

# LV51131T

## Specifications

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Parameter		Symbol	Conditions	Ratings	Unit
Power Supply Voltage		V <sub>DD</sub>		-0.3 to +12	V
Input Voltage Charger Minus Voltage		V-		V <sub>DD</sub> -28 to V <sub>DD</sub> +0.3	V
Output Voltage	Cout Pin Voltage	V <sub>cout</sub>		V <sub>DD</sub> -28 to V <sub>DD</sub> +0.3	V
	Dout Pin Voltage	V <sub>dout</sub>		V <sub>SS</sub> -0.3 to V <sub>DD</sub> +0.3	V
Allowable Power Dissipation		P <sub>d max</sub>	Independent IC	170	mW
Operating Ambient Temperature		T <sub>opr</sub>		-30 to +85	°C
Storage Temperature		T <sub>stg</sub>		-40 to +125	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Absolute maximum rating shows the permission level that must not surpass even for an instant.
2. Even if LV521131T was used within the absolute maximum rating, if it operate frequently on high temperature and high current or high voltage or great temperature changes in succession, reliability might decrease.

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operation input voltage	V <sub>cell</sub>	V <sub>DD</sub> - V <sub>SS</sub> between voltage	1.5		10	V
0 V cell charging minimum operation voltage	V <sub>min</sub>	V <sub>DD</sub> - V <sub>SS</sub> = 0, V <sub>DD</sub> - V between voltage			1.5	V
Over-charge detection voltage	V <sub>d1</sub>		4.325	4.350	4.375	V
		T <sub>a</sub> = 0-45°C (Note 4)	4.315	4.350	4.385	V
Over-charge release voltage	V <sub>r1</sub>	V <sub>M</sub> ≤ V <sub>d3</sub>	4.100	4.150	4.200	V
		V <sub>M</sub> > V <sub>d3</sub>	4.250		4.360	V
Over-charge detection delay time	t <sub>d1</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V → 4.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	0.5	1.0	1.5	s
Over-charge release delay time	t <sub>r1</sub>	V <sub>DD</sub> - V <sub>c</sub> = 4.5 V → 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	20.0	40.0	60.0	ms
Over-discharge detection voltage	V <sub>d2</sub>		2.20	2.30	2.40	V
Over-discharge release hysteresis voltage	V <sub>h2</sub>		10.0	20.0	40.0	mV
Over-discharge detection delay time	t <sub>d2</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V → 2.2 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	50	100	150	ms
Over-discharge release delay time	t <sub>r2</sub>	V <sub>DD</sub> - V <sub>c</sub> = 2.2 V → 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	0.5	1.0	1.5	ms
Over-current detection voltage	V <sub>d3</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	0.130	0.150	0.170	V
Over-current release hysteresis voltage	V <sub>h3</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	5.0	10.0	20.0	mV
Over-current detection delay time	t <sub>d3</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	10.0	20.0	30.0	ms
Short-current release delay time	t <sub>r3</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	0.5	1.0	1.5	ms
Short circuit detection voltage	V <sub>d4</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	1.0	1.3	1.6	V
Short circuit detection delay time	t <sub>d4</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	0.125	0.250	0.500	ms
Excessive charger detection voltage	V <sub>d5</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V (V-) - V <sub>SS</sub> between voltage	-0.60	-0.45	-0.30	V
Release hysteresis voltage	V <sub>h5</sub>	V <sub>DD</sub> - V <sub>c</sub> = 3.5 V, V <sub>c</sub> - V <sub>SS</sub> = 3.5 V	25.0	50.0	100.0	mV

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified) (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Stand-by release voltage	V <sub>stb</sub>	V <sub>DD</sub> - V <sub>C</sub> = 2.0 V, V <sub>C</sub> - V <sub>SS</sub> = 2.0 V (V <sup>-</sup> ) - V <sub>SS</sub> between voltage	V <sub>DD</sub> × 0.4	V <sub>DD</sub> × 0.5	V <sub>DD</sub> × 0.6	V
Excessive charger detection delay time	td5	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V (Note 3)	0.5	1.5	3.0	ms
Excessive charger release delay time	tr5	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	0.5	1.5	3.0	ms
Internal resistance (VM-VDD)	R <sub>DD</sub>	When overcharge is detected	100	200	400	kΩ
Internal resistance (VM-VSS)	R <sub>SS</sub>	When over current or short circuit is detected	15	30	60	kΩ
Cout Nch ON voltage	V <sub>OL1</sub>	I <sub>OL</sub> = 50 μA, V <sub>DD</sub> - V <sub>C</sub> = 4.4 V, V <sub>C</sub> - V <sub>SS</sub> = 4.4 V			0.5	V
Cout Pch ON voltage	V <sub>OH1</sub>	I <sub>OL</sub> = 50 μA, V <sub>DD</sub> - V <sub>C</sub> = 3.9 V, V <sub>C</sub> - V <sub>SS</sub> = 3.9 V	V <sub>DD</sub> - 0.5			V
D <sub>OUT</sub> Nch ON voltage	V <sub>OL2</sub>	I <sub>OL</sub> = 50 μA, V <sub>DD</sub> - V <sub>C</sub> = 2.2 V, V <sub>C</sub> - V <sub>SS</sub> = 2.2 V			0.5	V
D <sub>OUT</sub> Pch ON voltage	V <sub>OH2</sub>	I <sub>OL</sub> = 50 μA, V <sub>DD</sub> - V <sub>C</sub> = 3.9 V, V <sub>C</sub> - V <sub>SS</sub> = 3.9 V	V <sub>DD</sub> - 0.5			V
V <sub>C</sub> input current	I <sub>vc</sub>	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V		0.0	1.0	μA
Current consumption	I <sub>DD</sub>	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V		6.0	13.0	μA
Stand-by current	I <sub>stb</sub>	V <sub>DD</sub> - V <sub>C</sub> = 2.2 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V			0.2	μA
T-terminal input ON voltage	V <sub>tst</sub>	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	V <sub>DD</sub> × 0.4	V <sub>DD</sub> × 0.5	V <sub>DD</sub> × 0.6	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Over charge detection to over discharge battery is It is delay time from after over-discharge return.

4. This specification value is the design target value and does not check at production test.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -20°C to 60°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operation input voltage	V <sub>cell</sub>	V <sub>DD</sub> - V <sub>SS</sub> between voltage	1.65		10	V
0 V cell charging minimum operation voltage	V <sub>min</sub>	V <sub>DD</sub> - V <sub>SS</sub> = 0, V <sub>DD</sub> - V between voltage			1.65	V
Over-charge detection voltage	V <sub>d1</sub>	(Note 6)	4.305	4.350	4.390	V
Over-charge reset voltage	V <sub>h1</sub>	VM ≤ V <sub>d3</sub>	4.080	4.150	4.215	V
		VM > V <sub>d3</sub>	4.235		4.375	V
Over-charge detection delay time	td1	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V → 4.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	0.350	1.000	2.400	s
Over-charge reset delay time	tr1	V <sub>DD</sub> - V <sub>C</sub> = 4.5 V → 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	14.0	40.0	96.0	ms
Over-discharge detection voltage	V <sub>d2</sub>		2.18	2.30	2.42	V
Over-discharge release hysteresis voltage	V <sub>h2</sub>		8.0	20.0	42.0	mV
Over-discharge detection delay time	td2	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V → 2.2 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	35	100	240	ms
Over-discharge release delay time	tr2	V <sub>DD</sub> - V <sub>C</sub> = 2.2 V → 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	0.35	1.0	2.4	ms
Over-current detection voltage	V <sub>d3</sub>	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	0.120	0.150	0.180	V
Over-current release hysteresis voltage	V <sub>h3</sub>	V <sub>DD</sub> - V <sub>C</sub> = 3.5 V, V <sub>C</sub> - V <sub>SS</sub> = 3.5 V	3.5	10.0	23.0	mV

**ELECTRICAL CHARACTERISTICS** ( $T_A = -20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ , unless otherwise specified) (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Over-current detection delay time	td3	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	7.0	20.0	48.0	ms
Over-current release delay time	tr3	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	0.35	1.0	2.4	ms
Short circuit detection voltage	Vd4	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	0.9	1.3	1.7	V
Short circuit detection delay time	td4	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	0.049	0.250	0.800	ms
Excessive charger detection voltage	Vd5	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$ (V-) - $V_{SS}$ between voltage	-0.70	-0.45	-0.20	V
Release hysteresis voltage	Vh5	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	21.0	50.0	112.0	mV
Stand-by release voltage	Vstb	$V_{DD} - V_C = 2.0\text{ V}$ , $V_C - V_{SS} = 2.0\text{ V}$ (V-) - $V_{SS}$ between voltage	$V_{DD} \times 0.4$	$V_{DD} \times 0.5$	$V_{DD} \times 0.6$	V
Excessive charger detection delay time	td5	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$ (Note 5)	0.35	1.5	4.8	ms
Excessive charger release delay time	tr5	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	0.35	1.5	4.8	ms
Internal resistance ( $V_M - V_{DD}$ )	$R_{DD}$	When overcharge is detected	70	200	520	$k\Omega$
Internal resistance ( $V_M - V_{SS}$ )	$R_{SS}$	When over current or short circuit is detected	10.5	30	78	$k\Omega$
Cout Nch ON voltage	$V_{OL1}$	$I_{OL} = 50\text{ }\mu\text{A}$ , $V_{DD} - V_C = 4.4\text{ V}$ , $V_C - V_{SS} = 4.4\text{ V}$			0.5	V
Cout Pch ON voltage	$V_{OH1}$	$I_{OL} = 50\text{ }\mu\text{A}$ , $V_{DD} - V_C = 3.9\text{ V}$ , $V_C - V_{SS} = 3.9\text{ V}$	$V_{DD} - 0.5$			V
Dout Nch ON voltage	$V_{OL2}$	$I_{OL} = 50\text{ }\mu\text{A}$ , $V_{DD} - V_C = 2.2\text{ V}$ , $V_C - V_{SS} = 2.2\text{ V}$			0.5	V
Dout Pch ON voltage	$V_{OH2}$	$I_{OL} = 50\text{ }\mu\text{A}$ , $V_{DD} - V_C = 3.9\text{ V}$ , $V_C - V_{SS} = 3.9\text{ V}$	$V_{DD} - 0.5$			V
$V_C$ input current	$I_{VC}$	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$		0.0	1.0	$\mu\text{A}$
Current consumption	$I_{DD}$	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$		6.0	16.9	$\mu\text{A}$
Stand-by current	$I_{stb}$	$V_{DD} - V_C = 2.2\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$			0.2	$\mu\text{A}$
T-terminal input ON voltage	$V_{test}$	$V_{DD} - V_C = 3.5\text{ V}$ , $V_C - V_{SS} = 3.5\text{ V}$	$V_{DD} \times 0.4$	$V_{DD} \times 0.5$	$V_{DD} \times 0.6$	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. Over charge detection to over discharge battery is It is delay time from after over-discharge return.

6. This specification value is the design target value and does not check at production test.

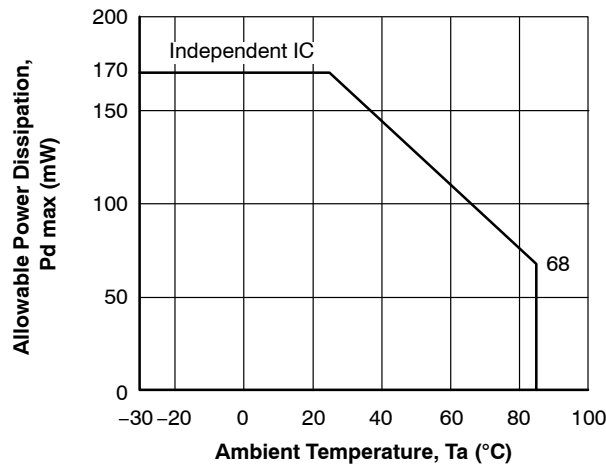


Figure 1.  $P_d \text{ max}$  vs.  $T_A$

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## PIN ASSIGNMENT

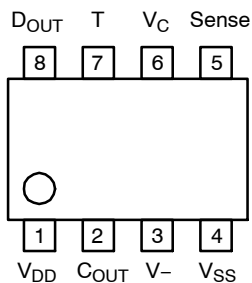


Figure 2. Pin Assignment (Top View)

## PIN FUNCTION

Pin No.	Symbol	Description
1	$V_{DD}$	$V_{DD}$ pin
2	$C_{OUT}$	Overcharge detection output pin
3	$V^-$	Charger minus voltage input pin
4	$V_{SS}$	$V_{SS}$ pin
5	Sense	Sense pin
6	$V_C$	Intermediate voltage input pin
7	T	Pin to shorten detection time ([H]: Shortening mode, [L] or [open]: normal mode)
8	$D_{OUT}$	Over-discharge detection output pin

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## BLOCK DIAGRAM

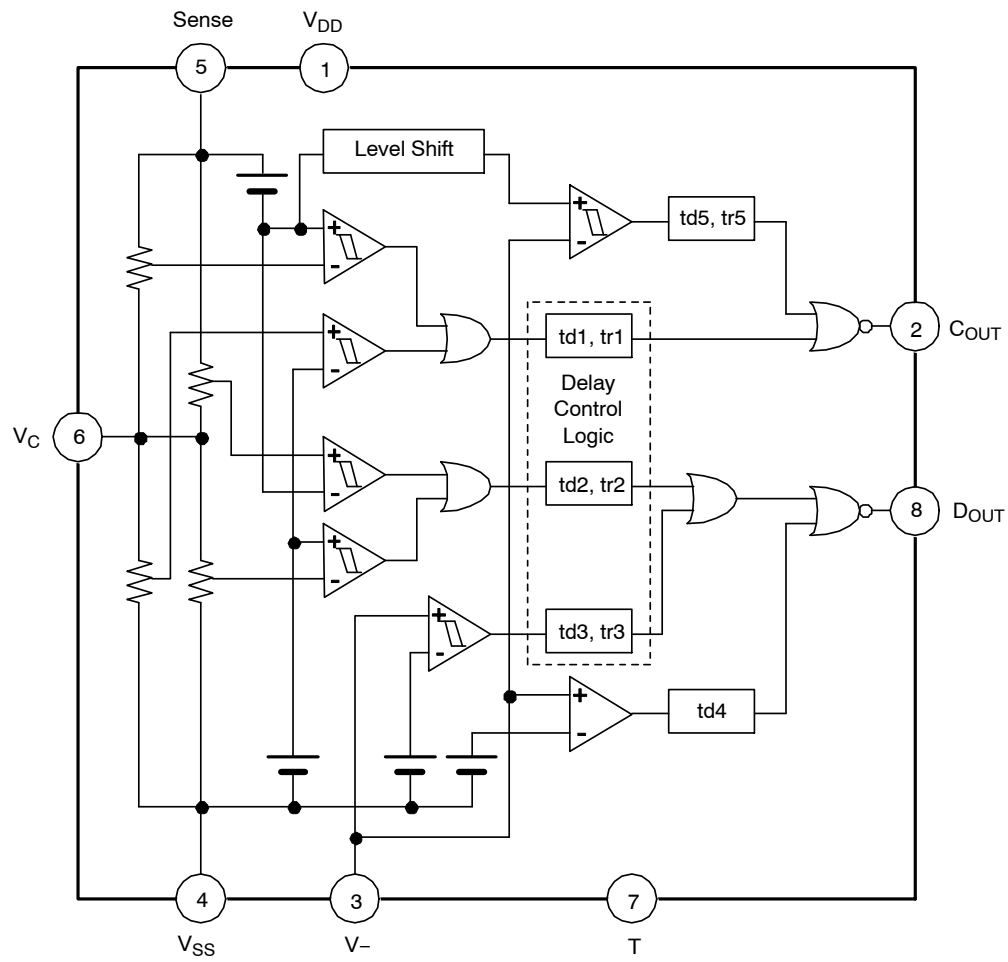


Figure 3. Block Diagram

## FUNCTIONAL DESCRIPTION

**Over-charge Detection**

If either of the cell voltage is equal to or more than the over-charge detection voltage, stop further charging by turning “L” the Cout pin and turning off external Nch MOS FET after the over-charge detection delay time. This delay time is set by the internal counter.

The over-charge detection comparator has the hysteresis function. Note that this hysteresis can be cancelled by connecting the load after detection of over-charge detection, and hysteresis become decrease to value peculiar to comparator.

Once over-charge detection is made, over-current detection is not made to prevent malfunction. Note that short-circuit can be detected.

**Over-charge Return**

If charger is connected and both cell voltages become equal to or lower than the over-charge recovery voltage or over-charge detection voltage when load is connected, the Cout pin returns to “H” after the over-charge recovery delay time set by the internal counter.

When load is connected and either cell or both cell voltages are equal to or more than the over-charge detection voltage, the Cout pin does not return to “H.” When the load current is passed through the external Cout pin parasite diode of Nch MOS FET after the over-charge recovery delay time and each cell voltage becomes equal to or below over-charge detection voltage, the Cout returns to “H.”

However, high voltage charger is connected as mentioned below, Cout pin does not return to “H” because over-charger detection sequence starts after over-charge recovery.

**Over-discharge Detection**

When either cell voltage is equal to or below over-discharge voltage, stop further discharge by turning “L” the Dout pin and turning off external Nch MOS FET after the over-charge detection delay time.

The IC becomes standby state after detecting over-discharge and its consumption current is kept at about 0 A. After detection, the V<sup>-</sup> pin will be connected to V<sub>DD</sub> pin via 200 kΩ.

**Over-discharge Return**

Return from over-discharge is made by connecting charger. If the V<sup>-</sup> pin voltage becomes equal to or lower than the standby return voltage by connecting charger after detecting over-discharge, it returns from the standby state to start cell voltage monitoring. If both voltages become equal to or more than the over-discharge detection voltage by charging, the Dout pin returns to “H” after the over-discharge return delay time set by the internal counter.

**Over-current Detection**

When high current is passed through the battery, the V potential rises by the ON resistor of external MOS FET and becomes equal to or more than the over-current detection

voltage, that will be deemed over-current state. Turn “L” the Dout pin after the over-current detection delay time and turn off the external Nch MOS FET to prevent high current in the circuit. The delay time is set by the internal counter. After detection, the V<sup>-</sup> pin will be connected to V<sub>SS</sub> via 30 kΩ. It will not go into standby state after detecting over-current.

**Short Circuit Detection**

If greater discharge current is passed and the V<sup>-</sup> pin voltage becomes equal to or more than the short-circuit detection voltage, it will go into short-circuit detection state after the short circuit delay time shorter than the over-current detection delay time. When short-circuit is detected, just like the time of over-current detection, turn Dout pin “L” and turn off external Nch MOS FET to prevent high current in the circuit. The V<sup>-</sup> pin will be connected to V<sub>SS</sub> after detection via 30 kΩ. It will not go into standby state after detecting short-circuit.

**Over-current/Short-detection Return**

After detecting over-current or short circuit, the return resistor (typ. 30 kΩ) between V<sup>-</sup> pin and V<sub>SS</sub> pin becomes effective and if the resistor is opened the V<sup>-</sup> pin voltage will be pulled by the V<sub>SS</sub> pin voltage. Thereafter, the IC will return from the over-current/short-circuit detection state when the V<sup>-</sup> pin voltage becomes equal to or below the over-current detection voltage and the Dout pin returns to “H” after over-current return delay time set by the internal counter.

**Over-charger Detection/Return**

If the potential difference between V<sup>-</sup> pin and V<sub>SS</sub> pin becomes equal to or below the over-charger detection voltage by connecting a charger, no charging can be made by turning “L” the Cout pin after certain delay time and turning off the external Nch MOS FET. If this difference returns to equal to or more than the over-charger detection voltage during detection delay time, the over-charger detection will be stopped. If the potential difference between V<sup>-</sup> pin and V<sub>SS</sub> pin becomes equal to or more than the over-charger detection voltage after over-charger detection, the Cout returns to “H” after certain time. The detection/return delay time is set internally.

If Dout pin is “L” charging will be made through the external Nch FET parasite diode of Dout pin. In that case, the potential difference between V<sup>-</sup> pin and V<sub>SS</sub> pin becomes -V<sub>f</sub> which is equal to or less than the over-charger detection voltage, no over-charger detection will be made during over-discharge, over-current or short-circuit detection. Further, if over-discharged battery is connected to over-charger, no over-charger detection is made while the Dout pin is “L.”

If the battery voltage rises to the over-discharge detection voltage through the parasite diode and the Dout pin becomes “H”, and the potential difference between V<sup>-</sup> pin and V<sub>SS</sub>

pin is equal to or below the over-charger detection voltage, the delay operation will be started after Dout pin becoming “H.”

#### 0 V Cell Charge

If the cell voltage is 0 V but a potential difference between  $V_{DD}$  and V becomes equal to or greater than the 0 V cell charging lowest operation voltage, the Cout pin will output “H” and enable charging.

#### Test Time Reduction Function

By turning T pin to the  $V_{DD}$  potential, the delay times set by the counter can be cut. Normal time settings if T pin is open. Delay time not set by the counter cannot be controlled by this pin. Recommend that connect the T terminal to VSS terminal if it is possible. Because the malfunction such as it becoming a standby mode by the power supply voltage drop caused by the excessive electric current at the time of load short circuits is assumed by a board layout.

### OPERATION IN CASE OF DETECTION OVERLAP

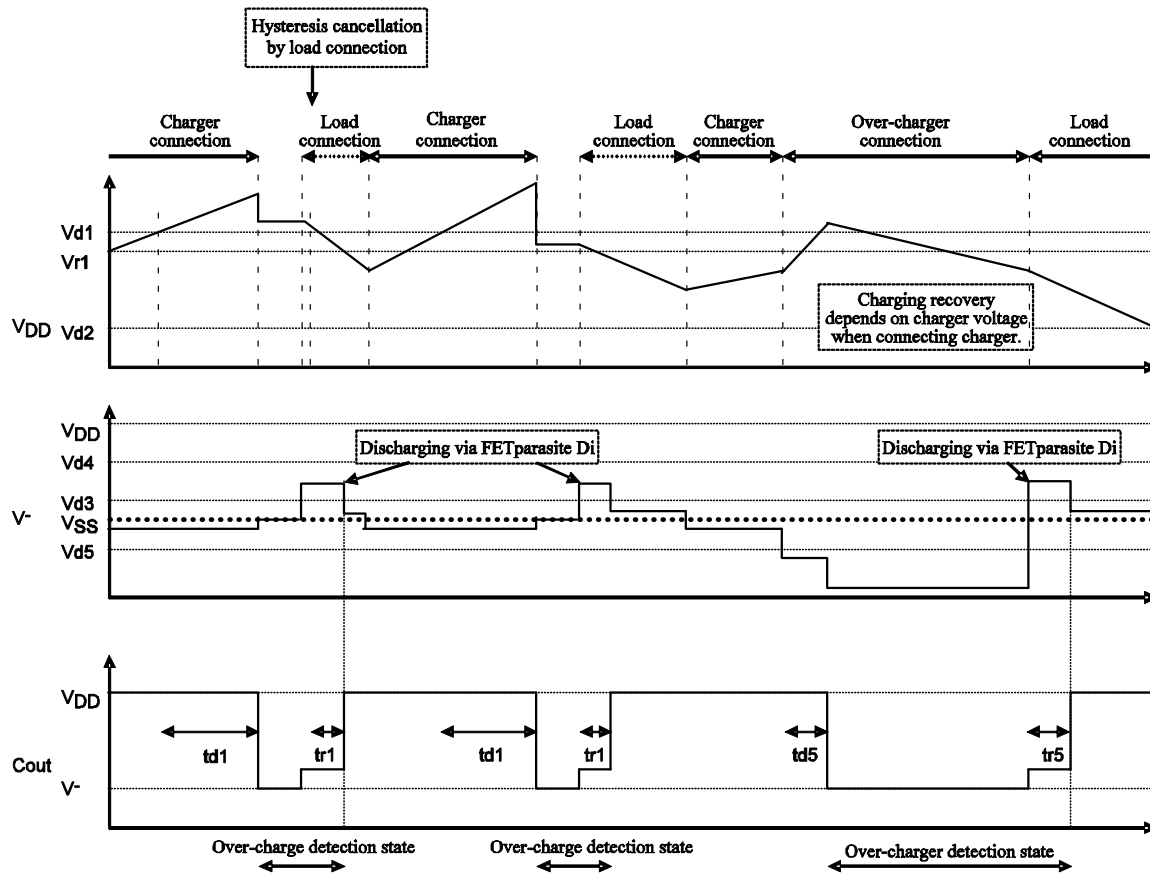
#### OPERATION IN CASE OF DETECTION OVERLAP

Overlap State		Operation in Case of Detection Overlap	State after Detection
When, during over-charge detection	Over-discharge detection is made	Over-charge detection is preferred. If over-discharge state continues even after over-charge detection, over-discharge detection is resumed.	When over-charge detection is made first, $V^-$ is released. When over-discharge is detected after over-charge detection, the standby state is not effectuated. Note that $V^-$ is connected to $V_{DD}$ via 200 k $\Omega$ .
	Over-current detection is made	(*1) Both detections' can be made in parallel. Over-charge detection continues even when the over-current state occurs. If the over-charge state occurs first, over-current detection is interrupted.	(*2) When over-current is detected first, $V^-$ is connected to $V_{SS}$ via 30 k $\Omega$ . When over-charge detection is made first, $V^-$ is released.
When, during over-discharge detection	Over-charge detection is made	Over-discharge detection is interrupted and over-charge detection is preferred. When over-discharge state continues even after over-charge detection, over-discharge detection is resumed.	The standby state is not effectuated when over-discharge detection is made after over-charge detection. Note that $V^-$ is connected to $V_{DD}$ via 200 k $\Omega$ .
	Over-current detection is made	(*3) Both detections can be made in parallel. Over-discharge detection continues even when the over-current state is effectuated first. Over-current detection is interrupted when the over-discharge state is effectuated first,	(*4) If over-current is detected in advance, V will be connected to $V_{SS}$ via 30 k $\Omega$ . After detecting over-discharge, V will be connected to $V_{DD}$ via 200 k $\Omega$ to get into standby state. If over-discharge is detected in advance, V will be connected to $V_{DD}$ via 200 k $\Omega$ to get into standby state.
When, during over-current detection	Over-charge detection is made	(*1)	(*2)
	Over-discharge detection is made	(*3)	(*4)

NOTE: Short-circuit detection can be made independently.

Over-charger detection does not work during over-discharge, over-current or short-circuit detection and the delay time starts after return from these states.

## TIMING CHART

Figure 4. C<sub>OUT</sub> Output System



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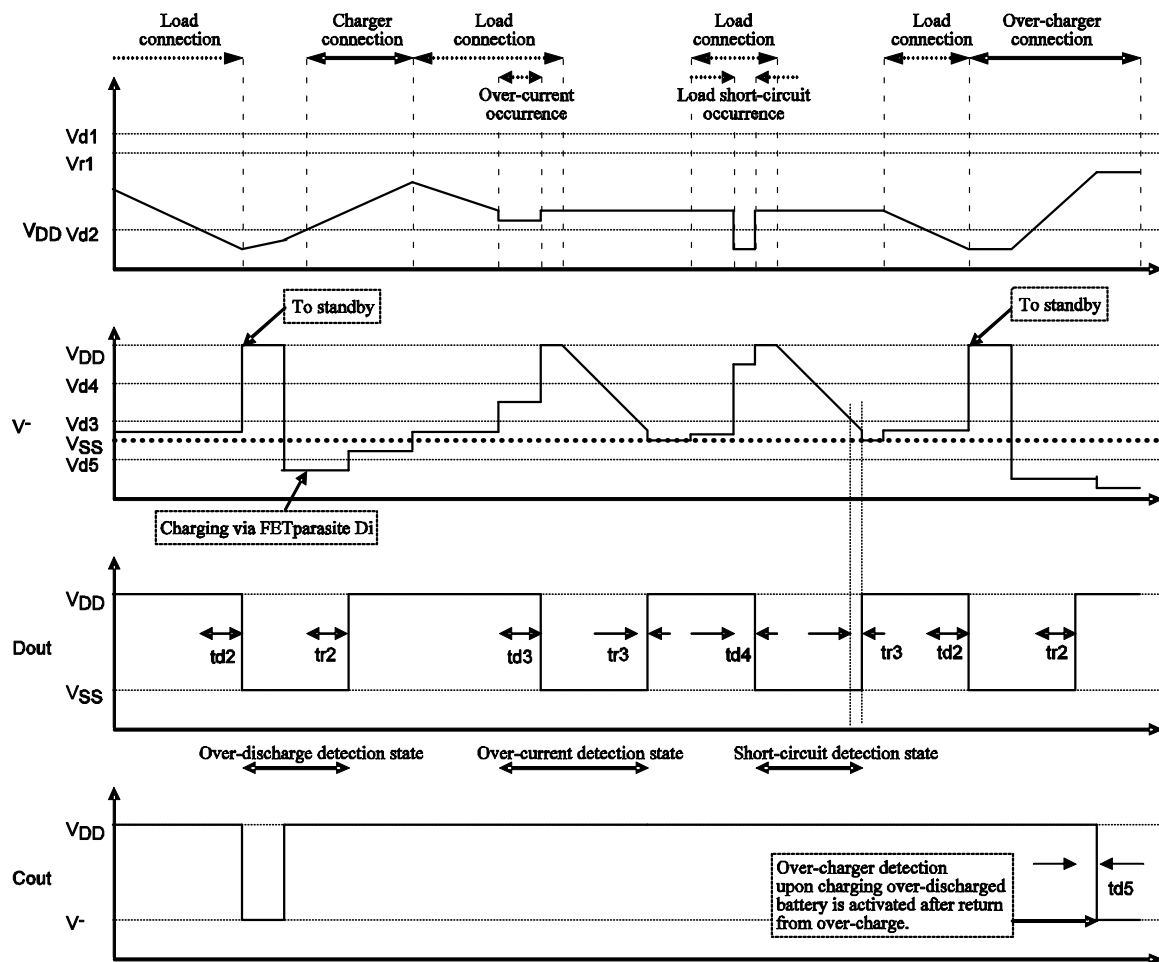


Figure 5.  $D_{OUT}$  Output System

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## APPLICATION CIRCUIT EXAMPLE

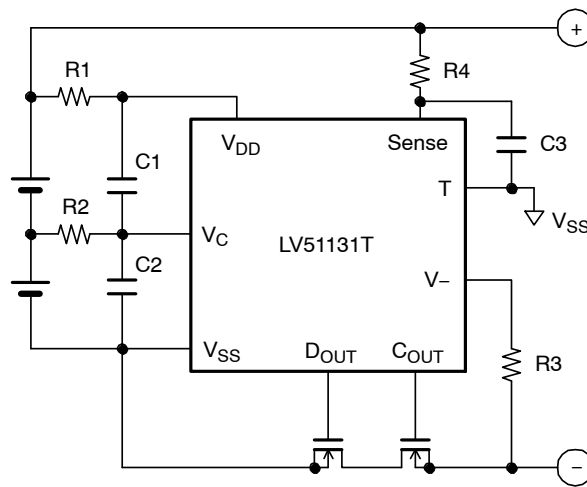


Figure 6. Application Circuit Example

Components	Recommended Value	Max	Unit
R1, R2	100	500	$\Omega$
R3	2	4	k $\Omega$
R4	100	500	$\Omega$
C1, C2, C3	0.1	1	$\mu F$

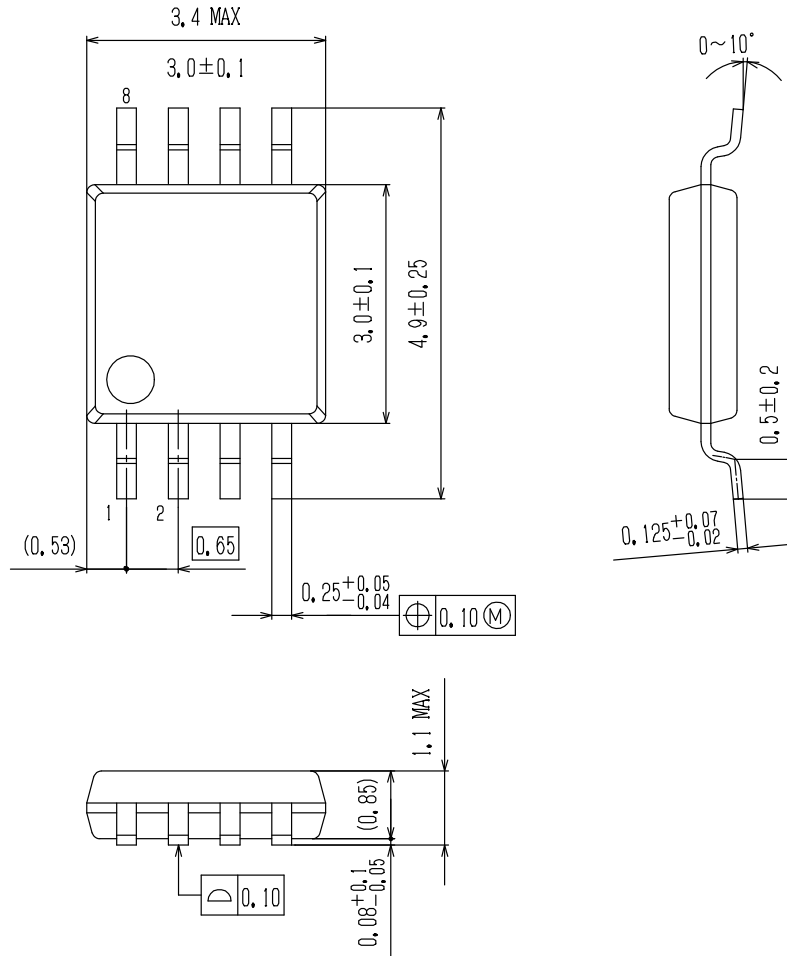
\*These numbers don't mean to guarantee the characteristic of the IC.

\*In addition to the components in the upper diagram, it is necessary to insert a capacitor with enough capacity between  $V_{DD}$  and  $V_{SS}$  of the IC as near as possible to stabilize the power supply voltage to the IC.

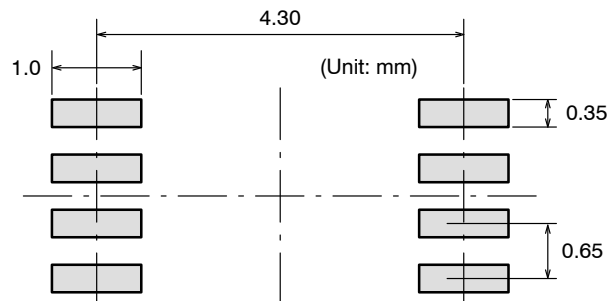
# LV51131T

## PACKAGE DIMENSIONS

Micro8 / MSOP8 (150 mil)  
CASE 846AH  
ISSUE A




### SOLDERING FOOTPRINT\*



NOTE: The measurements are not to guarantee but for reference only.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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