CMOS IC Application Note

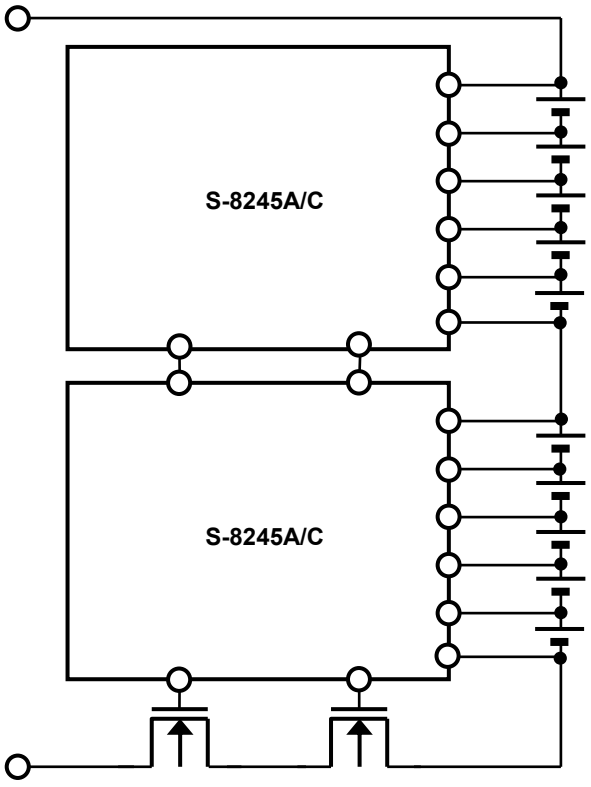
S-8245A/C Series Usage Guidelines Rev.1.0_00

The S-8245A/C Series is a protection IC for 3-serial to 5-serial cell lithium-ion rechargeable batteries, which includes high-accuracy voltage detection circuits and delay circuits.
This application note is a guideline of the typical connection examples for applications using the S-8245A/C Series, and contains the components list.
Refer to the datasheet for details and specs of this IC.

It is possible to configure the following application by using the S-8245A/C Series.

- Protection circuit for multi-serial cell of 6 cells or more

- Protection circuit for multi-serial cell using S-8245A/C Series



Contents

1. Connection examples: Protection circuits for 6-serial to 10-serial cell with S-8245A/C Series (Cascade connection)

1. 1 S-8245A Series (6-serial cell, integrated charge and discharge path)

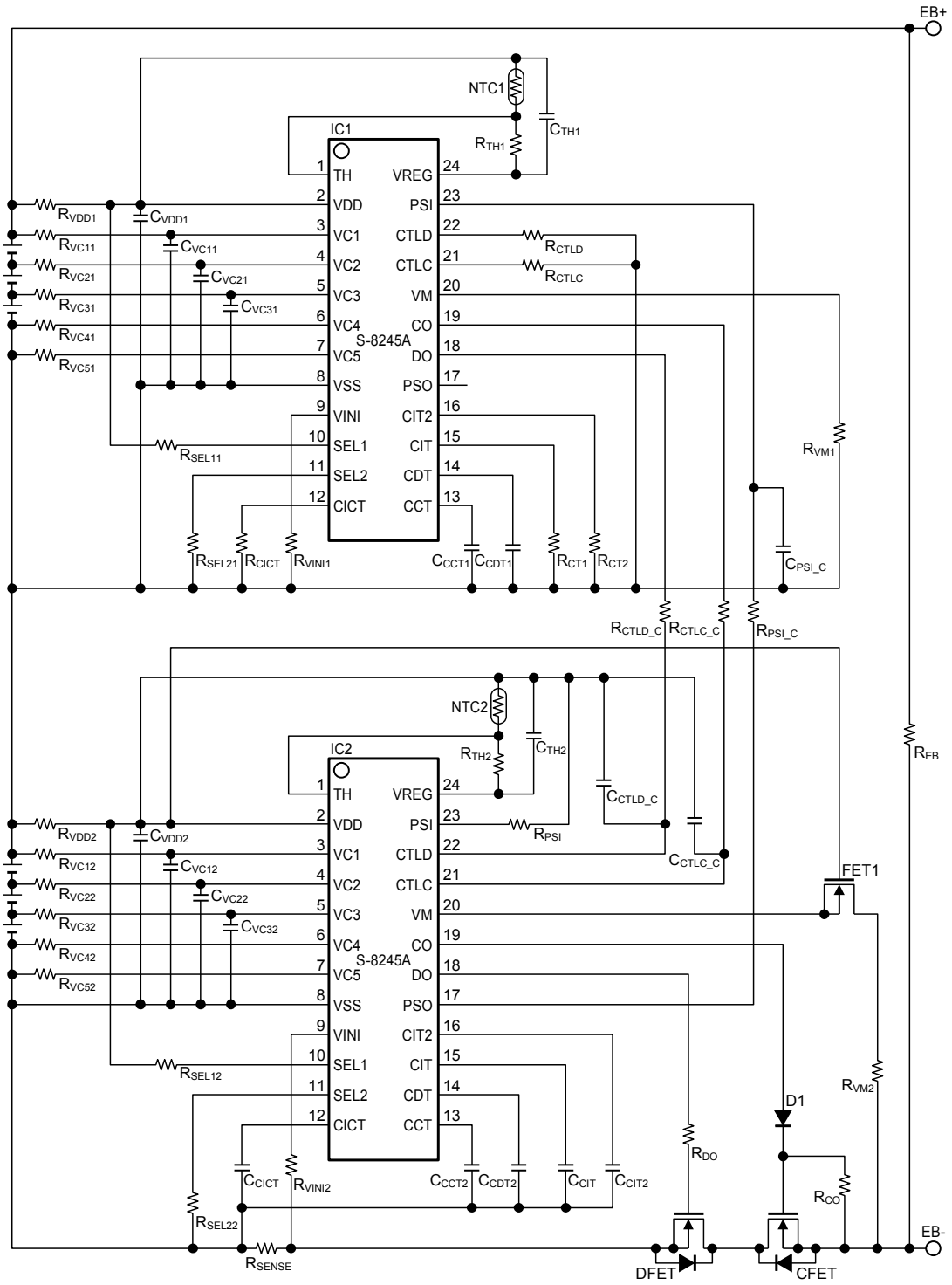


Figure 1

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 connection example. The connection example shown above will not guarantee successful operation.

1. 2 S-8245C Series (6-serial cell, separate charge and discharge paths)

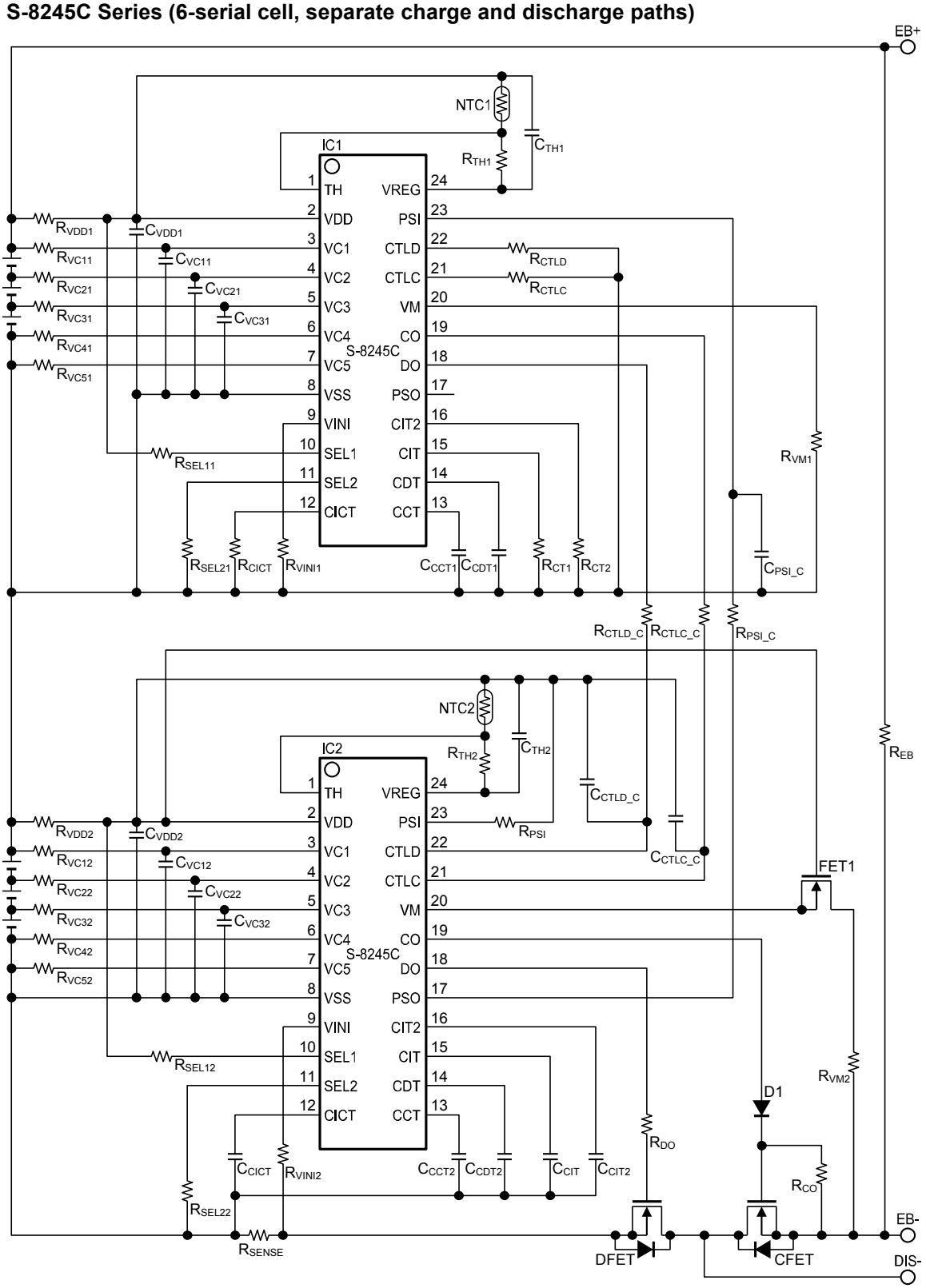


Figure 2

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

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1. 3 S-8245A Series (7-serial cell, integrated charge and discharge path)

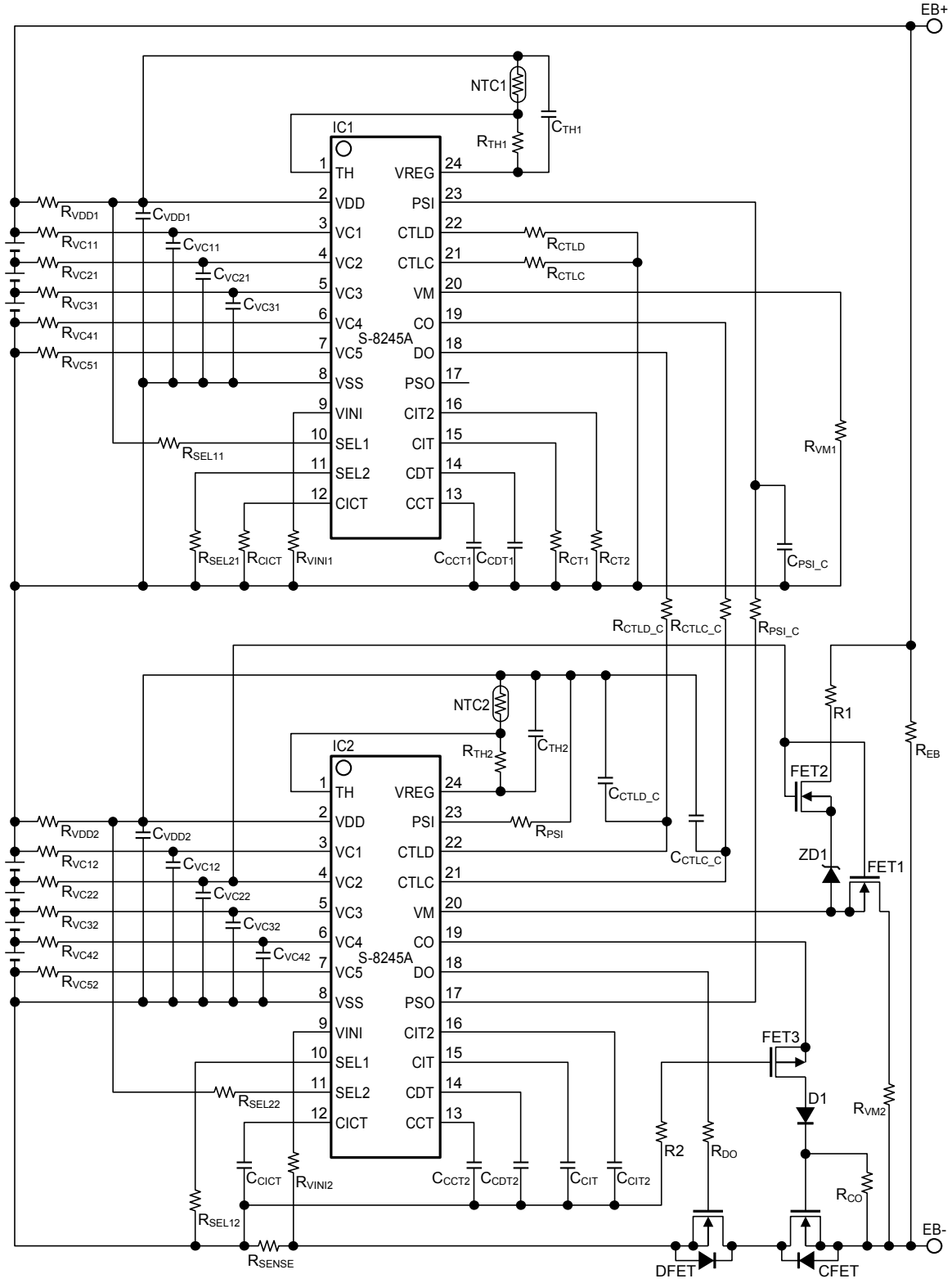

Figure 3

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

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1. 4 S-8245C Series (7-serial cell, separate charge and discharge paths)

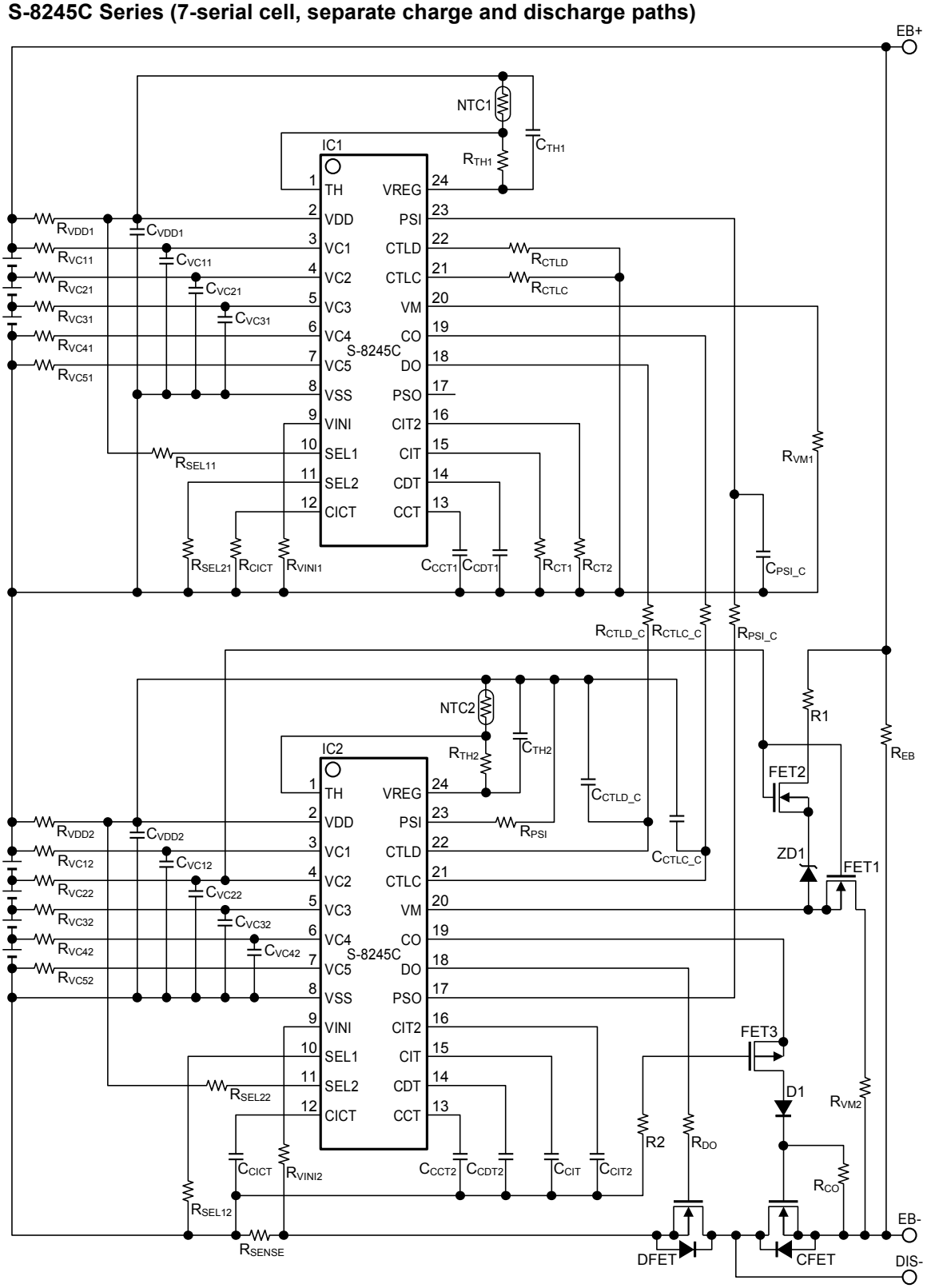

Figure 4

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

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1. 5 S-8245A Series (8-serial cell, integrated charge and discharge path)

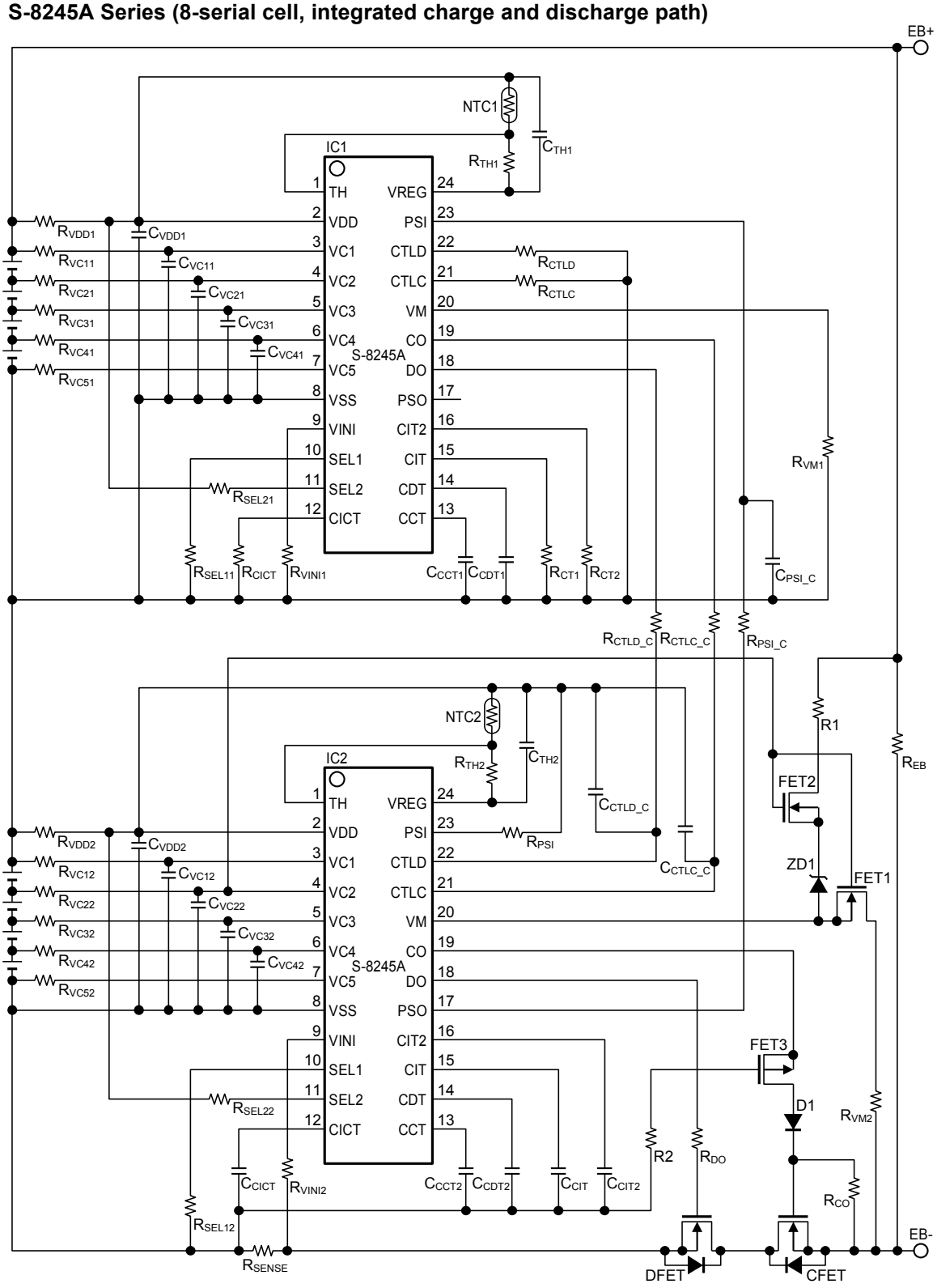

Figure 5

Caution 1. The above connection example may be changed without notice.
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1. 6 S-8245C Series (8-serial cell, separate charge and discharge paths)

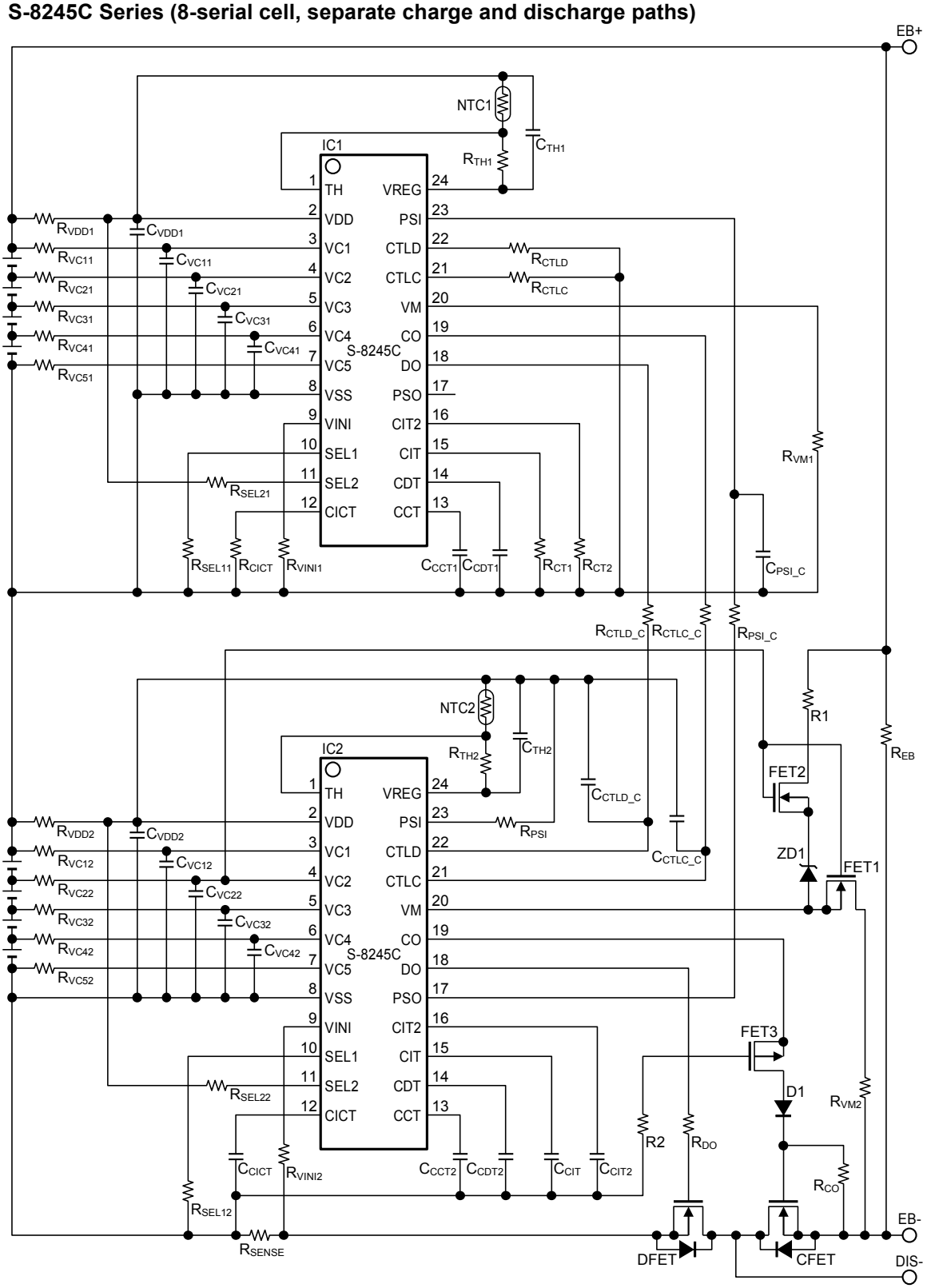

Figure 6

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

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1. 7 S-8245A Series (9-serial cell, integrated charge and discharge path)

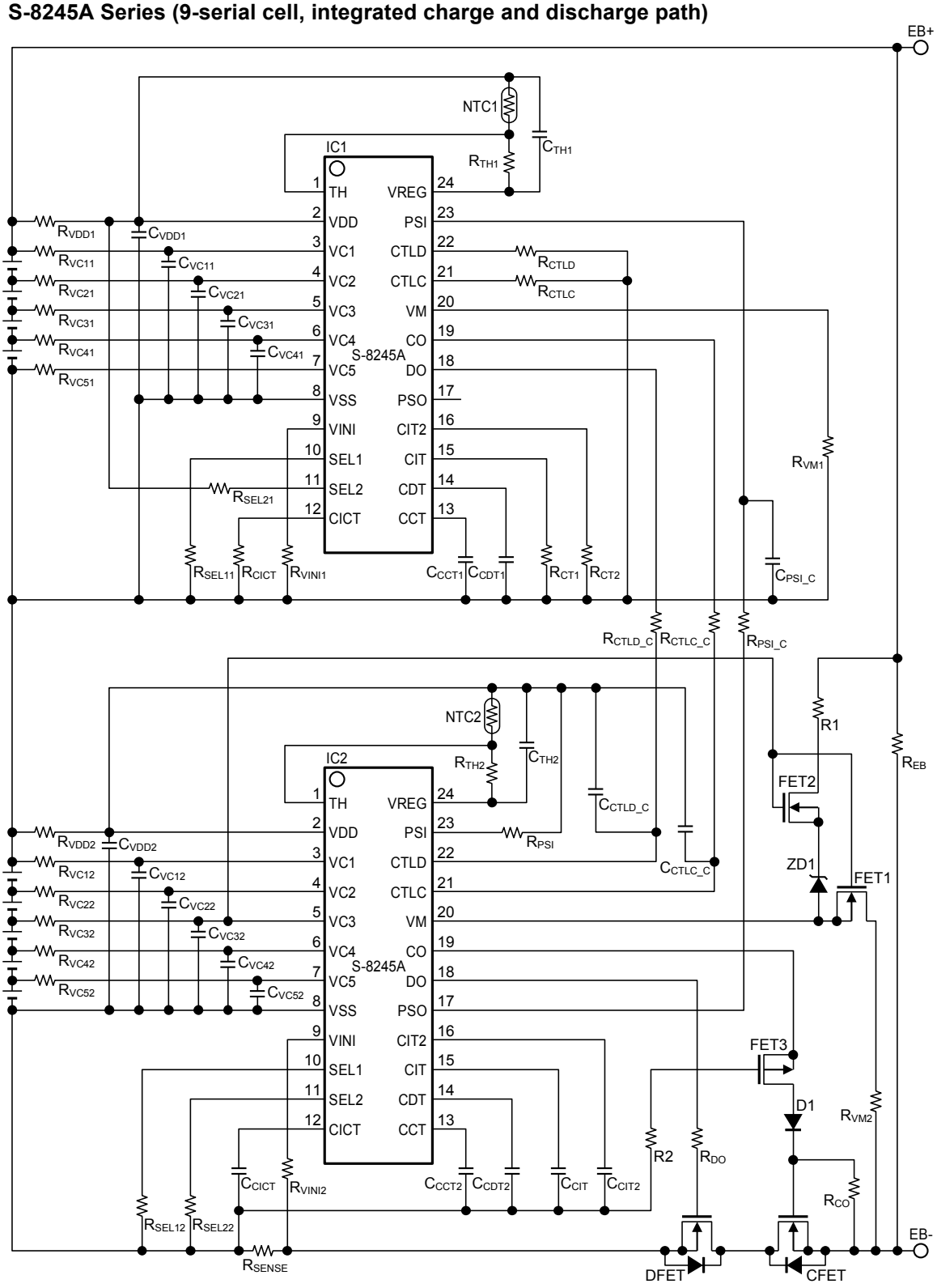

Figure 7

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

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1. 8 S-8245C Series (9-serial cell, separate charge and discharge paths)

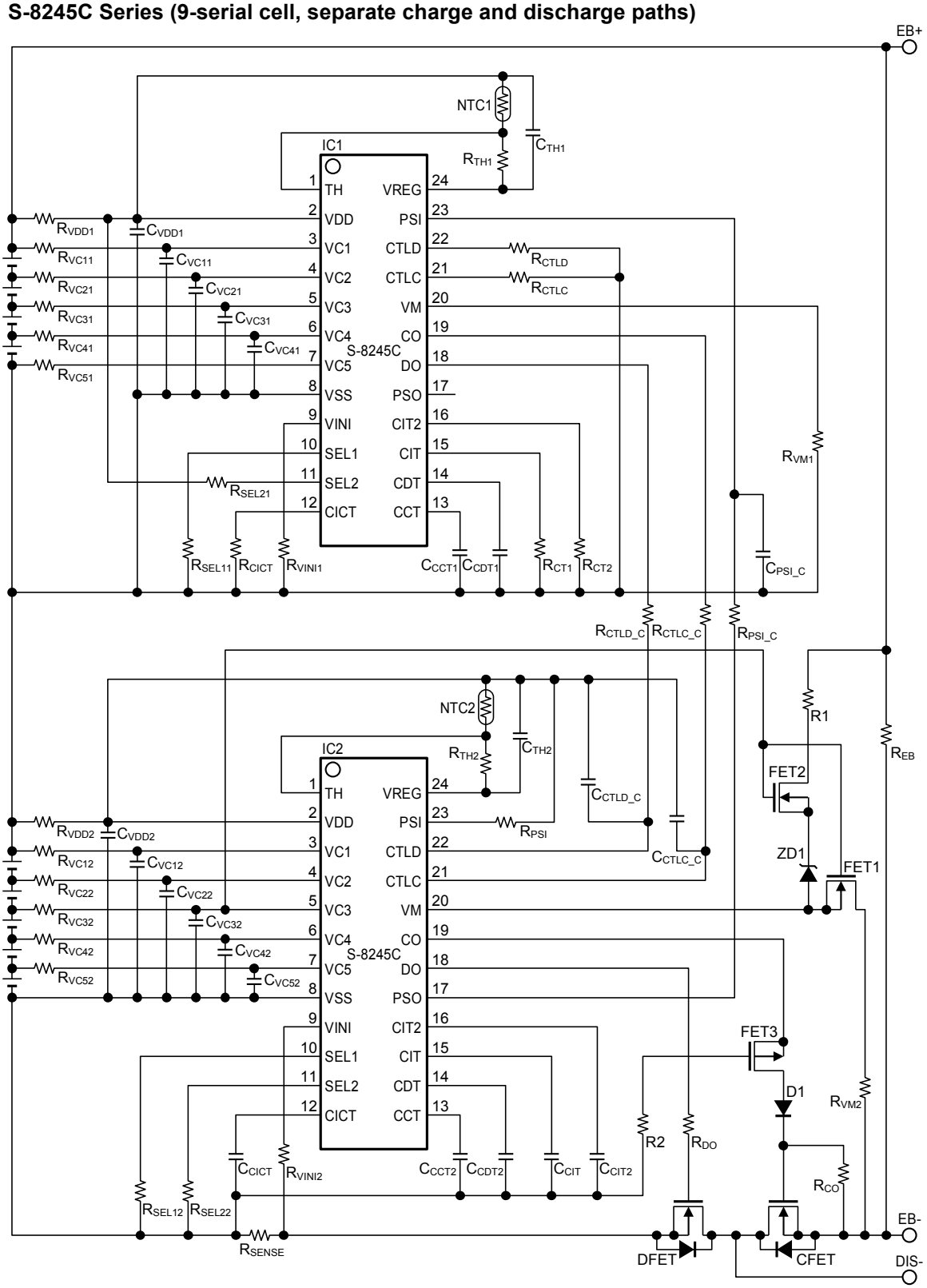

Figure 8

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

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1. 9 S-8245A Series (10-serial cell, integrated charge and discharge path)

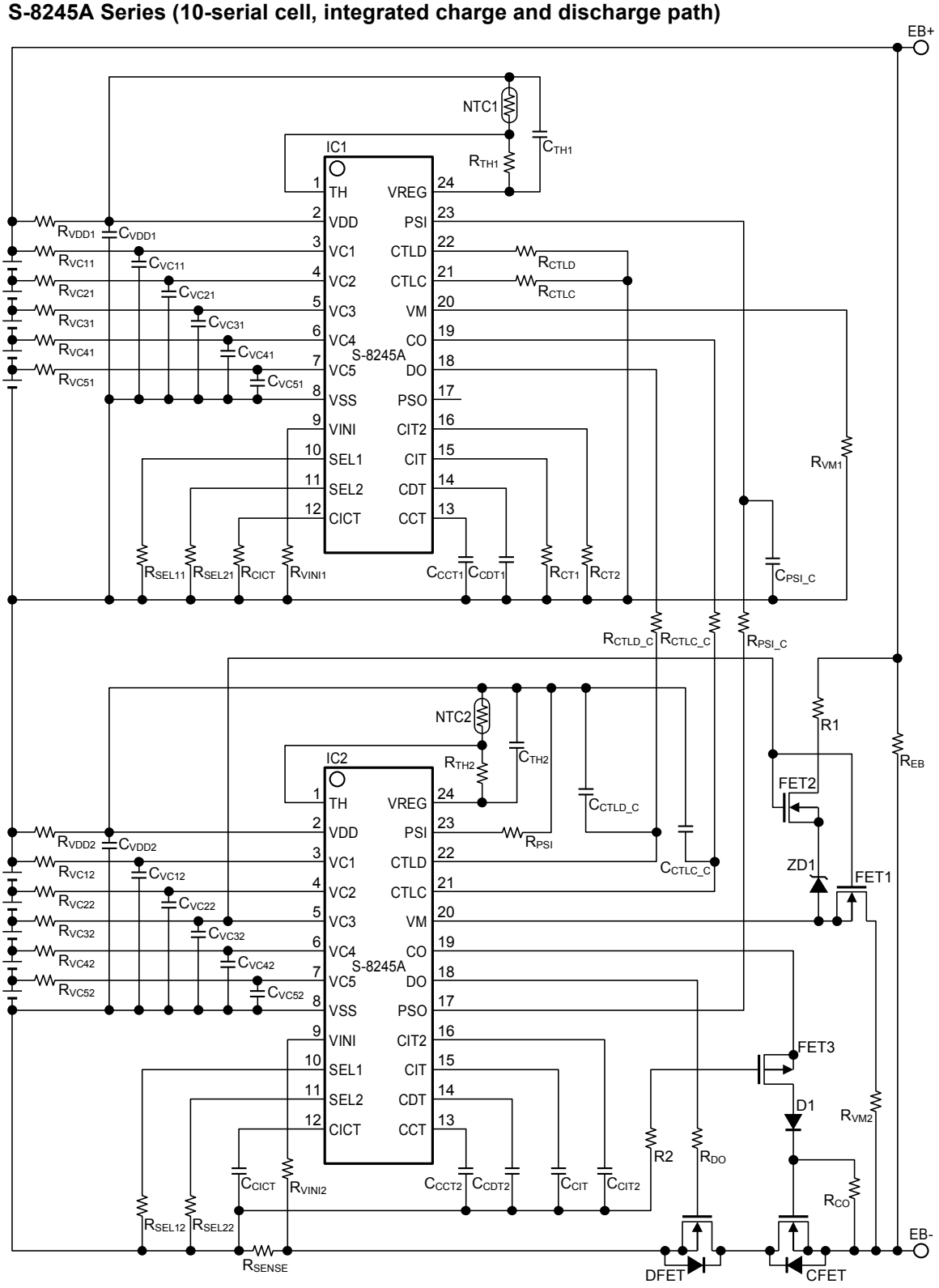

Figure 9

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 connection example. The connection example shown above will not guarantee successful operation.

1. 10 S-8245C Series (10-serial cell, separate charge and discharge paths)

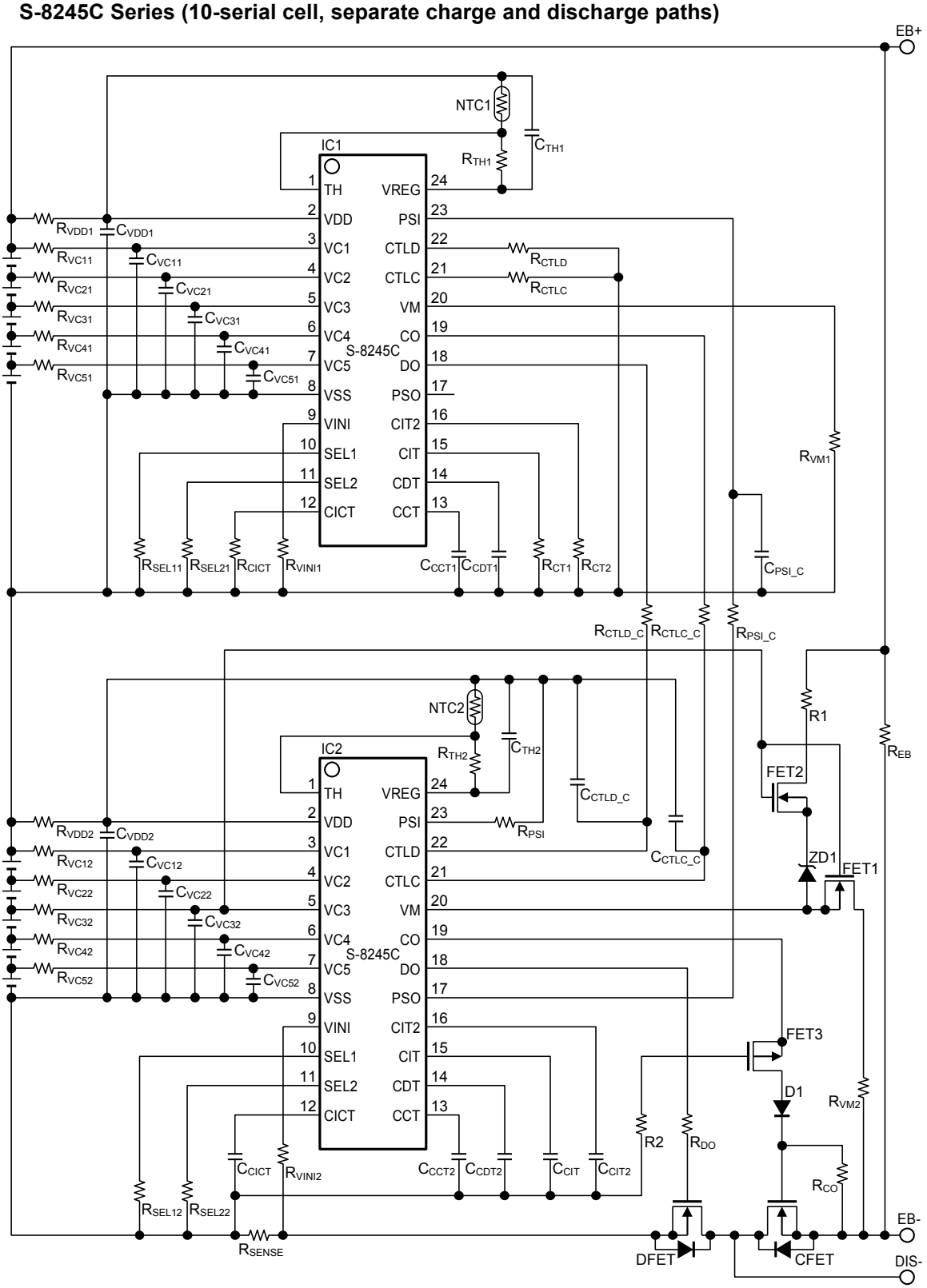

Figure 10

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

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1. 11 External components list

Table 1 shows external components used in the connection examples: **Figure 1** to **Figure 10**.

Table 1 (1 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
IC1	–	–	S-8245A/C	ABLIC Inc.	Necessary
IC2	–	–	S-8245A/C	ABLIC Inc.	Necessary
R_{VDD1}	100	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VDD2}	100	Ω	MCR03	ROHM CO., LTD.	Recommend
R_{VC11}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC21}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC31}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC41}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC51}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC12}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC22}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC32}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC42}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VC52}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL11}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL12}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL21}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SEL22}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VINI1}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VINI2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLC}	2	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLD}	2	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{PSI}	2	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VM1}	5.1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{VM2}	5.1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLC_C}	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CTLD_C}	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{PSI_C}	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CIT}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CIT2}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CICT}	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{CO}	5.1	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{DO}	5.1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{EB}	10	MΩ	MCR03	ROHM CO., LTD.	Recommend
R_{TH1}	10	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{TH2}	10	kΩ	MCR03	ROHM CO., LTD.	Recommend
R1	100	Ω	MCR03	ROHM CO., LTD.	Recommend
R2	1	kΩ	MCR03	ROHM CO., LTD.	Recommend
R_{SENSE}	–	mΩ	–	–	User setting
C_{VDD1}	1	μF	GRM21	Murata Manufacturing Co., Ltd.	Recommend
C_{VDD2}	1	μF	GRM21	Murata Manufacturing Co., Ltd.	Recommend
C_{VC11}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC21}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC31}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC41}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC51}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend

Table 1 (2 / 2)

Symbol	Typical	Unit	Components Name	Maker	Note
C_{VC12}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC22}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC32}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC42}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{VC52}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CTLC_C}	470	pF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CTLD_C}	470	pF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{PSI_C}	470	pF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CCT1}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CCT2}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CDT1}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CDT2}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CIT}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CIT2}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{CICT}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{TH1}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
C_{TH2}	0.1	μF	GRM188	Murata Manufacturing Co., Ltd.	Recommend
NTC1	10	kΩ	NCP18XH103F03RB	Murata Manufacturing Co., Ltd.	Recommend
NTC2	10	kΩ	NCP18XH103F03RB	Murata Manufacturing Co., Ltd.	Recommend
D1*1	–	–	1SS355VM	ROHM CO., LTD.	Recommend
ZD1*2	–	–	UDZV16B	ROHM CO., LTD.	Recommend
FET1*3	–	–	1HN04CH	ON Semiconductor Corporation	Recommend, Nch FET
FET2*2	–	–	1HN04CH	ON Semiconductor Corporation	Recommend, Nch FET
FET3*4	–	–	1HP04CH	ON Semiconductor Corporation	Recommend, Pch FET
CFET	–	–	–	–	User setting, Nch FET
DFET	–	–	–	–	User setting, Nch 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.

***1.** D1: prevents voltage (of V_{DD} or higher) from being applied to the CO pin.
***2.** ZD1 and FET2: prevent voltage (of V_{DD} – 28 V or lower) from being applied to the VM pin, and limit gate-to-source voltage (V_{GS}) to FET1.
***3.** FET1: prevents voltage (of V_{DD} or higher) from being applied to the VM pin.
***4.** FET3: prevents voltage (of V_{DD} – 28 V or lower) from being applied to the CO pin.

2. Precautions when cascade-connecting S-8245A/C Series

Cascade-connecting the S-8245A/C Series, it allows for configuration of a battery protection circuit for multi-serial cell. However, when each cell is not connected simultaneously, voltage exceeding the absolute maximum ratings for the S-8245A/C Series may be applied to the S-8245A/C Series from the external circuit. Note that this may damage the S-8245A/C Series.
It is thus recommended to add a Zener diode of 25 V to 28 V between the VDD pin and the VSS pin of the S-8245A/C Series as a countermeasure.

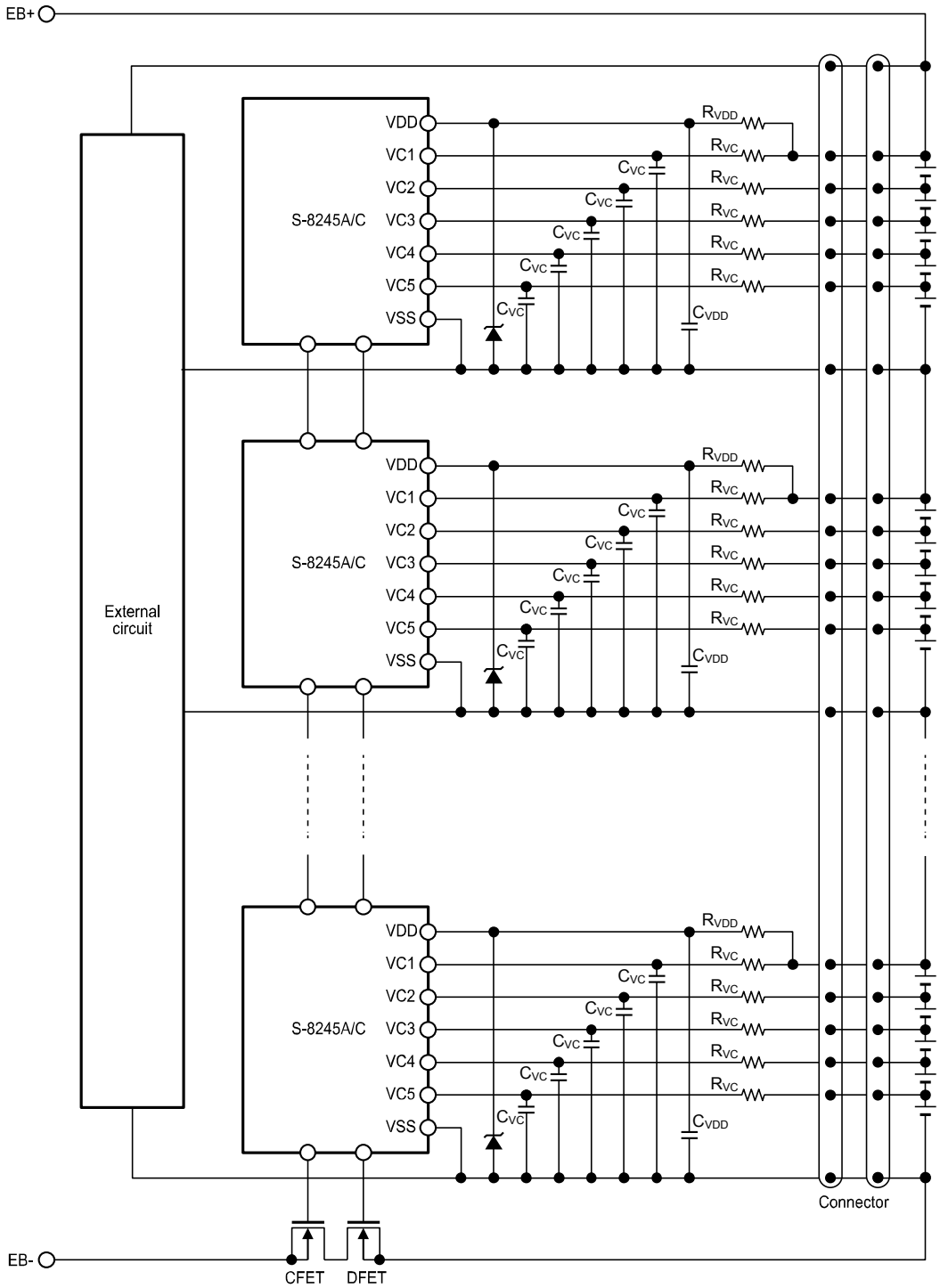

Figure 11

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 connection example. The connection example shown above will not guarantee successful operation.

3. 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.

- 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.

4. Related source

Refer to the following datasheet for details of the S-8245A/C Series.

S-8245A/C Series Datasheet

The information described in this application note and the datasheet is subject to change without notice.
Contact our sales office for details.
Regarding the newest version of the datasheet, select product category and product name on our website, and download the PDF file.

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