

Protection for Lithium-Ion Batteries (for double protection) Monolithic IC MM3284 Series

Outline

This IC is a double protection IC for lithium battery of 1-cell to 4-cell. It detects the battery voltage for every cell. It includes a timer, eliminating an external capacitor for overcharge detection delay that is used for our conventional ICs, which allows programmable detection delay time.

Features

1. Overcharge detection voltage 4.0~4.5V Accuracy $\pm 30\text{mV}$ ($-40\sim 85^\circ\text{C}$)
2. Current consumption ($V_{\text{CELL}}=3.5\text{V}$) 2.5 μA typ.
3. Current consumption ($V_{\text{CELL}}=2.5\text{V}$) 2.0 μA typ.
4. Maximum rating 28V
5. Operating voltage range: 2~24V
6. No external capacitance required for delay time
(Delay time is determined by the internal circuit, ranging from 1s to 12s upon request)

Packages

SOT-26A
SSON-6A

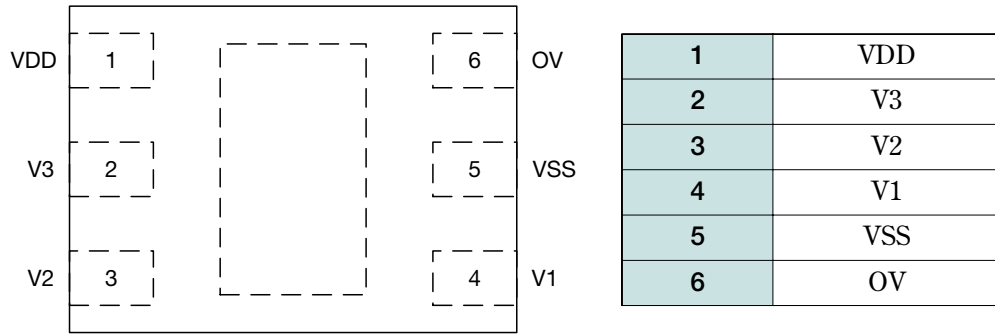
Applications

1. Laptop PCs
2. Battery powered device

Line-up

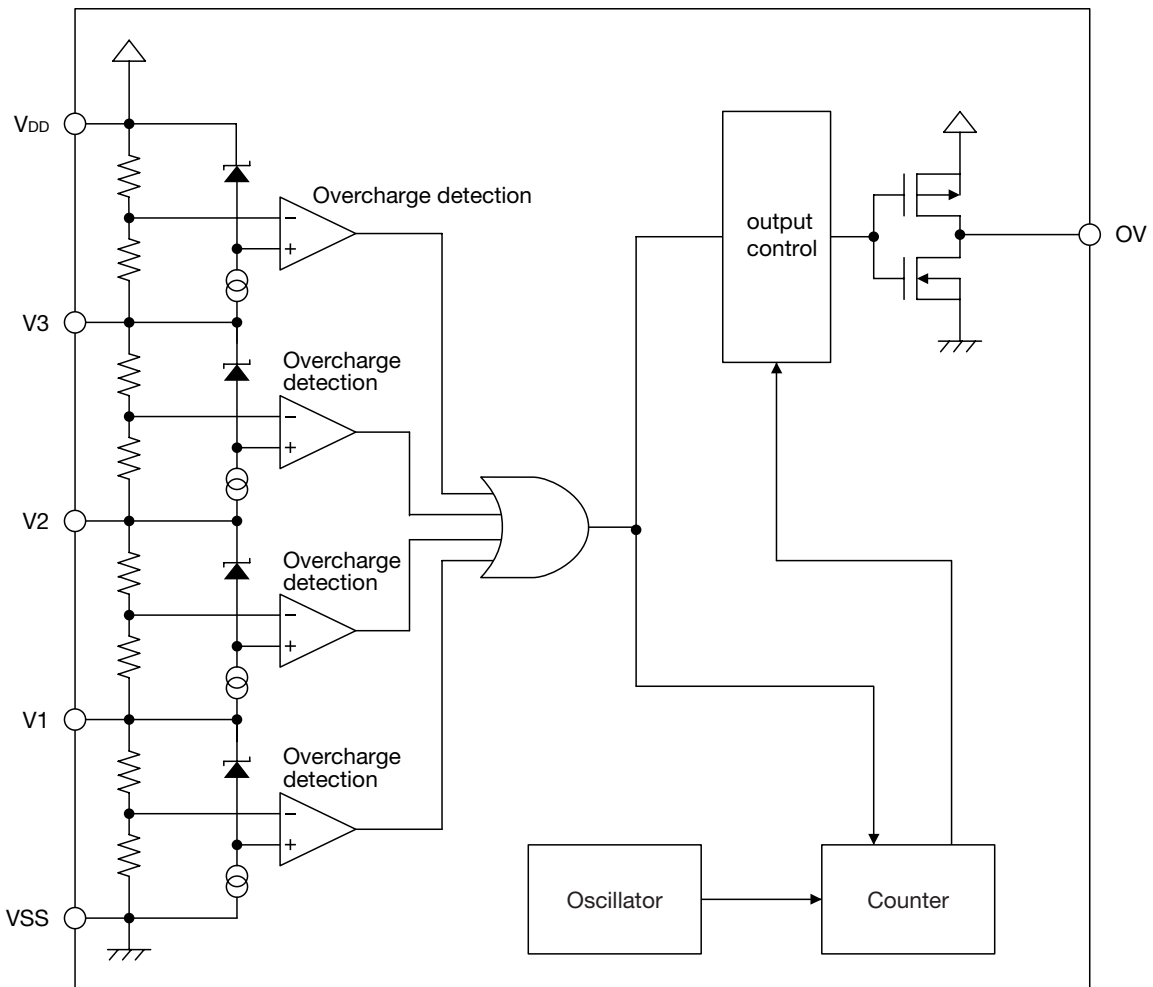
Model	Overcharge Detection Voltage	Overcharge Release Hysteresis Voltage	Overcharge Detection Dead Time
MM3284A	4.350 \pm 0.03V	200 \pm 60mV	1.2s typ.
MM3284B	4.350 \pm 0.03V	1000 \pm 300mV	1.2s typ.
MM3284C	4.350 \pm 0.03V	1000 \pm 300mV	10.0s typ.
MM3284E	4.450 \pm 0.03V	200 \pm 60mV	1.2s typ.
MM3284G	4.450 \pm 0.03V	1000 \pm 300mV	10.0s typ.
MM3284H	4.350 \pm 0.03V	1000 \pm 300mV	5.0s typ.
MM3284I	4.450 \pm 0.03V	1000 \pm 300mV	5.0s typ.
MM3284J	4.400 \pm 0.03V	1000 \pm 300mV	10.0s typ.

Pin Assignment



SSON-6A
(TOP VIEW)

Block Diagram



Pin Description

Pin No.	Pin name	Input/Output	Functions
1	VDD	INPUT	The input terminal of the power supply for IC and of the positive voltage for V4 cell.
2	V3	INPUT	The input terminal of the positive voltage for V3 cell and of the negative voltage for V4 cell.
3	V2	INPUT	The input terminal of the positive voltage for V2 cell and of the negative voltage for V3 cell.
4	V1	INPUT	The input terminal of the positive voltage for V1 cell and of the negative voltage for V2 cell.
5	VSS	INPUT	The input terminal of the ground of IC and of the negative voltage for V1 cell.
6	OV	OUTPUT	The output terminal of over-charge detection. Output type is CMOS. · Normal mode : "Low" · Overcharge mode : "High"

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Unit
Storage temperature range	T _{STG}	-5~+125	°C
Operating temperature range	T _{OPR}	-40~+110	°C
Supply voltage	V _{DDmax.}	VSS-0.3~VSS+28	V
OV pin input voltage	V _{Omax.}	VSS-0.3~VDD+0.3	V
Allowable loss	P _d	150	mW

Recommended Operating Conditions (Ta=25°C)

Item	Symbol	Ratings	Unit
Operating temperature range	T _{OPR}	-40~+110	°C
Operating voltage range	V _{OPR}	VSS+2.0~VSS+24	V

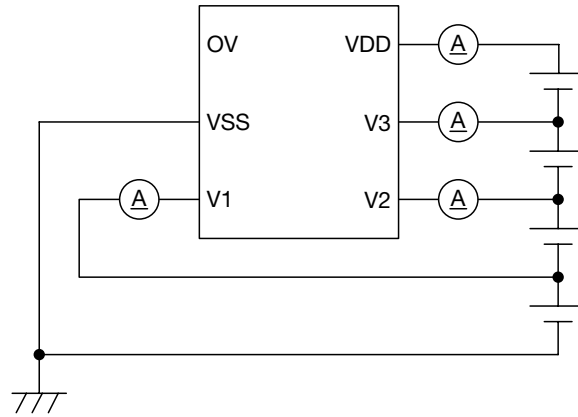
Electrical Characteristics (Except where noted otherwise, Ta=25°C, VCELL=3.5V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit	Measuring Circuit
Consumption current 1	I _{DD1}	V _{CELL} =3.5V, I _{OUT} =0mA		2.5	5	μA	A
Consumption current 2	I _{DD2}	V _{CELL} =2.3V, I _{OUT} =0mA		2	4	μA	A
V3 pin input current	I _{V3}	V _{CELL} =3.5V	-300		300	nA	A
V2 pin input current	I _{V2}	V _{CELL} =3.5V	-300		300	nA	A
V1 pin input current	I _{V1}	V _{CELL} =3.5V	-300		300	nA	A
Overcharge detection voltage	V _{CELLU}	Ta=0~+50°C *1 V _{CELL} =3.5V→4.5V	4.320	4.350	4.380	V	B
Overcharge detection voltage	V _{CELLU}	Ta=-40~+85°C *1 V _{CELL} =3.5V→4.5V	4.300	4.350	4.400	V	B
Overcharge detection voltage	V _{CELLU}	Ta=-40~+110°C *1 V _{CELL} =3.5V→4.5V	4.270	4.350	4.430	V	B
Overcharge release voltage	V _{CELL0}	V _{CELL} =4.5V→3.5V	V _{CELLU} 1.2V	V _{CELLU} 1.0V	V _{CELLU} 0.8V	V	B
Overcharge detection dead time	t _{OV}	V _{CELL} =3.5V→4.5V	7.0	10.0	13.0	s	B
OV pin source current	I _{SOOV}	V _{CELL} >V _{CELLU} V _{OV} =V _{IN} -0.5V	20			μA	C
OV pin sink current	I _{SOV}	V _{OV} =0.5V Ta=-40~110°C *1	20			μA	C
OV pin output voltage H	V _{THOVH}	V _{CELL} >V _{CELLU} V _{IN} -V _{OV} I _{SO} =20μA			0.5	V	D
OV pin output voltage L	V _{THOVL}	V _{OV} -V _{SS} I _{SO} =-20μA Ta=-40~110°C *1			0.5	V	D
Voltage of delay time shortening	V _{DS}	V _{CELL} =6V→8V	6.0	7.0	8.0	V	B

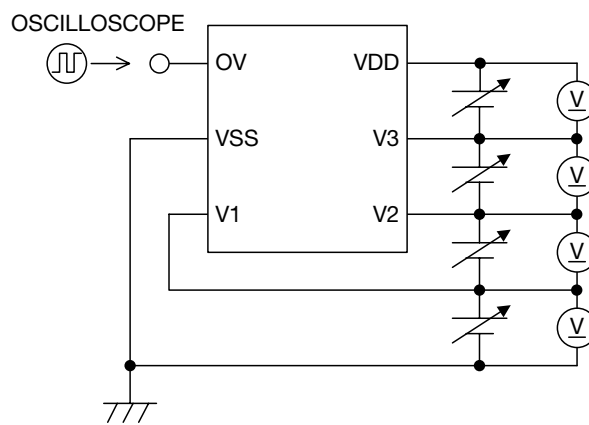
Note1: *1 Guaranteed value

Measuring Circuit

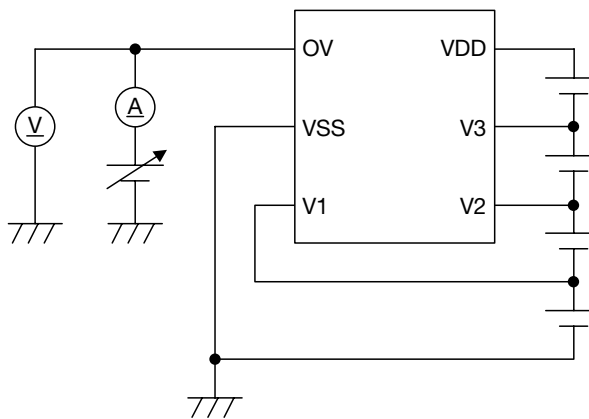
A.



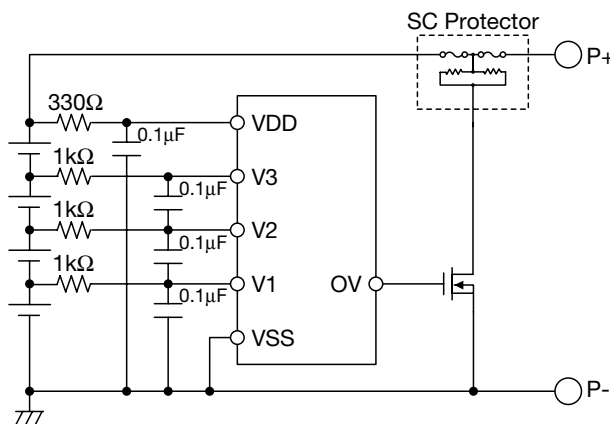
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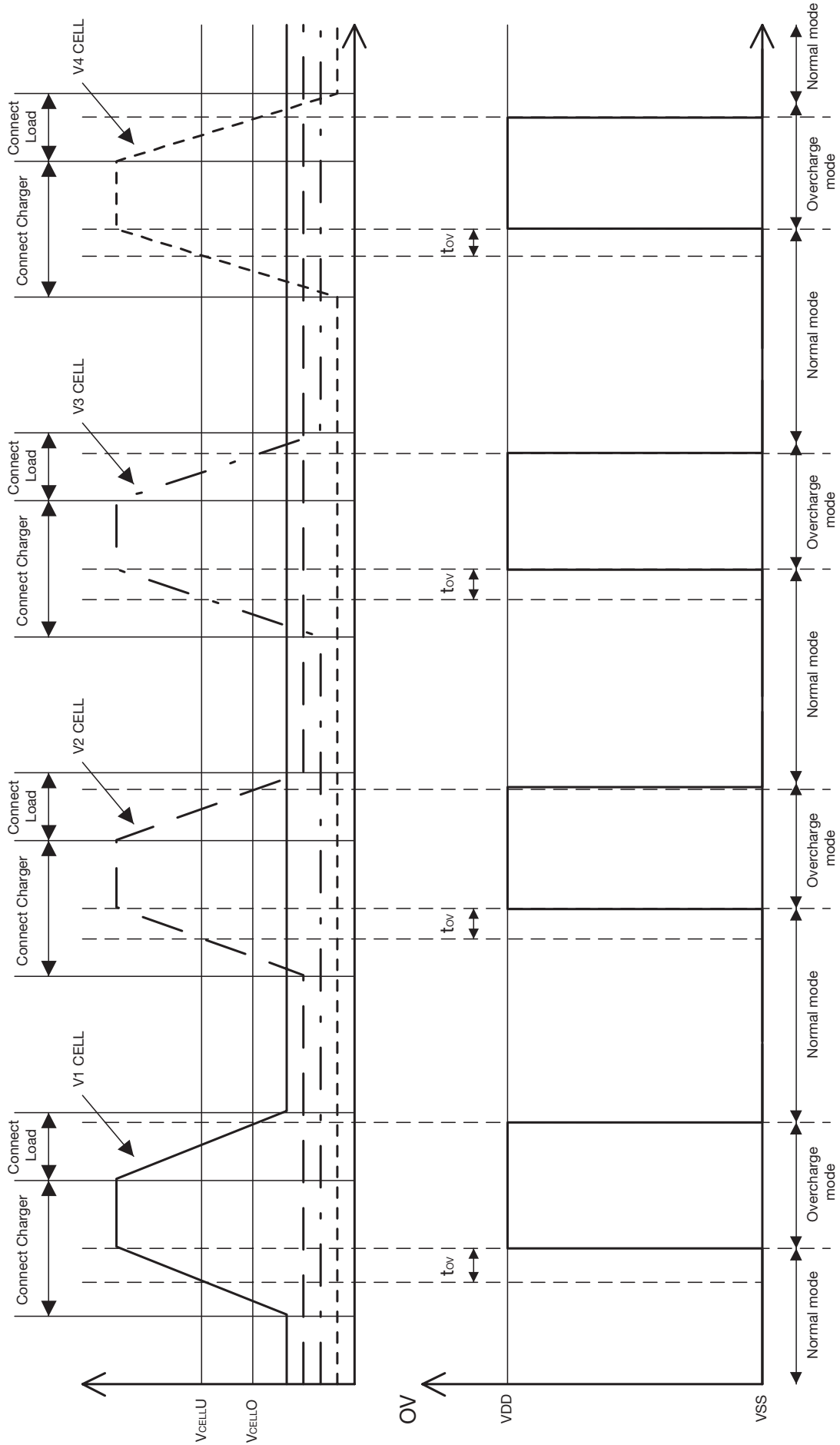
C.



D.

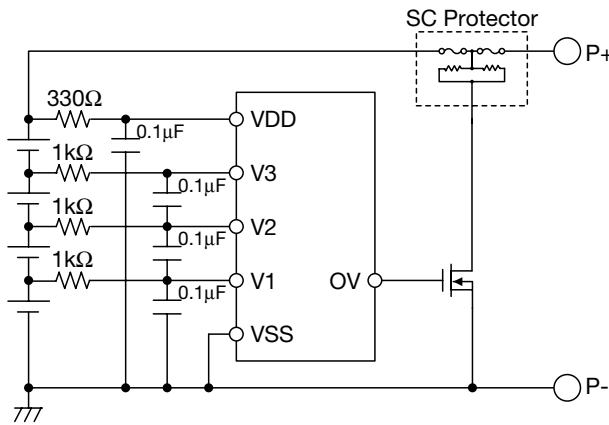


Timing Chart

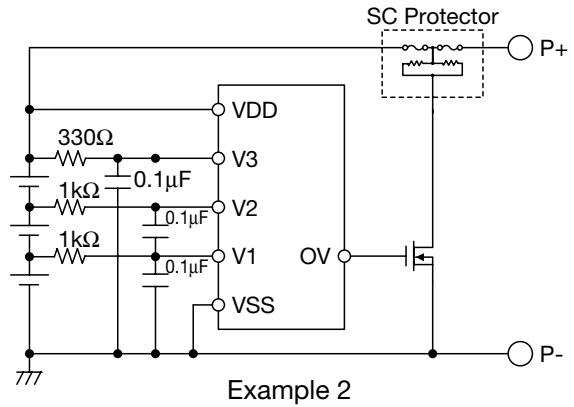
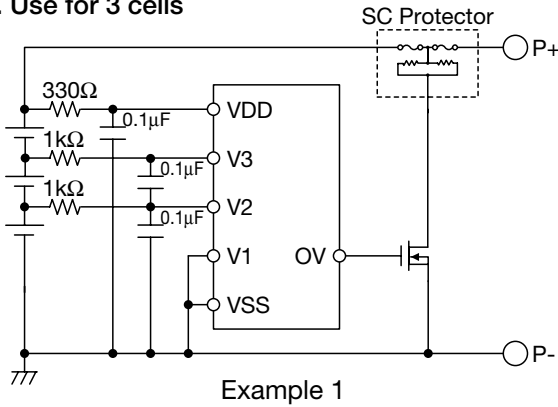


Application Circuit

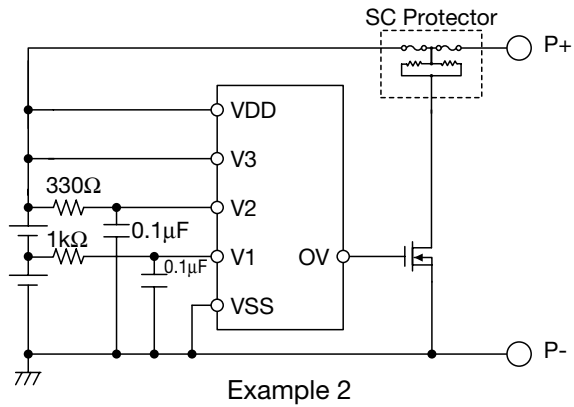
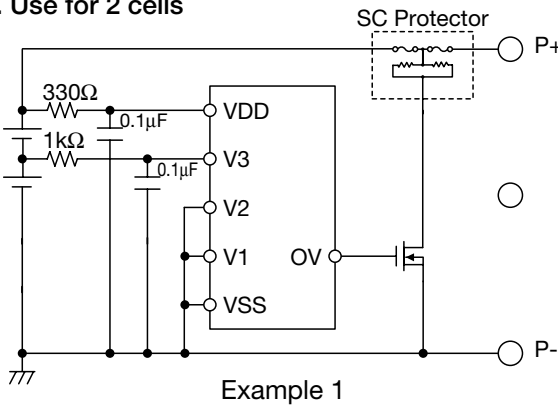
1. Use for 4 cells



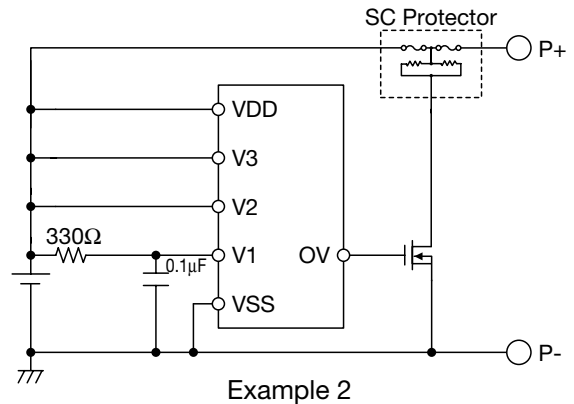
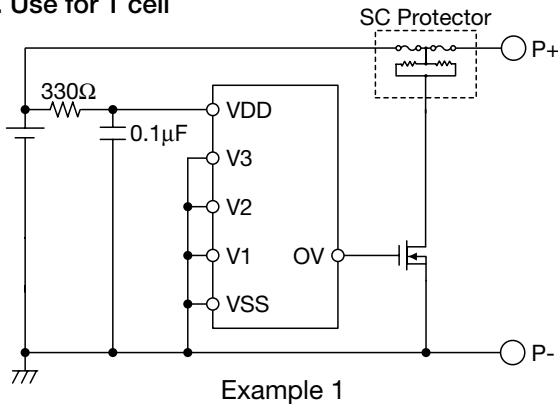
2. Use for 3 cells



3. Use for 2 cells



4. Use for 1 cell



When the battery is connected, OV and VSS are short-circuited by the jumper, and we recommend the method of removing the jumper that is short-circuited of OV and VSS when the connection of all cells is completed.

* The fixed number is reference value.