



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°C)

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 $(1\text{ms} \times 2^{n1}) + (1\text{ms} \times 2^{n2})$
	*n1 and n2 can select two arbitrary integers between 0 to 13. (However $n1 \neq n2$)

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

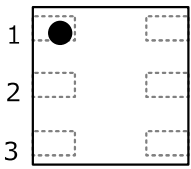
• SS0N-6A	2.00 × 1.80 × 0.75 [mm]
• SOT-26A	2.90 × 2.80 × 1.15 [mm]

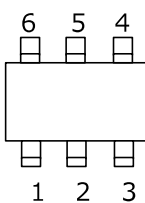




Pin explanations

•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	°C

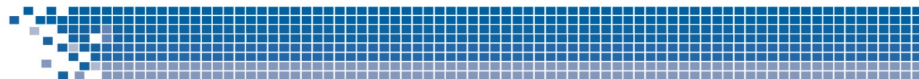
Recommended Operating Conditions

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

Electrical characteristics

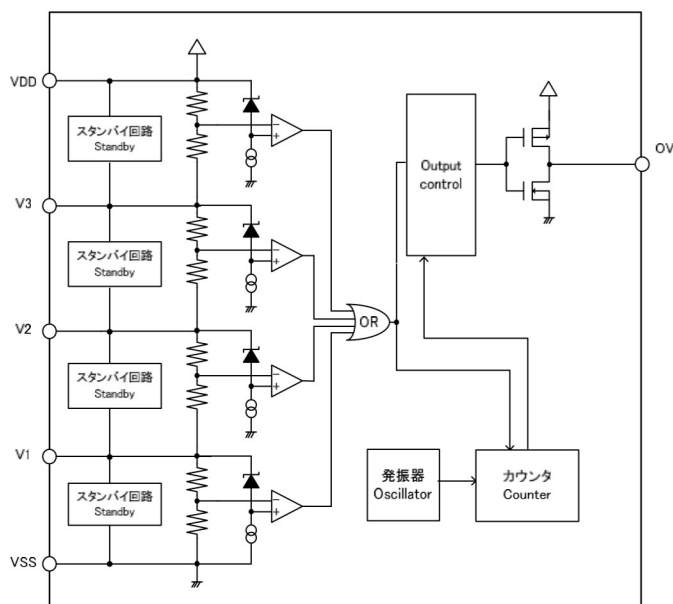
(Unless otherwise specified, $T_a=25^{\circ}\text{C}$)

Parameter	Symbol	Note	Min	Typ	Max	Unit
Output current						
OV pin source current	I_{SOV}	$V_{OV}=V_{IN}-0.5V$	20	-	-	uA
OV pin sink current	I_{SIOV}	$V_{OV}=0.5V$	20	-	-	uA
Current consumption						
Consumption current 1 (MM3508A/B)	I_{DD1}	$V_{CELL}=4.0V$	-	3.5	5.0	uA
Consumption current 1 (MM3508C)			-	3.0	5.0	uA
Consumption current 2 (MM3508A/B)	I_{DD2}	$V_{CELL}=2.3V$	-	0.15	0.30	uA
Consumption current 2 (MM3508C)			-	2.5	4.0	uA
V3 pin input current	I_{V3}	$V_{CELL}=3.5V$	-300	-	300	nA
V2 pin input current	I_{V2}	$V_{CELL}=3.5V$	-300	-	300	nA
V1 pin input current	I_{V1}	$V_{CELL}=3.5V$	-300	-	300	nA
Detection/Release voltage						
Overcharge detection voltage	V_{CELLU}	$T_a=+25^{\circ}\text{C}$	Typ-0.020	V_{CELLU}	Typ+0.020	V
		$T_a=0\sim+50^{\circ}\text{C}$			Typ+0.050	
		$T_a=-40\sim+85^{\circ}\text{C}$	Typ-0.050		Typ+0.050	
Overcharge release voltage (MM3508A/B)	V_{CELLO}		Typ-0.10	V_{CELLO}	Typ+0.10	V
Overcharge release voltage (MM3508C)			Typ-0.16		Typ+0.16	V
Standby Voltage (MM3508A)	V_{st}		2.6	3.2	3.8	V
Standby Voltage (MM3508B)	V_{st}		2.5	3.1	3.7	V
Detection delay time						
Overcharge detection dead time	t_{OVdead}		Typ*0.7	t_{ovd}	Typ*1.3	s

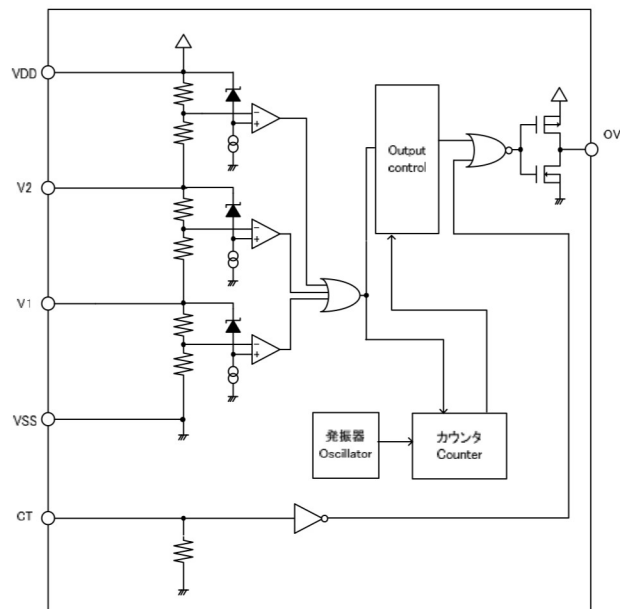


Block diagram

•MM3508A/B

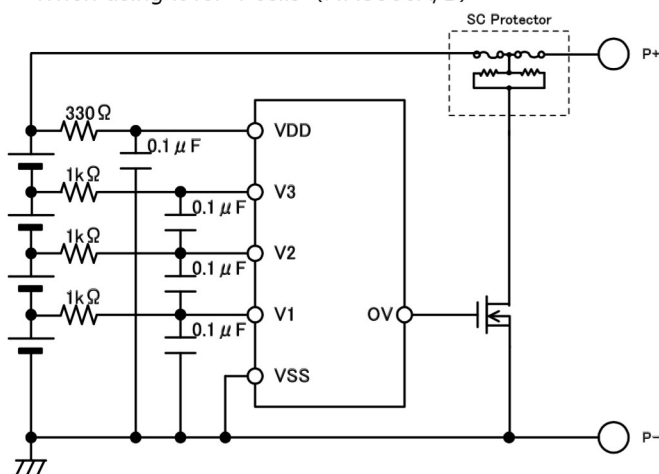


•MM3508C

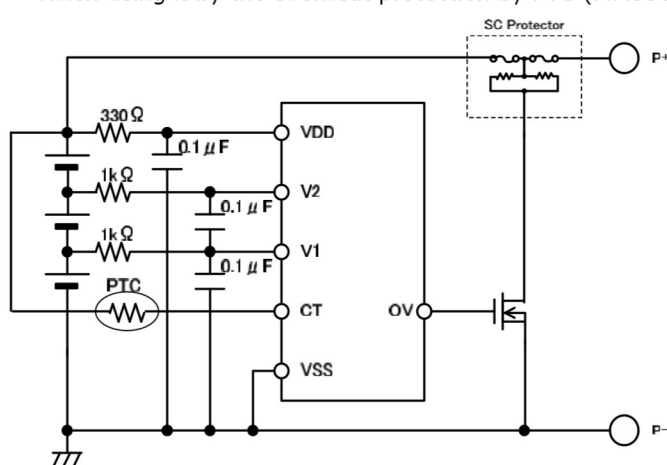


Typical application circuit

•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.