CMOS IC Application Note

S-8204B Series Connection Examples

Rev.1.5_00

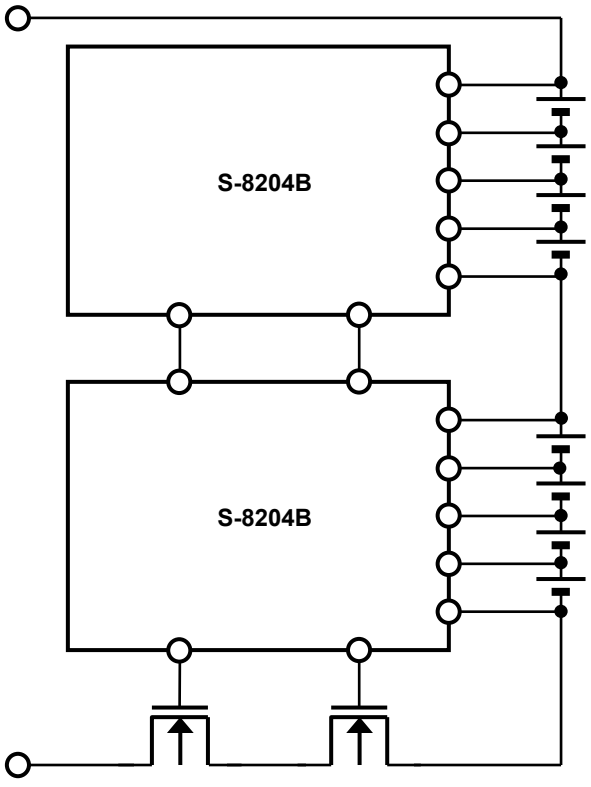
The S-8204B Series is a protection IC for 3-series or 4-series cell lithium-ion rechargeable battery, and includes high-accuracy voltage detection circuits and delay circuits. By using cascade connection, it is also possible to protect 6-series or more cells lithium-ion rechargeable battery pack.
In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

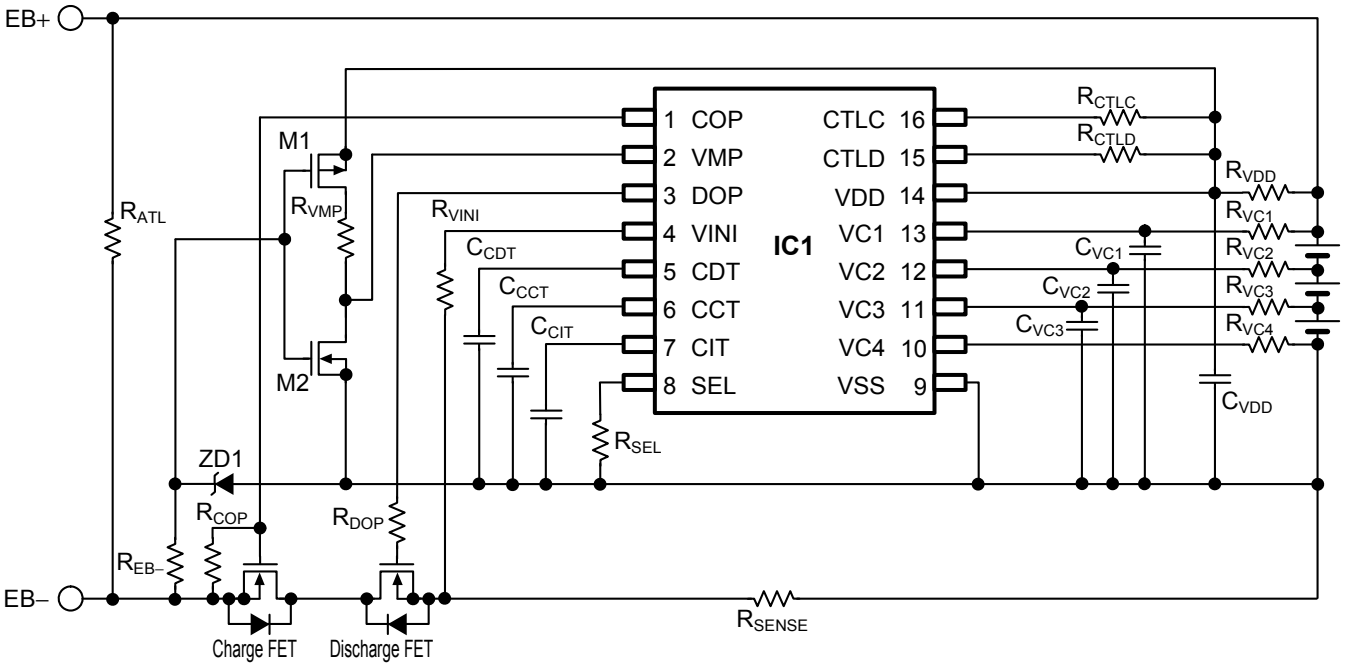
- Protection circuit for multi-series cell using S-8204B Series



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)



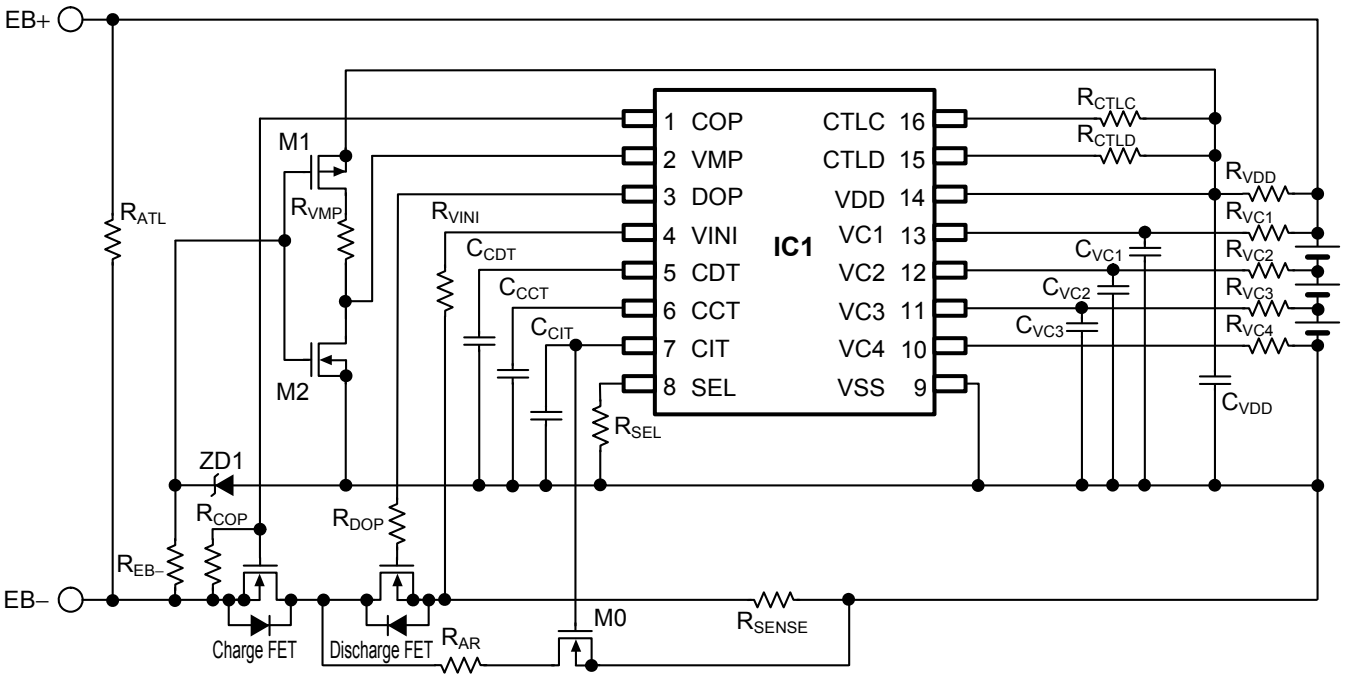
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

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)



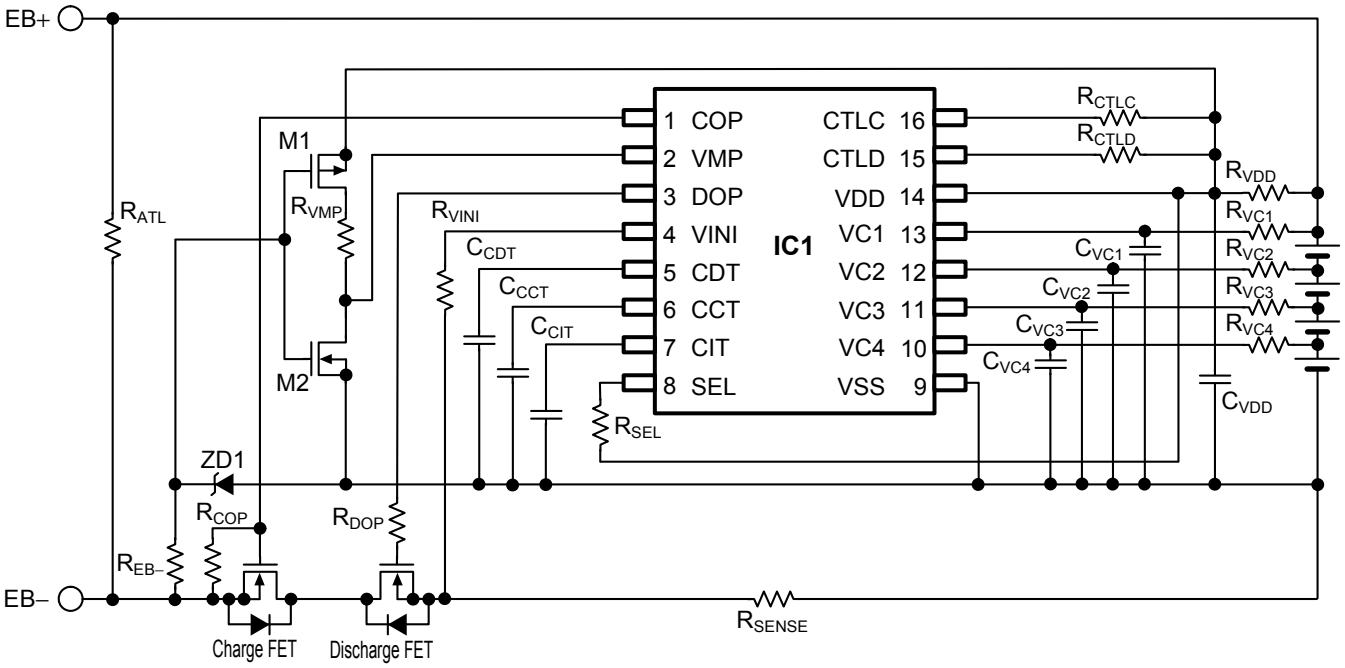
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

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)



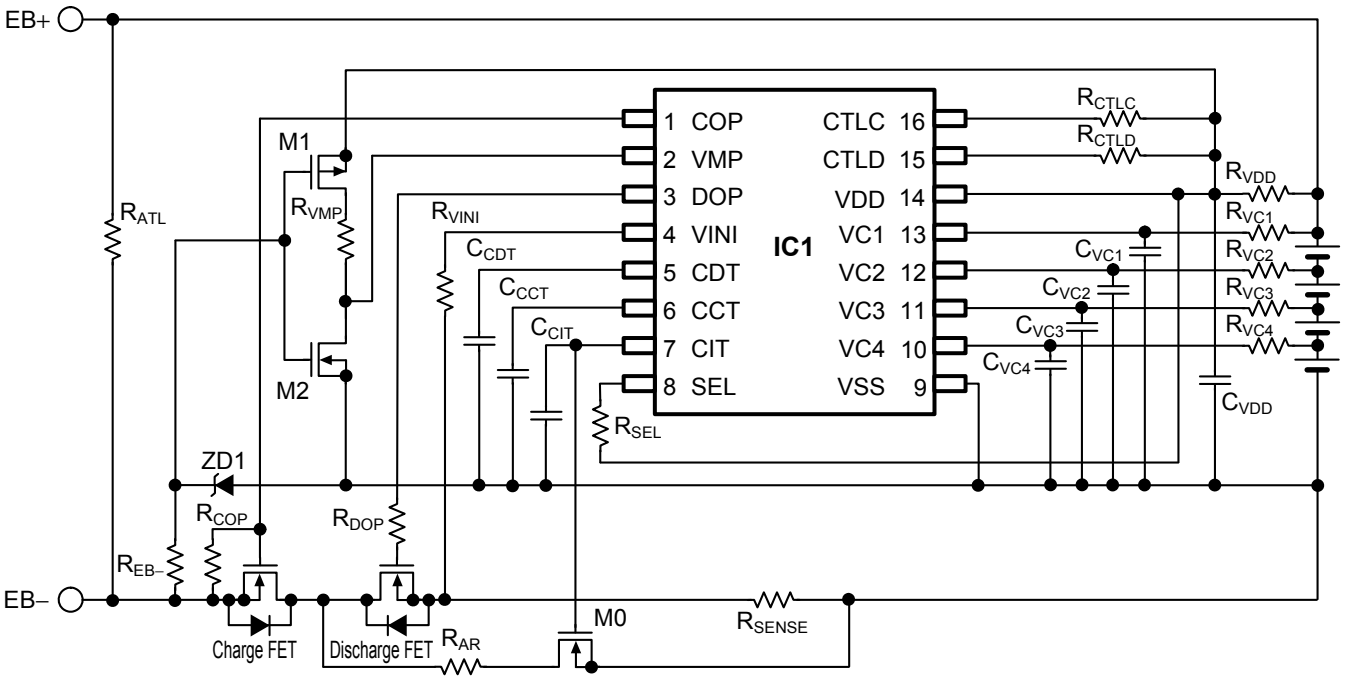
Remark Refer to "**1. 5 External components list (Protection circuit for 3-series / 4-series cell)**" for constants of external components.

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**.

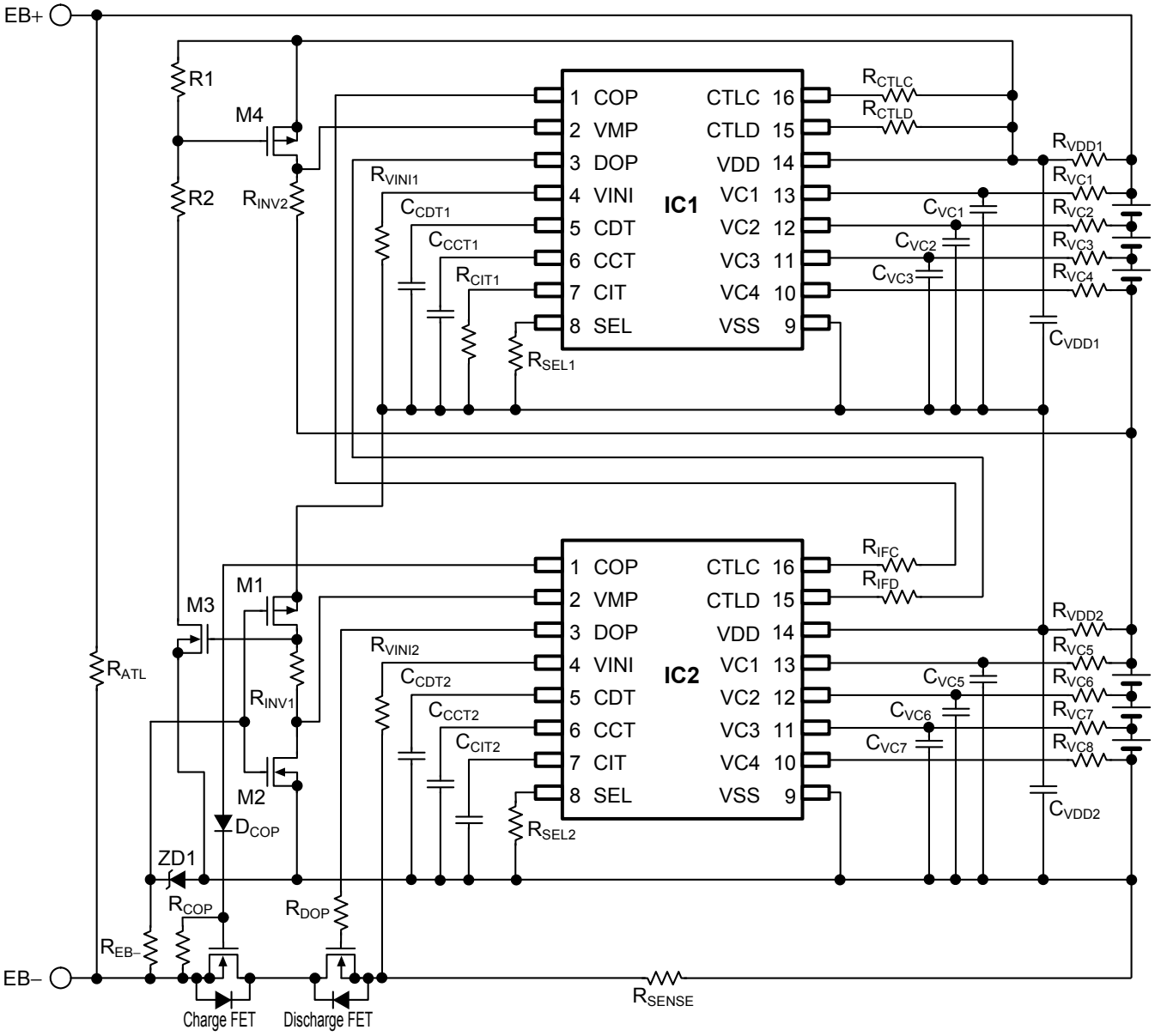
Table 1

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8204B	SII Semiconductor Corporation	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)



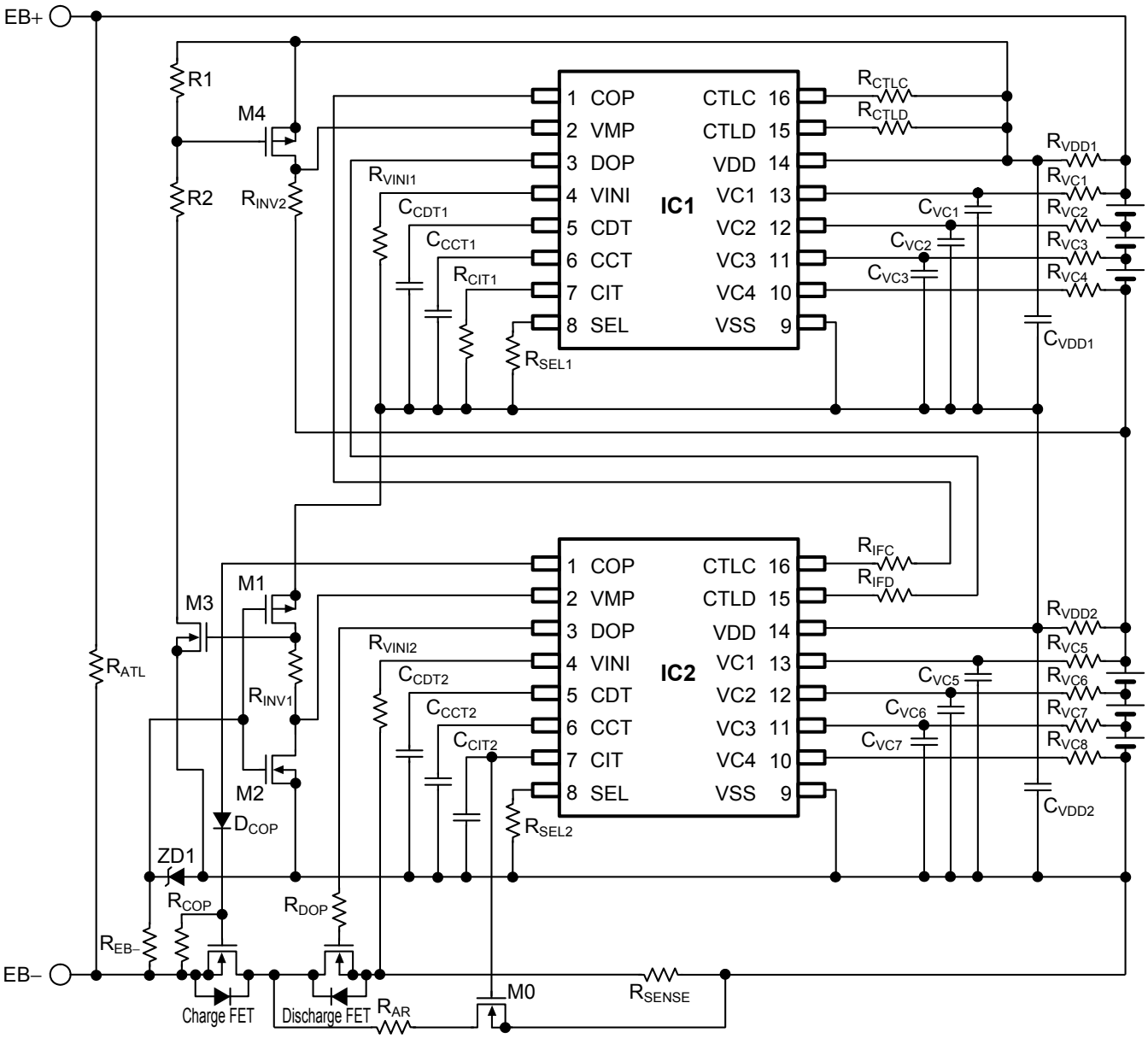
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

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)



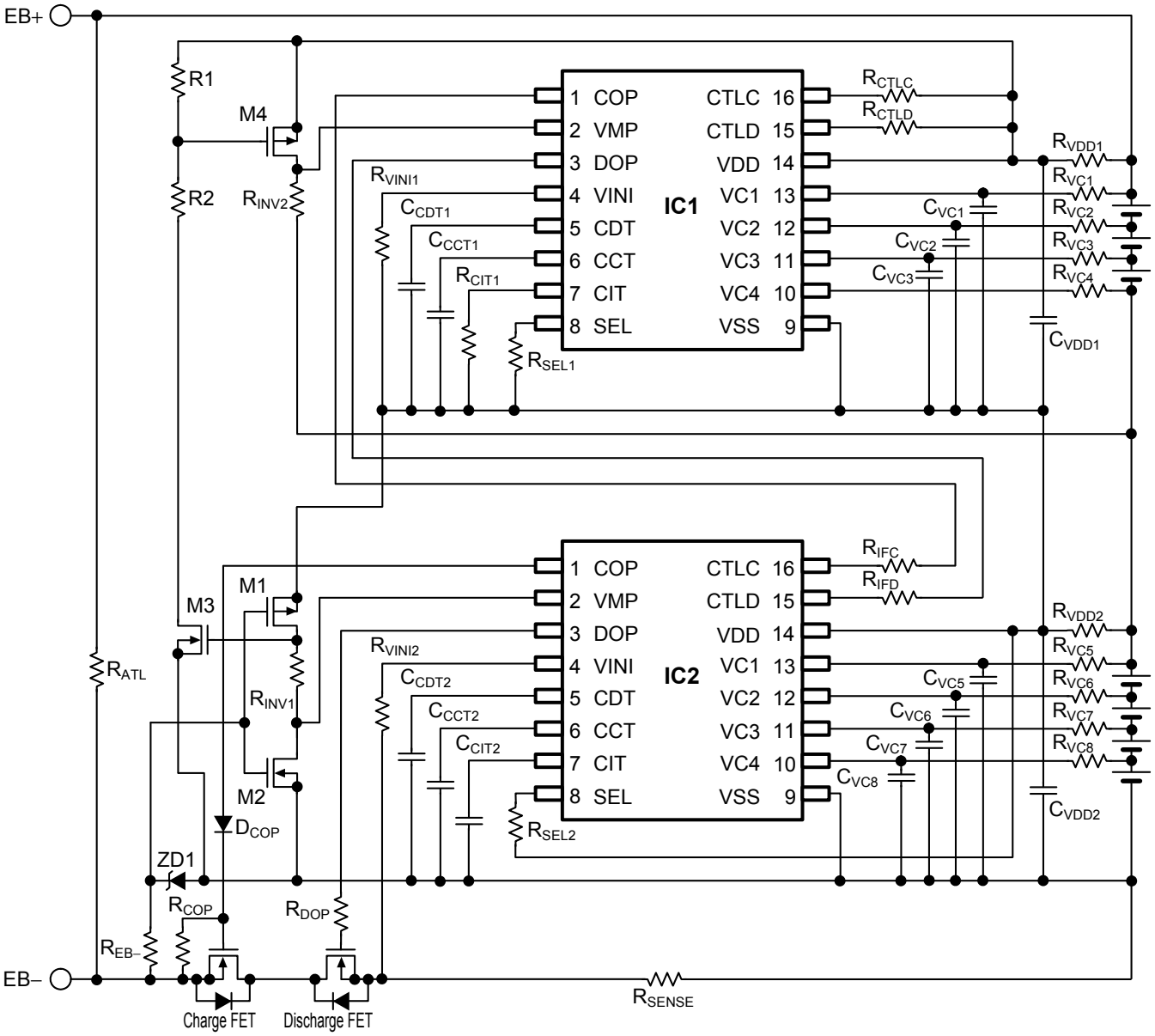
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

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)



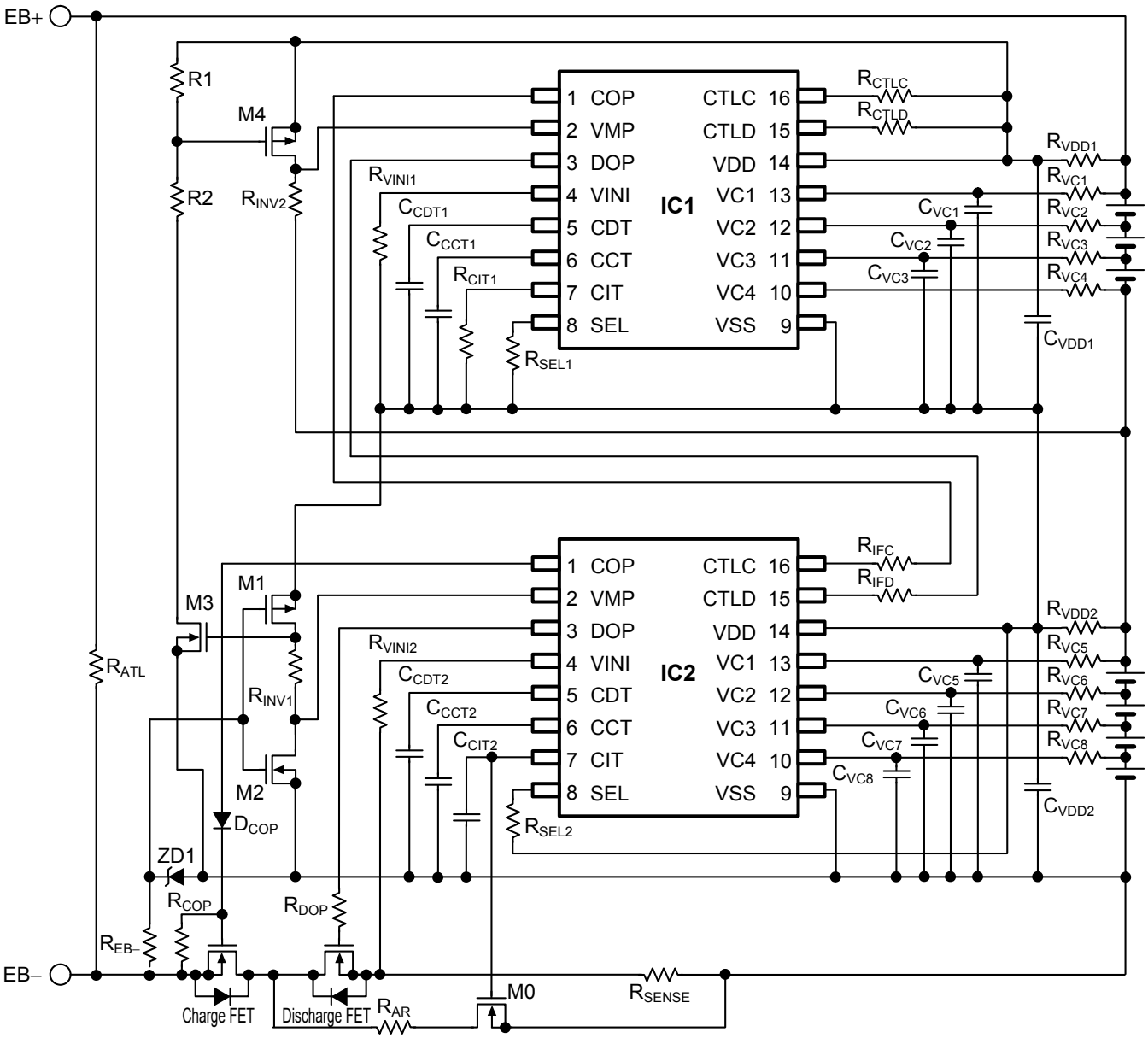
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

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)



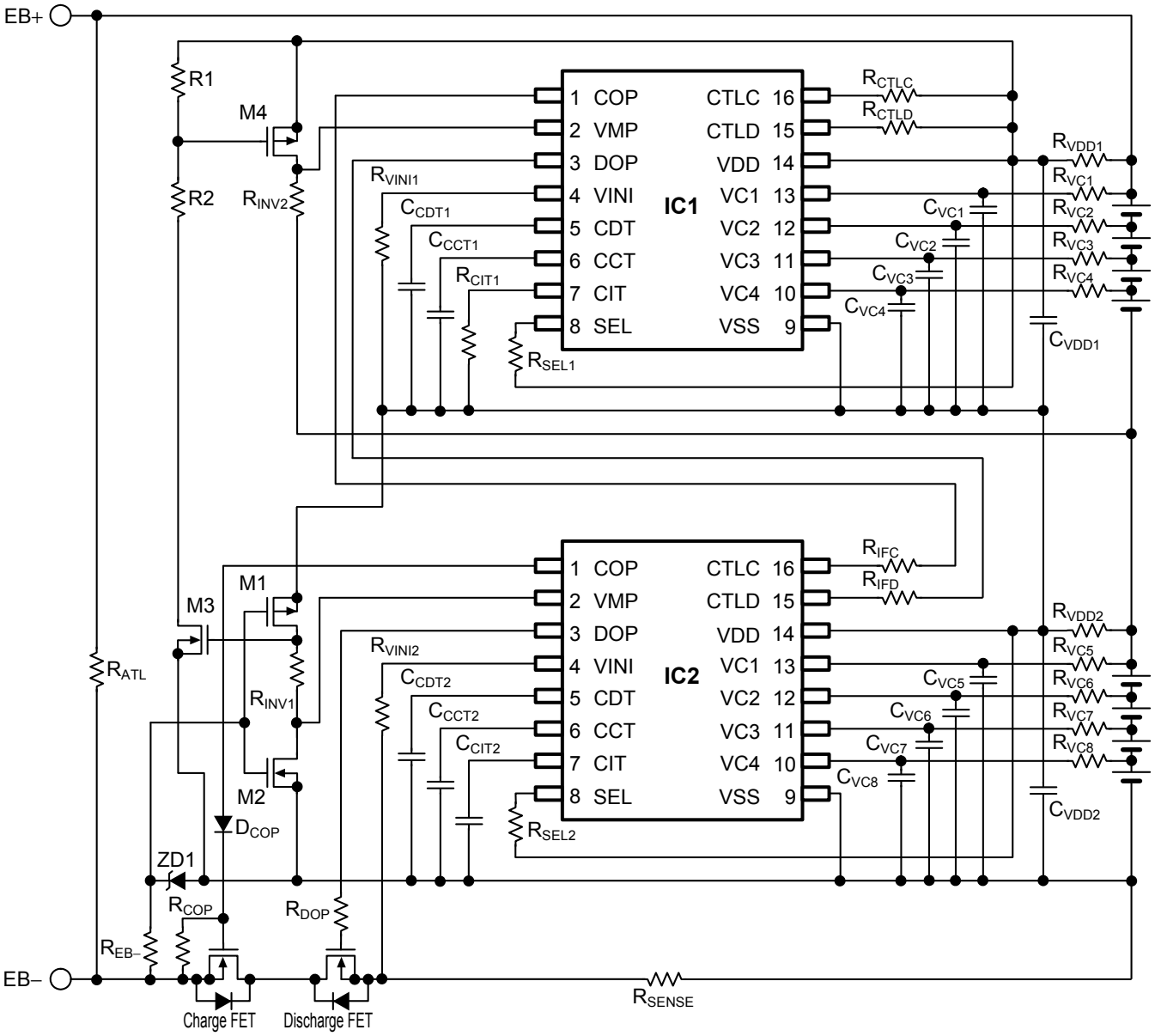
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

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)



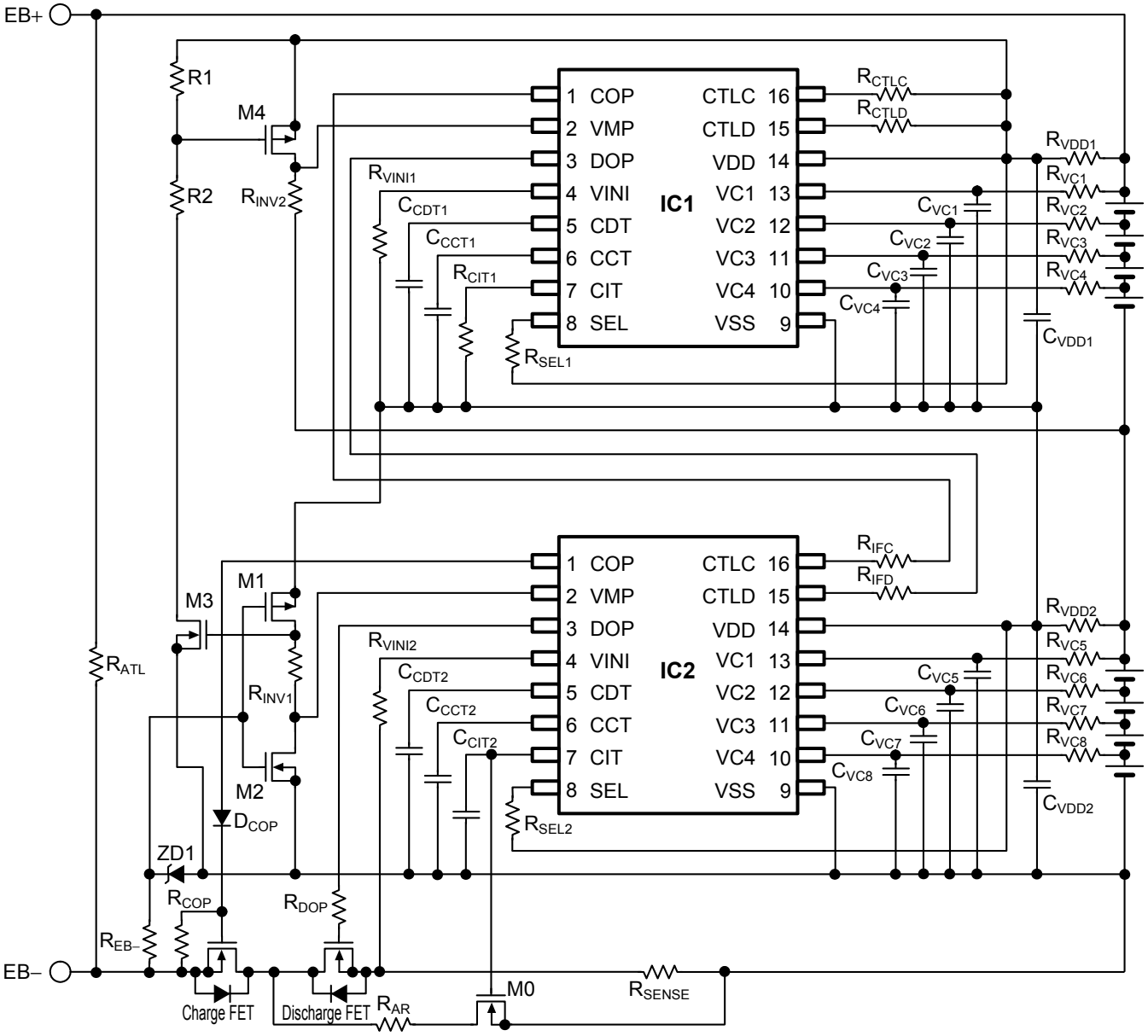
Remark Refer to "**2. 7 External components list (Protection circuit for 6-series to 8-series cell)**" for constants of external components.

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	SII Semiconductor Corporation	Necessary
IC2	–	–	S-8204B	SII Semiconductor Corporation	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}	–	–	–	–	–

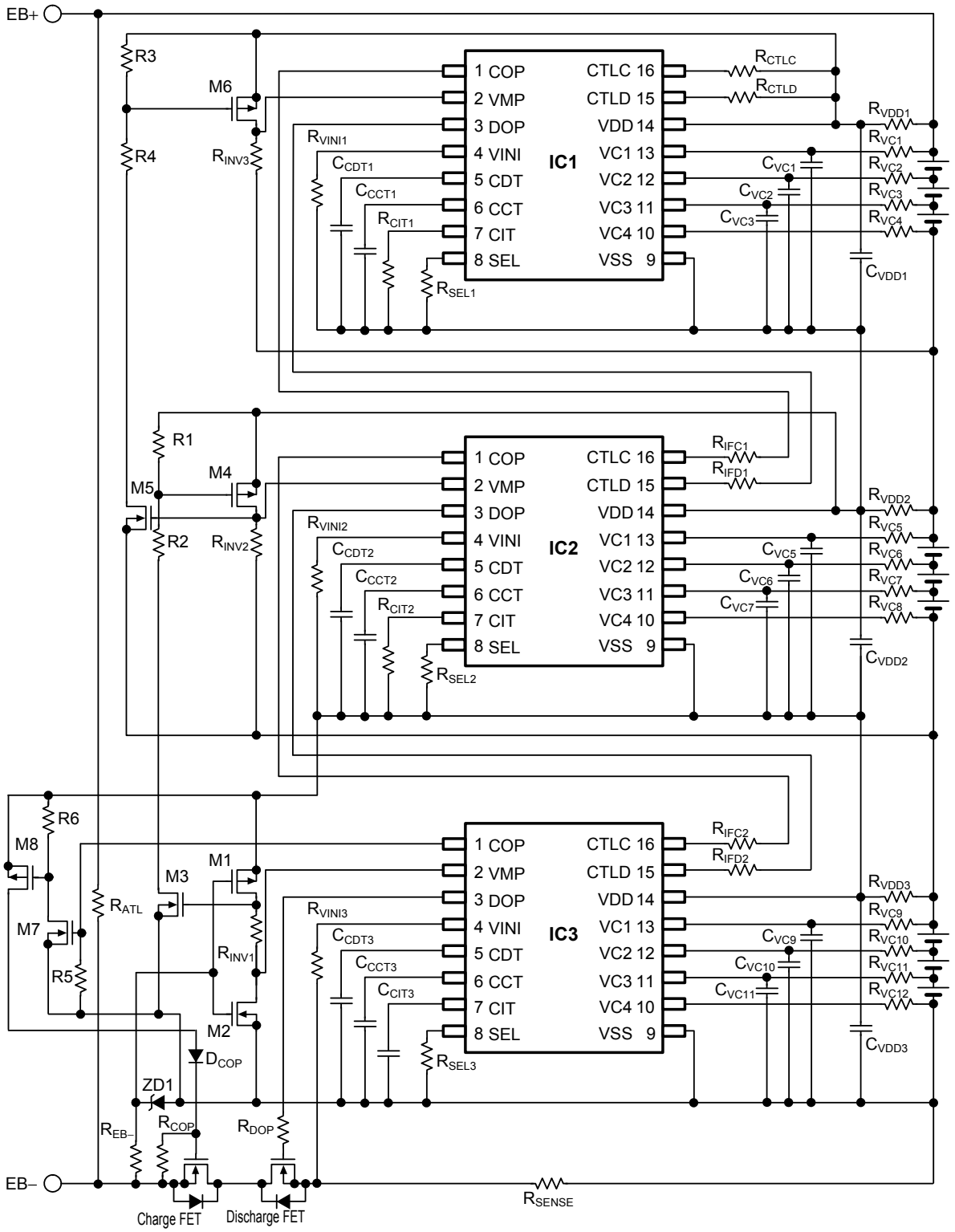
Table 2 (2 / 2)

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)



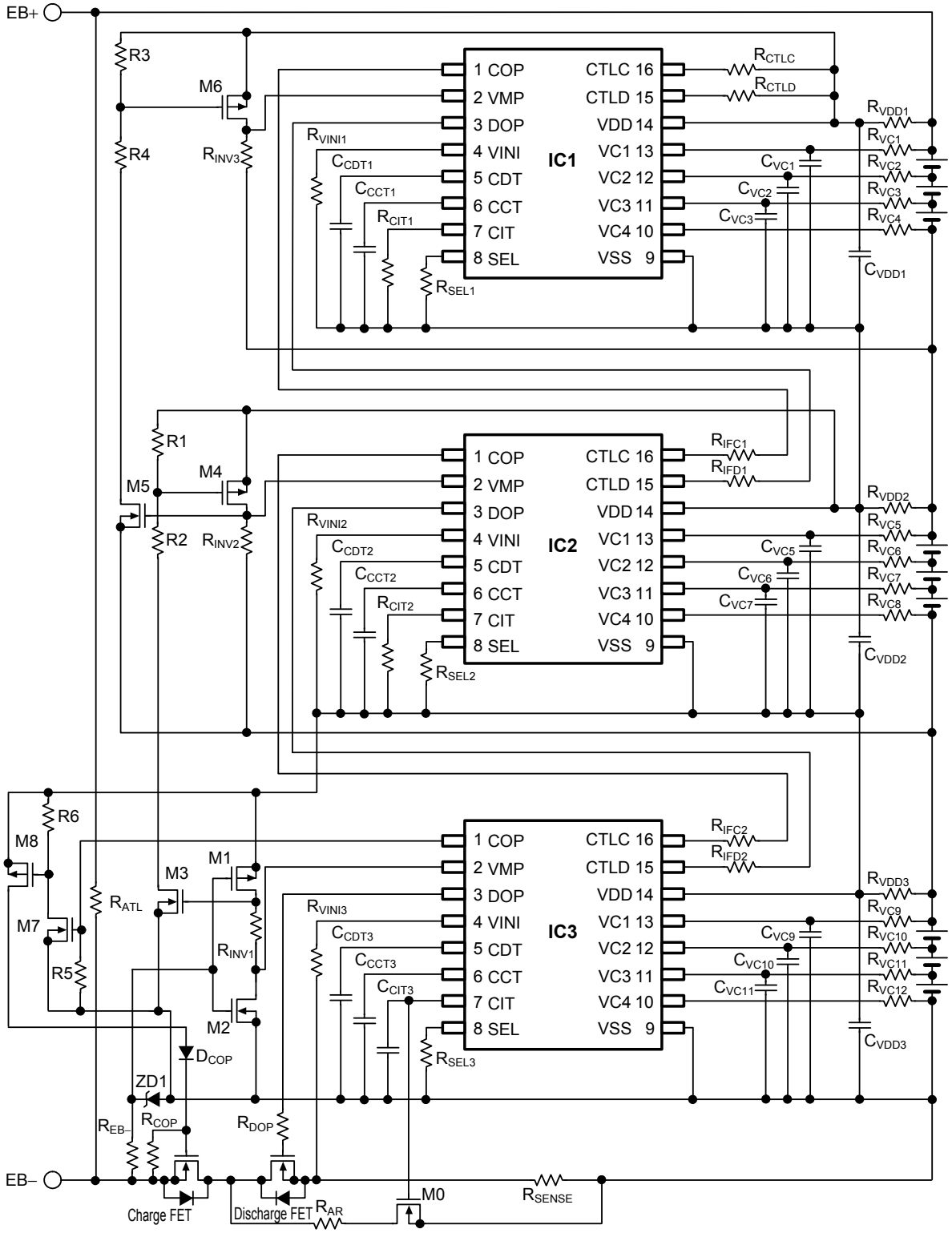
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)



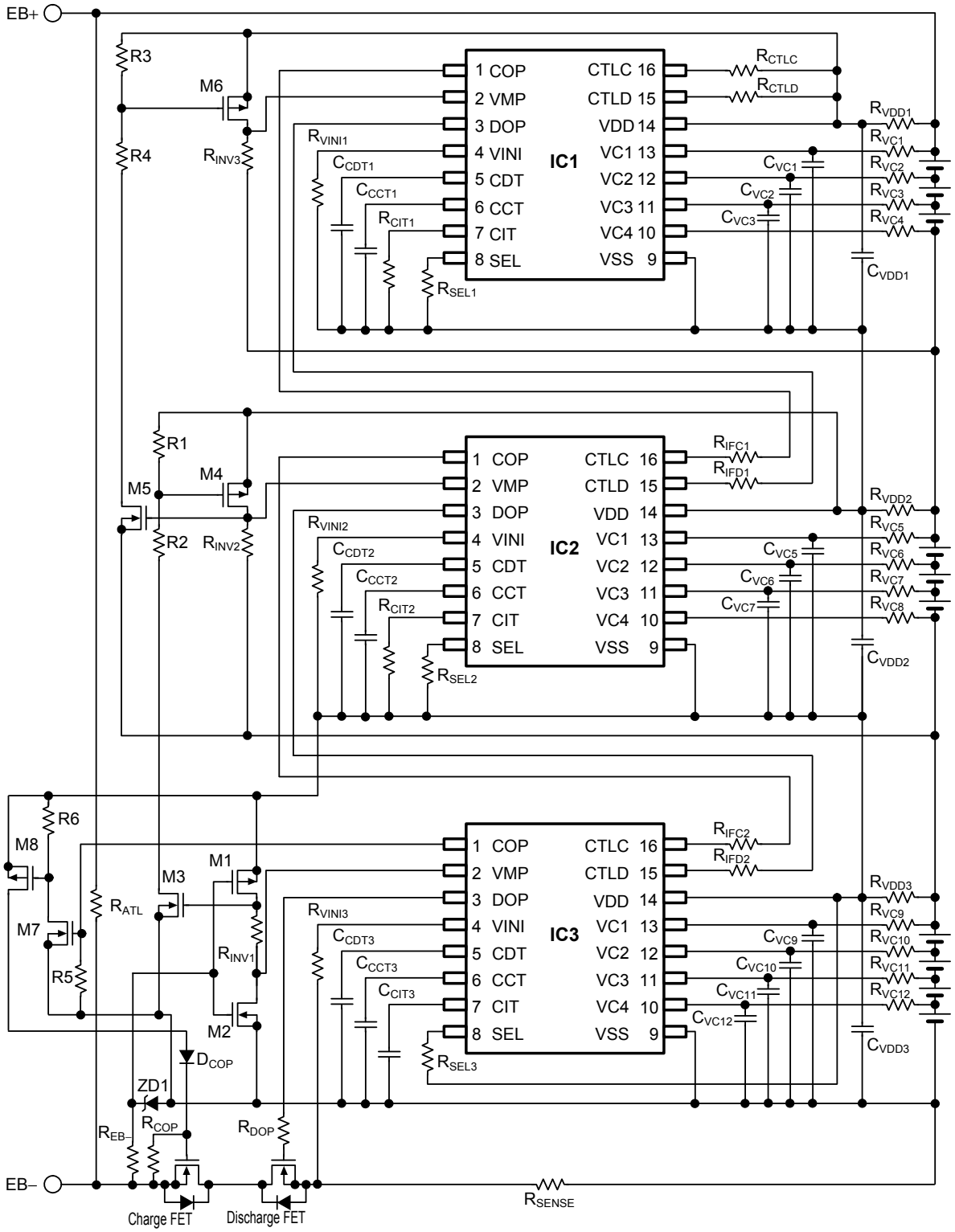
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)



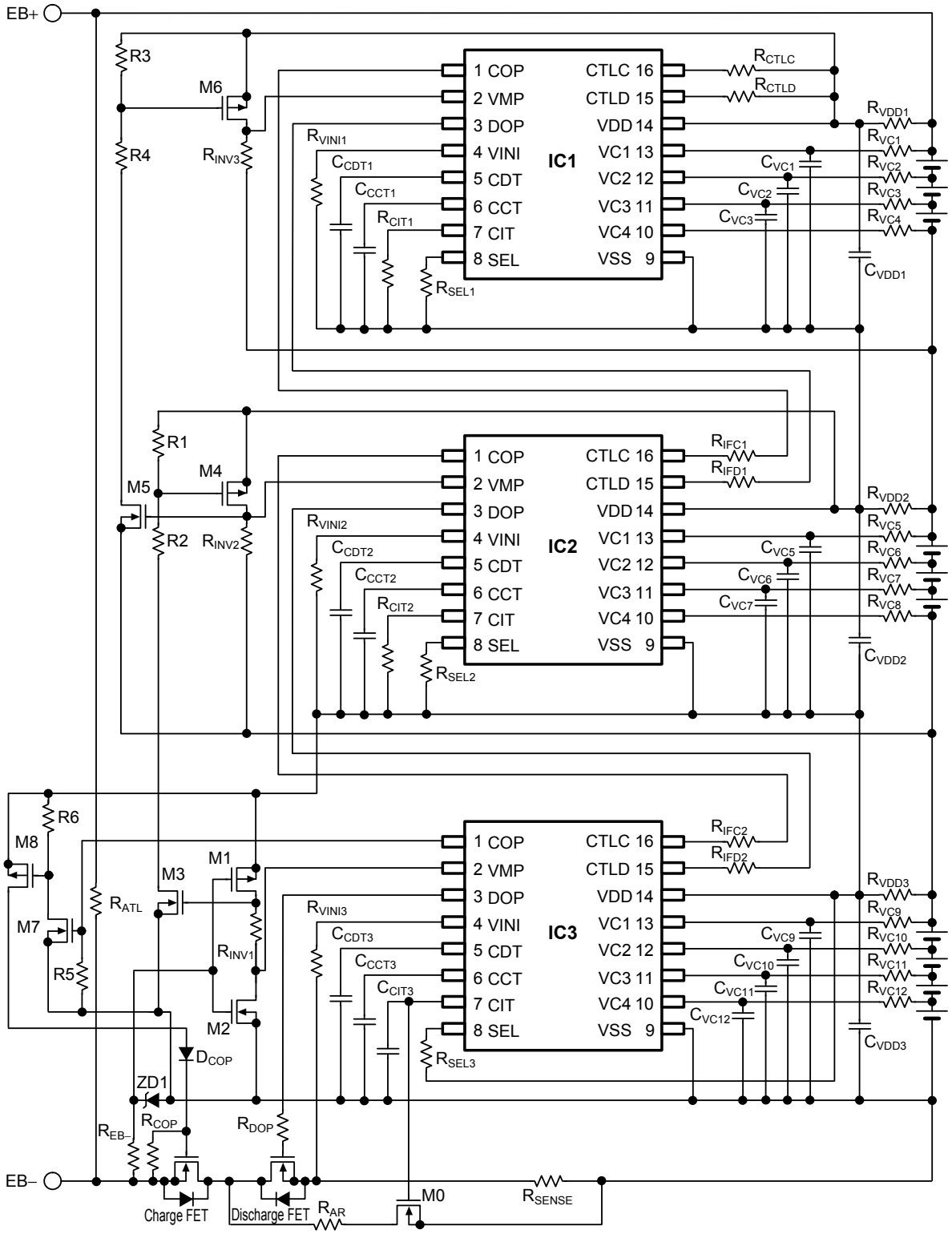
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)



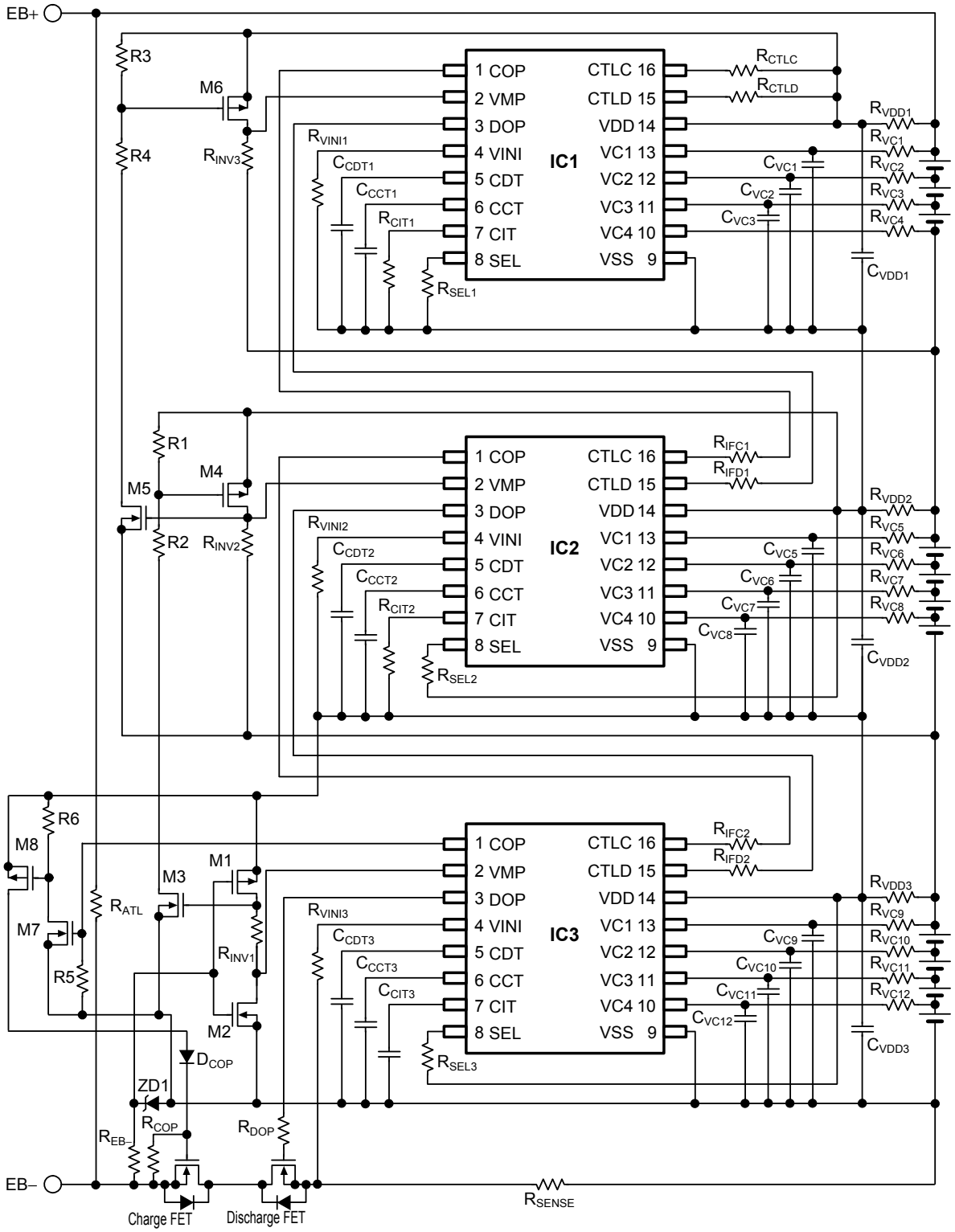
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)



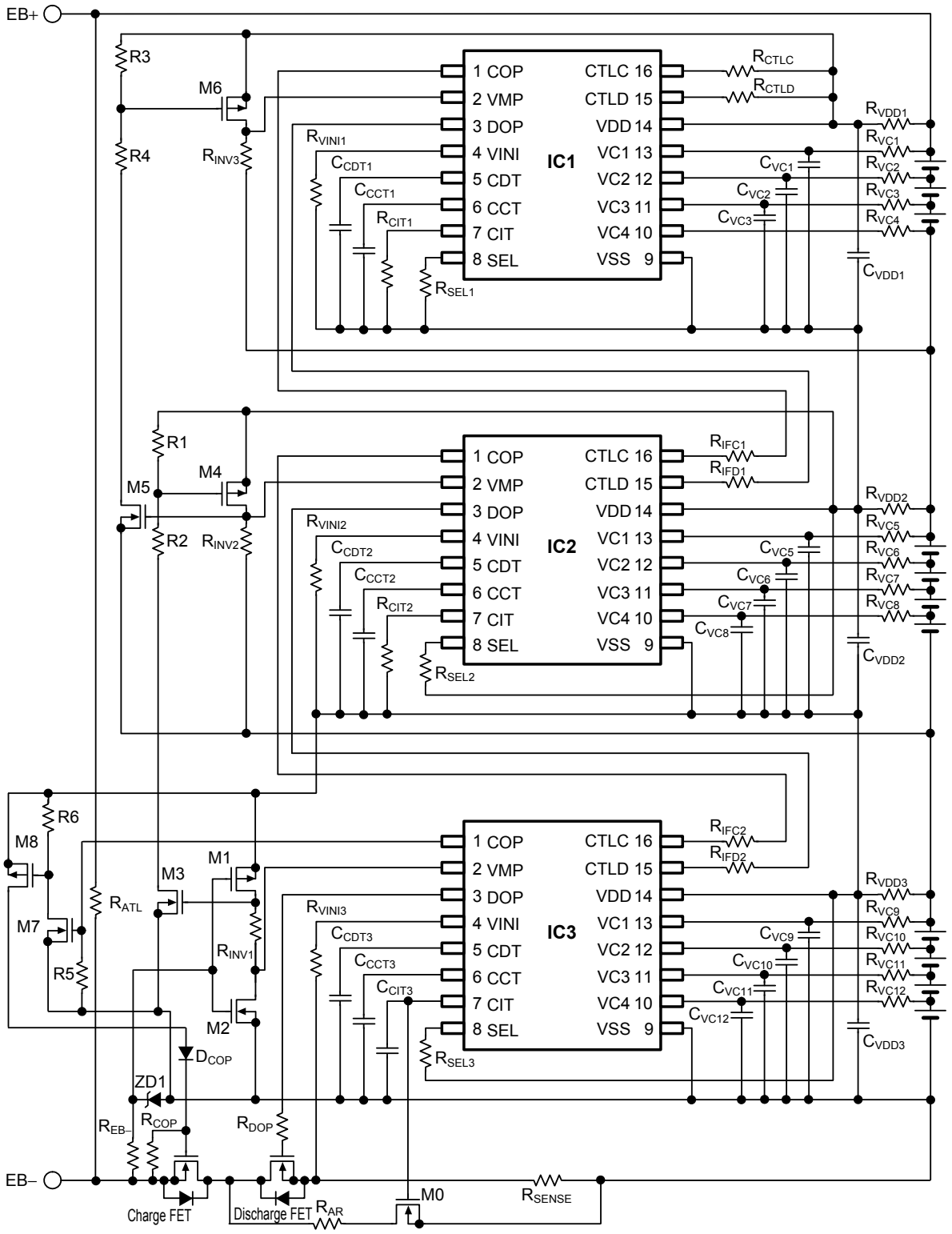
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)



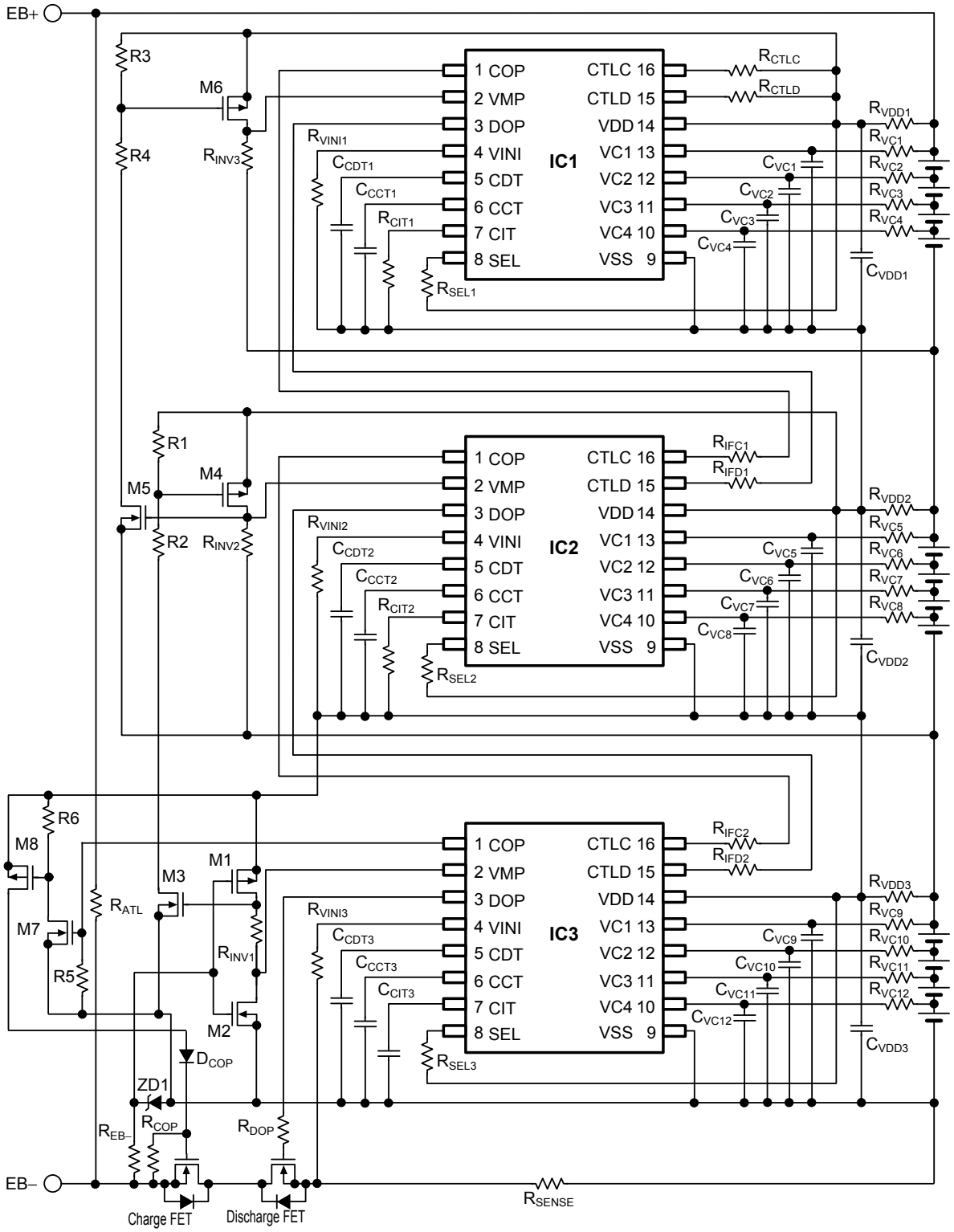
Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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)

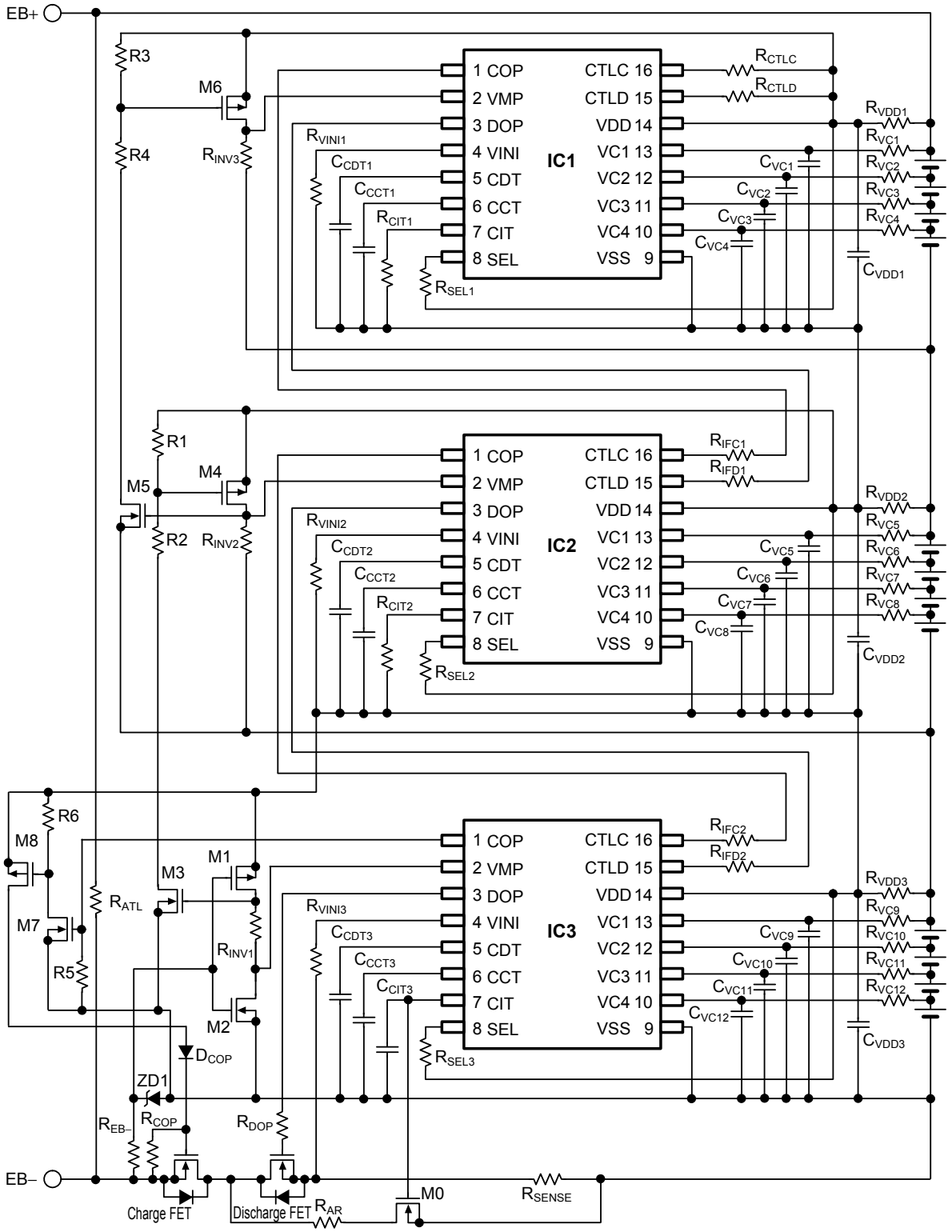


Remark Refer to "**3. 9 External components list (Protection circuit for 9-series to 12-series cell)**" for constants of external components.

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	SII Semiconductor Corporation	Necessary
IC2	–	–	S-8204B	SII Semiconductor Corporation	Necessary
IC3	–	–	S-8204B	SII Semiconductor Corporation	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**.

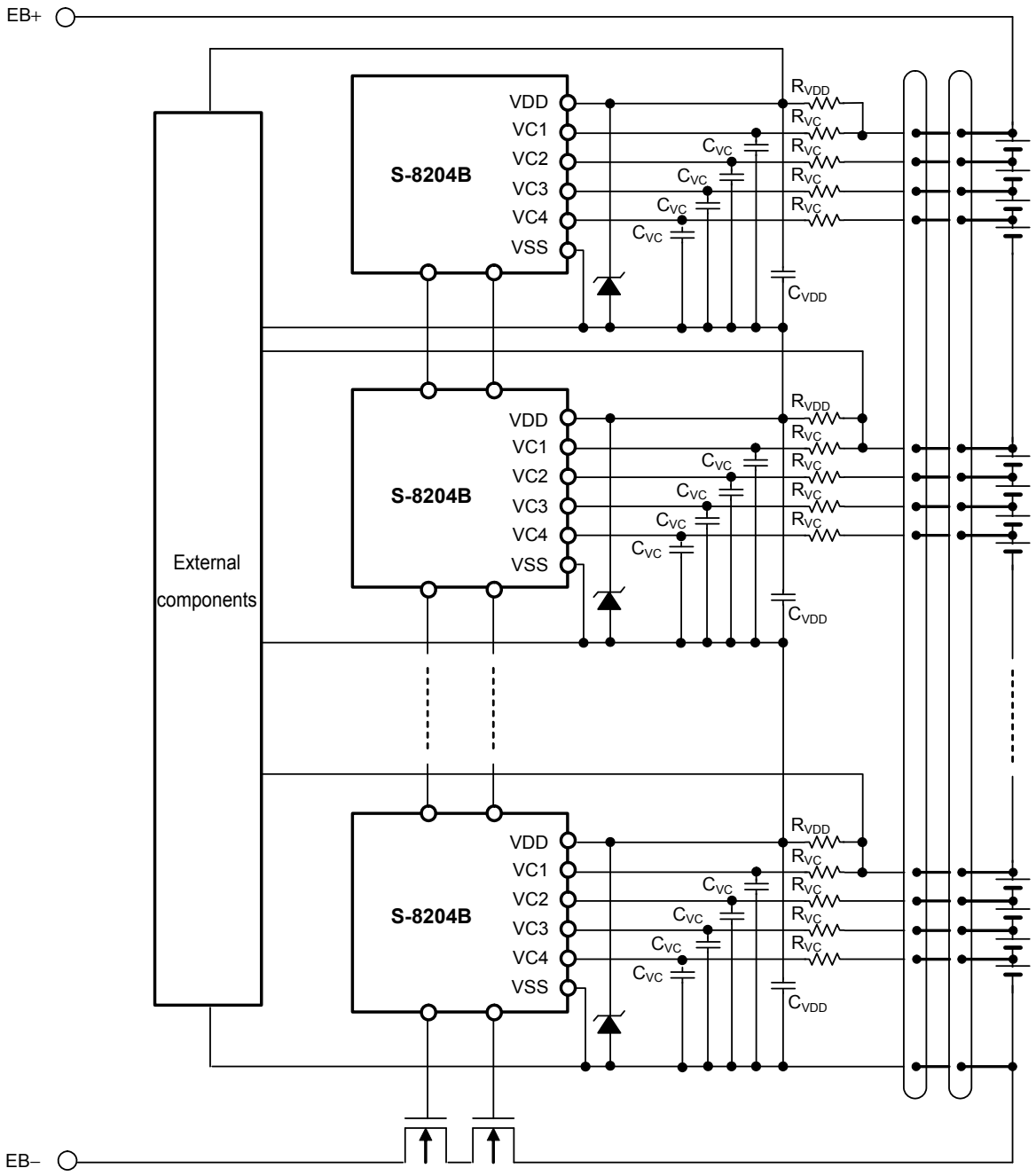


Figure 19

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 SII Semiconductor Corporation. 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. SII Semiconductor Corporation shall not bear any responsibility for patent infringements related to products using the circuits described herein.

- SII Semiconductor Corporation claims no responsibility for any disputes arising out of or in connection with any infringement by products including this IC of patents owned by a third party.

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.

www.sii-ic.com SII Semiconductor Corporation website

Disclaimers (Handling Precautions)

1. All the information described herein (product data, specifications, figures, tables, programs, algorithms and application circuit examples, etc.) is current as of publishing date of this document and is subject to change without notice.
2. The circuit examples and the usages described herein are for reference only, and do not guarantee the success of any specific mass-production design.
   SII Semiconductor Corporation is not responsible for damages caused by the reasons other than the products or infringement of third-party intellectual property rights and any other rights due to the use of the information described herein.
3. SII Semiconductor Corporation is not responsible for damages caused by the incorrect information described herein.
4. Take care to use the products described herein within their specified ranges. Pay special attention to the absolute maximum ratings, operation voltage range and electrical characteristics, etc.
   SII Semiconductor Corporation is not responsible for damages caused by failures and/or accidents, etc. that occur due to the use of products outside their specified ranges.
5. When using the products described herein, confirm their applications, and the laws and regulations of the region or country where they are used and verify suitability, safety and other factors for the intended use.
6. When exporting the products described herein, comply with the Foreign Exchange and Foreign Trade Act and all other export-related laws, and follow the required procedures.
7. The products described herein must not be used or provided (exported) for the purposes of the development of weapons of mass destruction or military use. SII Semiconductor Corporation is not responsible for any provision (export) to those whose purpose is to develop, manufacture, use or store nuclear, biological or chemical weapons, missiles, or other military use.
8. The products described herein are not designed to be used as part of any device or equipment that may affect the human body, human life, or assets (such as medical equipment, disaster prevention systems, security systems, combustion control systems, infrastructure control systems, vehicle equipment, traffic systems, in-vehicle equipment, aviation equipment, aerospace equipment, and nuclear-related equipment), excluding when specified for in-vehicle use or other uses. Do not use those products without the prior written permission of SII Semiconductor Corporation.
   Especially, the products described herein cannot be used for life support devices, devices implanted in the human body and devices that directly affect human life, etc.
   Prior consultation with our sales office is required when considering the above uses.
   SII Semiconductor Corporation is not responsible for damages caused by unauthorized or unspecified use of our products.
9. Semiconductor products may fail or malfunction with some probability.
   The user of these products should therefore take responsibility to give thorough consideration to safety design including redundancy, fire spread prevention measures, and malfunction prevention to prevent accidents causing injury or death, fires and social damage, etc. that may ensue from the products' failure or malfunction.
   The entire system must be sufficiently evaluated and applied on customer's own responsibility.
10. The products described herein are not designed to be radiation-proof. The necessary radiation measures should be taken in the product design by the customer depending on the intended use.
11. The products described herein do not affect human health under normal use. However, they contain chemical substances and heavy metals and should therefore not be put in the mouth. The fracture surfaces of wafers and chips may be sharp. Take care when handling these with the bare hands to prevent injuries, etc.
12. When disposing of the products described herein, comply with the laws and ordinances of the country or region where they are used.
13. The information described herein contains copyright information and know-how of SII Semiconductor Corporation.
    The information described herein does not convey any license under any intellectual property rights or any other rights belonging to SII Semiconductor Corporation or a third party. Reproduction or copying of the information described herein for the purpose of disclosing it to a third-party without the express permission of SII Semiconductor Corporation is strictly prohibited.
14. For more details on the information described herein, contact our sales office.

1.0-2016.01