

Integrated Protection IC for 1-Cell Battery Pack

Features

- Integrate all peripheral capacitor, resistors, MOSFETs of a standard protection IC into one tiny package
- High Detection Accuracy
 - Over-charge Detection: $\pm 20\text{mV}$
 - Over-discharge Detection: $\pm 40\text{mV}$
- Ultra Small Package
 - QFN-2.0x3.0-8L

Description

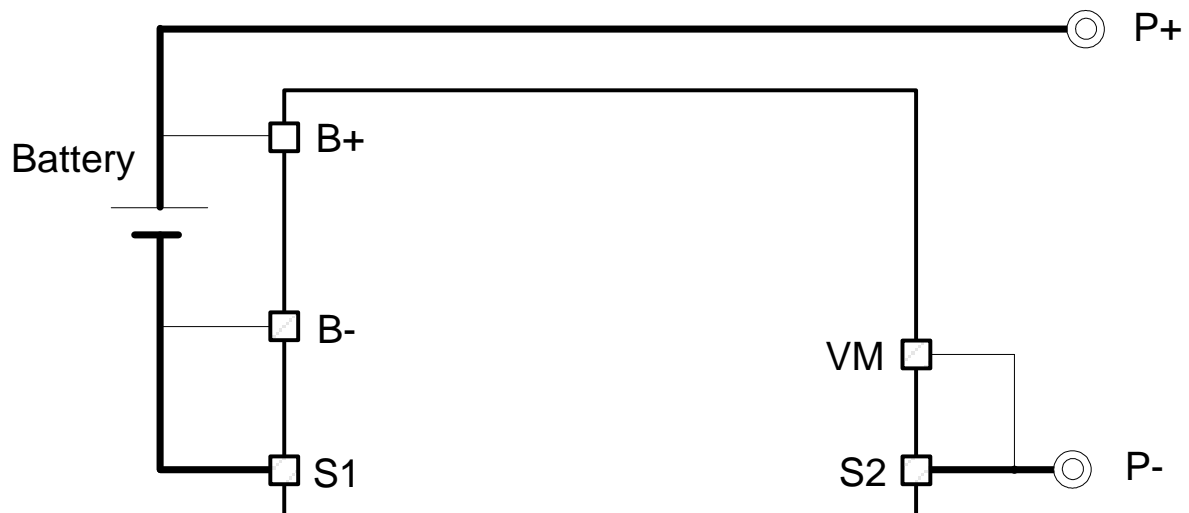
The NT1613 series are the integrated 1-cell protection IC for lithium-ion/lithium-polymer rechargeable battery pack. The high accuracy voltage detector and delay time circuits are built in NT1613 series with state-of-the-art design and process.

To minimize power consumption, NT1613 series activate power down mode when an over-discharge event is detected for power-down mode enabled version. Besides, NT1613 series perform protection functions without any external components for miniaturized PCB.

Application

- Wearable device battery packs
- Mobile phone battery packs

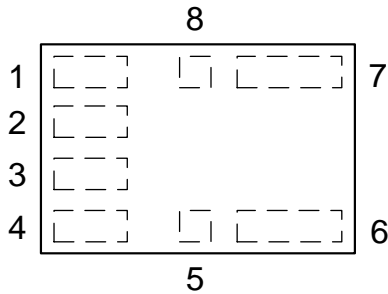
Typical Application Circuit



These devices have limited build-in ESD protection. The leads must be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

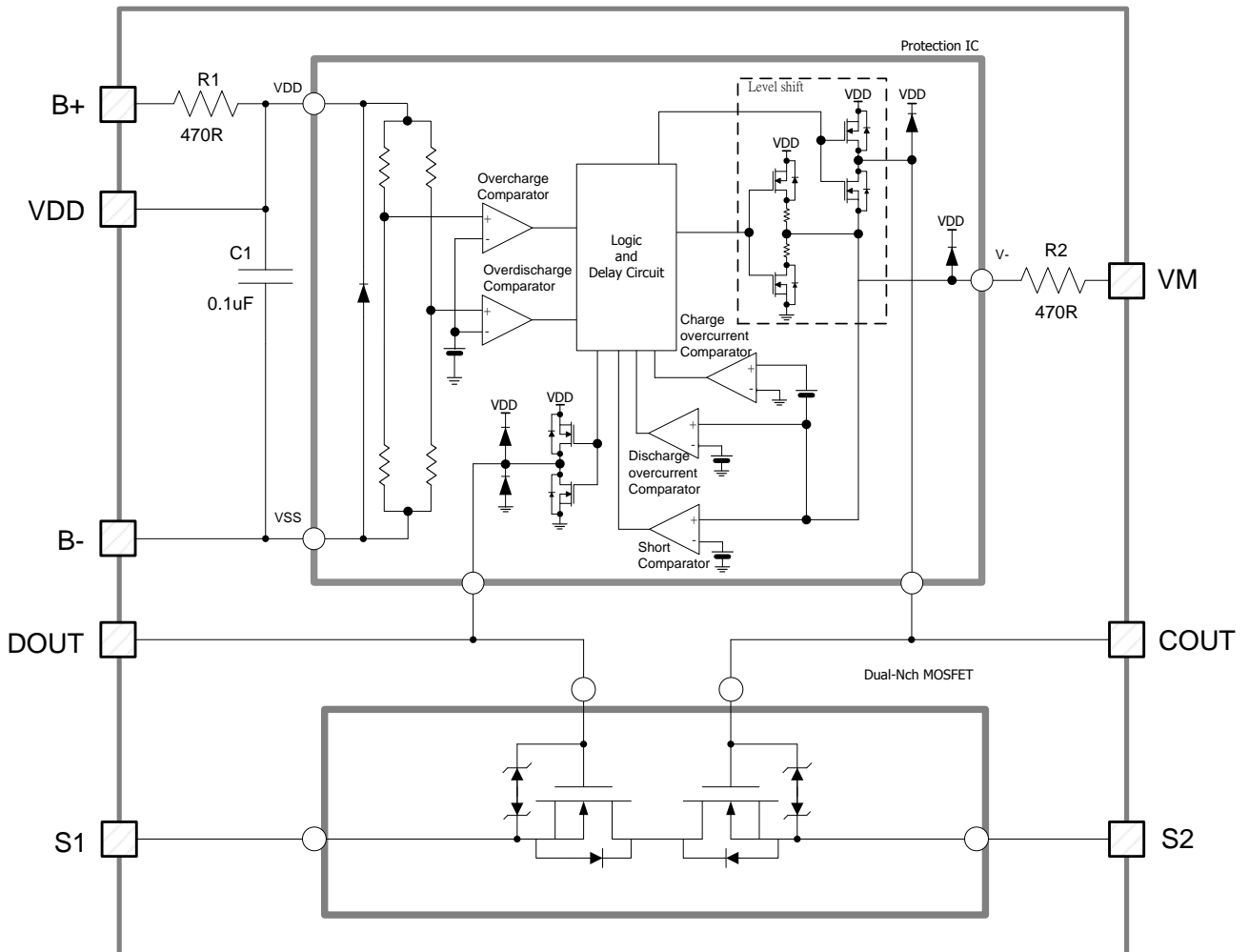
Package and Pin Description

QFN 2.0x3.0-8L



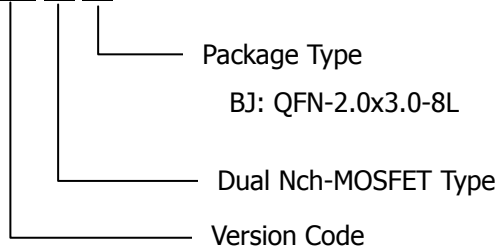
Pin No.	Symbol	Pin description
1	B+	Connection for positive battery input
2	B-	Connection for negative battery input
3	VDD	Connect to VDD pin
4	VM	Over-current and charger detection
5	COUT	Connection of charge control FET gate
6	S2	Source of charge control MOSFET
7	S1	Source of discharge control MOSFET
8	DOUT	Connection of discharge control FET gate

Block Diagram



Ordering Information

NT1613A -XXX YY ZZ



Product version code:

Table1: Detection threshold level table

Product Name	Protection IC Version Code	MOSFET Type	Package Type	Over-charge detection Voltage $V_{DET1}(V)$	Over-charge release voltage $V_{REL1}(V)$	Over-discharge detection voltage $V_{DET2}(V)$	Over-discharge release voltage $V_{REL2}(V)$	Discharge over-current detection $I_{DET3}(A)$		
								B+=4.0V	B+=3.5V	B+=3.0V
NT1613A	NQA	30	BJ	4.425	4.225	2.8	3.0	0.83	0.81	0.78
NT1613A	NQB	30	BJ	4.425	4.225	2.8	3.0	2.85	2.75	2.60
NT1613A	NQC	30	BJ	4.425	4.225	2.8	3.0	2.19	2.12	2.00

Product Name	Protection IC Version Code	MOSFET Type	Package Type	Charge over-current detection $I_{DET4}(A)$			Load short-circuiting detection $I_{SHORT}(A)$			OV Battery Charge Function	Power Down Mode	Delay Time Table2
				B+=4.0V	B+=3.5V	B+=3.0V	B+=4.0V	B+=3.5V	B+=3.0V			
NT1613A	NQA	30	BJ	-1.13	-1.11	-1.07	6.60	6.40	6.15	Available	Yes	(1)
NT1613A	NQB	30	BJ	-2.85	-2.75	-2.60	10.8	10.6	10.2	Available	Yes	(3)
NT1613A	NQC	30	BJ	-2.19	-2.12	-2.00	10.8	10.6	10.2	Available	Yes	(3)

Remark: Please contact our sales for the products with detection voltage value other than those specified above.

Table2: Delay Time table

Delay time	Over-charge delay time $t_{VDET1}(S)$	Over-discharge delay time $t_{VDET2}(mS)$	Discharge over-current delay time $t_{IDET3}(mS)$	Charge over-current delay time $t_{IDET4}(mS)$	Load short-circuiting delay time $t_{SHORT}(uS)$
(1)	1.0 +/- 20%	125 +/- 20%	8.0 +/- 20%	8.0 +/- 20%	400 +/- 30%
(3)	1.0 +/- 30%	20 +/- 30%	12.0 +/- 33.3%	16.0 +/- 31.2%	250 +60/-33.3%