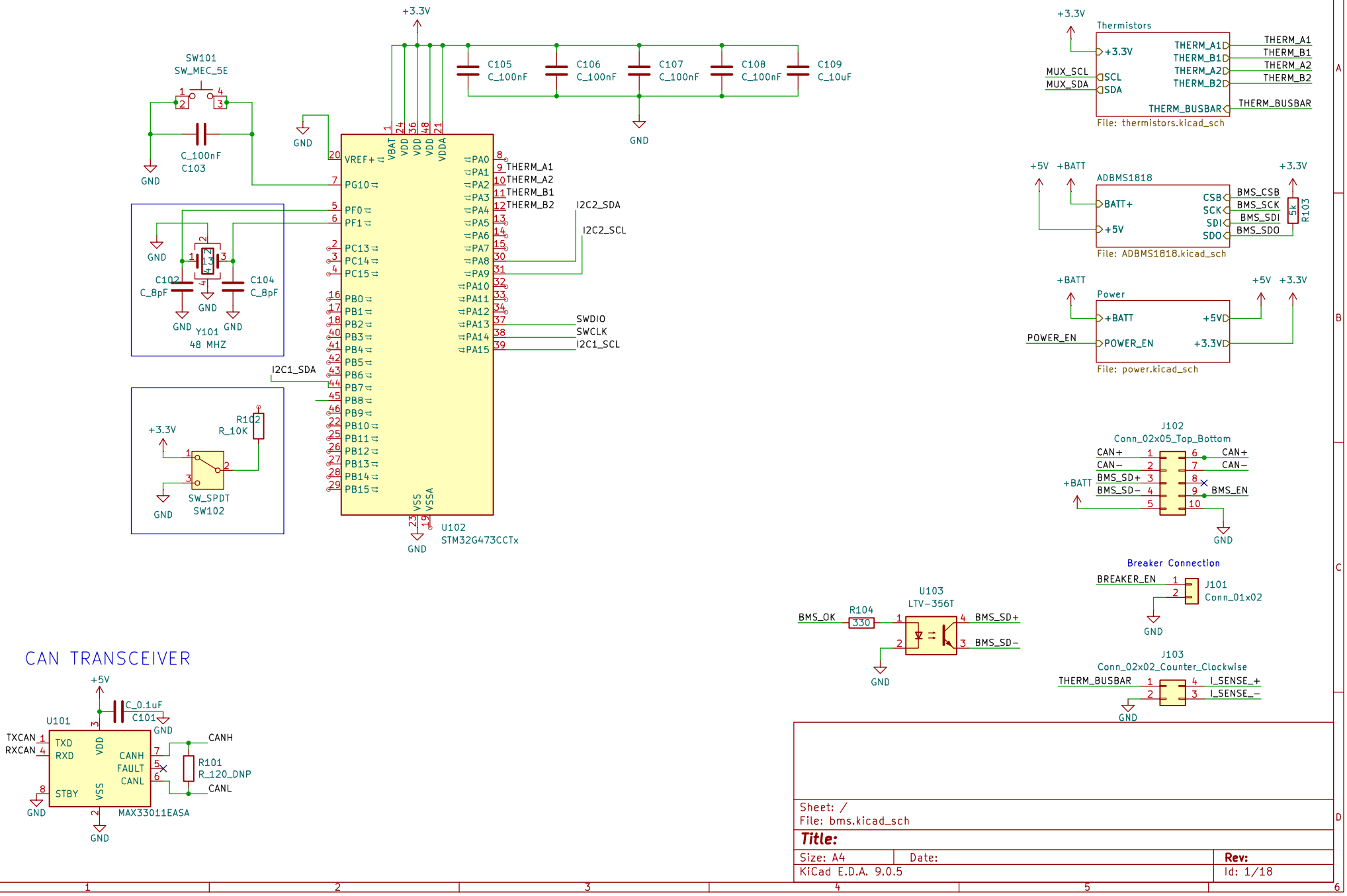
+3.3V
SW101
SW_MEC_5E
C_100nF
C103
GND
C105
C_100nF
C106
C_100nF
C107
C_100nF
C108
C_100nF
C109
C_10uF
VBAT
VDD
VDD
VDD
VDDA
VREF+
PG10
PF0
PF1
PC13
PC14
PC15
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PB8
PB9
PB10
PB11
PB12
PB13
PB14
PB15
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PA8
PA9
PA10
PA11
PA12
PA13
PA14
PA15
THERM_A1
THERM_A2
THERM_B1
THERM_B2
I2C2_SDA
I2C2_SCL
SWDIO
SWCLK
I2C1_SCL
I2C1_SDA
VSS
VSSA
U102
STM32G473CCTx
Y101
48 MHZ
C102
C_8pF
C104
C_8pF
R102
R_10K
SW_SPDT
SW102
Thermistors
+3.3V
MUX_SCL
MUX_SDA
SCL
SDA
THERM_A1
THERM_B1
THERM_A2
THERM_B2
THERM_BUSBAR
File: thermistors.kicad_sch
ADBMS1818
+5V
+BATT
BATT+
CSB
SCK
SDI
SDO
BMS_CSB
BMS_SCK
BMS_SDI
BMS_SDO
5k
R103
File: ADBMS1818.kicad_sch
Power
POWER_EN
+5V
+3.3V
File: power.kicad_sch
J102
Conn_02x05_Top_Bottom
CAN+
CAN−
BMS_SD+
BMS_SD−
BMS_EN
U103
LTV−356T
BMS_OK
R104
330
BMS_SD+
BMS_SD−
Breaker Connection
BREAKER_EN
J101
Conn_01x02
J103
Conn_02x02_Counter_Clockwise
THERM_BUSBAR
I_SENSE_+
I_SENSE_−
CAN TRANSCEIVER
U101
TXCAN
RXCAN
TXD
RXD
VDD
CANH
FAULT
CANL
STBY
VSS
MAX33011EASA
C_0.1uF
C101
R101
R_120_DNP
Sheet: /
File: bms.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.5
Id: 1/18

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"A cell pin filter of 100 Ω and 10 nF
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However, since it limits the balancing current...

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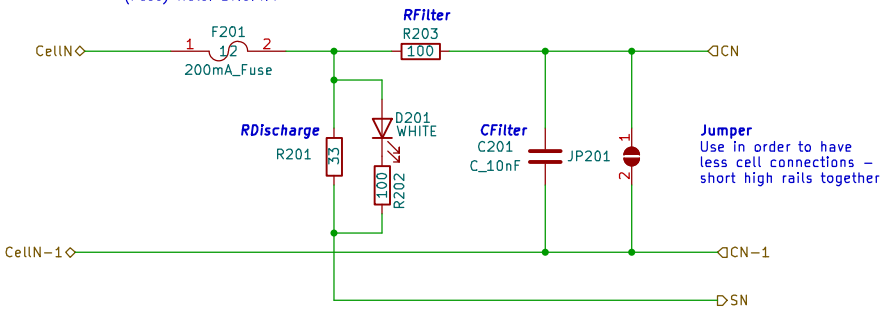
**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

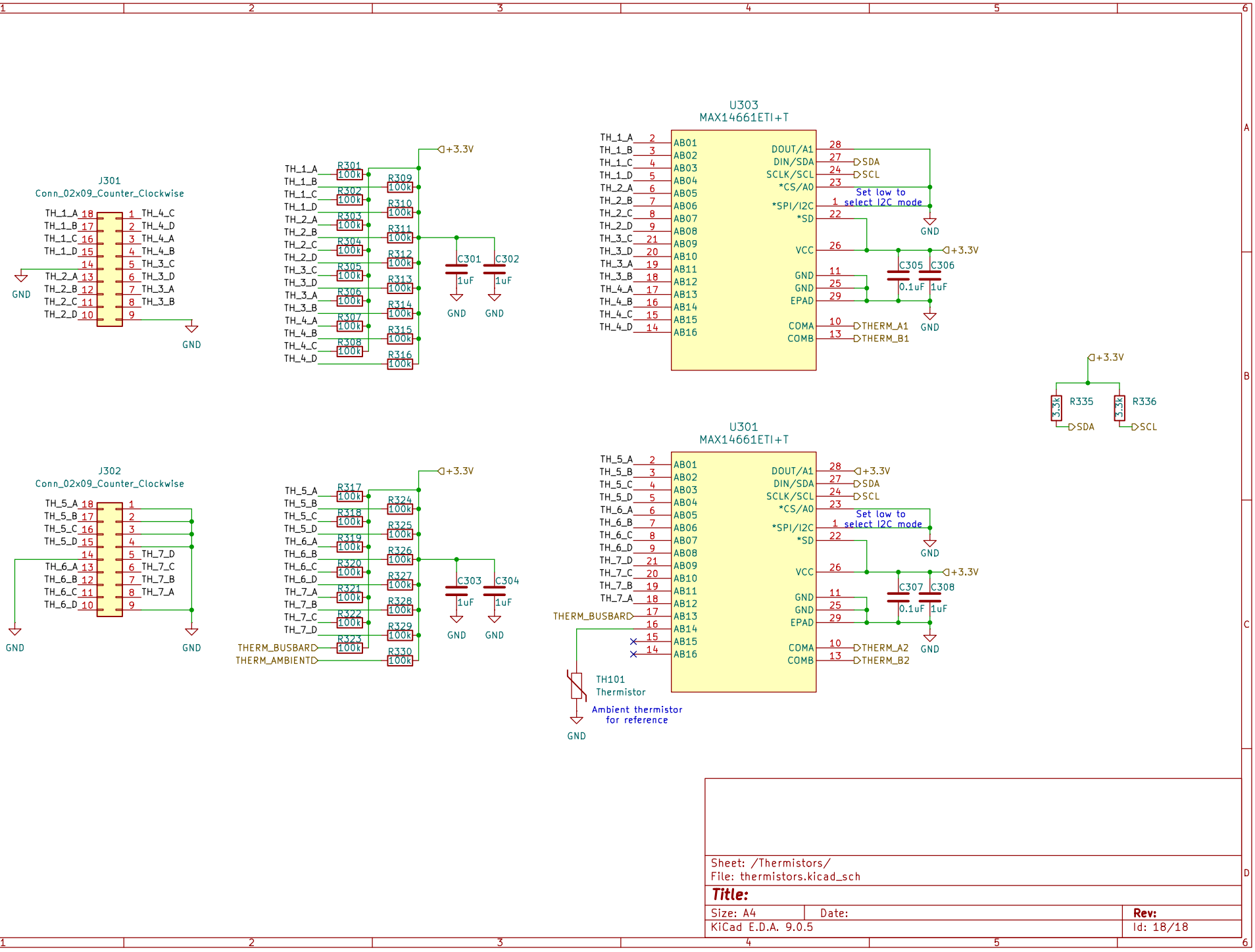
= 26.25 ohms

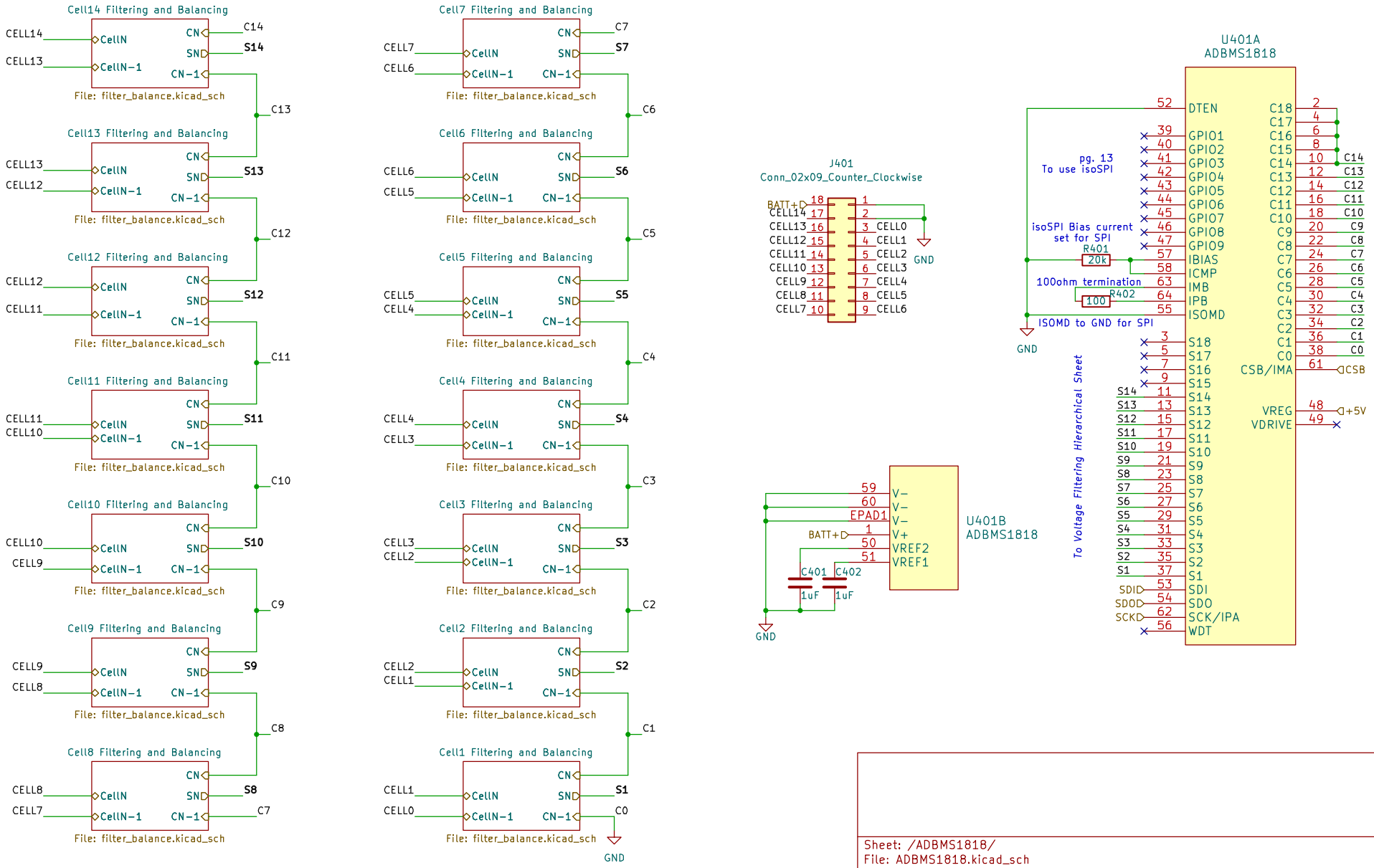
Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell1 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 17/18


J301
Conn_02x09_Counter_Clockwise
TH_1_A 18
TH_1_B 17
TH_1_C 16
TH_1_D 15
14
TH_2_A 13
TH_2_B 12
TH_2_C 11
TH_2_D 10
1 TH_4_C
2 TH_4_D
3 TH_4_A
4 TH_4_B
5 TH_3_C
6 TH_3_D
7 TH_3_A
8 TH_3_B
9
GND
GND
+3.3V
TH_1_A R301 100k
TH_1_B R302 100k
TH_1_C R303 100k
TH_1_D R304 100k
TH_2_A R305 100k
TH_2_B R306 100k
TH_2_C R307 100k
TH_2_D R308 100k
TH_3_C R309 100k
TH_3_D R310 100k
TH_3_A R311 100k
TH_3_B R312 100k
TH_4_A R313 100k
TH_4_B R314 100k
TH_4_C R315 100k
TH_4_D R316 100k
C301 1uF
C302 1uF
GND
GND
U303
MAX14661ETI+T
TH_1_A 2
TH_1_B 3
TH_1_C 4
TH_1_D 5
TH_2_A 6
TH_2_B 7
TH_2_C 8
TH_2_D 9
TH_3_C 21
TH_3_D 20
TH_3_A 19
TH_3_B 18
TH_4_A 17
TH_4_B 16
TH_4_C 15
TH_4_D 14
AB01
AB02
AB03
AB04
AB05
AB06
AB07
AB08
AB09
AB10
AB11
AB12
AB13
AB14
AB15
AB16
DOUT/A1 28
DIN/SDA 27 SDA
SCLK/SCL 24 SCL
*CS/A0 23
Set low to
1 select I2C mode
*SPI/I2C
*SD 22
GND
VCC 26 +3.3V
C305 0.1uF
C306 1uF
GND 11
GND 25
EPAD 29
GND
COMA 10 THERM_A1
COMB 13 THERM_B1
+3.3V
R335 3.3k
R336 3.3k
SDA
SCL
J302
Conn_02x09_Counter_Clockwise
TH_5_A 18
TH_5_B 17
TH_5_C 16
TH_5_D 15
14
TH_6_A 13
TH_6_B 12
TH_6_C 11
TH_6_D 10
1
2
3
4
5 TH_7_D
6 TH_7_C
7 TH_7_B
8 TH_7_A
9
GND
GND
+3.3V
TH_5_A R317 100k
TH_5_B R318 100k
TH_5_C R319 100k
TH_5_D R320 100k
TH_6_A R321 100k
TH_6_B R322 100k
TH_6_C R323 100k
TH_6_D R324 100k
TH_7_A R325 100k
TH_7_B R326 100k
TH_7_C R327 100k
TH_7_D R328 100k
THERM_BUSBARD R329 100k
THERM_AMBIENTD R330 100k
C303 1uF
C304 1uF
GND
GND
U301
MAX14661ETI+T
TH_5_A 2
TH_5_B 3
TH_5_C 4
TH_5_D 5
TH_6_A 6
TH_6_B 7
TH_6_C 8
TH_6_D 9
TH_7_D 21
TH_7_C 20
TH_7_B 19
TH_7_A 18
THERM_BUSBARD 17
16
15
14
AB01
AB02
AB03
AB04
AB05
AB06
AB07
AB08
AB09
AB10
AB11
AB12
AB13
AB14
AB15
AB16
DOUT/A1 28 +3.3V
DIN/SDA 27 SDA
SCLK/SCL 24 SCL
*CS/A0 23
Set low to
1 select I2C mode
*SPI/I2C
*SD 22
GND
VCC 26 +3.3V
C307 0.1uF
C308 1uF
GND 11
GND 25
EPAD 29
GND
COMA 10 THERM_A2
COMB 13 THERM_B2
TH101
Thermistor
Ambient thermistor
for reference
GND
Sheet: /Thermistors/
File: thermistors.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 9.0.5
Id: 18/18



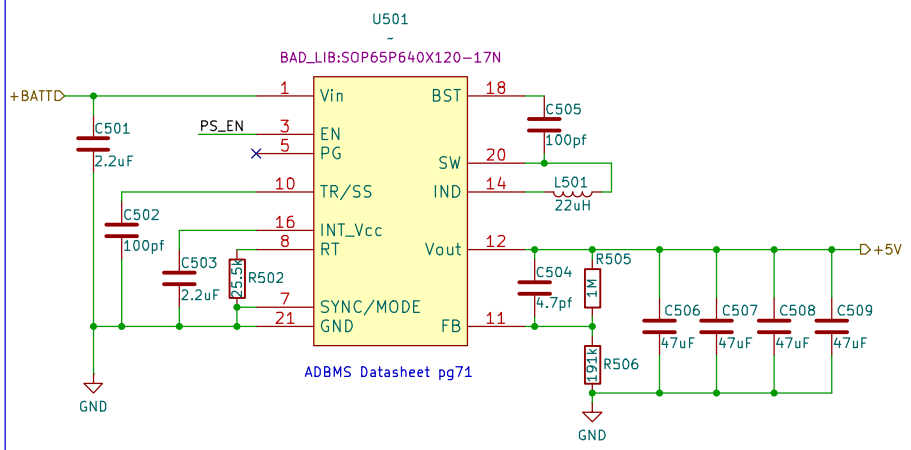
Sheet: /ADBMS1818/
File: ADBMS1818.kicad_sch

Title:

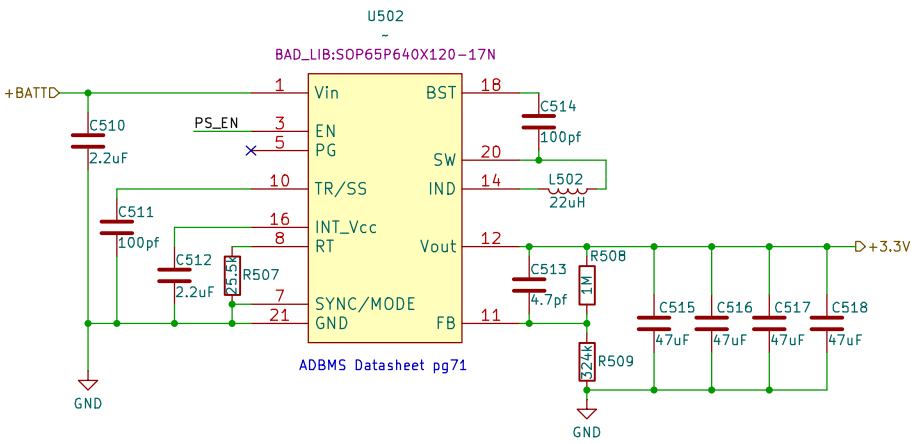
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 19/18

POWER

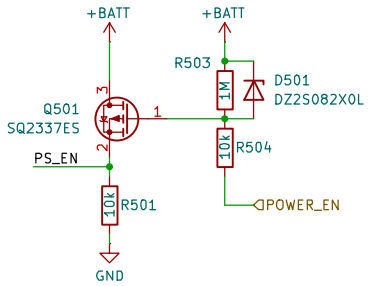
5V Buck Converter



3.3V Buck Converter



POWER-ON CIRCUIT



Sheet: /Power/		
File: power.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 19/18

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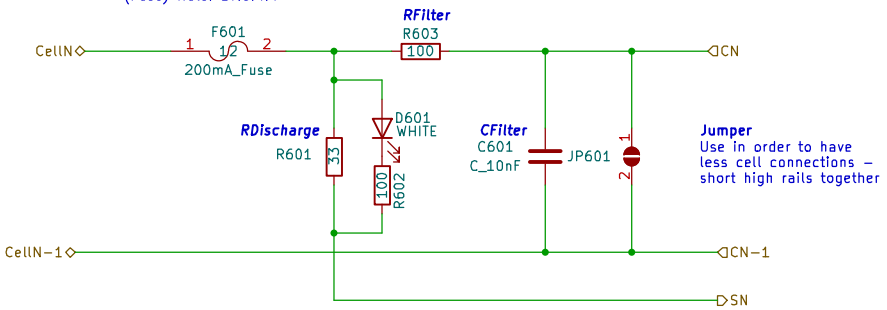
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell2 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 20/18

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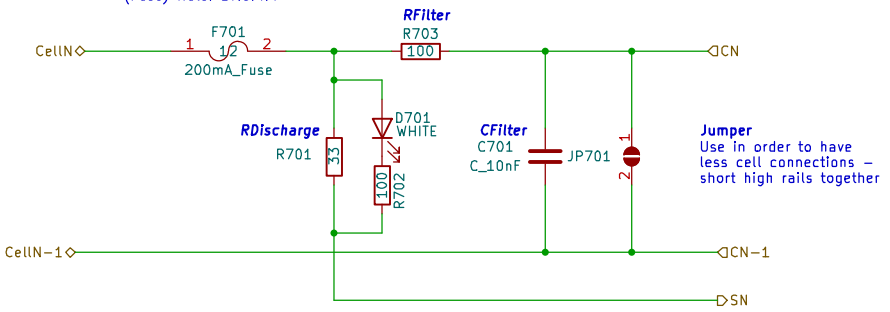
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

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= (105 mA)^2 * 40 Ω

= 0.441 W

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This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell3 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 21/18

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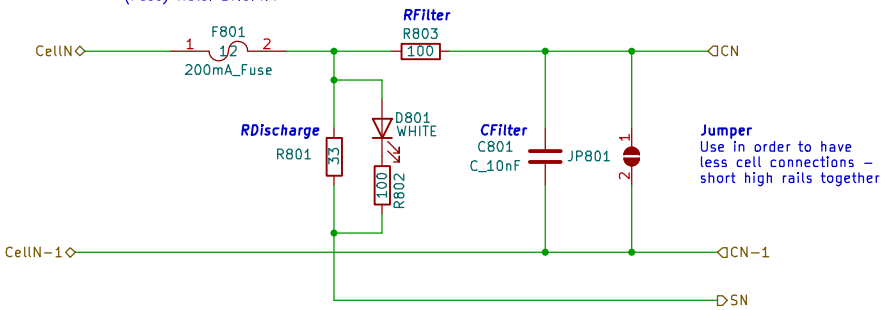
**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
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Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

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Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell4 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 22/18

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ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
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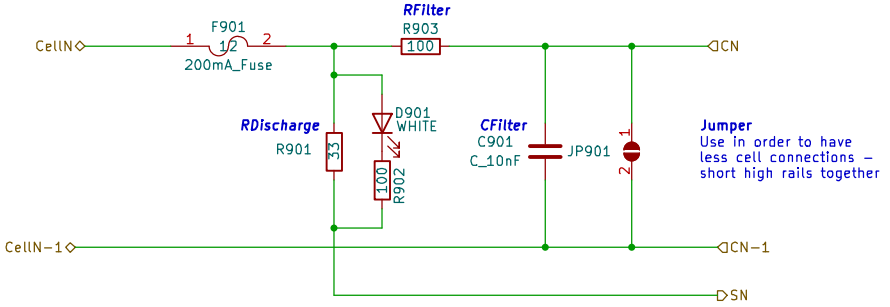
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

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in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell5 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 23/18

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voltage measurement filtering is permitted, but the filter resistor
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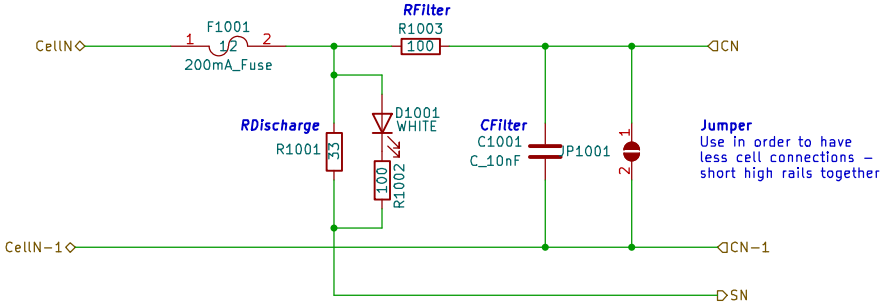
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

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ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell6 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 24/18

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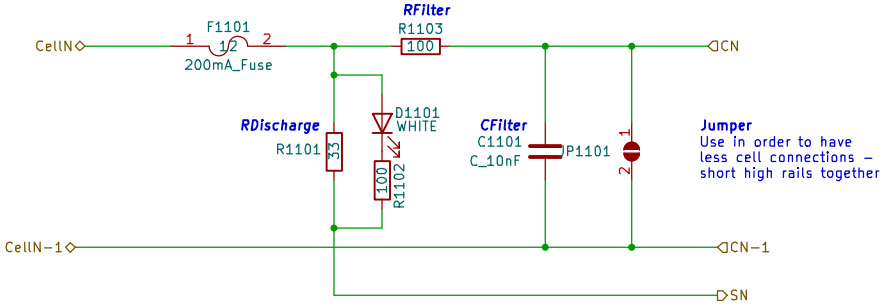
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell7 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 25/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

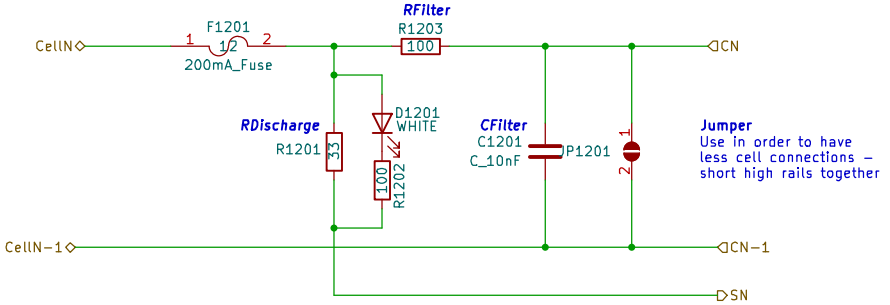
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell8 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 26/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

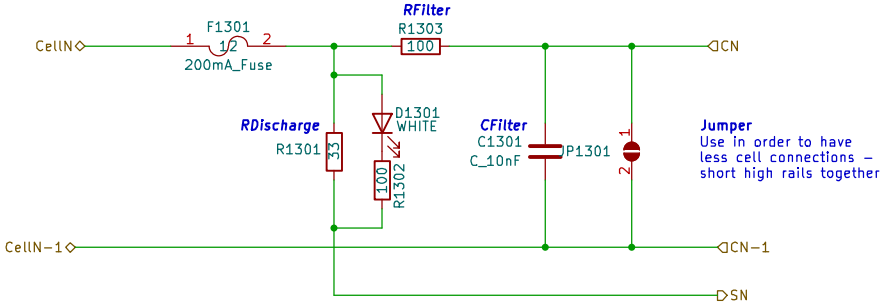
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell9 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 27/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

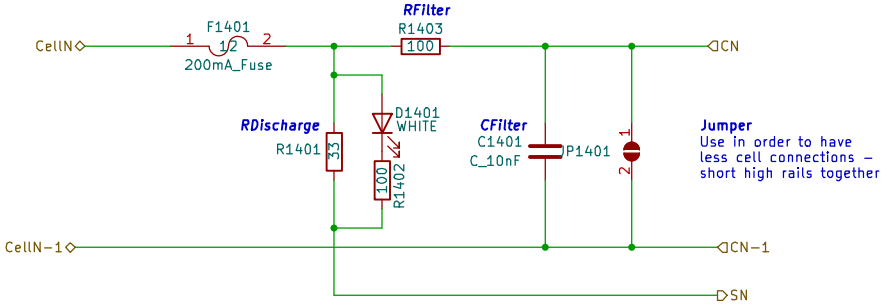
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell10 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 28/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

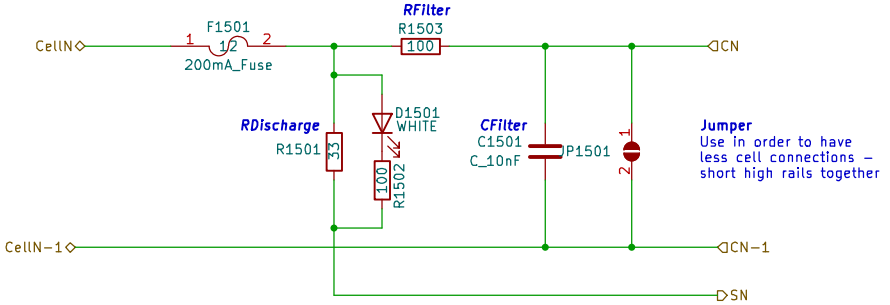
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell11 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 29/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

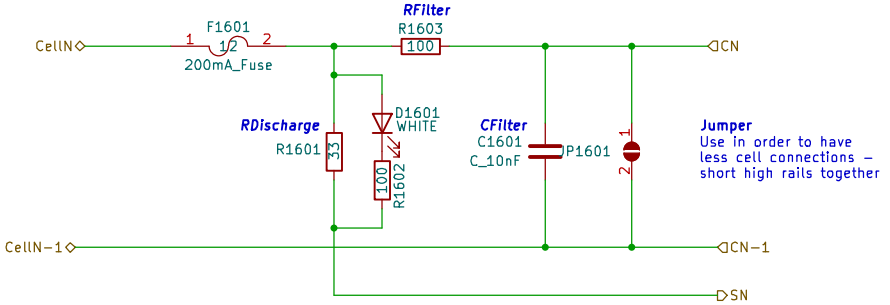
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell12 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 30/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

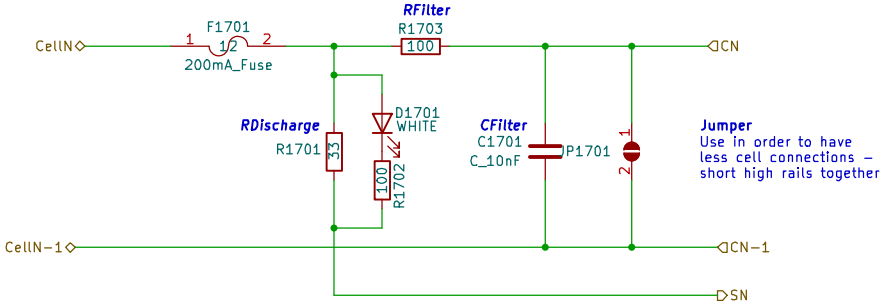
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell13 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 31/18

This is a Hierarchical Sheet.
That means that this is a "copy-paste"
block for each block shown.
(ie. As seen on "Voltage Filter")

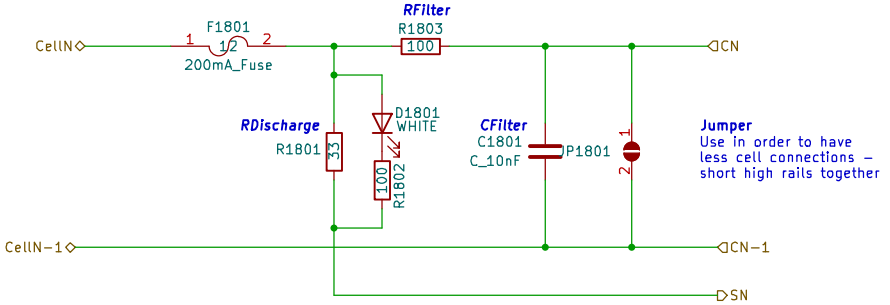
"A cell pin filter of 100 Ω and 10 nF
is recommended for all applications"
ADBMS1818 datasheet pg. 71

However, since it limits the balancing current...

"Note that the antialiasing filter resistor is part of the discharge path
and must be removed or reduced. Use of an RC for added cell
voltage measurement filtering is permitted, but the filter resistor
must remain small, typically around 10 Ω to reduce the effect on the
balance current." pg. 72

**Filtering RC circuit as depicted on
ADBMS1818 datasheet pg. 72**

Voltage Sense Overcurrent Protection
(Fuse) Rule: EV.8.4.4



Balance Current

V = 4.2 V

R = RDISCHARGE + RFILTER + RDS_ON
= 26 Ω + 10 Ω + 4 Ω
= 40 Ω

I = 4.2 V / 40 Ω
= 105 mA

Power

P = I^2 R

= (105 mA)^2 * 40 Ω

= 0.441 W

Balance current [A]

= (% SOC imbalance * battery capacity)/(num of hours to balance)

= (0.05 * 64Ah) / (20)

= 160 mA

Discharge Resistor [ohms]

= cell voltage / balancing current

= 4.2 V / 160mA

= 26.25 ohms

As long as balance current is below 200mA,
everything is okay to use the internal MOSFETs
of the ADBMS1818 chip for balancing.

This is the calculated balance current for the 10087191NSH5
cells, trying to keep it under 200mA. The example in the
ADBMS1818 datasheet uses 5% SOC imbalance being resolved
in 5 hours, but we can push to a longer balancing time if needed.

Cells: Samsung 40T 21700
https://cdn.shopify.com/s/files/1/0481/9678/0183/files/Samsung_Introduction_of_New_40T_v3.pdf?v=1612843210

Sheet: /ADBMS1818/Cell14 Filtering and Balancing/
File: filter_balance.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.5		Id: 32/18