CMOS IC Application Note

S-8204A Series Connection Examples

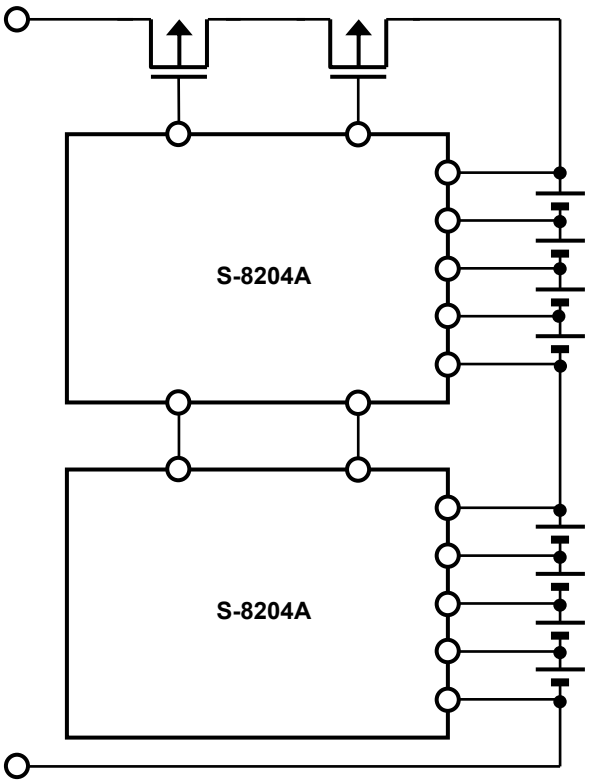
Rev.1.5_01

The S-8204A 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-8204A 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-8204A Series.

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

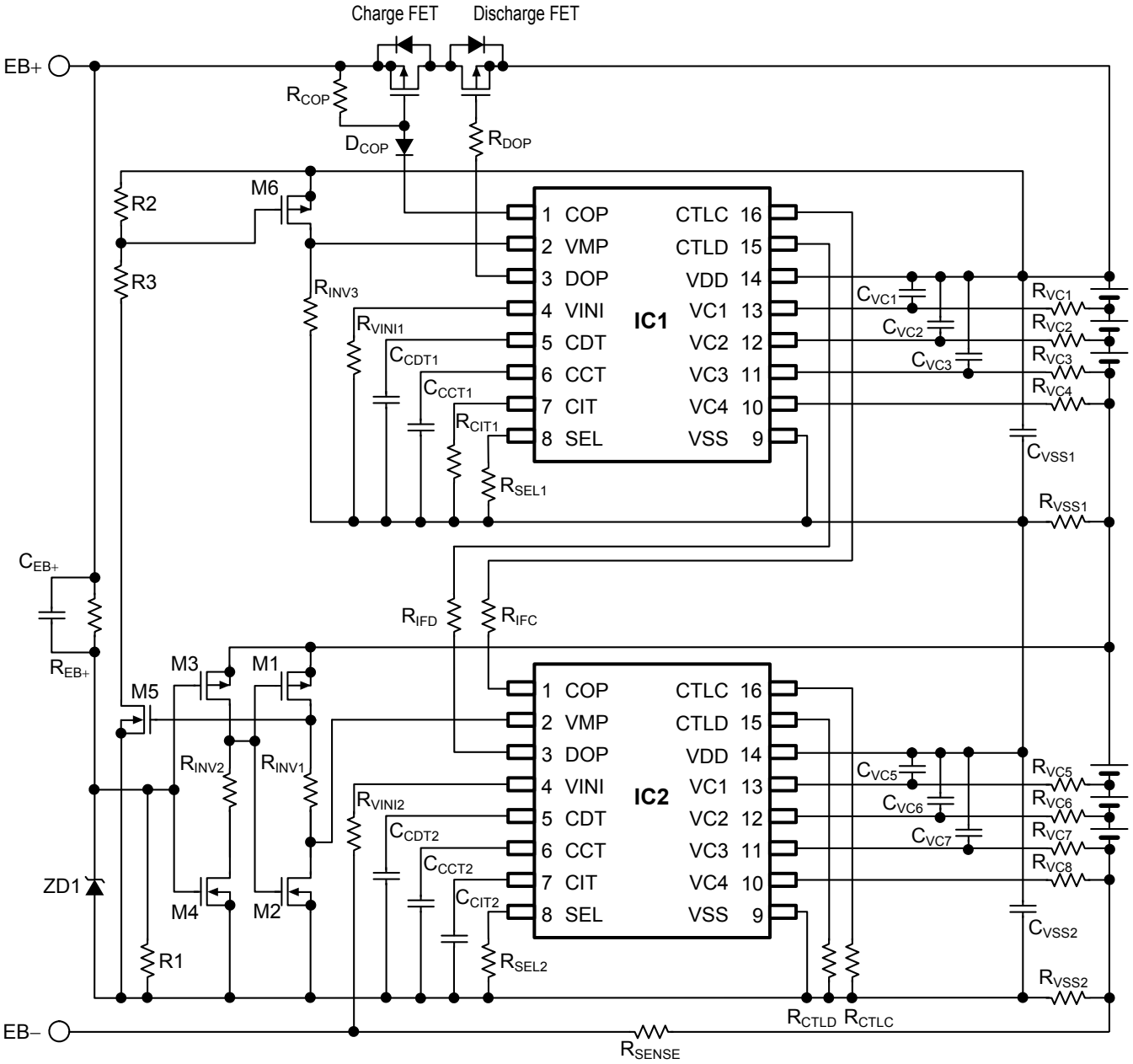
- Protection circuit for multi-series cell using S-8204A Series



Contents

1. Protection circuit for multi-series cell using S-8204A Series (Cascade connection)

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



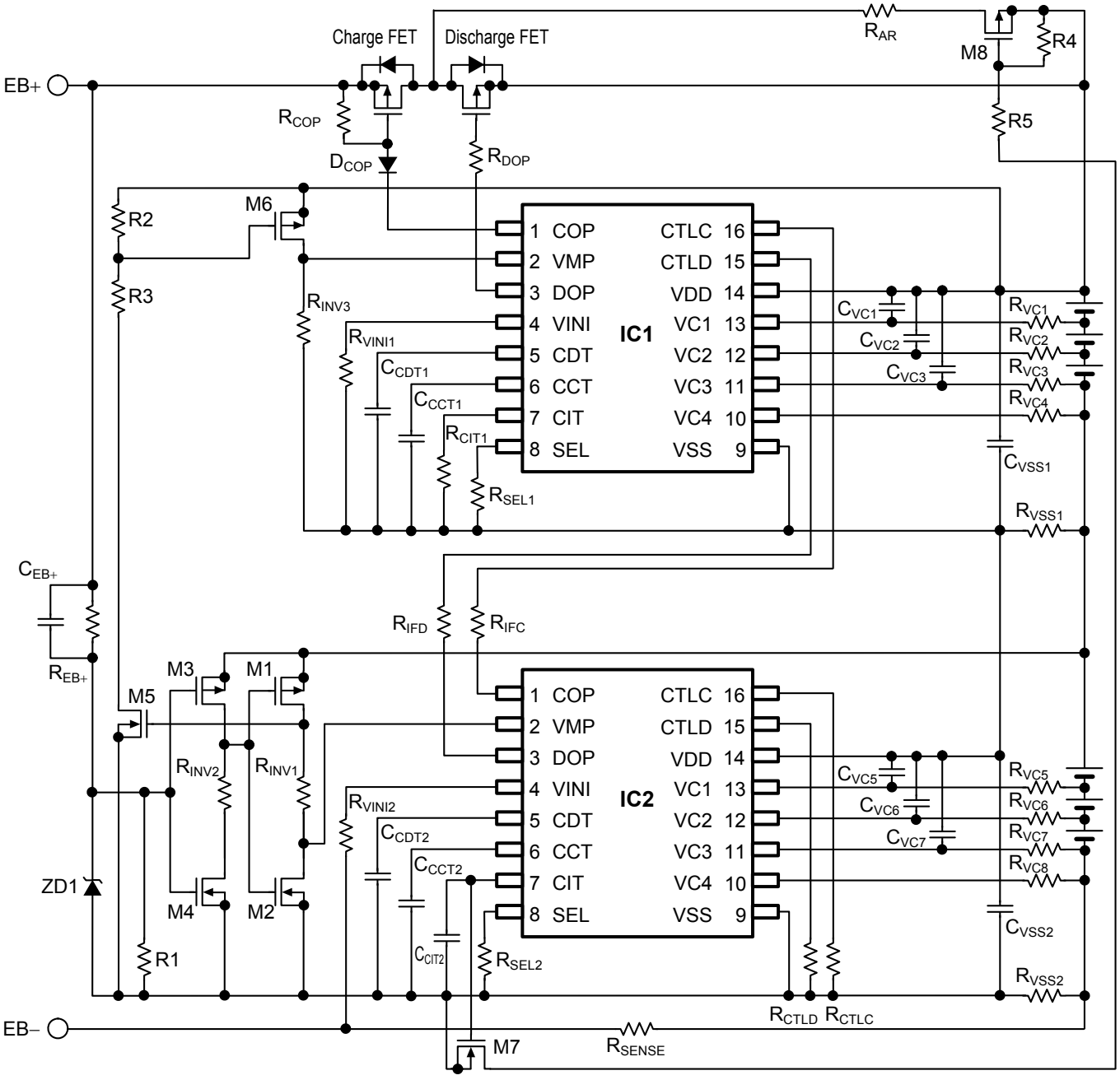
Remark Refer to "**1. 13 External components list**" for constants of external components.

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 6-series cell (with discharge overcurrent protection function and automatic recovery function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 2

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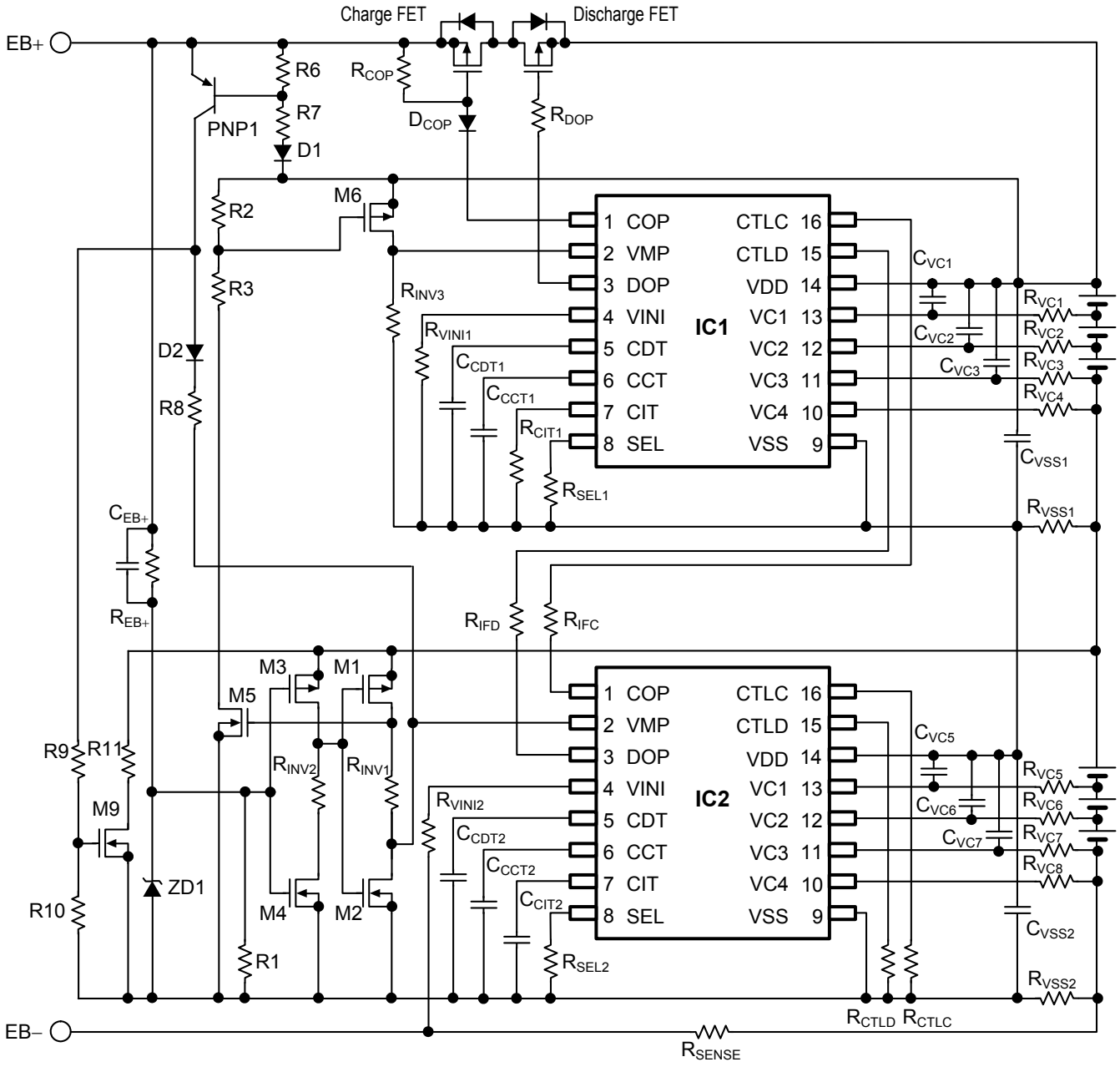
1. 3 Protection circuit for 6-series cell (with discharge overcurrent protection function and charge overcurrent protection function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 3

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

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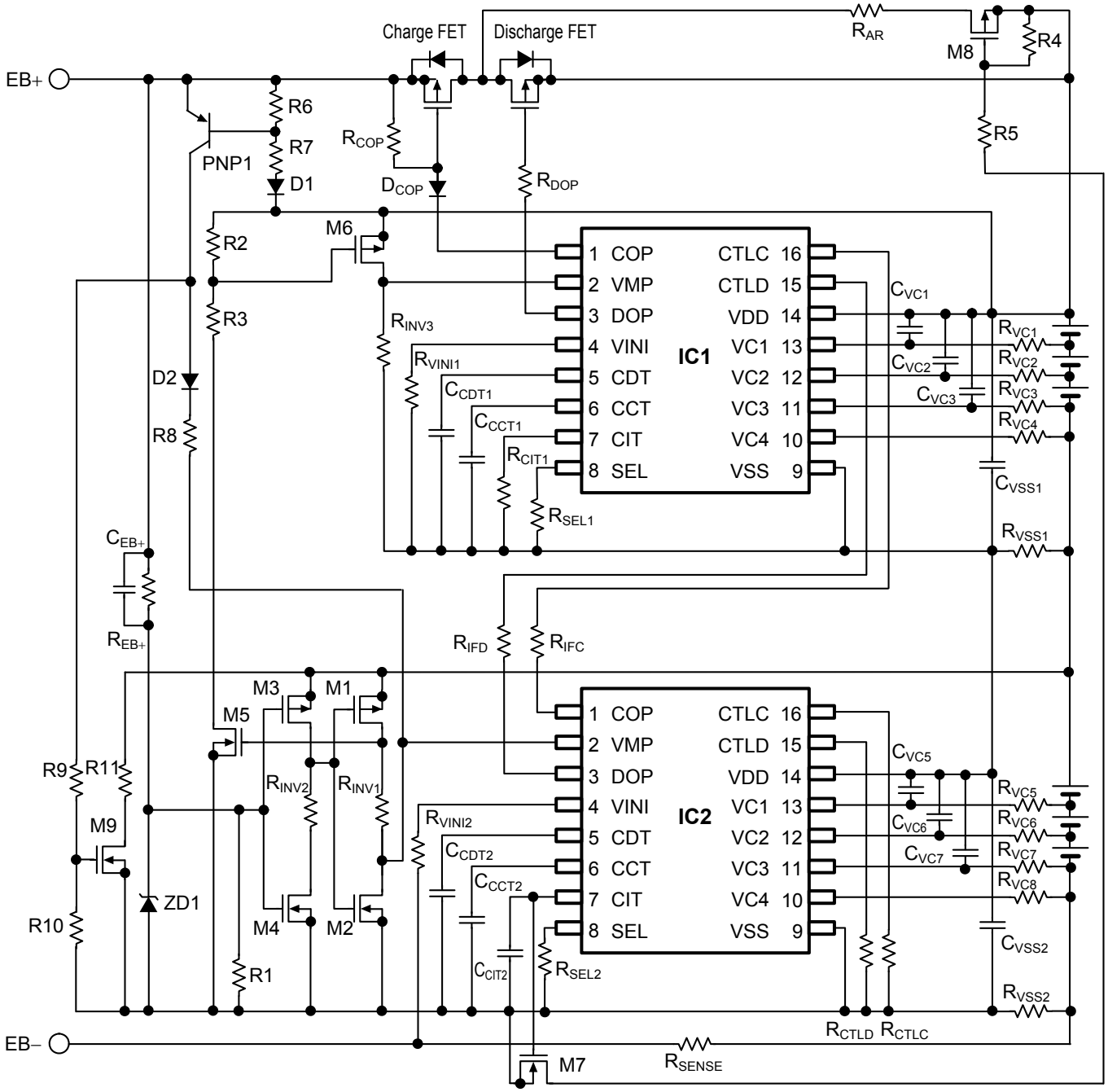
1. 4 Protection circuit for 6-series cell (with discharge overcurrent protection function, automatic recovery function and charge overcurrent protection function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 4

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

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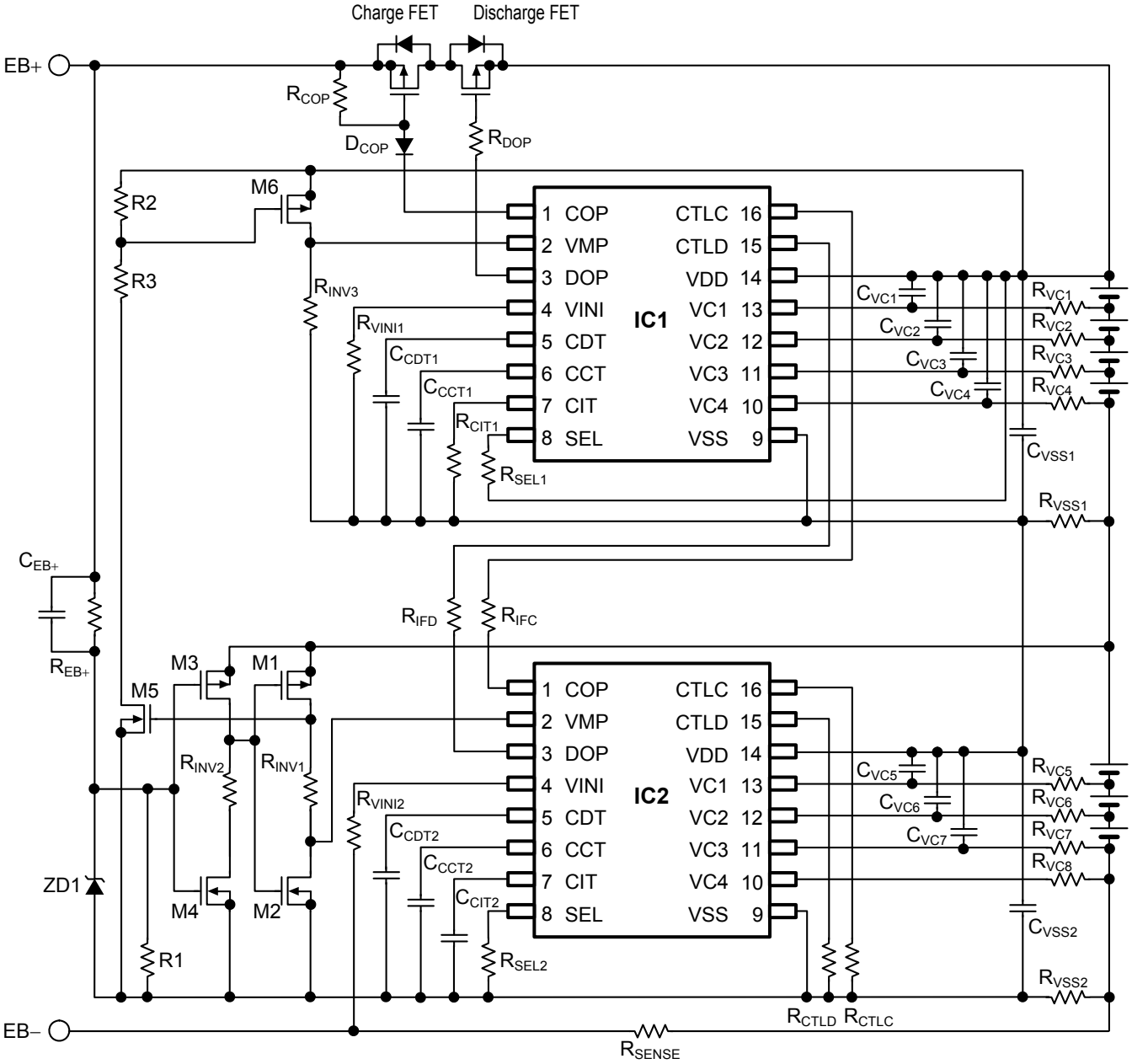
1. 5 Protection circuit for 7-series cell (with discharge overcurrent protection function)



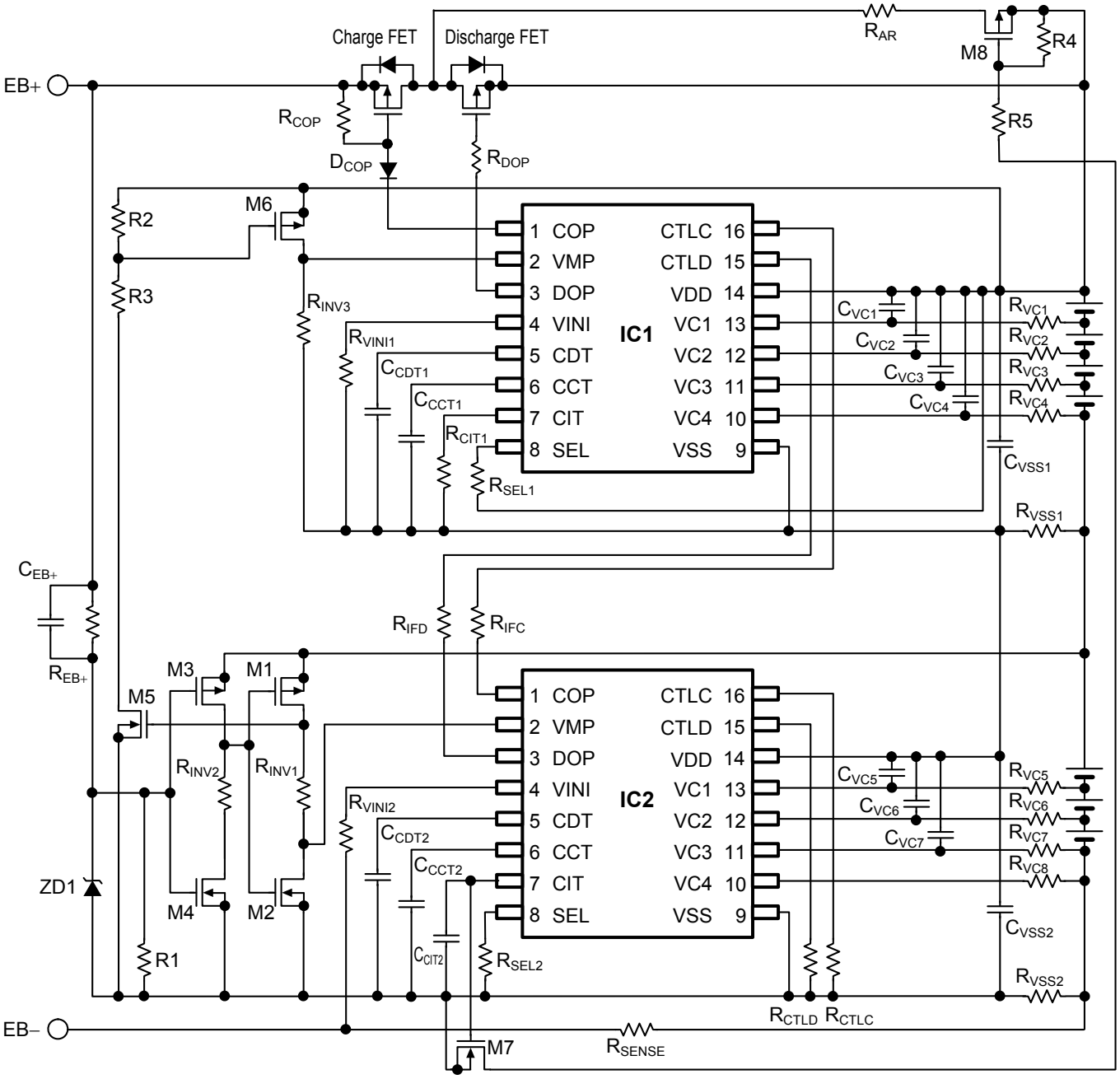
Remark Refer to "**1. 13 External components list**" for constants of external components.

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.

1. 6 Protection circuit for 7-series cell (with discharge overcurrent protection function and automatic recovery function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 6

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

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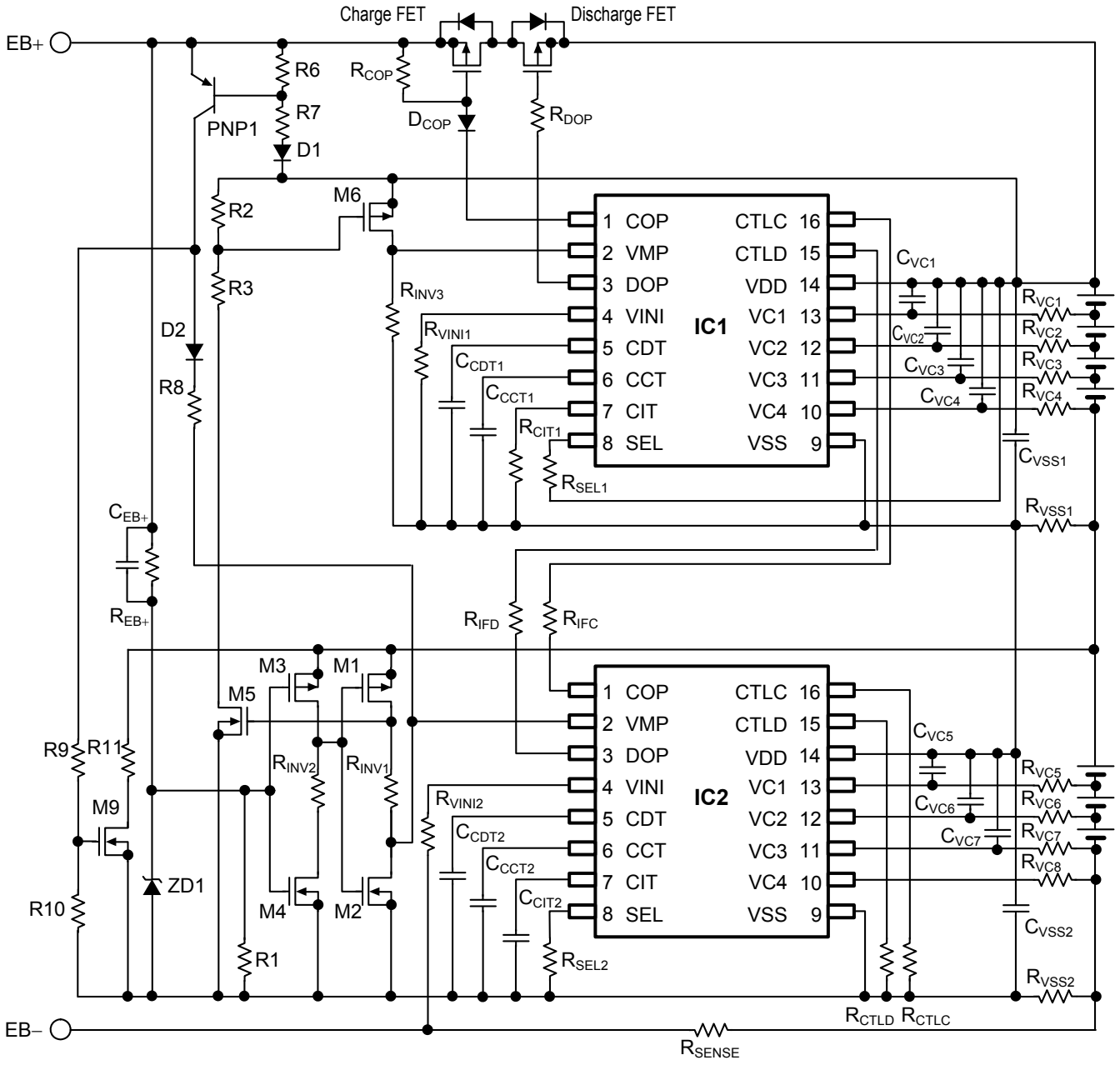
1. 7 Protection circuit for 7-series cell (with discharge overcurrent protection function and charge overcurrent protection function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 7

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

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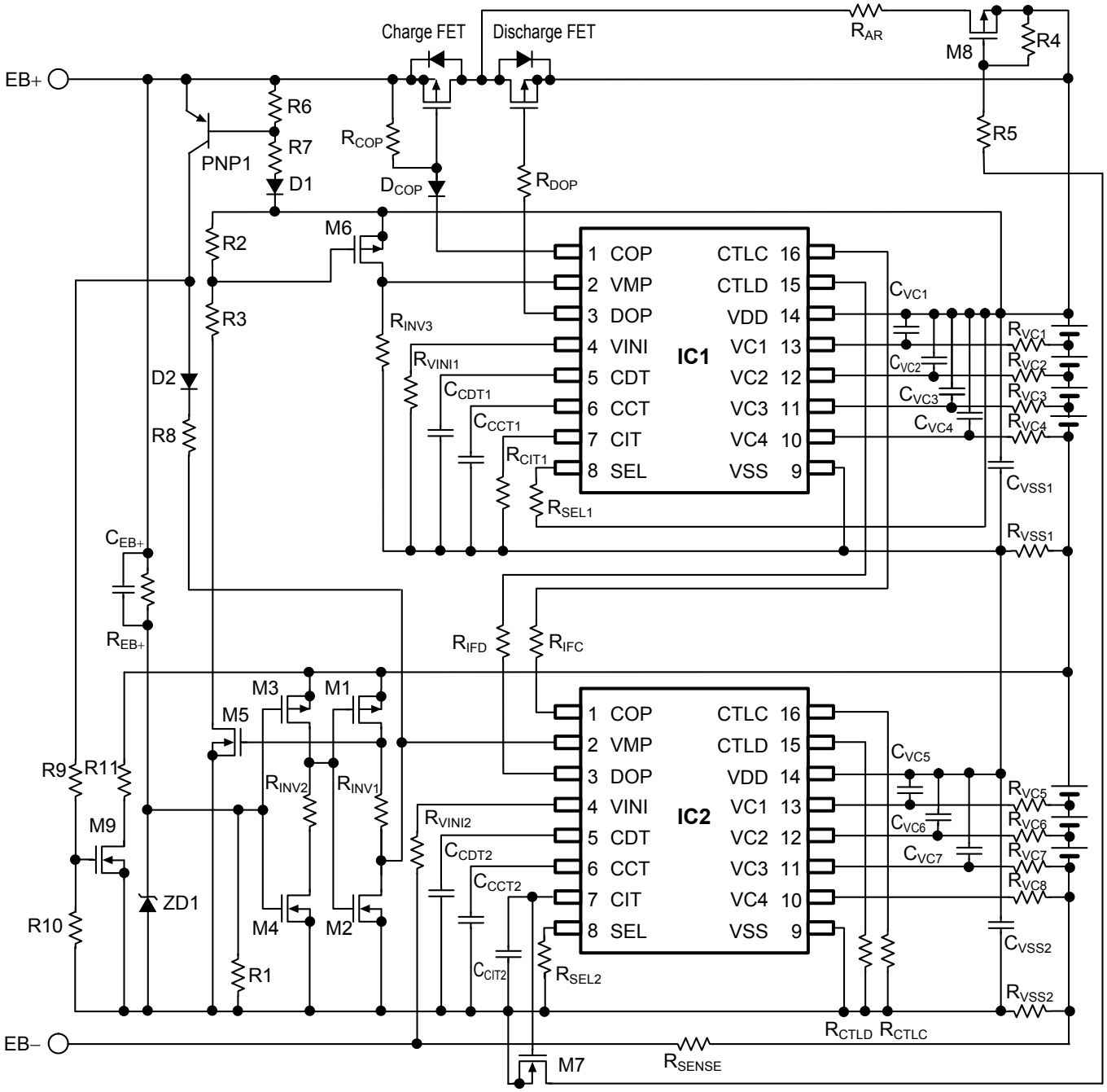
1. 8 Protection circuit for 7-series cell (with discharge overcurrent protection function, automatic recovery function and charge overcurrent protection function)



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 8

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

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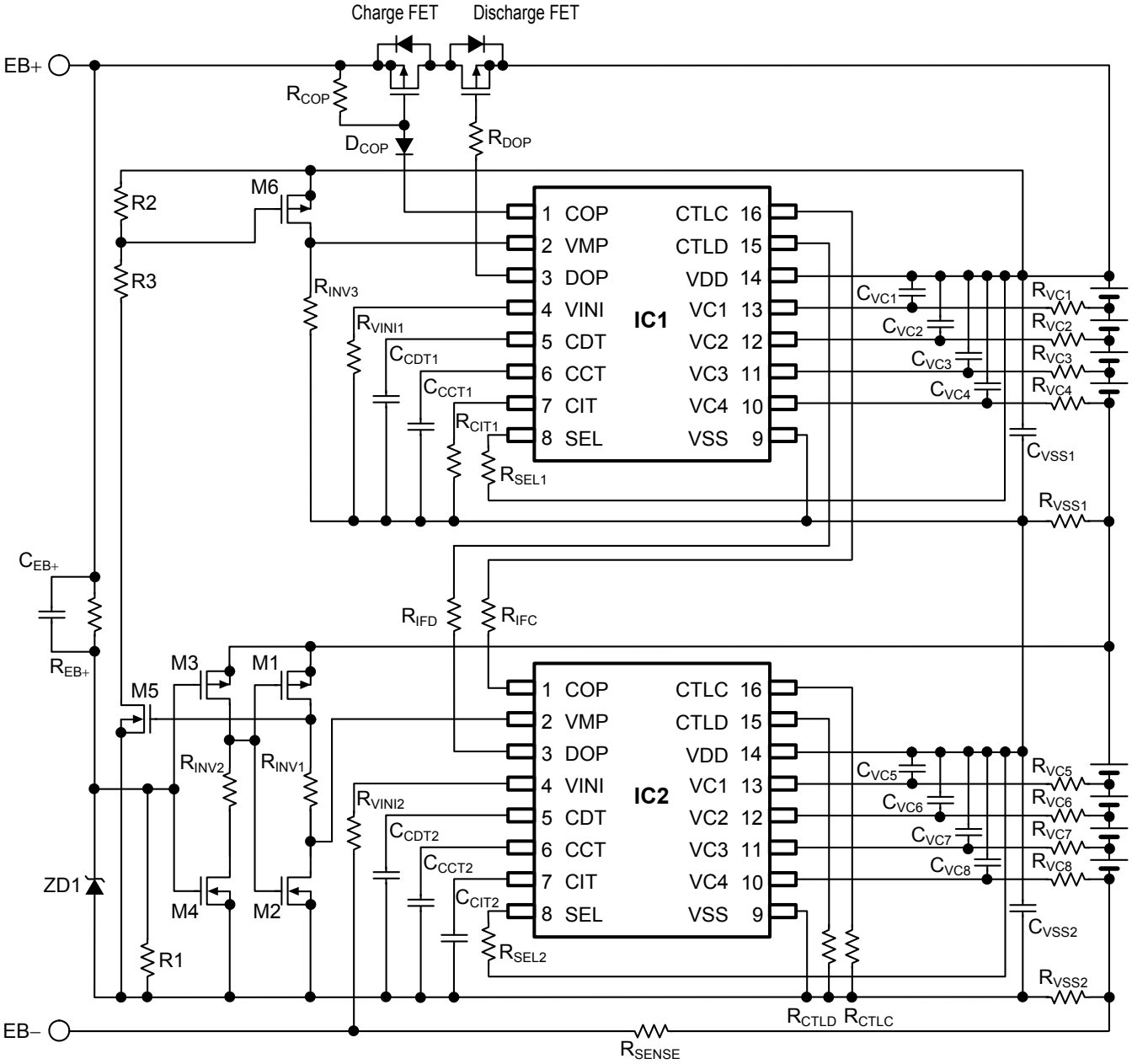
1. 9 Protection circuit for 8-series cell (with discharge overcurrent protection function)



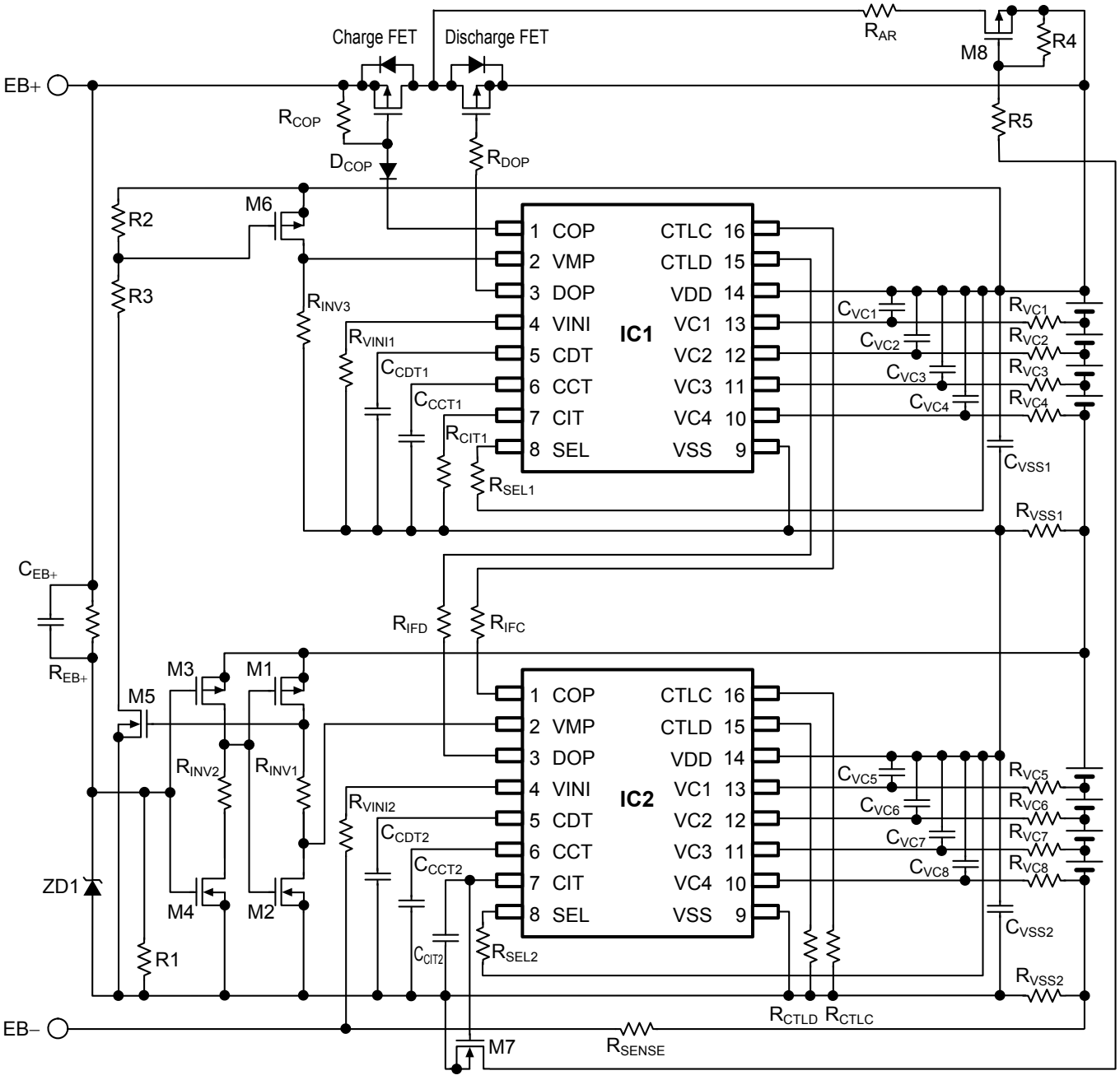
Remark Refer to "**1. 13 External components list**" for constants of external components.

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.

1. 10 Protection circuit for 8-series cell (with discharge overcurrent protection function and automatic recovery function)



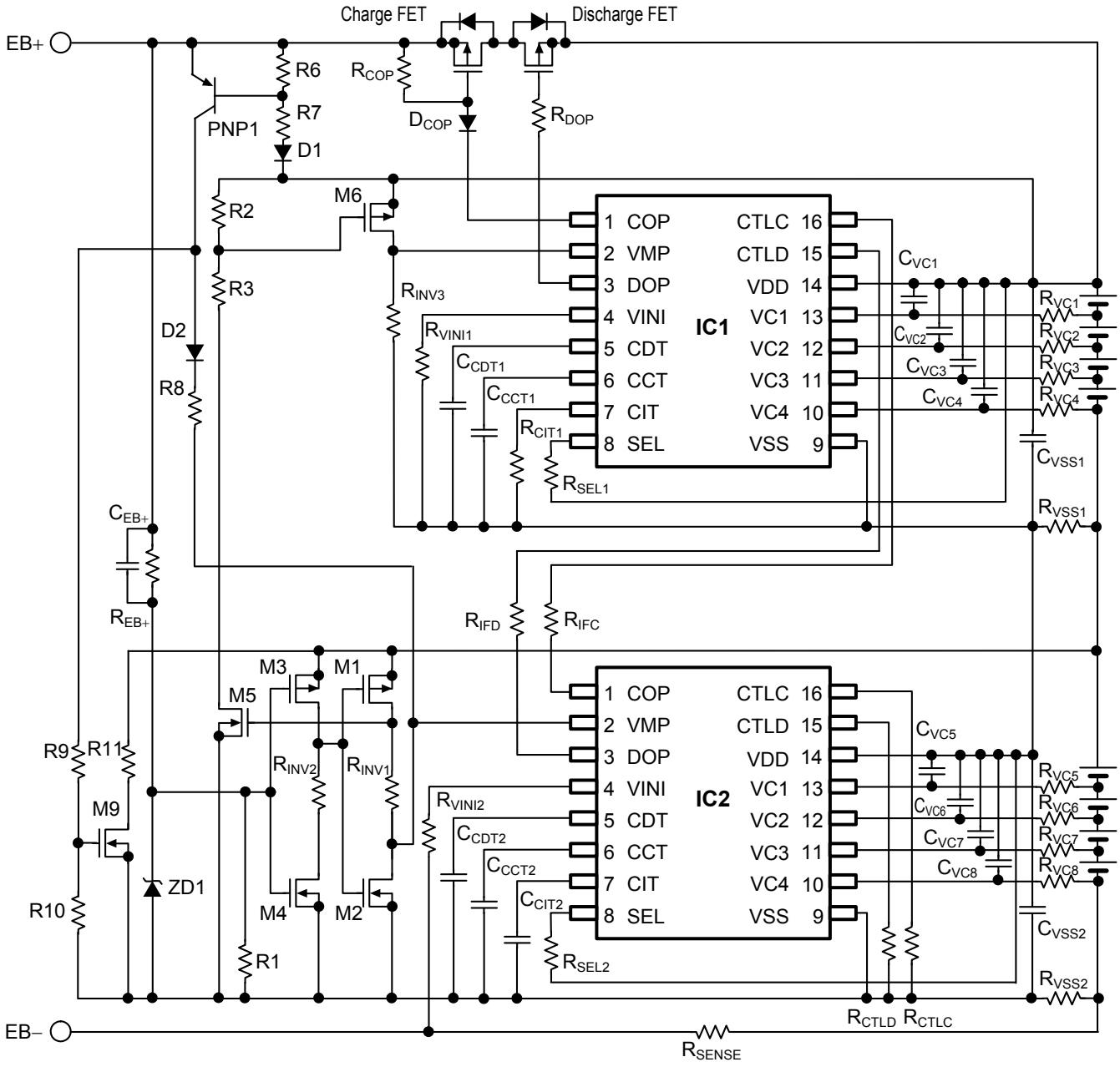
Remark Refer to "**1. 13 External components list**" for constants of external components.

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.

1. 11 Protection circuit for 8-series cell (with discharge overcurrent protection function and charge overcurrent protection function)



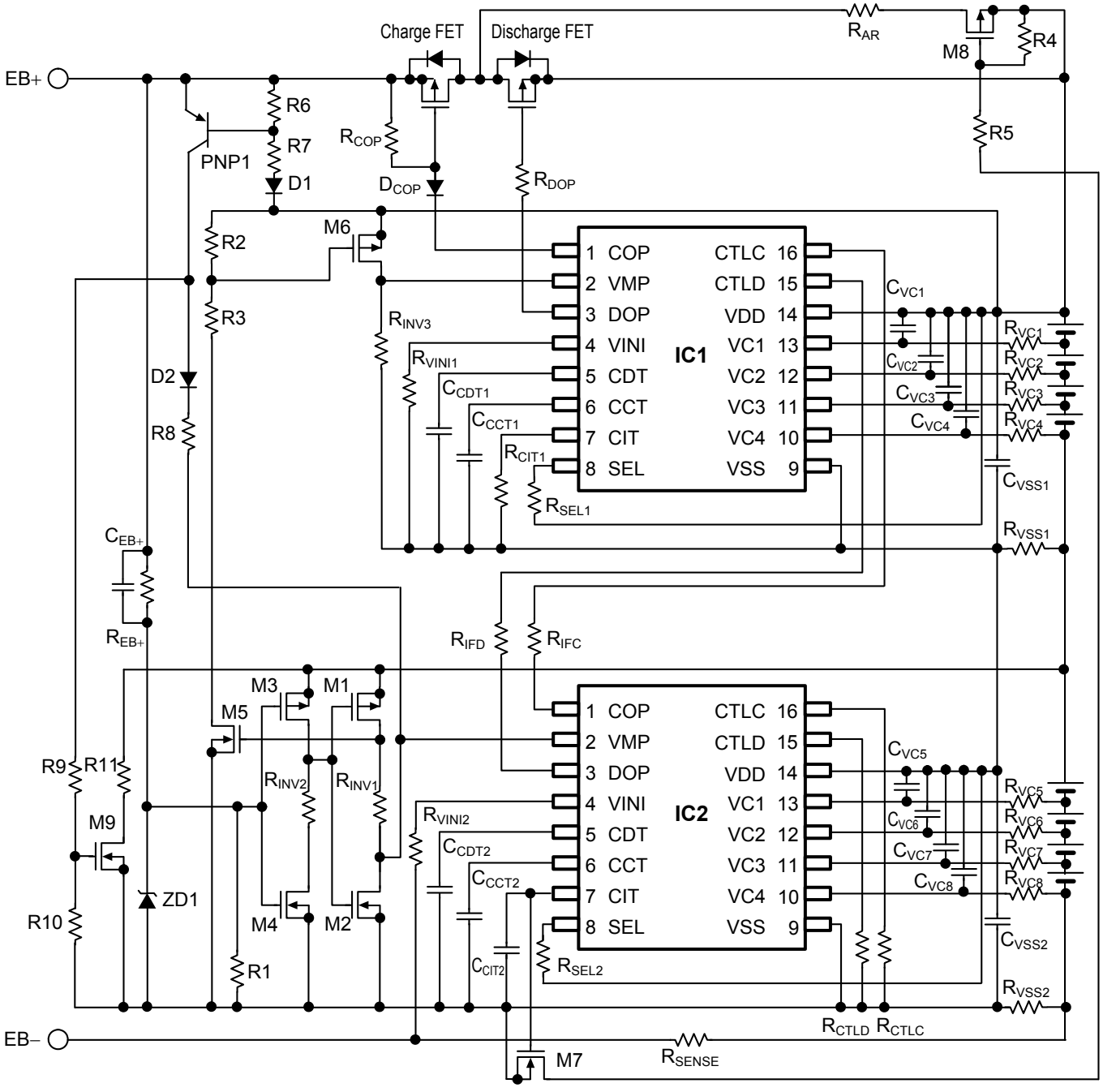
Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 11

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



Remark Refer to "**1. 13 External components list**" for constants of external components.

Figure 12

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. 13 External components list

Table 1 shows external components in the connection examples of **Figure 1** to **Figure 12**.

Table 1 (1 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8204A	ABLIC Inc.	Necessary
IC2	–	–	S-8204A	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_{VSS1}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VSS2}	47	Ω	MCR03	ROHM CO., LTD.	Recommend
C_{VSS1}	1.5	μF	GRM32D	Murata Manufacturing Co., Ltd.	Recommend
C_{VSS2}	1	μF	GRM188B	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_{COP}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{DOP}	51	kΩ	MCR03	ROHM CO., LTD.	Recommend
D_{COP}	–	–	1SS355	ROHM CO., LTD.	Recommend
D1	–	–	1SS355	ROHM CO., LTD.	Recommend
D2	–	–	1SS355	ROHM CO., LTD.	Recommend
R_{SENSE}	–	–	–	–	–

Table 1 (2 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
M1	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M2	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M3	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M4	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M5	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M6	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M7	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
M8	–	–	2SJ210C	Renesas Electronics Corporation	Recommend
M9	–	–	2SK1590C	Renesas Electronics Corporation	Recommend
PNP1	–	–	2SA1037AK	ROHM CO., LTD.	Recommend
R_{INV1}	5.1	kΩ	MCR03	ROHM CO., LTD.	Necessary
R_{INV2}	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{INV3}	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R1	10	MΩ	–	–	Recommend
R2	10	MΩ	–	–	Recommend
R3	10	MΩ	–	–	Recommend
R4	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R5	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R6	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R7	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R8	270	kΩ	MCR03	ROHM CO., LTD.	Necessary
R9	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R10	1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R11	270	kΩ	MCR03	ROHM CO., LTD.	Necessary
ZD1	–	–	UDZS18B	ROHM CO., LTD.	Recommend
R_{EB+}	3	MΩ	MCR03	ROHM CO., LTD.	Recommend
C_{EB+}	100	pF	GRM188B	Murata Manufacturing Co., Ltd.	Recommend
R_{AR}	100	kΩ	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.

2. Precautions

- The usages described in this application note are 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.

- ABLIC Inc. 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.

3. Related source

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

S-8204A 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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2.4-2019.07