1 cell lithium–ion/lithium–polymer battery protection IC

MM3725/MM3726 Series

Outline

The MM3725/MM3726 series are protection IC using high voltage CMOS process for overcharge, overdischarge andovercurrent 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, referencevoltage sources, oscillator, counter circuit and logical circuits.

Features

(Unless otherwise specified, Ta=25°C)

(1) Range and accuracy of detection/release voltage

● Overcharge detection voltage	Vdet1	3.6V to 5.0V	±20m
		5mVstep	±25mV
		(Ta=-20 to 60°C)	
● Overcharge release voltage	Vrel1	Vdet1-0.2V to Vdet1	±30mV
		5mV step	
● Overdischarge detection voltage	Vdet2	2.0V to 3.0V	±35m
		50mV step	
● Overdischarge release voltage	Vrel2	2.0V to 3.0V	+50 / -35mV
		(In case Vdet2=Vrel2)	
		50mV step	+90 / -65mV
		(In case Vdet2≠Vrel2)	
● Discharging overcurrent detection voltage	Vdet3	20mV to 300mV	±5mV
		1mV step	
● Charging overcurrent detection voltage	Vdet4	-300mV to -20mV	±5mV
		1mV step	
● Short detection voltage	Vshort	40mV to 350mV	±8%
		1mV step	
● 0V battery charge inhibition battery voltage	Vst	1.3V to 1.8V/0.1V step	±100mV
		0.9V	±300mV

(2) Range of detection delay time

● Overcharge detection delay time	tVdet1	256ms to 4.6s
● Overdischarge detection delay time	tVdet2	8ms to 256ms
● Discharging overcurrent detection delay time	tVdet3	8ms to 256ms
● Charging overcurrent detection delay time	tVdet4	6ms to 64ms
● Short detection delay time	tVshort	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 “Prohibition”

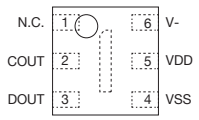
5) Absolute maximum ratings

● VDD pin	VSS–0.3V to +12V
● COUT 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 to +125°C
● Operation temperature	–40 to +85°C

Pin assignment

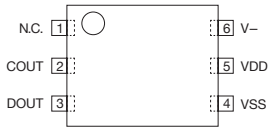
SSON-6J

(Top view)



SON-6C

(Top view)



Pin no.	Symbol	Function
1	N.C.	None connection
2	COUT	Charge FET control terminal
3	DOUT	Discharge FET control terminal
4	VSS	Negative power supply voltage input terminal
5	VDD	Positive power supply voltage input terminal
6	V-	Current detection terminal

LINE UP

MODEL	Package	0V charge	Protection mode latch function			Hys-Cancel		Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharging overcurrent detection voltage	Charging overcurrent detection voltage	Short detection voltage	Delay time *1
			Overcharge	Overdischarge	Discharge overcurrent	Overcharge	Overdischarge	Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4	Vshort	
								V	V	V	V	V	V	V	
MM3725AC2YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.045	-0.040	0.100	A
MM3725AC7YLE	SON-6C	1.2	Disable	Disable	Disable	Enable	Enable	4.550	4.250	2.300	2.500	0.025	-0.030	0.075	J
MM3725AC9YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.055	-0.045	0.100	L
MM3725ACCYLE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.020	-0.020	0.070	F
MM3725AM1YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.065	-0.050	0.190	B
MM3725AM4YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.425	4.225	2.500	2.800	0.025	-0.025	0.075	E
MM3725AM5YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.045	-0.040	0.095	F
MM3725AMHYLE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.800	0.024	-0.024	0.070	O
MM3725AN1YRE	SON-6C	Permission	Disable	Disable	Disable	Enable	Enable	4.425	4.225	2.500	2.900	0.080	-0.080	0.230	G
MM3725ANBYRE	SON-6C	Permission	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.800	0.060	-0.050	0.160	E
MM3725AR1YLE	SON-6C	Permission	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.900	0.055	-0.055	0.150	M
MM3725CM2YLE	SON-6C	0.9	Disable	Enable	Disable	Enable	-	4.470	4.270	2.500	2.500	0.025	-0.025	0.100	N
MM3725CM2RLE	SSON-6J	0.9	Disable	Enable	Disable	Enable	-	4.470	4.270	2.500	2.500	0.025	-0.025	0.100	N
MM3725CM3YRE	SON-6C	0.9	Disable	Enable	Disable	Enable	-	4.275	4.075	2.500	2.500	0.025	-0.020	0.080	M
MM3725CN2YRE	SON-6C	Permission	Disable	Enable	Disable	Enable	-	4.280	4.080	3.000	3.000	0.030	-0.030	0.205	E
MM3726AM6YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.400	2.800	0.150	-0.125	0.350	G
MM3726AM7YRE	SON-6C	0.9	Disable	Disable	Disable	Enable	Enable	4.550	4.250	2.000	2.400	0.075	-0.055	0.250	C
MM3726AN2YLE	SON-6C	Permission	Disable	Disable	Disable	Enable	Enable	4.425	4.225	2.500	2.800	0.055	-0.055	0.255	G
MM3726ANAYLE	SON-6C	Permission	Disable	Disable	Disable	Enable	Enable	4.475	4.275	2.500	2.800	0.055	-0.055	0.255	G

*1 Delay time

	tVdet1	tVrel1	tVdet2	tVrel2	tVdet3	tVrel3	tVdet4	tVrel4	tshort
	s	ms	ms	ms	ms	ms	ms	ms	µs
A	1.024	16.00	20.00	1.00	12.00	1.00	8.00	1.00	300
B	1.024	16.00	32.00	1.00	16.00	1.00	4.00	1.00	280
C	1.024	16.00	64.00	1.00	16.00	1.00	8.00	1.00	280
D	1.024	16.00	64.00	1.00	8.00	1.00	4.00	1.00	280
E	1.024	16.00	32.00	1.00	8.00	1.00	8.00	1.00	280
F	1.024	16.00	64.00	1.00	16.00	1.00	16.00	1.00	280
G	1.024	16.00	64.00	1.00	8.00	1.00	8.00	1.00	280
H	1.024	16.00	64.00	1.00	32.00	1.00	16.00	1.00	280
I	1.024	16.00	32.00	1.00	16.00	1.00	16.00	1.00	280
J	1.024	16.00	32.00	1.00	16.00	1.00	16.00	1.00	530
K	1.024	16.00	128.00	1.00	8.00	1.00	8.00	1.00	280
L	1.024	16.00	20.00	1.00	12.00	1.00	8.00	1.00	280
M	1.024	16.00	20.00	1.00	12.00	1.00	8.00	1.00	250
N	1.024	16.00	32.00	1.00	12.00	1.00	12.00	1.00	280
O	1.024	16.00	20.00	1.00	10.00	1.00	8.00	1.00	300

*Please inquire to us, if you need another spec.