

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

MM3511 Series

Outline

MM3511 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.

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	0.5V fixed	Accuracy±100mV

2. Range of detection delay time

● Overcharge detection delay time	Selection from 143ms, 573ms, 1.2s
● Overdischarge detection delay time	Selection from 38ms, 150ms, 300ms
● Discharging overcurrent detection delay time	Selection from 4.5ms, 9ms, 18ms
● Charging overcurrent detection delay time	Selection from 4.5ms, 9ms, 18ms
● Short detection delay time	Selection from 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 to +125°C
● Operation temperature	-40 to +85°C

Pin Assignment

Top view		Pin No.	Function
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 substrate)
		6	Input terminal connected to charger negative voltage

Selection Guide

(SSON-6J ... 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]
		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			
MM3511A16Y	SON-6C	4.275	4.175	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511A26Y	SON-6C	4.280	4.080	2.300	2.300	0.080	-0.100	Permission	1	0.1
MM3511A36Y	SON-6C	4.280	4.080	2.300	2.300	0.100	-0.100	Permission	1	0.1
MM3511A46Y	SON-6C	4.275	4.075	2.300	2.300	0.150	-0.100	Permission	1	0.1
MM3511A56Y	SON-6C	4.280	4.280	2.800	2.800	0.050	-0.100	Permission	1	0.1
MM3511A66Y	SON-6C	4.280	4.280	3.000	3.000	0.075	-0.100	Permission	1	0.1
MM3511A76Y	SON-6C	4.275	4.175	2.300	2.400	0.050	-0.100	Permission	1	0.1
MM3511A86Y	SON-6C	4.300	4.100	2.300	2.300	0.130	-0.100	Permission	1	0.1
MM3511B16Y	SON-6C	3.900	3.800	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511B26Y	SON-6C	3.950	3.850	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511B36Y	SON-6C	4.000	3.900	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511B46Y	SON-6C	4.050	3.950	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511B56Y	SON-6C	4.100	4.000	2.300	2.400	0.100	-0.100	Permission	1	0.1
MM3511C16Y	SON-6C	4.280	4.080	2.300	2.300	0.100	-0.100	Prohibition	1	0.1
MM3511C26Y	SON-6C	4.280	4.080	2.300	2.300	0.130	-0.100	Prohibition	1	0.1
MM3511C36Y	SON-6C	4.280	4.130	2.600	3.100	0.150	-0.100	Prohibition	1	0.1
MM3511C46Y	SON-6C	4.280	4.130	2.800	3.100	0.150	-0.100	Prohibition	1	0.1
MM3511C56Y	SON-6C	4.200	4.100	2.800	2.900	0.150	-0.100	Prohibition	1	0.1
MM3511C66Y	SON-6C	4.280	4.130	2.800	3.100	0.100	-0.100	Prohibition	1	0.1
MM3511C76Y	SON-6C	4.280	4.130	2.800	3.100	0.050	-0.100	Prohibition	1	0.1
MM3511C96Y	SON-6C	4.280	4.130	2.800	2.800	0.150	-0.100	Prohibition	1	0.1
MM3511E16Y	SON-6C	4.325	4.075	2.500	2.900	0.150	-0.100	Permission	2	0.1
MM3511F16Y	SON-6C	4.325	4.075	2.500	2.900	0.150	-0.100	Prohibition	2	0.1
MM3511G16Y	SON-6C	4.350	4.150	2.300	3.000	0.200	-0.100	Permission	3	0.1
MM3511H16Y	SON-6C	4.280	4.180	2.300	2.300	0.120	-0.100	Permission	4	0.1
MM3511H26Y	SON-6C	4.275	4.075	2.800	3.100	0.100	-0.100	Permission	4	0.1
MM3511H36Y	SON-6C	4.275	4.175	2.300	2.300	0.120	-0.100	Permission	4	0.1
MM3511H46Y	SON-6C	4.275	4.175	2.400	2.400	0.100	-0.100	Permission	4	0.1
MM3511J16Y	SON-6C	4.280	4.180	2.300	2.300	0.120	-0.100	Prohibition	4	0.1
MM3511K16Y	SON-6C	4.275	4.275	2.300	2.300	0.100	-0.100	Permission	5	0.1
MM3511K26R	SSON-6J	4.275	4.075	2.300	2.300	0.120	-0.100	Permission	5	0.1
MM3511K26Y	SON-6C	4.275	4.075	2.300	2.300	0.120	-0.100	Permission	5	0.1
MM3511K36R	SSON-6J	4.275	4.075	2.300	2.300	0.130	-0.100	Permission	5	0.1
MM3511K36Y	SON-6C	4.275	4.075	2.300	2.300	0.130	-0.100	Permission	5	0.1
MM3511K46R	SSON-6J	4.275	4.075	2.300	2.300	0.150	-0.100	Permission	5	0.1
MM3511K46Y	SON-6C	4.275	4.075	2.300	2.300	0.150	-0.100	Permission	5	0.1

* Delay time combination

		1	2	3	4	5	6	7	8
Overcharge detection delay time	tVdet1	1.2s	1.2s	143ms	1.2s	1.2s	1.2s	573ms	1.0s
Overdischarge detection delay time	tVdet2	150ms	150ms	38ms	150ms	38ms	150ms	150ms	96ms
Discharging overcurrent detection delay time	tVdet3	9ms	9ms	18ms	18ms	9ms	4.5ms	4.5ms	12ms
Charging overcurrent detection delay time	tVdet4	9ms	9ms	9ms	9ms	9ms	9ms	4.5ms	6ms
Short detection delay time	tshort	300µs	400µs	300µs	300µs	300µs	300µs	300µs	400µs

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Selection Guide (SSON-6J ... 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]
		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			
MM3511K56Y	SON-6C	4.275	4.275	2.300	2.300	0.050	-0.100	Permission	5	0.1
MM3511K66R	SSON-6J	4.270	4.070	2.300	2.300	0.100	-0.100	Permission	5	0.1
MM3511K66Y	SON-6C	4.270	4.070	2.300	2.300	0.100	-0.100	Permission	5	0.1
MM3511K76Y	SON-6C	4.275	4.075	2.300	2.300	0.130	-0.130	Permission	5	0.1
MM3511K86R	SSON-6J	4.275	4.075	2.600	2.600	0.110	-0.085	Permission	5	0.1
MM3511K86Y	SON-6C	4.275	4.075	2.600	2.600	0.110	-0.085	Permission	5	0.1
MM3511K96Y	SON-6C	4.275	4.075	2.600	2.600	0.190	-0.085	Permission	5	0.1
MM3511L16R	SSON-6J	4.275	4.075	2.600	2.600	0.100	-0.085	Permission	5	0.1
MM3511L16Y	SON-6C	4.275	4.075	2.600	2.600	0.100	-0.085	Permission	5	0.1
MM3511L36R	SSON-6J	4.275	4.075	2.600	2.600	0.180	-0.120	Permission	5	0.1
MM3511L36Y	SON-6C	4.275	4.075	2.600	2.600	0.180	-0.120	Permission	5	0.1
MM3511L37Y	SON-6C	4.275	4.275	2.600	2.600	0.180	-0.120	Permission	5	0.1
MM3511L66Y	SON-6C	4.275	4.075	2.600	2.600	0.150	-0.100	Permission	5	0.1
MM3511L66R	SSON-6J	4.275	4.075	2.600	2.600	0.150	-0.100	Permission	5	0.1
MM3511L76Y	SON-6C	4.275	4.275	2.300	2.300	0.125	-0.100	Permission	5	0.1
MM3511L86Y	SON-6C	4.275	4.075	2.600	2.600	0.100	-0.080	Prohibition	5	0.1
MM3511L96Y	SON-6C	4.275	4.275	2.600	2.600	0.100	-0.080	Prohibition	5	0.1
MM3511M16R	SSON-6A	4.275	4.275	2.500	2.500	0.160	-0.100	Prohibition	1	0.1
MM3511M16Y	SON-6C	4.275	4.275	2.500	2.500	0.160	-0.100	Prohibition	1	0.1
MM3511N16Y	SON-6C	4.280	4.080	2.400	2.400	0.050	-0.100	Prohibition	6	0.1
MM3511P16Y	SON-6C	4.225	4.125	2.000	2.000	0.200	-0.100	Prohibition	7	0.1

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Overcharge detection delay time	tVdet1	1.2s	1.2s	143ms	1.2s	1.2s	1.2s	573ms	1.0s
Overdischarge detection delay time	tVdet2	150ms	150ms	38ms	150ms	38ms	150ms	150ms	96ms
Discharging overcurrent detection delay time	tVdet3	9ms	9ms	18ms	18ms	9ms	4.5ms	4.5ms	12ms
Charging overcurrent detection delay time [ms]	tVdet4	9ms	9ms	9ms	9ms	9ms	9ms	4.5ms	6ms
Short detection delay time	tshort	300μs	400μs	300μs	300μs	300μs	300μs	300μs	400μs

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