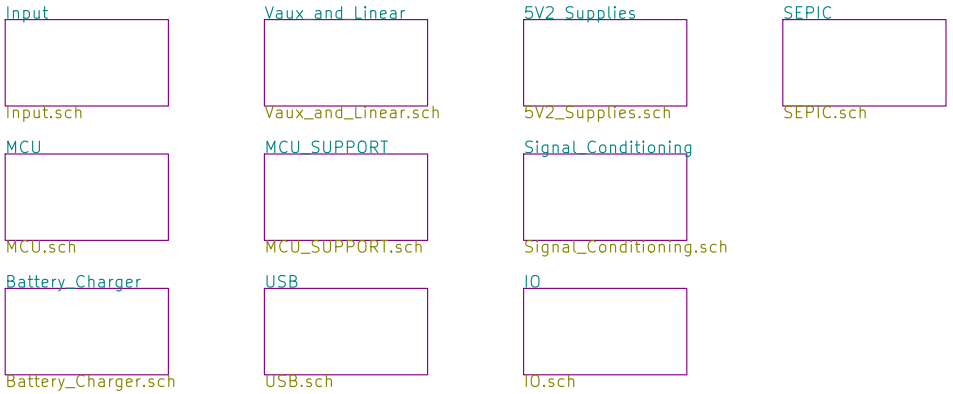
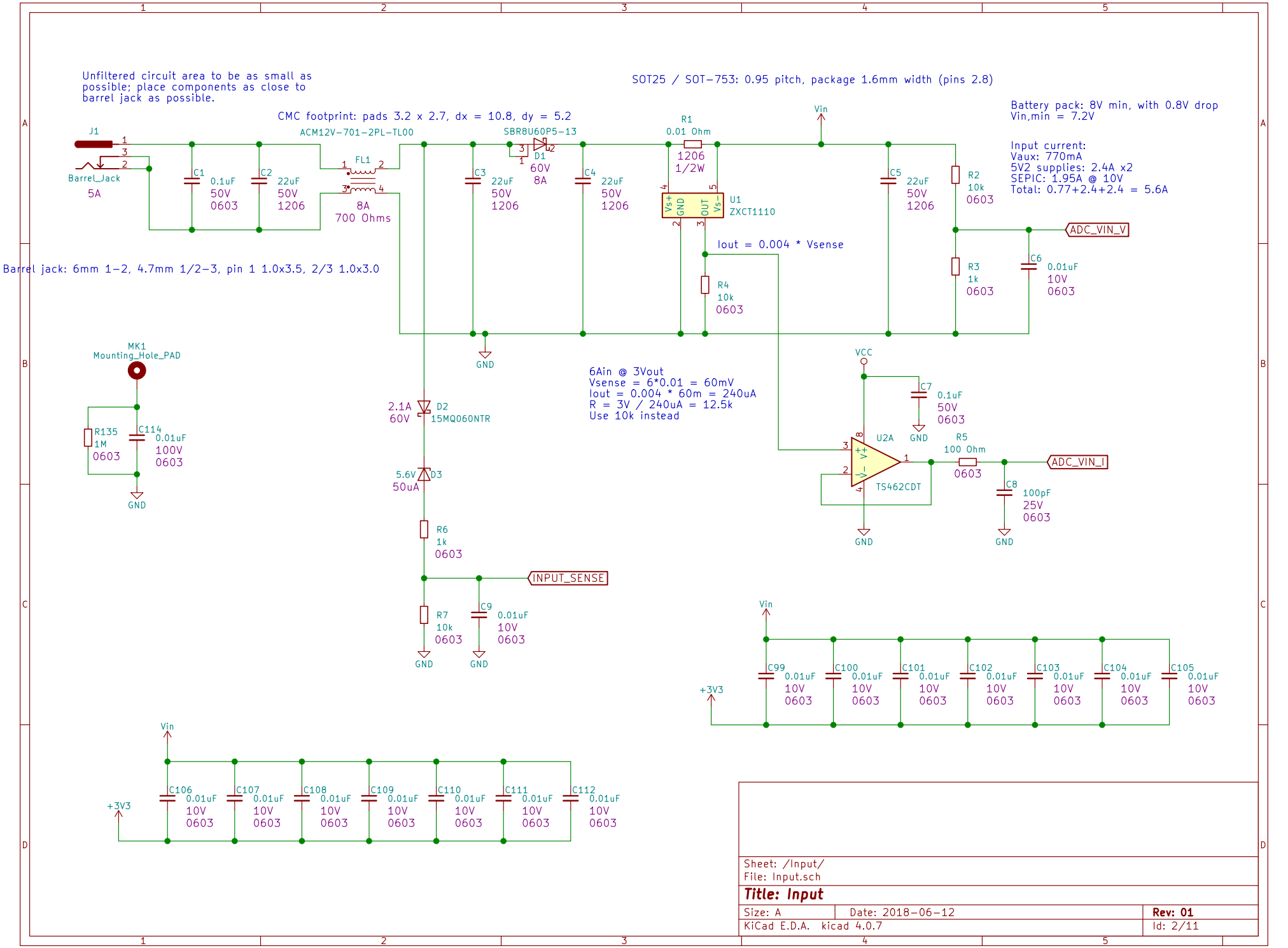
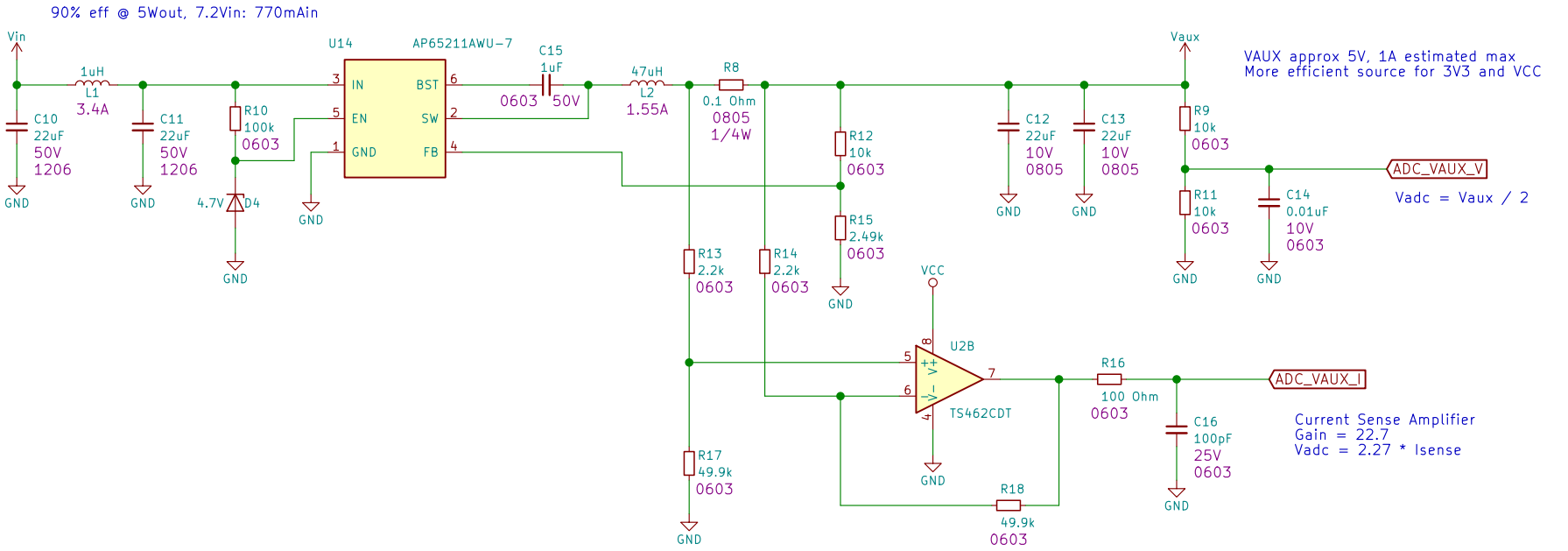


Sheet: /
File: NAS_Controller.sch

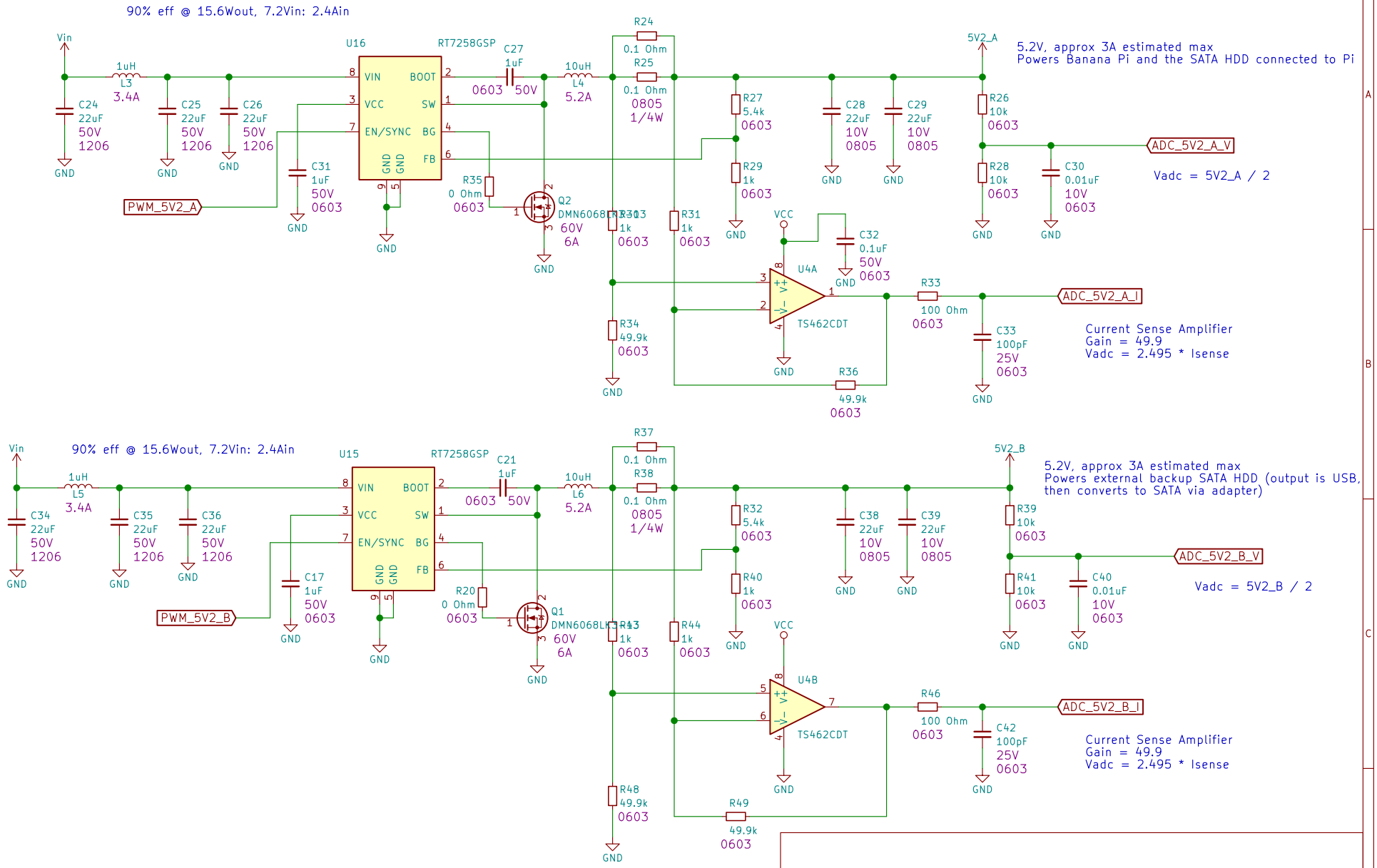
Title: NAS Controller

Size: A	Date: 2018-06-12	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 1/11

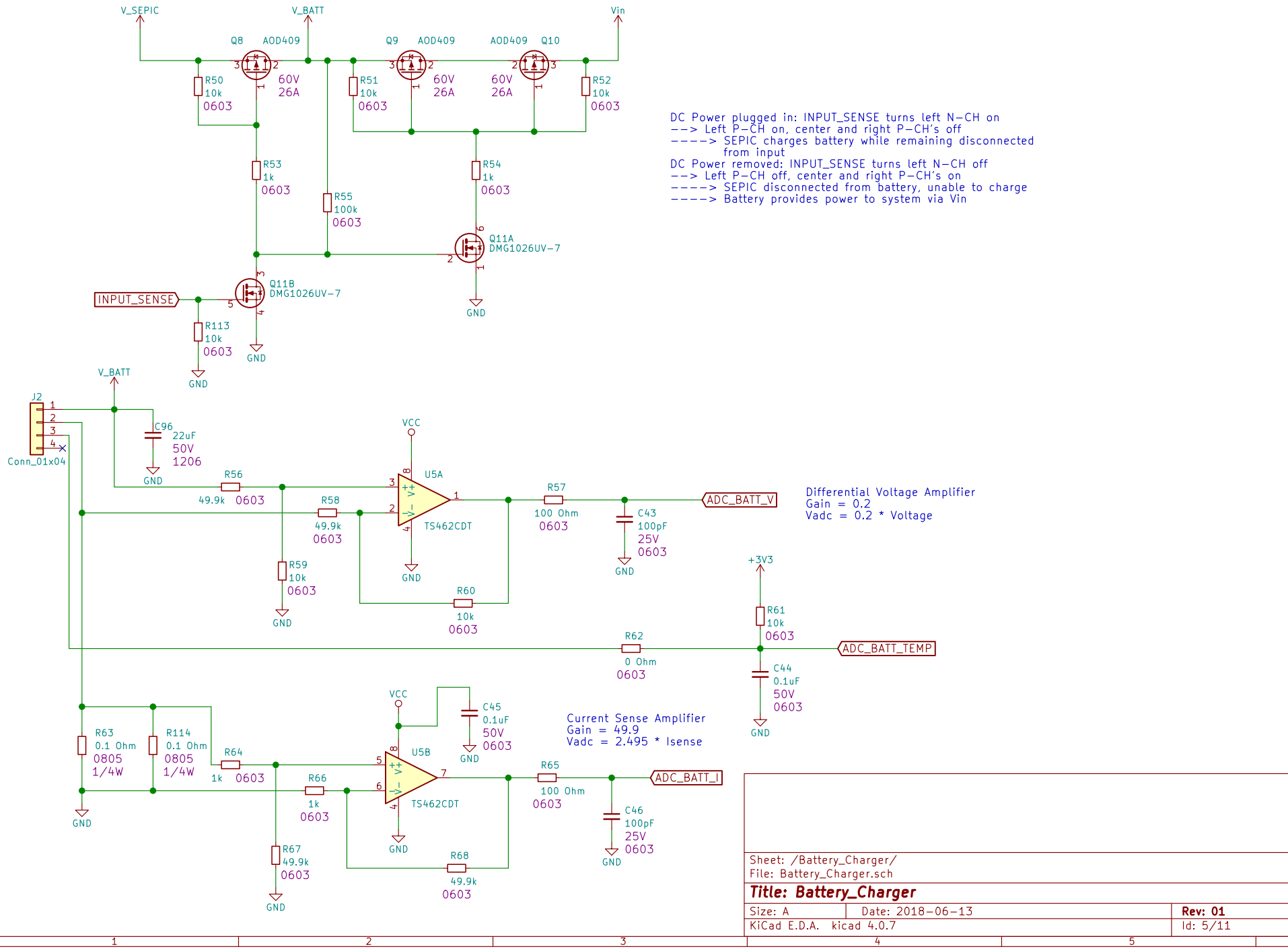

Unfiltered circuit area to be as small as possible; place components as close to barrel jack as possible.
CMC footprint: pads 3.2 x 2.7, dx = 10.8, dy = 5.2
SOT25 / SOT-753: 0.95 pitch, package 1.6mm width (pins 2.8)
Battery pack: 8V min, with 0.8V drop
Vin,min = 7.2V
Input current:
Vaux: 770mA
5V2 supplies: 2.4A x2
SEPIC: 1.95A @ 10V
Total: 0.77+2.4+2.4 = 5.6A
Barrel jack: 6mm 1-2, 4.7mm 1/2-3, pin 1 1.0x3.5, 2/3 1.0x3.0
J1
Barrel_Jack
5A
C1 0.1uF 50V 0603
C2 22uF 50V 1206
ACM12V-701-2PL-TL00
FL1
8A
700 Ohms
C3 22uF 50V 1206
SBR8U60P5-13
D1
60V
8A
C4 22uF 50V 1206
R1
0.01 Ohm
1206
1/2W
U1
ZXCT1110
Vs+
GND
OUT
Vs-
Vin
C5 22uF 50V 1206
R2 10k 0603
ADC_VIN_V
R3 1k 0603
C6 0.01uF 10V 0603
Iout = 0.004 * Vsense
R4 10k 0603
GND
MK1
Mounting_Hole_PAD
R135 1M 0603
C114 0.01uF 100V 0603
6Ain @ 3Vout
Vsense = 6*0.01 = 60mV
Iout = 0.004 * 60m = 240uA
R = 3V / 240uA = 12.5k
Use 10k instead
2.1A
60V
D2
15MQ060NTR
5.6V
50uA
D3
R6 1k 0603
INPUT_SENSE
R7 10k 0603
C9 0.01uF 10V 0603
VCC
C7 0.1uF 50V 0603
U2A
TS462CDT
R5 100 Ohm 0603
ADC_VIN_I
C8 100pF 25V 0603
C99 0.01uF 10V 0603
C100 0.01uF 10V 0603
C101 0.01uF 10V 0603
C102 0.01uF 10V 0603
C103 0.01uF 10V 0603
C104 0.01uF 10V 0603
C105 0.01uF 10V 0603
+3V3
C106 0.01uF 10V 0603
C107 0.01uF 10V 0603
C108 0.01uF 10V 0603
C109 0.01uF 10V 0603
C110 0.01uF 10V 0603
C111 0.01uF 10V 0603
C112 0.01uF 10V 0603
Sheet: /Input/
File: Input.sch
Title: Input
Size: A
Date: 2018-06-12
Rev: 01
KiCad E.D.A. kicad 4.0.7
Id: 2/11



Sheet: /Vaux_and_Linear/		
File: Vaux_and_Linear.sch		
Title: Vaux_and_Linear		
Size: A	Date: 2018-06-12	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 3/11



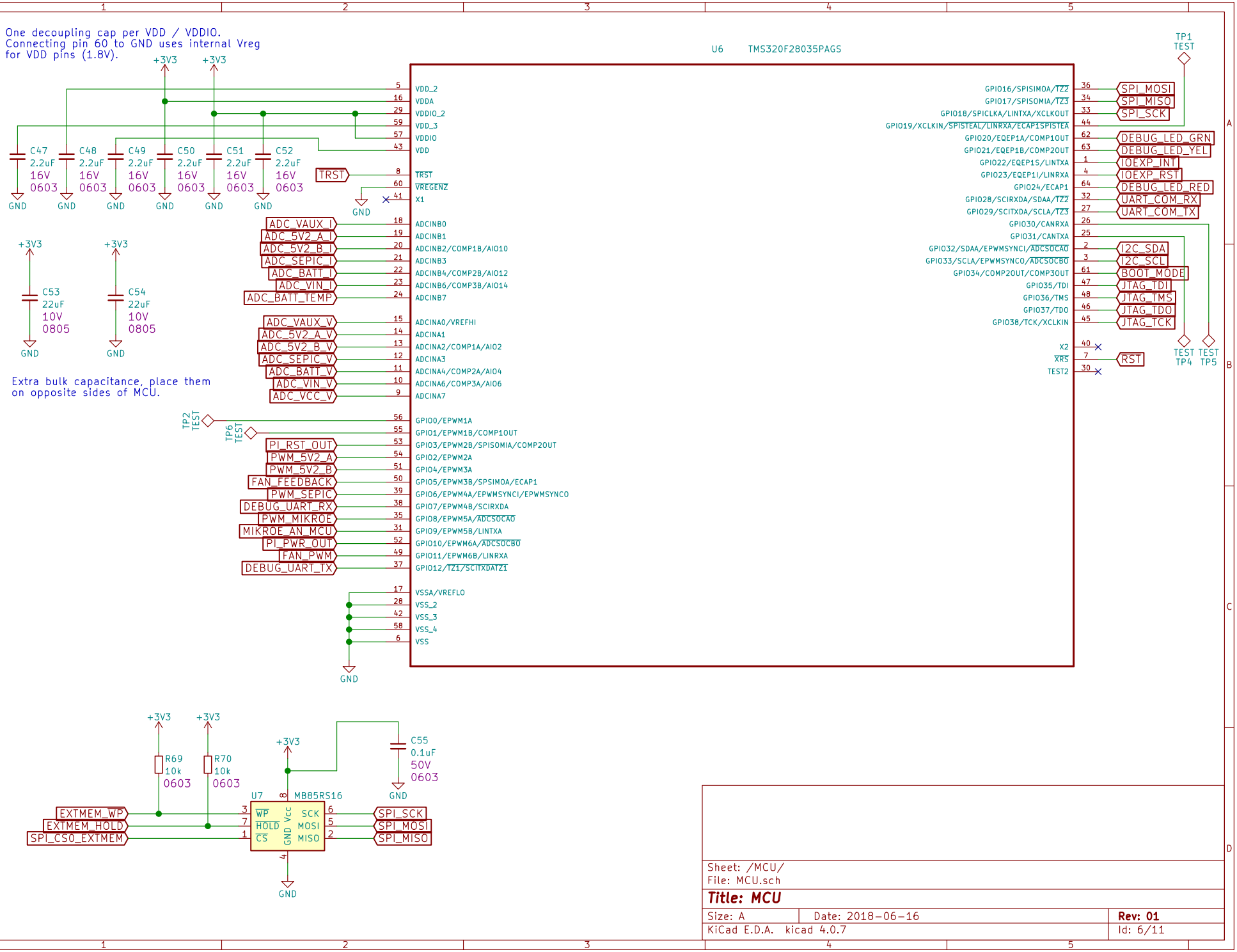
Sheet: /5V2_Supplies/		
File: 5V2_Supplies.sch		
Title: 5V2_Supplies		
Size: A	Date: 2018-06-14	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 4/11

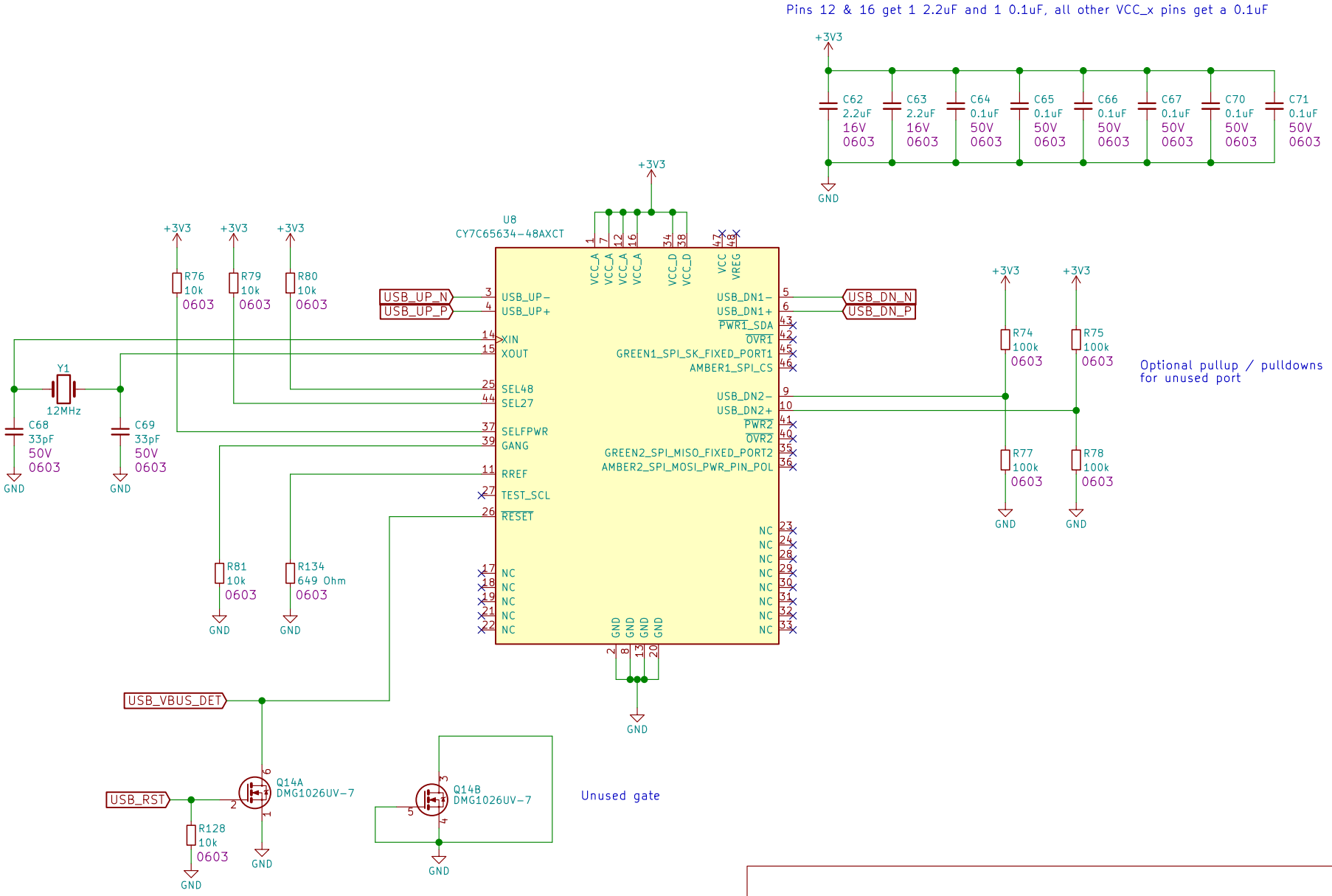


Sheet: /Battery_Charger/
File: Battery_Charger.sch

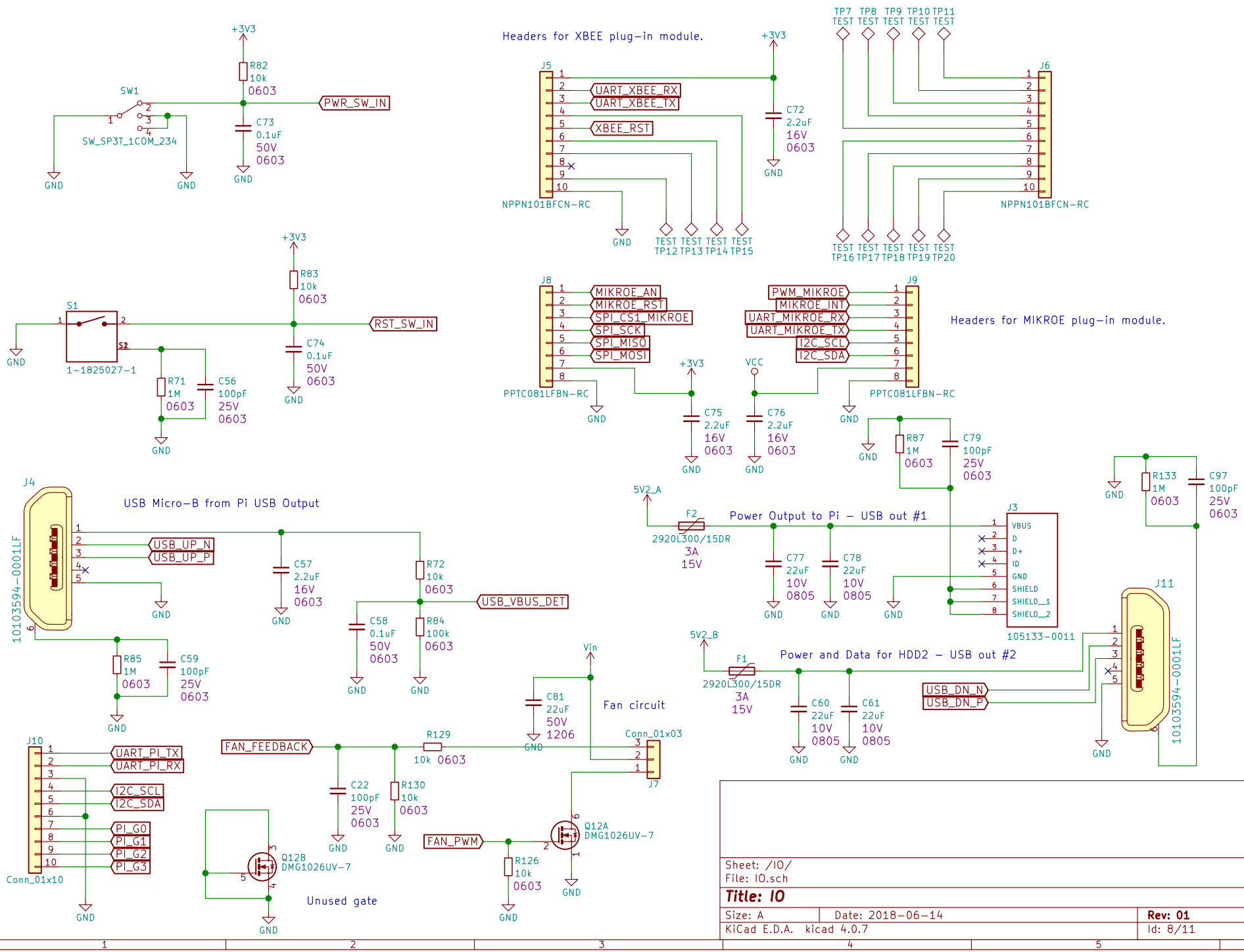
Title: Battery_Charger

Size: A	Date: 2018-06-13	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 5/11

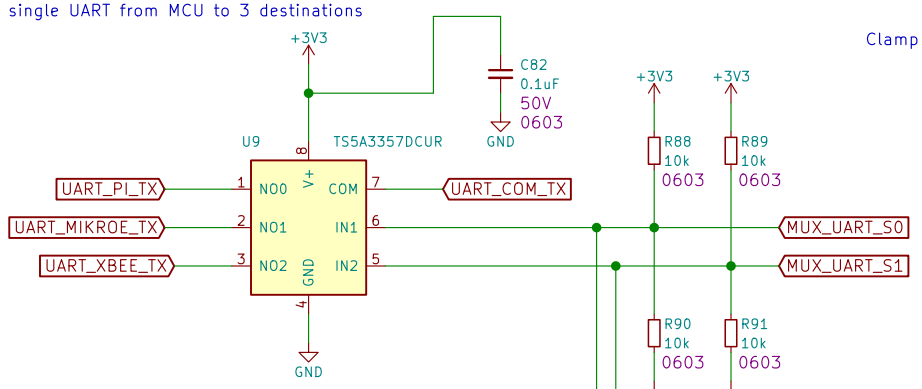

One decoupling cap per VDD / VDDIO.
Connecting pin 60 to GND uses internal Vreg
for VDD pins (1.8V).
U6 TMS320F28035PAGS
+3V3
GND
C47 2.2uF 16V 0603
C48 2.2uF 16V 0603
C49 2.2uF 16V 0603
C50 2.2uF 16V 0603
C51 2.2uF 16V 0603
C52 2.2uF 16V 0603
C53 22uF 10V 0805
C54 22uF 10V 0805
Extra bulk capacitance, place them
on opposite sides of MCU.
TRST
VDD_2
VDDA
VDDIO_2
VDD_3
VDDIO
VDD
VREGENZ
X1
ADC_VAUX_I
ADC_5V2_A_I
ADC_5V2_B_I
ADC_SEPIC_I
ADC_BATT_I
ADC_VIN_I
ADC_BATT_TEMP
ADCINB0
ADCINB1
ADCINB2/COMP1B/AIO10
ADCINB3
ADCINB4/COMP2B/AIO12
ADCINB6/COMP3B/AIO14
ADCINB7
ADC_VAUX_V
ADC_5V2_A_V
ADC_5V2_B_V
ADC_SEPIC_V
ADC_BATT_V
ADC_VIN_V
ADC_VCC_V
ADCINA0/VREFHI
ADCINA1
ADCINA2/COMP1A/AIO2
ADCINA3
ADCINA4/COMP2A/AIO4
ADCINA6/COMP3A/AIO6
ADCINA7
TP2 TEST
TP6 TEST
PI_RST_OUT
PWM_5V2_A
PWM_5V2_B
FAN_FEEDBACK
PWM_SEPIC
DEBUG_UART_RX
PWM_MIKROE
MIKROE_AN_MCU
PI_PWR_OUT
FAN_PWM
DEBUG_UART_TX
GPIO0/EPWM1A
GPIO1/EPWM1B/COMP1OUT
GPIO3/EPWM2B/SPISOMIA/COMP2OUT
GPIO2/EPWM2A
GPIO4/EPWM3A
GPIO5/EPWM3B/SPSIMOA/ECAP1
GPIO6/EPWM4A/EPWMSYNCI/EPWMSYNCO
GPIO7/EPWM4B/SCIRXDA
GPIO8/EPWM5A/ADCSOCAO
GPIO9/EPWM5B/LINTXA
GPIO10/EPWM6A/ADCSOCBO
GPIO11/EPWM6B/LINRXA
GPIO12/TZ1/SCITXDATZ1
VSSA/VREFLO
VSS_2
VSS_3
VSS_4
VSS
GPIO16/SPISIMOA/TZ2
GPIO17/SPISOMIA/TZ3
GPIO18/SPICLKA/LINTXA/XCLKOUT
GPIO19/XCLKIN/SPISTEAL/LINRXA/ECAP1SPISTEA
GPIO20/EQEP1A/COMP1OUT
GPIO21/EQEP1B/COMP2OUT
GPIO22/EQEP1S/LINTXA
GPIO23/EQEP1I/LINRXA
GPIO24/ECAP1
GPIO28/SCIRXDA/SDAA/TZ2
GPIO29/SCITXDA/SCLA/TZ3
GPIO30/CANRXA
GPIO31/CANTXA
GPIO32/SDAA/EPWMSYNCI/ADCSOCAO
GPIO33/SCLA/EPWMSYNCO/ADCSOCBO
GPIO34/COMP2OUT/COMP3OUT
GPIO35/TDI
GPIO36/TMS
GPIO37/TDO
GPIO38/TCK/XCLKIN
X2
XRS
TEST2
SPI_MOSI
SPI_MISO
SPI_SCK
DEBUG_LED_GRN
DEBUG_LED_YEL
IOEXP_INT
IOEXP_RST
DEBUG_LED_RED
UART_COM_RX
UART_COM_TX
I2C_SDA
I2C_SCL
BOOT_MODE
JTAG_TDI
JTAG_TMS
JTAG_TDO
JTAG_TCK
RST
TP1 TEST
TEST TP4
TEST TP5
R69 10k 0603
R70 10k 0603
C55 0.1uF 50V 0603
U7 MB85RS16
WP
HOLD
CS
GND
Vcc
SCK
MOSI
MISO
EXTMEM_WP
EXTMEM_HOLD
SPI_CS0_EXTMEM
SPI_SCK
SPI_MOSI
SPI_MISO
Sheet: /MCU/
File: MCU.sch
Title: MCU
Size: A
Date: 2018-06-16
Rev: 01
KiCad E.D.A. kicad 4.0.7
Id: 6/11

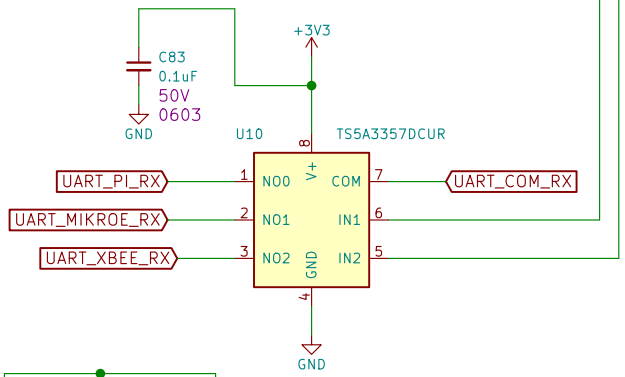


Sheet: /USB/		
File: USB.sch		
Title: USB		
Size: A	Date: 2018-06-13	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 7/11

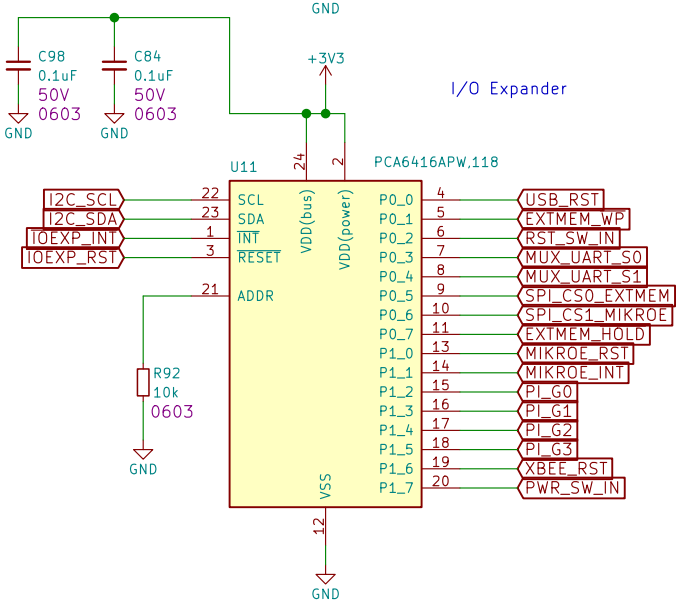

Headers for XBEE plug-in module.
Headers for MIKROE plug-in module.
USB Micro-B from Pi USB Output
Power Output to Pi - USB out #1
Power and Data for HDD2 - USB out #2
Fan circuit
Unused gate
Sheet: /IO/
File: IO.sch
Title: IO
Size: A
Date: 2018-06-14
Rev: 01
KiCad E.D.A. kicad 4.0.7
Id: 8/11

MUX a single UART from MCU to 3 destinations

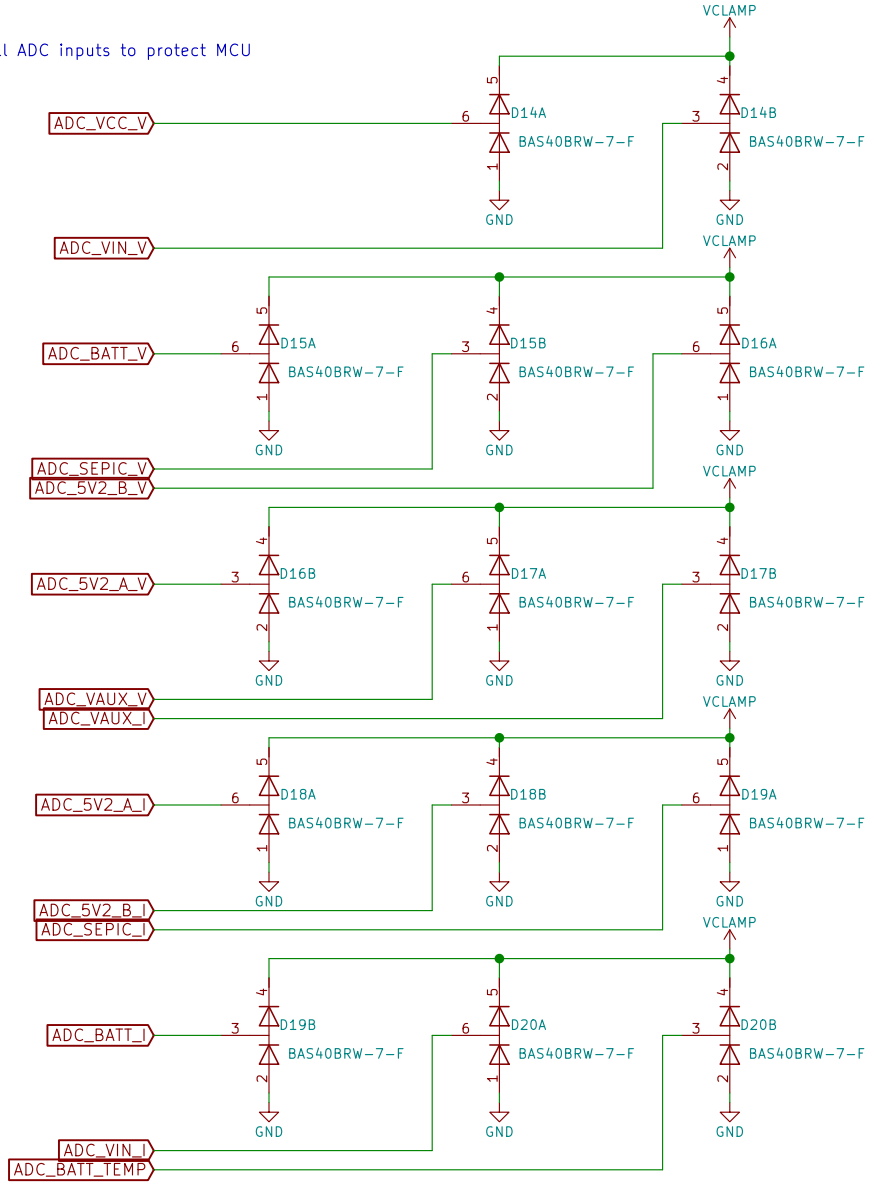




I/O Expander



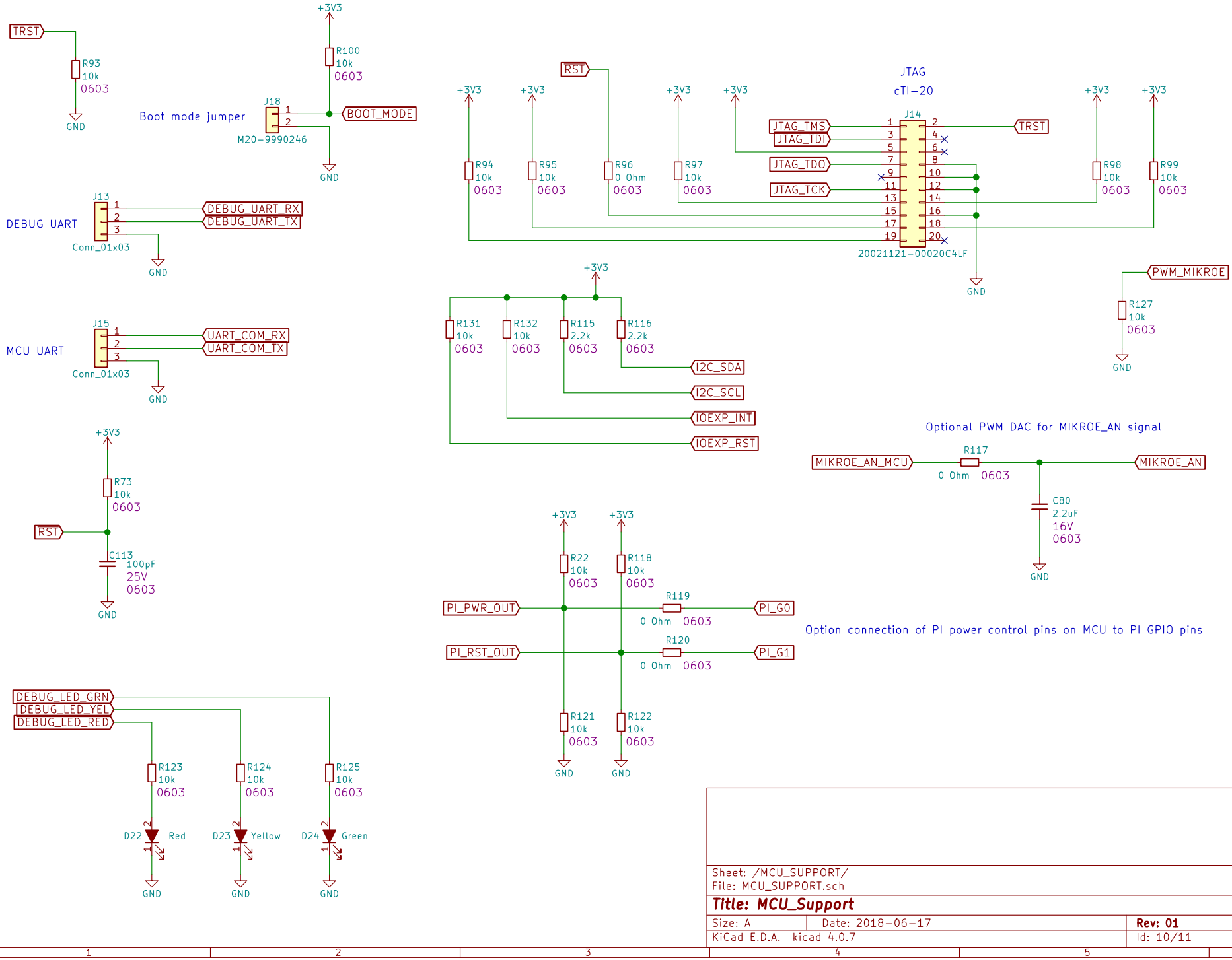
Clamp all ADC inputs to protect MCU

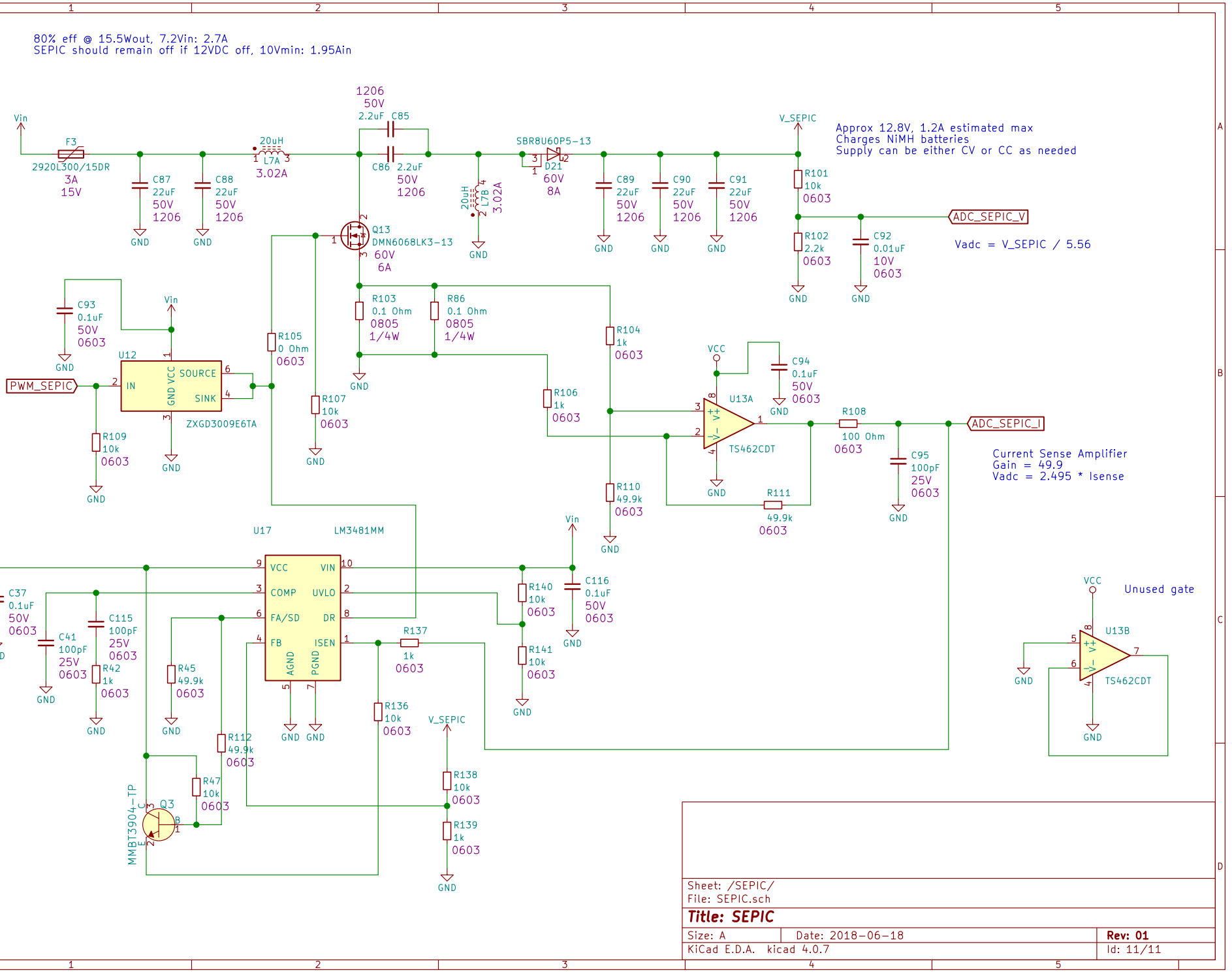


Sheet: /Signal_Conditioning/
File: Signal_Conditioning.sch

Title: Signal_Conditioning

Size: A	Date: 2018-06-16	**Rev: 01**
KiCad E.D.A. kicad 4.0.7		Id: 9/11


TRST
R93
10k
0603
GND
+3V3
R100
10k
0603
Boot mode jumper
J18
M20-9990246
BOOT_MODE
GND
DEBUG UART
J13
DEBUG_UART_RX
DEBUG_UART_TX
Conn_01x03
GND
MCU UART
J15
UART_COM_RX
UART_COM_TX
Conn_01x03
GND
+3V3
R73
10k
0603
RST
C113
100pF
25V
0603
GND
DEBUG_LED_GRN
DEBUG_LED_YEL
DEBUG_LED_RED
R123
10k
0603
R124
10k
0603
R125
10k
0603
D22
Red
D23
Yellow
D24
Green
GND
GND
GND
RST
+3V3
+3V3
+3V3
+3V3
JTAG
cTI-20
J14
JTAG_TMS
JTAG_TDI
JTAG_TDO
JTAG_TCK
TRST
20021121-00020C4LF
R94
10k
0603
R95
10k
0603
R96
0 Ohm
0603
R97
10k
0603
R98
10k
0603
R99
10k
0603
GND
+3V3
R131
10k
0603
R132
10k
0603
R115
2.2k
0603
R116
2.2k
0603
I2C_SDA
I2C_SCL
IOEXP_INT
IOEXP_RST
PWM_MIKROE
R127
10k
0603
GND
Optional PWM DAC for MIKROE_AN signal
MIKROE_AN_MCU
R117
0 Ohm
0603
MIKROE_AN
C80
2.2uF
16V
0603
GND
+3V3
+3V3
R22
10k
0603
R118
10k
0603
PI_PWR_OUT
R119
0 Ohm
0603
PI_G0
PI_RST_OUT
R120
0 Ohm
0603
PI_G1
R121
10k
0603
R122
10k
0603
GND
GND
Option connection of PI power control pins on MCU to PI GPIO pins
Sheet: /MCU_SUPPORT/
File: MCU_SUPPORT.sch
Title: MCU_Support
Size: A
Date: 2018-06-17
Rev: 01
KiCad E.D.A. kicad 4.0.7
Id: 10/11


80% eff @ 15.5Wout, 7.2Vin: 2.7A
SEPIC should remain off if 12VDC off, 10Vmin: 1.95Ain
Vin
F3
2920L300/15DR
3A
15V
C87
22uF
50V
1206
C88
22uF
50V
1206
20uH
L7A
3.02A
1206
50V
2.2uF
C85
C86
2.2uF
50V
1206
20uH
L7B
3.02A
SBR8U60P5-13
D21
60V
8A
C89
22uF
50V
1206
C90
22uF
50V
1206
C91
22uF
50V
1206
V_SEPIC
Approx 12.8V, 1.2A estimated max
Charges NiMH batteries
Supply can be either CV or CC as needed
R101
10k
0603
R102
2.2k
0603
C92
0.01uF
10V
0603
ADC_SEPIC_V
Vadc = V_SEPIC / 5.56
Q13
DMN6068LK3-13
60V
6A
R103
0.1 Ohm
0805
1/4W
R86
0.1 Ohm
0805
1/4W
R104
1k
0603
R105
0 Ohm
0603
R107
10k
0603
R106
1k
0603
C93
0.1uF
50V
0603
U12
PWM_SEPIC
IN
GND
VCC
SOURCE
SINK
ZXGD3009E6TA
R109
10k
0603
U13A
TS462CDT
VCC
C94
0.1uF
50V
0603
R108
100 Ohm
0603
C95
100pF
25V
0603
ADC_SEPIC_I
Current Sense Amplifier
Gain = 49.9
Vadc = 2.495 * Isense
R110
49.9k
0603
R111
49.9k
0603
U17
LM3481MM
VCC
VIN
COMP
UVLO
FA/SD
DR
FB
ISEN
AGND
PGND
C37
0.1uF
50V
0603
C41
100pF
25V
0603
C115
100pF
25V
0603
R42
1k
0603
R45
49.9k
0603
R112
49.9k
0603
R137
1k
0603
R136
10k
0603
R140
10k
0603
R141
10k
0603
C116
0.1uF
50V
0603
R47
10k
0603
MMBT3904-TP
Q3
R138
10k
0603
R139
1k
0603
Unused gate
U13B
TS462CDT
GND
Sheet: /SEPIC/
File: SEPIC.sch
Title: SEPIC
Size: A
Date: 2018-06-18
Rev: 01
KiCad E.D.A. kicad 4.0.7
Id: 11/11