

## MM414x Series

2023/12/06

### Outline

MM414x series are Li-ion battery protection IC and detect charge current / discharge current with high precision by current sensing resistor (Rsns). MM414x have two step discharge overcurrent detection. And system is protected appropriately in the next 2 state, Normal discharge mode and large current discharge mode.

### Product Series

For one-cell

### Features

1) Range and accuracy of detection voltage

Overcharge detection voltage 3.8V to 4.8V, 5mV steps Accuracy $\pm$ 15mV

Overdischarge detection voltage 2.0V to 3.0V, 50mV steps Accuracy $\pm$ 35mV

Discharging overcurrent detection voltage 1 +3mV to +50mV, 0.1mV steps Accuracy $\pm$ 1.00mV(MM4140 Series)

Accuracy $\pm$ 0.75mV(MM4141 Series)

Accuracy $\pm$ 0.50mV(MM4142 Series)

Discharging overcurrent detection voltage 2 +6mV to +100mV, 0.5mV steps

Accuracy $\pm$ 2.00mV(MM4140/MM4141 Series)

Accuracy $\pm$ 1.50mV(MM4142 Series)

Charging overcurrent detection voltage -50mV to -3mV, 0.1mV steps Accuracy $\pm$ 1.00mV(MM4140 Series)

Accuracy $\pm$ 0.75mV(MM4141 Series)

Accuracy $\pm$ 0.50mV(MM4142 Series)

Short detection voltage +10mV to +150mV, 1mV steps Accuracy $\pm$ 2.5mV

0V Battery Charging Inhibition Voltage 1.2V~2.0V, 0.1V steps Accuracy $\pm$ 0.2V(1.2V)

Accuracy $\pm$ 0.1V(1.3V~2.0V)

2) Low current consumption

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Normal mode Typ. 2.5μA, Max. 4.0μA

Stand-by mode(Overdischarge Latch ""ENABLE"" ) Max. 0.1μA

Stand-by mode(Overdischarge Latch ""DISABLE"" ) Max. 0.5μA

## Specifications

Product name	Package	OV battery charge function	Overcharge release function	Overdischarge release function	Discharging overcurrent release function	Overcharge detection voltage [V]
MM4140AF1RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.550
MM4140AF2RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.600
MM4140AF3RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.570
MM4140AF4RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.620
MM4140AF5RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.570
MM4140AF6RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.620
MM4140AF7RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.620
MM4140AF8RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.620
MM4140AF9RS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.600
MM4140AFARS4	SSON-6TA/TB/TC	Prohibition	voltage	voltage	voltage	4.680

Product name	Overcharge release voltage [V]	Overdischarge detection voltage [V]	Overdischarge release voltage [V]	Discharging overcurrent detection voltage1 [V]	Discharging overcurrent detection voltage2 [V]	Charging overcurrent detection voltage [V]	Short detect voltage [V]
MM4140AF1RS4	4.400	2.350	2.550	0.0070	0.0110	-0.0160	0.028
MM4140AF2RS4	4.400	2.100	2.300	0.0070	0.0110	-0.0180	0.028
MM4140AF3RS4	4.420	2.350	2.550	0.0070	0.0110	-0.0160	0.028
MM4140AF4RS4	4.420	2.100	2.300	0.0070	0.0110	-0.0180	0.028
MM4140AF5RS4	4.420	2.350	2.550	0.0070	0.0110	-0.0160	0.028
MM4140AF6RS4	4.420	2.100	2.300	0.0070	0.0110	-0.0180	0.028
MM4140AF7RS4	4.420	2.350	2.550	0.0070	0.0110	-0.0160	0.028
MM4140AF8RS4	4.420	2.100	2.300	0.0070	0.0110	-0.0180	0.028
MM4140AF9RS4	4.400	2.350	2.550	0.0070	0.0110	-0.0160	0.028
MM4140AFARS4	4.480	2.350	2.550	0.0070	0.0110	-0.0160	0.028

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MM4140AF5RS4	4.420	2.350	2.350	0.0070	0.0110	-0.0250	0.028
MM4140AF6RS4	4.420	2.100	2.300	0.0070	0.0110	-0.0250	0.028
MM4140AF7RS4	4.420	2.100	2.300	0.0115	0.0250	-0.0375	0.042
MM4140AF8RS4	4.420	2.100	2.300	0.0115	0.0250	-0.0270	0.042
MM4140AF9RS4	4.450	2.350	2.550	0.0105	0.0165	-0.0240	0.042
MM4140AFARS4	4.480	2.100	2.300	0.0115	0.0250	-0.0270	0.042

Product name	Overcharge detection delay time [s]	Overcharge release delay time [ms]	Overdischarge detection delay time [ms]	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]
MM4140AF1RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF2RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF3RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF4RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF5RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF6RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF7RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF8RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AF9RS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00
MM4140AFARS4	1.024	1.0	64.0	1.0	3584.0	16.0	8.00

Product name	Charging overcurrent detection delay time [ms]	Charging overcurrent release delay time [ms]	Short detection delay time [ms]
MM4140AF1RS4	16.0	4.0	0.280
MM4140AF2RS4	16.0	4.0	0.280
MM4140AF3RS4	16.0	4.0	0.280
MM4140AF4RS4	16.0	4.0	0.280
MM4140AF5RS4	16.0	4.0	0.280
MM4140AF6RS4	16.0	4.0	0.280
MM4140AF7RS4	16.0	4.0	0.280
MM4140AF8RS4	16.0	4.0	0.280
MM4140AF9RS4	16.0	4.0	0.280
MM4140AFARS4	16.0	4.0	0.280

## Package

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SSON-6TA

SSON-6TB

SSON-6TC

SSON-6J

SSON-6M

SSON-6U

SSON-6V

SON-6F

SON-6G