Protected Cell

Reverse Polarity Protection

Overcurrent, OverVoltage, Undervoltage Protection

+BATT

4,2V Li-Ion
BT1

6A
F1

+BATT

U1
Comparator

GND

U3
FS8205
S1 G1 G2 S2
D12 D12

R1
100

C1
0.1uF

U5 DW01A
VCC CS
TD
GND OD OC

R3
1k

U7
FS8205
S1 G1 G2 S2
D12 D12

GND1

Protected Cell

Reverse Polarity Protection

Overcurrent, OverVoltage, Undervoltage Protection

+BATT

4,2V Li-Ion
BT2

6A
F2

+BATT

U2
Comparator

GND

U4
FS8205
S1 G1 G2 S2
D12 D12

R2
100

C2
0.1uF

U6 DW01A
VCC CS
TD
GND OD OC

R4
1k

U8
FS8205
S1 G1 G2 S2
D12 D12

GND2

Phone wiring

+BATT

Charging Status Detector

J1
1 VBat
2 BSI
3 BTemp
4 GND

Phone Port

Protected Cell

GND1

Protected Cell

GND2

R5
1k

10k
R12

C5
0.1uF

R13
1M

+BATT

U13
Comparator

GND

R16
100

5mil

ChargingMode

82k

NTC Thermistor

U9 FS8205
G1 D12
G2 D12
S2

U10 FS8205
G1 D12
G2 D12
S2

Cell1Discharge
Cell1Charge

Cell2Discharge
Cell2Charge

↑ Discharge
↓ Charge

↑ Discharge
↓ Charge

↑ Discharge
↓ Charge

GND

Cells Balancing Control

Control Logic

+BATT

R6
10K

R7
1M

R14
1M

R10
10k

C3
0.1uF

+BATT

U11
Comparator

GND

Protected Cell GND2

Protected Cell GND1

+BATT

R8
10K

R9
1M

R15
1M

R11
10k

C4
0.1uF

+BATT

U12
Comparator

GND

The higher the potential
the lower is the Cell voltage ->

ChargingMode

<-- High if battery is Charging

<-- High if cells are balanced

Cell1Charge

Cell2Charge

Cell1Discharge

Cell2Discharge

Control Logic Truth Table

Comparator 1 (U11) High if VCell1 >≈ VCell2
Comparator 2 (U12) High if VCell2 >≈ VCell1

Comparator 1	Comparator 2	ChargingMode	Cell1Charge	Cell2Charge	Cell1Discharge	Cell2Discharge	
0	0	0	0	0	0	0	Unfeasible Condition (or turned off battery) -> Open all the gates
0	0	1	0	0	0	0	Unfeasible Condition (or turned off battery) -> Open all the gates
0	1	0	0	0	0	1	Cell 2 is fuller & ChargeMode Off -> Discharge Cell 2
0	1	1	1	0	0	0	Cell 2 is fuller & ChargeMode On -> Charge Cell 1
1	0	0	0	0	1	0	Cell 1 is fuller & ChargeMode Off -> Discharge Cell 1
1	0	1	0	1	0	0	Cell 1 is fuller & ChargeMode On -> Charge Cell 2
1	1	0	1	1	1	1	Cells are Balanced & ChargeMode Off -> Close all gates
1	1	1	1	1	1	1	Cells are Balanced & ChargeMode On -> Close all gates

Cell1Charge = (Charging && Comp2) || (Comp1 && Comp2)

Cell2Charge = (Charging && Comp1) || (Comp1 && Comp2)

Cell1Discharge = (! Charging && Comp1) || (Comp1 && Comp2)

Cell2Discharge = (! Charging && Comp2) || (Comp1 && Comp2)

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