

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

MJ3542 series

Outline

MJ3542 series are protection IC with integrated MOS-FET for protection of the rechargeable Lithium-ion or Lithium-polymer battery. The overcharge, overdischarge and discharging and charging overcurrent protection of the rechargeable one-cell Lithium-ion or Lithium-polymer battery can be detected.

Features

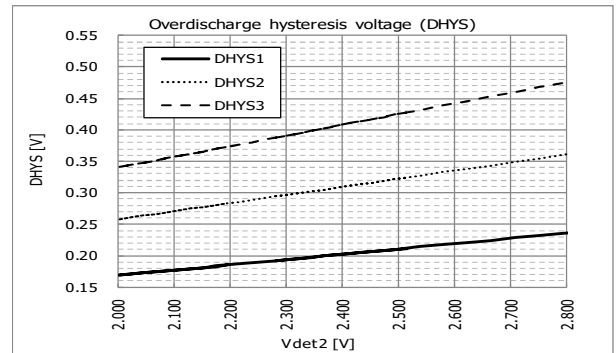
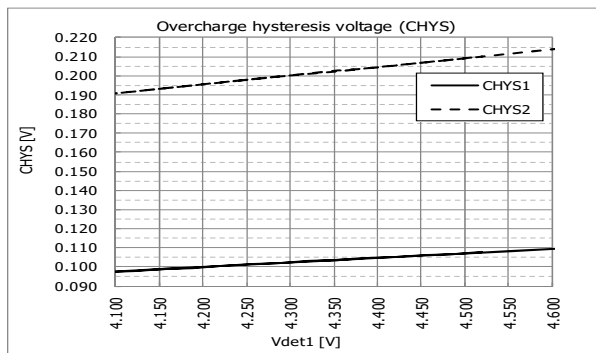
(Unless otherwise specified, Ta=25°C)

1) Range and accuracy of detection/release voltage

• Overcharge detection voltage	4.1V to 4.60V, 5mV steps	Accuracy±10mV
• Overcharge release voltage	Vdet1 - CHYS *1	
• Overdischarge detection voltage	2.00V to 2.80V, 100mV step	Accuracy±35mV
• Overdischarge release voltage	Vdet2 + DHYS *2	
• Discharging overcurrent detection current	3.0A to 12.0A, 0.1A step *3	
• Charging overcurrent detection current	3.0A to 12.0A, 0.1A step *3	
• Short detection voltage	90mV to 180mV, 5mV step	Accuracy±10mV

*1 "CHYS" is selectable from "None(0V)", "CHYS1", "CHYS2"
"CHYS1", "CHYS2" depend on setting value of Vdet1

*2 "DHYS" is selectable from "None(0V)", "DHYS1", "DHYS2", "DHYS3"
"DHYS1", "DHYS2", "DHYS3" depend on setting value of Vdet2

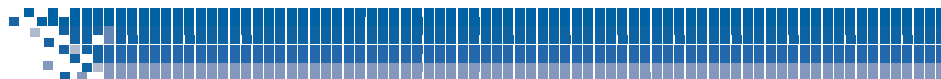


*3 Please inquire to us about details of the accuracy of Overcurrent detection current, which is varies depending on the setting value.

2) Range of detection delay time

• Overcharge detection delay time	Selection from 1.024s, 4.60s
• Overdischarge detection delay time	Selection from 20ms, 96ms, 144ms
• Discharging overcurrent detection delay time	Selection from 6ms, 8ms, 12ms, 16ms, 20ms, 32ms, 128ms, 256ms
• Charging overcurrent detection delay time	Selection from 8ms, 16ms, 32ms
• Short detection delay time	300us to 600us, 50us step





- 3) 0V battery charge function Selection from "Prohibition" or "Permission"

- 4) Low current consumption
 - Normal mode Typ. 4.5uA, Max. 7.0uA
 - Stand-by mode Max. 0.1uA (In case Overdischarge latch function "Enable")
Max. 0.3uA (In case Overdischarge latch function "Disable")

- 5) MOS-FET
 - Source to Source on state resistance Typ. 4.7mΩ (@VDD=3.5V)

- 6) Package type
 - SSON-6N 3.60× 1.80 × 0.65 [mm]

Pin explanations

PLP-6G	Pin No.	Symbol	Function
	1	DOUT	Discharge MOS-FET control terminal (Connected to G1)
	2	VSS	Negative power supply voltage input terminal
	3	VPP	Test terminal (Connected to VSS)
	4	S2	Source terminal of charge MOS-FET
	5	G2	Gate terminal of charge MOS-FET (Connected to COUT)
	6	COUT	Charge MOS-FET control terminal (Connected to G2)
	7	V-	Charger negative voltage input terminal
	8	VDD	Positive power supply voltage input terminal
	9	S1	Source terminal of discharge MOS-FET
	10	G1	Gate terminal of discharge MOS-FET (Connected to DOUT)





Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage	VDD	-0.3	8.0	V
V- terminal voltage	V-	VDD-15	VDD+0.3	V
Source-source voltage	VSSS	-	15	V
Source current	IS	-	12	A
Storage temperature	Tstg	-55	125	°C

Recommended Operating Conditions

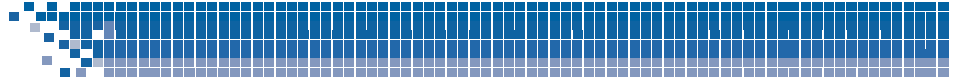
Parameter	Symbol	Min	Max	Unit
Operating ambient temperature	Topr	-40	85	°C
Operating voltage	Vop	1.5	4.8	V

Electrical characteristics

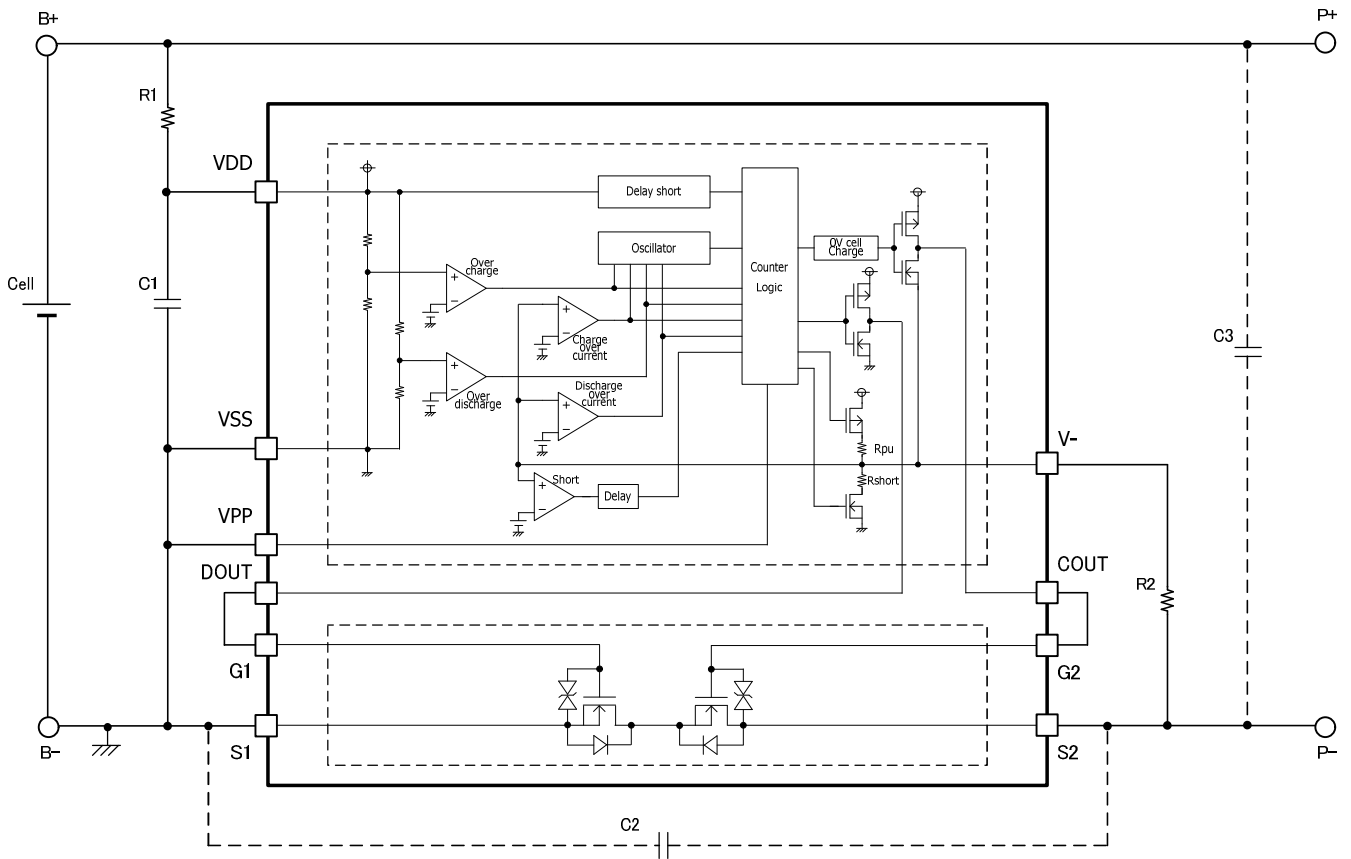
(Unless otherwise specified, Ta=25°C)

Parameter	Symbol	Note	Min	Typ	Max	Unit
Current consumption						
Current consumption	I _{dd}	VDD=4.0V, V-=0V	-	4.5	7.0	μA
Current consumption at stand-by	I _{stb}	V _{det2} =V _{rel2}	-	-	0.1	μA
		V _{det2} ≠V _{rel2}	-	0.15	0.30	μA
Detection/Release voltage						
Overcharge detection voltage	V _{det1}		Typ-0.010	V _{det1}	Typ+0.010	V
Overcharge release voltage	V _{rel1}	V _{det1} =V _{rel1}	Typ-0.030	V _{rel1}	Typ+0.010	V
		V _{det1} ≠V _{rel1}	Typ-0.030		Typ+0.030	V
Overdischarge detection voltage	V _{det2}		Typ-0.035	V _{det2}	Typ+0.035	V
Overdischarge release voltage	V _{rel2}	V _{det2} =V _{rel2}	Typ-0.035	V _{rel2}	Typ+0.045	V
		V _{det2} ≠V _{rel2}	Typ-0.090		Typ+0.090	V
Discharge Overcurrent detection voltage	V _{det3}		I _{dch36} *R _{sson36} ※2			V
Charge Overcurrent detection voltage	V _{det4}		-I _{chg36} *R _{sson36} ※2			V
Short detection voltage	V _{short}		Typ-0.010	V _{short}	Typ+0.010	V
0V battery charge inhibition battery voltage	V _{st}		0.60	0.90	1.20	V
			1.10	1.25	1.40	V
0V battery charge permission charger voltage	V _{st}		-	-	1.60	V
Detection delay time						
Overcharge detection delay time	t _{vdet1}		Typ*0.8	t _{vdet1}	Typ*1.2	s
Overdischarge detection delay time	t _{vdet2}		Typ*0.8	t _{vdet2}	Typ*1.2	ms
Discharging overcurrent detection delay time	t _{vdet3}		Typ*0.8	t _{vdet3}	Typ*1.2	ms
Charging overcurrent detection delay time	t _{vdet4}		Typ*0.8	t _{vdet4}	Typ*1.2	ms
Short detection delay time	t _{vshort}		※2	t _{vshort}	※2	us
MOS-FET						
Source current of cut off	ISSS	VSS=10V	-	-	1.0	μA
Source to source on state resistance 45	R _{SS(on)45}	VDD=4.5V, I _s =3.0A	3.5	4.7	6.1	mΩ
Source to source on state resistance 35	R _{SS(on)35}	VDD=3.5V, I _s =3.0A	3.5	4.7	6.1	mΩ
Source to source on state resistance 25	R _{SS(on)25}	VDD=2.5V, I _s =3.0A	4.0	5.7	7.7	mΩ
Body diode forward voltage	V _F	I _s =1A	0.40	0.60	0.80	V

※2 Please inquire to us about details of the accuracy of Overcurrent detection current and Short detection delay time, which is varies depending on the setting value.



Block diagram / Typical application circuit



Symbol	Part	Min.	Typ.	Max.	Unit
R1	Resistor	-	330	-	Ω
C1	Capacitor	0.01	0.1	1.0	μF
R2	Resistor	-	1.0	10.0	$\text{k}\Omega$
C2/C3	Capacitor	-	0.1	-	μF

※Application hints

The resistors that are inserted into each pin are to protect the IC. They help to remove ESD and latch-up damages. The capacitors help to reduce the effects of transient variations in voltage and electromagnetic waves, and to improve ESD tolerance of the IC. Please use either C2 or C3, or both of them by request of your application.

These values in the above figure are for example. Please choose appropriate values.

