1～3cell Li-ion/Li-polymer battery Secondary protection IC

MM3563B Series

Description

MM3563B series are secondary protection IC using high voltage CMOS process for overcharge protection of the rechargeable Lithium-ion or Lithium-polymer battery. The high accuracy overcharge detection of each cell of the rechargeable 1～3-cell Lithium-ion or Lithium-polymer battery is possible. Each of these IC composed of four voltage detectors, reference voltage sources, oscillator, counter circuit and logical circuits.The ultra-small package SSON-6A is used to minimize footprints.

Features

(Unless otherwise specified, Ta=25 degC)

・Detection voltage | Range | Accuracy

   Overcharge detection voltage   4.0V to 4.5V, 5mV steps   +/-25mV(Ta=-20 to +60 degC)

   Overcharge hysteresis voltage   50mV to 500mV, 50mV steps   +/-50mV to 100mV

・Low current consumption

   Typ. 1.5uA Max. 3.0uA (Vcell=4.0V)
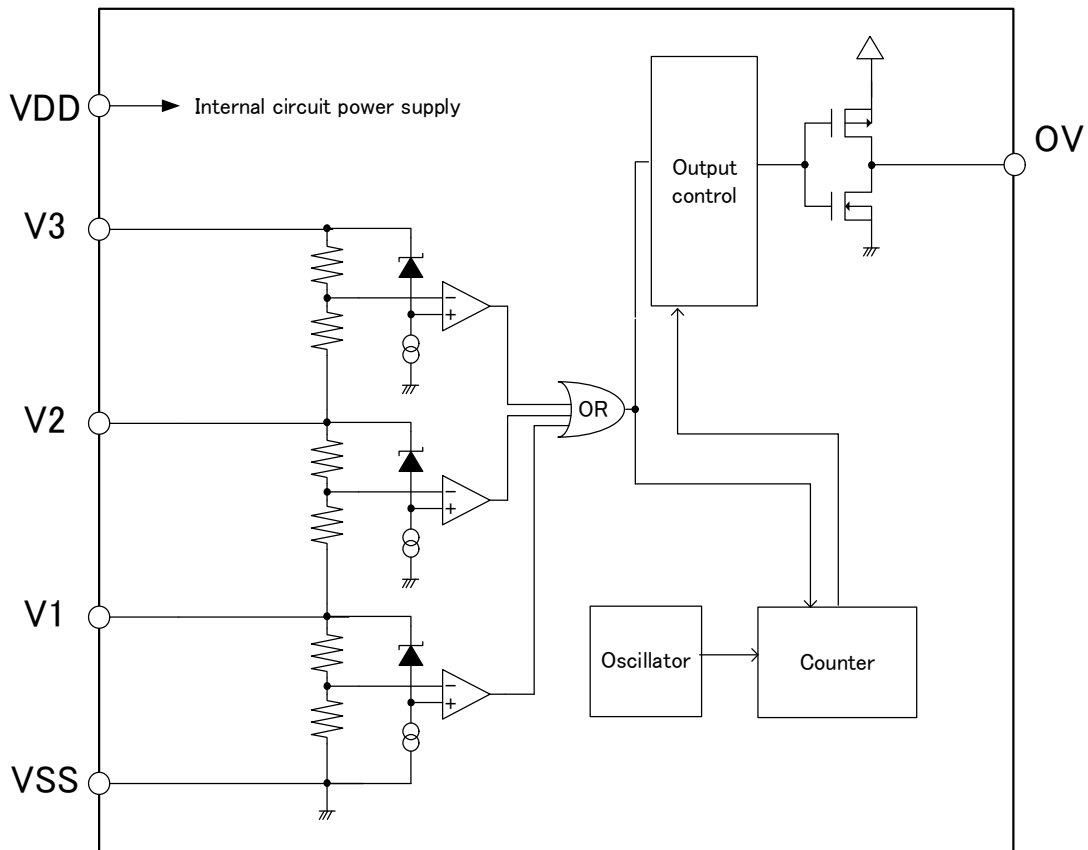
   Typ. 0.15uA Max. 0.30uA (Vcell=2.3V)

Applications

・Lithium-ion rechargeable battery pack
・Lithium polymer rechargeable battery pack

Package type

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

Block diagram

VDD → Internal circuit power supply

V3

V2

V1

VSS

Output control

OV

OR

Oscillator → Counter

Package and pin configuration

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

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

Package dimensions

Unit:mm

・SSON-6A
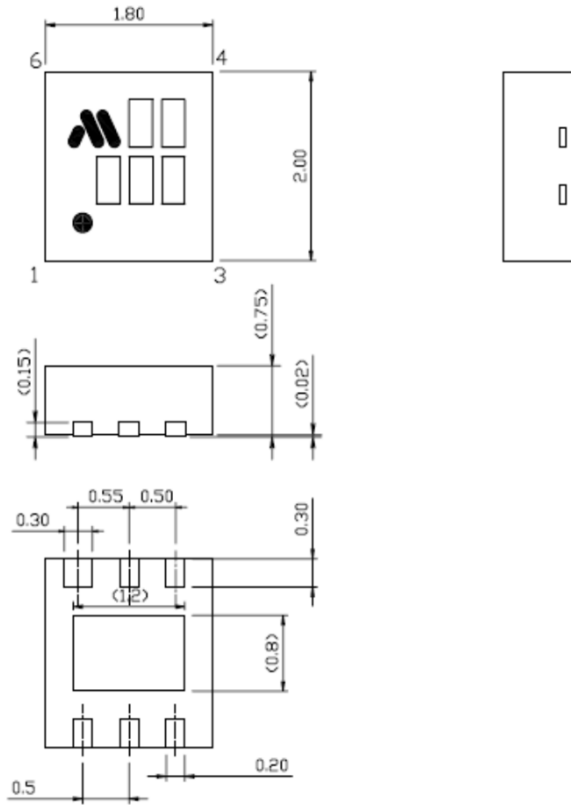
・SOT-26A
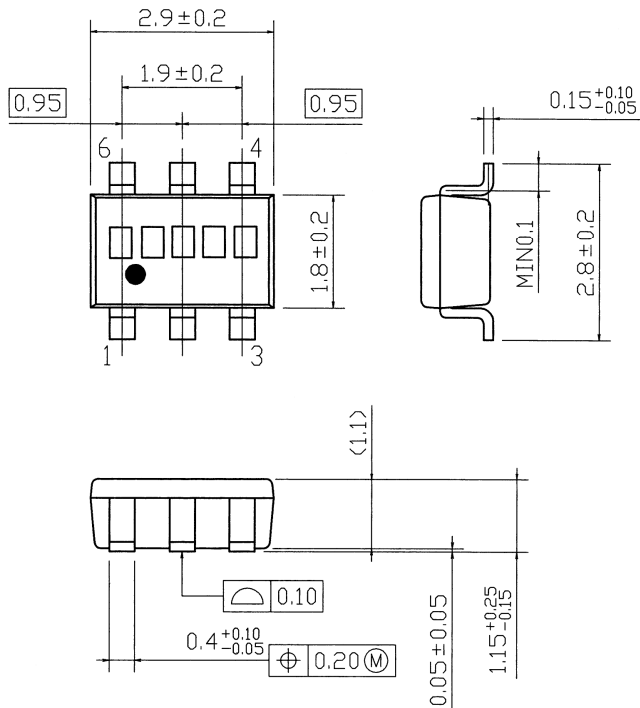
Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Supply voltage	VDD	-0.3 to 18	V
OV terminal	VO	VSS-0.3 to VDD+0.3	V
Storage temperature	Tstg	-55 to +125	degC
Power Dissipation	Pd	150	mV

Recommend operating conditions

| Parameter	Symbol	Rating	Unit
Operating ambient temperature	Topr	-40 to +110	degC
Operating voltage	Vop	2.0 to 18.0	V

Electrical characteristics

(Unless otherwise specified, Ta=25 degC)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption1	IDD1	VCELL=3.5V, IOUT=0mA	-	1.5	3.0	uA
Current consumption2	IDD2	VCELL=2.3V, IOUT=0mA	-	0.2	0	uA
V1 pin input current	IV1	VCELL=3.5V	-300	-	300	nA
V2 pin input current	IV2	VCELL=3.5V	-300	-	300	nA
Overcharge detection voltage	VCELLU	Ta=0～+60℃ *1 VCELL=3.5V→4.6V	typ. -25mV	typ	typ. +25mV	V
Overcharge detection voltage	VCELLU	Ta=-40～+110℃ *1 VCELL=3.5V→4.6V	typ. -70mV	typ	typ. +70mV	V
Overcharge release voltage	VCELLO	VCELL=4.5V→3.5V	VCELLU	VCELLU	VCELLU	V
Standby Voltage	Vst	V1CELL=]V2LCELL =V3CELL=V4CELL =4.5V→1.0V	2.40	3.00	3.60	V
OV pin source current	ISOOV	$V_{CELL} > V_{CELL}U$ $V_{OV}=V_{IN}$-0.5V	250	-	-	nA
OV pin sink current	ISIOV	$V_{CELL} < V_{CELL}U$ V_{OV}=0.5V	250	-	-	nA

Typical application circuit

・When using it for 3 cells
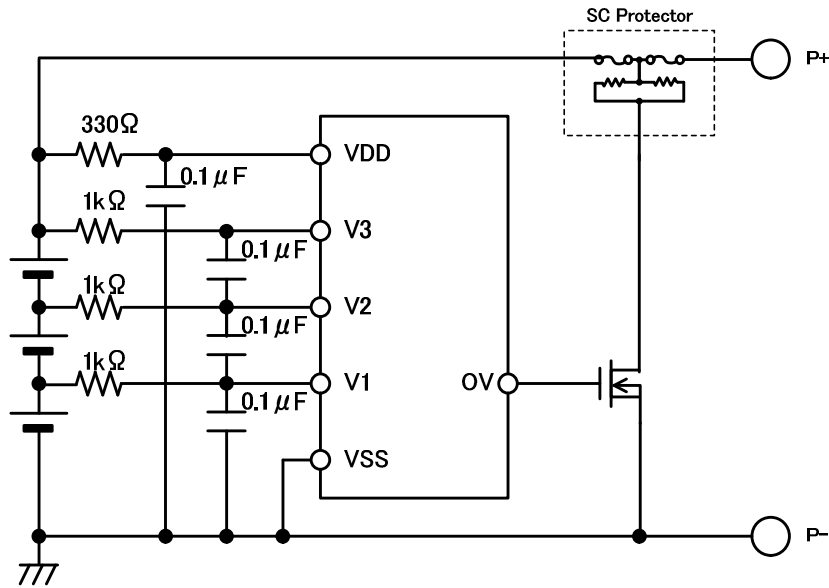
※1.The constant of the mark is a standard.

※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.

MODEL NAME

```
M  M  3  5  6  3  □  □  □  □  □  □
                        └──────┘  └┘ └┘ └┘
                           ①      ②  ③  ④
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①	②	③	④
rank	Package	Packing Specifications	Taping Material
*1	N SOT-26A	R R HOUSING *Standard	H Emboss tape / For Halogen free
	R SSON-6A	L L HOUSING	E Emboss tape *2
		F F HOUSING	
		B B HOUSING	

*1 Please refer to MODEL LIST.

*2 SSON-6A corresponds to halogen free.

MODEL LIST

Parts Name					Overcharge detection voltage $V_{CELL}U$	Overcharge hysteresis voltage V_{HYS}	Detection delay time Tov	Standby function	PTC function
	①	②	③	④					
MM3563	B 0 2	N	R	H	4.350±0.025V	100±50mV	2.0±30% s	◯	
MM3563	B 0 2	R	R	E	4.350±0.025V	100±50mV	2.0±30% s	◯	
MM3563	B 0 3	N	R	H	4.350±0.025V	100±50mV	6.0±30% s	◯	
MM3563	B 0 3	R	R	E	4.350±0.025V	100±50mV	6.0±30% s	◯	
MM3563	B 0 4	N	R	H	4.450±0.025V	200±70mV	2.0±30% s	◯	
MM3563	B 0 4	R	R	E	4.450±0.025V	200±70mV	2.0±30% s	◯	
MM3563	B 0 5	R	R	E	4.350±0.025V	500±100mV	4.1±30% s	◯	
MM3563	B 0 6	R	R	E	4.450±0.025V	500±100mV	4.1±30% s	◯	
MM3563	B 0 7	N	R	H	4.300±0.025V	100±50mV	2.0±30% s	◯	
MM3563	B 0 7	R	R	E	4.300±0.025V	100±50mV	2.0±30% s	◯	
MM3563	B 0 8	R	R	E	4.400±0.025V	200±70mV	2.0±30% s	◯	
MM3563	B 0 9	R	R	E	4.220±0.025V	500±100mV	4.1±30% s	◯	
MM3563	B 1 1	R	R	E	4.350±0.025V	300±80mV	6.0±30% s	◯	
MM3563	B 1 3	R	R	E	4.500±0.025V	500±100mV	4.1±30% s	◯	
MM3563	B 1 5	R	R	E	4.450±0.025V	300±80mV	6.0±30% s	◯	

NOTES

【Safety Precautions】

- Though Mitsumi Electric Co., Ltd. (hereinafter referred to as "Mitsumi") works continually to improve our product's quality and reliability, semiconductor products may generally malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of this product could cause loss of human life, bodily injury, or damage to property, including data loss or corruption. Before customers use this product, create designs including this product, or incorporate this product into their own applications, customers must also refer to and comply with (a) the latest versions or all of our relevant information, including without limitation, product specifications, data sheets and application notes for this product and (b) the user's manual, handling instructions or all relevant information for any products which is to be used, or combined with this products. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. Mitsumi assumes no liability for customers' product design or applications.

- This product is intended for applying to computers, OA units, communication units, instrumentation units, machine tools, industrial robots, AV units, household electrical appliances, and other general electronic units.

【Precautions for Product Liability Act】

- No responsibility is assumed by us for any consequence resulting from any wrong or improper use or operation, etc. of this product.

【ATTENTION】

- This product is designed and manufactured with the intention of normal use in general electronics. No special circumstance as described below is considered for the use of it when it is designed. With this reason, any use and storage under the circumstances below may affect the performance of this product. Prior confirmation of performance and reliability is requested to customers.
    Environment with strong static electricity or electromagnetic wave
    Environment with high temperature or high humidity where dew condensation may occur

- This product is not designed to withstand radioactivity, and must avoid using in a radioactive environment.

- This specification is written in Japanese and English. The English text is faithfully translated into the Japanese. However, if any question arises, Japanese text shall prevail.