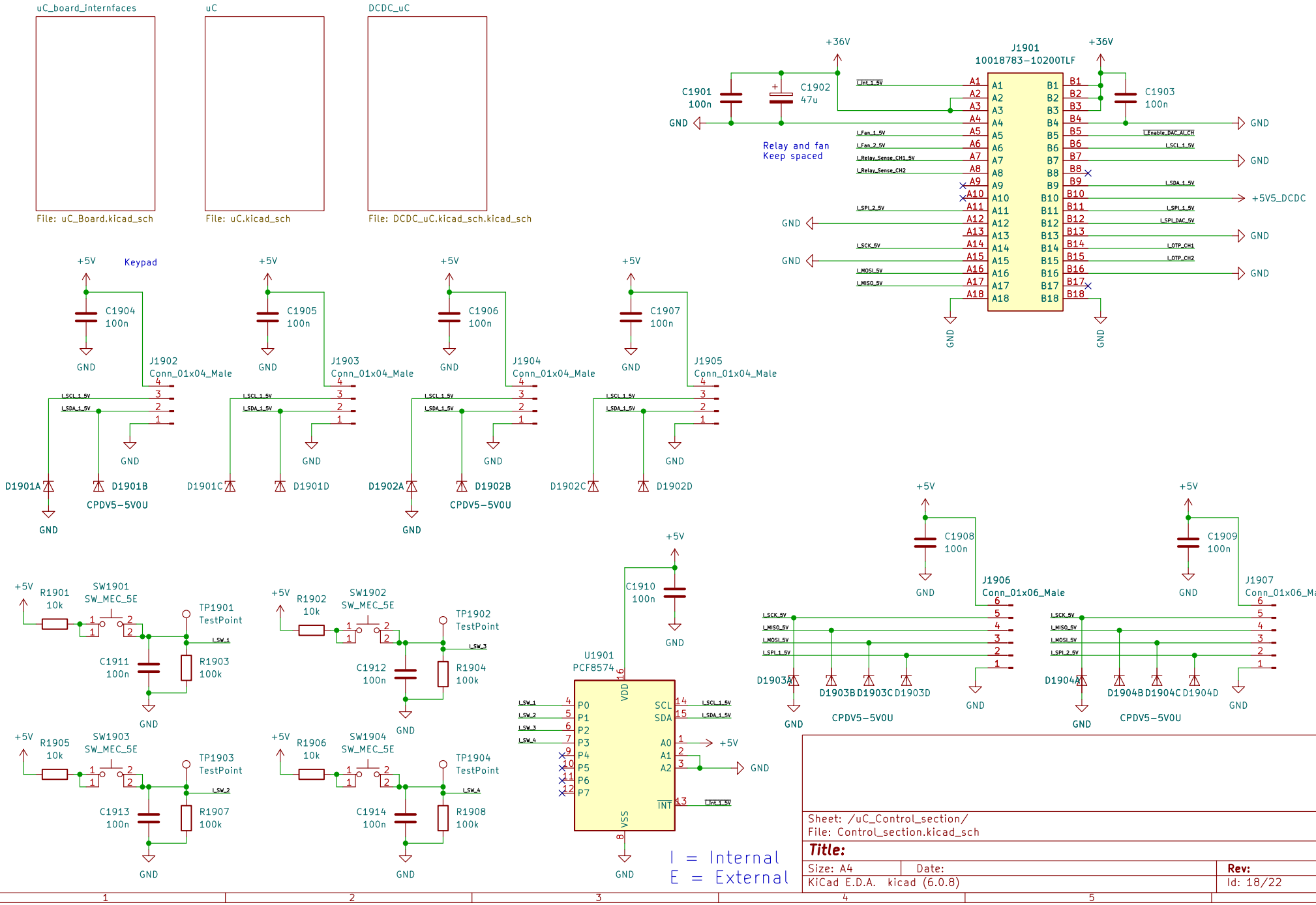
I = Internal
E = External

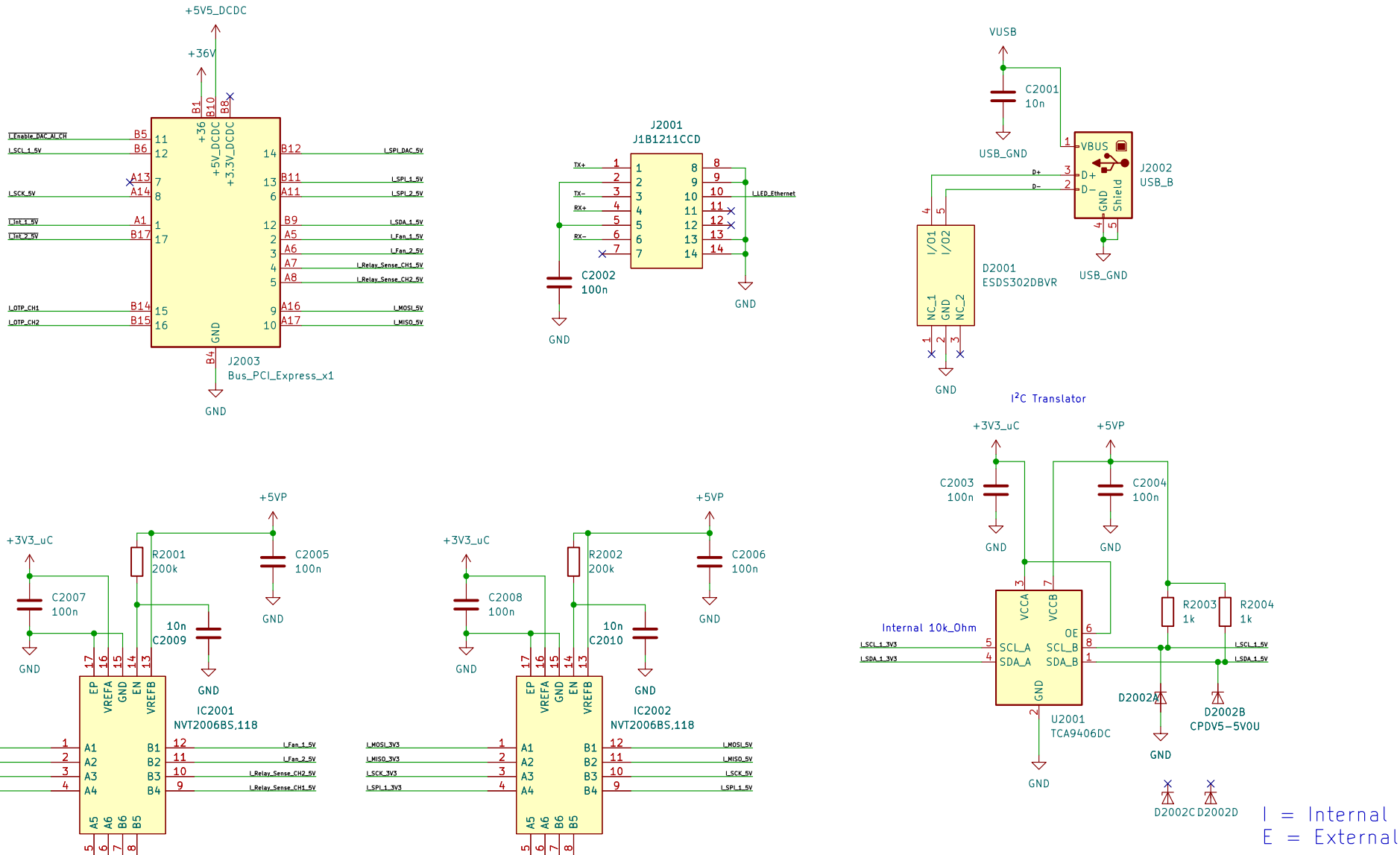
Sheet: /Voltage_Converter/ADC/
File: ADC.kicad_sch

Title:

Size: A4 | Date: | **Rev:**
KiCad E.D.A. kicad (6.0.8) | Id: 16/22


+5V
TH1801 82°C@4V18
NRBE105J4150B1J
C1801
100n
J1801
Conn_01x02_Male
TP1801
TestPoint
R1801 U1801A
10k LM2904QS-13
TP1802
TestPoint
R1802
10k
I_OTP_Trip_CH1
R1803
51k
R1804
47k
I_OTP_CH1
TP1803
TestPoint
R1805
200k
R1806
91k
R1807
51k
GND
+5V5_DCDC
Max 500mA total
J1802
Conn_01x04_Male
R1808
10k
I_Fan_2
Q1801B
DMN2053UVT
R1809
10k
I_Fan_1
Q1801A
DMN2053UVT
D1801
SP0502BAHT
TH1802 82°C@4V18
NRBE105J4150B1J
C1802
100n
J1803
Conn_01x02_Male
TP1804
TestPoint
R1810 U1801B
10k LM2904QS-13
TP1805
TestPoint
R1811
10k
I_OTP_Trip_CH2
R1812
51k
R1813
47k
I_OTP_CH2
TP1806
TestPoint
R1814
200k
R1815
91k
R1816
51k
+12V
C1803
100n
U1801C
LM2904QS-13
V+
V-
I = Internal
E = External
Sheet: /Voltage_Converter/Temp_Fan/
File: Temp_Fan.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 17/22

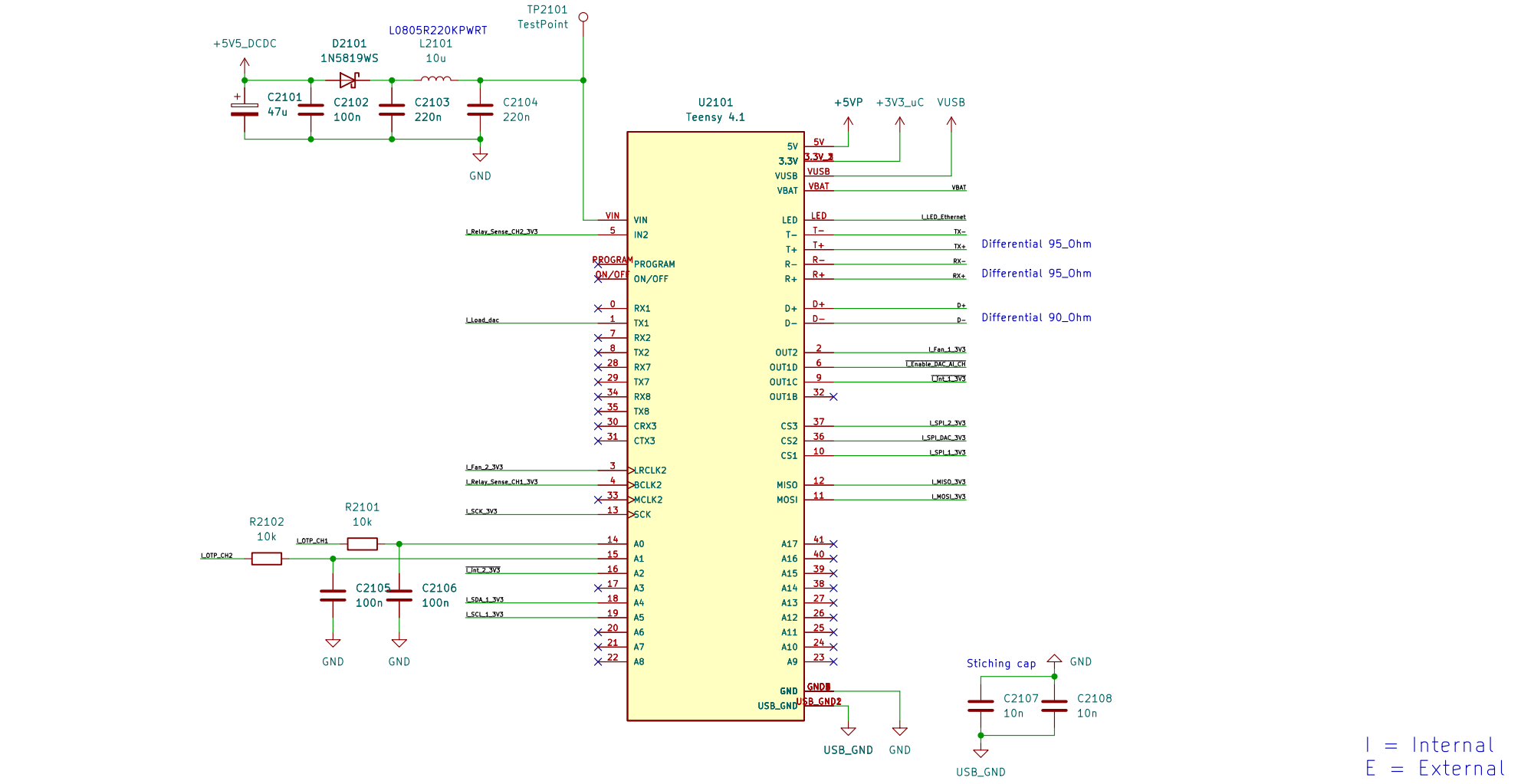

uC_board_internfaces
File: uC_Board.kicad_sch
uC
File: uC.kicad_sch
DCDC_uC
File: DCDC_uC.kicad_sch.kicad_sch
+36V
C1901
100n
GND
C1902
47u
Relay and fan
Keep spaced
J1901
10018783-10200TLF
C1903
100n
+5V5_DCDC
+5V
Keypad
C1904
100n
J1902
Conn_01x04_Male
C1905
100n
J1903
Conn_01x04_Male
C1906
100n
J1904
Conn_01x04_Male
C1907
100n
J1905
Conn_01x04_Male
D1901A
D1901B
CPDV5-5V0U
D1901C
D1901D
D1902A
D1902B
CPDV5-5V0U
D1902C
D1902D
R1901
10k
SW1901
SW_MEC_5E
TP1901
TestPoint
C1911
100n
R1903
100k
R1902
10k
SW1902
SW_MEC_5E
TP1902
TestPoint
C1912
100n
R1904
100k
R1905
10k
SW1903
SW_MEC_5E
TP1903
TestPoint
C1913
100n
R1907
100k
R1906
10k
SW1904
SW_MEC_5E
TP1904
TestPoint
C1914
100n
R1908
100k
C1910
100n
U1901
PCF8574
I = Internal
E = External
C1908
100n
J1906
Conn_01x06_Male
D1903A
D1903B
D1903C
D1903D
CPDV5-5V0U
C1909
100n
J1907
Conn_01x06_Male
D1904A
D1904B
D1904C
D1904D
CPDV5-5V0U
Sheet: /uC_Control_section/
File: Control_section.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 18/22

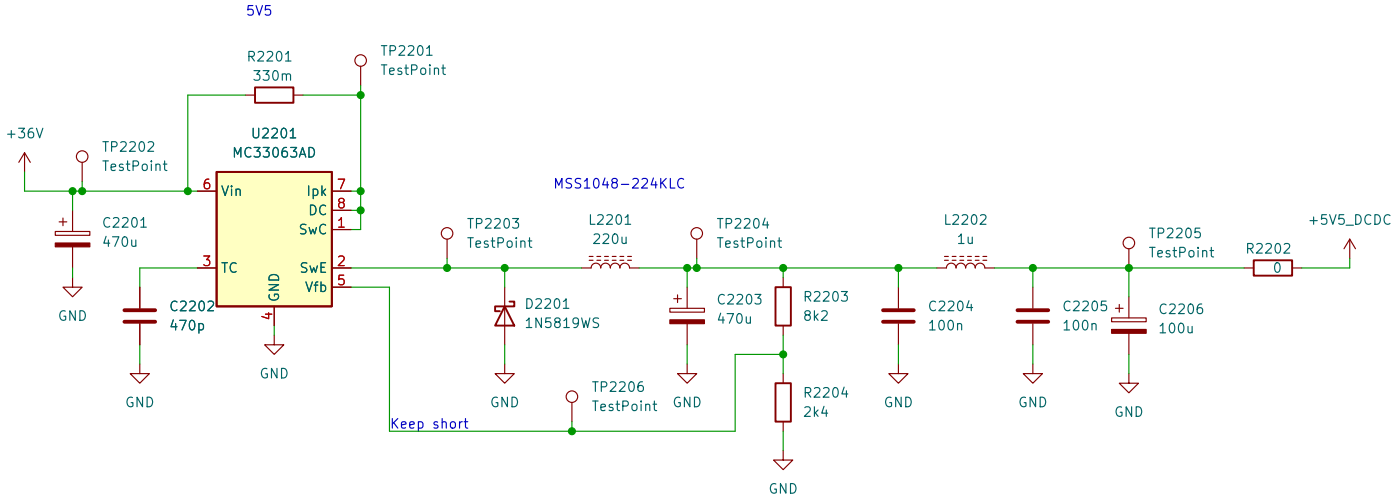


Sheet: /uC_Control_section/uC_board_internfaces/
File: uC_Board.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.8)		Id: 19/22


TP2101
TestPoint
L0805R220KPWRT
+5V5_DCDC
D2101
1N5819WS
L2101
10u
C2101
47u
C2102
100n
C2103
220n
C2104
220n
GND
U2101
Teensy 4.1
+5VP
+3V3_uC
VUSB
5V
3.3V
VUSB
VBAT
VIN
IN2
PROGRAM
ON/OFF
RX1
TX1
RX2
TX2
RX7
TX7
RX8
TX8
CRX3
CTX3
LRCLK2
BCLK2
MCLK2
SCK
A0
A1
A2
A3
A4
A5
A6
A7
A8
LED
T−
T+
R−
R+
D+
D−
OUT2
OUT1D
OUT1C
OUT1B
CS3
CS2
CS1
MISO
MOSI
A17
A16
A15
A14
A13
A12
A11
A10
A9
GND
USB_GND
I_Relay_Sense_CH2_3V3
I_Load_dac
I_Fan_2_3V3
I_Relay_Sense_CH1_3V3
I_SCK_3V3
I_OTP_CH1
I_OTP_CH2
I_Int_2_3V3
I_SDA_1_3V3
I_SCL_1_3V3
I_LED_Ethernet
TX−
TX+
RX−
RX+
D+
D−
I_Fan_1_3V3
I_Enable_DAC_AI_CH
I_Int_1_3V3
I_SPI_2_3V3
I_SPI_DAC_3V3
I_SPI_1_3V3
I_MISO_3V3
I_MOSI_3V3
Differential 95_Ohm
Differential 95_Ohm
Differential 90_Ohm
R2101
10k
R2102
10k
C2105
100n
C2106
100n
GND
GND
USB_GND
GND
Stiching cap
GND
C2107
10n
C2108
10n
USB_GND
I = Internal
E = External
U2102
Battery
VBAT
GND
Sheet: /uC_Control_section/uC/
File: uC.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (6.0.8)
Id: 20/22



I = Internal
E = External

Sheet: /uC_Control_section/DCDC_uC/
File: DCDC_uC.kicad_sch.kicad_sch

Title:

Size: A4 | Date: | **Rev:**
KiCad E.D.A. kicad (6.0.8) | Id: 21/22