One-cell lithium-ion/lithium-polymer battery protection IC
MM3446 Series

Outline

MM3446 series are protection IC using high voltage CMOS process for protection of the rechargeable lithium-ion or lithium-polymer battery. The overcharge, overdischarge, discharging overcurrent, charging overcurrent, and short protection of the rechargeable one-cell lithium-ion or lithium-polymer battery can be detected.
The temperature detection becomes possible if connects the thermally sensitive resistor with the VTH terminal.

Features (Unless otherwise specified, Topr=+25°C)

1. Range and accuracy of detection/release voltage

●Overcharge detection voltage	4.0V to 4.5V, 5mV steps	Accuracy±20mV
		Accuracy±25mV (Topr=–5 to +60°C)
●Overcharge release voltage	3.9V to 4.5V, 50mV steps	Accuracy±30mV
●Overdischarge detection voltage	2.0V to 3.0V, 50mV steps	Accuracy±35mV
●Overdischarge release voltage	2.0V to 3.5V, 50mV steps	Accuracy±100mV
●Discharging overcurrent detection voltage	+50mV to +300mV, 5mV steps	Accuracy±10mV
●Charging overcurrent detection voltage	-50mV to -300mV, 5mV steps	Accuracy±20mV
●Short detection voltage	VDD – 0.9V fixed	Accuracy±100mV
●Battery temperature detection voltage	VDD × 0.85	Accuracy±25mV
●Battery temperature release voltage	VDD × 0.817	Accuracy±25mV

2. Range of detection delay time

●Overcharge detection delay time	Selection from 0.25s,1.0s, 1.25s, 4.5s
●Overdischarge detection delay time	Selection from 20ms, 24ms, 96ms, 125ms, 144ms
●Discharging overcurrent detection delay time	Selection from 8ms, 12ms, 16ms, 20ms, 48ms
●Charging overcurrent detection delay time	Selection from 4ms, 6ms, 8ms, 16ms
●Short detection delay time	400µs fixed
●Battery temperature detection H delay time	512ms

3. 0V battery charge function — Selection from "Prohibition" or "Permission"

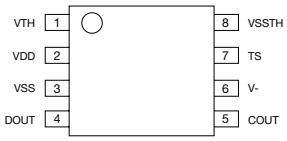
4. Low current consumption

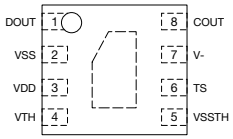
●Normal mode	Typ. 5.0µA, Max. 8.0µA
●Stand-by mode	Max. 0.6µA

5. Absolute maximum ratings

●VDD pin	VSS–0.3V to +12V
●COUT pin and V– pin	VDD–28V to VDD+0.3V
●DOUT pin	VSS–0.3V to VDD+0.3V
●Storage temperature	–55 to +125°C
●Operation temperature	–40 to +85°C

Pin Assignment

Top view SSOP-8A	Pin No.	Function
	1	Temperature detection terminal
	2	VDD terminal (Connected to IC substrait)
	3	VSS terminal (Connected to ground)
	4	Output of overdischarge detection (Output type is CMOS)
	5	Output of overcharge detection (Output type is CMOS)
	6	Input terminal connected to charger negative voltage
	7	Output of discharge (Output type is CMOS)
	8	Common terminal of temperature detection

Top view SSON-8B	Pin No.	Function
	1	Output of overdischarge detection (Output type is CMOS)
	2	VSS terminal (Connected to ground)
	3	VDD terminal (Connected to IC substrait)
	4	Temperature detection terminal
	5	Common terminal of temperature detection
	6	Output of discharge (Output type is CMOS)
	7	Input terminal connected to charger negative voltage
	8	Output of overcharge detection (Output type is CMOS)

Selection Guide (3000pcs/Reel)

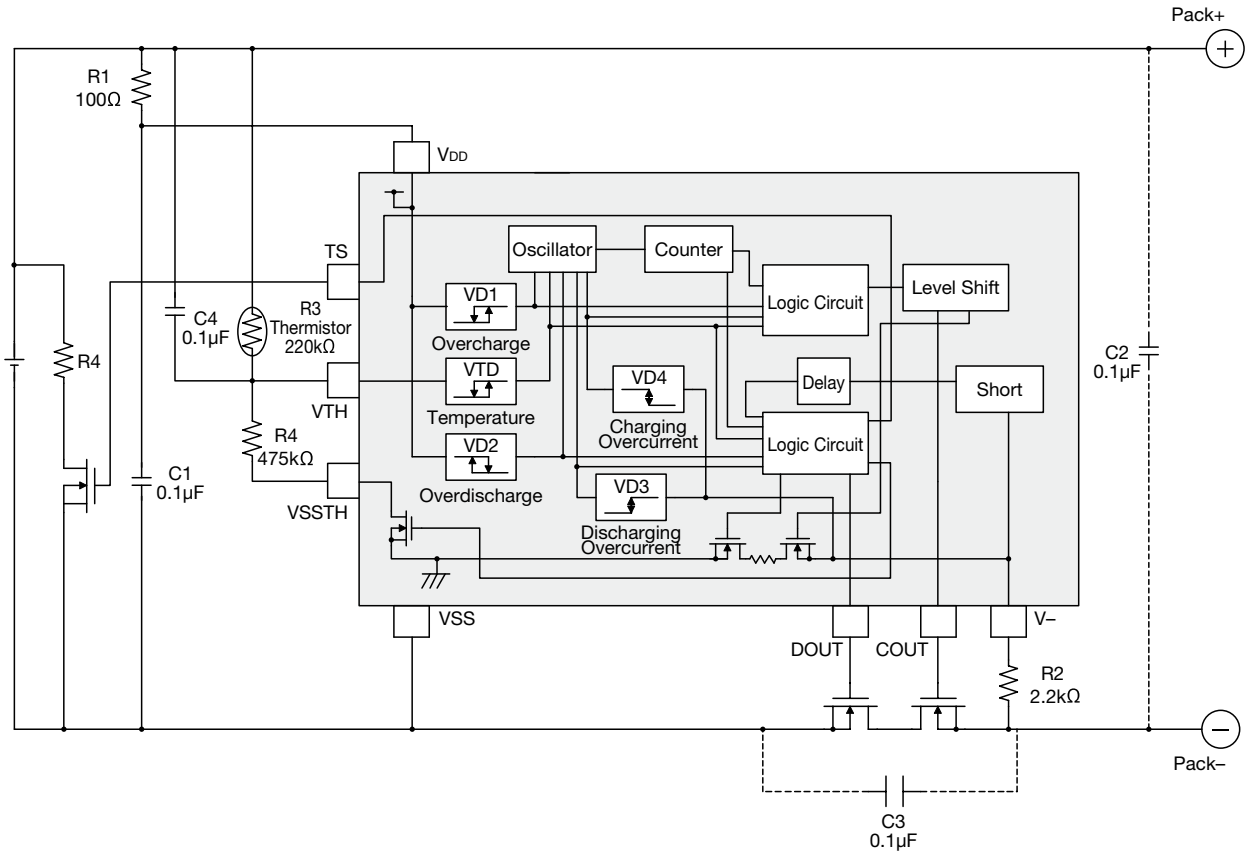
Product name	Package	Detection / Release voltage									0V battery charge function	Delay time combination *
		Overcharge detection voltage [V]	Overcharge release voltage [V]	Overdischarge detection voltage[V]	Overdischarge release voltage [V]	Discharging overcurrent detection voltage [V]	Charging overcurrent detection voltage [V]	Battery temperature detection voltage[V]	Battery temperature release voltage[V]	Overcharge detection voltage at temperature detection[V]		
		Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4	VtdetH	VtrelH	Vdet1th		
MM3446B01JRH	SSOP-8A	4.275	4.175	2.800	2.900	0.100	−0.100	VDD×0.85	VDD×0.817	3.850	Prohibition	1

* Delay time combination

		1
Overcharge detection delay time	tVdet1	1.0s
Overdischarge detection delay time	tVdet2	125ms
Discharging overcurrent detection delay time	tVdet3	8.0ms
Charging overcurrent detection delay time	tVdet4	16ms
Short detection delay time	tshort	400µs
Battery temperature detection H delay time	tVtH1	512ms

Please inquire to us, if you request a rank other than the above.

Application Circuit



R1 and C1 stabilize a supply voltage ripple. However, the detection voltage rises by the current of penetration in IC of the voltage detection when R1 is enlarged, and the value of R1 is adjusted to 1kΩ or less. Moreover, adjust the value of C1 to 0.01μF or more to do the stability operation, please.

R1 and R2 resistors are current limit resistance if a charger is connected reversibly or a high-voltage charger that exceeds the absolute maximum rating is connected. R1 and R2 may cause a power consumption will be over rating of power dissipation, therefore the `R1+R2` should be more than 1kΩ. Moreover, if R2 is too enlarged, the charger connection release cannot be occasionally done after the overdischarge is detected, so adjust the value of R2 to 10kΩ or less, please.

C2,C3 and C4 capacitors have effect that the system stability about voltage ripple or imported noise. After check characteristics, decide that these capacitors should be inserted or not, where should be inserted, and capacitance value, please.

The detection temperature can be arbitrarily set by R3 and R4. Please select the thermally sensitive resistor and resistance after confirming the characteristic.