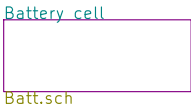
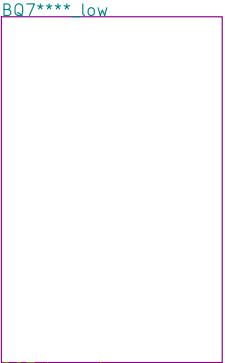
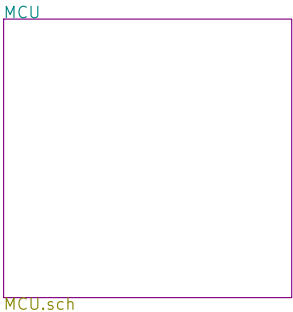
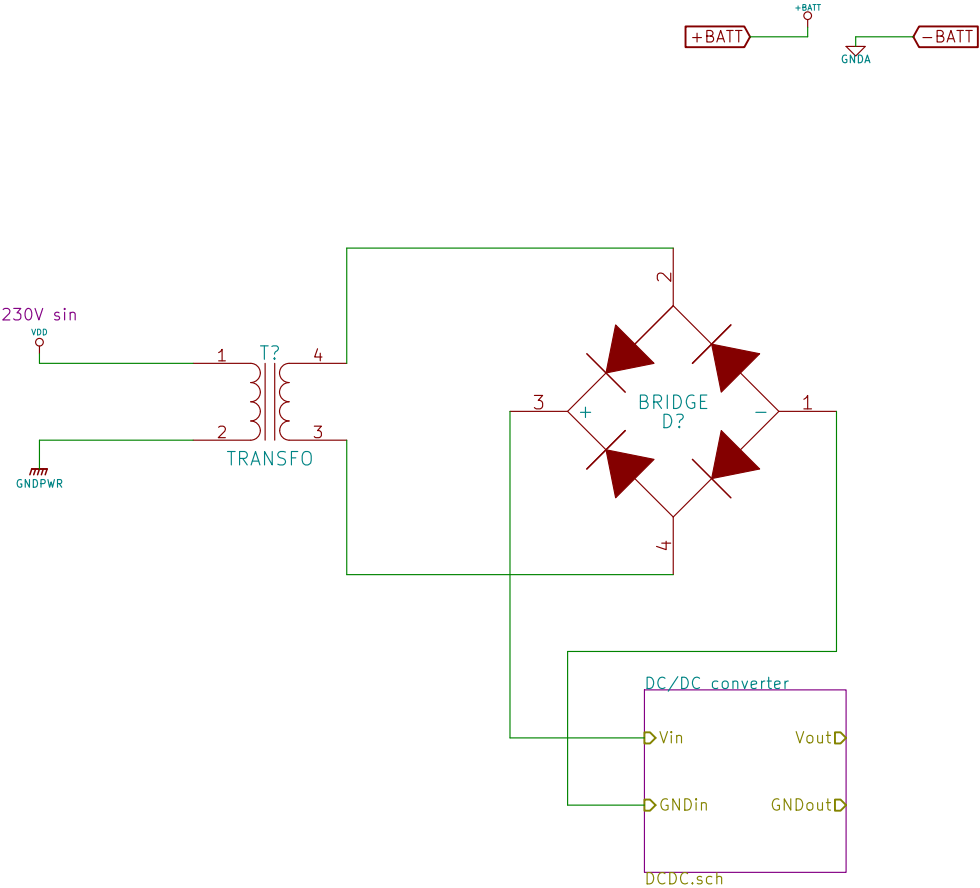


This is start of BMS it made of 4 components first is transformator from 220V/100V and graetz.
Next is DC/DC converter with variable currnet and voltage.(this first is more a charger)
Next on every cell i bq7*** microchip with abilty to measere and balance every battery cell
(one is doing that for 15 batterys)(balance is done with discharging).
And bq7*** is controled with some mcu



| | | | |
|---------------|---|--|-----------|
| | | | |
| FESB | | | |
| Sheet: / | | | |
| File: BMS.sch | | | |
| Title: | | | |
| Size: A4 | Date: | | Rev: |
| KiCad E.D.A. | kicad (after 2015-may-25 BZR unknown)-product | | Id: 1/101 |

| | | | | | | |
|---|--|---|---|---|--|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| A | Pick any MCU you whant and make schematic or him and strat codeing | | | | | A |
| B | | | | | | B |
| C | | | | | | C |
| D | | | | | <div><div>FESB</div><div>Sheet: /MCU/ File: MCU.sch</div><div>Title:</div><div><div>Size: A4</div><div>Date:</div><div>Rev:</div></div><div>KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product</div><div>Id: 2/101</div></div> | D |
| | 1 | 2 | 3 | 4 | 5 | 6 |

Because a voltage to REGSRC is to high we are going to use FET for limiting

Bq7*** circuit its basicly disconnected from other stuff looking a voltage of every cell and if needed discharging them.(balancing) Controlled by a MCU two of them because we have 30 batteries.

VSS is same as ground symbol in this sheet

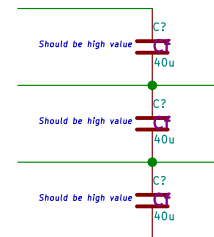
Be caerfull with VSS and other pins beacuse we must maintaine a specific max voltage diff between pins.

Pin configuration

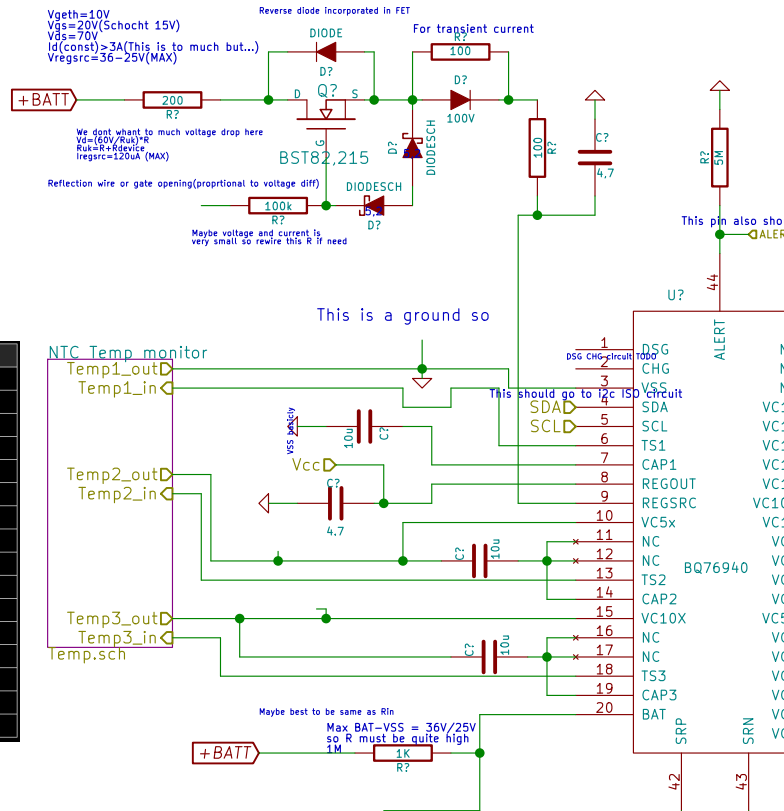
| PIN | NAME | TYPE | DESCRIPTION |
|-----|--------|------|---|
| 1 | DSG | O | Discharge FET driver |
| 2 | CHG | O | Charge FET driver |
| 3 | VSS | — | Chip VSS |
| 4 | SDA | I/O | I ² C communication to the host controller |
| 5 | SCL | I | I ² C communication to the host controller |
| 6 | TS1 | I | Thermistor #1 positive terminal ⁽¹⁾ |
| 7 | CAP1 | O | Capacitor to VSS |
| 8 | REGOUT | P | Output LDO |
| 9 | REGSRC | I | Input source for output LDO |
| 10 | VC5X | P | Thermistor #2 negative terminal |
| 11 | NC | — | No connect (short to CAP2) |
| 12 | NC | — | No connect (short to CAP2) |
| 13 | TS2 | I | Thermistor #2 positive terminal ⁽¹⁾ |
| 14 | CAP2 | O | Capacitor to VC5X |
| 15 | VC10X | P | Thermistor #3 negative terminal |
| 16 | NC | — | No connect (short to CAP3) |

| PIN | NAME | TYPE | DESCRIPTION |
|-----|-------|------|--|
| 17 | NC | — | No connect (short to CAP3) |
| 18 | TS3 | I | Thermistor #3 positive terminal ⁽¹⁾ |
| 19 | CAP3 | O | Capacitor to VC10X |
| 20 | BAT | P | Battery (top-most) terminal |
| 21 | NC | — | No connect |
| 22 | NC | — | No connect |
| 23 | NC | — | No connect |
| 24 | VC15 | I | Sense voltage for 15th cell positive terminal |
| 25 | VC14 | I | Sense voltage for 14th cell positive terminal |
| 26 | VC13 | I | Sense voltage for 13th cell positive terminal |
| 27 | VC12 | I | Sense voltage for 12th cell positive terminal |
| 28 | VC11 | I | Sense voltage for 11th cell positive terminal |
| 29 | VC10b | I | Sense voltage for 10th cell negative terminal |
| 30 | VC10 | I | Sense voltage for 10th cell positive terminal |
| 31 | VC9 | I | Sense voltage for 9th cell positive terminal |
| 32 | VC8 | I | Sense voltage for 8th cell positive terminal |
| 33 | VC7 | I | Sense voltage for 7th cell positive terminal |
| 34 | VC6 | I | Sense voltage for 6th cell positive terminal |
| 35 | VC5b | I | Sense voltage for 5th cell negative terminal |
| 36 | VC5 | I | Sense voltage for 5th cell positive terminal |
| 37 | VC4 | I | Sense voltage for 4th cell positive terminal |
| 38 | VC3 | I | Sense voltage for 3rd cell positive terminal |
| 39 | VC2 | I | Sense voltage for 2nd cell positive terminal |
| 40 | VC1 | I | Sense voltage for 1st cell positive terminal |
| 41 | VC0 | I | Sense voltage for 1st cell negative terminal |
| 42 | SRP | I | Negative current sense (nearest VSS) |
| 43 | SRN | I | Positive current sense |
| 44 | ALERT | I/O | Alert output and override input |

Capacitor between termistors



Dont forget this when programming



In general we dont need this diodes but I would like to have them

Schottky diode for avoiding high current on pin(We go to 50A+ so...)

And overvoltage value must be very close to max batt voltage.

And overvoltage value must be very close to max batt voltage.

FESB

Sheet: /BQ7***_high/
File: BQ7.sch

Title: BQ76940

Size: A4

Date:

Rev:

KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

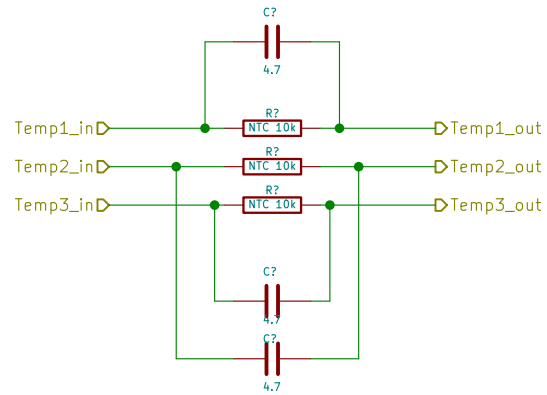
Id: 3/101

Missing only for NTC so we can convert to Temp

$$V_{TSX} = (ADC \text{ in Decimal}) \times 382 \mu V/LSB$$

$$R_{TS} = (10,000 \times V_{TSX}) \div (3.3 - V_{TSX})$$

Termistors
Connect with outer 6 pin



FESB

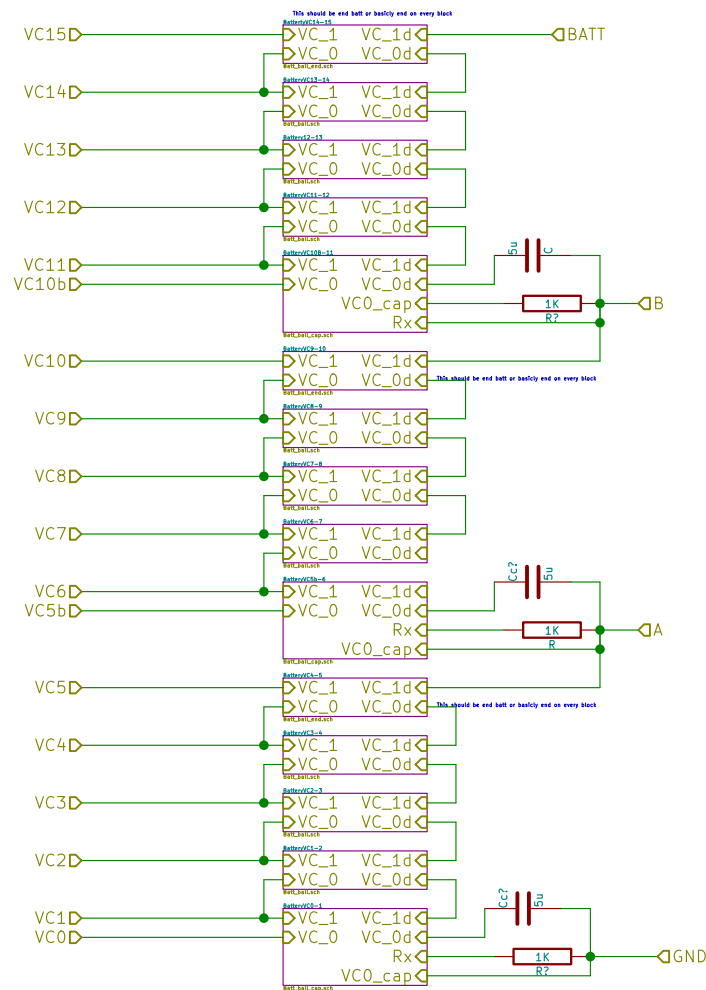
Sheet: /BQ7***_high/NTC Temp monitor/
File: Temp.sch

Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 4/101

Mess bellow. Batt_ball circuit are sharing every pin except last and first
So because they are sharing pin they are sharing a Rin so only
last should have it.(IN every block).



FESB

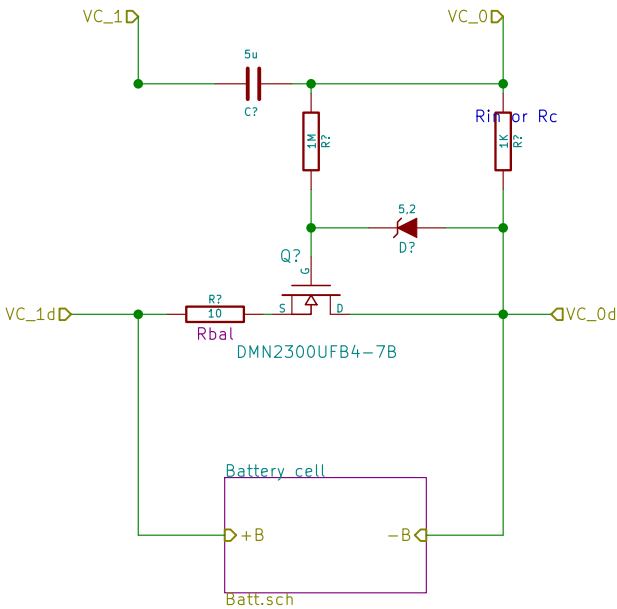
Sheet: /BQ7***_high/Battery_pack/
File: Batt_pack.sch

Title: Battery Pack

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 5/101

This is just mesurment and balancing circuit



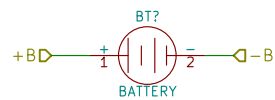
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC1-2/
File: Batt_ball.sch

Title:

| | | |
|--|-------|-----------|
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 6/101 |

Put anything about possible battery in this sheet as component description or should I say new field.



Sheet: /BQ7***_high/Battery_pack/BatteryVC1-2/Battery cell/
File: Batt.sch

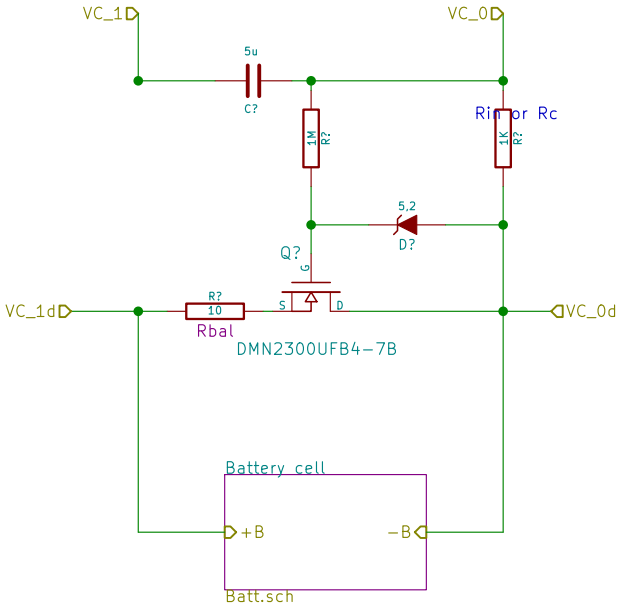
| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 7/101

Id: 7/101

This is just mesurment and balancing circuit



FESB

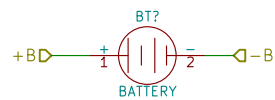
Sheet: /BQ7***_high/Battery_pack/BatteryVC2-3/
File: Batt_ball.sch

Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 8/101

Put anything about possible battery in this sheet as component description or should I say new field.



Sheet: /BQ7***_high/Battery_pack/BatteryVC2-3/Battery cell/
File: Batt.sch

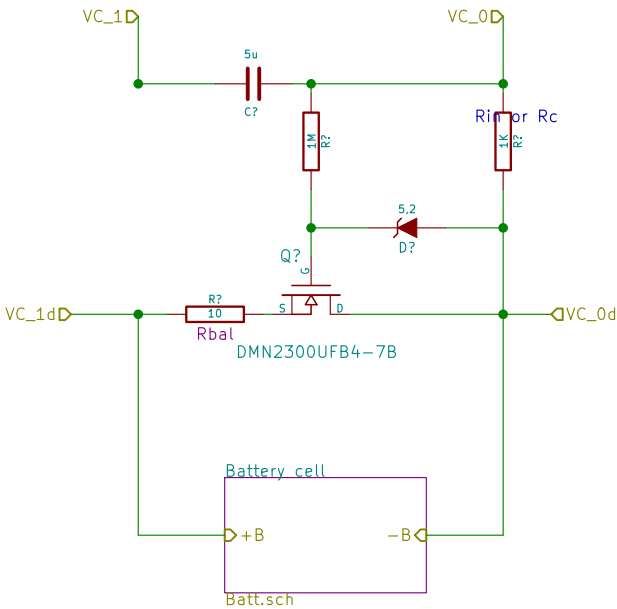
| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 9/101

Id: 9/101

This is just mesurment and balancing circuit



FESB

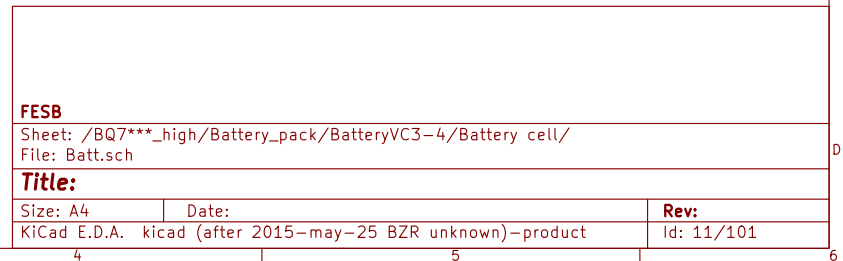
Sheet: /BQ7***_high/Battery_pack/BatteryVC3-4/
File: Batt_ball.sch

Title:

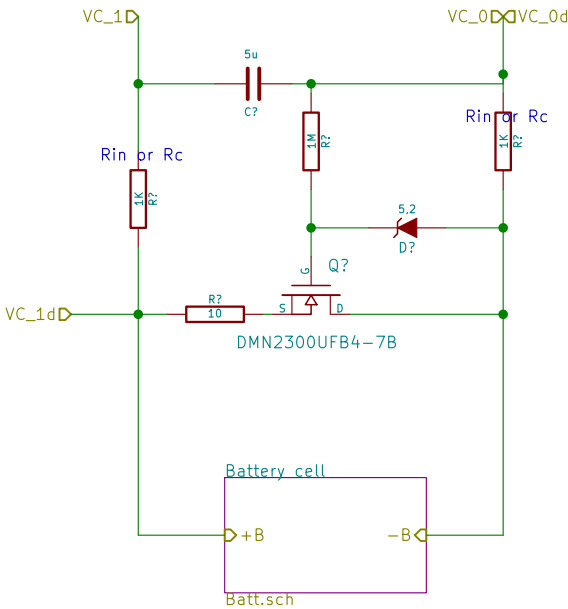
Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 10/101

Put anything about possible battery in this sheet as component description or should I say new field.



This is just mesurment and balancing circuit



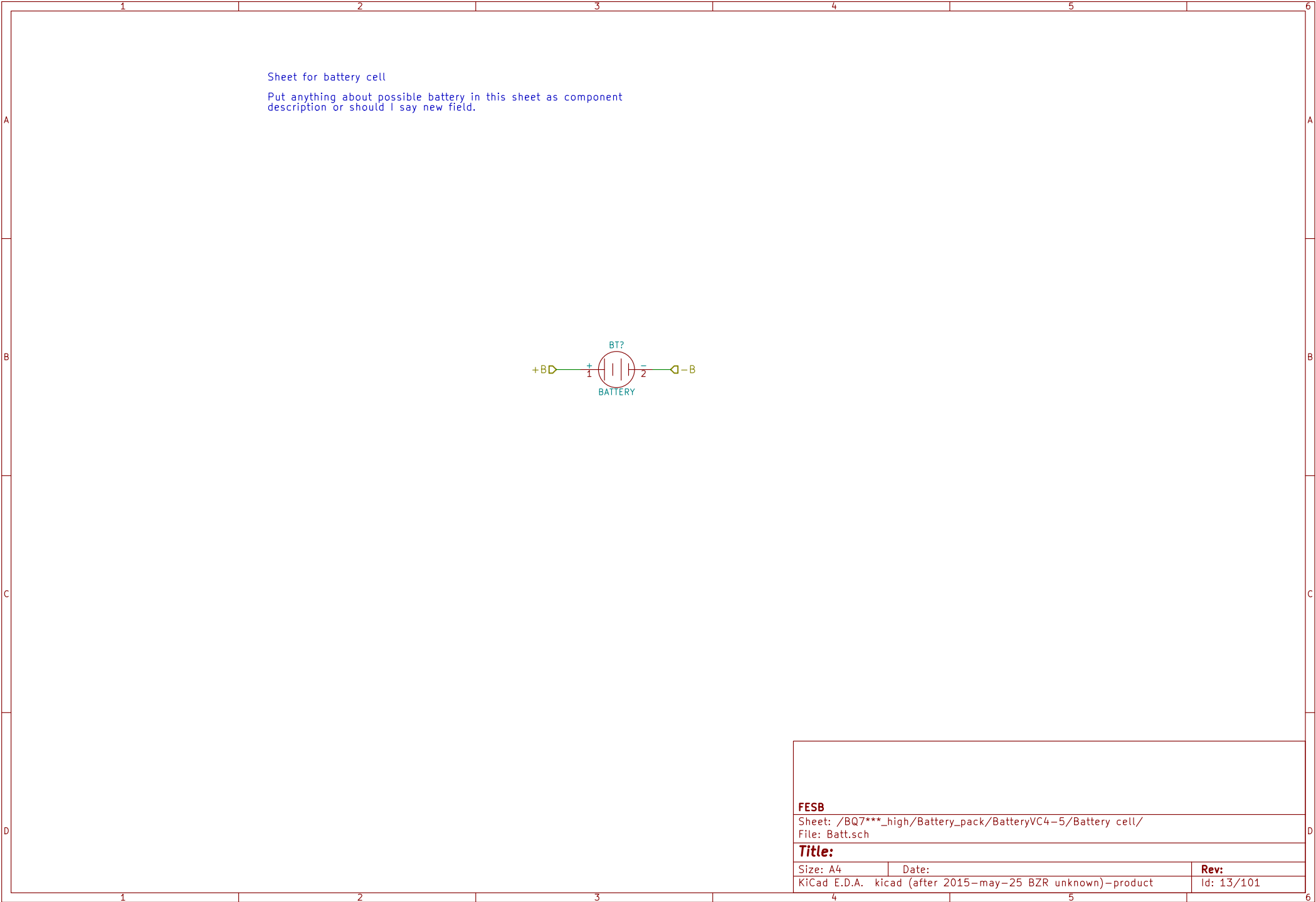
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC4-5/
File: Batt_ball_end.sch

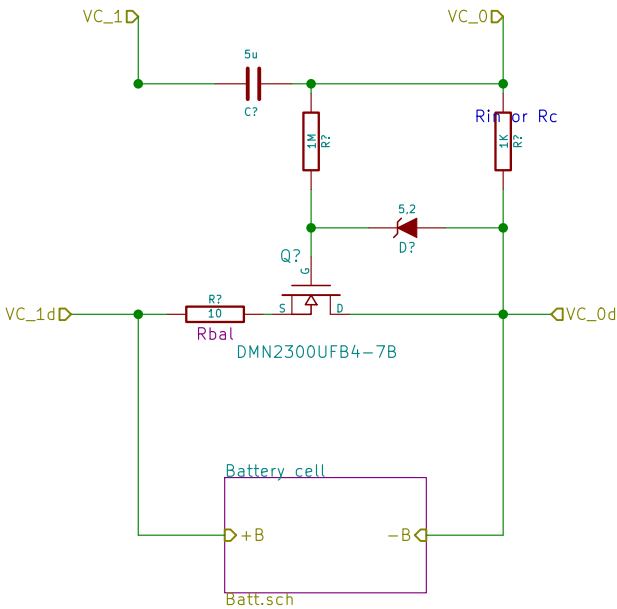
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 12/101



This is just mesurment and balancing circuit



FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC6-7/
File: Batt_ball.sch

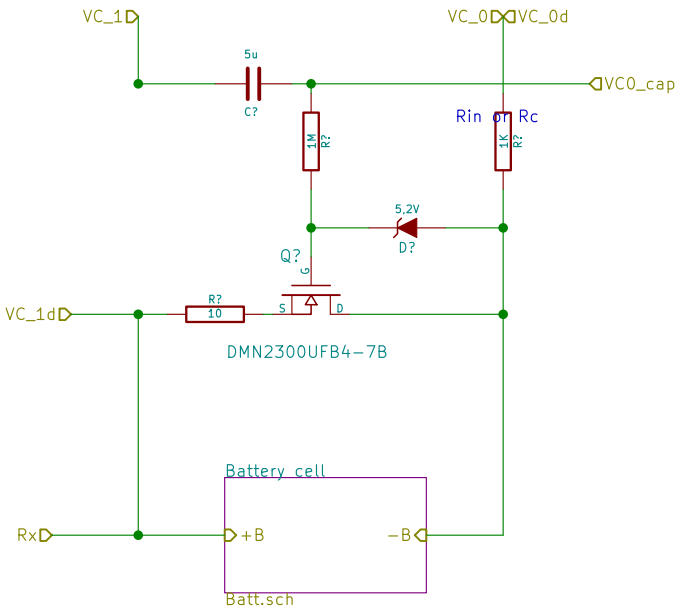
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 14/101

| | | | | | | |
|---|--|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| A | <div> <div>Sheet for battery cell</div> <div>Put anything about possible battery in this sheet as component description or should I say new field.</div> </div> | | | | | |
| B | <div> </div> | | | | | |
| C | | | | | | |
| D | <div> <div>FESB</div> <div> <div>Sheet: /BQ7***_high/Battery_pack/BatteryVC6-7/Battery cell/</div> <div>File: Batt.sch</div> </div> <div> <div>Title:</div> <div> <div>Size: A4</div> <div>Date:</div> <div>Rev:</div> </div> <div> <div>KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product</div> <div>Id: 15/101</div> </div> </div> </div> | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |

This is just mesurment and balancing circuit



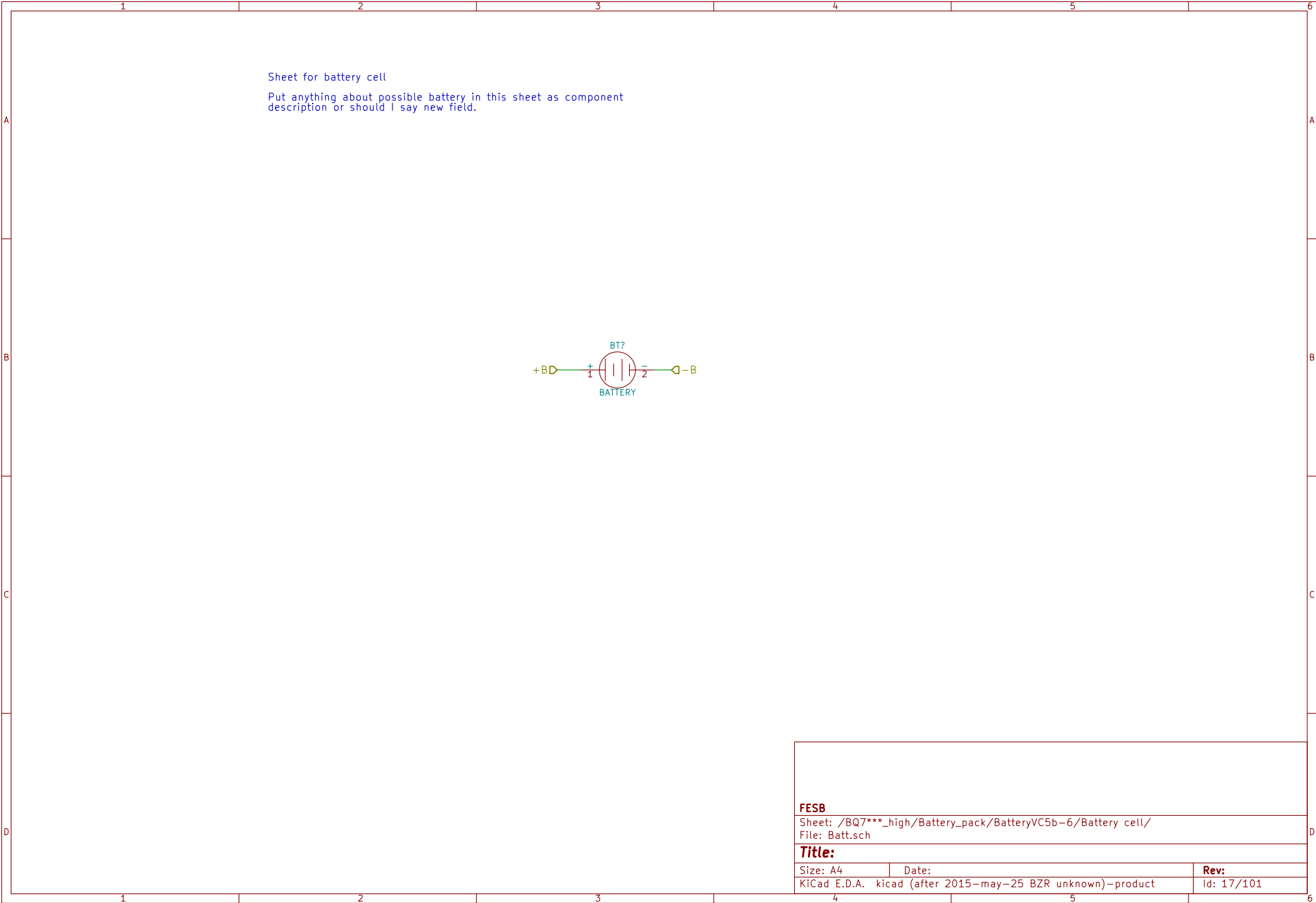
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC5b-6/
File: Batt_ball_cap.sch

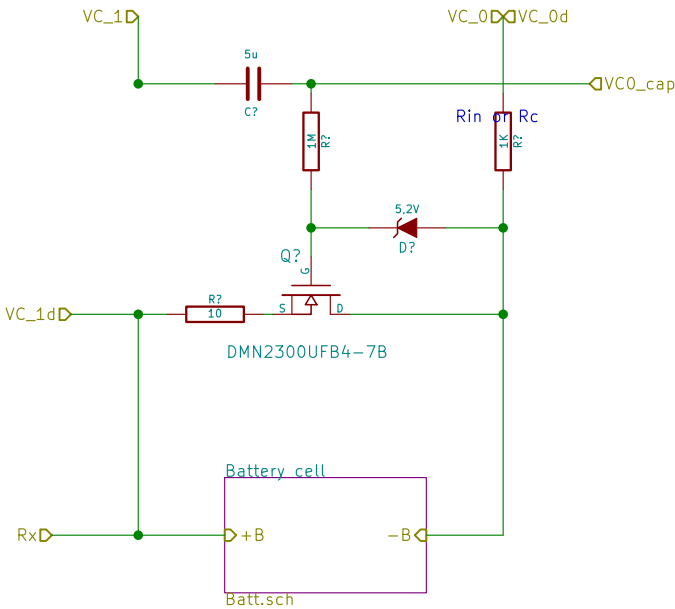
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 16/101



This is just mesurment and balancing circuit



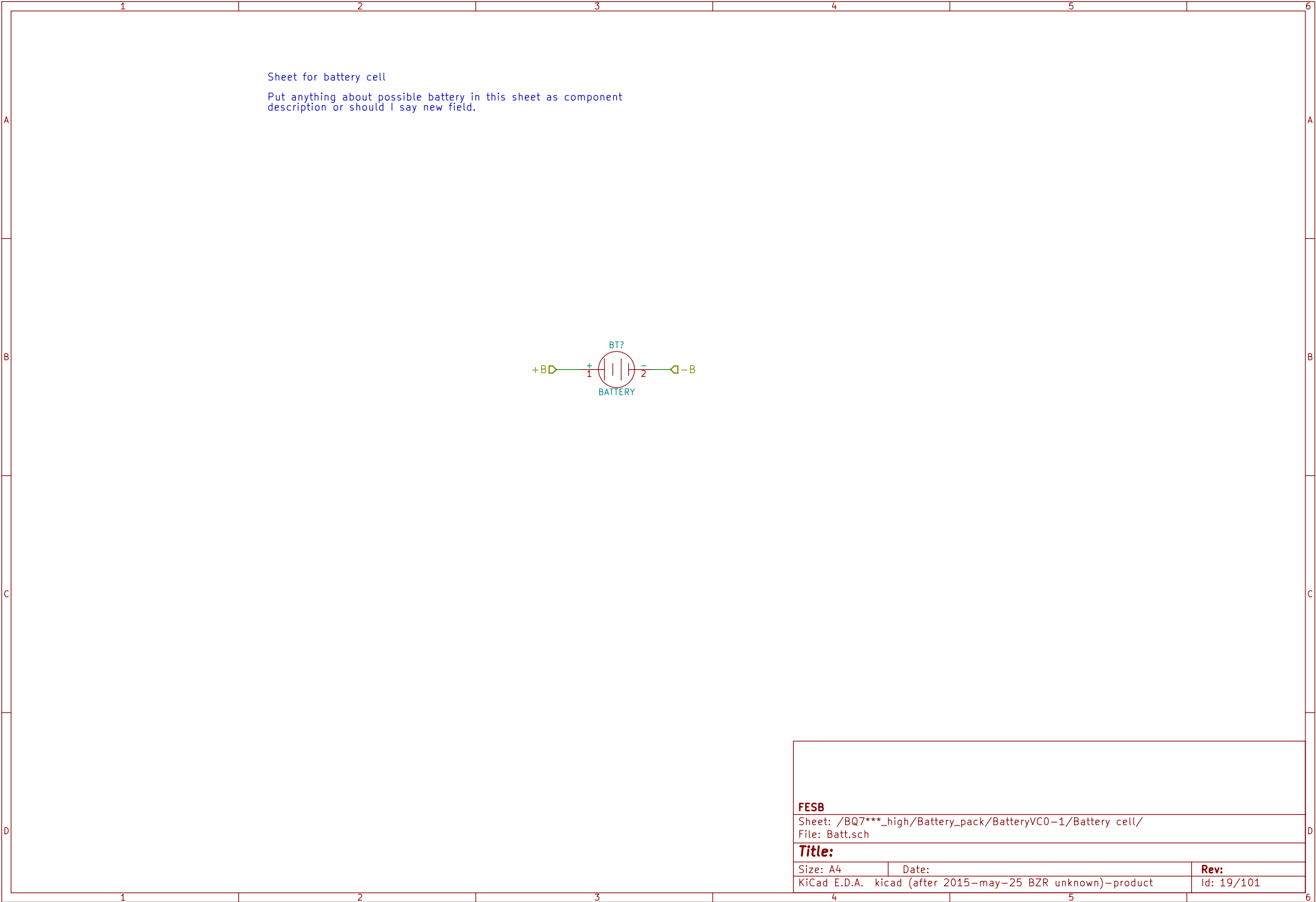
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC0-1/
File: Batt_ball_cap.sch

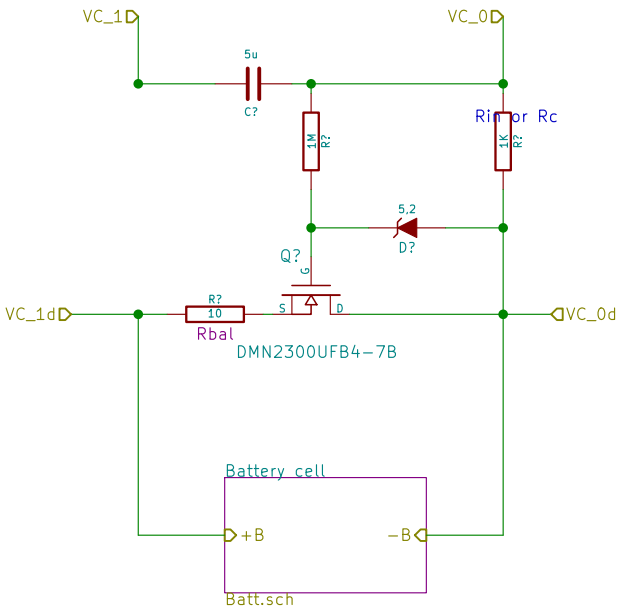
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 18/101



This is just mesurment and balancing circuit



FESB

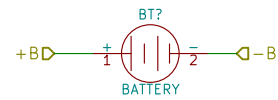
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File: Batt_ball.sch

Title:

Size: A4 Date: Rev:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Id: 20/101

Put anything about possible battery in this sheet as component description or should I say new field.



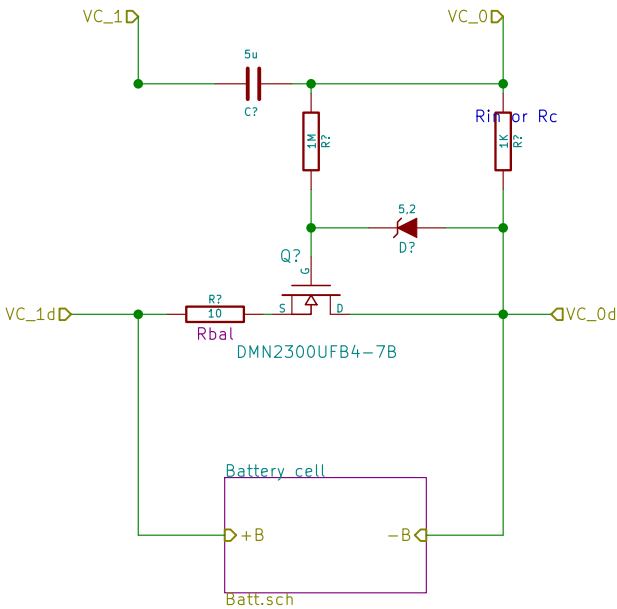
Sheet: /BQ7***_high/Battery_pack/BatteryVC7-8/Battery cell/
File: Batt.sch

| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 21/101

This is just mesurment and balancing circuit



FESB

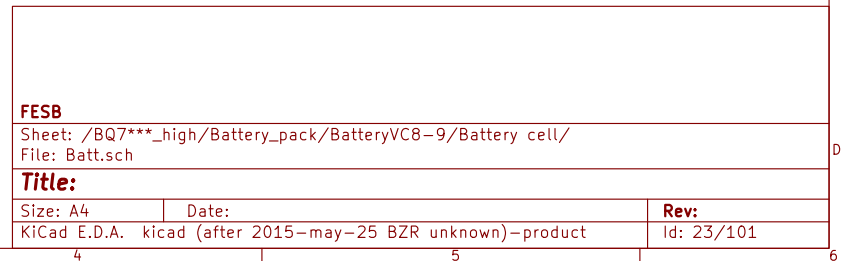
Sheet: /BQ7***_high/Battery_pack/BatteryVC8-9/
File: Batt_ball.sch

Title:

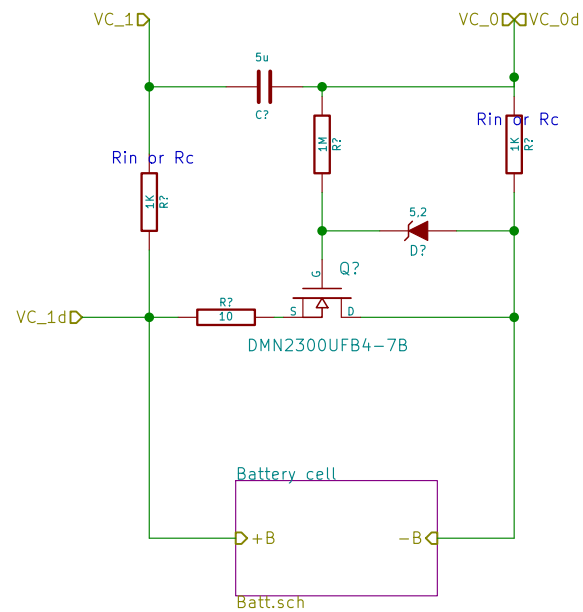
Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 22/101

Put anything about possible battery in this sheet as component description or should I say new field.



This is just mesurment and balancing circuit



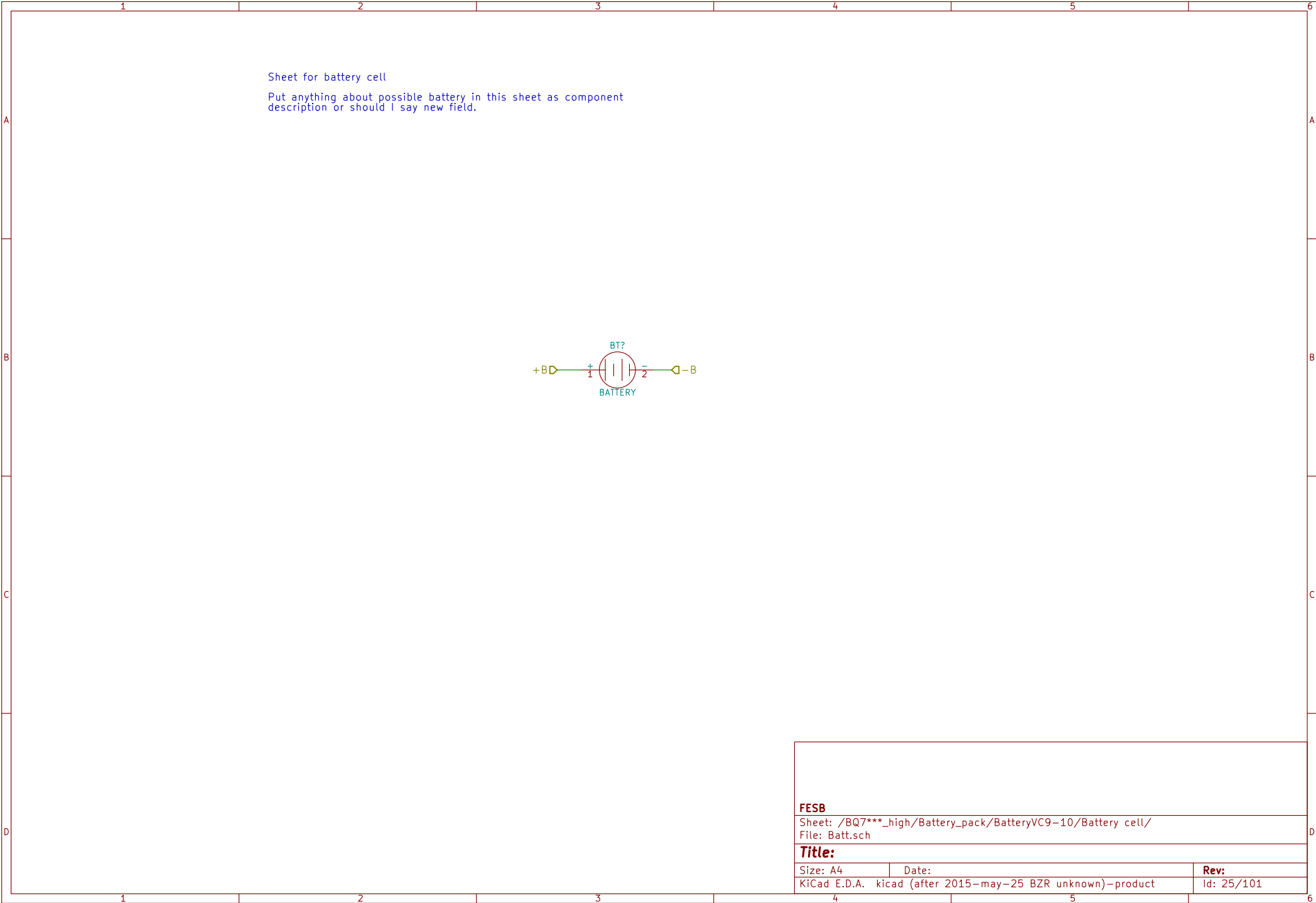
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC9-10/
File: Batt_ball_end.sch

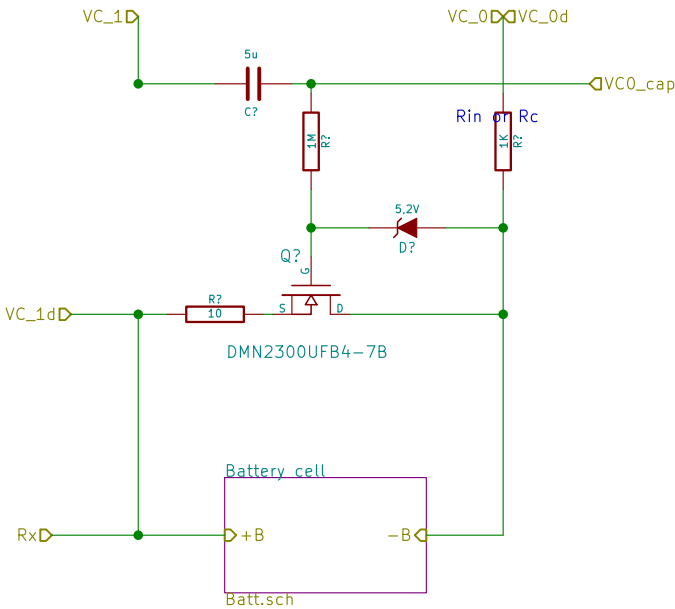
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 24/101



This is just mesurment and balancing circuit



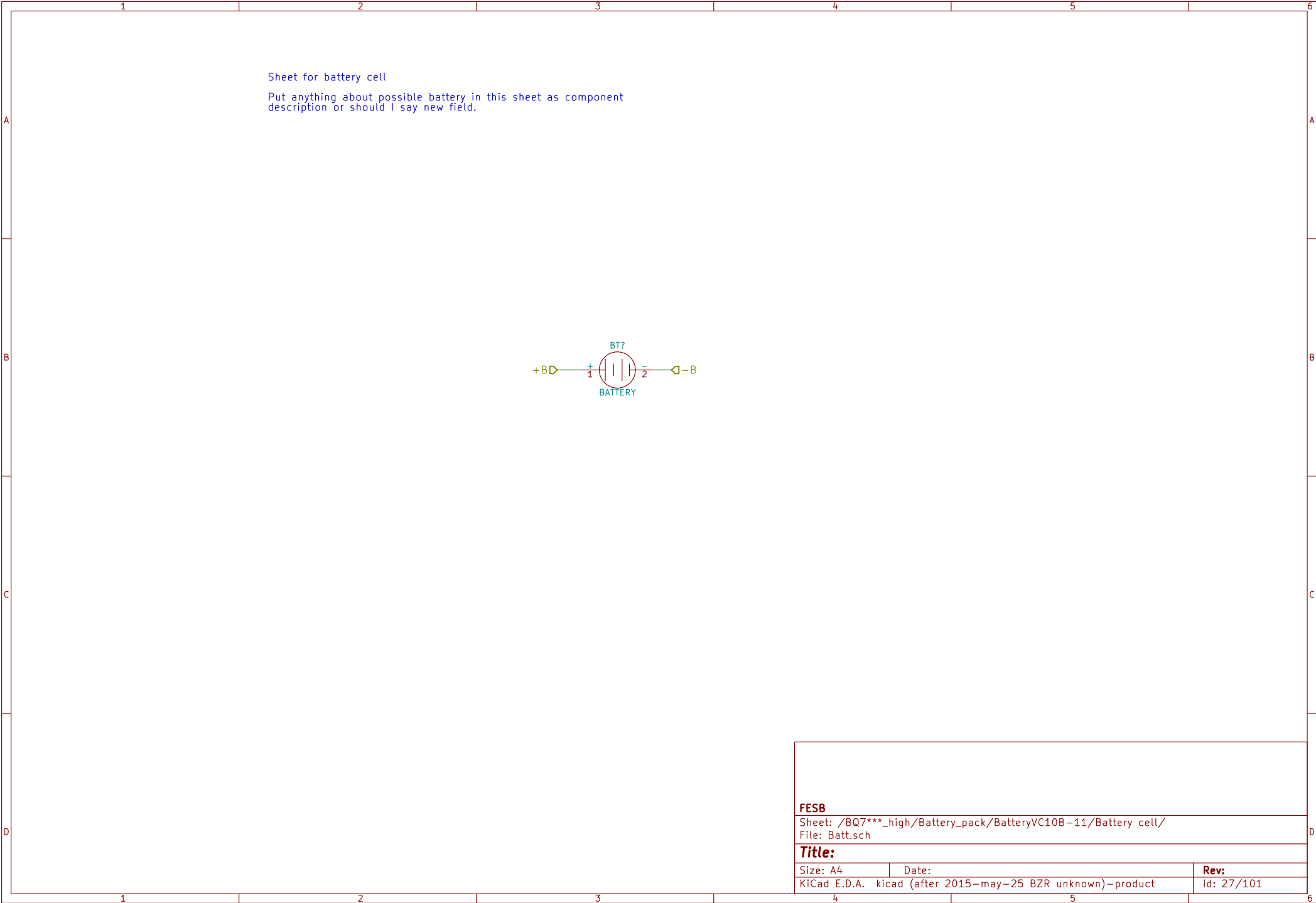
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC10B-11/
File: Batt_ball_cap.sch

Title:

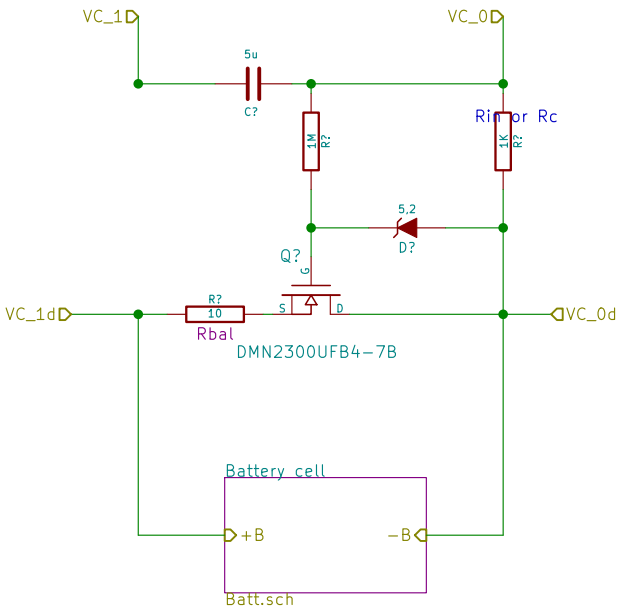
Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 26/101

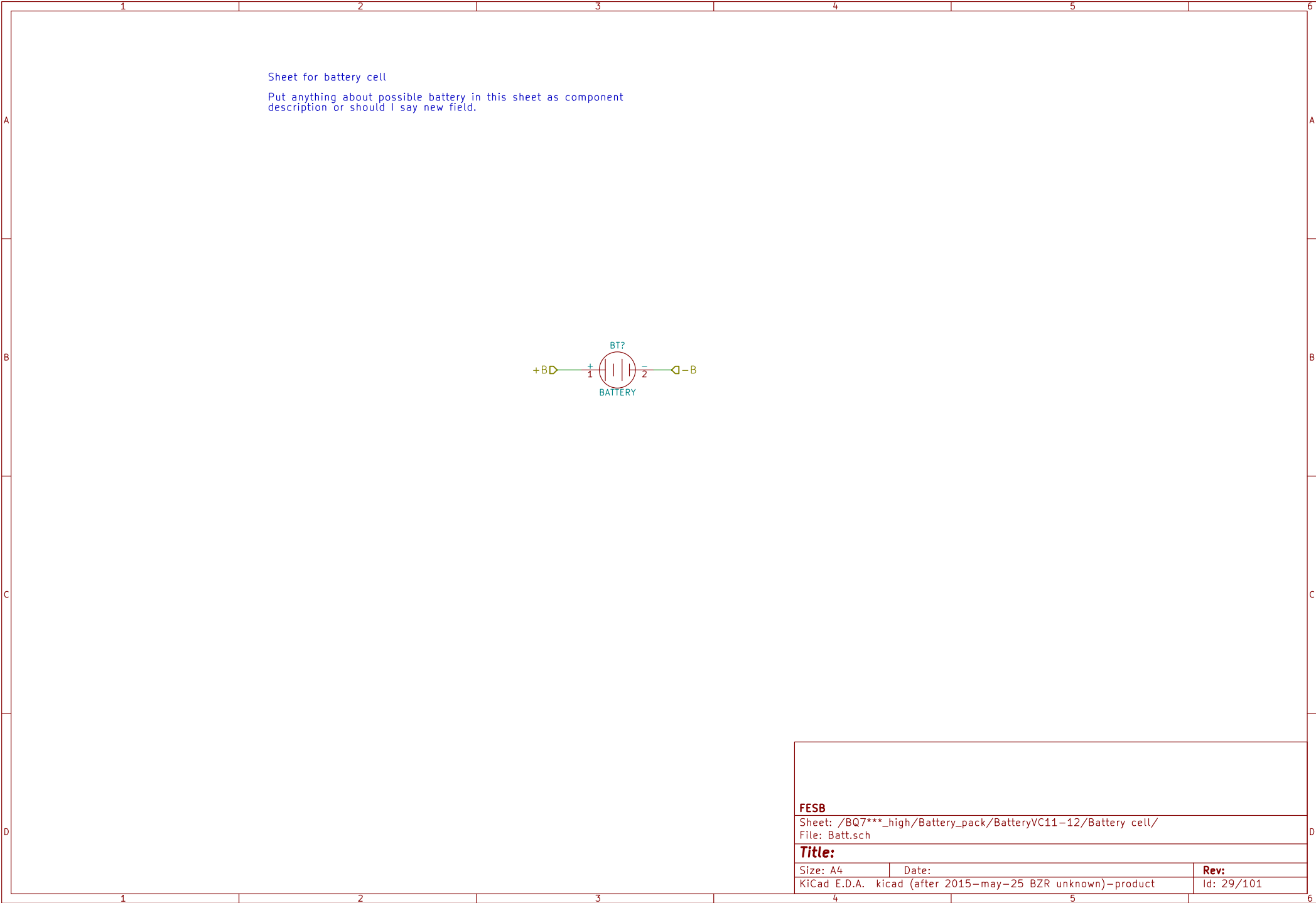


| | | |
|--|-------|------------|
| FESB | | |
| Sheet: /BQ7***_high/Battery_pack/BatteryVC10B-11/Battery cell/ | | |
| File: Batt.sch | | |
| Title: | | |
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 27/101 |

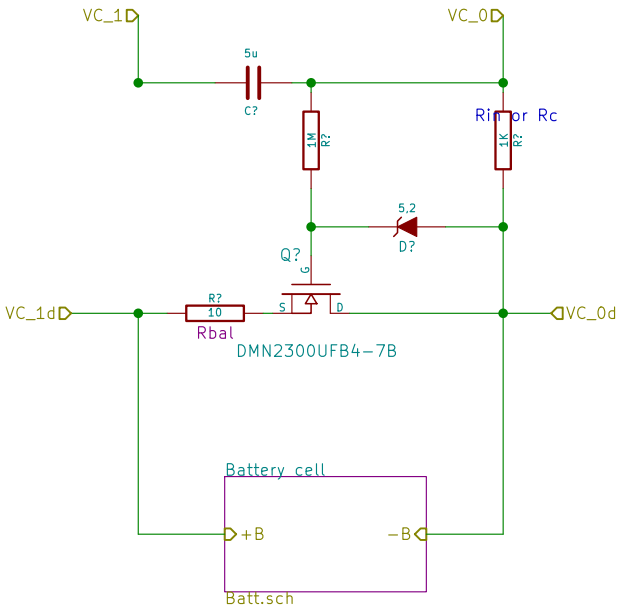
This is just mesurment and balancing circuit



| | | |
|--|-------|------------|
| FESB | | |
| Sheet: /BQ7***_high/Battery_pack/BatteryVC11-12/ | | |
| File: Batt_ball.sch | | |
| Title: | | |
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 28/101 |



This is just mesurment and balancing circuit



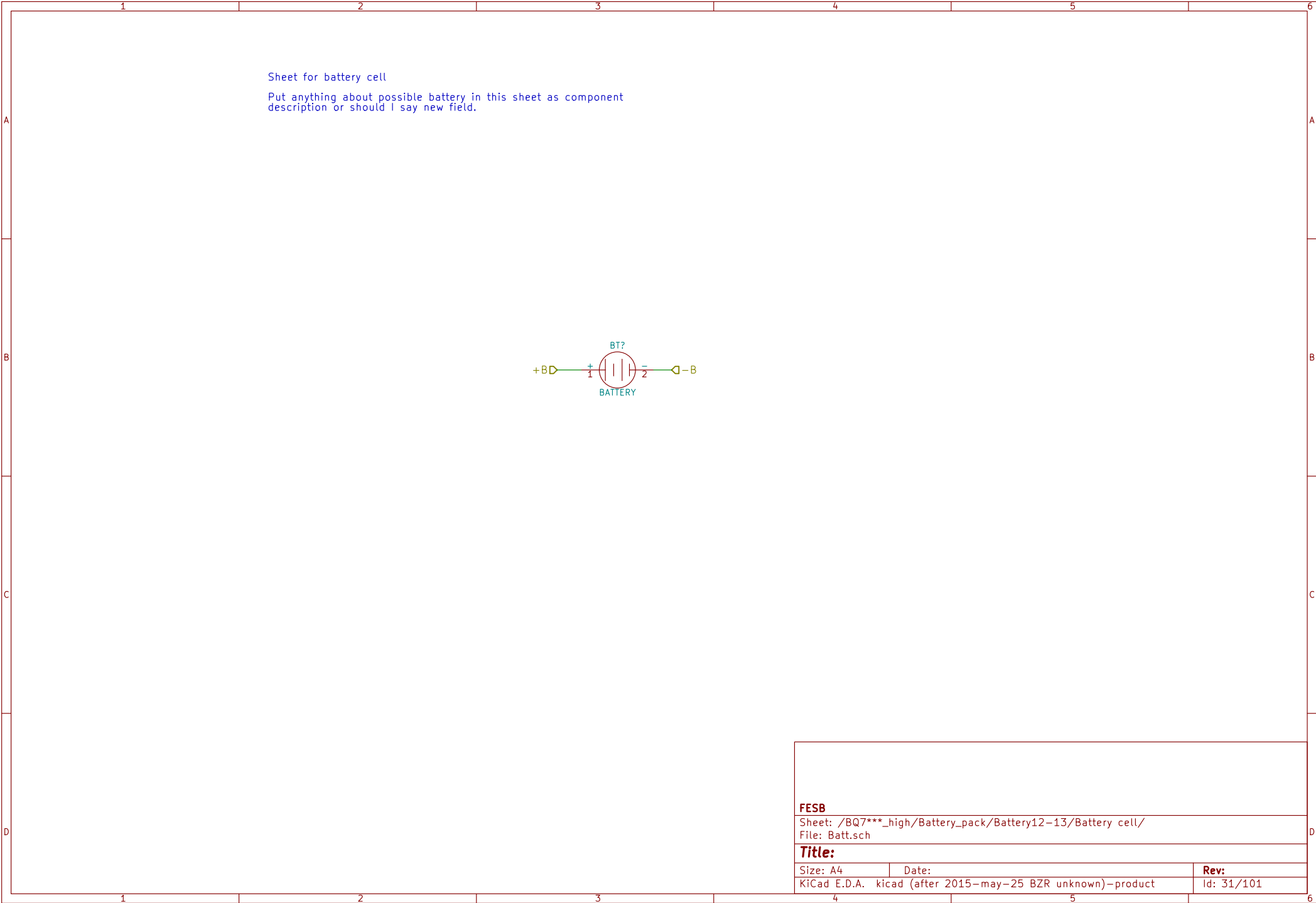
FESB

Sheet: /BQ7***_high/Battery_pack/Battery12-13/
File: Batt_ball.sch

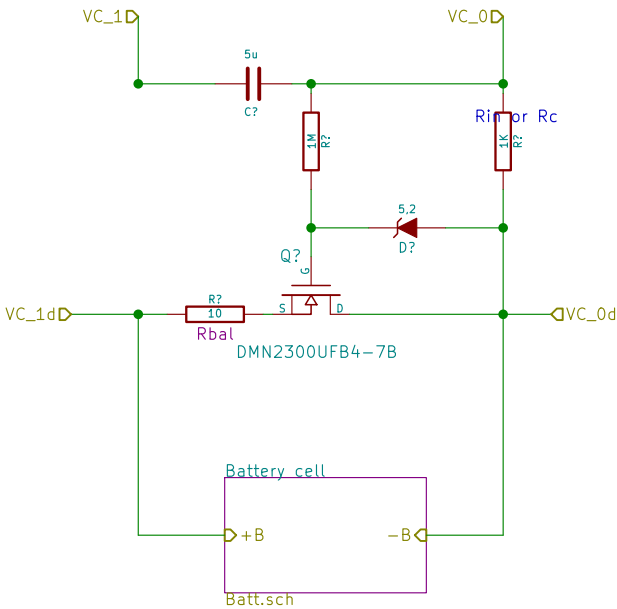
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 30/101



This is just mesurment and balancing circuit



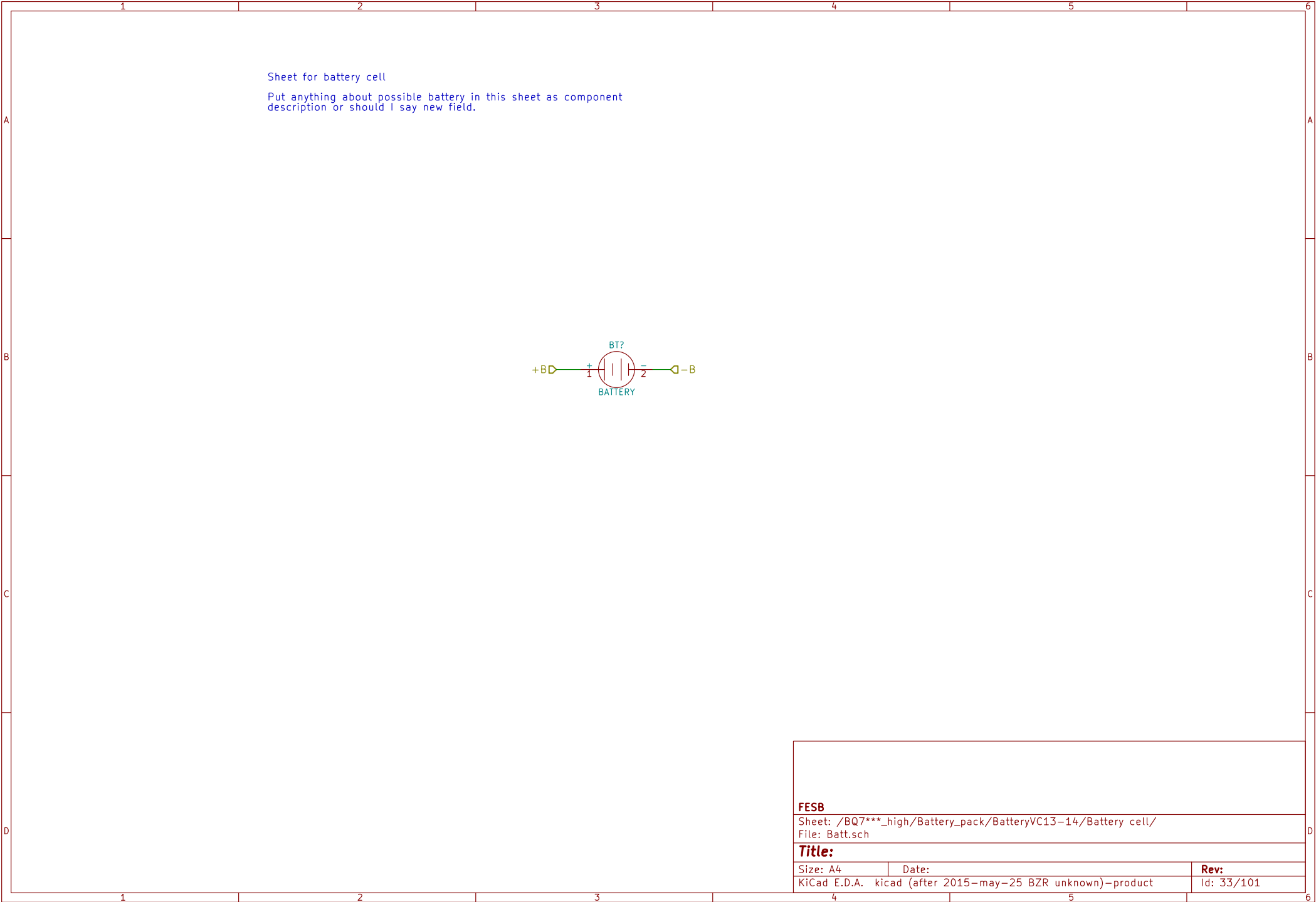
FESB

Sheet: /BQ7***_high/Battery_pack/BatteryVC13-14/
File: Batt_ball.sch

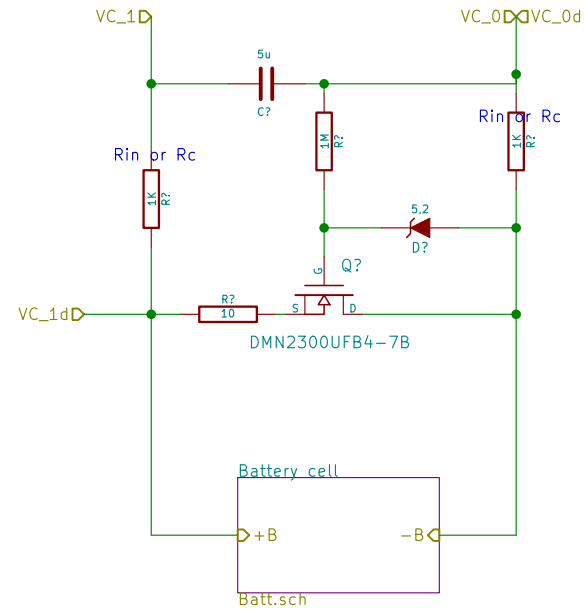
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 32/101



This is just mesurment and balancing circuit



FESB

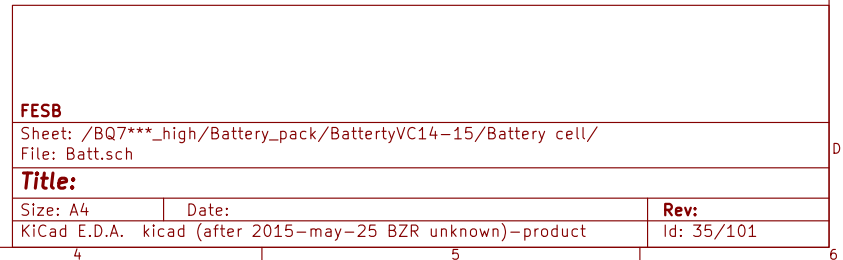
Sheet: /BQ7***_high/Battery_pack/BatteryVC14-15/
File: Batt_ball_end.sch

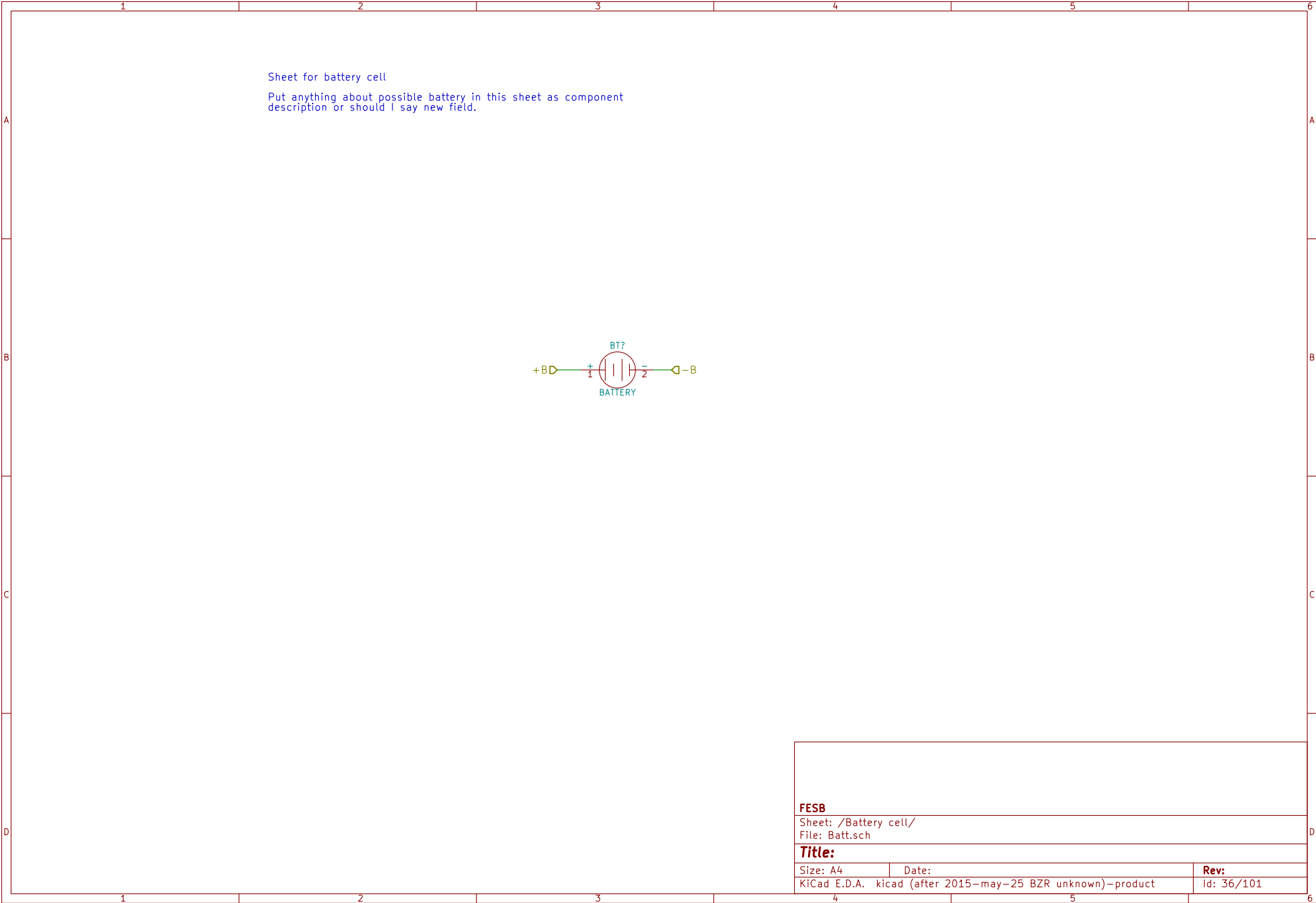
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

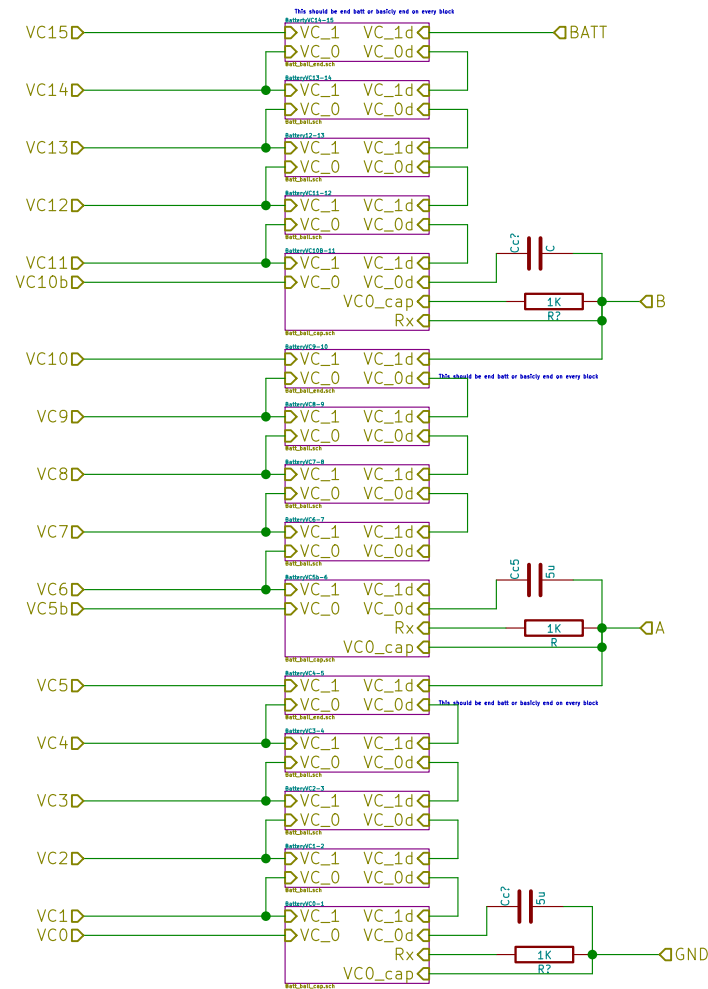
Rev:
Id: 34/101

Put anything about possible battery in this sheet as component description or should I say new field.





Mess bellow. Batt_ball circuit are sharing every pin except last and first
 So because they are sharing pin they are sharing a Rin so only
 last should have it.(IN every block).



FESB

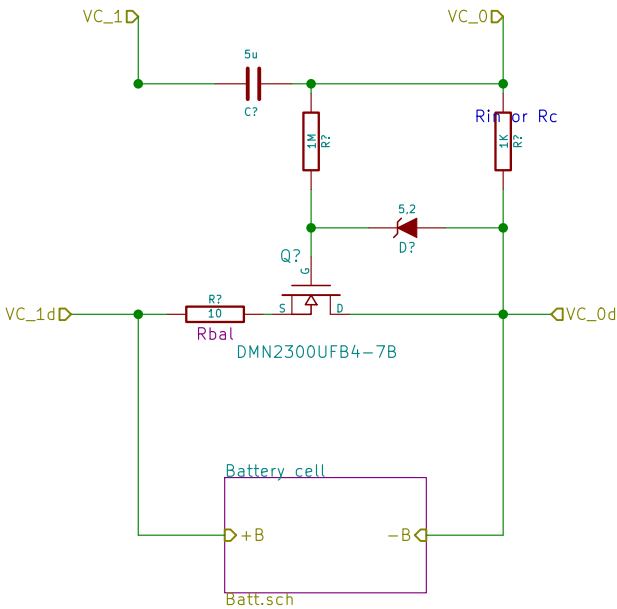
Sheet: /Battery_pack/
 File: Batt_pack.sch

Title: Battery Pack

Size: A4 Date:
 KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
 Id: 37/101

This is just mesurment and balancing circuit



FESB

Sheet: /Battery_pack/BatteryVC1-2/
File: Batt_ball.sch

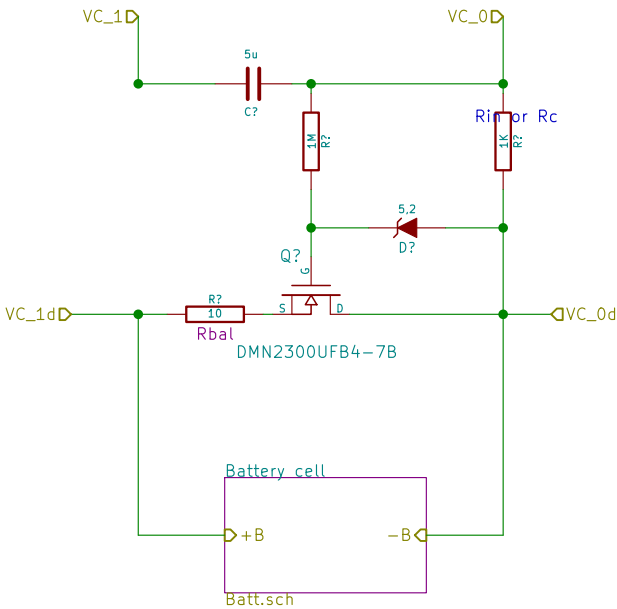
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 38/101

| | | | | | | |
|---|--|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| A | <div> <div>Sheet for battery cell</div> <div>Put anything about possible battery in this sheet as component description or should I say new field.</div> </div> | | | | | |
| B | <div> </div> | | | | | |
| C | | | | | | |
| D | <div> <div>FESB</div> <div>Sheet: /Battery_pack/BatteryVC1-2/Battery cell/</div> <div>File: Batt.sch</div> <div>Title:</div> <div> <div>Size: A4</div> <div>Date:</div> <div>Rev:</div> </div> <div> <div>KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product</div> <div>Id: 39/101</div> </div> </div> | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |

This is just mesurment and balancing circuit



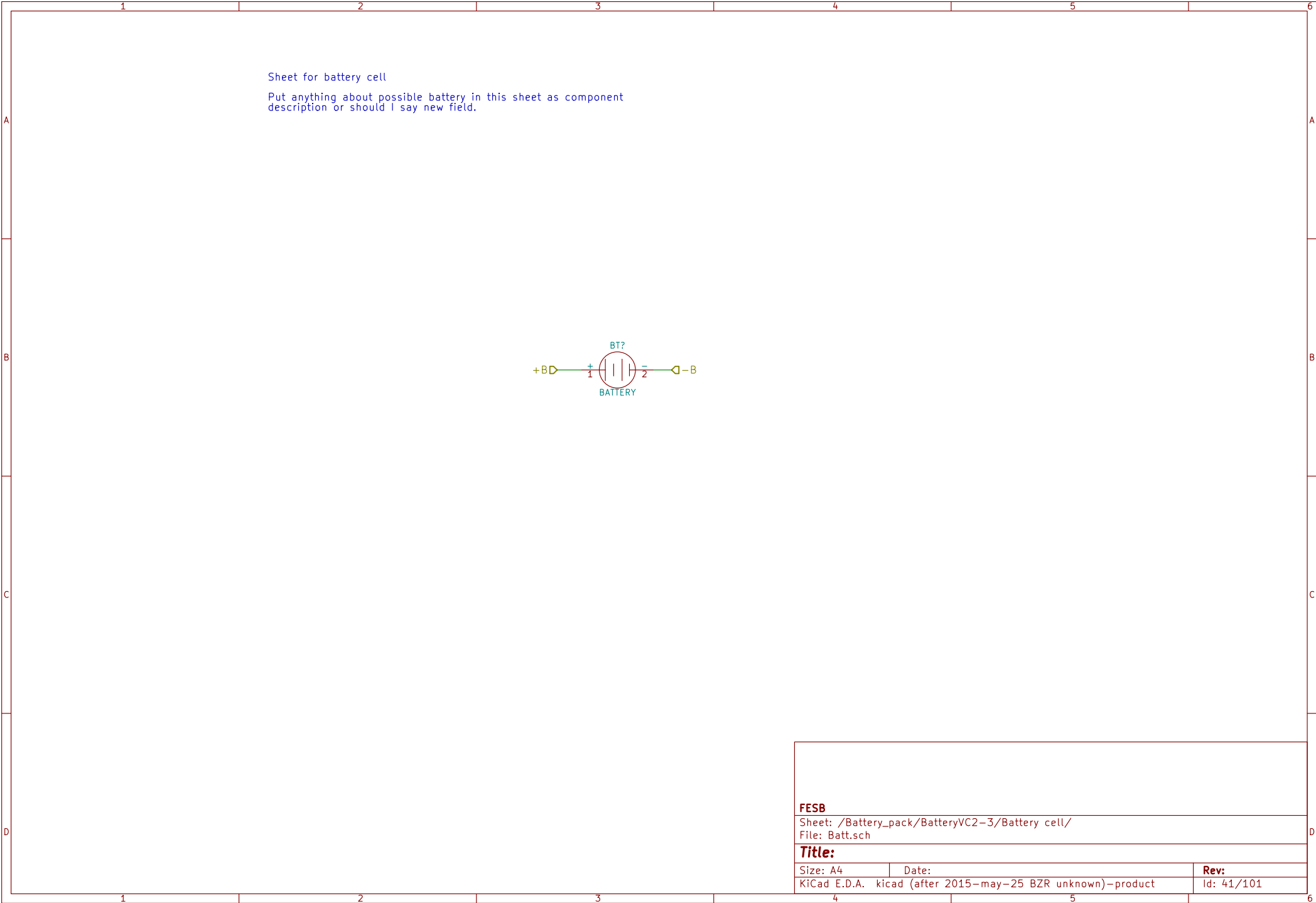
FESB

Sheet: /Battery_pack/BatteryVC2-3/
File: Batt_ball.sch

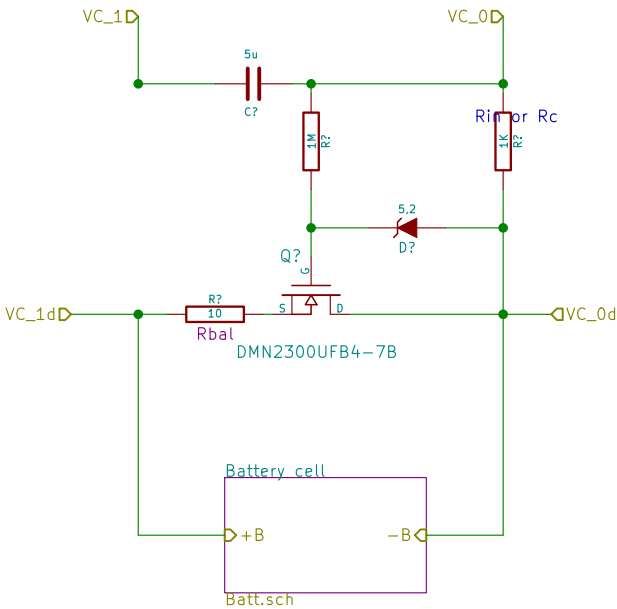
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 40/101



This is just mesurment and balancing circuit



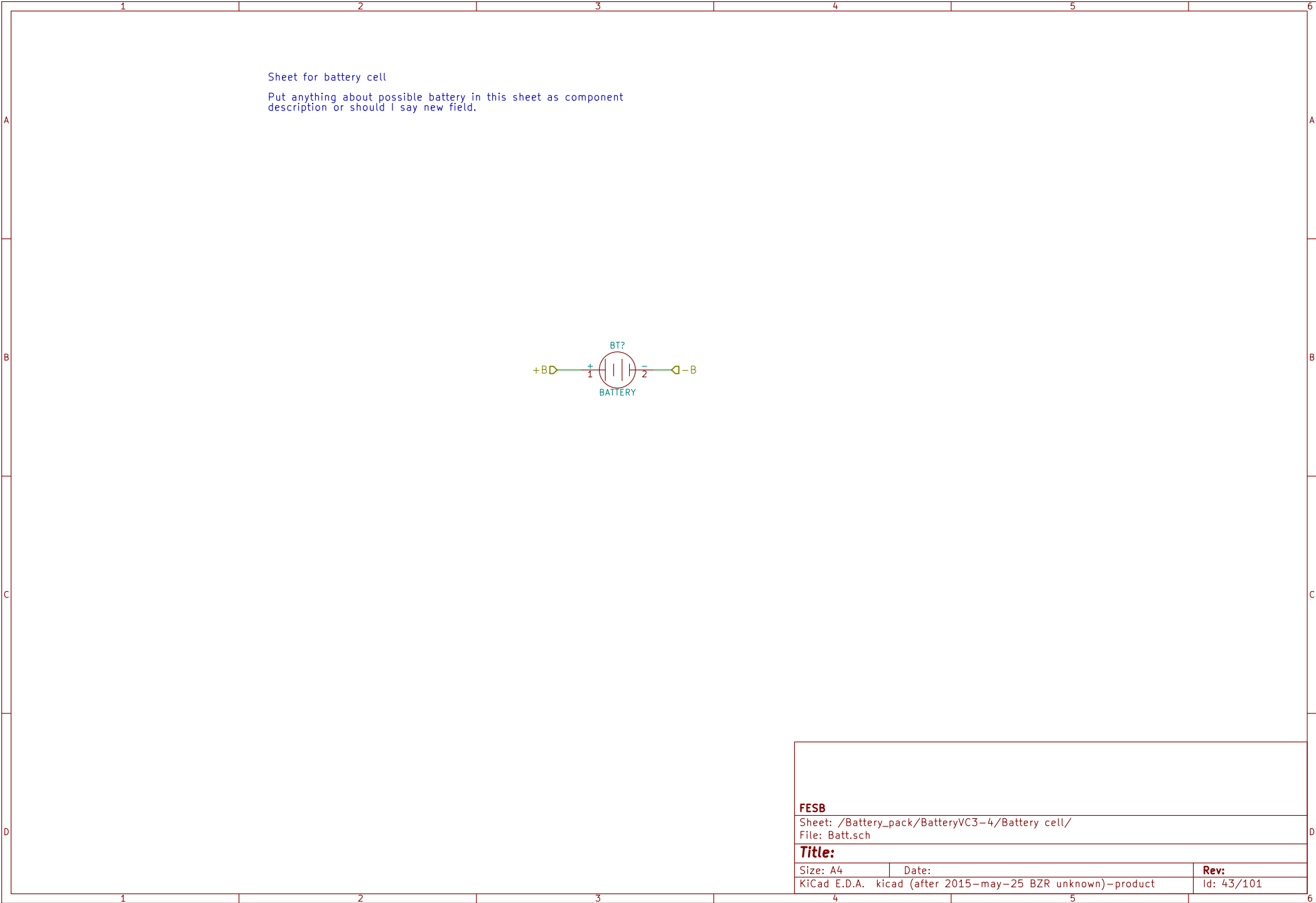
FESB

Sheet: /Battery_pack/BatteryVC3-4/
File: Batt_ball.sch

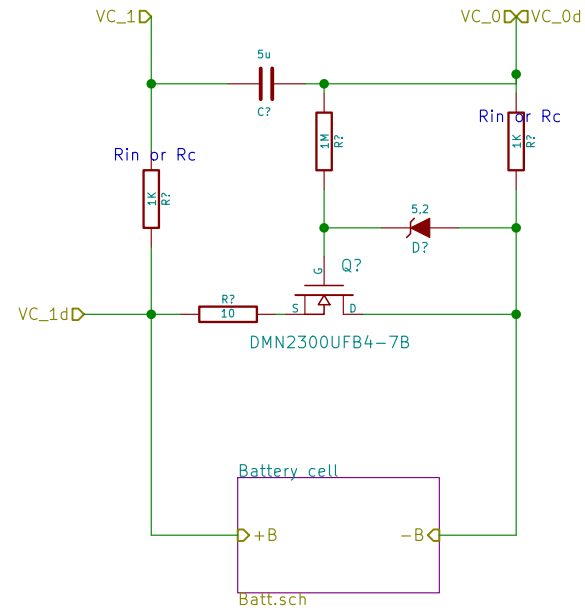
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 42/101



This is just mesurment and balancing circuit



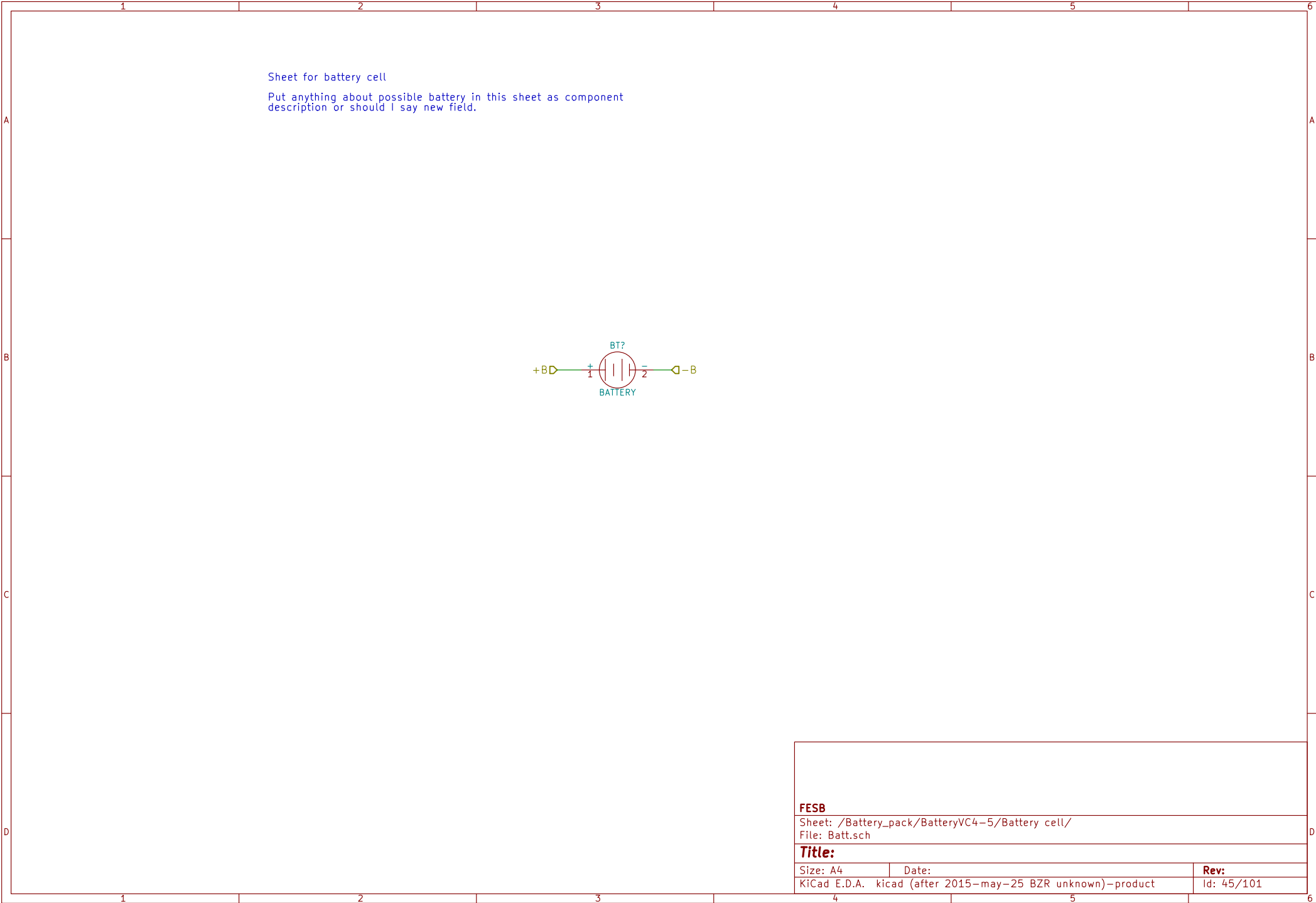
FESB

Sheet: /Battery_pack/BatteryVC4-5/
File: Batt_ball_end.sch

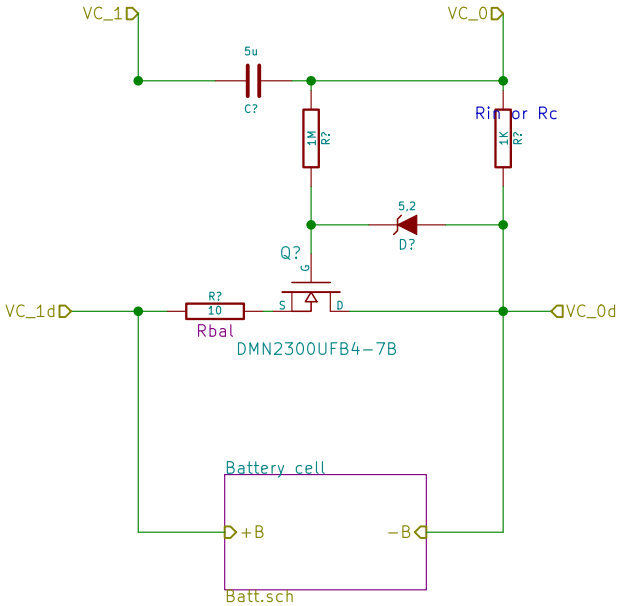
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 44/101



This is just mesurment and balancing circuit



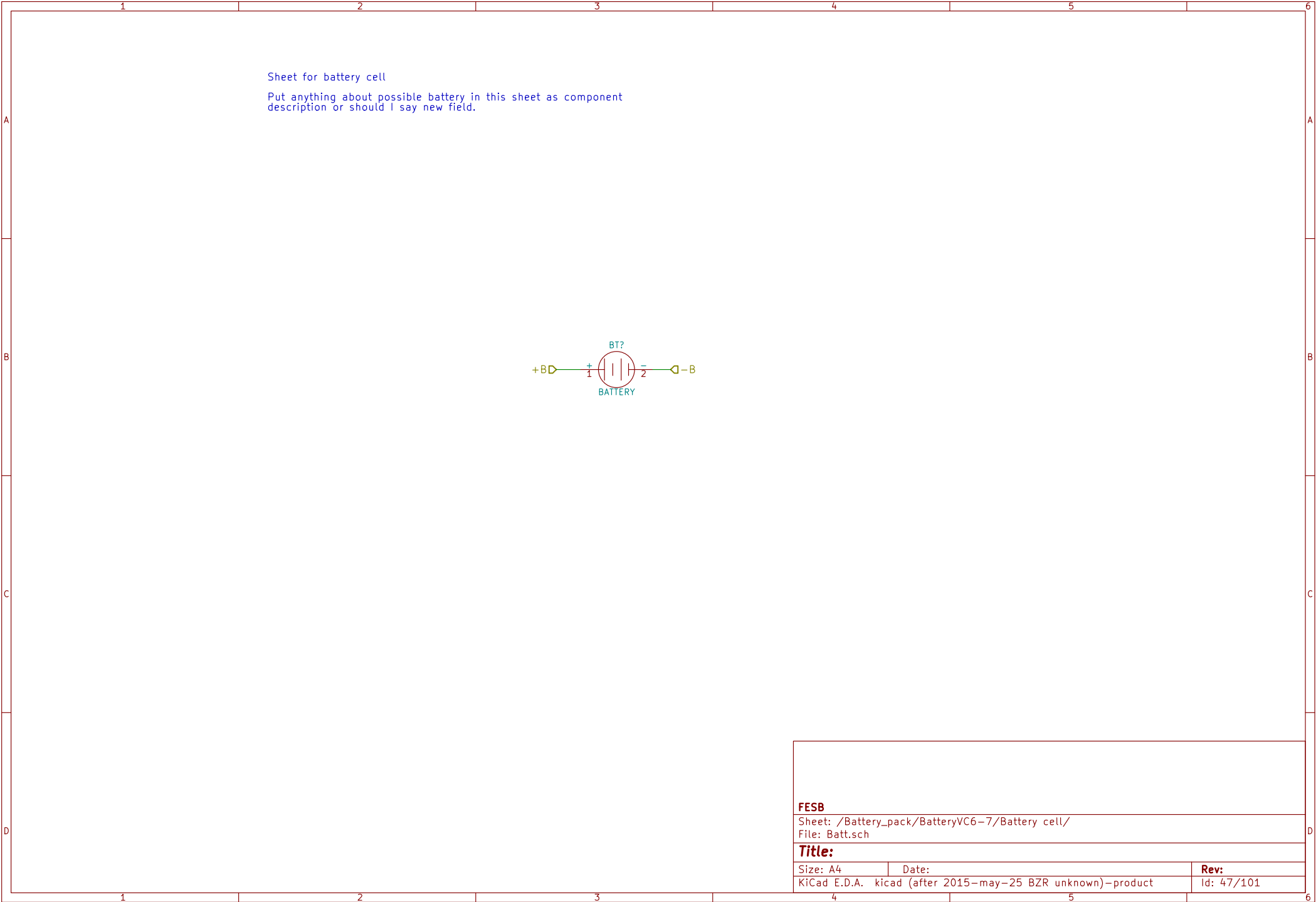
FESB

Sheet: /Battery_pack/BatteryVC6-7/
File: Batt_ball.sch

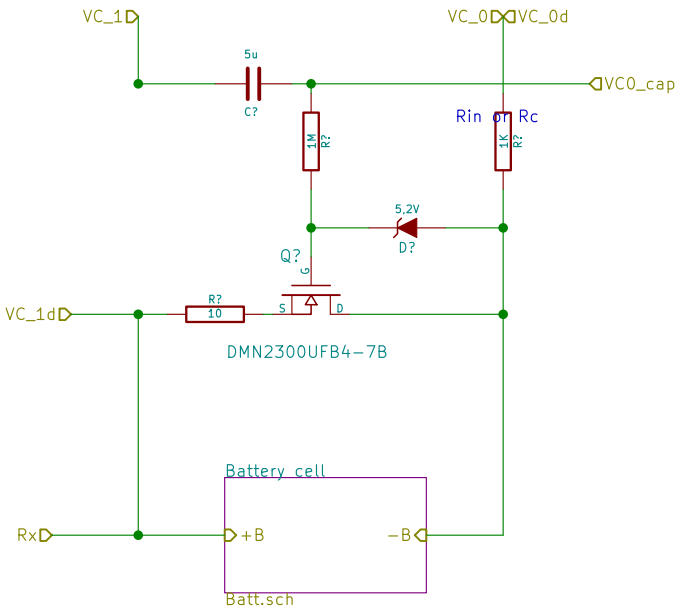
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 46/101



This is just mesurment and balancing circuit



FESB

Sheet: /Battery_pack/BatteryVC5b-6/
File: Batt_ball_cap.sch

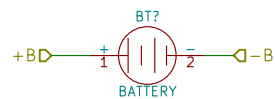
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 48/101

Sheet for battery cell

Put anything about possible battery in this sheet as component
description or should I say new field.



FESB

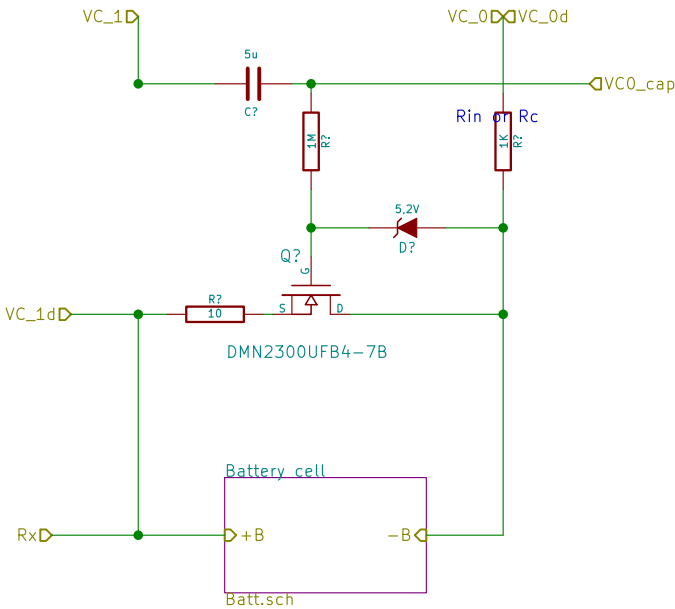
Sheet: /Battery_pack/BatteryVC5b-6/Battery cell/
File: Batt.sch

Title:

Size: A4 Date: **Rev:**
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Id: 49/101

This is just mesurment and balancing circuit



FESB

Sheet: /Battery_pack/BatteryVC0-1/
File: Batt_ball_cap.sch

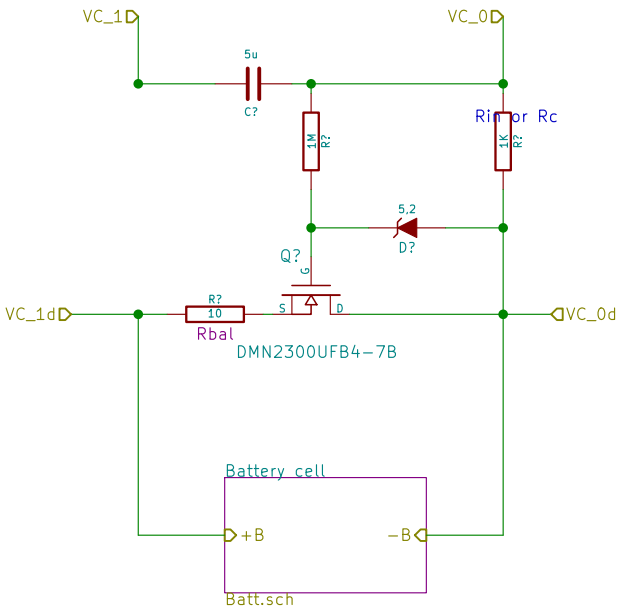
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 50/101

| | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| A | <div> <div>Sheet for battery cell</div> <div>Put anything about possible battery in this sheet as component description or should I say new field.</div> </div> | | | | | |
| B | <div> </div> | | | | | |
| C | | | | | | |
| D | <div> <div>FESB</div> <div> <div>Sheet: /Battery_pack/BatteryVC0-1/Battery cell/</div> <div>File: Batt.sch</div> </div> <div>Title:</div> <div> <div>Size: A4</div> <div>Date:</div> <div>Rev:</div> </div> <div> <div>KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product</div> <div>Id: 51/101</div> </div> </div> | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |

This is just mesurment and balancing circuit



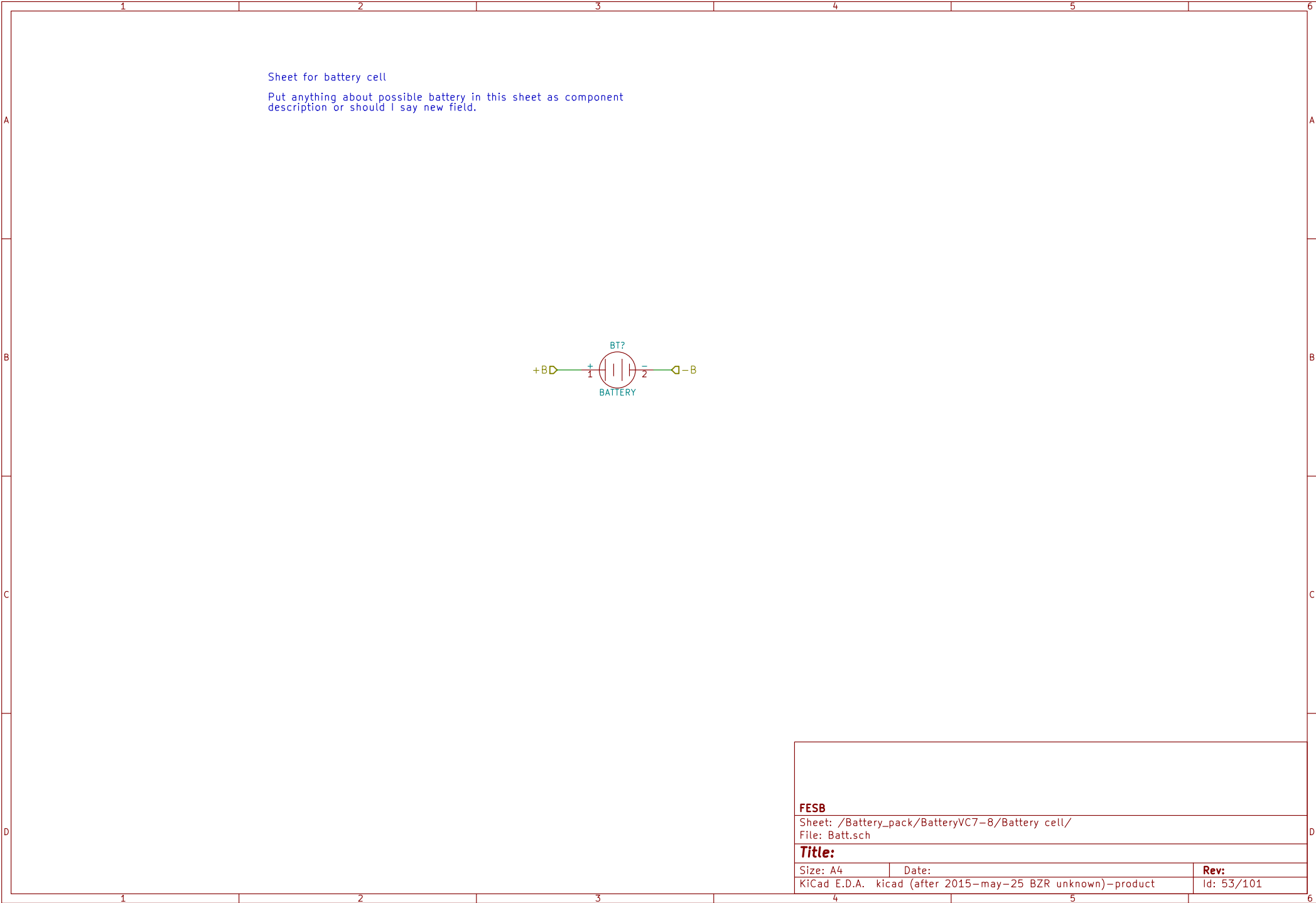
FESB

Sheet: /Battery_pack/BatteryVC7-8/
File: Batt_ball.sch

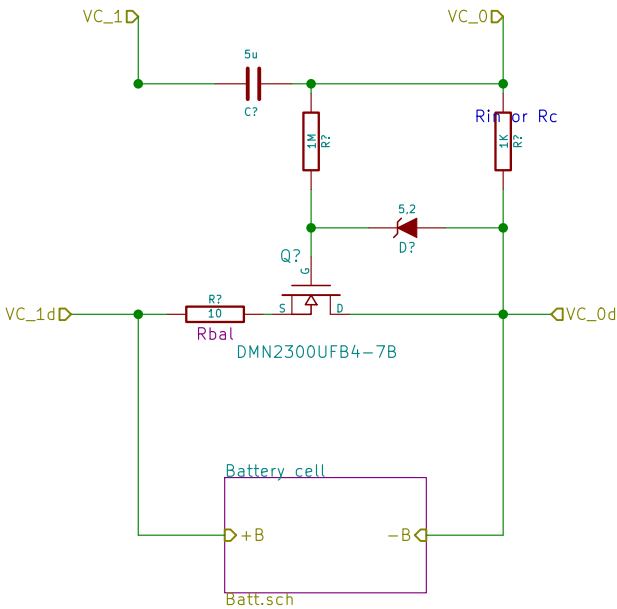
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 52/101



This is just mesurment and balancing circuit



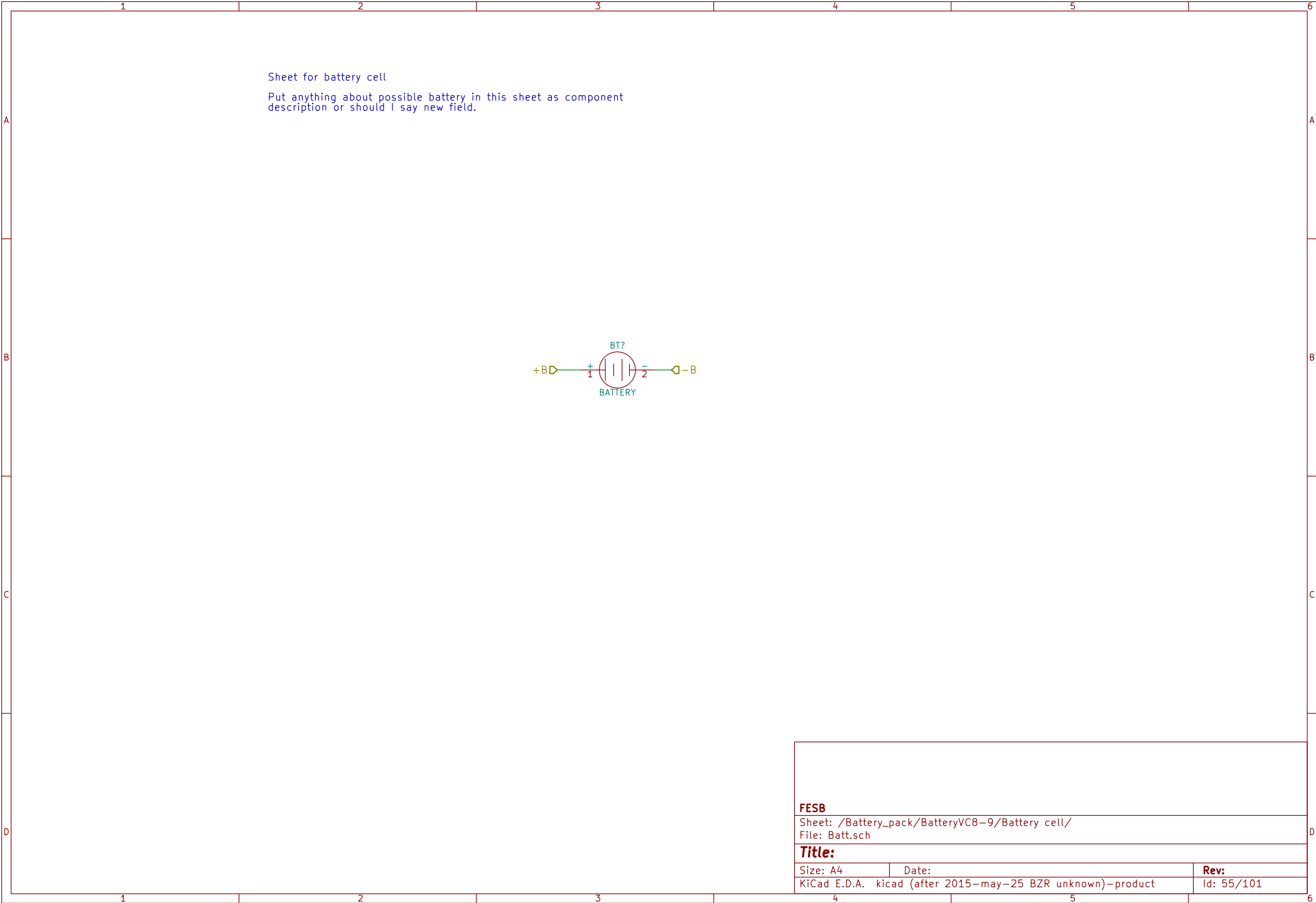
FESB

Sheet: /Battery_pack/BatteryVC8-9/
File: Batt_ball.sch

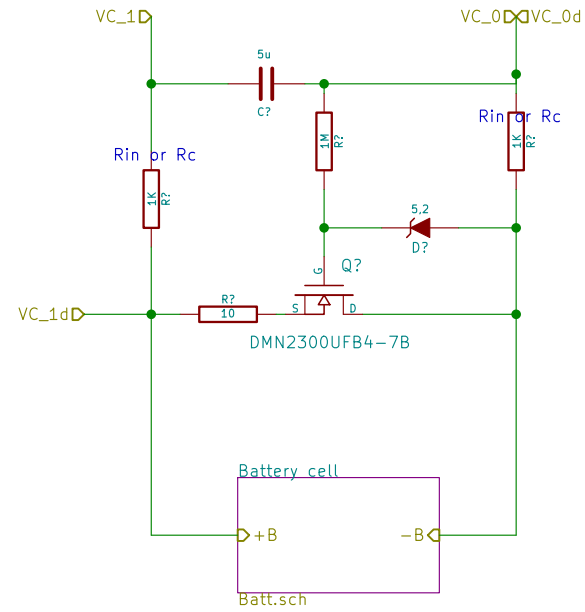
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 54/101



This is just mesurment and balancing circuit



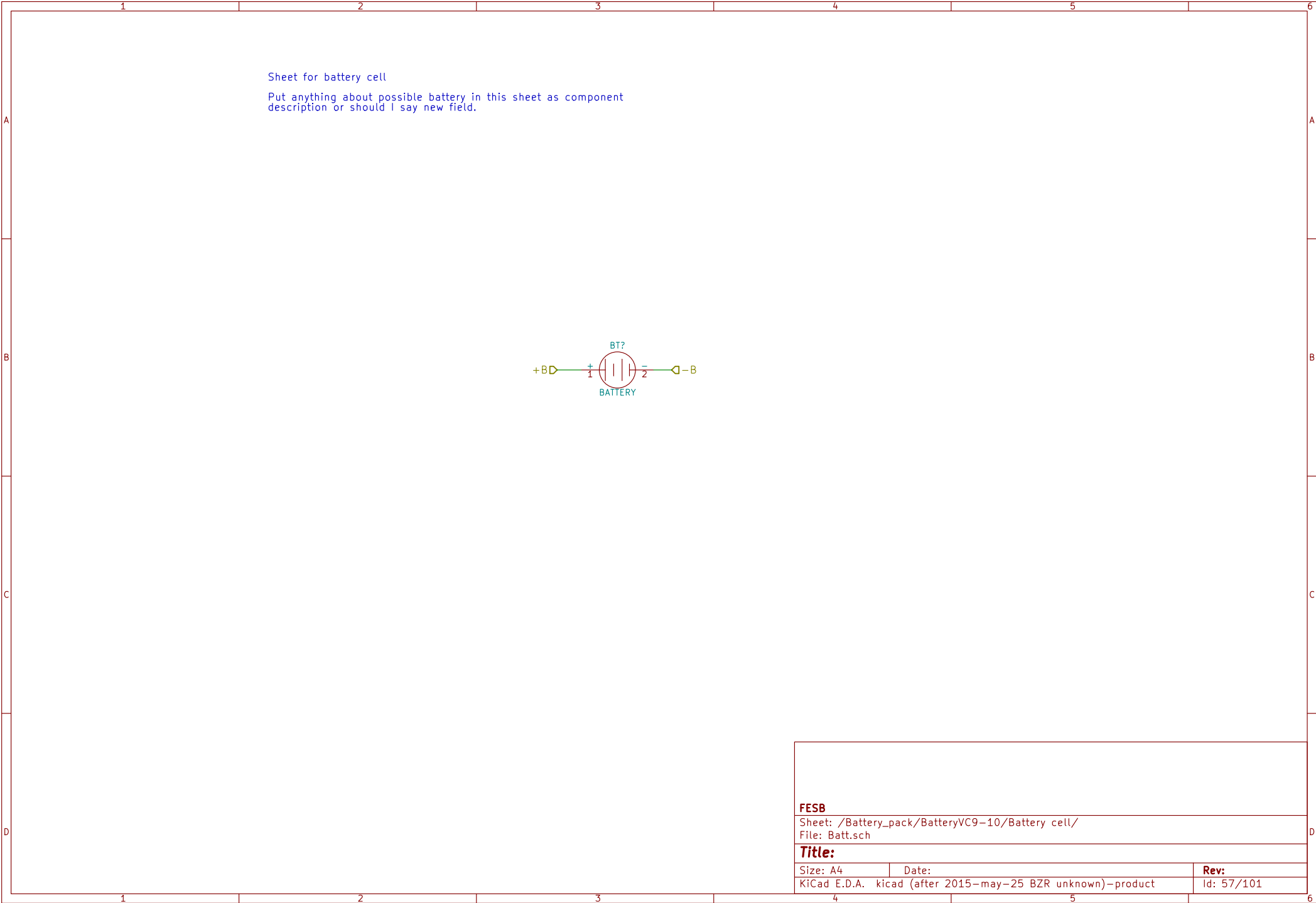
FESB

Sheet: /Battery_pack/BatteryVC9-10/
File: Batt_ball_end.sch

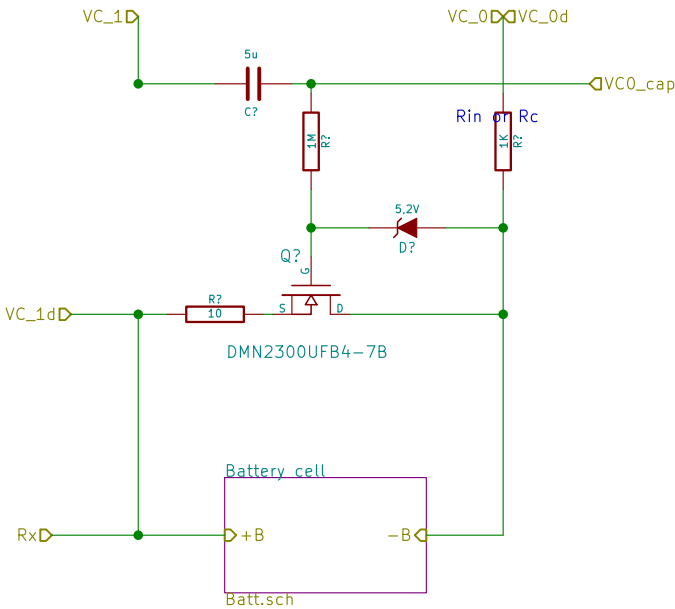
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 56/101



This is just mesurment and balancing circuit



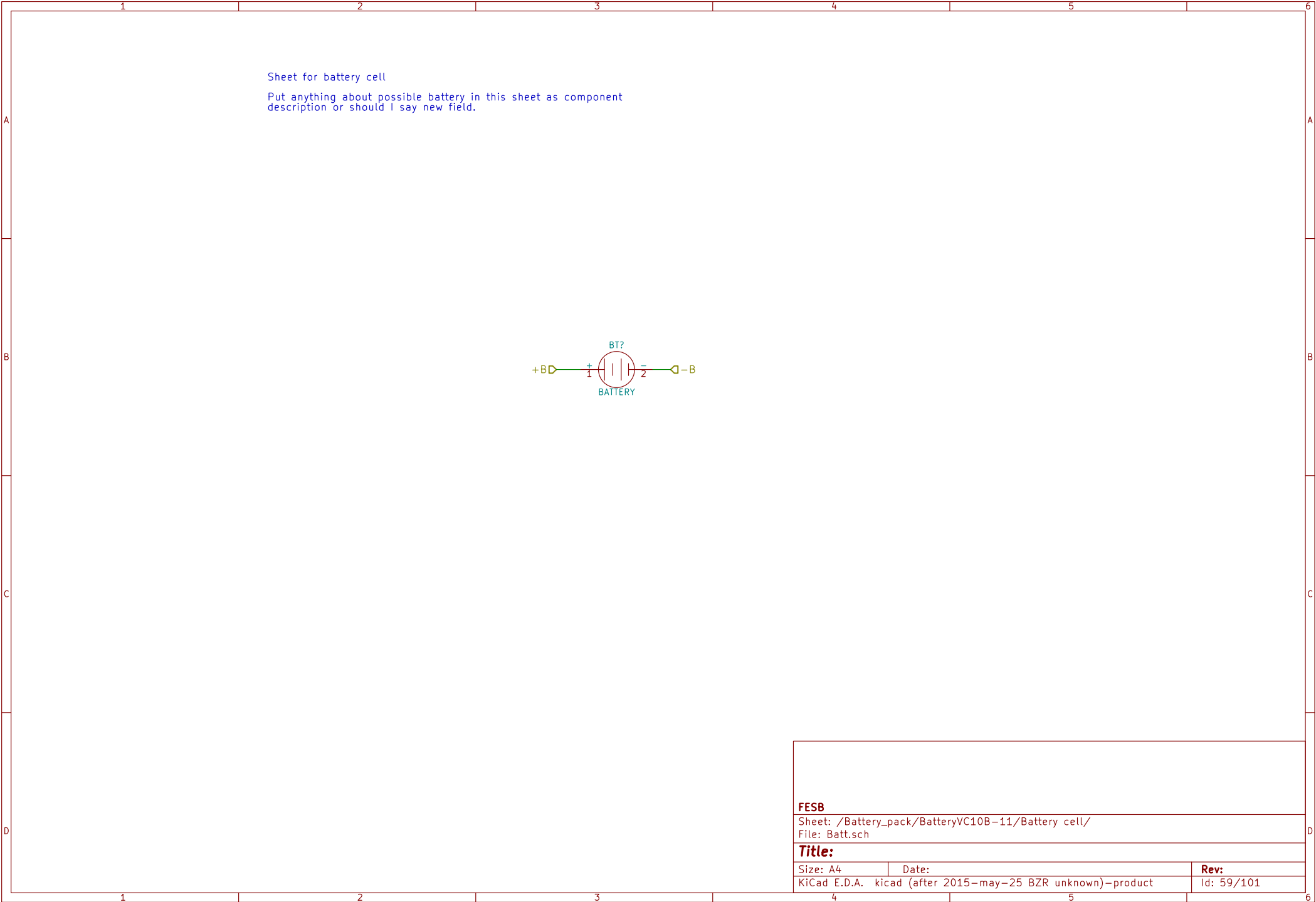
FESB

Sheet: /Battery_pack/BatteryVC10B-11/
File: Batt_ball_cap.sch

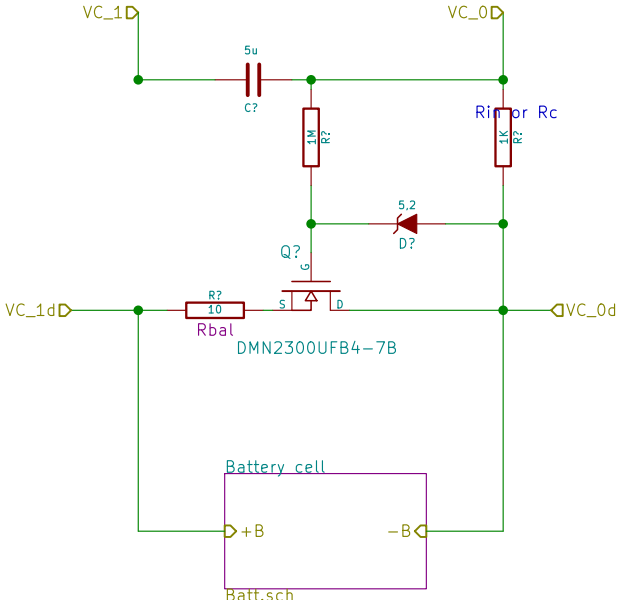
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 58/101



This is just measurement and balancing circuit



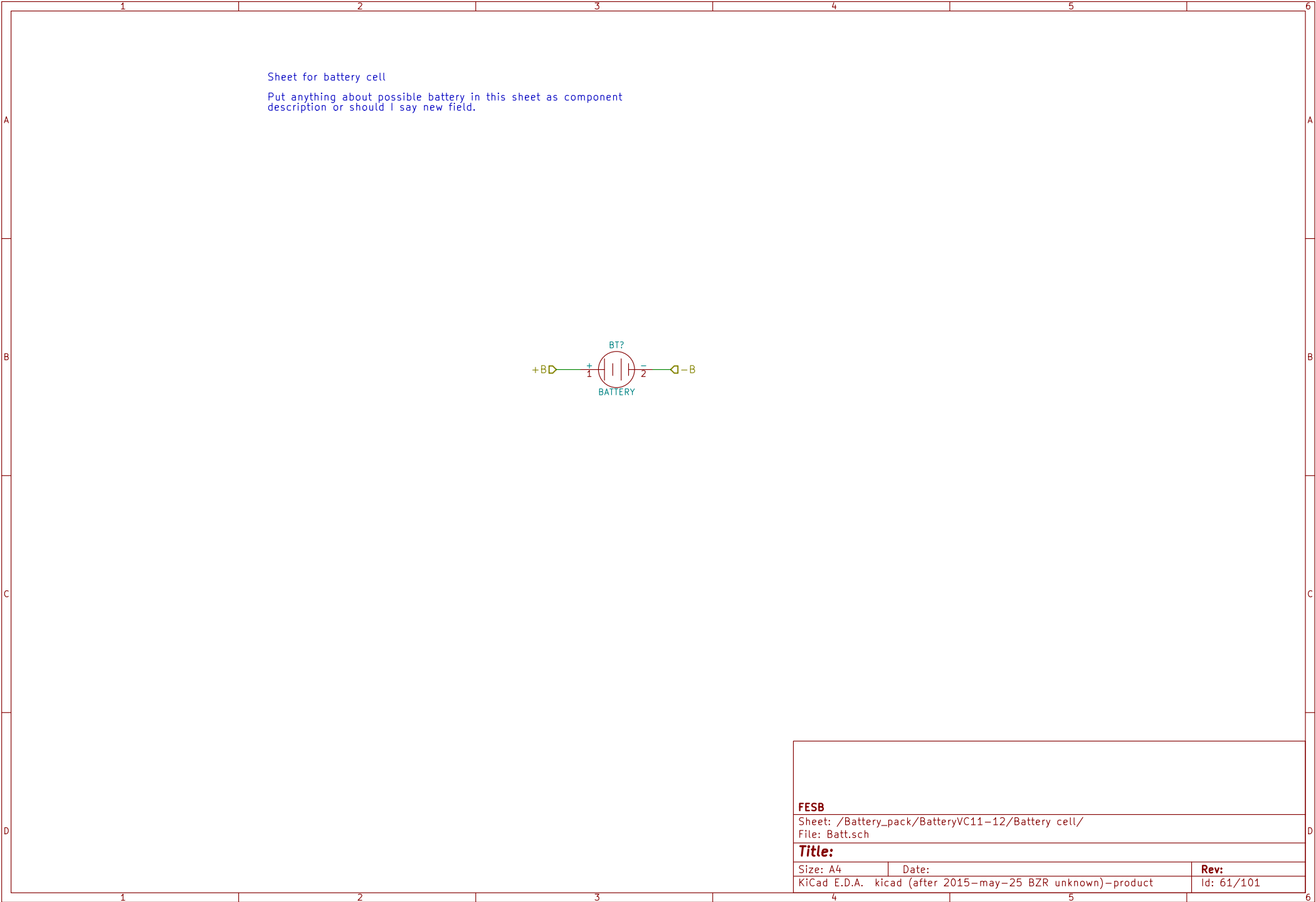
FESB

Sheet: /Battery_pack/BatteryVC11-12/
File: Batt_ball.sch

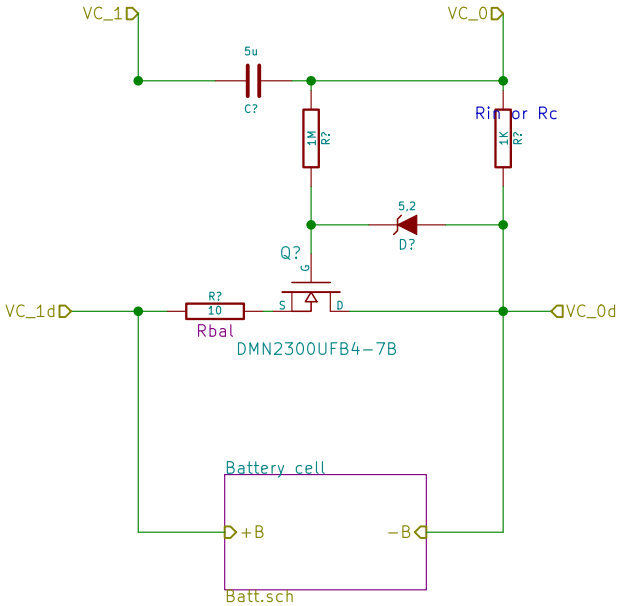
Title:

| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

Rev: 1.0
Id: 60/101



This is just mesurment and balancing circuit



FESB

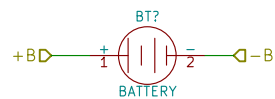
Sheet: /Battery_pack/Battery12-13/
File: Batt_ball.sch

Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 62/101

Put anything about possible battery in this sheet as component description or should I say new field.



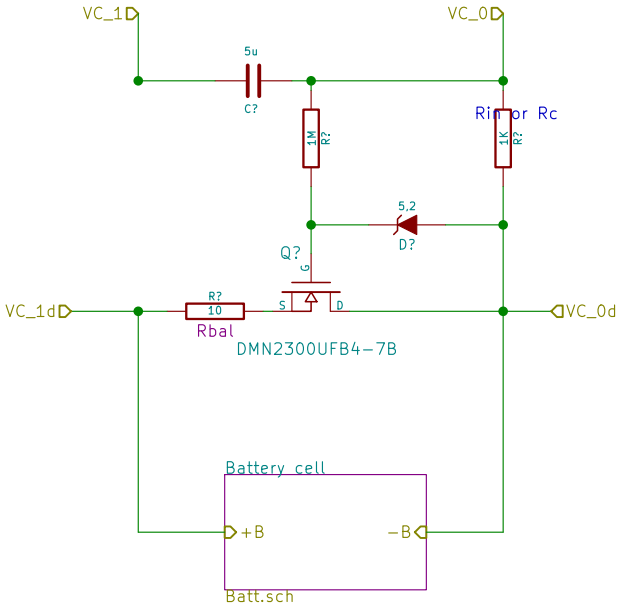
Sheet: /Battery_pack/Battery12-13/Battery cell/
File: Batt.sch

| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 63/101

This is just mesurment and balancing circuit



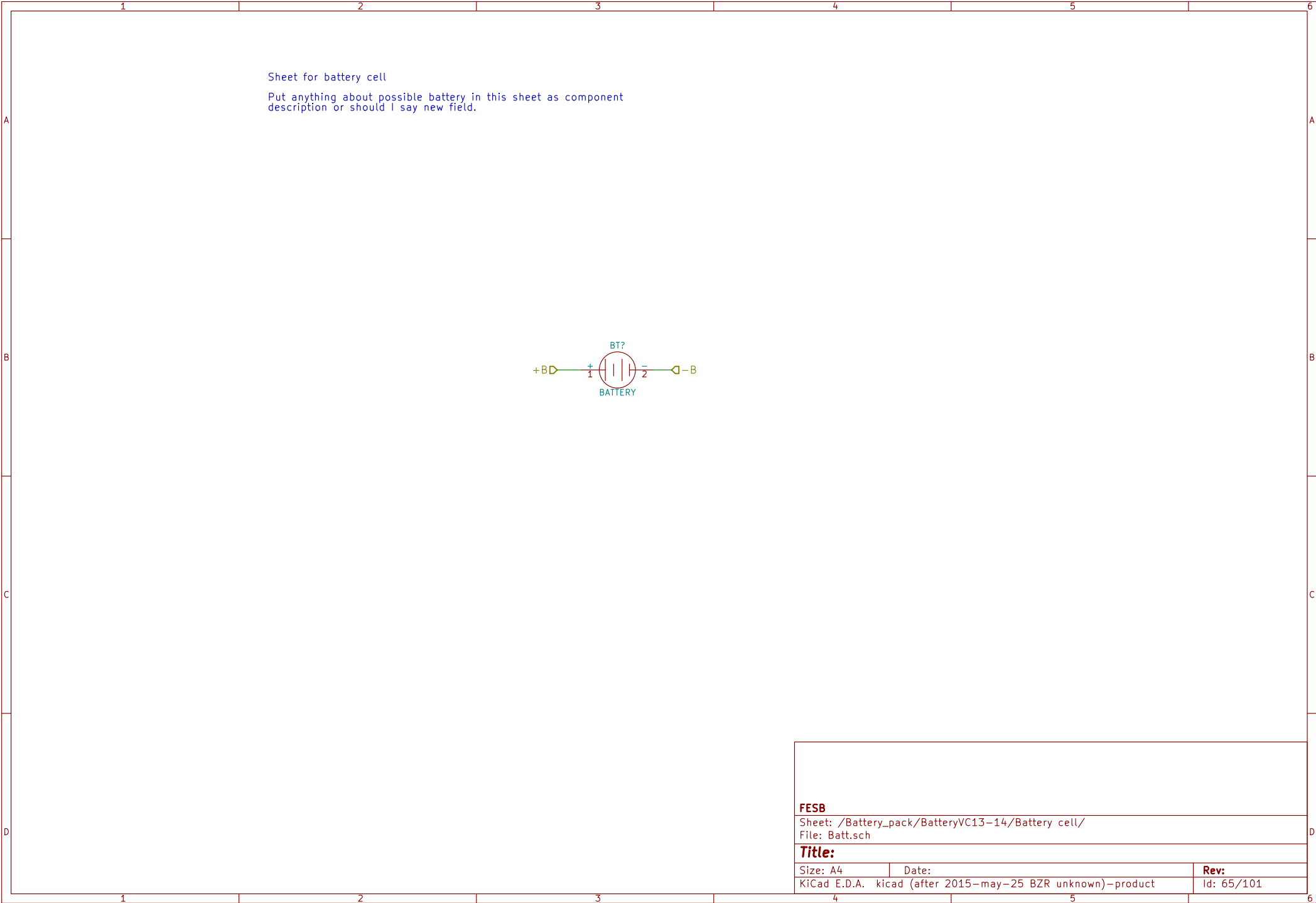
FESB

Sheet: /Battery_pack/BatteryVC13-14/
File: Batt_ball.sch

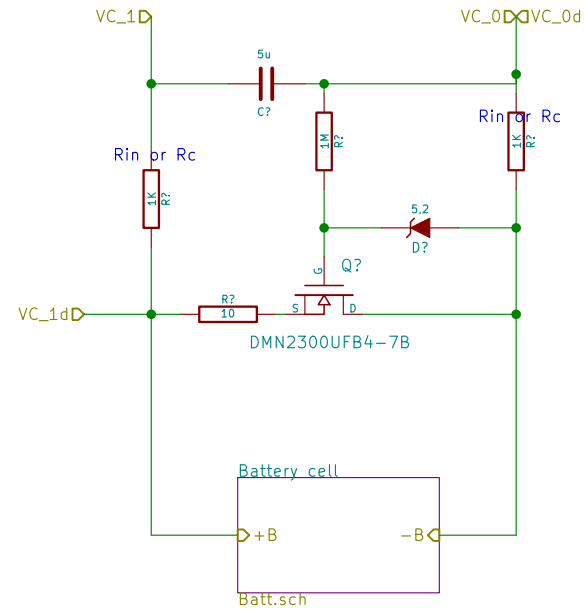
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: 64/101



This is just mesurment and balancing circuit



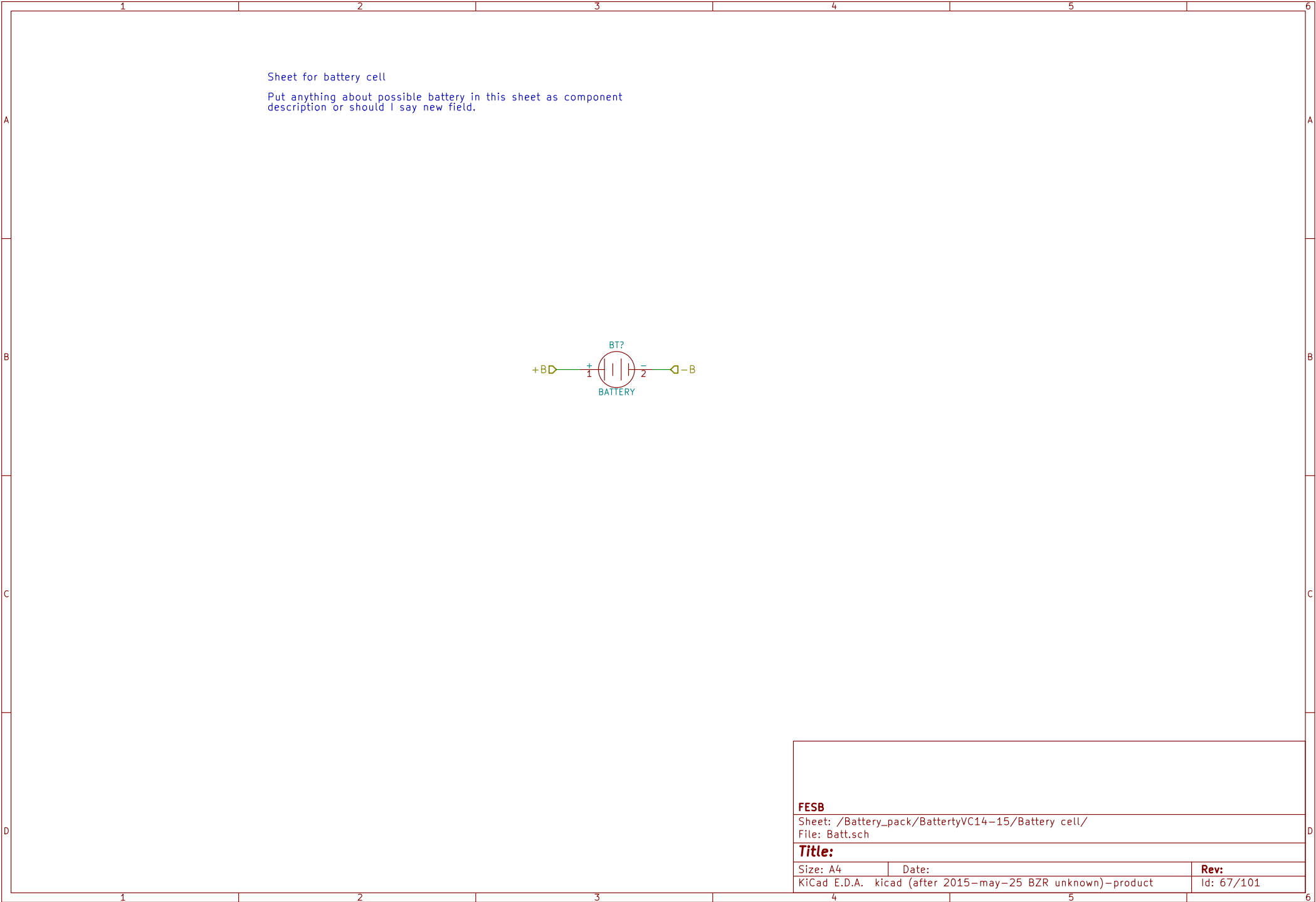
FESB

Sheet: /Battery_pack/BatteryVC14-15/
File: Batt_ball_end.sch

Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 66/101



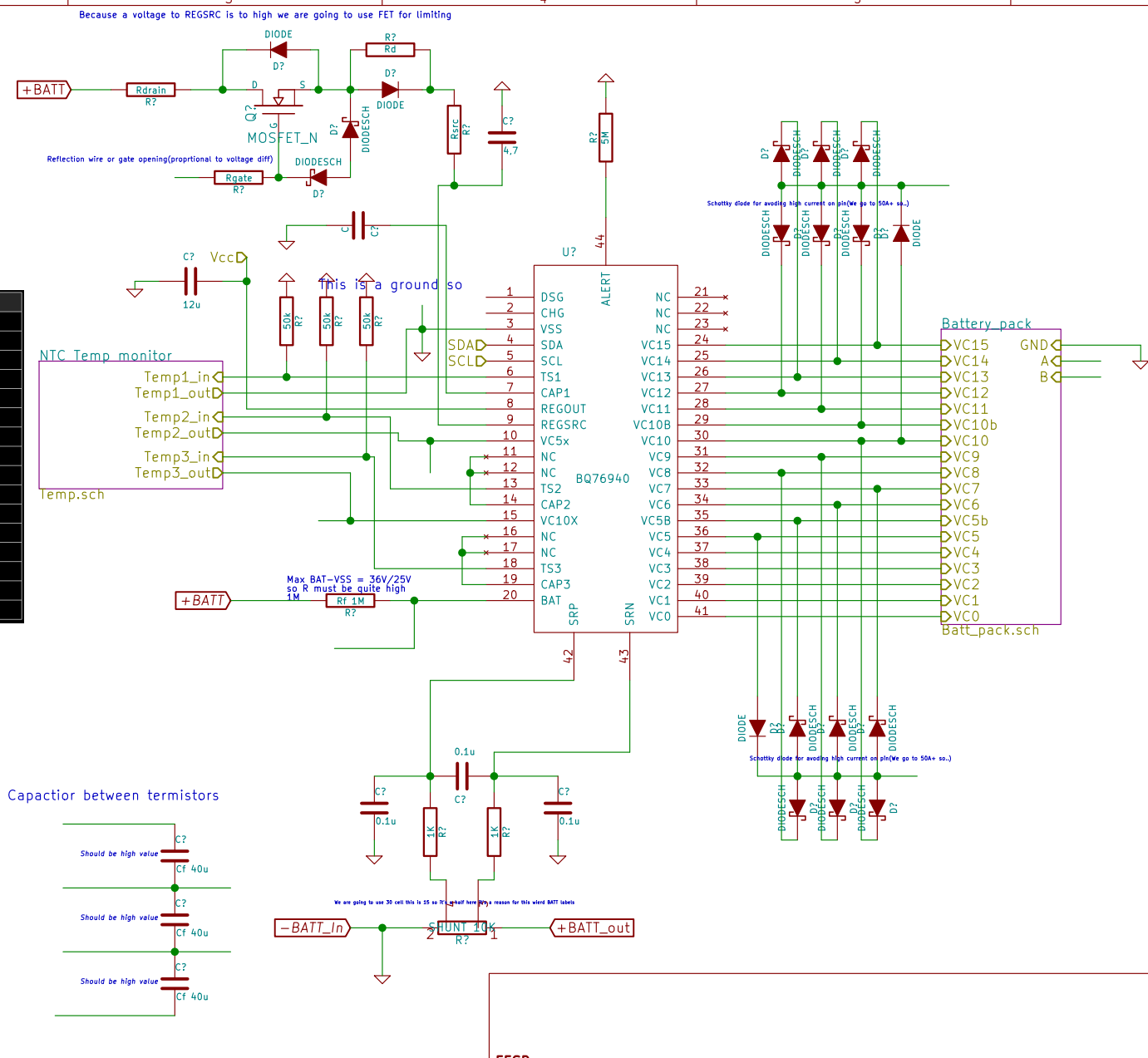
Bq7*** circuit its basically disconnected from other stuff looking a voltage of every cell and if needed discharging them.(balancing)
Controlled by a MCU two of them because we have 30 batteries.

VSS is same as ground symbol in this sheet

Pin configuration

| PIN | NAME | TYPE | DESCRIPTION |
|-----|--------|------|---|
| 1 | DSG | O | Discharge FET driver |
| 2 | CHG | O | Charge FET driver |
| 3 | VSS | — | Chip VSS |
| 4 | SDA | I/O | I ² C communication to the host controller |
| 5 | SCL | I | I ² C communication to the host controller |
| 6 | TS1 | I | Thermistor #1 positive terminal ⁽¹⁾ |
| 7 | CAP1 | O | Capacitor to VSS |
| 8 | REGOUT | P | Output LDO |
| 9 | REGSRC | I | Input source for output LDO |
| 10 | VC5X | P | Thermistor #2 negative terminal |
| 11 | NC | — | No connect (short to CAP2) |
| 12 | NC | — | No connect (short to CAP2) |
| 13 | TS2 | I | Thermistor #2 positive terminal ⁽¹⁾ |
| 14 | CAP2 | O | Capacitor to VC5X |
| 15 | VC10X | P | Thermistor #3 negative terminal |
| 16 | NC | — | No connect (short to CAP3) |

| PIN | NAME | TYPE | DESCRIPTION |
|-----|-------|------|--|
| 17 | NC | — | No connect (short to CAP3) |
| 18 | TS3 | I | Thermistor #3 positive terminal ⁽¹⁾ |
| 19 | CAP3 | O | Capacitor to VC10X |
| 20 | BAT | P | Battery (top-most) terminal |
| 21 | NC | — | No connect |
| 22 | NC | — | No connect |
| 23 | NC | — | No connect |
| 24 | VC15 | I | Sense voltage for 15th cell positive terminal |
| 25 | VC14 | I | Sense voltage for 14th cell positive terminal |
| 26 | VC13 | I | Sense voltage for 13th cell positive terminal |
| 27 | VC12 | I | Sense voltage for 12th cell positive terminal |
| 28 | VC11 | I | Sense voltage for 11th cell positive terminal |
| 29 | VC10b | I | Sense voltage for 10th cell negative terminal |
| 30 | VC10 | I | Sense voltage for 10th cell positive terminal |
| 31 | VC9 | I | Sense voltage for 9th cell positive terminal |
| 32 | VC8 | I | Sense voltage for 8th cell positive terminal |
| 33 | VC7 | I | Sense voltage for 7th cell positive terminal |
| 34 | VC6 | I | Sense voltage for 6th cell positive terminal |
| 35 | VC5b | I | Sense voltage for 6th cell negative terminal |
| 36 | VC5 | I | Sense voltage for 5th cell positive terminal |
| 37 | VC4 | I | Sense voltage for 4th cell positive terminal |
| 38 | VC3 | I | Sense voltage for 3rd cell positive terminal |
| 39 | VC2 | I | Sense voltage for 2nd cell positive terminal |
| 40 | VC1 | I | Sense voltage for 1st cell positive terminal |
| 41 | VC0 | I | Sense voltage for 1st cell negative terminal |
| 42 | SRP | I | Negative current sense (nearest VSS) |
| 43 | SRN | I | Positive current sense |
| 44 | ALERT | I/O | Alert output and override input |



FESB

Sheet: /BQ7****_low/
File: BQ7_low.sch

Title: BQ76940

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

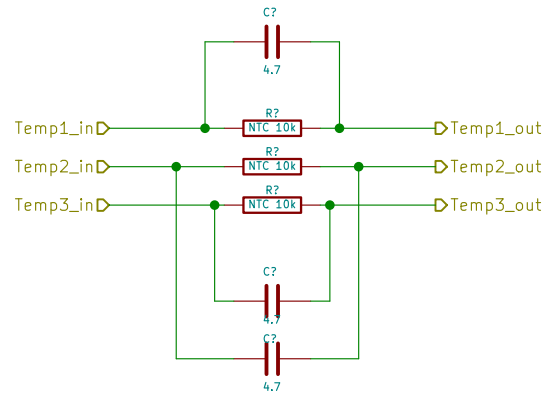
Rev:
Id: 68/101

Dont forget this when programming

Missing only for NTC so we can convert to Temp

$$V_{TSX} = (ADC \text{ in Decimal}) \times 382 \mu V/LSB$$
$$R_{TS} = (10,000 \times V_{TSX}) \div (3.3 - V_{TSX})$$

Termistors
Connect with outer 6 pin



FESB

Sheet: /BQ7****_low/NTC Temp monitor/
File: Temp.sch

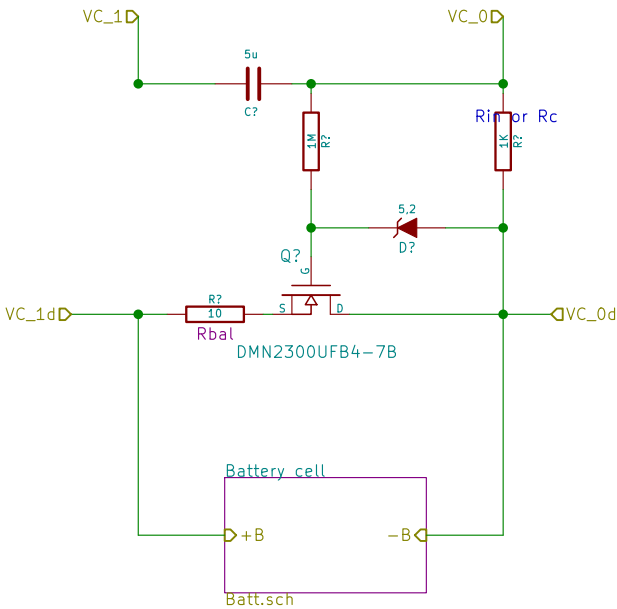
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 69/101

Rev:
Id: 70/101

This is just mesurment and balancing circuit

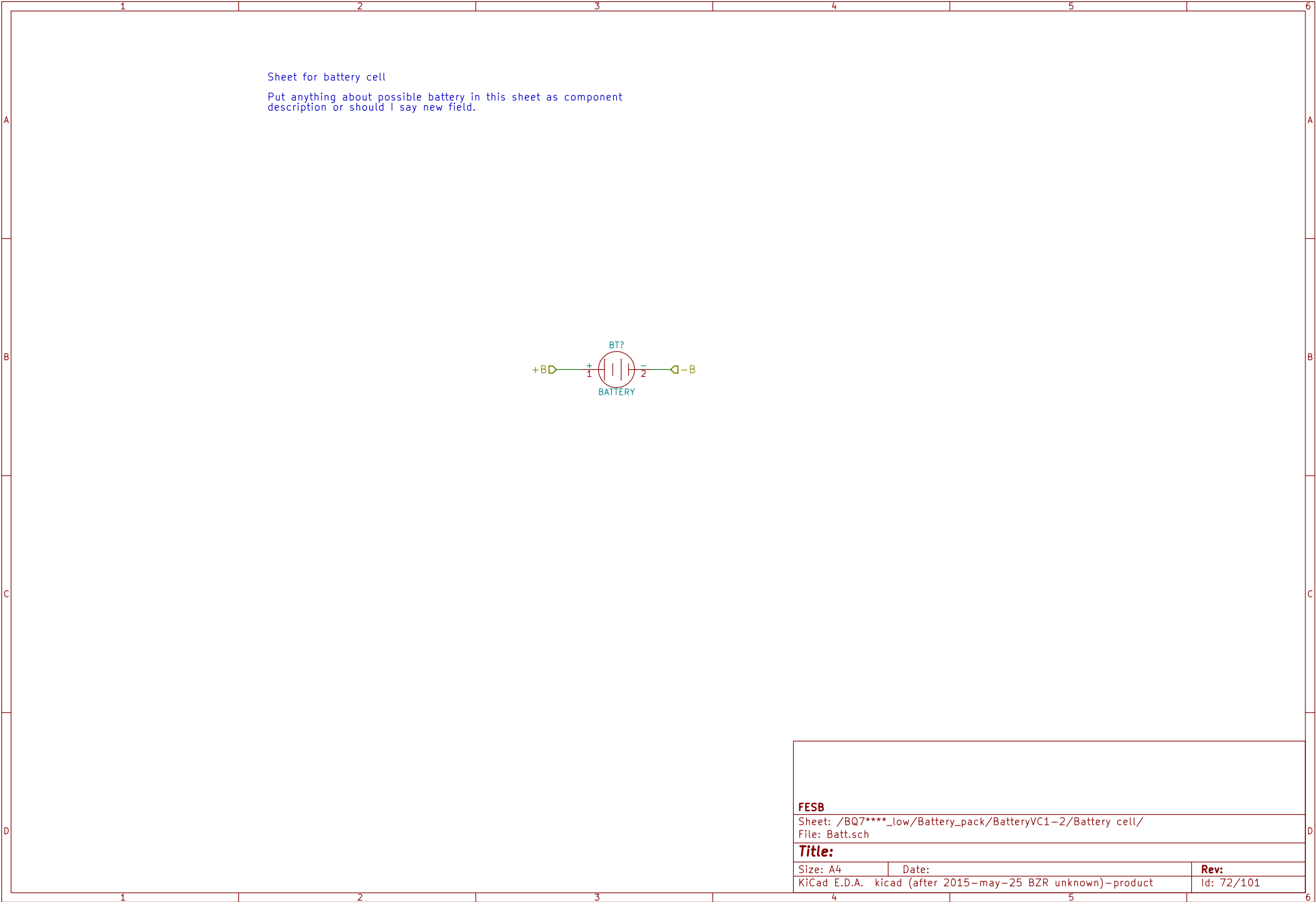


FESB

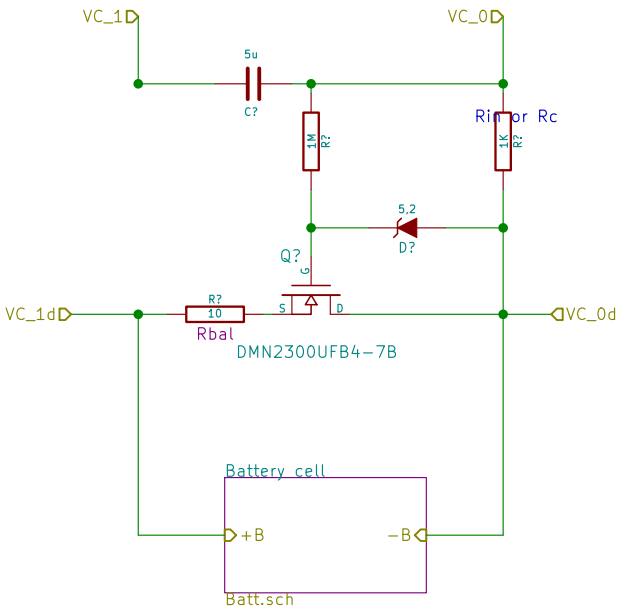
Sheet: /BQ7****_low/Battery_pack/BatteryVC1-2/
File: Batt_ball.sch

Title:

| | | |
|--|-------|------------|
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 71/101 |



This is just mesurment and balancing circuit



FESB

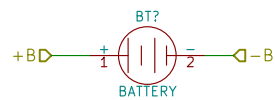
Sheet: /BQ7****_low/Battery_pack/BatteryVC2-3/
File: Batt_ball.sch

Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 73/101

Put anything about possible battery in this sheet as component description or should I say new field.



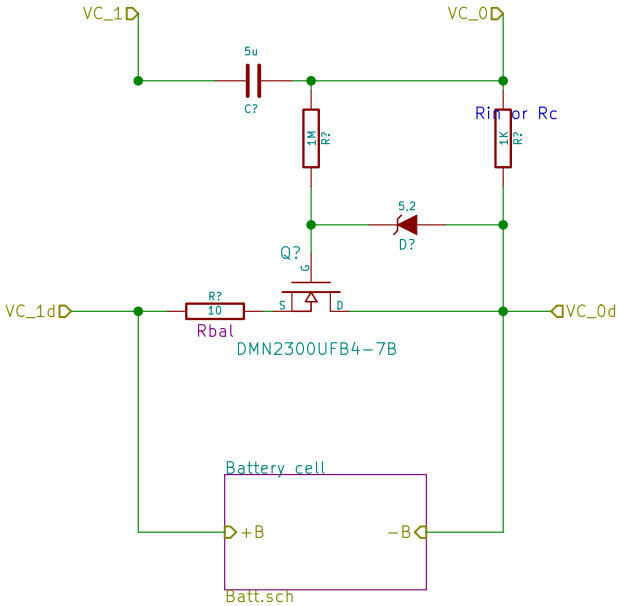
Sheet: /BQ7****_low/Battery_pack/BatteryVC2-3/Battery cell/
File: Batt.sch

| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 74/101

This is just mesurment and balancing circuit



FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC3-4/
File: Batt_ball.sch

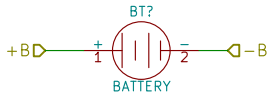
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 75/101

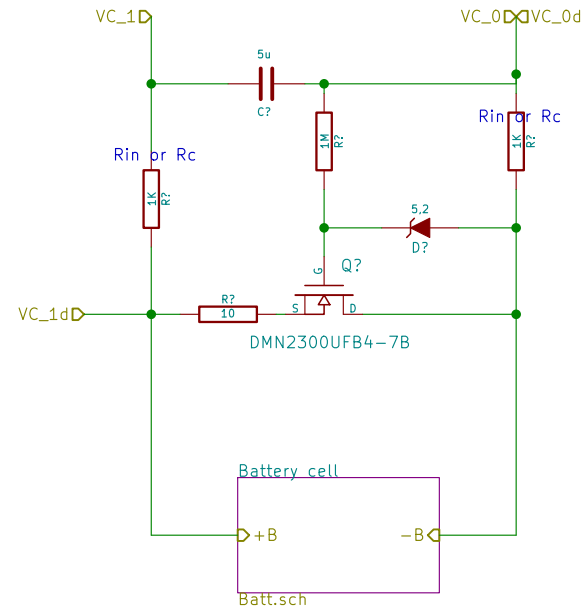
Sheet for battery cell

Put anything about possible battery in this sheet as component description or should I say new field.



| | | |
|---|-------|------------|
| FESB | | |
| Sheet: /BQ7****_low/Battery_pack/BatteryVC3-4/Battery cell/ | | |
| File: Batt.sch | | |
| Title: | | |
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 76/101 |

This is just mesurment and balancing circuit



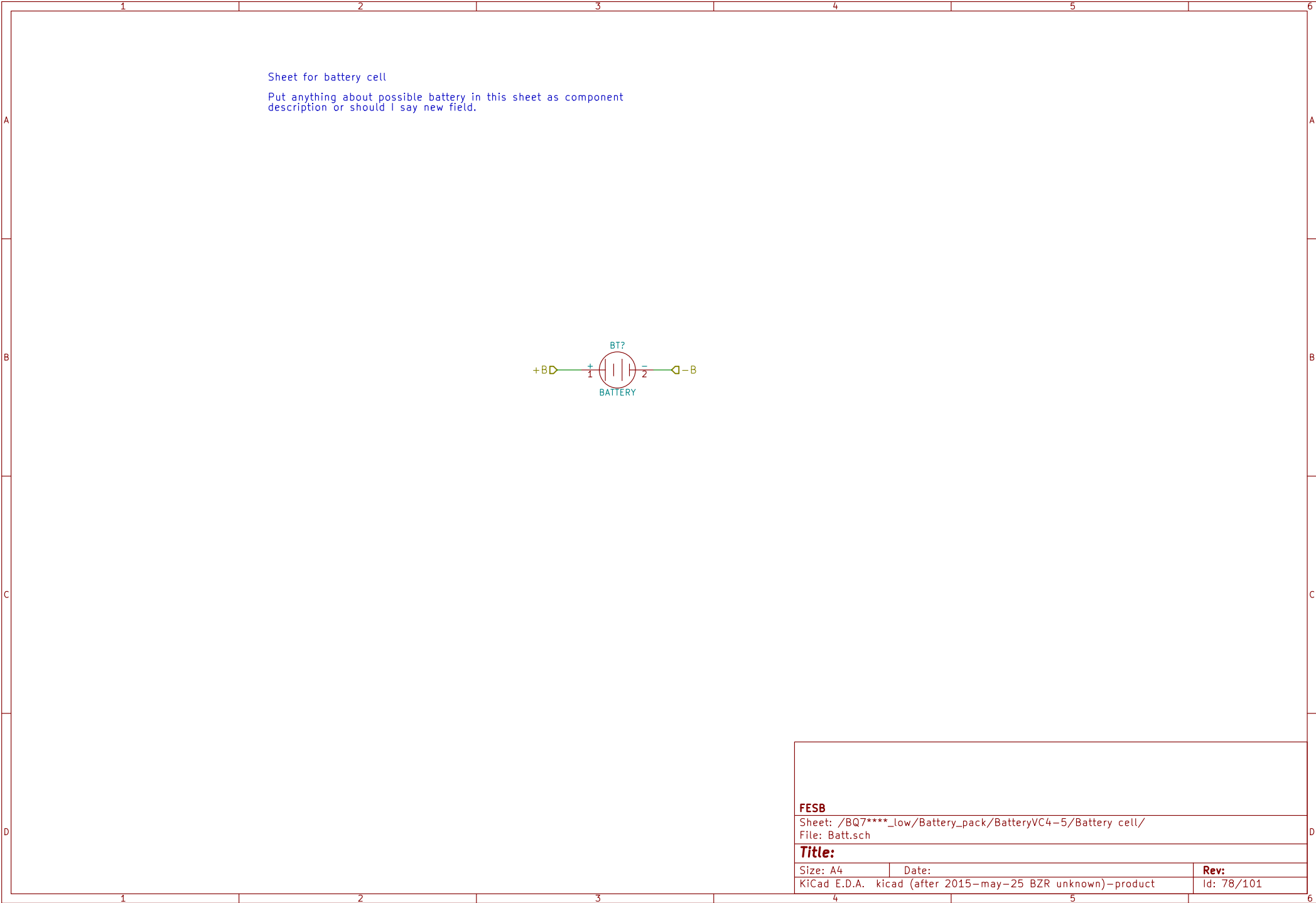
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC4-5/
File: Batt_bal_end.sch

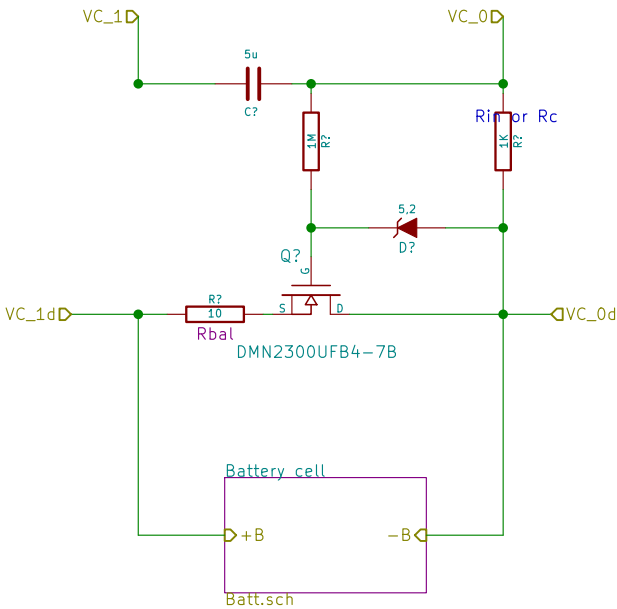
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 77/101



This is just mesurment and balancing circuit



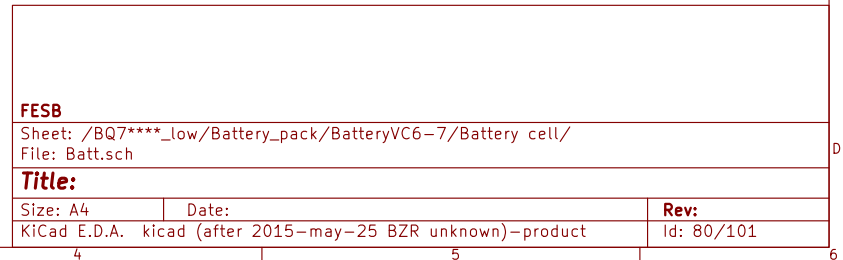
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC6-7/
File: Batt_ball.sch

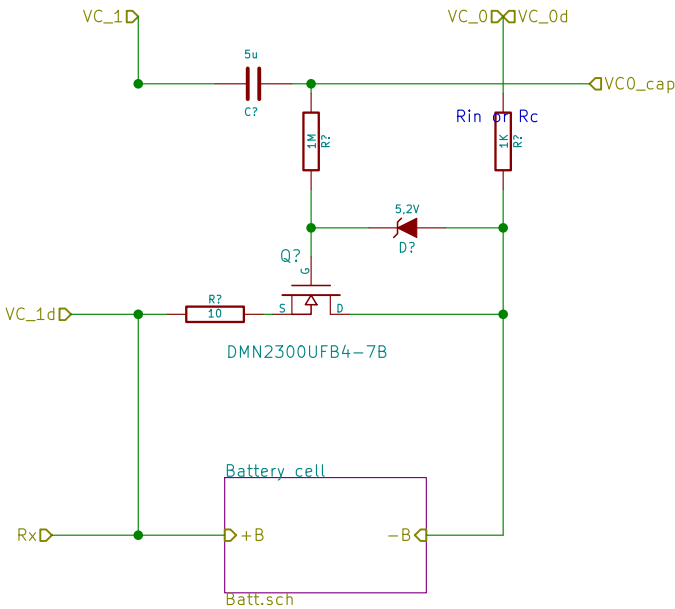
Title:

| | | |
|--|-------|------------|
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 79/101 |

Put anything about possible battery in this sheet as component description or should I say new field.



This is just mesurment and balancing circuit



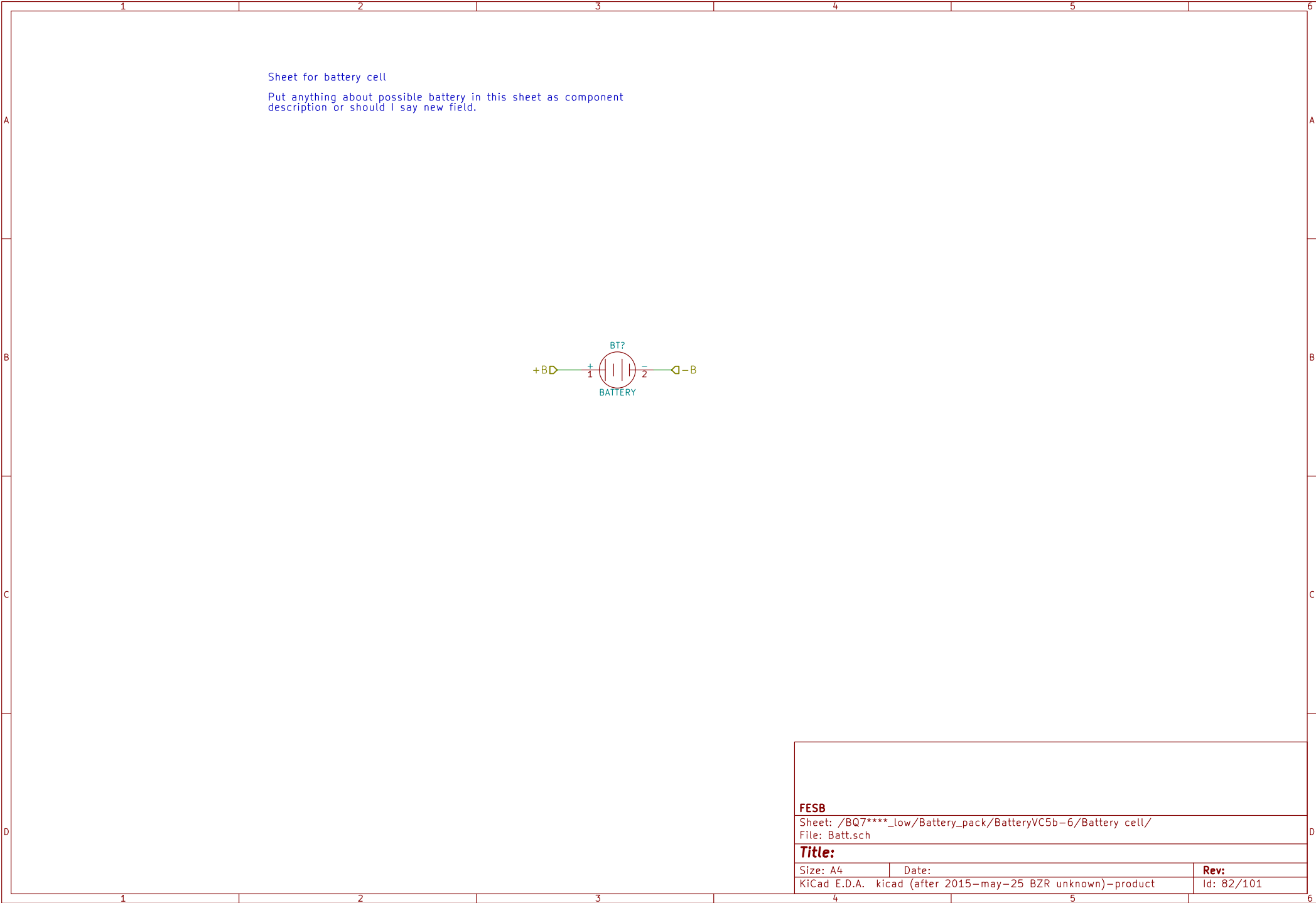
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC5b-6/
File: Batt_ball_cap.sch

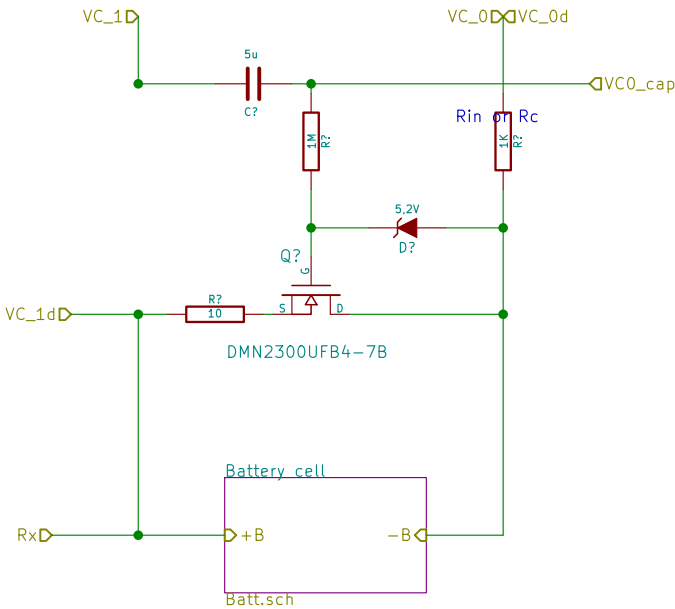
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 81/101



This is just mesurment and balancing circuit



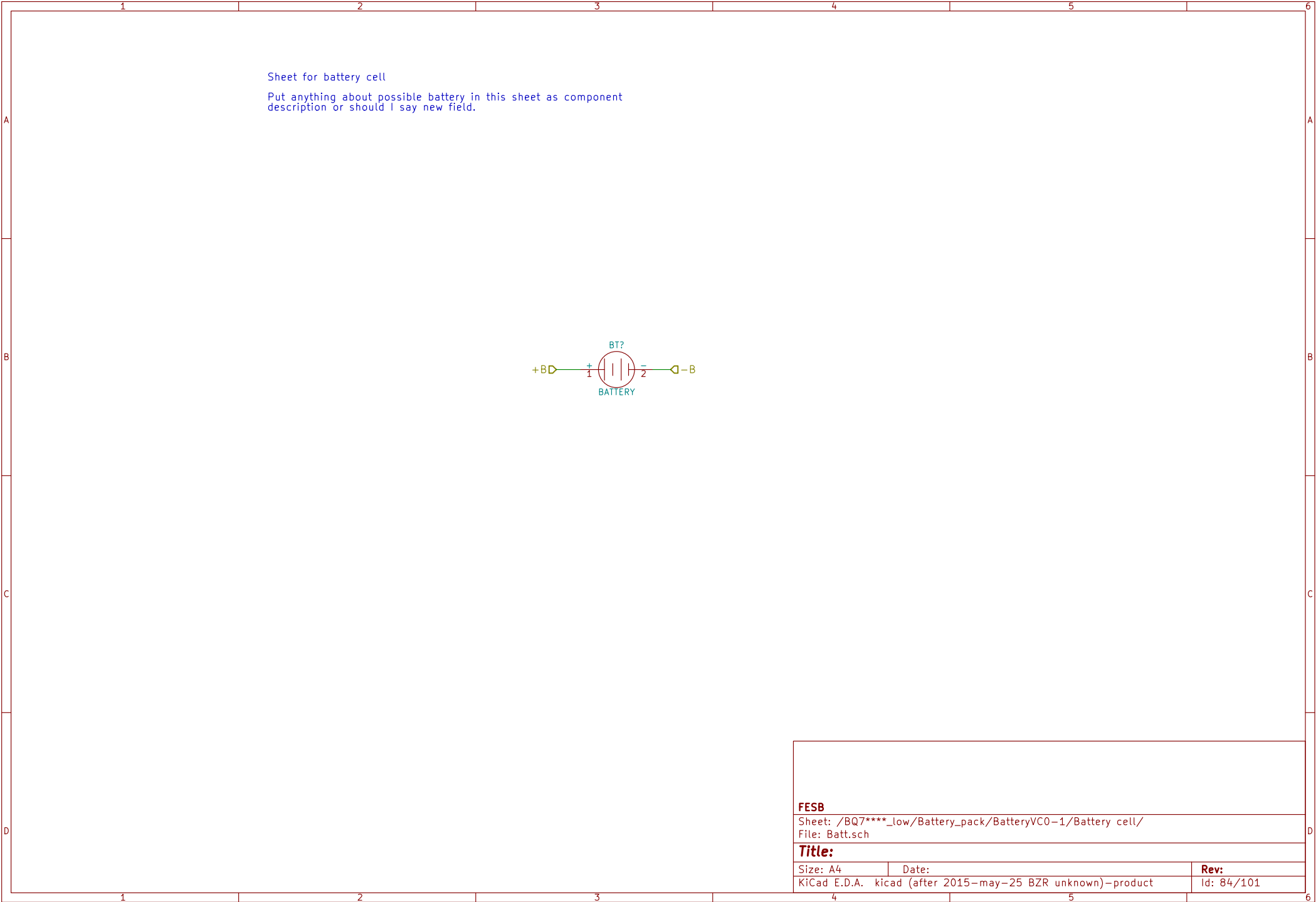
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC0-1/
File: Batt_ball_cap.sch

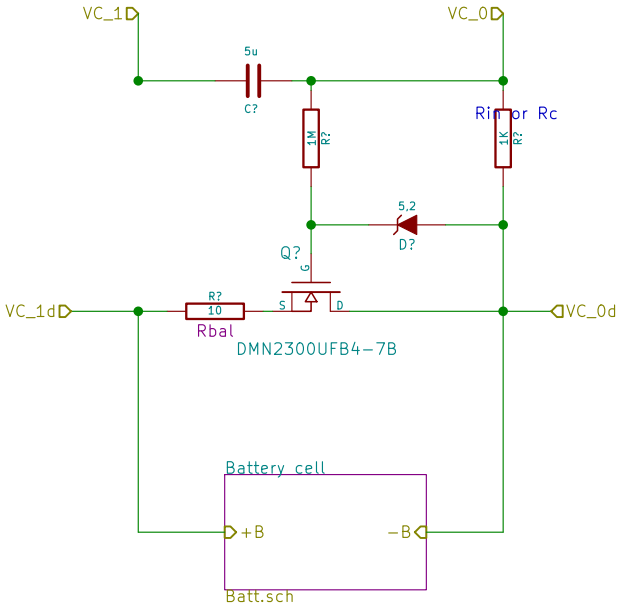
Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 83/101



This is just mesurment and balancing circuit



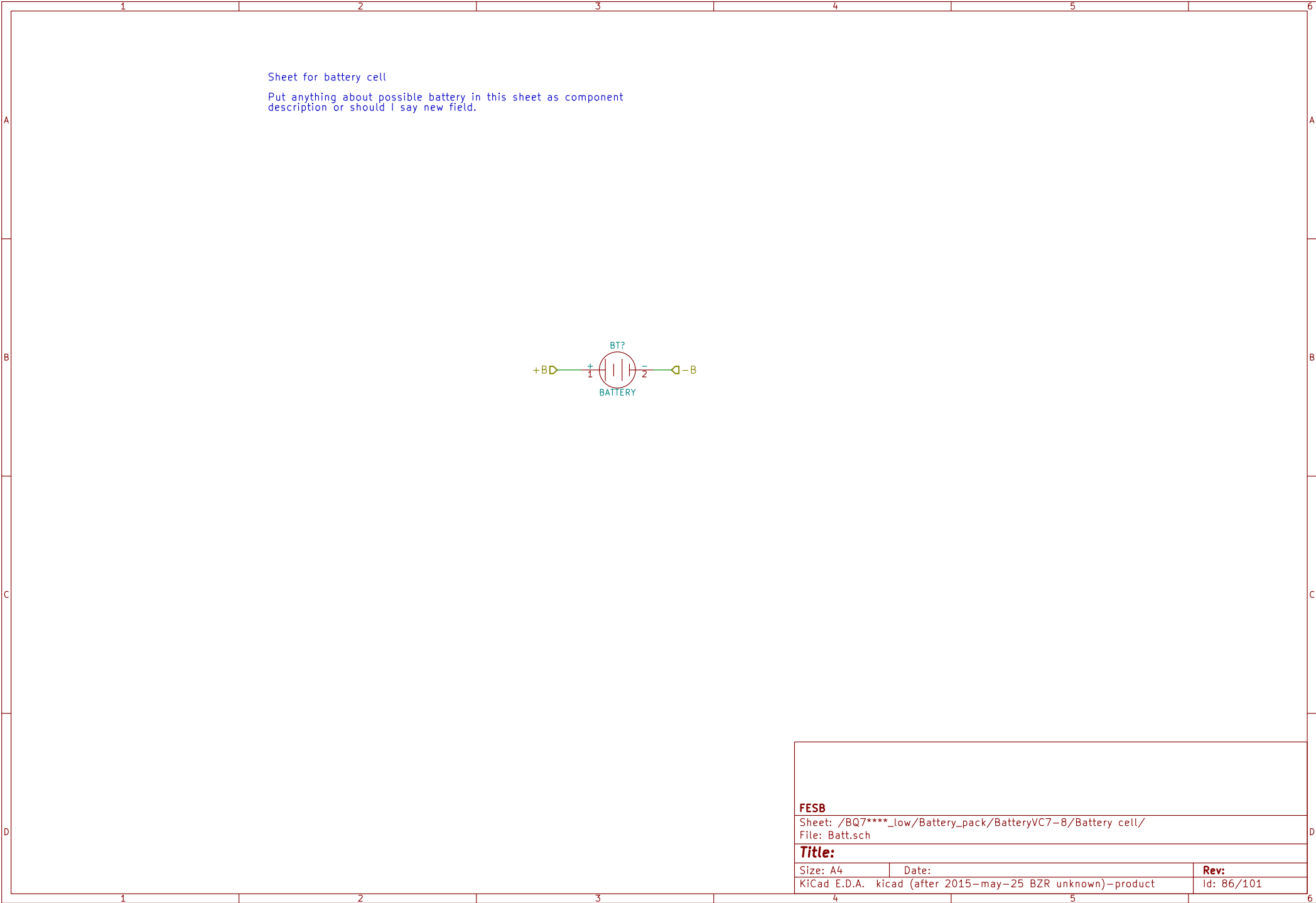
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC7-8/
File: Batt_ball.sch

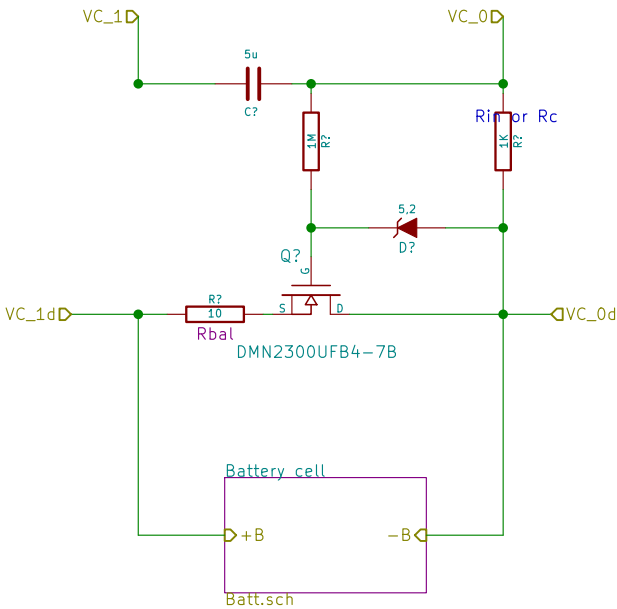
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 85/101



This is just mesurment and balancing circuit



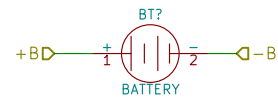
FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC8-9/
File: Batt_ball.sch

Title:

| | | |
|--|-------|------------|
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 87/101 |

Put anything about possible battery in this sheet as component description or should I say new field.



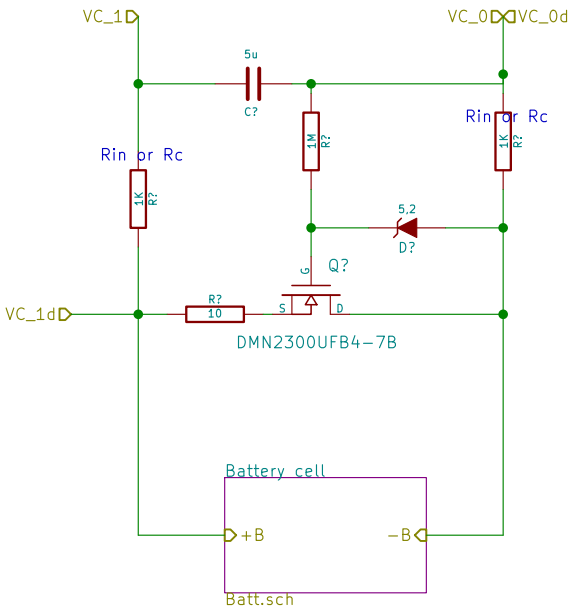
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File: Batt.sch

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|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

cad (after 2015-may-25 BZR unknown)-product

Id: 88/101

This is just mesurment and balancing circuit



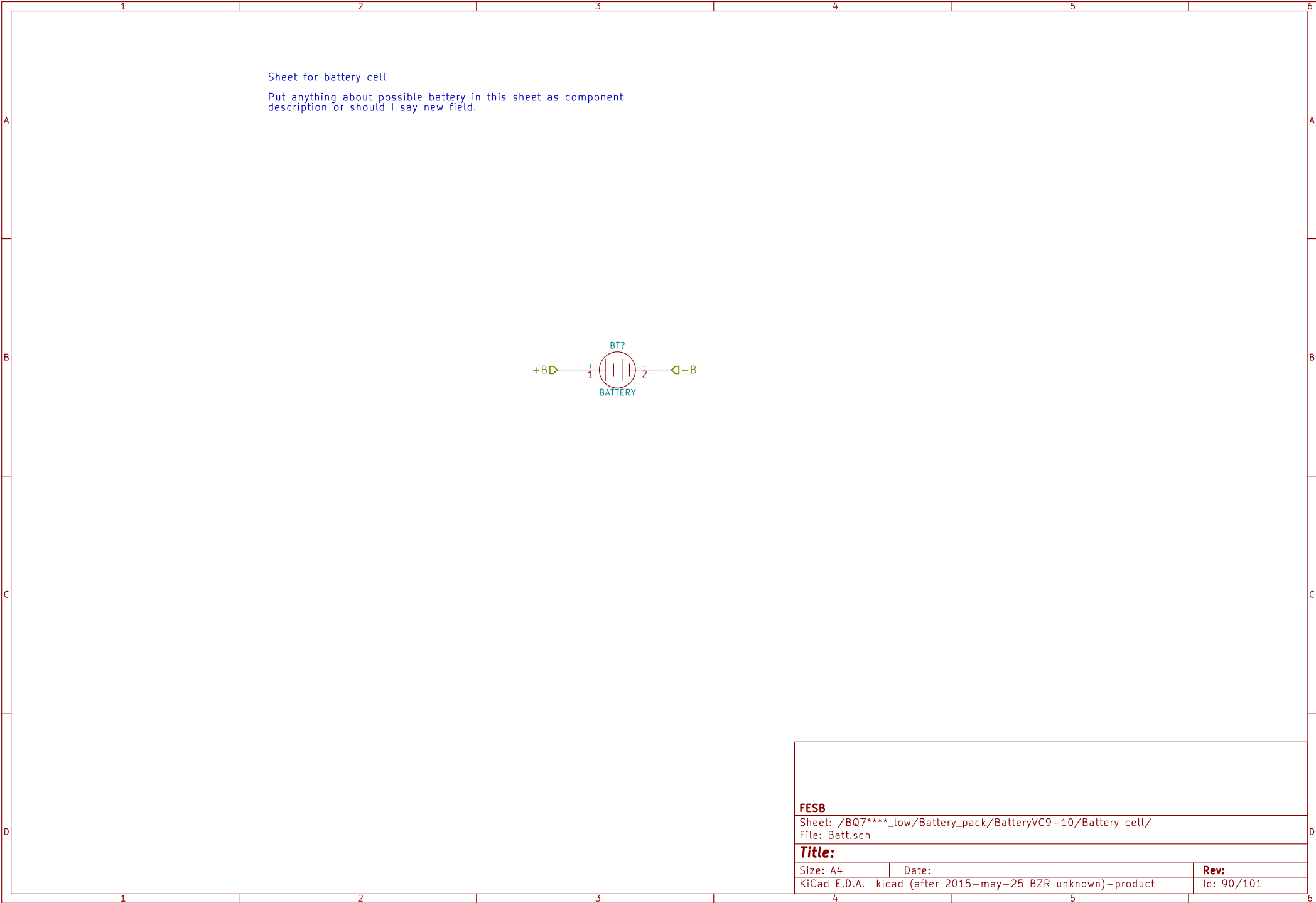
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File: Batt_ball_end.sch

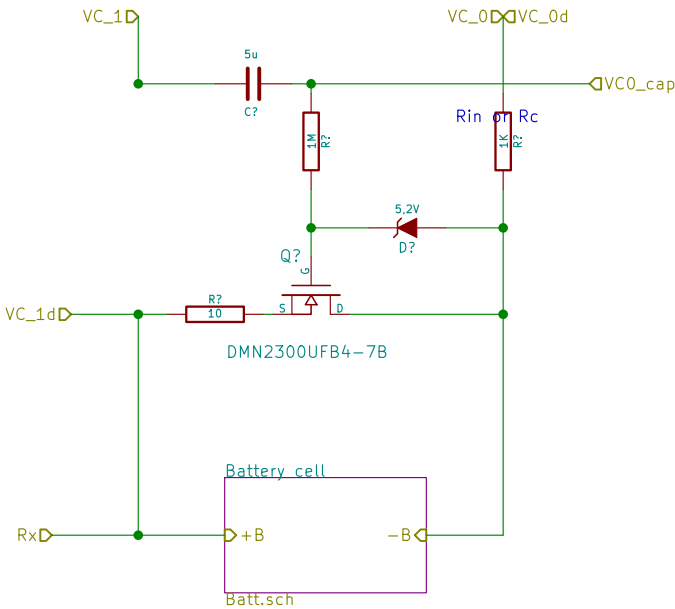
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Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 89/101



This is just mesurment and balancing circuit



FESB

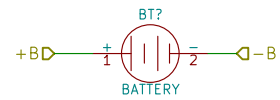
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File: Batt_ball_cap.sch

Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 91/101

Put anything about possible battery in this sheet as component description or should I say new field.



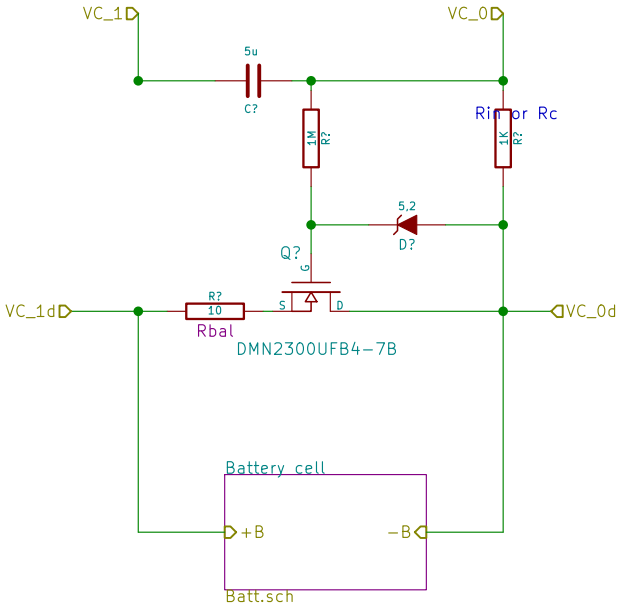
Sheet: /BQ7****_low/Battery_pack/BatteryVC10B-11/Battery cell/
File: Batt.sch

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|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

cad (after 2015-may-25 BZR unknown)-product

Id: 92/101

This is just mesurment and balancing circuit



FESB

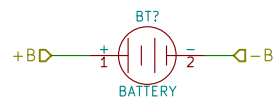
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File: Batt_ball.sch

Title:

Size: A4 Date: KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev: Id: 93/101

Put anything about possible battery in this sheet as component description or should I say new field.



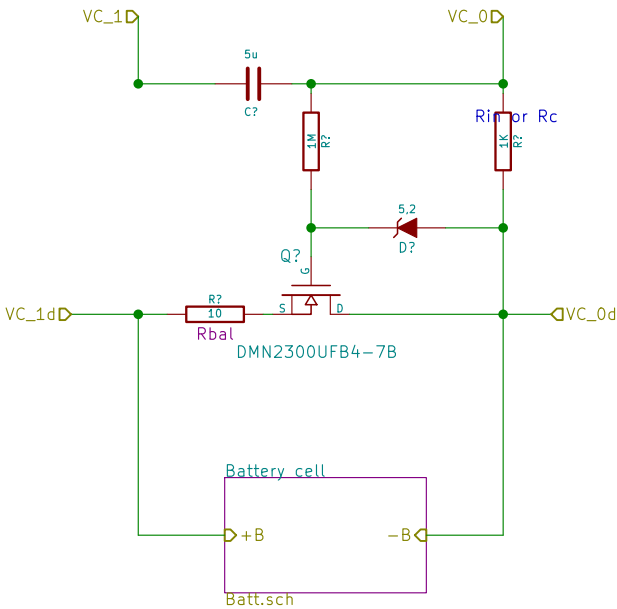
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File: Batt.sch

| | |
|--|-------|
| Size: A4 | Date: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | |

ad (after 2015-may-25 BZR unknown)-product

Id: 94/101

This is just mesurment and balancing circuit



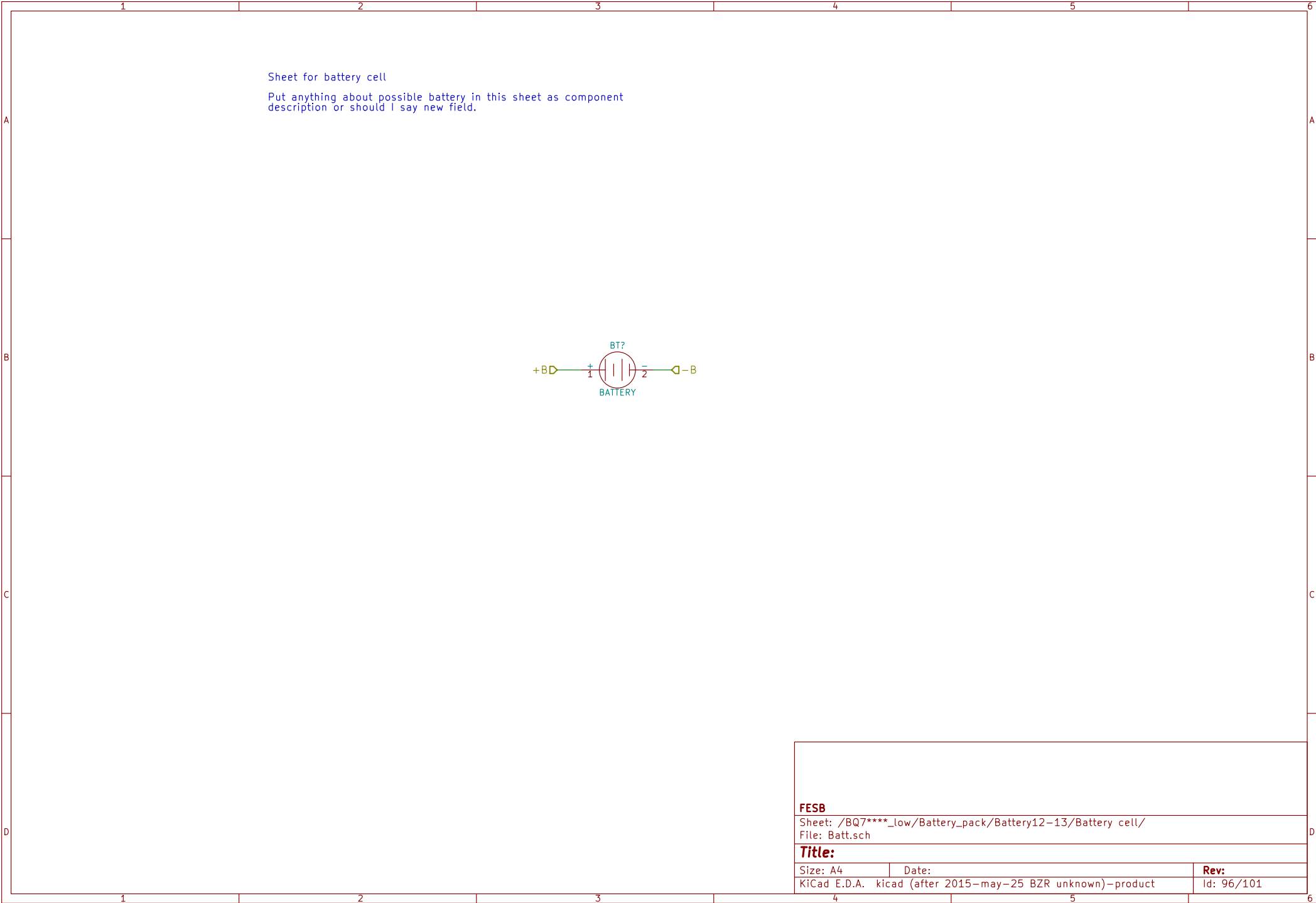
FESB

Sheet: /BQ7****_low/Battery_pack/Battery12-13/
File: Batt_ball.sch

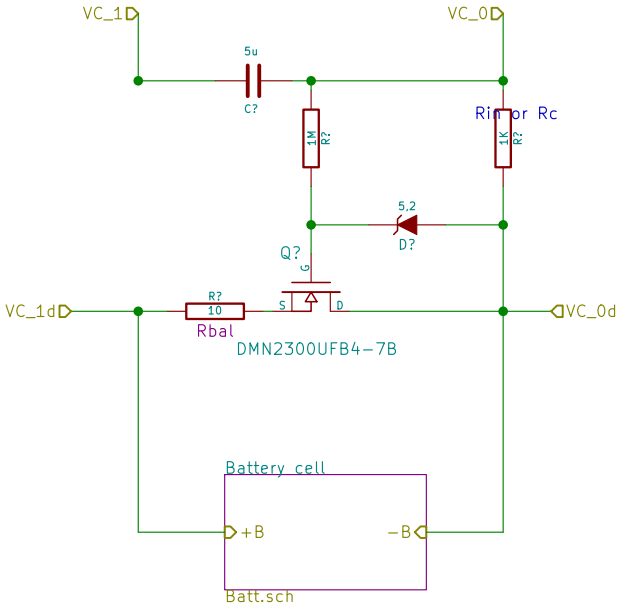
Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

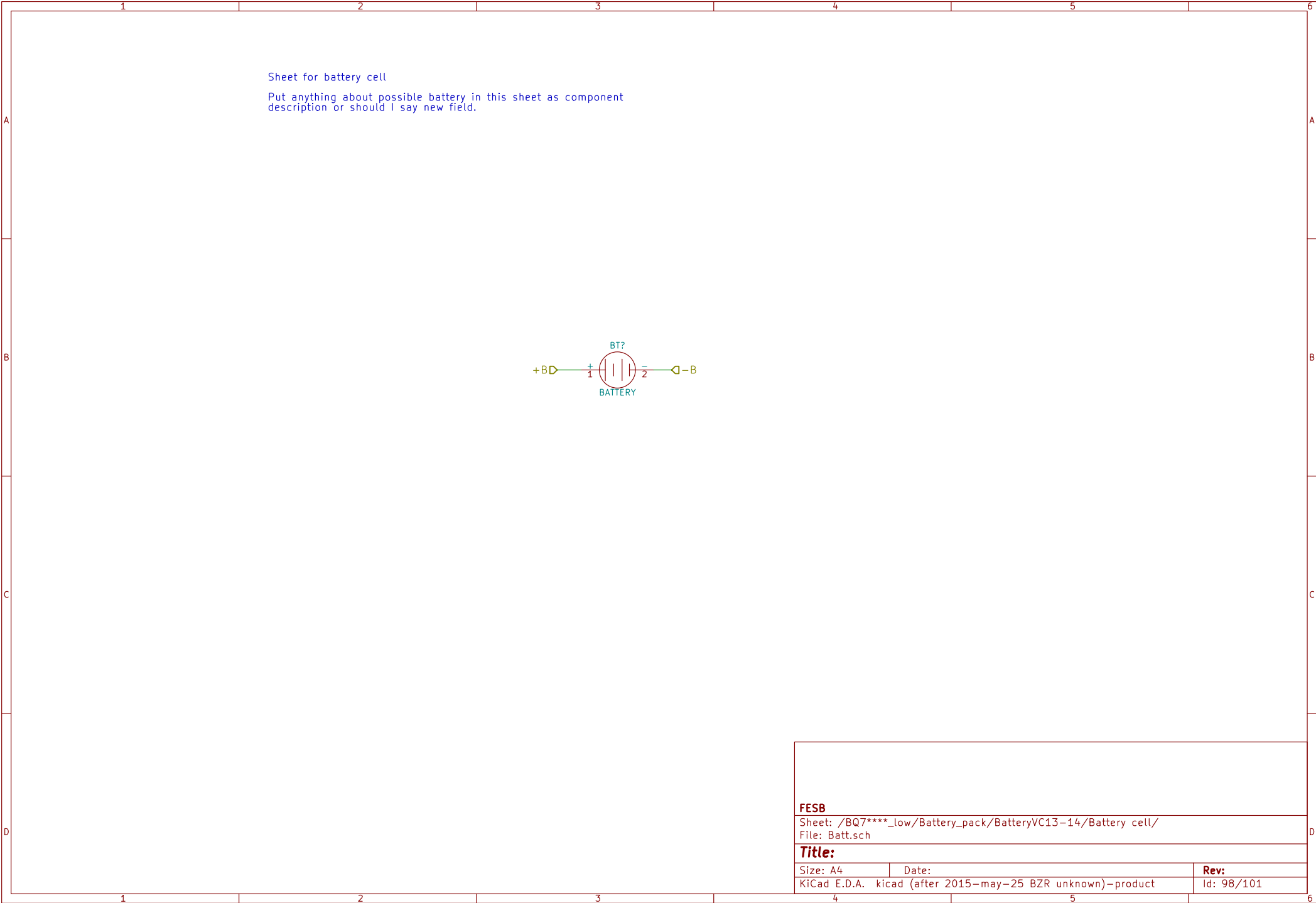
Rev:
Id: 95/101



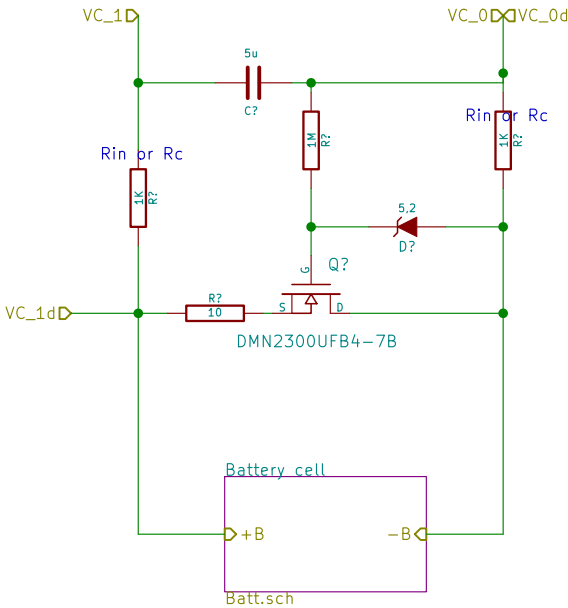
This is just mesurment and balancing circuit



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| FESB | | |
| Sheet: /BQ7****_low/Battery_pack/BatteryVC13-14/ File: Batt_ball.sch | | |
| Title: | | |
| Size: A4 | Date: | Rev: |
| KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product | | Id: 97/101 |



This is just mesurment and balancing circuit



FESB

Sheet: /BQ7****_low/Battery_pack/BatteryVC14-15/
File: Batt_bal_end.sch

Title:

Size: A4 Date:
KiCad E.D.A. kicad (after 2015-may-25 BZR unknown)-product

Rev:
Id: 99/101

