

MM3220 Series

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Outline

MM3220 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, short, charging, and overcurrent(optional) 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.

Product Series

For 2-cells

Features

1) Range and accuracy of detection / release voltage

- Overcharge detection voltage 4.0V to 4.5V, 5mV steps Accuracy±20mV
- 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 1 +50mV to +300mV, 5mV steps Accuracy±10mV
- Discharging overcurrent detection voltage 2 *1 +50mV to +700mV, 50mV steps Accuracy TYP±20%
- Charging overcurrent detection voltage *1 -300mV to -50mV, 5mV steps Accuracy±20mV
- Short detection voltage 0.9V fixed Accuracy±100mV Accuracy±300mV *2

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 1 Selection from 8ms, 12ms, 16ms, 20ms, 48ms
- Discharging overcurrent detection delay time 2 Selection from 0.5ms, 1ms, 1.5ms, 2ms, 4ms
- Charging overcurrent detection delay time Selection from 4ms, 6ms, 8ms, 16ms
- Short detection delay time 400µs fixed

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3) Low current consumption

- Normal mode Typ. 4.0μA, Max. 8.0μA
- Stand-by mode Max. 0.1μA

*1 Optional function

*2 When the discharging overcurrent detection voltage 2 function having

Specifications

Product name	Package	OV battery charge function	Overcharge detection voltage [V]	Overcharge release voltage [V]	Overdischarge detection voltage [V]	Overdischarge release voltage [V]
MM3220AA1NRH	SOT-26A	Permission	4.250	4.050	2.800	3.000
MM3220AA2NRH	SOT-26A	Permission	4.250	4.050	2.800	3.000
MM3220B01NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220C01NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220C02NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220C03NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220C08NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220D01NRH	SOT-26A	Permission	4.250	4.100	3.000	3.000
MM3220D05NRH	SOT-26A	Permission	4.250	4.100	2.500	2.500
MM3220F01NRH	SOT-26A	Permission	4.225	4.075	2.550	2.550
MM3220G01NRH	SOT-26A	Permission	4.290	4.050	3.000	3.200
MM3220G06NRH	SOT-26A	Permission	4.250	4.100	2.500	3.000
MM3220G07NRH	SOT-26A	Permission	4.400	4.250	2.500	3.000

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MM3220H01NRH	SOT-26A	Permission	4.225	4.075	3.000	3.000
MM3220H02NRH	SOT-26A	Prohibition	4.300	4.150	2.400	2.400
MM3220H03NRH	SOT-26A	Permission	4.250	4.100	3.200	3.200
MM3220H04NRH	SOT-26A	Prohibition	4.230	4.080	2.400	2.400
MM3220H06NRH	SOT-26A	Prohibition	4.230	4.080	2.865	2.865
MM3220H09NRH	SOT-26A	Prohibition	4.225	4.150	2.600	2.600
MM3220H10NRH	SOT-26A	Prohibition	4.250	4.175	2.600	2.600
MM3220H11NRH	SOT-26A	Permission	4.300	4.150	2.300	2.300
MM3220H13NRH	SOT-26A	Permission	4.250	4.050	2.400	2.400
MM3220H15NRH	SOT-26A	Prohibition	4.280	4.130	2.800	2.800
MM3220H16NRH	SOT-26A	Permission	4.250	4.100	3.000	3.000
MM3220H1ANRH	SOT-26A	Prohibition	4.225	4.150	2.600	2.600
MM3220J01NRH	SOT-26A	Prohibition	4.275	4.275	2.500	2.500
MM3220JA1NRH	SOT-26A	Permission	4.250	4.250	2.800	2.800
MM3220K01NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000
MM3220M01NRH	SOT-26A	Prohibition	4.280	4.080	2.000	2.000
MM3220M04NRH	SOT-26A	Prohibition	4.280	4.080	2.600	2.600
MM3220MB1NRH	SOT-26A	Prohibition	4.425	4.225	2.800	2.800
MM3220MC1NRH	SOT-26A	Prohibition	4.300	4.100	2.300	2.300
MM3220N01NRH	SOT-26A	Permission	4.250	4.100	2.500	3.000
MM3220N02NRH	SOT-26A	Permission	4.250	4.100	2.500	3.000
MM3220U01NRH	SOT-26A	Permission	4.250	4.100	2.500	3.000
MM3220Z01NRH	SOT-26A	Permission	4.300	4.100	2.000	2.000

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Product name	Discharging overcurrent detection voltage1 [V]	Discharging overcurrent detection voltage2 [V]	Charging overcurrent detection voltage [V]	Short detection voltage [V]	Overcharge detection delay time [s]	Overcharge release delay time [ms]	Overdischarge detection delay time [ms]
MM3220AA1NRH	0.2000		-0.2000	0.500	1.000	16.0	128.0
MM3220AA2NRH	0.1000		-0.1000	0.500	1.000	16.0	128.0
MM3220B01NRH	0.2200			0.900	1.000	16.0	12.0
MM3220C01NRH	0.0850	0.4500		0.900	1.130	14.4	10.8
MM3220C02NRH	0.1000	0.2000		0.900	1.000	16.0	12.0
MM3220C03NRH	0.1000	0.2000		0.900	1.000	16.0	12.0
MM3220C08NRH	0.0650	0.2000		0.900	1.000	16.0	12.0
MM3220D01NRH	0.2000			0.900	1.150	16.0	144.0
MM3220D05NRH	0.1500			0.900	1.150	16.0	144.0
MM3220F01NRH	0.2000			0.900	1.150	16.0	144.0
MM3220G01NRH	0.2000		-0.2000	1.100	1.000	16.0	128.0
MM3220G06NRH	0.1500		-0.1000	0.900	1.000	16.0	12.0
MM3220G07NRH	0.1500		-0.1000	0.900	1.000	16.0	12.0
MM3220H01NRH	0.2000		-0.2000	1.100	1.150	16.0	144.0
MM3220H02NRH	0.2000		-0.2000	1.100	1.150	16.0	144.0
MM3220H03NRH	0.2000		-0.2000	1.100	1.150	16.0	144.0
MM3220H04NRH	0.2000		-0.2000	1.100	1.150	16.0	144.0
MM3220H06NRH	0.2000		-0.2000	1.100	1.150	16.0	144.0
MM3220H09NRH	0.2500		-0.2000	1.100	1.150	16.0	1150.0
MM3220H10NRH	0.2500		-0.2000	1.100	1.150	16.0	1150.0
MM3220H11NRH	0.1500		-0.1500	0.900	1.000	16.0	96.0
MM3220H13NRH	0.2000		-0.2000	1.100	1.000	16.0	128.0
MM3220H15NRH	0.1500		-0.1500	0.500	1.000	16.0	128.0
MM3220H16NRH	0.2000		-0.2000	0.500	1.000	16.0	128.0
MM3220H1ANRH	0.2500			1.100	1.150	16.0	1.2
MM3220J01NRH	0.0850		-0.0600	0.300	0.250	16.0	20.0
MM3220JA1NRH	0.1000		-0.1000	1.000	1.000	16.0	96.0
MM3220K01NRH	0.1250	0.3000	-0.0900	0.900	1.150	16.0	144.0
MM3220M01NRH	0.2000		-0.1000	1.000	1.000	16.0	128.0
MM3220M04NRH	0.1350		-0.0850	0.800	1.000	16.0	128.0
MM3220MB1NRH	0.1500		-0.1000	0.500	1.000	16.0	128.0
MM3220MC1NRH	0.0900		-0.0900	0.900	1.000	16.0	12.0
MM3220N01NRH	0.1500			0.900	1.150	16.0	144.0
MM3220N02NRH	0.1500			0.900	1.150	16.0	512.0

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MM3220U01NRH	0.1500			0.900	1.150	16.0	512.0
MM3220Z01NRH	0.1000	0.1800		0.900	1.000	16.0	12.0
Product name	Overdischarge release delay time [ms]	Discharging overcurrent detection delay time 1 [ms]	Discharging overcurrent detection delay time 2 [ms]	Discharging overcurrent release delay time [ms]	Charging overcurrent detection delay time [ms]	Charging overcurrent release delay time [ms]	Short detectio delay time [ms]
MM3220AA1NRH	1.2	12.0		1.20	8.0	1.2	0.300
MM3220AA2NRH	1.2	12.0		1.20	8.0	1.2	0.300
MM3220B01NRH	0.9	12.0		1.00			0.400
MM3220C01NRH	0.9	10.8	0.5	0.90			0.400
MM3220C02NRH	1.0	48.0	4.0	1.00			0.400
MM3220C03NRH	1.0	256.0	2.5	1.00			0.400
MM3220C08NRH	1.0	256.0	0.5	1.00			0.400
MM3220D01NRH	1.0	9.0		1.00			0.300
MM3220D05NRH	1.0	9.0		1.00			0.300
MM3220F01NRH	1.0	9.0		1.00			0.300
MM3220G01NRH	1.0	12.0		1.00	8.0	1.0	0.300
MM3220G06NRH	1.0	256.0		1.00	8.0	1.0	0.400
MM3220G07NRH	1.0	256.0		1.00	8.0	1.0	0.400
MM3220H01NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H02NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H03NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H04NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H06NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H09NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H10NRH	1.0	9.0		1.00	8.0	1.0	0.300
MM3220H11NRH	1.0	20.0		1.00	8.0	1.0	0.300
MM3220H13NRH	1.0	12.0		1.00	8.0	1.0	0.300
MM3220H15NRH	1.0	9.0		1.00	8.0	1.0	0.280
MM3220H16NRH	1.0	8.0		1.00	8.0	1.0	0.300
MM3220H1ANRH	1.0	9.0		1.00			0.300
MM3220J01NRH	1.0	6.0		1.00	16.0	1.0	0.400
MM3220JA1NRH	1.0	10.0		1.00	6.0	1.0	0.300
MM3220K01NRH	1.0	12.0	0.5	1.00	8.0	1.0	0.400
MM3220M01NRH	1.0	12.0		1.00	8.0	1.0	0.300
MM3220M04NRH	1.0	12.0		1.00	8.0	1.0	0.300
MM3220MB1NRH	1.0	8.0		1.00	8.0	1.0	0.300
MM3220MC1NRH	1.0	48.0		1.00	16.0	1.0	0.400

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MM3220N01NRH	1.0	9.0		1.00			0.300
MM3220N02NRH	1.0	288.0		1.00			0.300
MM3220U01NRH	1.0	288.0		1.00			0.300
MM3220Z01NRH	1.0	256.0	2.5	1.00			0.400

Package

SOT-26A