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

MC3651 Series

Outline

MC3651 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 ..... 4.15V to 4.50V, 5mV step ..... Accuracy±20mV
  Accuracy±25mV
  (Topr=–5°C to +60°C)
- Overcharge release voltage ..... 4.00V to 4.35V *1 ..... Accuracy±50mV
- Overdischarge detection voltage ..... 2.00V to 3.00V *2 ..... Accuracy±100mV
- Overdischarge release voltage ..... 2.00V to 3.00V *2 ..... Accuracy±100mV
- Discharging overcurrent detection voltage ..... 20mV to 65mV, 1mV ..... Accuracy±5mV
  (Discharge current limit) .....(0.310A to 1.00A)
- Charging overcurrent detection voltage ..... –65mV to –25mV, 1mV ..... Accuracy±5mV
  (Charge current limit) .....(0.385A to 1.00A)
- Short detection voltage ..... Selection from 0.19V, 0.36V ..... Accuracy±50mV

(2) Range of detection delay time

- Overcharge detection delay time ..... Selection from 1.0s fixed
- Overdischarge detection delay time ..... Selection from 100ms, 256ms
- Discharging overcurrent detection delay time ... Selection from 8ms, 12ms, 16ms, 20ms, 48ms, 224ms
- Charging overcurrent detection delay time ..... Selection from 8.5ms, 16.5ms, 32.5ms
- Short detection delay time ..... Selection from 0.50ms, 0.75ms

(3) 0V battery charge function .....Selection from “Permission” or “Prohibition” *3

(4) Low current consumption

- Normal mode .....Typ. 3.0μA, Max. 4.5μA
- Stand-by mode .....Max. 0.1μA (In case Overdischarge latch function “Enable”)
  Max. 0.5μA (In case Overdischarge latch function “Disable”)

(6) MOS-FET

- Source to Source on state resistance .....Typ. 65.0mΩ (@VDD=3.5V)

(7) Absolute maximum ratings

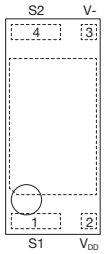
- VCC pin .....–0.3V to +12V
- V- pin .....VDD–24V to VDD+0.3V
- Drain-source voltage .....Max. 24V
- Drain current .....Max. 1.2A
- Total Power Dissipation .....Max. 0.4W
- Storage temperature .....–40°C to +125°C
- Operation temperature .....–40°C to +85°C

*1 Hysteresis voltagebetween Overcharge detection and release voltage is selectable from 0.10V/0.15V/0.20V/0.25V.
*2 Please inquire to us about details of the setting of Overdischarge detection and release voltage.
*3 In the case of "0V battery charge inhibition", the setting voltage is selectable from 0.65V/0.90V.
*4 Please inquire to us, if you need another specifications.

Pin assignment

PLP-4E

(Top view)



Pin no.	Symbol	Function
1	S1	Negative power supply and source of discharge MOS-FET terminal. Connect to the negative terminal of the battery.
2	VDD	Positive power supply voltage input terminal. Connect to the positive terminal of the battery through R1.
3	V−	Charger negative voltage input terminal. Connect to S2 terminal through R2.
4	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

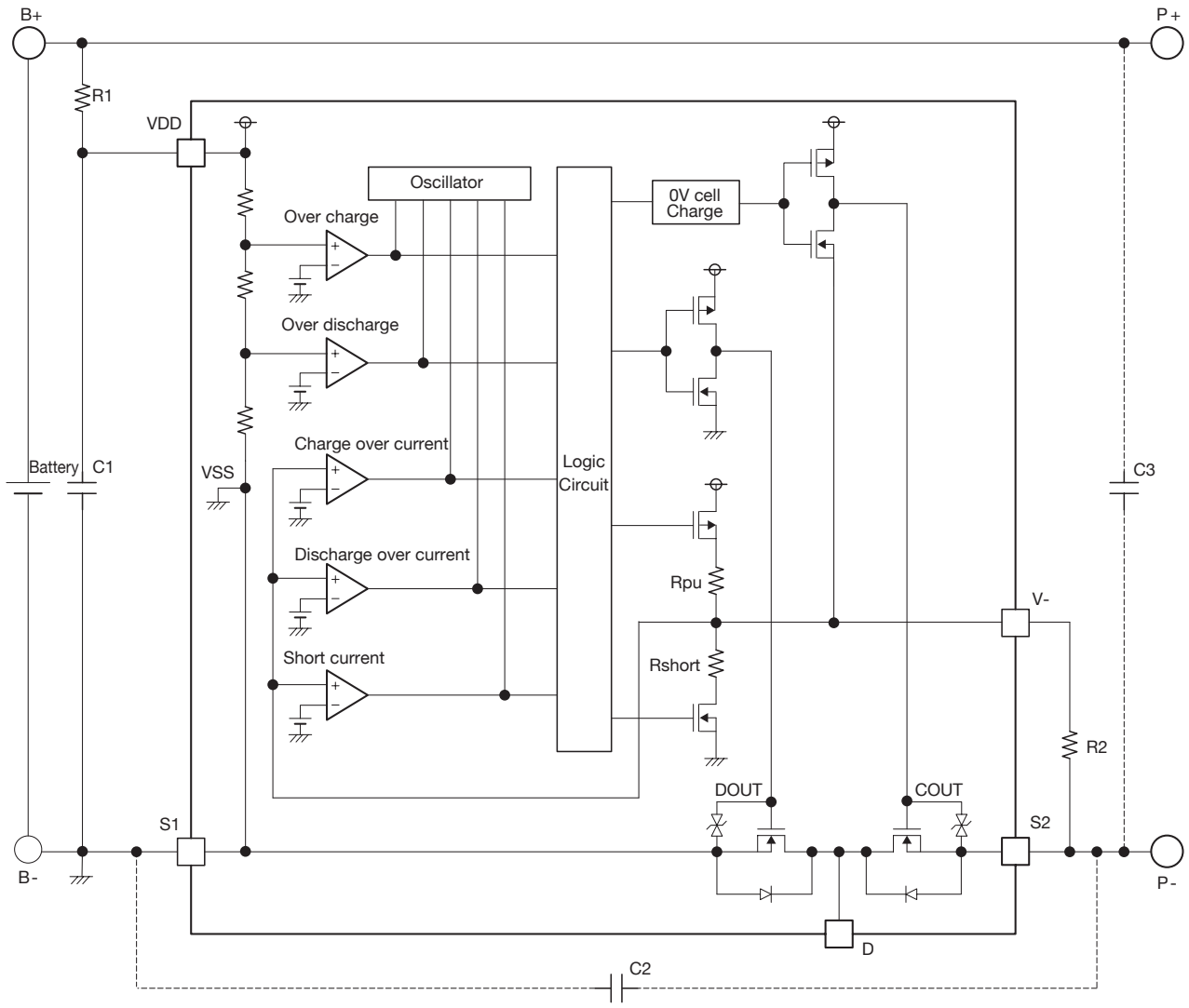
Product name	Package	Optional function			Detection / Release voltage							Detection delay time					Optional function		MOS -FET
		0V battery charge function	Overcharge detection Latch function	Overdischarge detection Latch function	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Discharging overcurrent detection voltage (@VDD=3.5V)	Charging overcurrent detection voltage (@VDD=3.5V)	Short detection voltage	Overcharge detection delay time	Overdischarge detection delay time	Discharging overcurrent detection delay time	Charging overcurrent detection delay time	Short detection delay time	Discharge current limit (@VCC=3.5V)	Charge current limit (@VCC=3.5V)	Source to source on-state resistance (@VCC=3.5V)
			*1	*1	Vdet1	Vrel1	Vdet2	Vrel2	Vdet3	Vdet4	Vshort	tVdet1	tVdet2	tVdet3	tVdet4	tshort	Idischg	Icharge	Rss(on)
					V	V	V	V	mV	mV	V	s	ms	ms	ms	µs	A	A	mΩ
MC3651DF1AAM	PLP-4E	0.65V	×	○	4.280	4.180	2.700	2.700	20.0	-25.0	0.190	1.0	100.0	20.0	8.5	750	0.315	0.390	65.0
MC3651DF3AAM	PLP-4E	0.90V	×	○	4.265	4.065	3.000	3.000	20.0	-25.0	0.190	1.0	100.0	20.0	8.5	500	0.315	0.390	65.0

*1 Optional functions ○ Provided. × Not provided.

PLP-4E ... 5,000pcs/Reel

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

Typical application circuit



Symbol	Parts	Min.	Typ.	Max.	Purpose
R1	Resistor	-	330Ω	470Ω	For voltage fluctuation, For ESD
C1	Capacitor	-	0.1μF	-	For voltage fluctuation
R2	Resistor	-	2.7kΩ	-	Current limit for charger reverse connection
C2	Capacitor	-	0.1μF	-	For exogenous noise
C3	Capacitor	-	0.1μF	-	For exogenous noise