CMOS IC Application Note

S-8204B Series Connection Examples

Rev.1.5_01

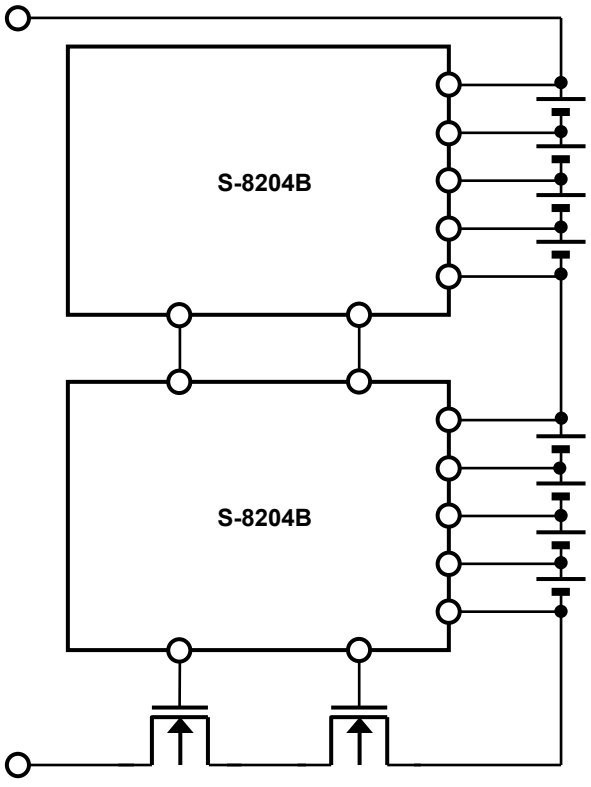
The S-8204B Series is a protection IC for 3-series or 4-series cell lithium-ion rechargeable battery, and includes high-accuracy voltage detection circuits and delay circuits. By using cascade connection, it is also possible to protect 6-series or more cells lithium-ion rechargeable battery pack.
In case of protecting 5-series cell lithium-ion rechargeable battery pack, contact our sales office.

This application note is a guideline of the typical connection examples for applications using the S-8204B Series, and contains the components list.
Refer to the datasheet for details and spec of this IC.

It is possible to configure the following application by using the S-8204B Series.

- Protection circuit for multi-series cell of 3 cells or more

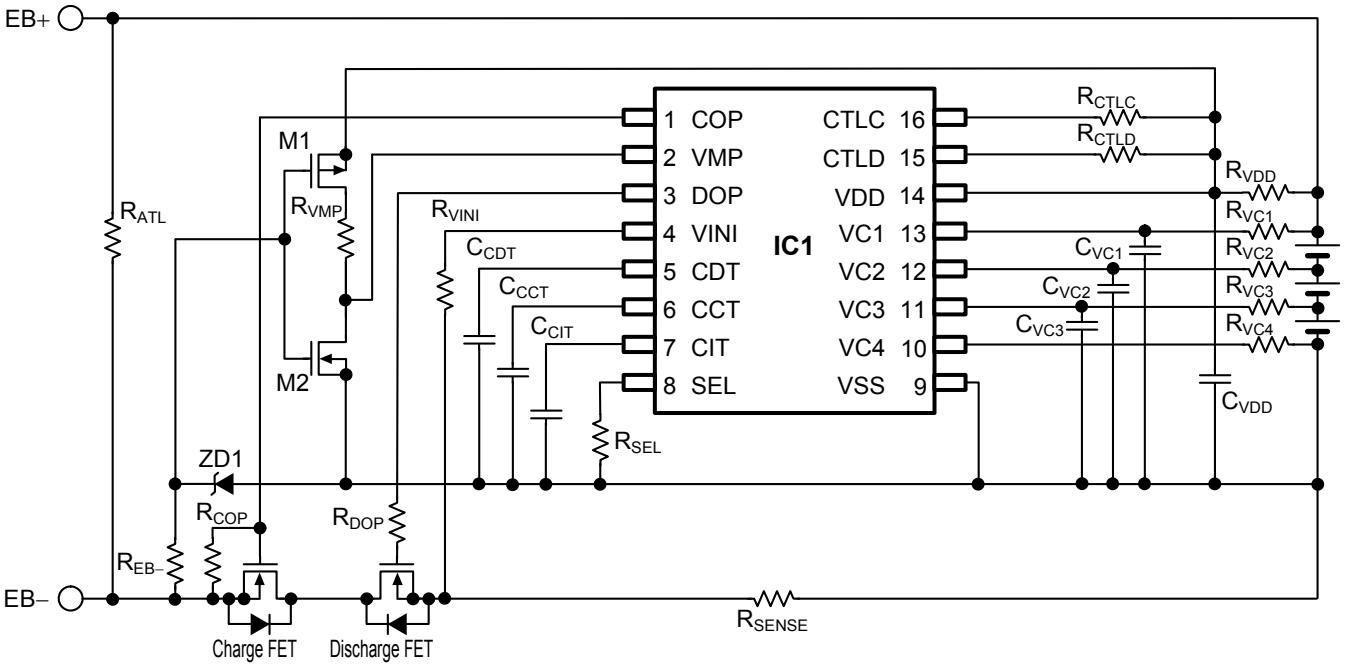
• Protection circuit for multi-series cell using S-8204B Series



Contents

1. Protection circuit for 3-series / 4-series cell using S-8204B Series

1. 1 Protection circuit for 3-series cell (with discharge overcurrent protection function)



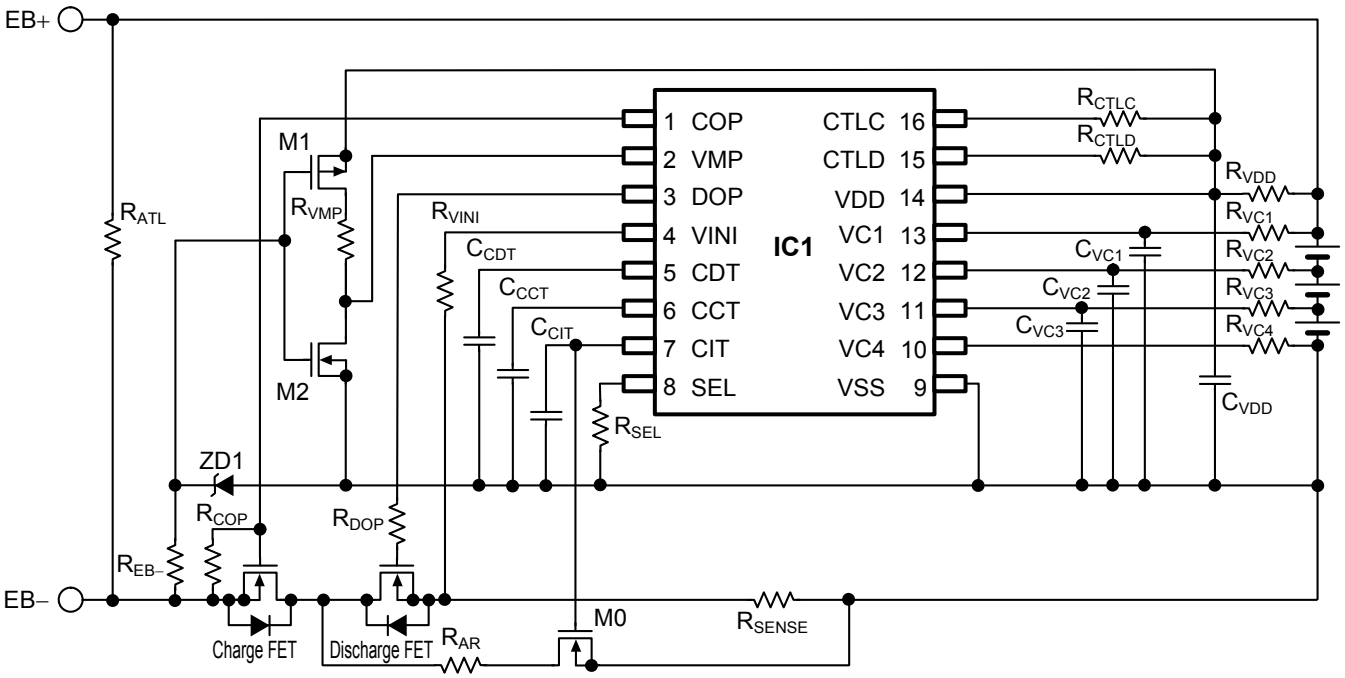
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

Figure 1

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

1. 2 Protection circuit for 3-series cell (with discharge overcurrent protection function and automatic recovery function)



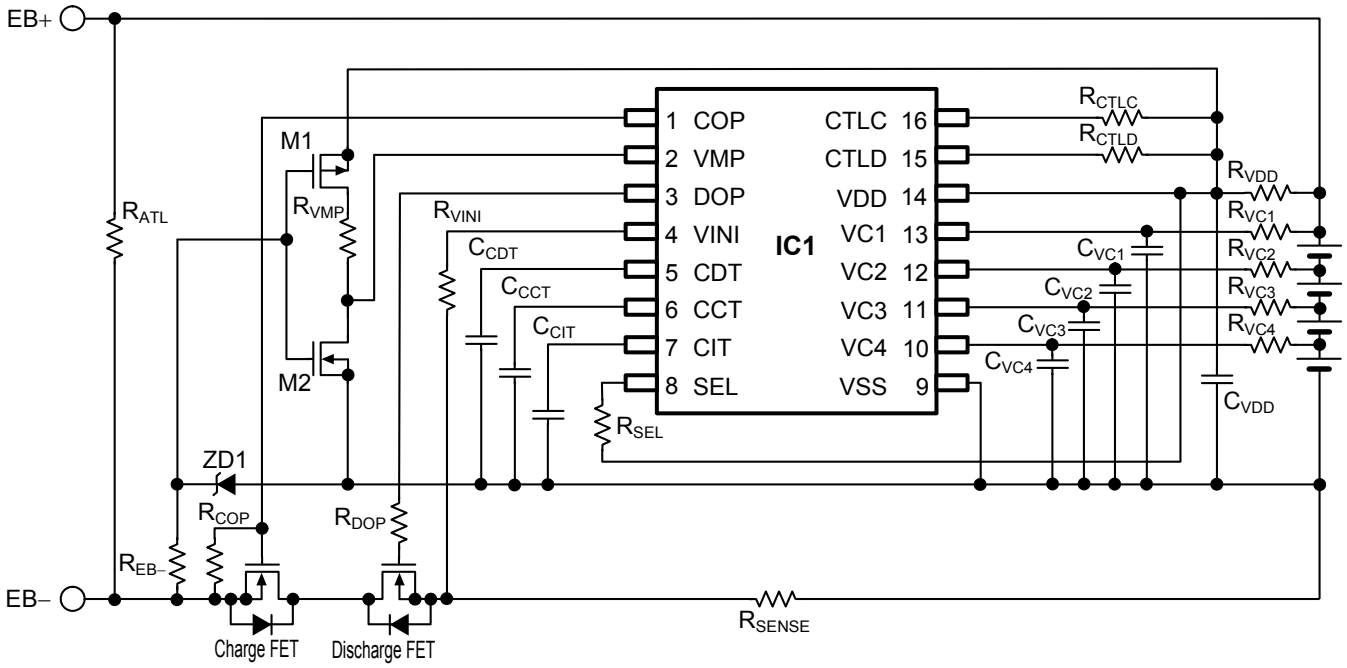
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

Figure 2

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

1. 3 Protection circuit for 4-series cell (with discharge overcurrent protection function)



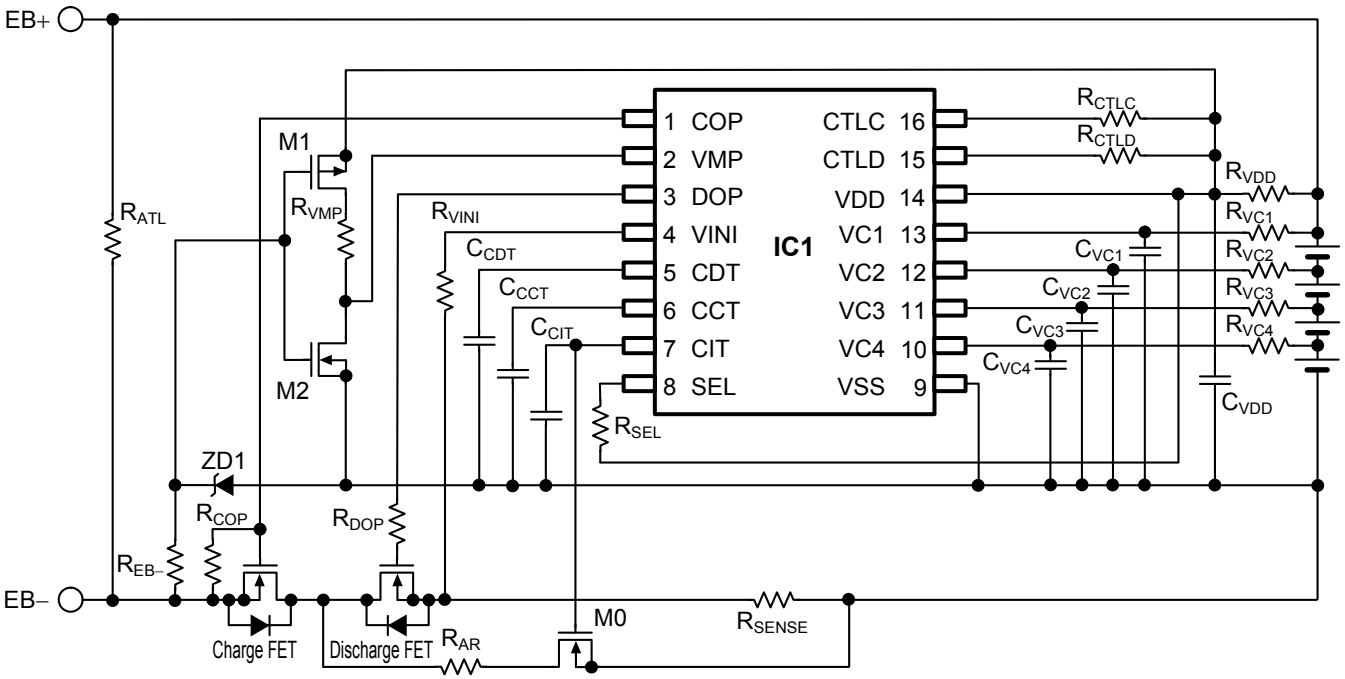
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

Figure 3

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

1. 4 Protection circuit for 4-series cell (with discharge overcurrent protection function and automatic recovery function)



Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

Figure 4

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

1. 5 External components list (Protection circuit for 3-series / 4-series cell)

Table 1 shows external components in the connection examples of **Figure 1** to **Figure 4**.

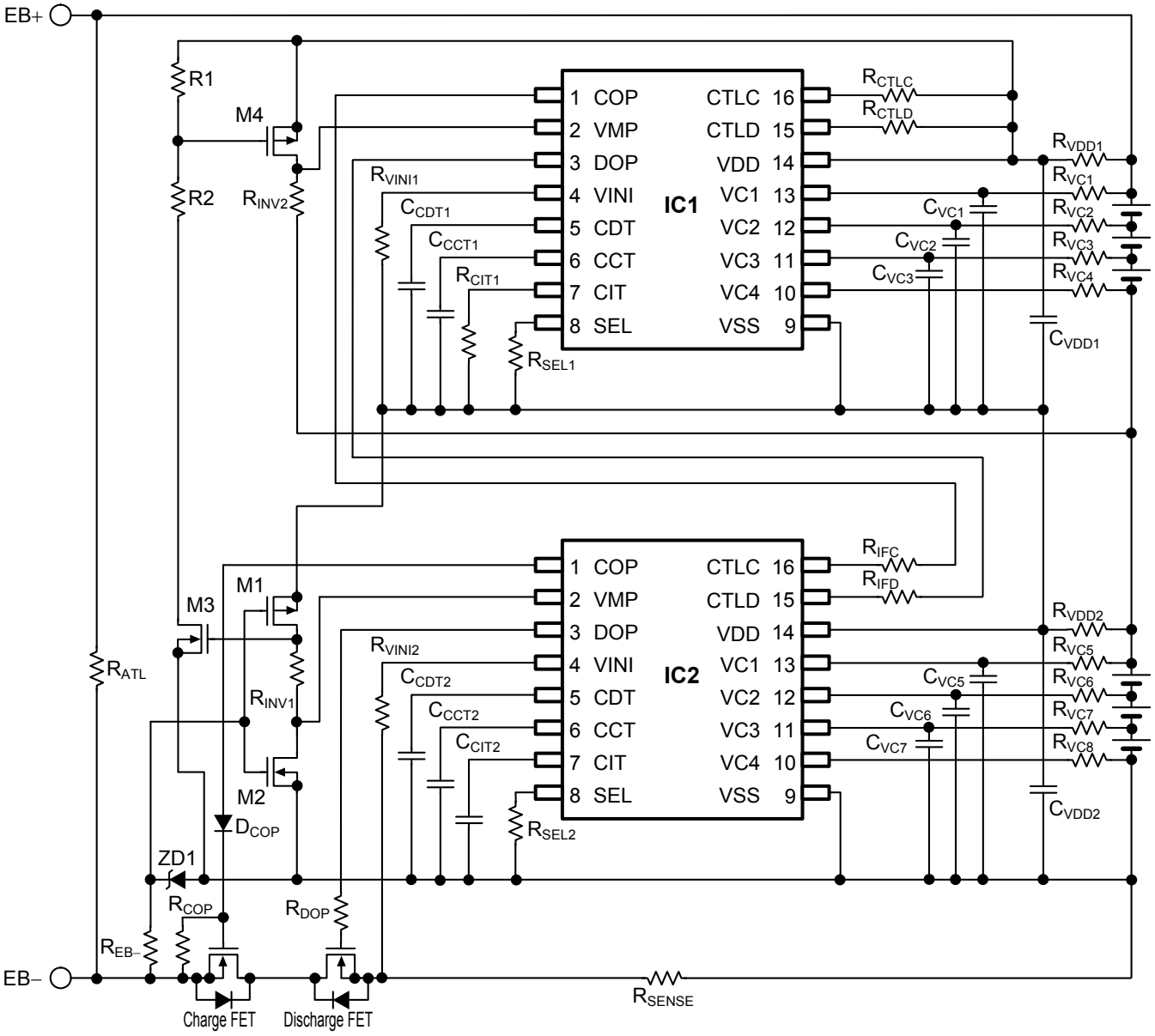
Table 1

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8204B	ABLIC Inc.	Necessary
R_{VC1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC3}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC4}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{VC1}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC2}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC3}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC4}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
R_{VDD}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
C_{VDD}	1	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
R_{SEL}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{CCT}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CIT}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
R_{VINI}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLC}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLD}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{COP}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{DOP}	5.1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VMP}	5.1	kΩ	MCR03	ROHM CO., LTD.	Necessary
R_{SENSE}	–	–	–	–	–
M0	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M1	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M2	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
ZD1	–	–	UDZS18B	ROHM CO., LTD.	Recommend
R_{AR}	100	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{EB-}	1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{ATL}	20	MΩ	MCR03	ROHM CO., LTD.	Recommend
Charge FET	–	–	–	–	–
Discharge FET	–	–	–	–	–

Caution 1. The above constants are subject to change without prior notice.
2. These constants will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

2. Protection circuit for 6-series to 8-series cell using S-8204B Series (Cascade connection)

2. 1 Protection circuit for 6-series cell (with discharge overcurrent protection function)



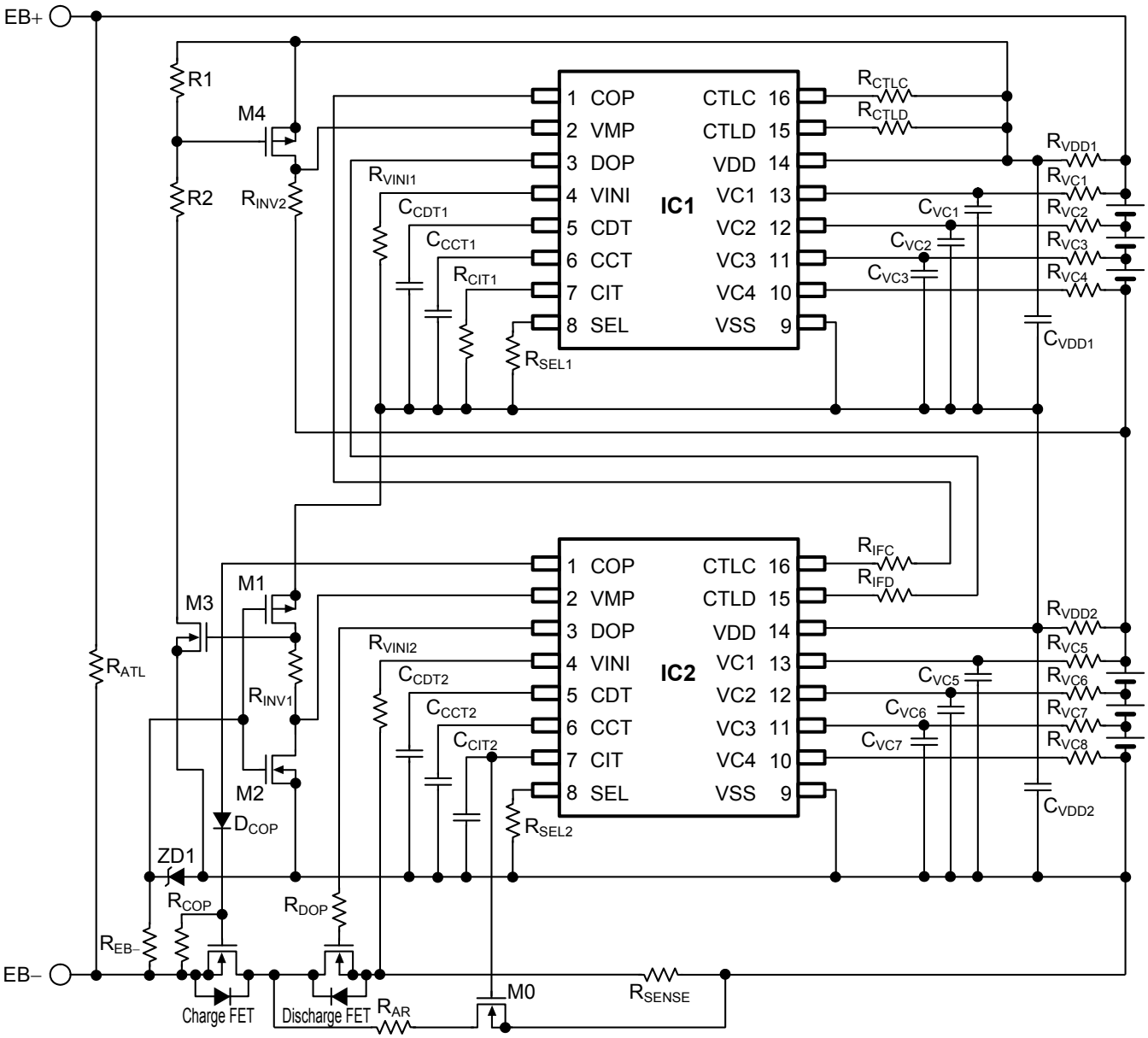
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 5

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 2 Protection circuit for 6-series cell (with discharge overcurrent protection function and automatic recovery function)



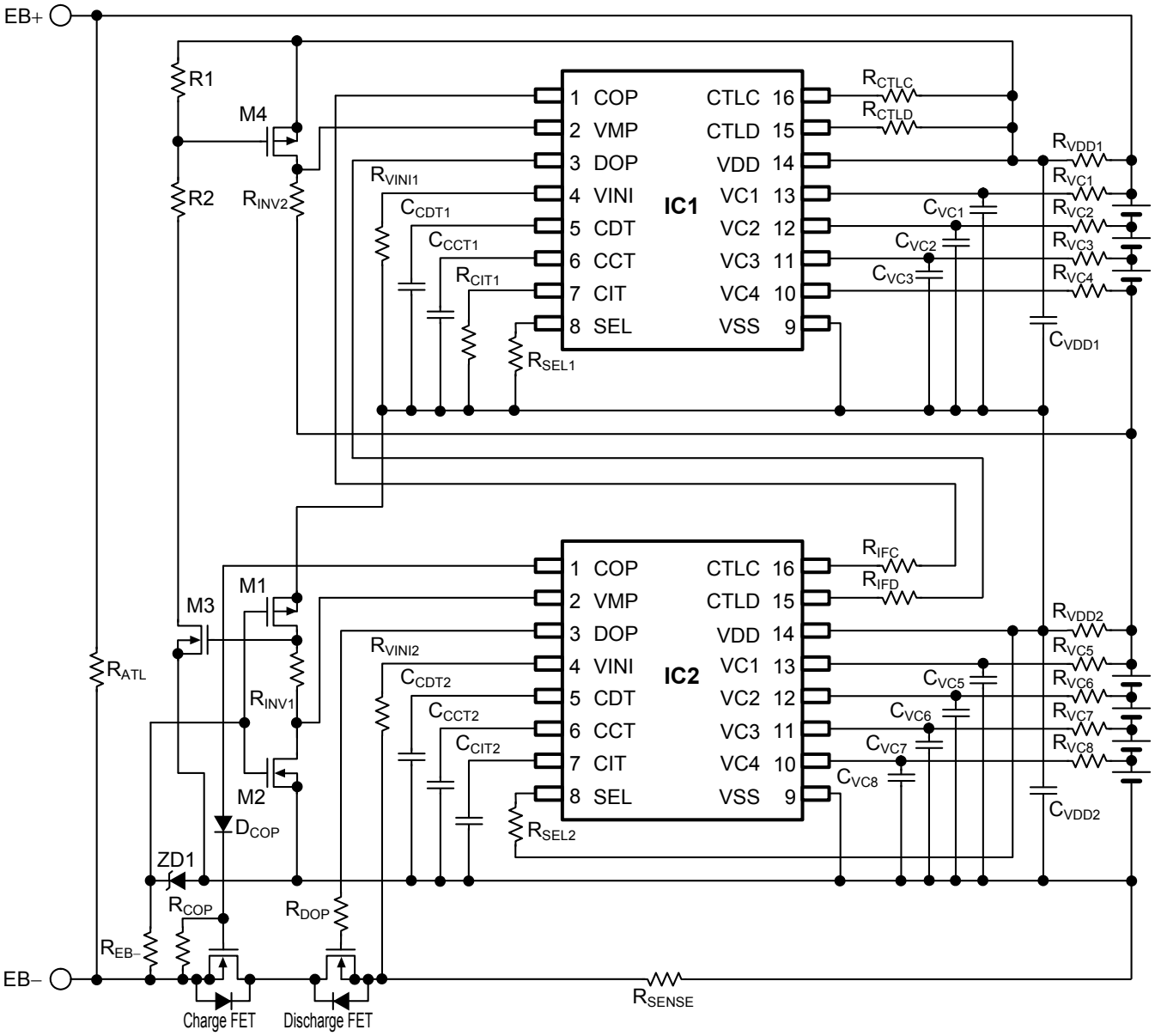
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 6

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 3 Protection circuit for 7-series cell (with discharge overcurrent protection function)



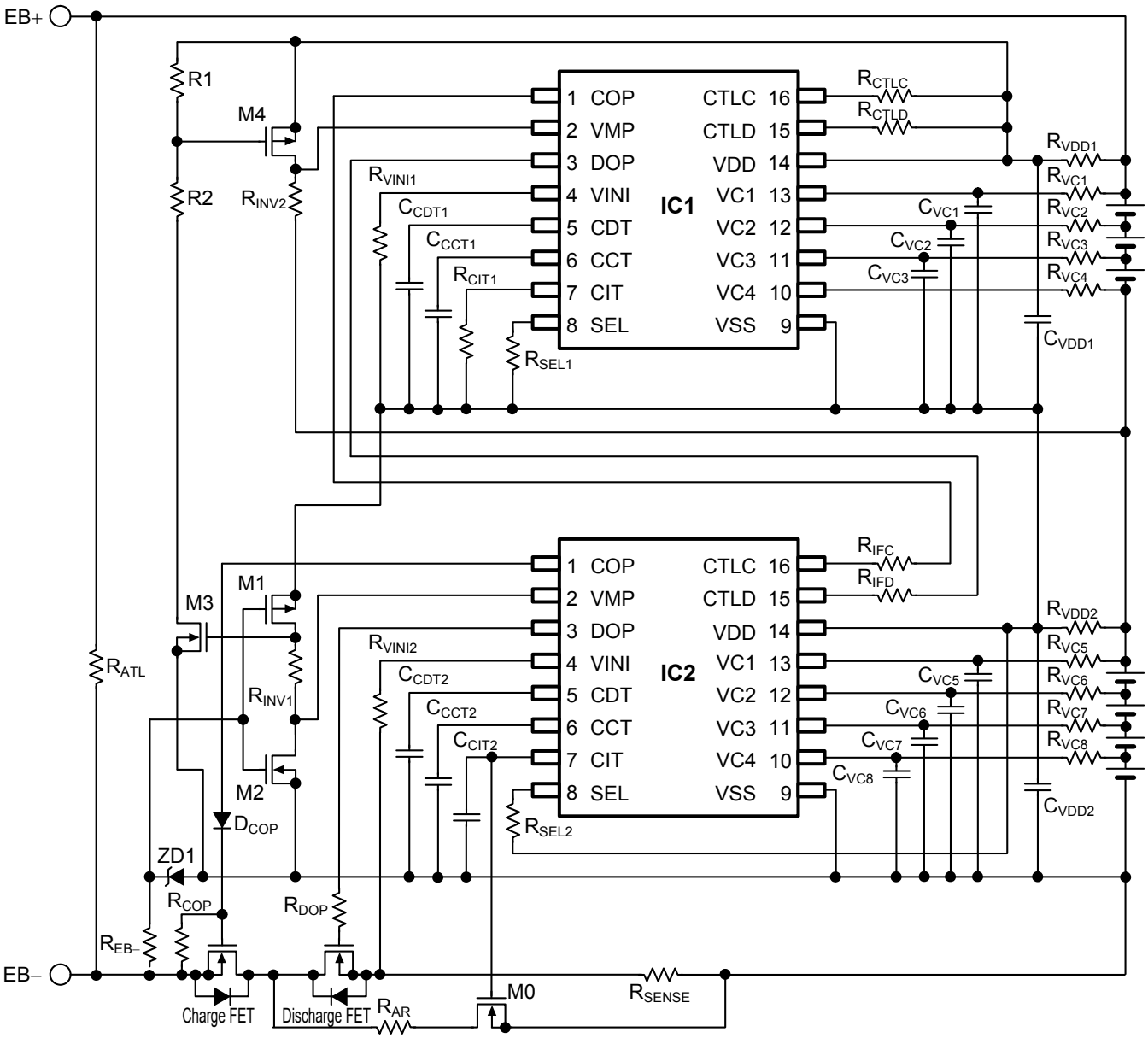
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 7

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 4 Protection circuit for 7-series cell (with discharge overcurrent protection function and automatic recovery function)



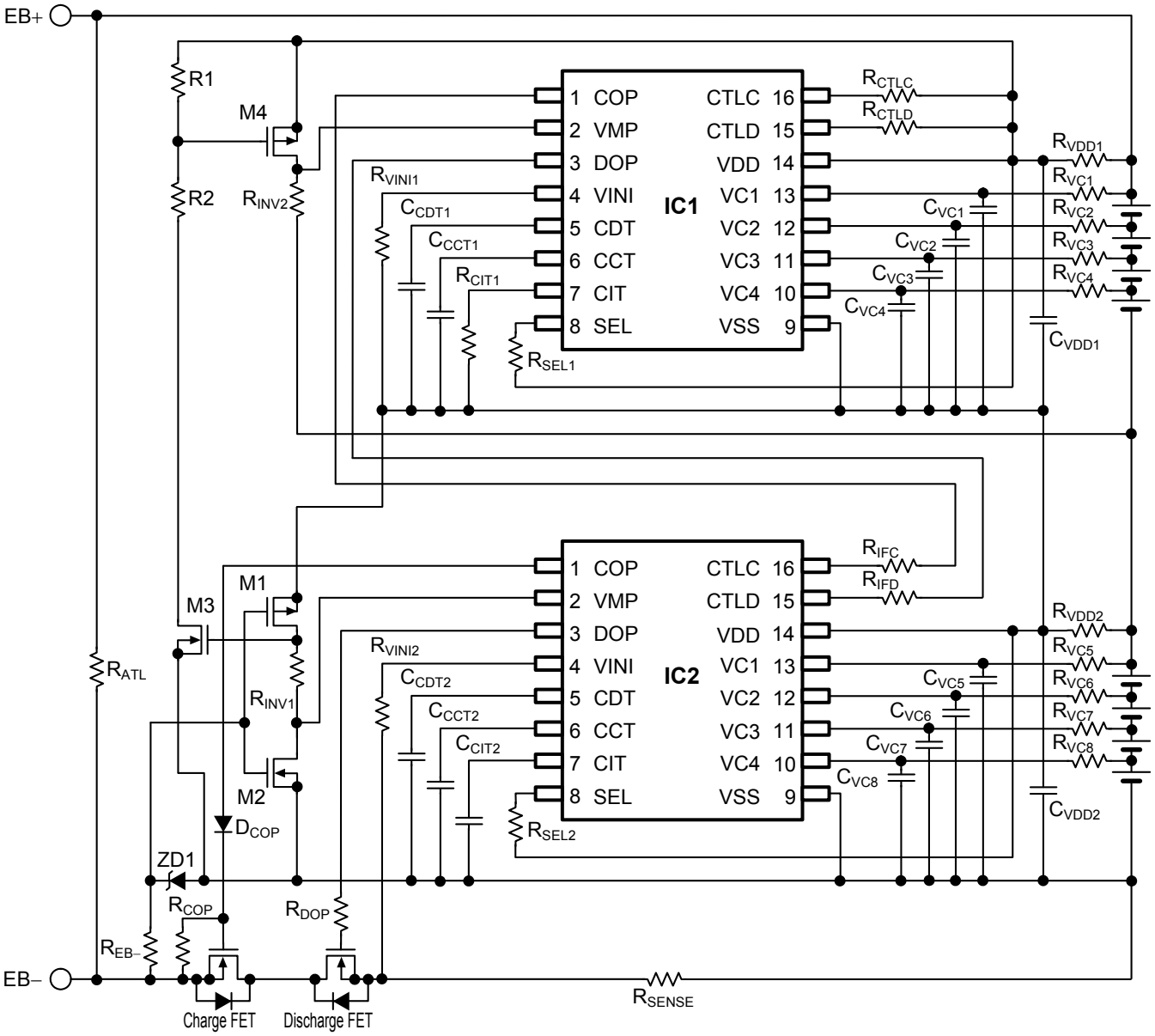
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 8

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 5 Protection circuit for 8-series cell (with discharge overcurrent protection function)



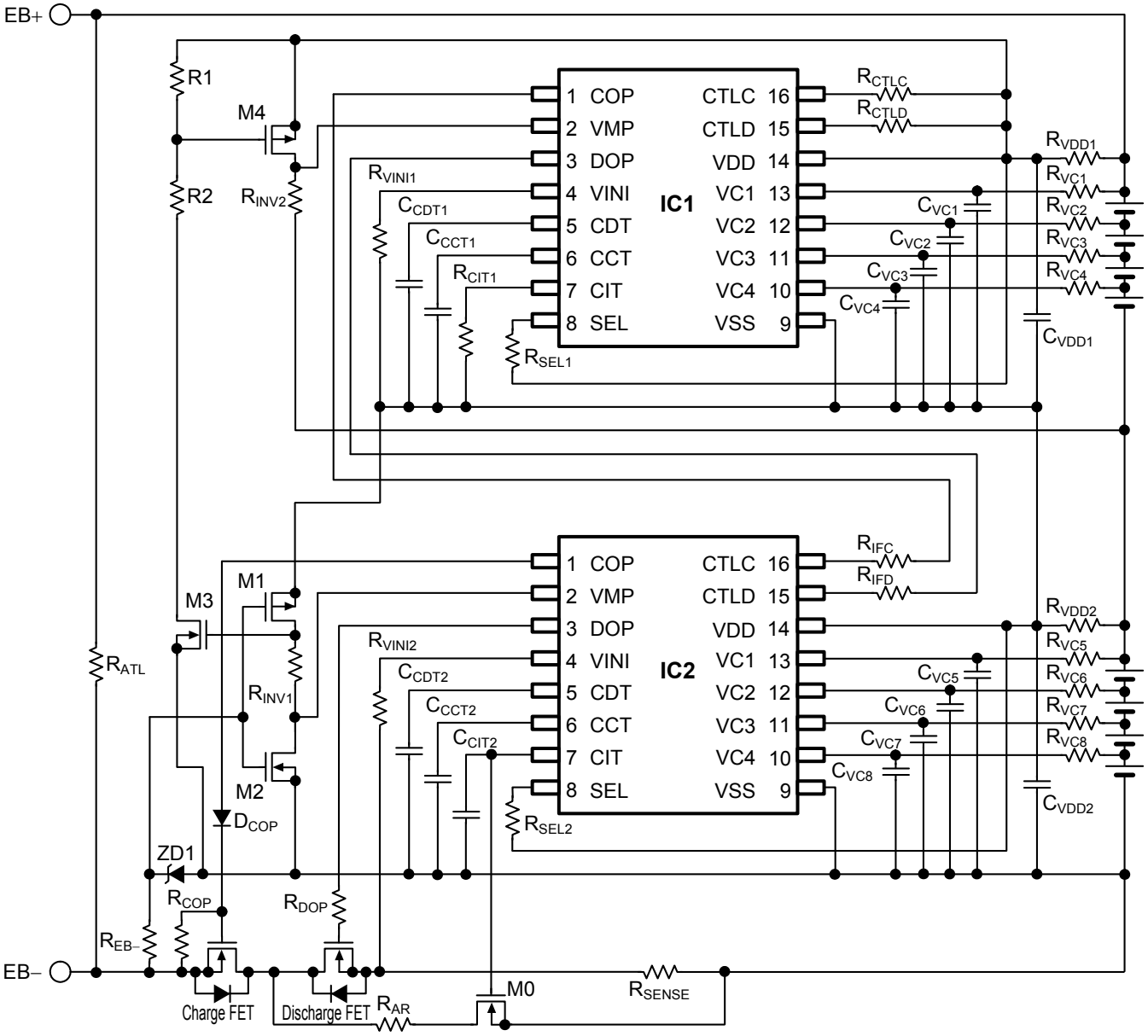
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 9

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 6 Protection circuit for 8-series cell (with discharge overcurrent protection function and automatic recovery function)



Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

Figure 10

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

2. 7 External components list (Protection circuit for 6-series to 8-series cell)

Table 2 shows external components in the connection examples of **Figure 5** to **Figure 10**.

Table 2 (1 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8204B	ABLIC Inc.	Necessary
IC2	–	–	S-8204B	ABLIC Inc.	Necessary
R_{VC1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC3}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC4}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC5}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC6}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC7}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC8}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{VC1}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC2}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC3}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC4}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC5}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC6}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC7}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC8}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
R_{VDD1}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VDD2}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
C_{VDD1}	1	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VDD2}	1.5	μF	GRM32D	Murata Manufacturing Co., Ltd.	Recommend
R_{SEL1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{CCT1}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CCT2}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT1}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT2}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
R_{CIT1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{CIT2}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
R_{VINI1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VINI2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLC}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLD}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{IFC}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{IFD}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{INV1}	5.1	kΩ	MCR03	ROHM CO., LTD.	Necessary
R_{INV2}	1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{COP}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{DOP}	51	kΩ	MCR03	ROHM CO., LTD.	Recommend
D_{COP}	–	–	1SS355	ROHM CO., LTD.	Recommend
R_{SENSE}	–	–	–	–	–

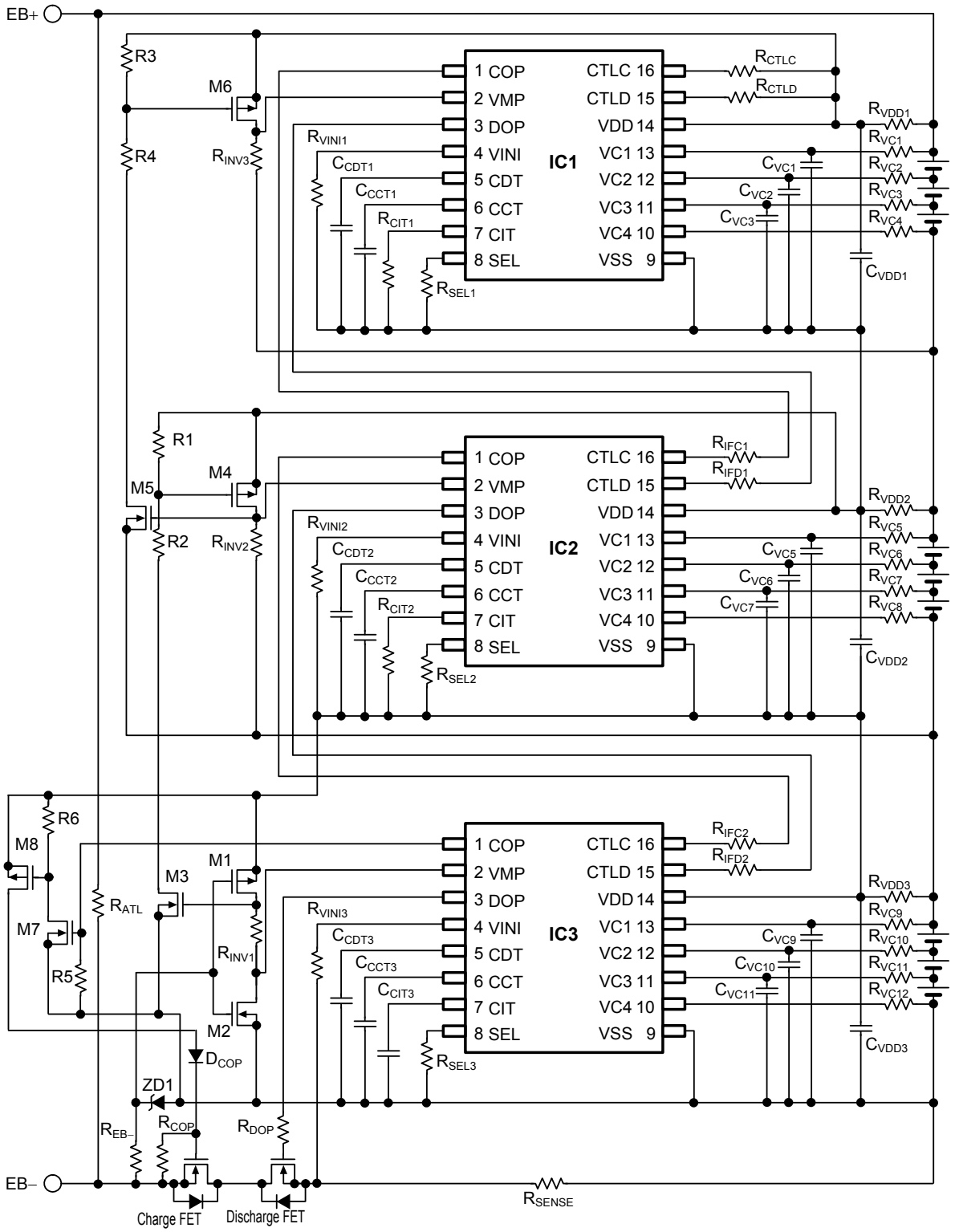
Table 2 (2 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
M0	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M1	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M2	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M3	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M4	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
ZD1	–	–	UDZS18B	ROHM CO., LTD.	Recommend
R1	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R2	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{AR}	100	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{EB-}	1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{ATL}	20	MΩ	MCR03	ROHM CO., LTD.	Recommend
Charge FET	–	–	–	–	–
Discharge FET	–	–	–	–	–

Caution 1. The above constants are subject to change without prior notice.
2. These constants will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constants.

3. Protection circuit for 9-series to 12-series cell using S-8204B Series (Cascade connection)

3. 1 Protection circuit for 9-series cell (with discharge overcurrent protection function)



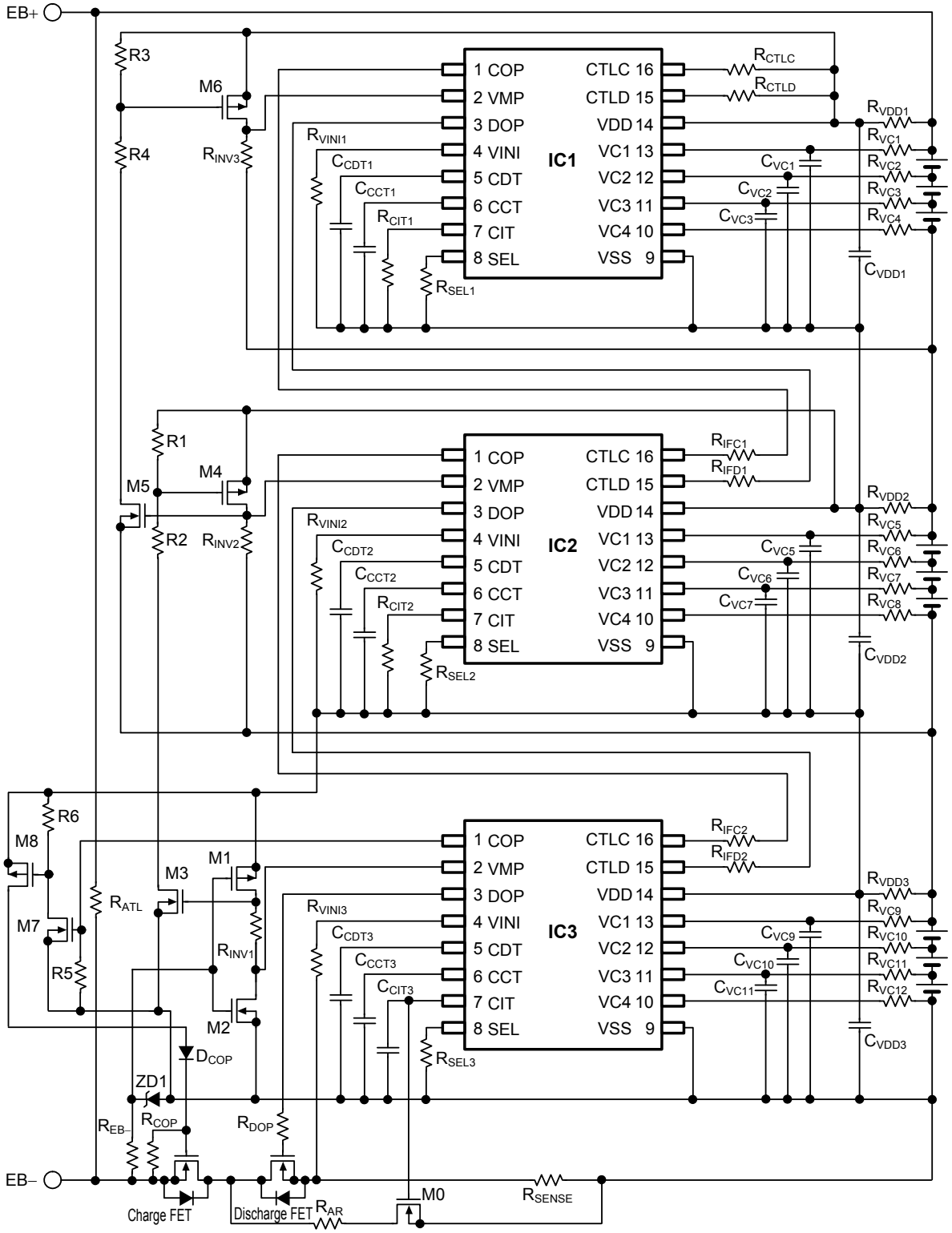
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 11

Caution 1. The above example connection may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 2 Protection circuit for 9-series cell (with discharge overcurrent protection function and automatic recovery function)



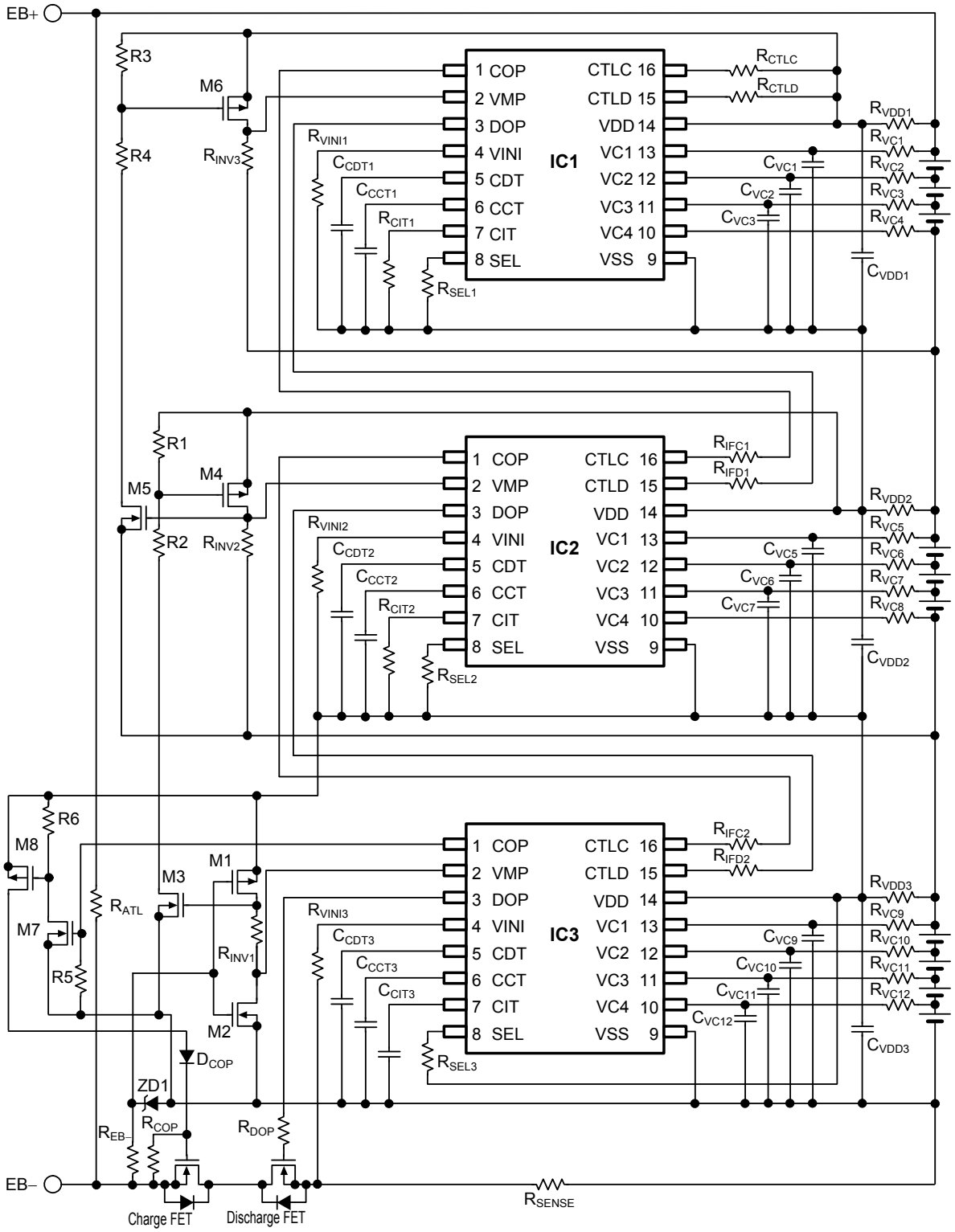
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 12

Caution 1. The above example connection may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 3 Protection circuit for 10-series cell (with discharge overcurrent protection function)



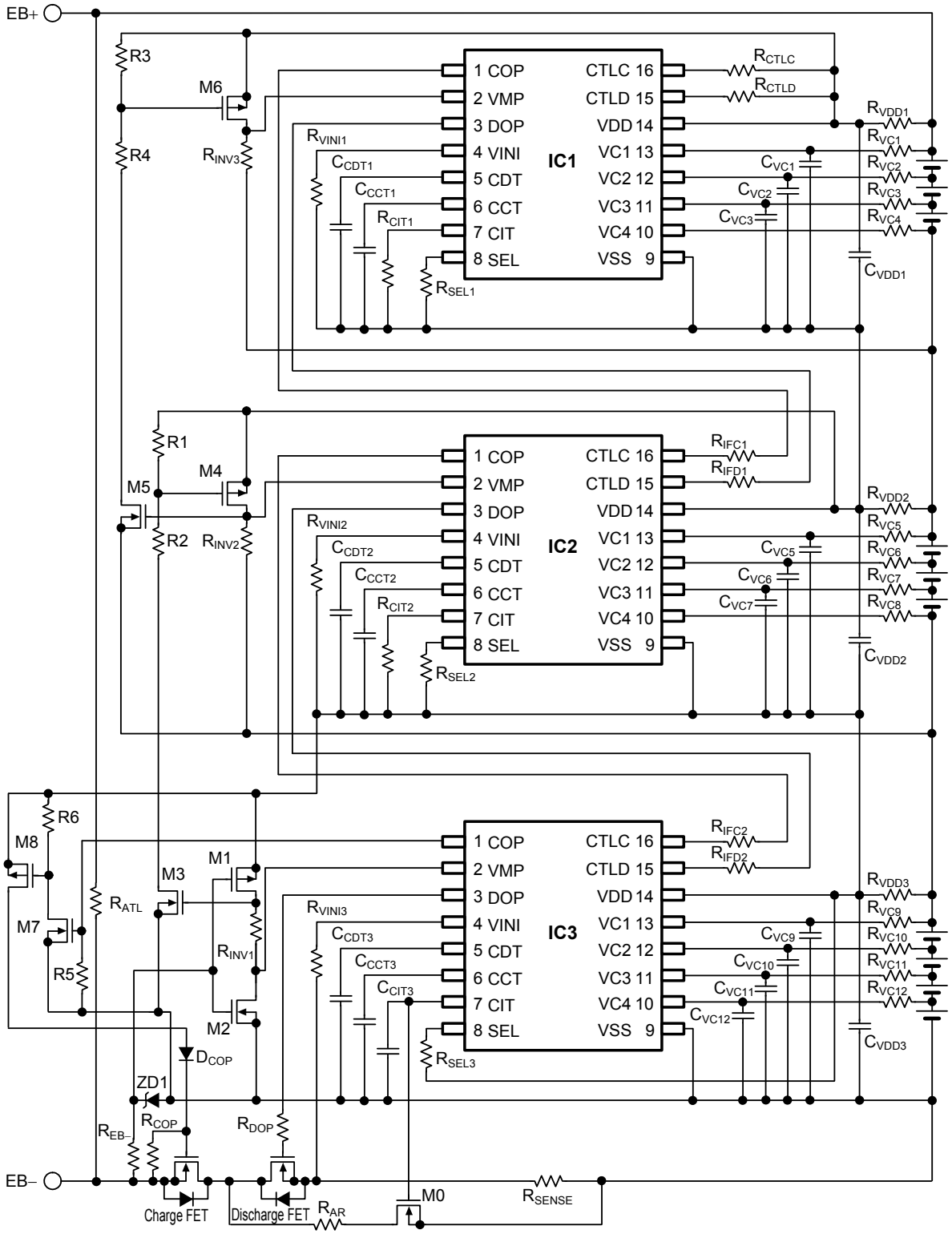
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 13

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 4 Protection circuit for 10-series cell (with discharge overcurrent protection function and automatic recovery function)



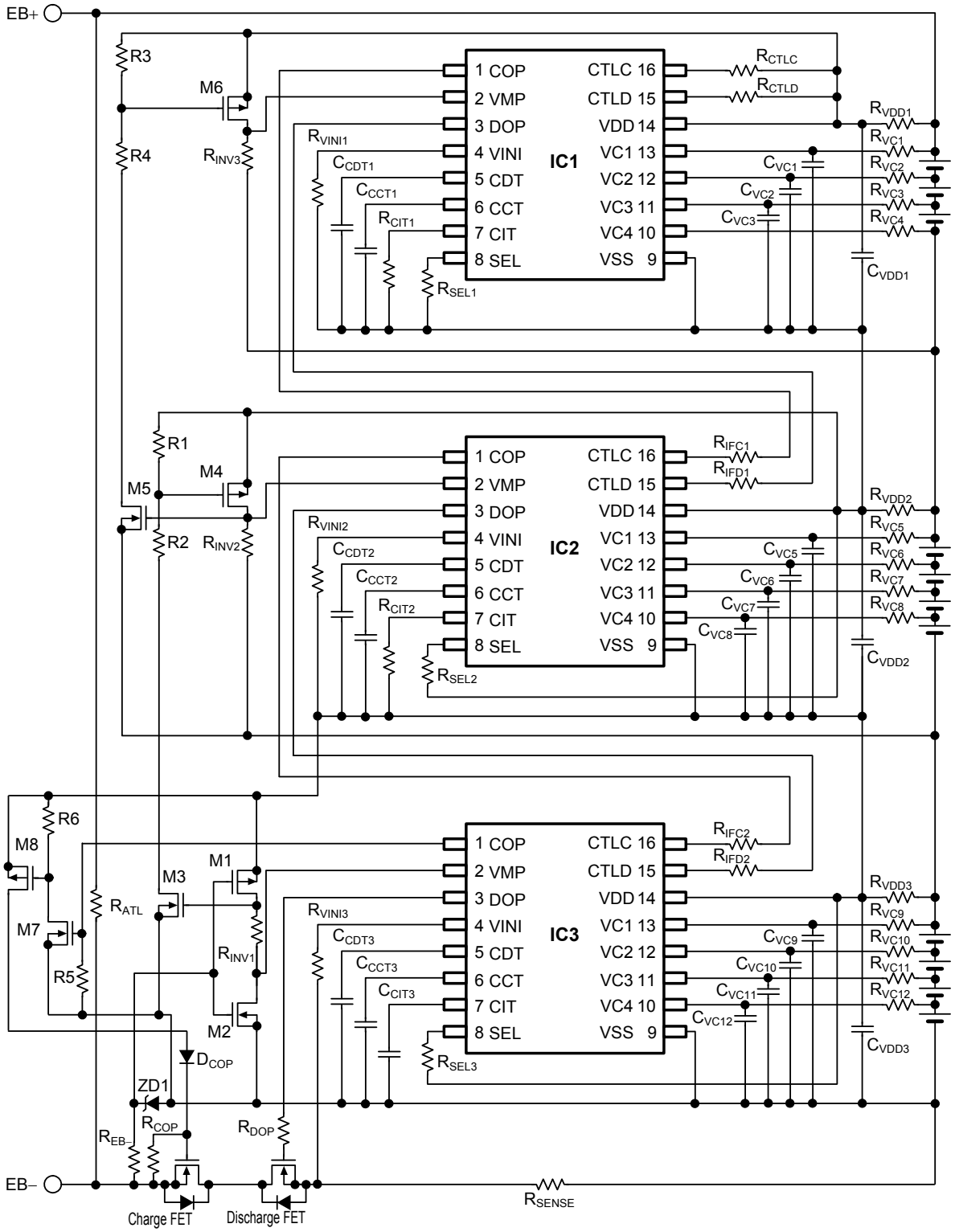
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 14

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 5 Protection circuit for 11-series cell (with discharge overcurrent protection function)



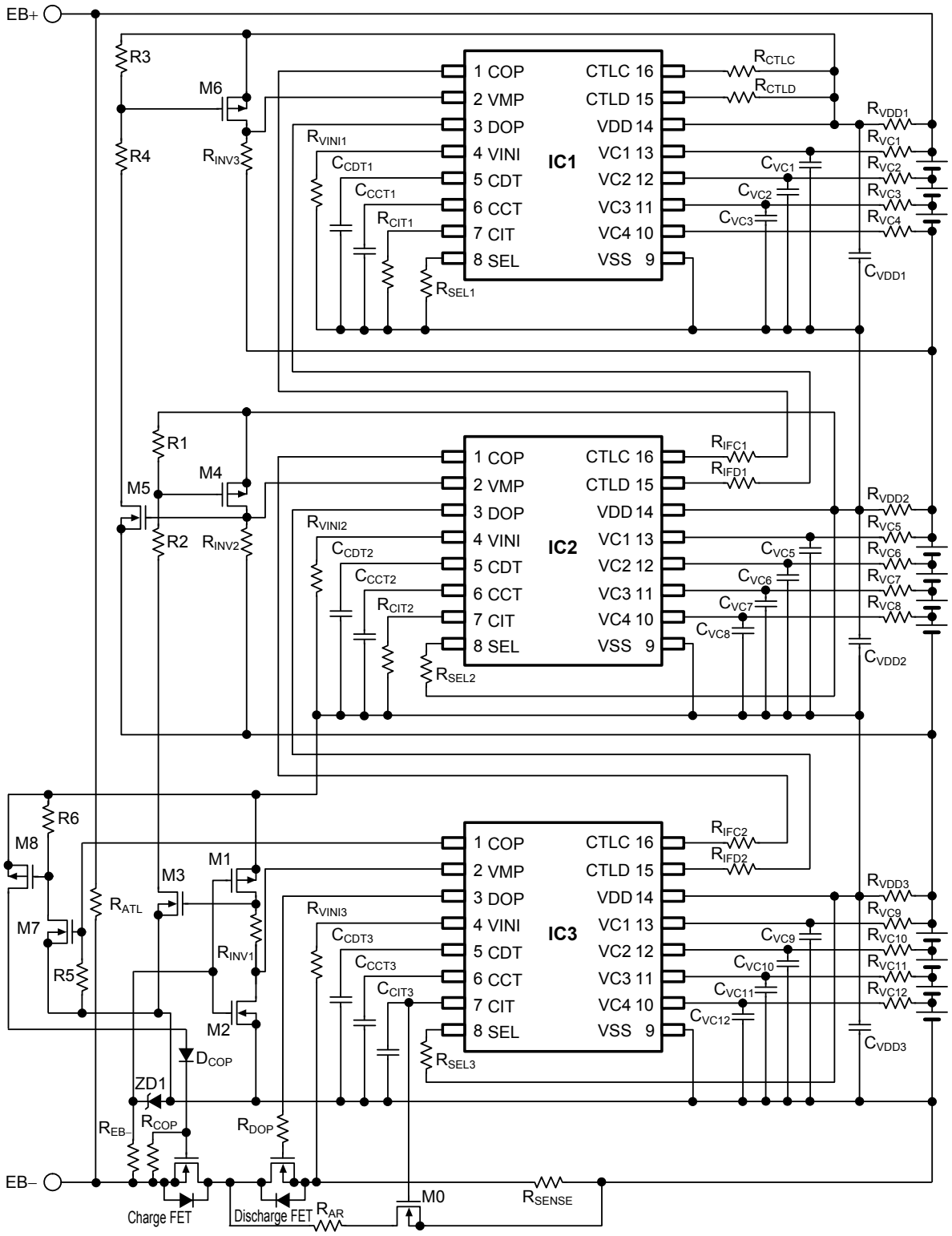
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 15

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 6 Protection circuit for 11-series cell (with discharge overcurrent protection function and automatic recovery function)



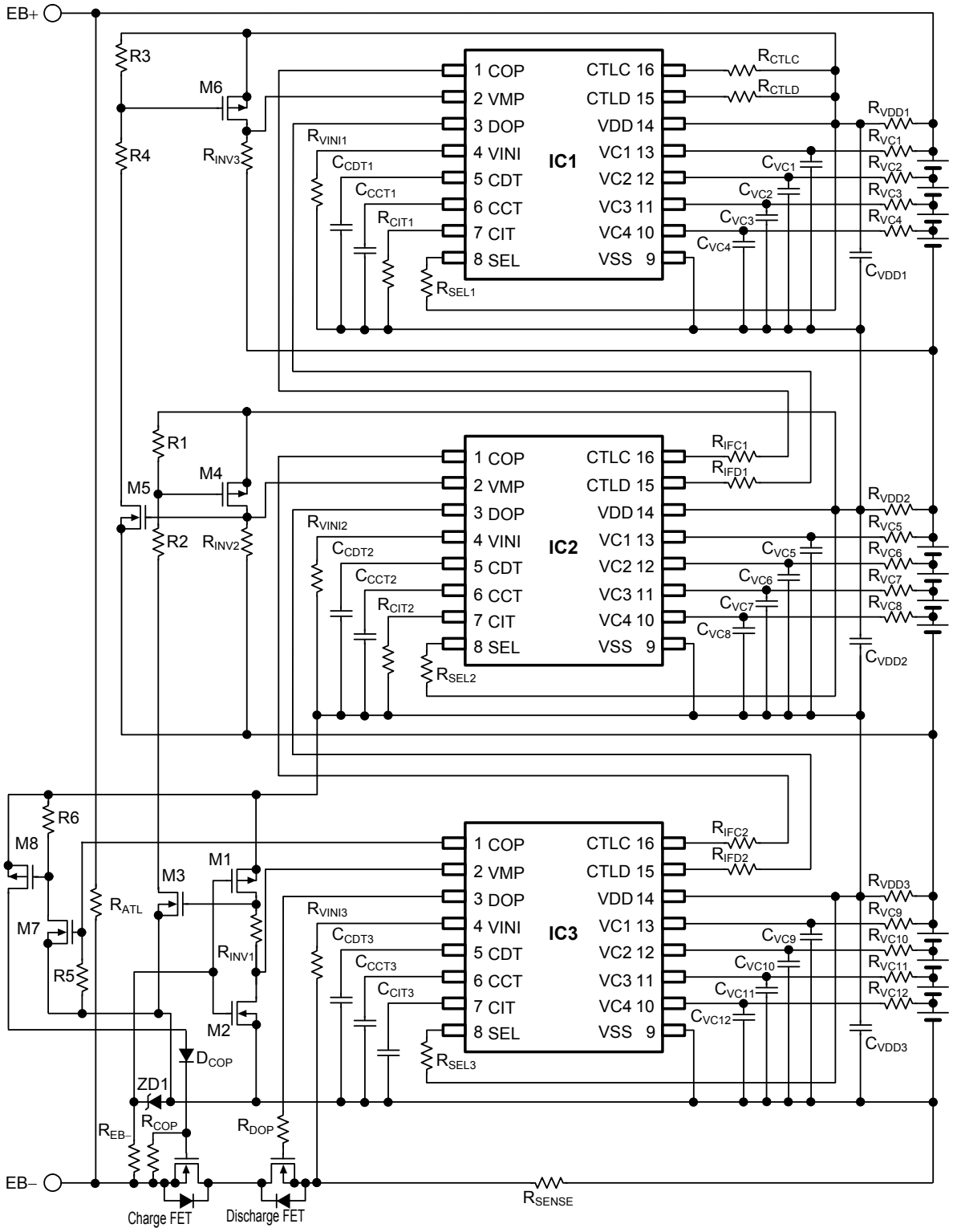
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 16

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 7 Protection circuit for 12-series cell (with discharge overcurrent protection function)

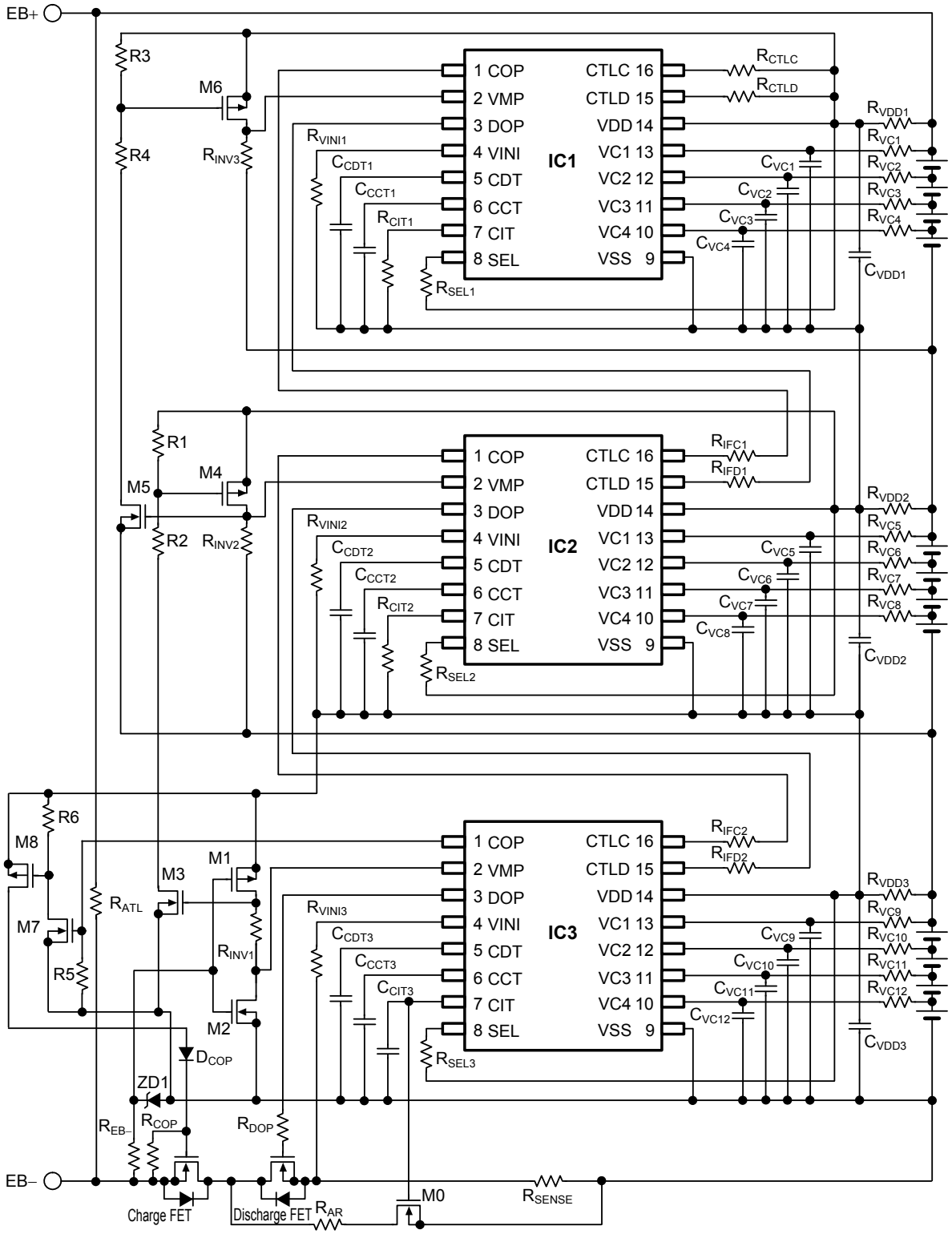


Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 17

Caution 1. The above connection example may be changed without notice.
2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 8 Protection circuit for 12-series cell (with discharge overcurrent protection function and automatic recovery function)



Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

Figure 18

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

3. 9 External components list (Protection circuit for 9-series to 12-series cell)

Table 3 shows external components in the connection examples of **Figure 11** to **Figure 18**.

Table 3 (1 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8204B	ABLIC Inc.	Necessary
IC2	–	–	S-8204B	ABLIC Inc.	Necessary
IC3	–	–	S-8204B	ABLIC Inc.	Necessary
R_{VC1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC3}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC4}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC5}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC6}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC7}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC8}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC9}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC10}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC11}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC12}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{VC1}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC2}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC3}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC4}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC5}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC6}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC7}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC8}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC9}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC10}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC11}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VC12}	0.047	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
R_{VDD1}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VDD2}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VDD3}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
C_{VDD1}	1	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VDD2}	1	μF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
C_{VDD3}	1.5	μF	GRM32D	Murata Manufacturing Co., Ltd.	Recommend
R_{SEL1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL3}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{CCT1}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CCT2}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CCT3}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT1}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT2}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
C_{CDT3}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–
R_{CIT1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CIT2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
C_{CIT3}	0.1	μF	GRM188B	Murata Manufacturing Co., Ltd.	–

Table 3 (2 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
R_{VINI1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VINI2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VINI3}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLC}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLD}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{IFC1}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{IFD1}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{IFC2}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{IFD2}	5.1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{INV1}	5.1	kΩ	MCR03	ROHM CO., LTD.	Necessary
R_{INV2}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{INV3}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{COP}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{DOP}	51	kΩ	MCR03	ROHM CO., LTD.	Recommend
D_{COP}	–	–	1SS355	ROHM CO., LTD.	Recommend
R_{SENSE}	–	–	–	–	–
M0	–	–	1HN04CH	ON Semiconductor	Recommend
M1	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M2	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M3	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M4	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M5	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M6	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M7	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M8	–	–	1HP04CH	ON Semiconductor	Recommend
ZD1	–	–	UDZS18B	ROHM CO., LTD.	Recommend
R1	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R2	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R3	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R4	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R5	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R6	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{AR}	100	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{EB-}	1	MΩ	MCR03	ROHM CO., LTD.	Necessary
R_{ATL}	20	MΩ	MCR03	ROHM CO., LTD.	Recommend
Charge FET	–	–	–	–	–
Discharge FET	–	–	–	–	–

Caution 1. The above constants are subject to change without prior notice.
2. These constants will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constants.

4. Withstand voltage protection when S-8204B Series devices are connected in cascade

The S-8204B Series can be used as a battery protection circuit for multi-series cell through cascade connection. However, the S-8204B Series may be damaged when it is exposed to voltage exceeding the absolute maximum ratings, resulting from the external components in this type of circuit design.
The potential for damage exists during battery connection under the following conditions:

- When the connecting of each cell is out of turn.
- In case that there is a difference at the time when each cell and each pin of the protection board are connected by using a connector in the application circuit where a cell of protection board is connected with a cell, as shown in **Figure 19**.

In order to prevent the destruction to the S-8204B Series, it is recommended to add the Zener diode of 20 V to 22 V between the VDD pin and the VSS pin of the S-8204B Series beforehand, as shown in **Figure 19**.

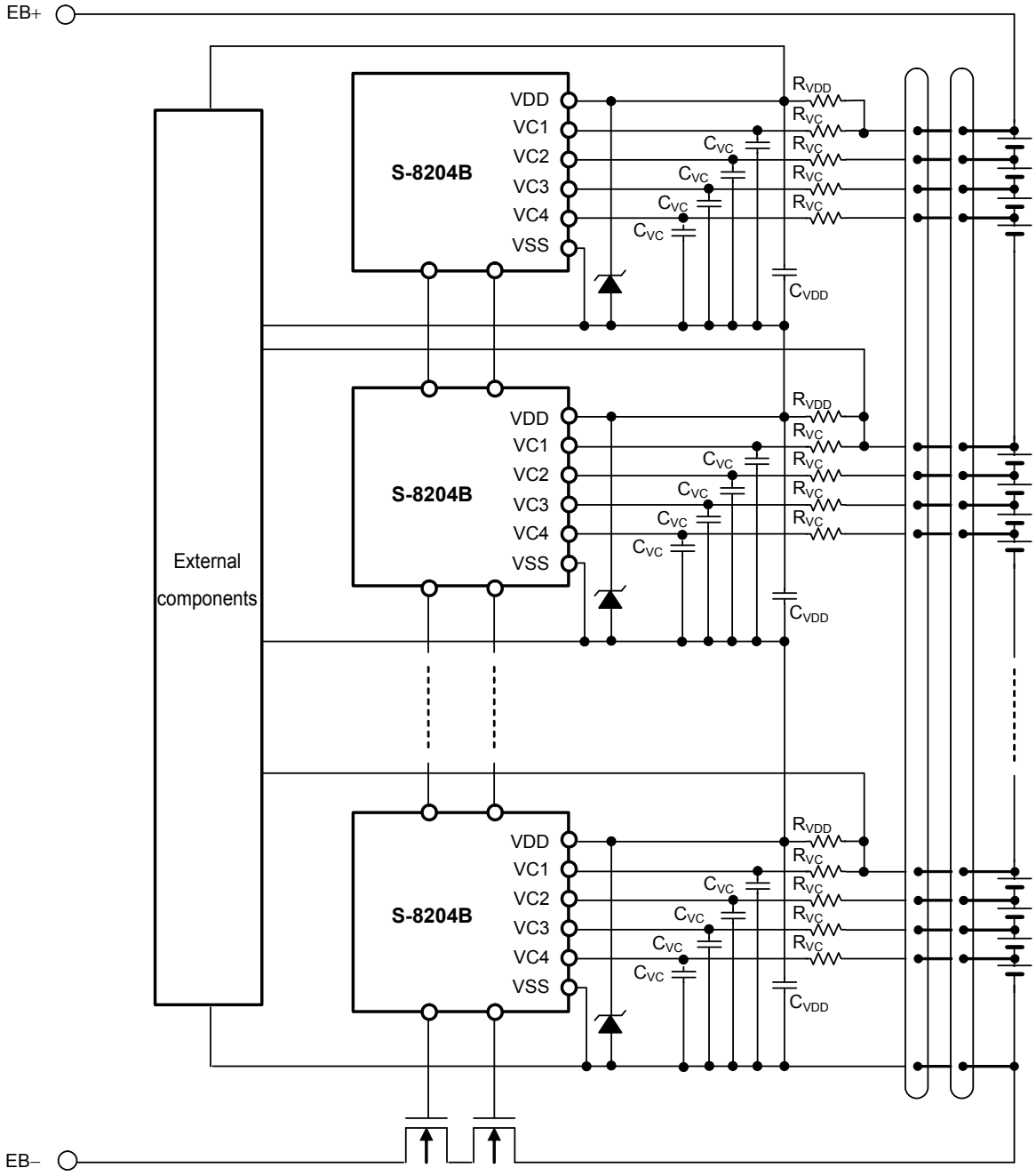


Figure 19

Caution 1. The above connection example may be changed without notice.

2. It has not been confirmed whether the operation is normal or not in circuits other than the above example of connection. The example of connection shown above will not guarantee successful operation.

5. Precautions

- The usage described in this application note is typical examples using ICs of ABLIC Inc.
  Perform thorough evaluation before use.

- When designing for mass production using an application circuit described herein, the product deviation and temperature characteristics of the external components should be taken into consideration. ABLIC Inc. shall not bear any responsibility for patent infringements related to products using the circuits described herein.

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6. Related source

Refer to the following datasheet for details of the S-8204B Series.

S-8204B Series Datasheet

The information described herein is subject to change without notice.
Regarding the newest version, contact our sales office.
Select product category and product name on our website, download the PDF file.

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