

General Description

The DW01 battery protection IC is designed to protect lithium-ion/polymer battery from damage or degrading the lifetime due to overcharge, overdischarge, and/or overcurrent for one-cell lithium-ion/polymer battery powered systems, such as cellular phones.

The ultra-small package and less required external components make it ideal to integrate the DW01 into the limited space of battery pack. The accurate $\pm 50\text{mV}$ overcharging detection voltage ensures safe and full utilization charging. The very low standby current drains little current from the cell while in storage.

Features

- Reduction in Board Size due to Miniature Package SOT-23-6.
- Ultra-Low Quiescent Current at $3\ \mu\text{A}$ ($V_{\text{CC}}=3.6\text{V}$).
- Overdischarge Current at $4\ \mu\text{A}$ ($V_{\text{CC}}=1.8\text{V}$).
- Precision Overcharge Protection Voltage $4.3\text{V} \pm 50\text{mV}$
- Two Detection Levels for Overcurrent Protection.
- Delay times are generated by internal circuits. No external capacitors required.

Ordering Information

PACKAGE TYPE
SOT-23-6

TEMPERATURE RANGE
 $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

OVERCHARGE PROTECTION
 $4.3\text{V} \pm 50\text{mV}$

Applications

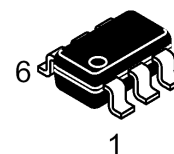
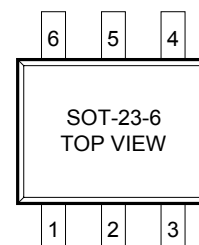
- Protection IC for One-Cell Lithium-Ion / Lithium-Polymer Battery Pack

Product Name List

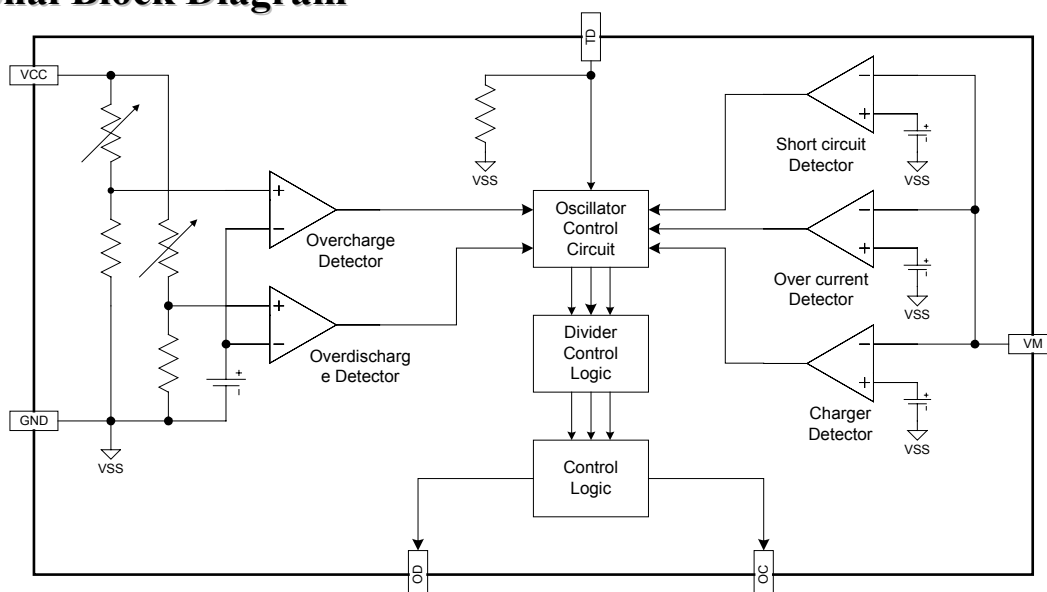
Product	Package	Overcharge detection voltage [VOCp] (V)	Overcharge release voltage [VOCR] (V)	Overdischarge detection voltage [VODP] (V)	Overdischarge release voltage [VODR] (V)	Overcurrent detection voltage [VOI1] (mV)	0V battery charge function	Stand by function release
DW01	SOT-23-6	4.300±0.050	4.100±0.050	2.50±0.1	2.90±0.1	150±20	available	Auto Recovery

Pin Configuration

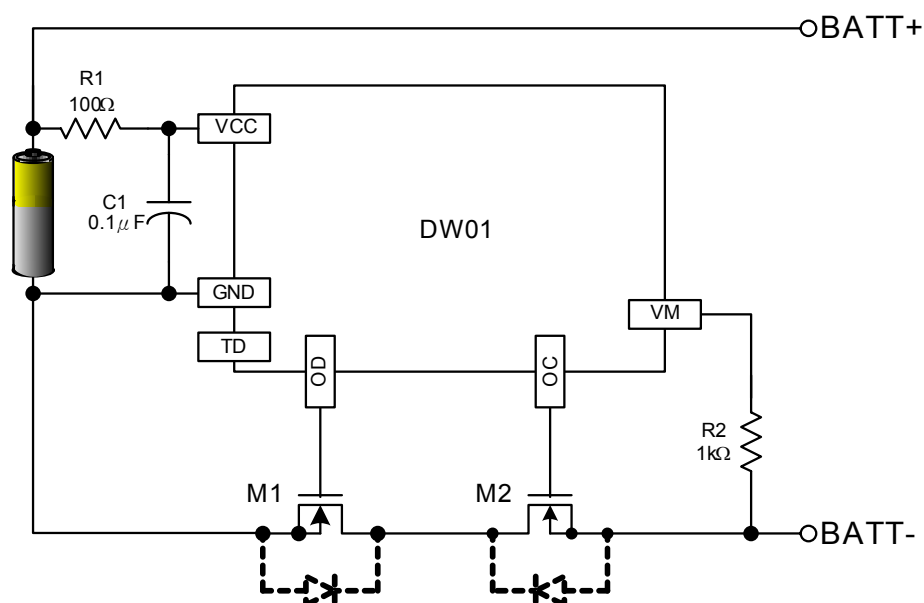
Pin No.	Symbol	Description
1	OD	MOSFET gate connection pin for discharge control
2	VM	Input pin for current sense, charger detect
3	OC	MOSFET gate connection pin for charge control
4	TD	Test pin for reduce delay time
5	VCC	Power supply, through a resistor (R1)
6	GND	Ground pin



Functional Block Diagram



Typical Application Circuit



Absolute Maximum Ratings

(VSS=0V, Ta=25 °C unless otherwise specified)

Item	Symbol	Rating	Unit
Input voltage between VDD and VSS	VDD	0.3 to 10	V
OC output pin voltage	VOC	VDD-24 to VDD+0.3	V
OD output pin voltage	VOD	VSS-0.3 to VDD+0.3	V
CS input pin voltage	Vcs	VDD-24 to VDD+0.3	V
Operating Temperature Range	TOP	-40 to +85	°C
Storage Temperature Range	TST	-40 to +125	°C

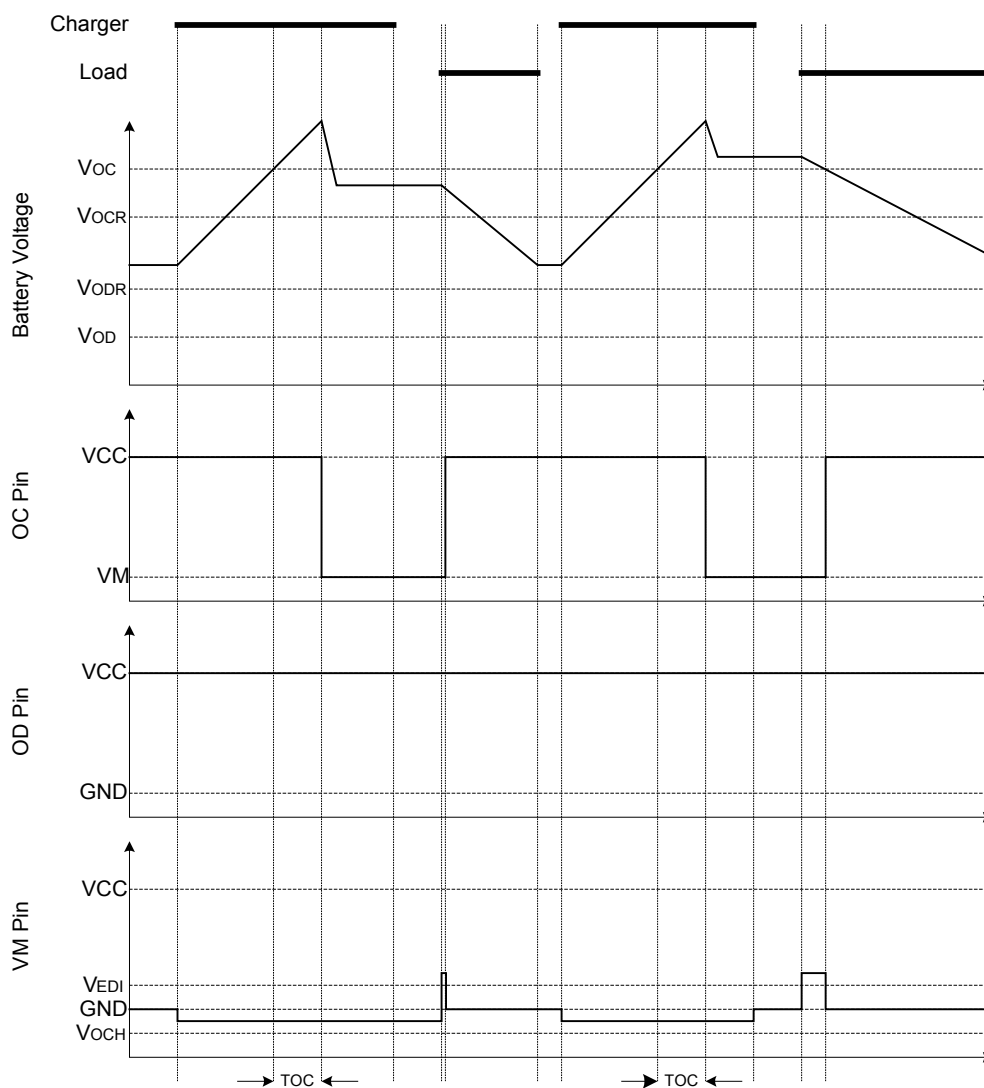
Electrical Characteristics

(Ta=25° C unless otherwise specified)

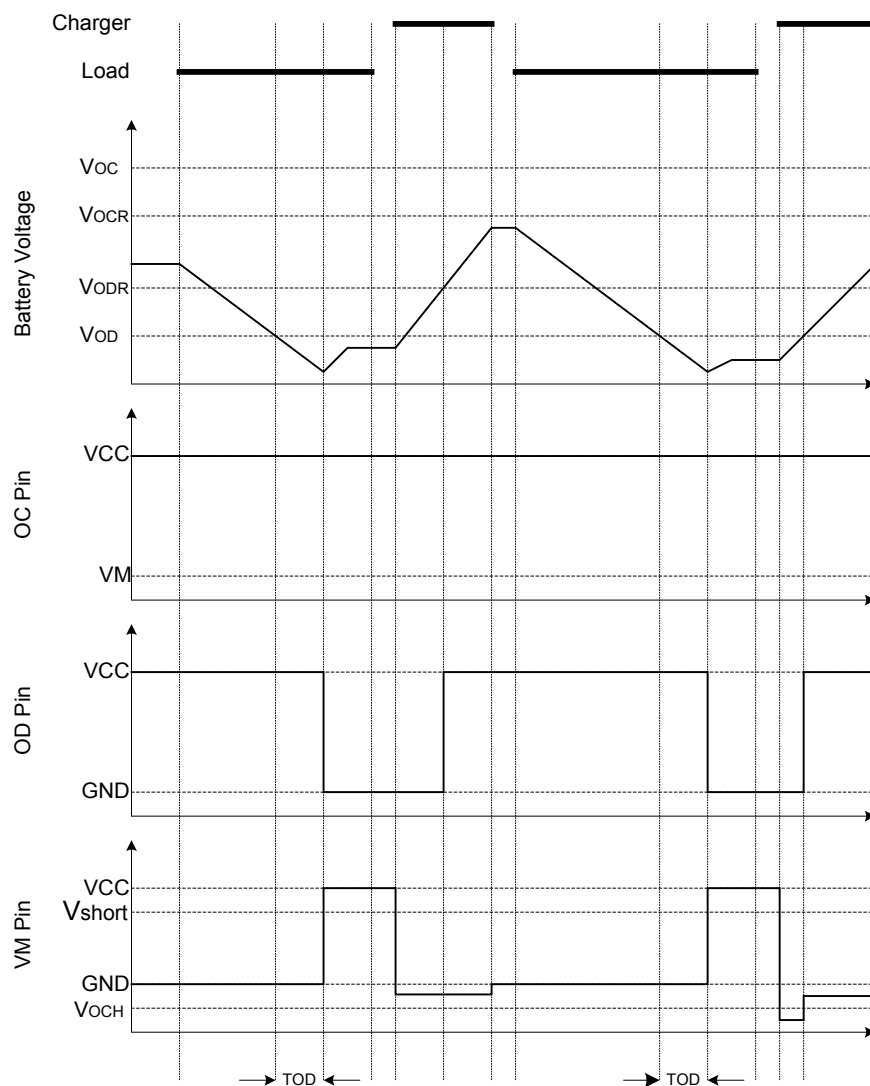
PARAMETER	TEST CONDITIONS	SYMBOL	Min	Typ	Max	UNIT
Supply Current	VCC=3.6V	ICC		3.0	6.0	μ A
Power-Down Current	VCC=1.8V	IPD			4	μ A
0V Battery Charge Starting Charger Voltage		V0CHA	1.2			V
Overcharge Protection Voltage		VOC	4.25	4.30	4.35	V
Overcharge Release Voltage		VOCR	4.05	4.10	4.15	V
Overdischarge Protection Voltage		VOD	2.40	2.50	2.60	V
Overdischarge Release Voltage		VODR	2.80	2.90	3.00	V
Overcurrent Protection Voltage		VEDI	130	150	170	mV
Short Current Protection Voltage		Vshort	0.82	1.36	1.75	V
Overcharge Delay Time		TOC		110	200	ms
Overdischarge Delay Time	VCC=3.6V to 2.4V	TOD		55	200	ms
Overcurrent Delay Time (1)		TEDI		7	20	ms
Overcurrent Delay Time (2)		Tshort		400	600	μ s
OD Pin Output "H" Voltage	VCC=3.9V ICO=10uA	DoutH	VCC-0.4	VCC-0.2		V
OD Pin Output "L" Voltage	VCC=2V IDO=10uA	DoutL		0.2	0.5	V
OC Pin Output "H" Voltage	VCC=3.9V ICO=10uA	CoutH	VCC-0.1	VCC-0.02		V

Timing Diagram

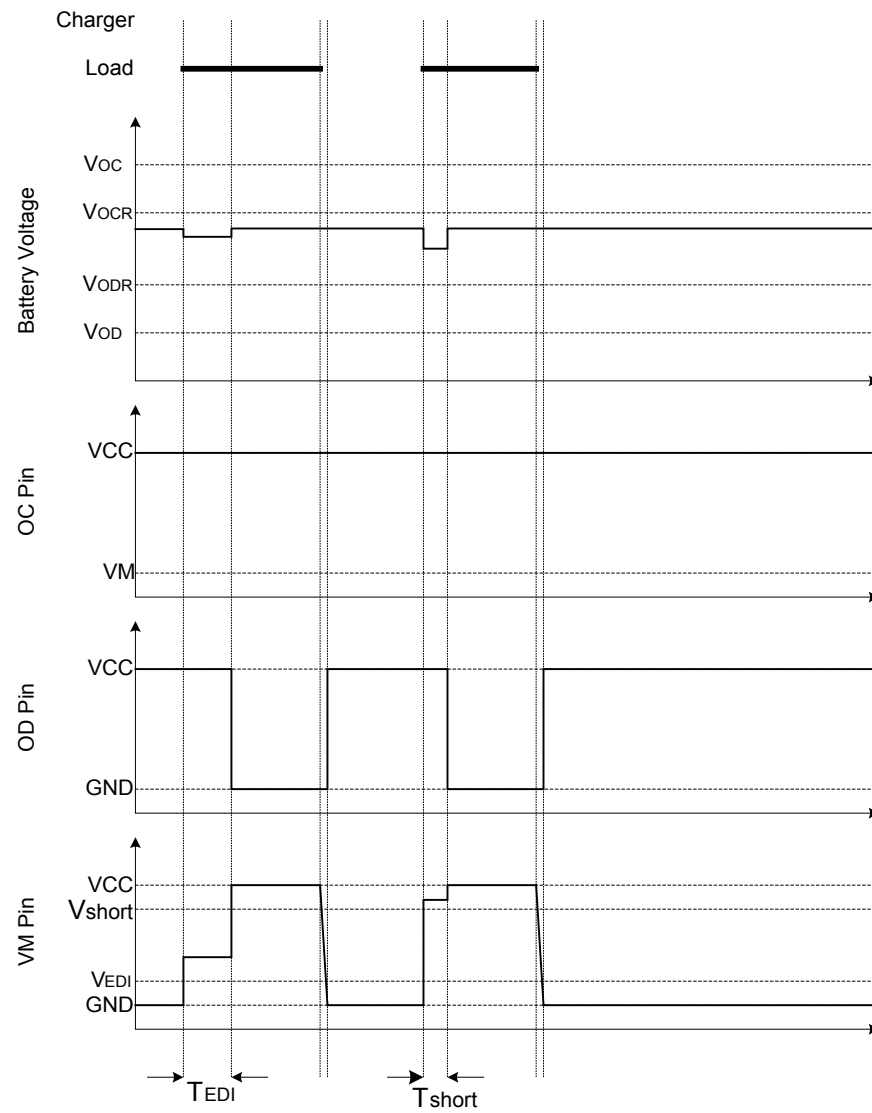
1. Overcharge Condition → Load Discharging → Normal Condition



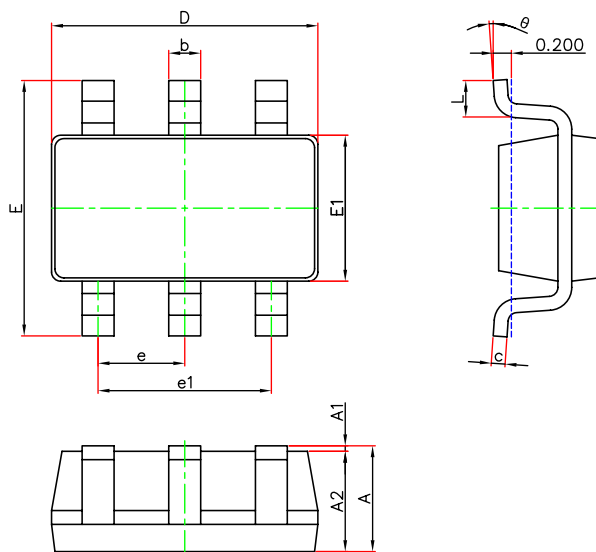
2. Overdischarge Condition → Charging by a Charger → Normal Condition



3. Over Current Condition → Normal Condition

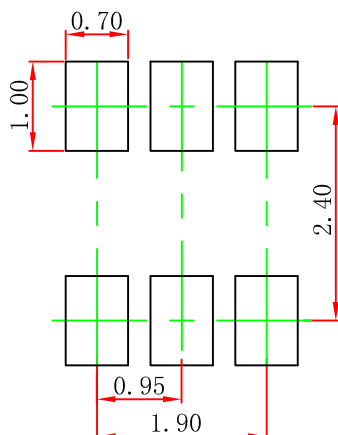


SOT-23-6 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-23-6 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters
2. General tolerance: $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only