

# Vacuum Cleaner Battery BMS Solutions



Solution	Solution A: AFE + MCU	Solution B: Standalone AFE	Solution C: MCU Monitor + Motor Driver	Solution D: Hardware
<b>Configuration</b>	6S1P ~ 10S1P	3S1P ~ 8S1P 3S2P ~ 8S2P	4S1P ~ 7S1P	3S1P ~ 8S1P 3S2P ~ 8S2P
<b>Nominal voltage</b>	21.6 V ~ 36.0 V	10.8 V ~ 28.8 V	14.4 V ~ 25.2 V	10.8 V ~ 28.8 V
<b>Cell type</b>	18650 21700	18650 21700	18650 21700	18650 21700
<b>Capacity</b>	1,800 mAh ~ 3,500 mAh 3,000 mAh ~ 5,000 mAh	3,600 mAh ~ 7,000 mAh 6,000 mAh ~ 10,000 mAh	1,800 mAh ~ 3,500 mAh 3,000 mAh ~ 5,000 mAh	3,600 mAh ~ 7,000 mAh 6,000 mAh ~ 10,000 mAh
<b>Max. continuous charge current</b>	3.5 A	5.0 A	3.5 A	5.0 A
<b>Max. continuous discharge current</b>	20.0 A 30.0 A	30.0 A 60.0 A	20.0 A 30.0 A	30.0 A 60.0 A
<b>Operation temperature</b>	0 °C ~ 45 °C (Charge) -20 °C ~ 80 °C (Discharge)	0 °C ~ 45 °C (Charge) -20 °C ~ 80 °C (Discharge)	0 °C ~ 45 °C (Charge) -20 °C ~ 80 °C (Discharge)	0 °C ~ 45 °C (Charge) -20 °C ~ 60 °C (Discharge)

## Solution A AFE + MCU

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Feature: Hardware protection, software protection, MCU coulomb counter gas gauge, communication

Basic information:

- 1.Support 6 ~ 10 series;
- 2.TI AFE (bq76930) + MCU (ST or NXP) or fully integrated IC (Renesas);
- 3.Support UART communication;
- 4.Support cell passive balance (80 mA);
- 5.Support 10 A charge, 25 A continuous discharge (adding FETs can increase discharge current);
- 6.Support LED indication SoC (State of Charge);
- 7.Support over voltage protection, under voltage protection, over charge current protection, over discharge current protection, over temperature protection, short circuit protection;
- 8.Support firmware update from PC or host device;
- 9.Standby current  $\leq 30 \mu\text{A}$ ;
- 10.Support MCU coulomb counter gas gauge;
- 11.Optional second level over voltage protection (IC + SCP fuse), meeting UL2054 requirements.

## Solution C MCU Monitor + Motor Driver

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Feature: Software protection, MCU coulomb counter gas gauge, communication

Basic information:

- 1.Support 4 ~ 7 series;
- 2.ST MCU control protection;
- 3.Support one wire communication;
- 4.Support 0.5 A charge, 10 A discharge;
- 5.Battery include motor driver;
- 6.Support LED indication SoC;
- 7.Support software protection, including over voltage protection, under voltage protection, over charge current protection, over discharge current protection, over temperature protection, short circuit protection;
- 8.Standby current  $\leq 40 \mu\text{A}$ ;
- 9.Support MCU coulomb counter gas gauge;
- 10.Optional second level over voltage protection (IC + SCP fuse), meeting UL2054 requirements.

## Solution B Standalone AFE

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Feature: Hardware protection, host device provided gas gauging, communication

Basic information:

- 1.Support 3 ~ 8 series;
- 2.Intersil ISL94202 AFE;
- 3.Support I<sup>2</sup>C bus communication;
- 4.Support cell passive balance (50 mA);
- 5.Support 10 A charge, 22 A continuous discharge (adding FETs can increase discharge current);
- 6.Support over voltage protection, under voltage protection, over charge current protection, over discharge current protection, over temperature protection, short circuit protection;
- 7.Standby current  $\leq 50 \mu\text{A}$ ;
- 8.Host device can read battery voltage and current;
- 9.Optional second level over voltage protection (IC + SCP fuse), meeting UL2054 requirements.

## Solution D Hardware

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Feature: Hardware protection

Basic information:

- 1.Support 3 ~ 8 series;
- 2.Hardware solution, Mitsumi, Seiko, BYD, CELLWISE IC.
- 3.Support 2 A charge, 7 A continuous discharge (adding FETs can increase discharge current);
- 4.Support over voltage protection, under voltage protection, over discharge current protection, over temperature protection, short circuit protection;
- 5.Standby current  $\leq 30 \mu\text{A}$ ;
- 6.Optional second level over voltage protection (IC + SCP fuse), meeting UL2054 requirements.