

## Battery Protection IC for 1-Cell Pack

### Features

- High accuracy voltage detection circuit
  - Over-charge detection:  $\pm 20\text{mV}$
  - Over-discharge detection voltage:  $\pm 35\text{mV}$
  - Discharge over-current detection:  $\pm 10\text{mV}$
  - Charge over-current detection:  $\pm 15\%$
  - Load short-circuiting detection voltage:  $\pm 25\%$
- High withstand voltage
  - Absolute maximum ratings: 28V max. (COUT,  $V_{\text{DD}} - V^-$ )
- Low current consumption of discharge mode.
- Ultra small package: SOT-23-6

### Description

The NT1715 series are the 1-cell protection IC for lithium-ion/lithium-polymer rechargeable battery pack. The high accuracy voltage, current detector and delay time circuits are built in NT1715 series with state-of-art design and process.

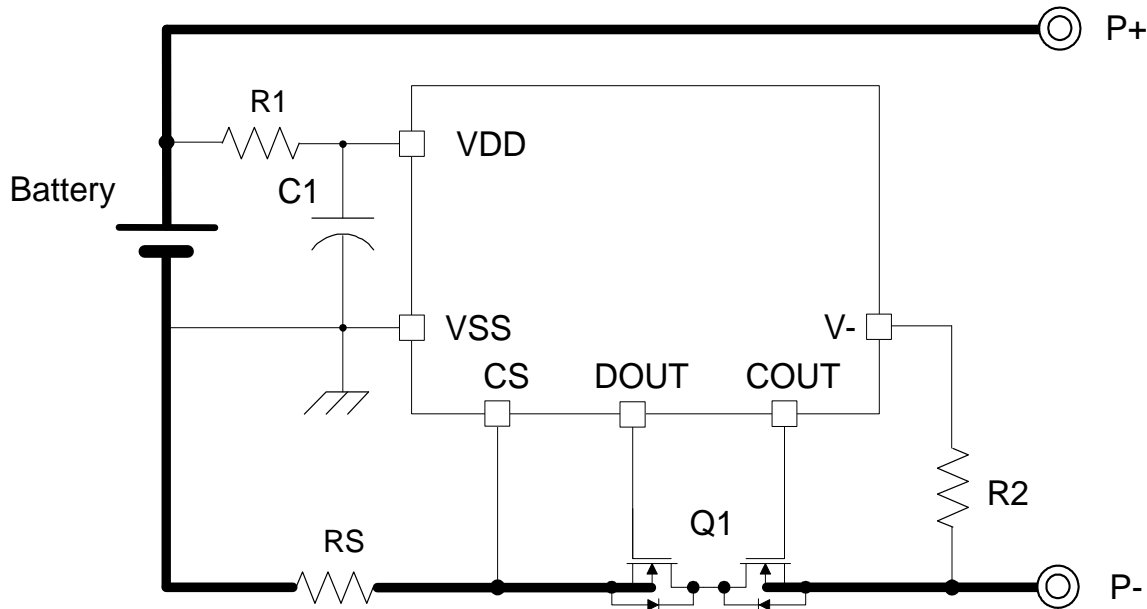
To minimize power consumption, NT1715 series perform protection functions with five external components for miniaturized PCB.

The tiny package is especially suitable for compact portable device, i.e. power tool.

### Applications

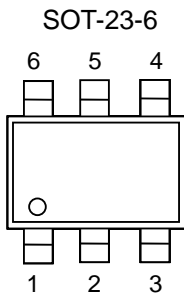
- Power tool

### Typical Application Circuit



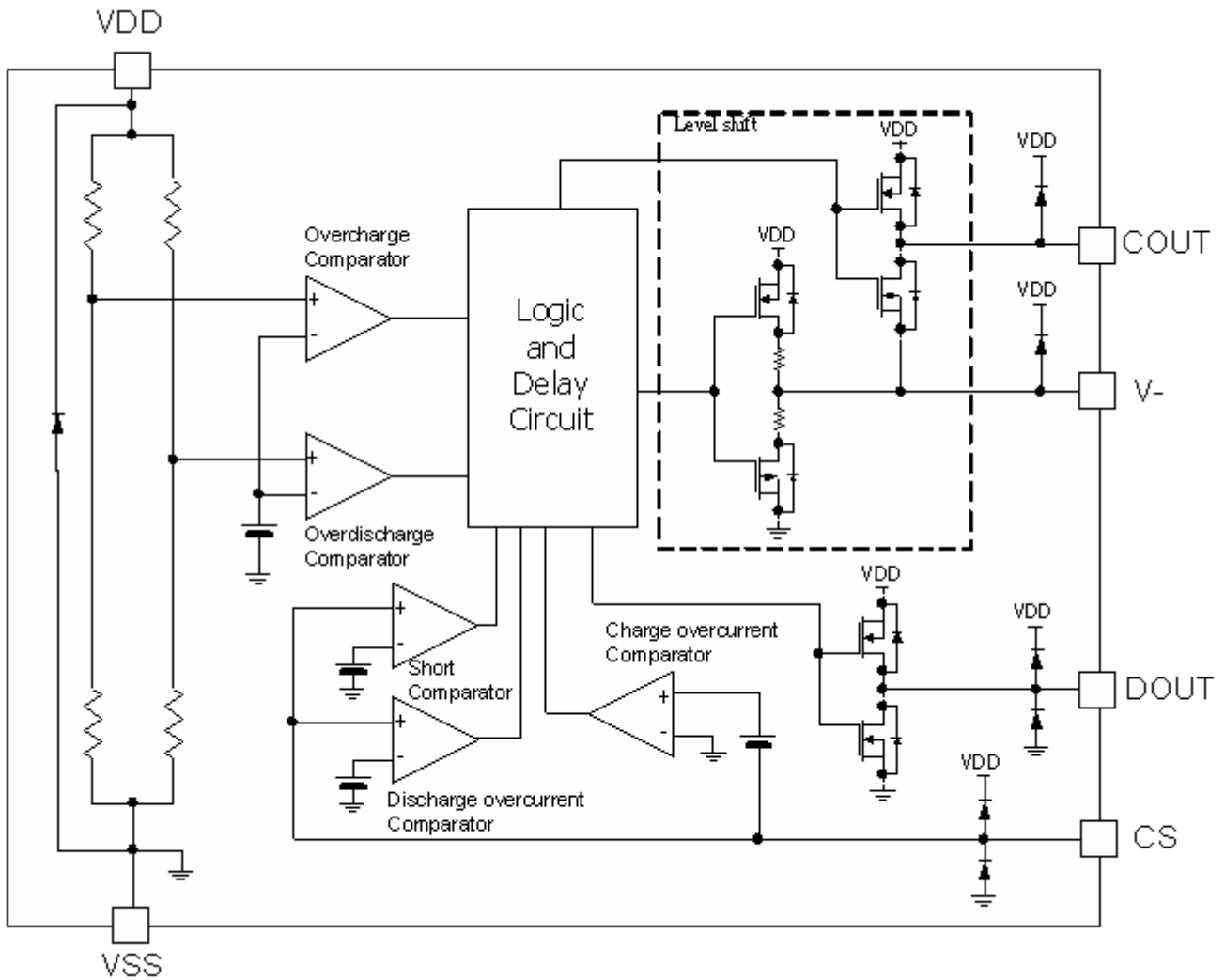
These devices have limited build-in ESD protection. The leads must be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## Package and Pin Configurations

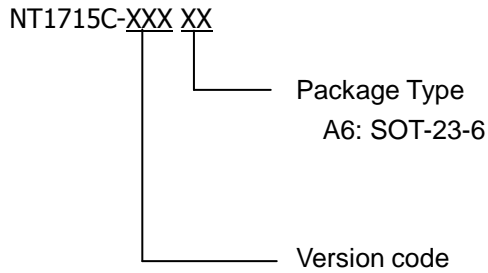


Pin No.	Symbol	Pin description
1	DOUT	Connection of discharge control FET gate
2	COUT	Connection of charge control FET gate
3	V-	Voltage detection between V- pin and VSS pin
4	CS	Current sense pin (low-voltage)
5	VDD	Connection for positive power supply input
6	VSS	Connection for negative power supply input

**Functional Block Diagram**



## Ordering Information



## Product version code:

Table1: Detection threshold level table

Product Name	Version Code	Package Type	Over-charge Detection Voltage	Over-charge Release Voltage	Over-discharge detection voltage	Over-discharge release voltage	Discharge over-current detection voltage	Charge over-current detection	Load short-circuiting detection voltage
			$V_{DET1}$ (V)	$V_{REL1}$ (V)	$V_{DET2}$ (V)	$V_{REL2}$ (V)	$V_{DET3}$ (V)	$V_{DET4}$ (V)	$V_{SHORT}$ (V)
NT1715C	TAA	A6	3.750	3.500	2.000	2.650	0.090	-0.030	0.40
NT1715C	DPA	A6	4.200	4.200	2.700	3.000	0.090	-0.030	0.40
NT1715C	FKA	A6	4.250	4.250	2.500	3.000	0.090	-0.030	0.40

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

Table2: Latch function

Product Name	Version Code	Latch function of Over-charge	0V Battery Charge Function	Power down mode	Auto Over-discharge Recovery Function	Delay Time (Table3)
NT1715C	TAA	No	Available	No	Yes	(3)
NT1715C	DPA	Yes	Available	No	Yes	(3)
NT1715C	FKA	Yes	Available	No	Yes	(3)

Table3: Delay Time table

Delay time	Over-charge delay time $t_{VDET1}$ (S)	Over-discharge delay time $t_{VDET2}$ (mS)	Discharge over-current delay time $t_{VDET3}$ (mS)	Charge over-current delay time $t_{VDET4}$ (mS)	Load short-circuiting delay time $t_{SHORT}$ (uS)
(3)	1.00 +/- 30%	125 +/- 30%	88.0 +/- 30%	8.0 +/- 30%	250 +40% /- 30%