2 to 4 cells lithium–ion/lithium–polymer battery secondary protection IC

MM3508A series

Outline

MM3508A series are double protection IC for 2 to 4 serial cells lithium–ion / lithium–polymer battery for secondary protection IC. Since it has a built–in timer circuit, it is able to set the detection delay time. It can hold the output of detection for a certain period by latch function. Therefore, it can maintain Fuse cutting time. In addition, it can lower the cell voltage when it is high after Fuse cutting.

Features

(Unless otherwise specified,Ta=25℃)

1) Range and accuracy of detection/release voltage

・Overcharge detection voltage	4.0V to 4.5V, 5mV steps	Accuracy±20mV
・Hysteresis voltage	50mV to 500mV, 50mV steps	Accuracy±100mV

2) Range of detection delay time

・Overcharge detection delay time	1ms to $(1ms\times2^{n1})+(1ms\times2^{n2})$ *n1 and n2 can select two arbitrary integers between 0 to 13. (However n1≠n2)

3) Low current consumption

・Current consumption1 (VCELL=4.0V)	Typ. 3.5uA, Max. 5.0uA
・Current consumption2 (VCELL=2.3V)	Typ. 0.15uA, Max. 0.30uA

4) The FUSE cutting signal is the output between period of time. And the CELL voltage is released by electric discharge resistance of"60KΩ(Typ.)" after FUSE was cut.
And CELL stops an electric discharge if the CELL voltage becomes less than the electric discharge release voltage.

5) Package type

・SSON-6A	2.00 × 1.80 × 0.75 [mm]
・SOT-26A	2.90 × 2.80 × 1.15 [mm]

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2 to 4 cells lithium–ion/lithium–polymer battery secondary protection IC

MM3508B series

Outline

MM3508B series are double protection IC for 2 to 4 serial cells lithium-ion / lithium-polymer secondary battery. It detects battery voltage for each cell. Each of these IC composed of four voltage detectors, reference voltage sources, oscillator, counter circuit and logical circuits.

Features

(Unless otherwise specified,Ta=25℃)

1) Range and accuracy of detection/release voltage

・Overcharge detection voltage	4.0V to 4.5V, 5mV steps	Accuracy±20mV
・Hysteresis voltage	50mV to 500mV, 50mV steps	Accuracy±100mV

2) Range of detection delay time

・Overcharge detection delay time	1ms to $(1ms\times2^{n1})+(1ms\times2^{n2})$ *n1 and n2 can select two arbitrary integers between 0 to 13. (However n1≠n2)

3) Low current consumption

・Current consumption1 (VCELL=4.0V)	Typ. 3.5uA, Max. 5.0uA
・Current consumption2 (VCELL=2.3V)	Typ. 0.15uA, Max. 0.30uA

4) Package type

・SSON-6A	2.00 × 1.80 × 0.75 [mm]
・SOT-26A	2.90 × 2.80 × 1.15 [mm]

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2 to 3 cells lithium–ion/lithium–polymer battery secondary protection IC

MM3508C series

Outline

MM3508C series are double protection IC for 2 to 3 serial cells lithium–on / lithium–polymer battery for secondary protection IC. It detects overcharge voltage with high accuracy for each cell. The terminal CT is used to control the output voltage of the terminal OV.

Features

(Unless otherwise specified,Ta=25℃)

1) Range and accuracy of detection/release voltage

・Overcharge detection voltage	4.0V to 4.5V, 5mV steps	Accuracy±20mV
・Hysteresis voltage	50mV to 500mV, 50mV steps	Accuracy±160mV

2) Range of detection delay time

・Overcharge detection delay time	1ms to $(1ms \times 2^{n1})+(1ms \times 2^{n2})$ *n1 and n2 can select two arbitrary integers between 0 to 13. (However n1≠n2)

3) Low current consumption

・Current consumption1 (VCELL=4.0V)	Typ. 3.0uA, Max. 5.0uA
・Current consumption2 (VCELL=2.3V)	Typ. 2.5uA, Max. 4.0uA

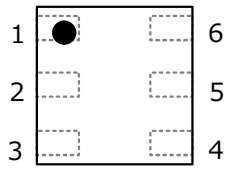
4) The terminal CT is used to control the output voltage of the terminal OV.

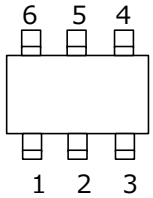
5) Package type

・SSON-6A	2.00 × 1.80 × 0.75 [mm]
・SOT-26A	2.90 × 2.80 × 1.15 [mm]

Pin explanations

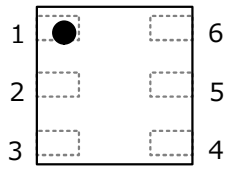
・MM3508A/B

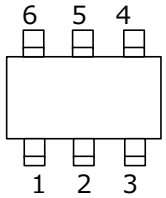
SSON-6A	Pin No.	Symbol	Function
	1	VDD	The input terminal of the power supply of IC, and the positive voltage of V4 cell
	2	V3	The input terminal of the positive voltage of V3 cell, and the negative voltage of V4 cell
	3	V2	The input terminal of the positive voltage of V2 cell, and the negative voltage of V3 cell
	4	V1	The input terminal of the positive voltage of V1 cell, and the negative voltage of V2 cell
	5	VSS	The input terminal of the ground of IC, and the negative voltage of V1 cell
	6	OV	Output of over charge detection. Output type is CMOS

SOT-26A	Pin No.	Symbol	Function
	1	V2	The input terminal of the positive voltage of V2 cell, and the negative voltage of V3 cell
	2	V3	The input terminal of the positive voltage of V3 cell, and the negative voltage of V4 cell
	3	VDD	The input terminal of the power supply of IC, and the positive voltage of V4 cell
	4	OV	Output of over charge detection. Output type is CMOS
	5	VSS	The input terminal of the ground of IC, and the negative voltage of V1 cell
	6	V1	The input terminal of the positive voltage of V1 cell, and the negative voltage of V2 cell

Pin explanations

・MM3508C

SSON-6A	Pin No.	Symbol	Function
	1	VDD	The input terminal of the power supply of IC, and the positive voltage of V3 cell
	2	V2	The input terminal of the positive voltage of V2 cell, and the negative voltage of V3 cell
	3	V1	The input terminal of the positive voltage of V1 cell, and the negative voltage of V2 cell
	4	CT	The input terminal of OV output control signal
	5	VSS	The input terminal of the ground of IC, and the negative voltage of V1 cell
	6	OV	Output of over charge detection. Output type is CMOS

SOT-26A	Pin No.	Symbol	Function
	1	V1	The input terminal of the positive voltage of V1 cell, and the negative voltage of V2 cell
	2	V2	The input terminal of the positive voltage of V2 cell, and the negative voltage of V3 cell
	3	VDD	The input terminal of the power supply of IC, and the positive voltage of V3 cell
	4	OV	Output of over charge detection. Output type is CMOS
	5	VSS	The input terminal of the ground of IC, and the negative voltage of V1 cell
	6	CT	The input terminal of OV output control signal

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage (MM3508A/B)	V_{DDMAX}	VSS-0.3	VSS+28	V
Supply voltage (MM3508C)		VSS-0.3	VSS+18	V
OV pin input voltage	V_{OMAX}	VSS-0.3	VDD+0.3	V
Storage temperature	T_{STG}	-55	125	℃

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating ambient temperature	T_{OPR}	-40	110	℃
Operating voltage (MM3508A/B)	V_{OPR}	VSS+2.0	VSS+21	V
Operating voltage (MM3508C)		VSS+2.0	VSS+18	V

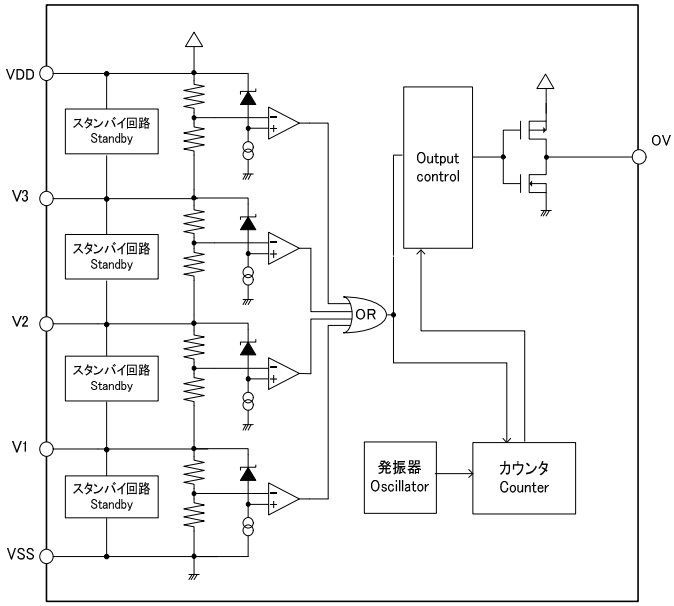
Electrical characteristics

(Unless otherwise specified,Ta=25℃)

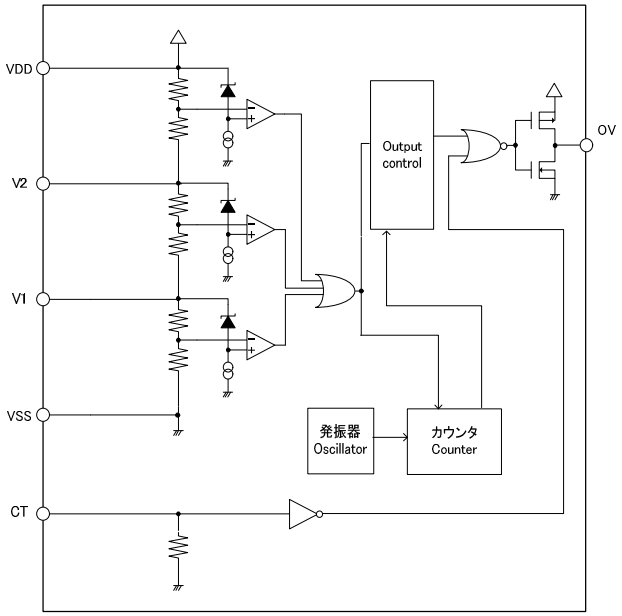
Parameter	Symbol	Note	Min	Typ	Max	Unit
Output current						
OV pin source current	$I_{SO}O_V$	V_{OV}=VIN-0.5V	20	-	-	uA
OV pin sink current	$I_{SI}O_V$	V_{OV}=0.5V	20	-	-	uA
Current consumption						
Consumption current 1 (MM3508A/B)	I_{DD1}	VCELL=4.0V	-	3.5	5.0	uA
Consumption current 1 (MM3508C)			-	3.0	5.0	uA
Consumption current 2 (MM3508A/B)	I_{DD2}	VCELL=2.3V	-	0.15	0.30	uA
Consumption current 2 (MM3508C)			-	2.5	4.0	uA
V3 pin input current	I_{V3}	VCELL=3.5V	-300	-	300	nA
V2 pin input current	I_{V2}	VCELL=3.5V	-300	-	300	nA
V1 pin input current	I_{V1}	VCELL=3.5V	-300	-	300	nA
Detection/Release voltage						
Overcharge detection voltage	$V_{CELL}U$	Ta=+25℃	Typ-0.020	$V_{CELL}U$	Typ+0.020	V
		Ta=0～+50℃				
		Ta=-40～+85℃	Typ-0.050		Typ+0.050	
Overcharge release voltage (MM3508A/B)	$V_{CELL}O$		Typ-0.10	$V_{CELL}O$	Typ+0.10	V
Overcharge release voltage (MM3508C)			Typ-0.16		Typ+0.16	V
Standby Voltage (MM3508A)	Vst		2.6	3.2	3.8	V
Standby Voltage (MM3508B)	Vst		2.5	3.1	3.7	V
Detection delay time						
Overcharge detection dead time	t_{OVdead}		Typ*0.7	tovd	Typ*1.3	s

Block diagram

・MM3508A/B

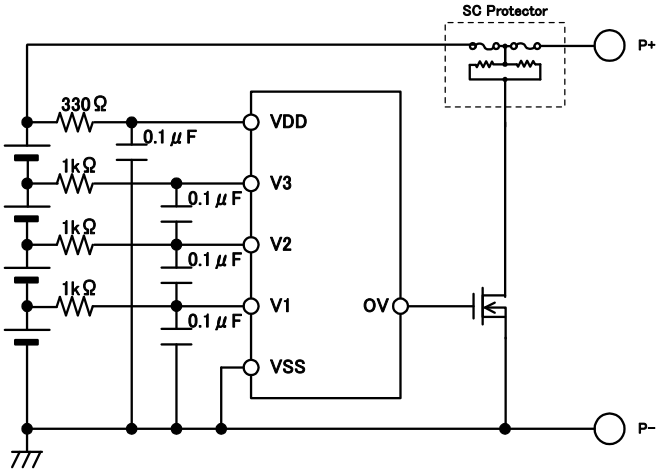


・MM3508C

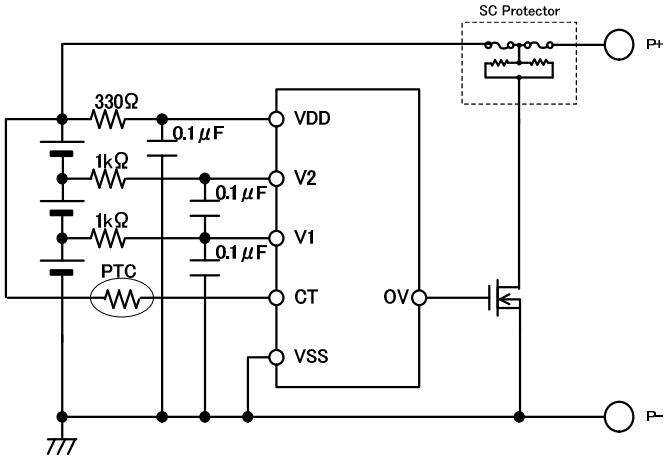


Typical application circuit

・When using it for 4 cells（MM3508A/B）



・ When using it by the overheat protection by PTC (MM3508C)



※1.constant of the mark is a standard.

※2.The voltage change becomes big according to an excessive current, and the current of the bias in IC is turned off temporarily. It is this influence, and there is a possibility that the output logic becomes unstable. In that case, please set the time constant of CR connected with the power supply terminal so that the variation in power source may become 1V/100μsec or more.