One-cell lithium-ion/lithium-polymer battery protection IC
MM3280 Series

Outline

MM3280 series are protection IC using high voltage CMOS process for protection of the rechargeable Lithium-ion or Lithium-polymer battery. The overcharge, overdischarge and discharging and charging (optional) overcurrent protection of the rechargeable one-cell Lithium-ion or Lithium-polymer battery can be detected.

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	0.9V fixed	Accuracy±100mV
●Over voltage charger detection voltage ⋆	VDD-8.0V fixed	Accuracy±2.0V
●Over voltage charger release voltage ⋆	VDD-7.3V fixed	Accuracy±2.0V

2. Range of detection delay time

●Overcharge detection delay time	Selection from 0.25s, 1.0s, 1.2s, 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

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

4. The overcharge detection delay timer reset time function (function for the pulse charge) is provided. ⋆

5. Low current consumption

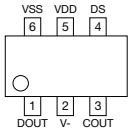
●Normal mode	Typ. 3.0μA, Max. 6.0μA
●Stand-by mode	Max. 0.1μA (For "Charger connection release" the overdischarge release condition.) Max. 0.5μA (For "Voltage release" the overdischarge release condition.)

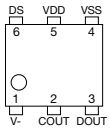
6. Absolute maximum ratings

●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

⋆Optional function

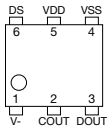
Pin Assignment

Top view SOT-26A/SOT-26B	Pin No.	Function
	1	Output of overdischarge detection (Output type is CMOS)
	2	Input terminal connected to charger negative voltage
	3	Output of overcharge detection (Output type is CMOS)
	4	Delay shorten terminal
	5	VDD terminal (Connected to IC substrait)
	6	VSS terminal (Connected to ground)

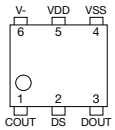
Top view SON-6C	Pin No.	Function
	1	Input terminal connected to charger negative voltage
	2	Output of overcharge detection (Output type is CMOS)
	3	Output of overdischarge detection (Output type is CMOS)
	4	VSS terminal (Connected to ground)
	5	VDD terminal (Connected to IC substrait)
	6	Delay shorten terminal

* SSON-6 : Pin Assignment is different depending on rank.

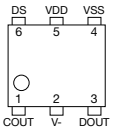
● **MM3280A01RRE, MM3280F02RRE, MM3280G01RRE, MM3280G02RRE MM3280S02RRE, MM3280T02RRE**

Top view SSON-6J	Pin No.	Function
	1	Input terminal connected to charger negative voltage
	2	Output of overcharge detection (Output type is CMOS)
	3	Output of overdischarge detection (Output type is CMOS)
	4	VSS terminal (Connected to ground)
	5	VDD terminal (Connected to IC substrait)
	6	Delay shorten terminal

● **MM3280M02RRE, MM3280M10RRE, MM3280P02RRE, MM3280P09RRE, MM3280P10RRE, MM3280P12RRE**

Top view SSON-6J/SSON-6E	Pin No.	Function
	1	Output of overcharge detection (Output type is CMOS)
	2	Delay shorten terminal
	3	Output of overdischarge detection (Output type is CMOS)
	4	VSS terminal (Connected to ground)
	5	VDD terminal (Connected to IC substrait)
	6	Input terminal connected to charger negative voltage

● **MM3280C01RRE**

Top view SSON-6K	Pin No.	Function
	1	Output of overcharge detection (Output type is CMOS)
	2	Input terminal connected to charger negative voltage
	3	Output of overdischarge detection (Output type is CMOS)
	4	VSS terminal (Connected to ground)
	5	VDD terminal (Connected to IC substrait)
	6	Delay shorten terminal

Selection Guide

(SOT26A/SOT-26B, SSON-6E, SSON-6J, SSON-6K ··· 3,000pcs/Reel)(SON-6C ··· 5,000pcs/Reel)

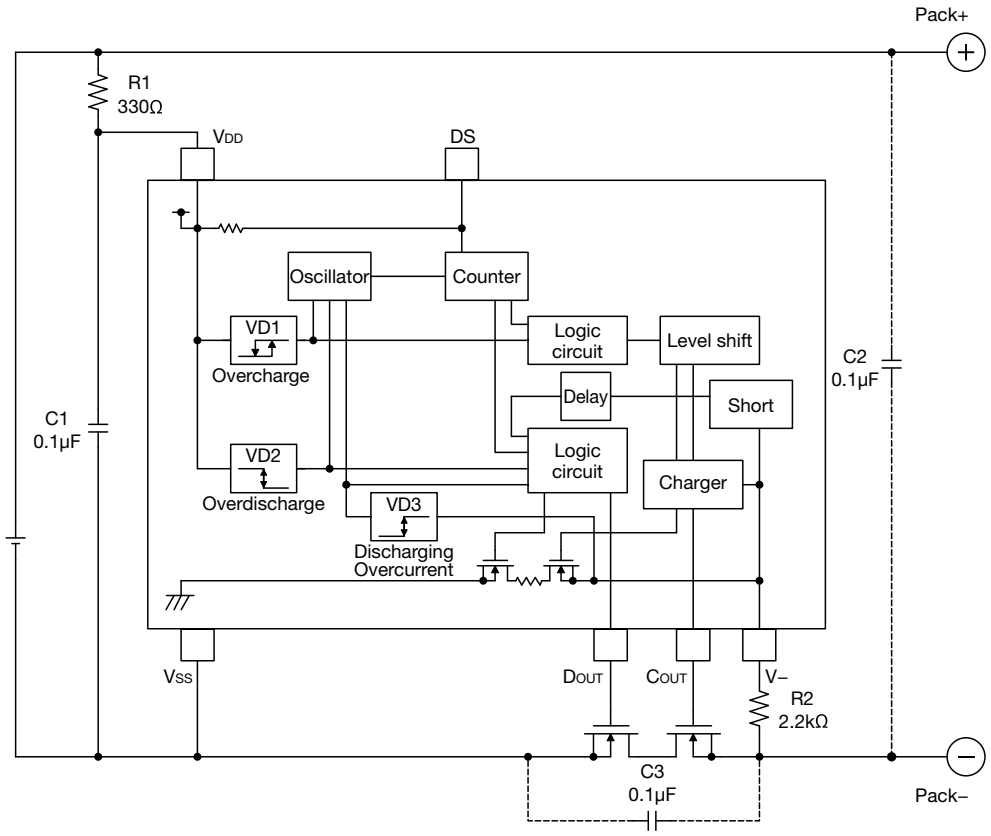
Product name	Package	Detection / Release voltage						0V battery charge function	Delay time combination *1	Current consumption at stand-by (MAX) [µA]	Optional function			
		Overcharge detection voltage [V]	Overcharge release voltage [V]	Overdischarge detection voltage[V]	Overdischarge release voltage [V]	Discharging overcurrent detection voltage [V]	Charging overcurrent detection voltage [V]				Over voltage charger detection	Overcharge detection delay timer reset time	Charging overcurrent detection	Charging overcurrent detection delay time [ms]
		Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4				○: Provided. ×: Provided.			tVdet4
MM3280A01RRE	SSON-6J	4.300	4.100	2.300	2.300	0.105	−0.100	Permission	1	0.1	○	○	○	16
MM3280A01YRE	SON-6C	4.300	4.100	2.300	2.300	0.105	−0.100	Permission	1	0.1	○	○	○	16
MM3280C01RRE	SSON-6K	4.225	4.025	2.800	2.800	0.150	−0.150	Permission	2	0.1	○	×	○	6
MM3280D01NRH	SOT-25A	4.275	4.075	2.800	3.100	0.100	−0.100	Permission	8	0.5	×	×	○	8
MM3280E01YRE	SON-6C	4.275	4.275	2.300	2.300	0.100	−0.100	Permission	6	0.1	×	×	○	8
MM3280F02RRE	SSON-6J	4.300	4.100	2.300	2.300	0.130		Permission	3	0.1	○	×	×	
MM3280G01RRE	SSON-6J	4.280	4.100	2.300	2.300	0.050		Prohibition	3	0.1	○	×	×	
MM3280G02RRE	SSON-6J	4.280	4.100	2.800	2.800	0.050		Prohibition	3	0.1	○	×	×	
MM3280H01NRH	SOT-26A/B	4.275	4.175	3.000	3.200	0.150		Permission	4	0.5	○	×	×	
MM3280H02NRH	SOT-26A/B	4.280	4.100	2.300	2.500	0.150		Permission	3	0.5	○	×	×	
MM3280H03NRH	SOT-26A/B	4.215	4.115	2.800	2.900	0.150		Permission	3	0.5	○	×	×	
MM3280H04NRH	SOT-26A/B	3.800	3.600	2.300	2.500	0.100		Permission	4	0.5	○	×	×	
MM3280I01NRH	SOT-26A/B	4.250	4.050	2.500	3.000	0.150		Permission	3	0.5	○	×	×	
MM3280I02NRH	SOT-26A/B	4.250	4.050	2.500	3.000	0.100		Permission	3	0.5	○	×	×	
MM3280J01NRH	SOT-26A/B	4.250	4.050	2.500	3.000	0.200	−0.100	Permission	10	0.5	×	×	○	8
MM3280J03NRH	SOT-26A/B	3.800	3.600	2.000	2.380	0.100	−0.100	Permission	11	0.5	×	×	○	12
MM3280J04NRH	SOT-26A/B	4.275	4.215	3.000	3.200	0.150	−0.100	Permission	11	0.5	×	×	○	12
MM3280J05NRH	SOT-26A/B	4.250	4.190	2.800	3.000	0.150	−0.100	Permission	11	0.5	×	×	○	12
MM3280M02RRE	SSON-6J	4.280	4.100	2.300	2.300	0.200		Prohibition	3	0.1	○	○	×	
MM3280M10RRE	SSON-6J	4.280	4.100	2.300	2.300	0.160		Prohibition	3	0.1	○	○	×	
MM3280N01YRE	SON-6C	4.280	4.180	2.300	2.300	0.160	−0.160	Permission	7	0.1	×	×	○	16
MM3280N02YRE	SON-6C	4.280	4.180	2.300	2.300	0.160	−0.160	Prohibition	7	0.1	×	×	○	16
MM3280P02RRE	SSON-6J	4.280	4.100	2.300	2.300	0.150	−0.220	Permission	3	0.1	×	×	○	4
MM3280P09RRE	SSON-6J	4.280	4.180	2.700	2.700	0.065	−0.075	Prohibition	7	0.1	×	×	○	18
MM3280P10RRE	SSON-6J	4.280	4.100	2.300	2.300	0.170	−0.170	Prohibition	3	0.1	×	×	○	4
MM3280P12RRE	SSON-6E	4.280	4.100	2.300	2.300	0.150	−0.220	Permission	3	0.1	×	×	○	4
MM3280S01NRH	SOT-26A/B	4.280	4.080	3.000	3.000	0.080		Permission	9	0.1	○	×	×	
MM3280S02RRE	SSON-6J	4.300	4.100	3.000	3.000	0.250		Permission	9	0.1	○	×	×	
MM3280T01NRH	SOT26-A/B	4.280	4.280	2.800	2.800	0.050	−0.100	Prohibition	6	0.1	×	×	○	8
MM3280T02RRE	SSON-6J	4.280	4.280	2.800	2.800	0.050	−0.100	Prohibition	6	0.1	×	×	○	8
MM3280W01NRH	SOT-26A/B	4.280	4.280	2.300	2.500	0.150	−0.150	Permission	3	0.6	○	×	○	8
MM3280W06NRH	SOT-26A/B	4.325	4.325	2.500	2.900	0.150	−0.150	Prohibition	3	0.6	○	×	○	8
MM3280W07NRH	SOT-26A/B	4.350	4.350	2.300	2.500	0.150	−0.150	Permission	3	0.6	○	×	○	8

*1 Delay time combination

		1	2	3	4	5	6	7	8	9	10	11
Overcharge detection delay time	tVdet1	4.5s	1.0s	1.0s	1.0s	1.0s	1.0s	1.0s	0.25s	1.2s	1.0s	1.0s
Overdischarge detection delay time	tVdet2	125ms	96ms	24ms	125ms	20ms	20ms	96ms	144ms	144ms	20ms	96ms
Discharging overcurrent detection delay time	tVdet3	12ms	12ms	12ms	12ms	12ms	6ms	20ms	16ms	8ms	12ms	20ms
Short detection delay time	tshort	400µs	400µs	400µs	400µs	400µs	400µs	400µs	400µs	400µs	300µs	300µs

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 and C3 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.