BMS common port   BMS separate port

Discharge Mosfet Q1 is switched off when battery is empty
Charge Mosfet Q2 is switched off when battery is full

COMMONT PORT
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A common port BMS requires a current direction detection
Controlling the Mosfets with a common port BMS is more complicated than with a separate port BMS:
When the battery voltage is at the minimum level, there are two situations:

1. When charging, Q1 and Q2 must be on
2. Discharging is not allowed, Q1 must be off

So, Q1 is only on during charging, an extra charge current detection circuit is required.
A separate port BMS requires no charge current detection circuit.

When the battery voltage is at the maximum level, there are also two situations:

1. When discharging, Q1 and Q2 must be on
2. Charging is not allowed, Q2 must be off

So, Q2 is only on during discharging, an extra discharge current detection circuit is required.

SEPARATE PORT
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The separate ports BMS configuration has two advantages:

— There is less loss because the discharge current does not also pass through the charge Mosfet Q2.
— The charge Mosfet Q2 can be smaller than the discharge Mosfet Q1.

It is not as easy as it seems, so are Q1 and Q2 sometimes in active—diode mode where the drain voltage is lower than the source voltage. The Mosfets are turned on and off as follows:

Discharging

1. Discharge Mosfet Q1 is on and switched off when battery is empty
2. Charge Mosfet Q2 is on and in active diode mode

Charging

1. Discharge Mosfet Q1 is on and in active diode mode
2. Charge Mosfet Q2 is on and switched off when battery is full