Features

- Protection of Charger Reverse Connection
- Protection of Battery Cell Reverse Connection
- Over-temperature Protection
- Overcharge Current Protection
- Two-step Overcurrent Detection:
  Over Discharge Current
  Load Short Circuiting
- Charger Detection Function
- RoHS Compliant and Lead (Pb) Free
- 45mΩ Low $R_{SS(ON)}$ Internal Power MOSFET
- Delay Times are generated inside
- High-accuracy Voltage Detection
- Low Current Consumption
  Operation Mode: 2.5μA typ.
  Power-down Mode: 1.5μA typ.
- Only One External Capacitor Required
- Available in SOT23-5 Package
- -40°C to +85°C Temperature Range

Applications

- One-Cell Li-ion Battery Pack
- Power Bank
- One-Cell Li-poly Battery Pack
- IOT Sensor/Electronic Toys

Typical Application Circuit

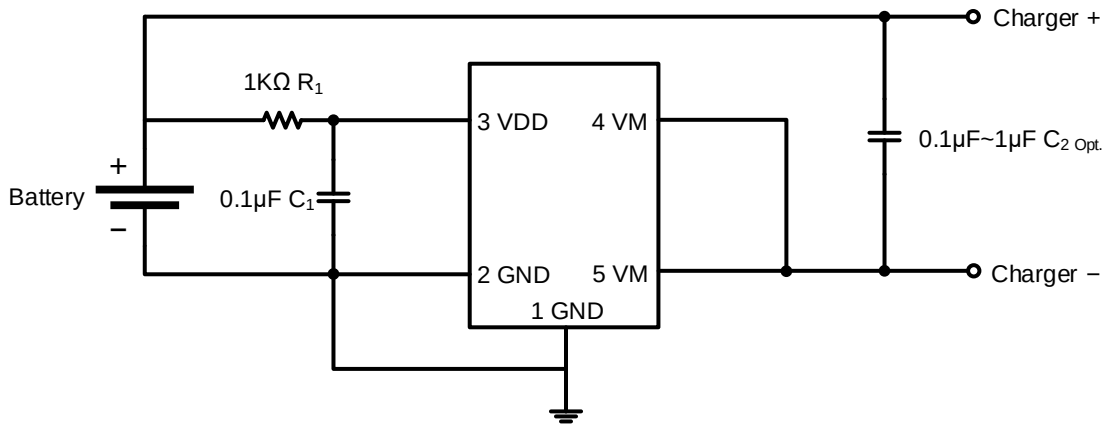


Figure 1. Typical Application Circuit

Absolute Maximum Ratings (1) (2)

VDD Input Voltage ……..….. -0.3V to 6V
VM Input Voltage ……..….. -6V to 10V V_{BS}
Operating Temperature …...-40°C to +85°C
Storage Temperature Range ……. -55°C to 150°C
Lead Temperature (Soldering, 10s) ……... +300°C
Junction Temperature……..……..…+125°C
θ_{JA} ……..…….…….....250°C/W
ESD (Human Body Made) HMB……..…….2KV
θ_{JC} ……..……..……..….....130°C/W
ESD (Machine Made) MM…….... 200V

Note 1: Exceeding these ratings may damage the device.

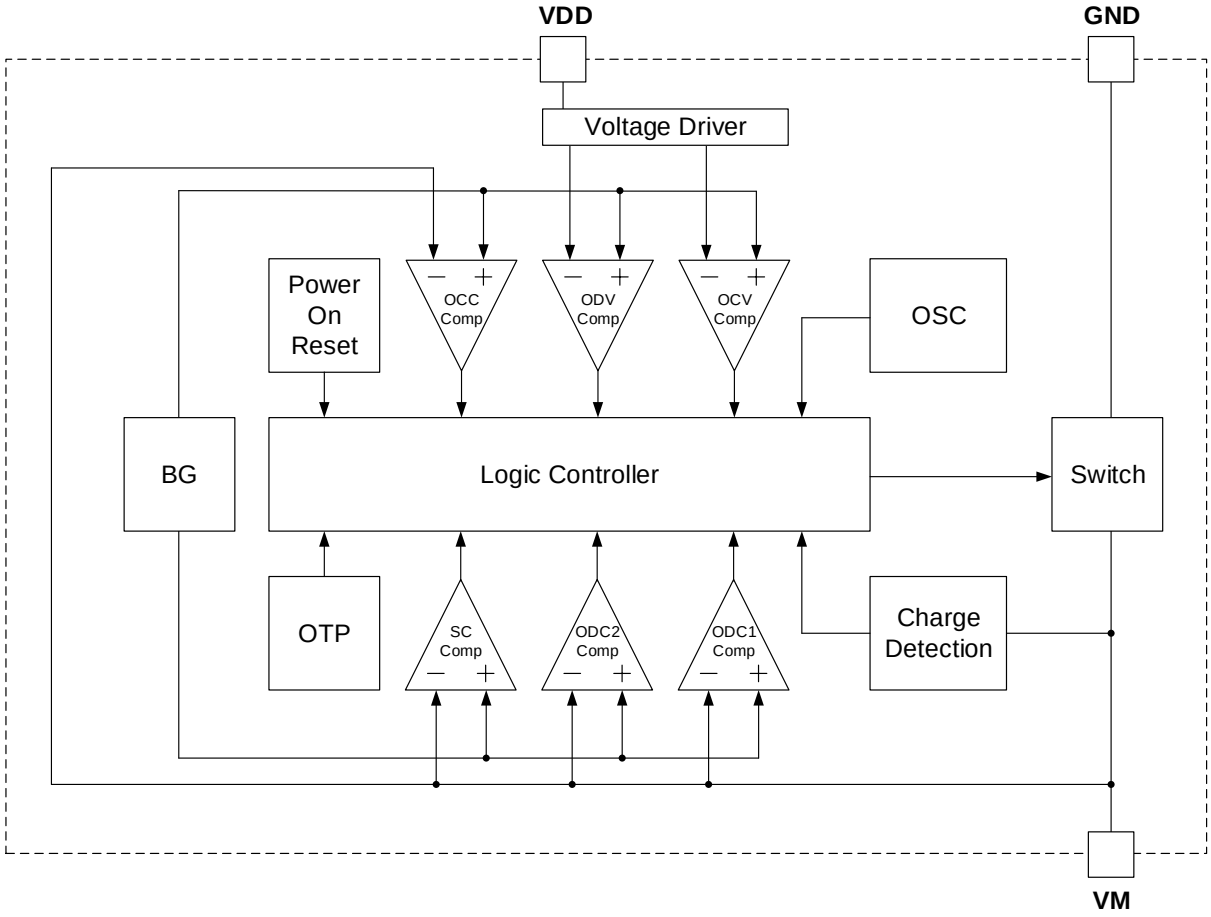
Note 2: The device is not guaranteed to function outside of its operating conditions.

Electrical Characteristics (3)

Parameter	Symbol	Test Conditions	Min	Typ.	Max	Unit
Detection Voltage						
Overcharge Detection Voltage	V_{CU}		4.25	4.3	4.35	V
Overcharge Release Voltage	V_{CL}		4.05	4.1	4.15	V
Overdischarge Detection Voltage	V_{DL}		2.3	2.4	2.5	V
Overdischarge Release Voltage	V_{DR}		2.9	3.0	3.1	V
Charger Detection Voltage	*V_{CHA}			-0.12		V
Detection Current						
Overdischarge Current1 Detection	*I_{IOV1}	V_{DD}=3.6V		3		A
Load Short-Circuiting Detection	*I_{SHORT}	V_{DD}=3.6V		15		A
Current Consumption						
Current Consumption in Operation	I_{OPE}	V_{DD}=3.6V VM=0V		2.5	5	μA
Current Consumption in power Down	I_{PDN}	V_{DD}=2.0V VM floating		1.5	4	μA
VM Internal Resistance						
Resistance between VM and V_{DD}	*R_{VMD}	V_{DD}=3.6V VM=1.0V		320		kΩ
Resistance between VM and GND	*R_{VMS}	V_{DD}=2.0V VM=1.0V		25		kΩ
FET on Resistance						
Equivalent FET on Resistance	*$R_{SS(ON)}$	V_{DD}=3.6V I_{VM}=1.0A		45		mΩ
Over Temperature Protection						
Over Temperature Protection	*T_{SHD+}			130		℃
Over Temperature Recovery Degree	*T_{SHD-}			100		℃
Detection Delay Time						
Overcharge Voltage Detection Delay Time	t_{CU}			128	200	mS
Overdischarge Voltage Detection Delay Time	t_{DL}			40	60	mS
Overdischarge Current Detection Delay Time	*t_{IOV}	V_{DD}=3.6V		10		mS
Load Short-Circuiting Detection Delay Time	*t_{SHORT}	V_{DD}=3.6V		80		μS

Note 3: *The parameter is guaranteed by design.

Functional Block Diagram



Overdischarge current detection

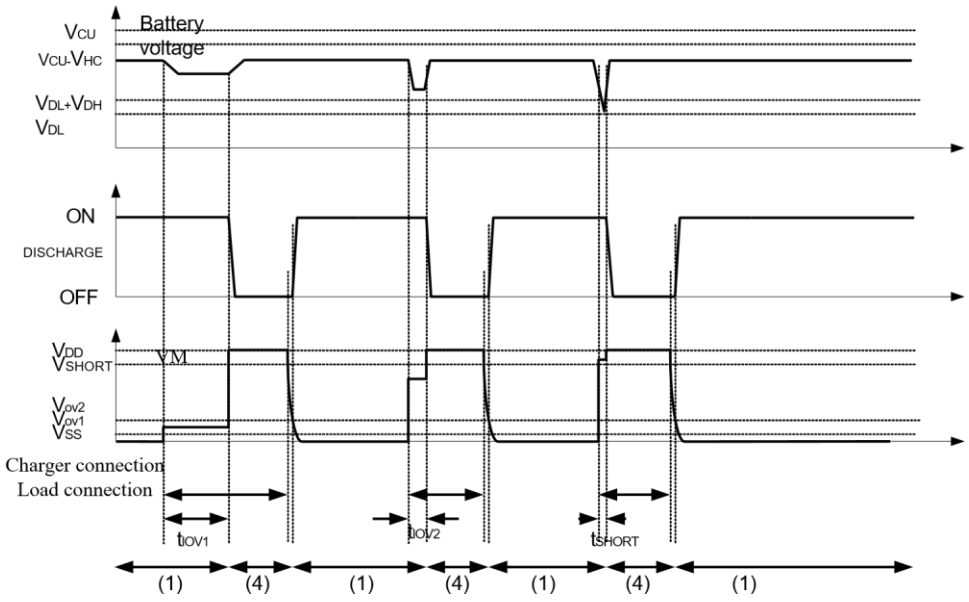


Figure5-2 Overdischarge Current Detection

Remark:

(1) Normal condition (2) Overcharge voltage condition

(3) Overdischarge voltage condition (4) Overcurrent condition

Charger Detection

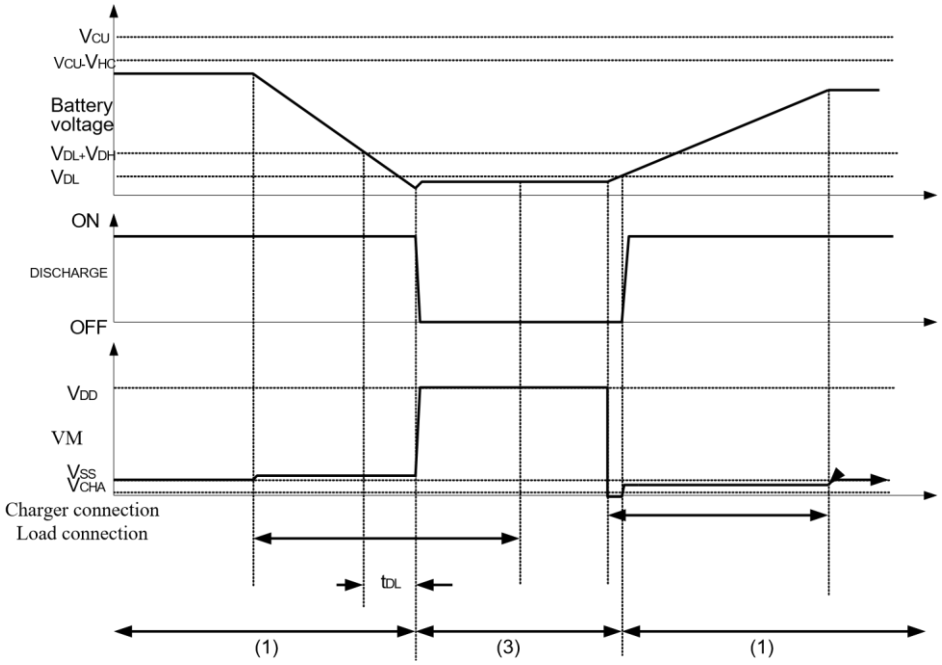


Figure5-3 Charger Detection

Remark:

(1) Normal condition (2) Overcharge voltage condition

(3) Overdischarge voltage condition (4) Overcurrent condition

Pin Description

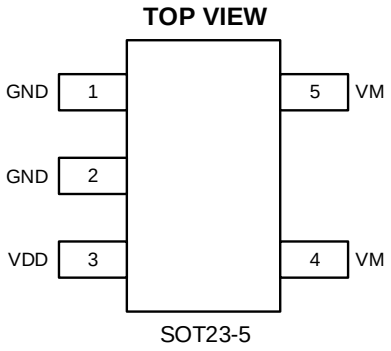


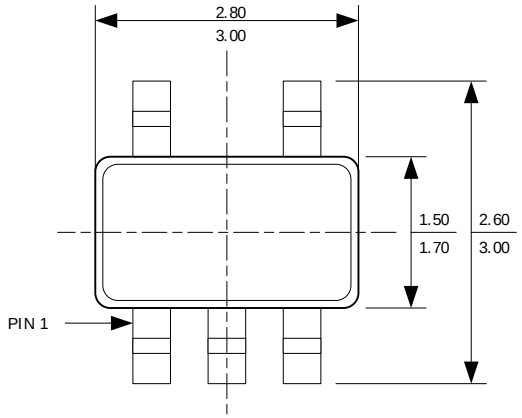
Figure 2. Pin Configuration

Pin Description

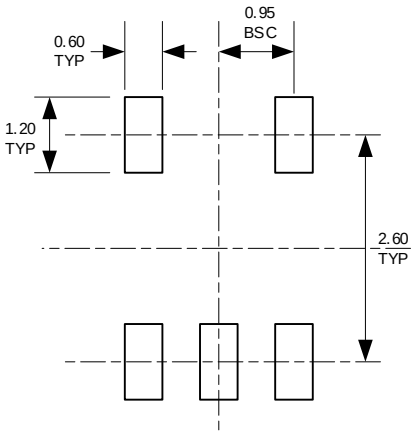
Pin	Name	Function
1	GND	Ground Pin
2	GND	Ground Pin
3	VDD	Power Supply Pin
4	VM	The negative terminal of the battery pack. The internal FET switch connects this terminal to GND
5	VM	The negative terminal of the battery pack. The internal FET switch connects this terminal to GND

Package Description

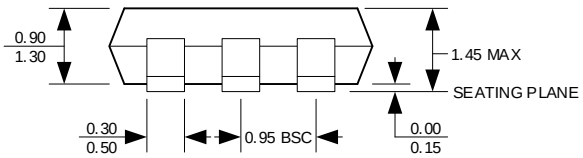
SOT23-5



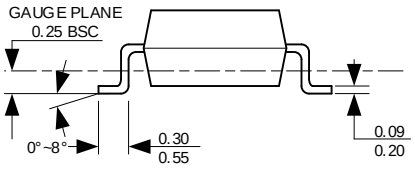
TOP VIEW



RECOMMENDED PAD LAYOUT



FRONT VIEW



SIDE VIEW

NOTE:
1. CONTROL DIMENSION IS IN INCHES. DIMENSION IN BRACKET IS IN MILLIMETERS.
2. PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
3. PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS.
4. LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.004" INCHES MAX.
5. DRAWING CONFORMS TO JEDEC MS-012, VARIATION BA.
6. DRAWING IS NOT TO SCALE.