

# 1cell Li-ion/Li-polymer battery protection IC MM3721 series

## Outline

MM3721 series are Li-ion battery protection IC and detect charge current/discharge current with high precision by current sensing resistor (Rsns). MM3721 have two step discharge overcurrent detection. And system is protected appropriately in the next 2 state, Normal discharge mode and large current discharge mode.

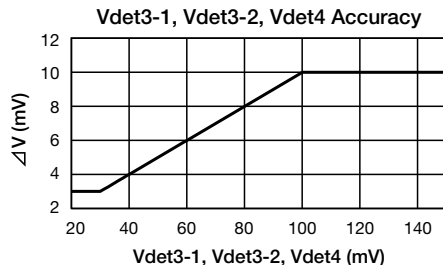
## Features

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

### (1) Range and accuracy of detection voltage

● Overcharge detection voltage	3.6V to 5.0V, 5mV step	Accuracy±25mV (Ta=-20°C to +60°C)
● Overcharge release voltage	Vdet1-0.2V to Vdet1, 5mV step	Accuracy±30mV
● Overdischarge detection voltage	2.0V to 3.0V, 50mV step	Accuracy±35mV
● Overdischarge release voltage	2.0V to 3.0V, 50mV step	Accuracy+65/-35mV (In case Vdet2=Vrel2) Accuracy+90/-65mV (In case Vdet2≠Vrel2)
● Discharging overcurrent detection voltage 1	20mV to 150mV, 1mV step	Accuracy±Δ (Note1)
● Discharging overcurrent detection voltage 2	Vdet3-1+10mV to 200mV, 1mV step	Accuracy±Δ (Note1)
● Charging overcurrent detection voltage	-150mV to -20mV, 1mV step	Accuracy±Δ (Note1)
● Short detection voltage	0.4V to 0.9V, 0.05V step	Accuracy±100mV
● 0V battery charge inhibition battery voltage	1.3V to 1.8V / 0.1V step 0.9V 0.9V	Accuracy±100mV Accuracy±300mV

Note1 : Current detection voltage Accuracy.



### (2) Delay time setting

● Overcharge detection delay time	256ms to 4.6s
● Overdischarge detection delay time	8ms to 256ms
● Discharging overcurrent 1 detection delay time	8ms to 7168ms
● Discharging overcurrent 2 detection delay time	6ms to 64ms (tVdet3-2 < tVdet3-1)
● Charging overcurrent detection delay time	6ms to 64ms
● Short detection delay time	250μs to 400μs

### (3) Current consumption

● Normal mode	Typ. 3.0μA, Max. 6.0μA
● Stand-by mode	Max. 0.1μA (In case Overdischarge latch function Enable.) Max. 0.6μA (In case Overdischarge latch function Disable.)

### (4) 0V battery Charge function

Selectable "Permission" or "inhibition"

### (5) Absolute maximum ratings

● VDD pin	VSS-0.3V to 12V
● COU pin and V- pin	VDD-28V to VDD+0.3V
● DOUT pin and CS 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-6J	SON-6C		
		1	Charger negative voltage input terminal
		2	Charge FET control terminal
		3	Discharge FET control terminal
		4	Negative power supply voltage input terminal
		5	Positive power supply voltage input terminal
		6	Current detection terminal

## Product Line up

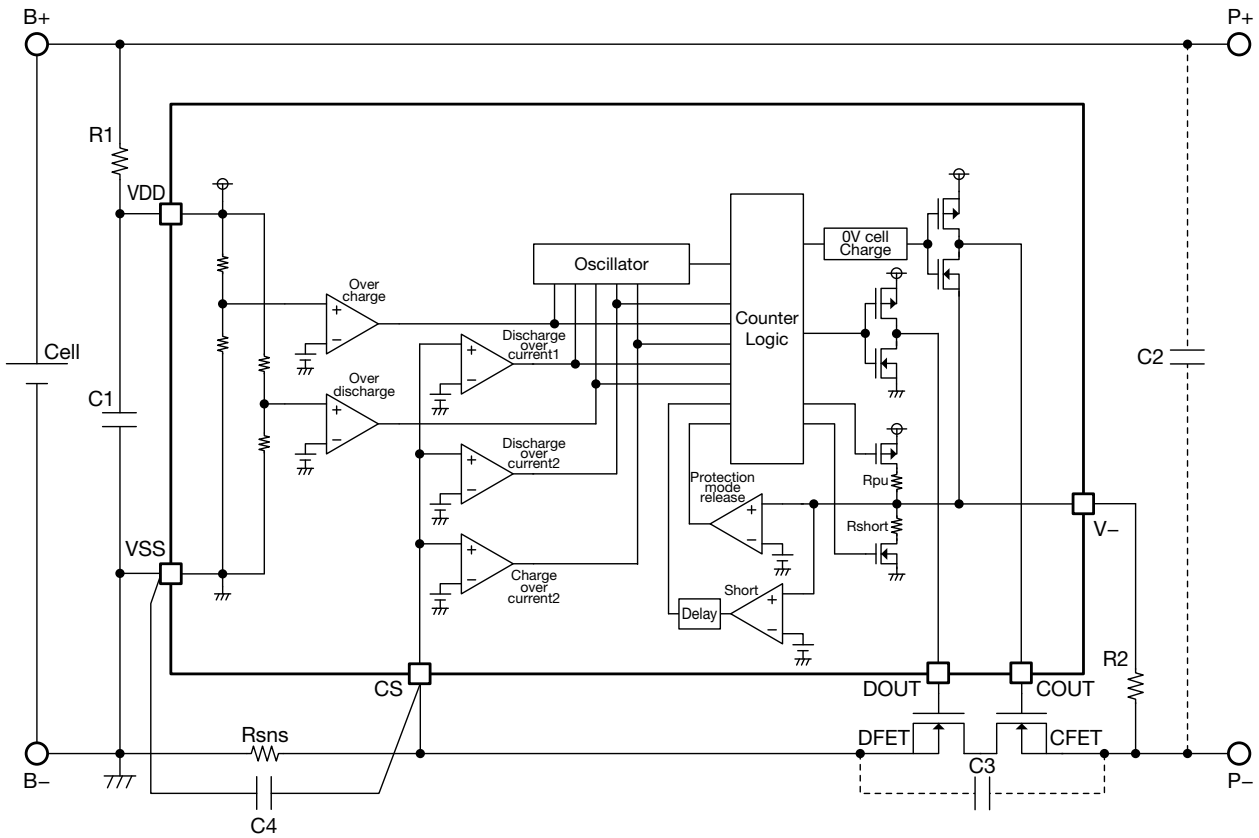
Product name	Package	OV charge	Protection mode latch function			Hys-Cancel		Discharging overcurrent release range extended function.	Overcharge detection voltage [V]	Overcharge detection voltage [V]	Overdischarge detection voltage [V]	Overdischarge detection voltage [V]	Discharging overcurrent detection voltage [V]	Discharging overcurrent detection voltage [V]	Charging overcurrent detection voltage [V]	Short detection voltage [V]	Delay time (Note2)
			Overcharge	Overdischarge	Discharge overcurrent	Overcharge	Overdischarge										
			Vdet1	Vrel1	Vdet2	Vrel2	Vdet3										
MM3721CK1RRE	SSON-6J	0.9	Disable	Enable	Enable	Enable		Yes (1.0V)	4.425	4.325	2.300	2.300	0.029	0.043	-0.027	0.400	G
MM3721EF1RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.425	4.425	2.400	2.400	0.040	0.072	-0.022	0.600	A
MM3721EF2RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.420	4.420	2.300	2.300	0.030	0.040	-0.020	0.400	B
MM3721EF5RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.420	4.420	2.300	2.300	0.032	0.047	-0.028	0.400	F
MM3721EF6RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.470	4.470	2.300	2.300	0.037	0.054	-0.021	0.400	B
MM3721EF7RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.430	4.430	2.300	2.300	0.034	0.050	-0.020	0.400	B
MM3721EF8RRE	SSON-6J	0.9	Enable	Enable	Disable			Yes (1.0V)	4.275	4.275	2.300	2.300	0.030	0.040	-0.020	0.400	B
MM3721FF1RRE	SSON-6J	1.6	Disable	Disable	Disable	Disable	Enable	Yes (1.0V)	4.440	4.240	2.300	2.600	0.040	0.063	-0.020	0.800	C
MM3721FF2YRE	SON-6C	1.6	Disable	Disable	Disable	Disable	Enable	Yes (1.0V)	4.440	4.240	2.300	2.600	0.064	0.095	-0.022	0.800	D
MM3721HF1RRE	SSON-6J	0.9	Disable	Enable	Disable	Disable		Yes (1.0V)	4.440	4.240	2.300	2.300	0.025	0.038	-0.020	0.400	E
MM3721HF2RRE	SSON-6J	0.9	Disable	Enable	Disable	Disable		Yes (1.0V)	4.440	4.240	2.300	2.300	0.025	0.034	-0.020	0.400	E
MM3721HF4RRE	SSON-6J	0.9	Disable	Enable	Disable	Disable		Yes (1.0V)	4.485	4.285	2.300	2.300	0.025	0.034	-0.020	0.400	E
MM3721JF1YRE	SON-6C	0.9	Enable	Disable	Disable		Enable	Yes (1.0V)	4.275	4.275	2.300	2.600	0.028	0.042	-0.024	0.400	B

### Note2 : Delay time

	tVdet1 [s]	tVrel1 [ms]	tVdet2 [ms]	tVrel2 [ms]	tVdet3-1 [ms]	tVrel3-1 [ms]	tVdet3-2 [ms]	tVrel3-2 [ms]	tVdet4 [ms]	tVrel4 [ms]	tshort [us]
A	1.02	16.00	125.00	1.00	3072.00	1.00	10.00	1.00	8.00	1.00	300
B	1.02	16.00	125.00	1.00	5120.00	1.00	8.00	1.00	8.00	1.00	300
C	4.60	16.00	96.00	1.00	160.00	1.00	16.00	1.00	8.00	1.00	300
D	4.60	16.00	96.00	1.00	160.00	1.00	16.00	1.00	8.00	1.00	400
E	4.60	16.00	96.00	1.00	448.00	1.00	24.00	1.00	8.00	1.00	300
F	1.02	16.00	125.00	1.00	2304.00	1.00	8.00	1.00	8.00	1.00	300
G	1.02	16.00	125.00	1.00	80.00	1.00	8.00	1.00	8.00	1.00	250

Please inquire to us, if you need another spec.

Application Circuit



Symbol	Part	Min.	Typ.	Max.	Purpose
R1	Resistor		100	1kΩ	For voltage fluctuation, For ESD
C1	Capacitor	0.01μF	0.1μF	1.0μF	For voltage fluctuation
R2	Resistor		1.0kΩ	10kΩ	Current limit for charger reverse connection
C2	Capacitor		0.1μF		For exogenous noise
C3	Capacitor		0.1μF		For exogenous noise
Rsns	Resistor			20mΩ	Current detection resistance
C4	Capacitor		0.1μF		For exogenous noise
DFET CFET	Nch MOS FET				Charge and discharge control

This typical application circuit and constant value do not guarantee proper operation. Please evaluate thoroughly by actual application to set up constants.

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