One-cell li-ion/li-polymer battery protection IC
MM3511 Series

Outline

MM3511 series are protection IC using high voltage CMOS process for overcharge, overdischarge and overcurrent 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. Each of these IC composed of four voltage detectors, short detection circuit, reference voltage sources, oscillator, counter circuit and logical circuits.

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

1. Range and accuracy of detection/release voltage

●Overcharge detection voltage	3.6V to 5.0V, 5mV steps	Accuracy±20mV Accuracy±25mV (Topr=–5 to +60°C)
●Overcharge release voltage	3.6V 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	–300mV to –50mV, 5mV steps	Accuracy±20mV
●Short detection voltage	0.5V fixed	Accuracy±100mV

2. Range of detection delay time

●Overcharge detection delay time	Selection from 143ms, 573ms, 1.0s, 1.2s
●Overdischarge detection delay time	Selection from 20ms, 38ms, 64ms, 75ms, 96ms, 150ms
●Discharging overcurrent detection delay time	Selection from 4.5ms, 8ms, 9ms, 12ms, 18ms
●Charging overcurrent detection delay time	Selection from 4.5ms, 6ms, 8ms, 9ms, 16ms
●Short detection delay time	Selection from 250µs, 300µs, 400µs

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

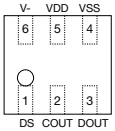
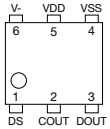
4. Low current consumption

●Normal mode	Typ. 3.0µA, Max. 5.5µA
●Stand-by mode	Max. 0.1µA

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°C to +125°C
●Operation temperature	–40°C to +85°C

Pin Assignment

Top view		Pin No.	Function
SSON-6A / SSON-6J	SON-6C		
		1	Delay shorten terminal
		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	Input terminal connected to charger negative voltage

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Selection Guide (SSON-6A, SSON-6J ··· 3,000pcs/Reel)(SON-6C ··· 5,000pcs/Reel)

Product name	Package	Detection / Release voltage						0V battery charge function	Delay time combination *1
		Overchaarge 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]		
		Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4		
MM3511A16Y	SON-6C	4.275	4.175	2.300	2.400	0.100	–0.100	Permission	1
MM3511A26Y	SON-6C	4.280	4.080	2.300	2.300	0.080	–0.100	Permission	1
MM3511A36Y	SON-6C	4.280	4.080	2.300	2.300	0.100	–0.100	Permission	1
MM3511A46Y	SON-6C	4.275	4.075	2.300	2.300	0.150	–0.100	Permission	1
MM3511A56Y	SON-6C	4.280	4.280	2.800	2.800	0.050	–0.100	Permission	1
MM3511A66Y	SON-6C	4.280	4.280	3.000	3.000	0.075	–0.100	Permission	1
MM3511A76Y	SON-6C	4.275	4.175	2.300	2.400	0.050	–0.100	Permission	1
MM3511A86Y	SON-6C	4.300	4.100	2.300	2.300	0.130	–0.100	Permission	1
MM3511AA6Y	SON-6C	4.225	4.025	2.800	2.800	0.150	–0.100	Permission	9
MM3511AB6Y	SON-6C	4.225	4.025	3.000	3.000	0.060	–0.060	Permission	9
MM3511B16Y	SON-6C	3.900	3.800	2.300	2.400	0.100	–0.100	Permission	1
MM3511B26Y	SON-6C	3.950	3.850	2.300	2.400	0.100	–0.100	Permission	1
MM3511B36Y	SON-6C	4.000	3.900	2.300	2.400	0.100	–0.100	Permission	1
MM3511B46Y	SON-6C	4.050	3.950	2.300	2.400	0.100	–0.100	Permission	1
MM3511B56Y	SON-6C	4.100	4.000	2.300	2.400	0.100	–0.100	Permission	1
MM3511C16Y	SON-6C	4.280	4.080	2.300	2.300	0.100	–0.100	Prohibition	1
MM3511C26Y	SON-6C	4.280	4.080	2.300	2.300	0.130	–0.100	Prohibition	1
MM3511C36Y	SON-6C	4.280	4.130	2.600	3.100	0.150	–0.100	Prohibition	1
MM3511C46Y	SON-6C	4.280	4.130	2.800	3.100	0.150	–0.100	Prohibition	1
MM3511C56Y	SON-6C	4.200	4.100	2.800	2.900	0.150	–0.100	Prohibition	1
MM3511C66Y	SON-6C	4.280	4.130	2.800	3.100	0.100	–0.100	Prohibition	1
MM3511C76Y	SON-6C	4.280	4.130	2.800	3.100	0.050	–0.100	Prohibition	1
MM3511C96Y	SON-6C	4.280	4.130	2.800	2.800	0.150	–0.100	Prohibition	1
MM3511CA6Y	SON-6C	4.225	4.025	2.300	2.300	0.150	–0.120	Prohibition	1
MM3511CC6Y	SON-6C	4.280	4.130	2.800	3.100	0.150	–0.100	Prohibition	1
MM3511E16Y	SON-6C	4.325	4.075	2.500	2.900	0.150	–0.100	Permission	2
MM3511G16Y	SON-6C	4.350	4.150	2.300	3.000	0.200	–0.100	Permission	3
MM3511H16Y	SON-6C	4.280	4.180	2.300	2.300	0.120	–0.100	Permission	4
MM3511H26Y	SON-6C	4.275	4.075	2.800	3.100	0.100	–0.100	Permission	4
MM3511H46Y	SON-6C	4.275	4.175	2.400	2.400	0.120	–0.100	Permission	4
MM3511H56Y	SON-6C	4.280	4.180	2.300	2.300	0.090	–0.075	Permission	4
MM3511K16Y	SON-6C	4.275	4.275	2.300	2.300	0.100	–0.100	Permission	5
MM3511K26R	SSON-6J	4.275	4.075	2.300	2.300	0.120	–0.100	Permission	5
MM3511K26Y	SON-6C	4.275	4.075	2.300	2.300	0.120	–0.100	Permission	5
MM3511K36R	SSON-6A	4.275	4.075	2.300	2.300	0.130	–0.100	Permission	5
MM3511K36R	SSON-6J	4.275	4.075	2.300	2.300	0.130	–0.100	Permission	5
MM3511K36Y	SON-6C	4.275	4.075	2.300	2.300	0.130	–0.100	Permission	5
MM3511K46R	SSON-6J	4.275	4.075	2.300	2.300	0.150	–0.100	Permission	5
MM3511K46Y	SON-6C	4.275	4.075	2.300	2.300	0.150	–0.100	Permission	5
MM3511K56Y	SON-6C	4.275	4.275	2.300	2.300	0.050	–0.100	Permission	5
MM3511K66R	SSON-6J	4.270	4.070	2.300	2.300	0.100	–0.100	Permission	5
MM3511K66Y	SON-6C	4.270	4.070	2.300	2.300	0.100	–0.100	Permission	5
MM3511K76Y	SON-6C	4.275	4.075	2.300	2.300	0.130	–0.130	Permission	5
MM3511K86R	SSON-6J	4.275	4.075	2.600	2.600	0.110	–0.085	Permission	5
MM3511K86Y	SON-6C	4.275	4.075	2.600	2.600	0.110	–0.085	Permission	5
MM3511K96Y	SON-6C	4.275	4.075	2.600	2.600	0.190	–0.085	Permission	5

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Selection Guide (SSON-6A, SSON-6J ··· 3,000pcs/Reel)(SON-6C ··· 5,000pcs/Reel)

Product name	Package	Detection / Release voltage						0V battery charge function	Delay time combination *1
		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]		
		Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4		
MM3511L16R	SSON-6J	4.275	4.075	2.600	2.600	0.100	–0.085	Permission	5
MM3511L16Y	SON-6C	4.275	4.075	2.600	2.600	0.100	–0.085	Permission	5
MM3511L36R	SSON-6J	4.275	4.075	2.600	2.600	0.180	–0.120	Permission	5
MM3511L36Y	SON-6C	4.275	4.075	2.600	2.600	0.180	–0.120	Permission	5
MM3511L56Y	SON-6C	4.350	4.150	2.300	2.300	0.130	–0.100	Permission	5
MM3511L66Y	SON-6C	4.275	4.075	2.600	2.600	0.150	–0.100	Permission	5
MM3511L76Y	SON-6C	4.275	4.275	2.300	2.300	0.125	–0.100	Permission	5
MM3511L86Y	SON-6C	4.275	4.075	2.600	2.600	0.100	–0.080	Prohibition	5
MM3511L96Y	SON-6C	4.275	4.275	2.600	2.600	0.100	–0.080	Prohibition	5
MM3511LA6Y	SON-6C	4.375	4.375	3.000	3.000	0.150	–0.150	Prohibition	5
MM3511M16RR	SSON-6A	4.275	4.275	2.500	2.500	0.160	–0.100	Prohibition	1
MM3511M16RL	SSON-6A	4.275	4.275	2.500	2.500	0.160	–0.100	Prohibition	1
MM3511M16YR	SON-6C	4.275	4.275	2.500	2.500	0.160	–0.100	Prohibition	1
MM3511M16YL	SON-6C	4.275	4.275	2.500	2.500	0.160	–0.100	Prohibition	1
MM3511N16Y	SON-6C	4.280	4.080	2.400	2.400	0.050	–0.100	Prohibition	11
MM3511P16Y	SON-6C	4.225	4.125	2.000	2.000	0.200	–0.100	Prohibition	7
MM3511W16Y	SON-6C	4.225	4.025	2.500	2.900	0.150	–0.150	Permission	8
MM3511W26Y	SON-6C	4.375	4.175	2.400	2.800	0.145	–0.145	Permission	6
MM3511WA6Y	SON-6C	4.390	4.190	2.500	2.500	0.130	–0.125	Prohibition	10
MM3511WB6Y	SON-6C	4.390	4.190	2.500	2.500	0.200	–0.125	Prohibition	10

* Delay time combination

		1	2	3	4	5	6	7	8	9	10	11
Overcharge detection delay time	tVdet1	1.2s	1.2s	143ms	1.2s	1.2s	1.0s	573ms	1.0s	1.2s	1.0s	1.2s
Overdischarge detection delay time	tVdet2	150ms	150ms	38ms	150ms	38ms	20ms	150ms	96ms	75ms	64ms	150ms
Discharging overcurrent detection delay time	tVdet3	9ms	9ms	18ms	18ms	9ms	12ms	4.5ms	12ms	9ms	8ms	4.5ms
Charging overcurrent detection delay time [ms]	tVdet4	9ms	9ms	9ms	9ms	9ms	16ms	4.5ms	6ms	9ms	8ms	9ms
Short detection delay time	tshort	300us	400us	300us	300us	300us	400us	300us	400us	300us	250us	300us

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

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