# 1 cell lithium-ion/lithium-polymer battery protection IC

# **MJ3401 Series**

### Outline

MJ3401 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

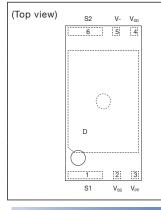
Lithium-ion or Lithium-polymer battery can be detected. It's possible by OTP technology to detect unusual state of a Li-ion battery with very high accuracy.

(1) Range and accuracy of detection/release voltage  Overcharge detection voltage	Features	(Unless otherwise specified, Ta=25°C)
Overcharge detection voltage	(1) Range and accuracy of detection/release vo	ltage
Accuracy-20mV to +15mV (Topr=-5°C to +60°C)  Overcharge release hysteresis voltage	,	
(Topr=5°C to +60°C)  Overcharge release hysteresis voltage		
Overcharge release hysteresis voltage		•
Overdischarge detection voltage	Overcharge release hysteresis voltage	· · · · · · · · · · · · · · · · · · ·
Overdischarge release hysteresis voltage		
Discharging overcurrent detection current		
Charging overcurrent detection current		
Short detection voltage	5 5	•
(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 Selection from 500µs, 820µs  (3) 0V battery charge function Selection from "Permission" or "Prohibition" *2  (4) Low current consumption Normal mode Normal mode Nax. 0.1µA (In case Overdischarge latch function "Enable") Max. 0.3µA (In case Overdischarge latch function "Disable")  (5) MOS-FET Source to Source on state resistance Typ. 11.0mΩ (@VDD=3.6V)  (6) Absolute maximum ratings VCC pin -0.3V to +10V V- pin -0.3V to DD-0.3V to VDD+0.3V VPP pin -0.7DD-0.3V to VDD+0.3V Drain-source voltage -0.7D year 1.0W Drain current -0.7D year 1.0W Nax. 1.2A Total Power Dissipation -0.55°C to +125°C		•
Overcharge detection delay time		,
Overdischarge detection delay time	(2) Range of detection delay time	
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 Selection from 500μs, 820μs  (3) 0V battery charge function Selection from "Permission" or "Prohibition" *2  (4) Low current consumption  Normal mode Typ. 4.5μA, Max. 7.0μA  Stand-by mode Max. 0.1μA (In case Overdischarge latch function "Enable")  Max. 0.3μA (In case Overdischarge latch function "Disable")  (5) MOS-FET Source to Source on state resistance Typ. 11.0mΩ (@VDD=3.6V)  (6) Absolute maximum ratings  VCC pin0.3V to +10V  VPP pin VDD-24V to VDD+0.3V  VPP pin VDD-0.3V to VDD+0.3V  Drain-source voltage Max. 24V  Drain current Max. 1.2A  Total Power Dissipation Max. 1.0W  Storage temperature55°C to +125°C	Overcharge detection delay time	Selection from 1.024s, 4.60s
<ul> <li>Charging overcurrent detection delay time</li></ul>	Overdischarge detection delay time	Selection from 20ms, 96ms, 144ms
Selection from 500μs, 820μs  (3) 0V battery charge function	<ul> <li>Discharging overcurrent detection delay til</li> </ul>	me Selection from 6ms, 8ms, 12ms, 16ms, 20ms, 32ms, 128ms, 256ms
(3) 0V battery charge function	<ul> <li>Charging overcurrent detection delay time</li> </ul>	Selection from 8ms, 16ms, 32ms
(4) Low current consumption  Normal mode	Short detection delay time	Selection from 500μs, 820μs
<ul> <li>Normal mode</li></ul>	(3) 0V battery charge function	Selection from "Permission" or "Prohibition" *2
<ul> <li>Stand-by mode</li></ul>	(4) Low current consumption	
<ul> <li>Stand-by mode</li></ul>	Normal mode	Τyp. 4.5μA, Max. 7.0μA
(5) MOS-FET		
<ul> <li>Source to Source on state resistanceTyp. 11.0mΩ (@VDD=3.6V)</li> <li>(6) Absolute maximum ratings</li> <li>VCC pin</li></ul>	•	Max. 0.3μA (In case Overdischarge latch function "Disable")
(6) Absolute maximum ratings  ■ VCC pin	(5) MOS-FET	
● VCC pin	<ul> <li>Source to Source on state resistance</li> </ul>	Τyp. 11.0mΩ (@VDD=3.6V)
● VCC pin	(6) Absolute maximum ratings	
VPP pin       VDD-0.3V to VDD+0.3V         Drain-source voltage       Max. 24V         Drain current       Max. 1.2A         Total Power Dissipation       Max. 1.0W         Storage temperature       -55°C to +125°C		0.3V to +10V
<ul> <li>Drain-source voltageMax. 24V</li> <li>Drain currentMax. 1.2A</li> <li>Total Power DissipationMax. 1.0W</li> <li>Storage temperature55°C to +125°C</li> </ul>	• V- pin	VDD-24V to VDD+0.3V
<ul> <li>Drain-source voltageMax. 24V</li> <li>Drain currentMax. 1.2A</li> <li>Total Power DissipationMax. 1.0W</li> <li>Storage temperature55°C to +125°C</li> </ul>	• VPP pin	VDD-0.3V to VDD+0.3V
<ul> <li>Drain currentMax. 1.2A</li> <li>Total Power DissipationMax. 1.0W</li> <li>Storage temperature55°C to +125°C</li> </ul>	•	
● Storage temperature55°C to +125°C	_	
● Storage temperature55°C to +125°C	● Total Power Dissipation	Max. 1.0W

<sup>\*1</sup> Please inquire to us about details of the accuracy of Overcurrent detection current, which is varies depending on the setting value. \*2 In the case of "0V battery charge inhibition", the setting voltage is selectable from 0.90V/1.25V. \*3 Please inquire to us, if you need another specifications.

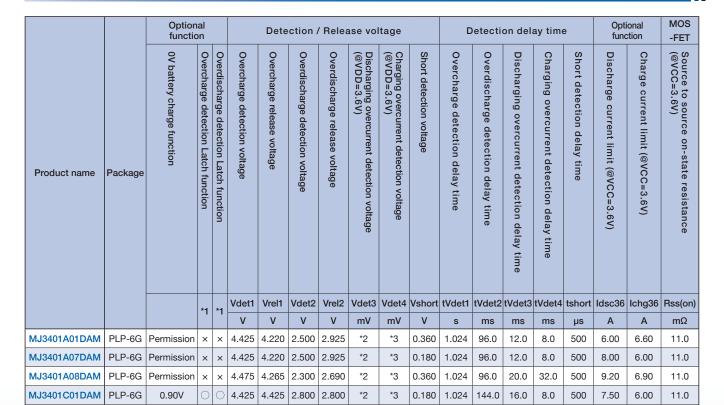
#### Pin assignment

#### **■ PLP-6G**



Pin no.	Symbol	Function		
1	S1	Source terminal of discharge MOS-FET.Connect to the negative terminal of the battery.		
2	VDD	Negative power supply voltage input terminal. Connect to the negative terminal of the battery.		
3	VPP	Test terminal. VPP terminal must be connected to VSS terminal .		
4	VDD	Positive power supply voltage input terminal. Connect to the positive terminal of the battery through R1.		
5	V-	Charger negative voltage input terminal. Connect to the S2 terminal through R2.		
6	S2	Source terminal of charge MOS-FET. Connect to a negative power supply terminal of charger.		
-	D	Drain terminal of discharge and charge MOS-FET. Drain terminal must be open electrically.		

#### LINE UP



\*2

2.800 | 2.800

\*3

0.180

1.024

144.0

16.0

4.435

4.435

\*3 Charging overcurrent detection voltage (Vdet4) = Ichg36 \* Rss(on)36

0.90V

PLP-6G

PLP-6G ... 5,000pcs/Reel

6.00

11.0

7.50

Please inquire to us, if you request a rank other than the above.

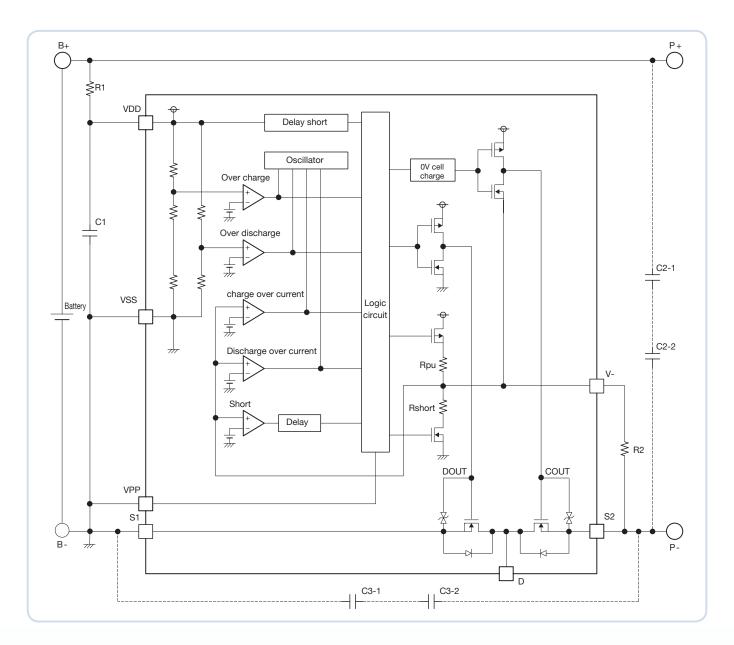
500

8.0

MJ3401C02DAM

### **MJ3401 Series**

## Typical application circuit



Symbol	Parts	Min.	Тур.	Max.	Purpose
R1	Resistor	-	330Ω	-	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