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 $(1ms×2^{n1})+(1ms×2^{n2})$
                                            *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. 3.5uA, 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.
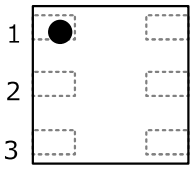
5) Package type
   - SSON-6A   2.00 × 1.80 × 0.75 [mm]
   - SOT-26A   2.90 × 2.80 × 1.15 [mm]
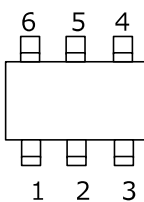
Pin explanations

・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

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

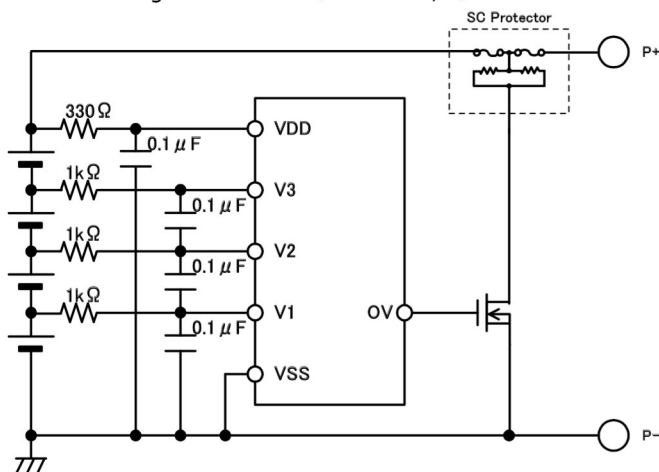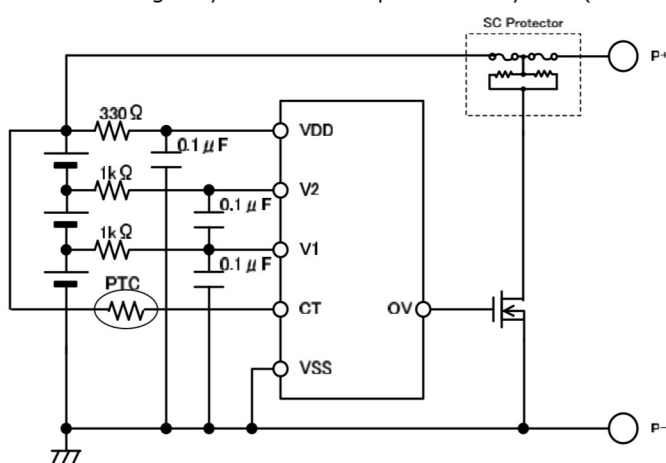## Block diagram

・MM3508A/B
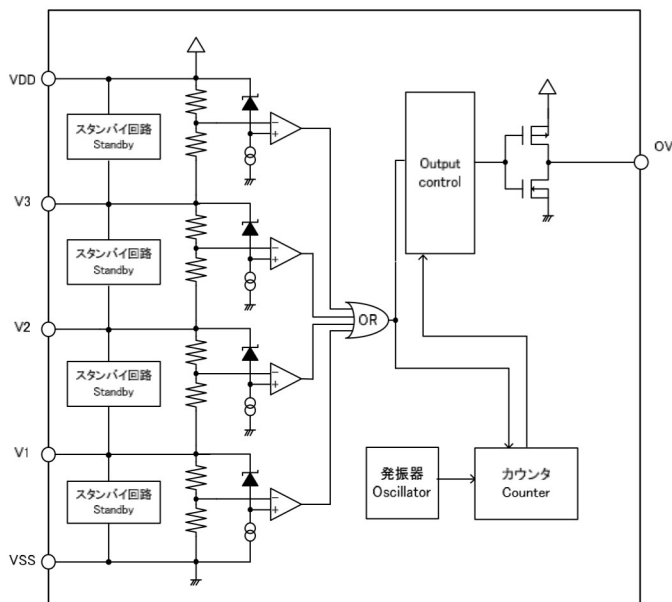
・MM3508C
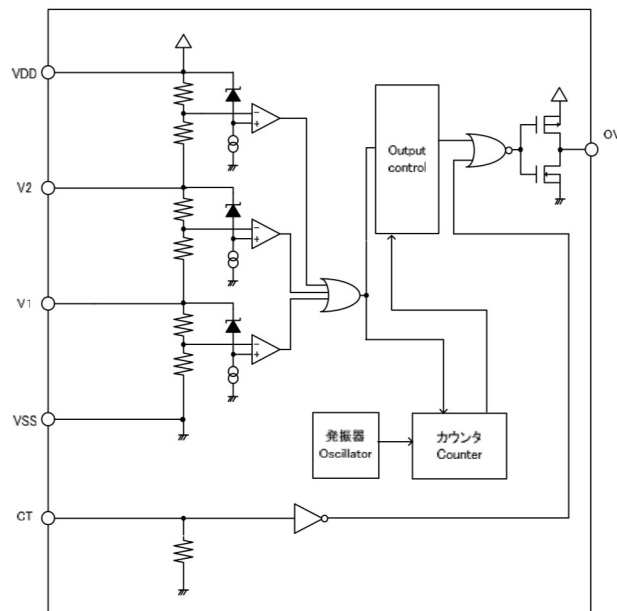
Typical application circuit

・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.