



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

Monolithic Digital IC

# LB1938T — 1ch, Low-saturation Forward/Reverse Motor Driver

## Overview

The LB1938T is an H-bridge motor driver that supports low-voltage drive and features low-saturation outputs in an ultraminiature slim package. The LB1938T provides forward, reverse, brake, and standby modes controlled by two input signals, and is an optimal DC motor driver for notebook personal computers, digital cameras, cell phones, and other portable equipment.

## Features

- Ultraminiature MSOP8 package (3.0mm×4.9mm×0.93mm)
- The low saturation voltage means that the voltage applied to the motor is higher and IC heat generation is reduced. This allows this IC to be used in environments with higher ambient operating temperatures.  
Output saturation voltage (high side + low side):  $V_{OSat} = 0.15V$  typical ( $I_O = 100mA$ )
- The wide usable voltage range and the low standby mode current drain of  $0.1 \mu A$  make this IC optimal for battery operated equipment.
- There are no constraints on the relationship between the input signal voltage and the supply voltage. For example, this IC can be use at  $V_{CC} = 3V$  and  $V_{IN} = 5V$ .
- Thermal protection circuit limits the drive current and prevents the IC from causing a fire or being destroyed if the IC chip temperature reaches or exceeds  $180^{\circ}C$  due to large currents flowing when the outputs are shorted due to, for example, motor layer shorting or other phenomena.

## Specifications

Absolute Maximum Ratings at  $T_a = 25^{\circ}C$ 

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}$ max		10.5	V
Output current	$I_{OUT}$ max		800	mA
Output voltage	$V_{OUT}$ max		$V_{CC} + V_{SF}$	V
Input applied voltage	$V_{IH}$ max		10	V

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# LB1938T

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Parameter	Symbol	Conditions	Ratings	Unit
Allowable power dissipation	$P_d \text{ max}$	Mounted on a specified board *	400	mW
Operating temperature range	$T_{opr}$		-30 to +85	°C
Storage temperature range	$T_{stg}$		-55 to +150	°C

Note \*: Mounted on a specified board: 114.3mm×76.1mm×1.5mm, glass epoxy resin, wiring density 20%

## Allowable Operating Range at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}$		2.2 to 10	V
Input high-level voltage	$V_{IH}$		2.0 to 9.5	V
Input low-level voltage	$V_{IL}$		-0.3 to +0.3	V

## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3\text{V}$

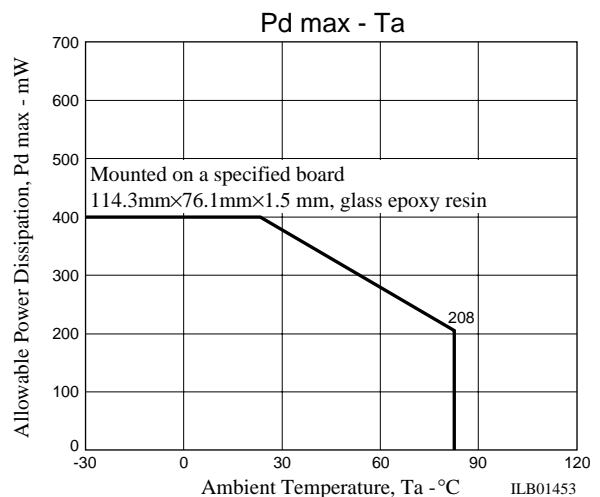
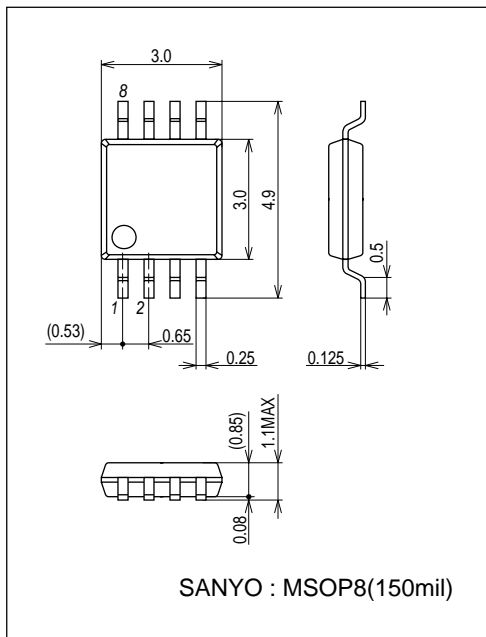
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	$I_{CC1}$	Standby		0.1	5	$\mu\text{A}$
	$I_{CC2}$	Forward/reverse drive		14	19	mA
	$I_{CC3}$	Brake		20	29	mA
Output saturation voltage	$V_{Osat1}$	Upper+lower $I_O = 100\text{mA}$ for forward/reverse rotation		0.15	0.2	V
	$V_{Osat2}$	Upper+lower $I_O = 300\text{mA}$ for forward/reverse rotation		0.35	0.5	V
	$V_{Osat3}$	Upper $I_O = 100\text{mA}$ for braking		0.1	0.15	V
Spark killer diode forward voltage	$V_{SF}$	$I_O = 300\text{mA}$		0.9	1.7	V
Spark killer diode inverse current	$I_{RS}$	$V_{OUT} = 10\text{V}$		0.1	5	$\mu\text{A}$
Input current	$I_{IN}$	$V_{IN} = 5\text{V}$		75	98	$\mu\text{A}$
Thermal protection operating temperature	TSD	Design target value *		180		°C

Note \*: Design target value: Measurement with a single unit not made.

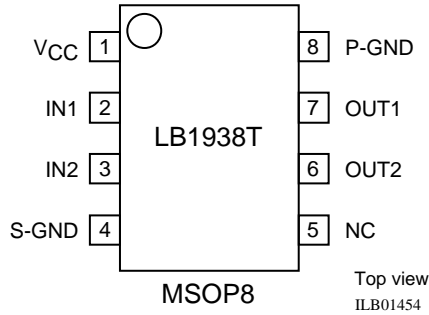
## Package Dimensions

unit : mm (typ)

3245B



## Pin Assignment

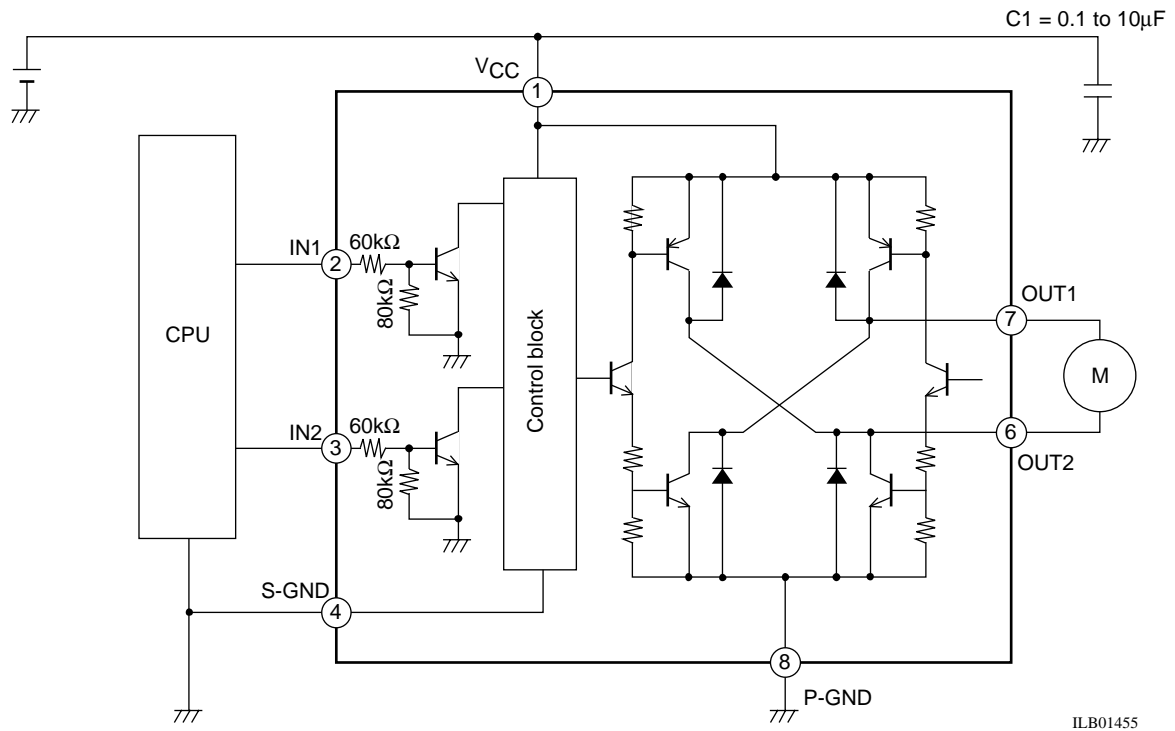


S-GND: GND for the control system  
P-GND: GND for the power system

## Truth Table

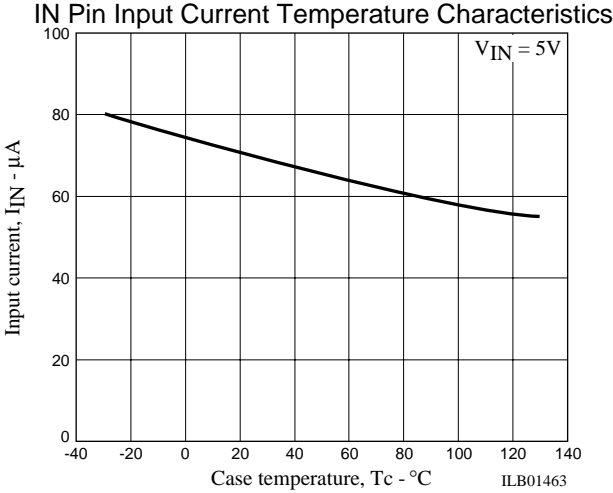
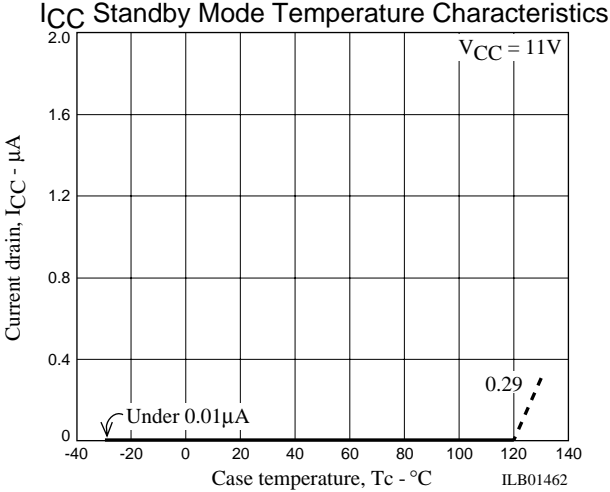
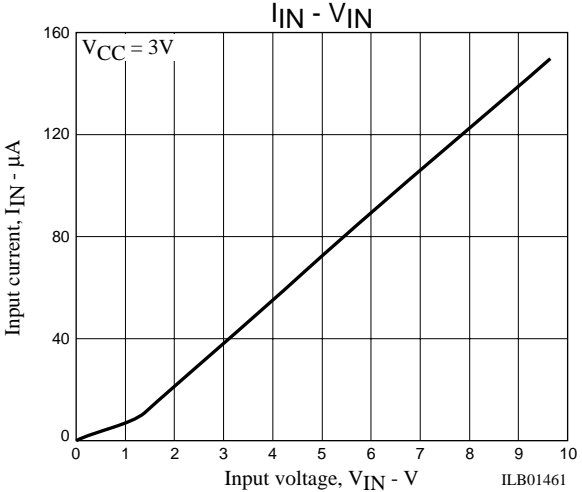
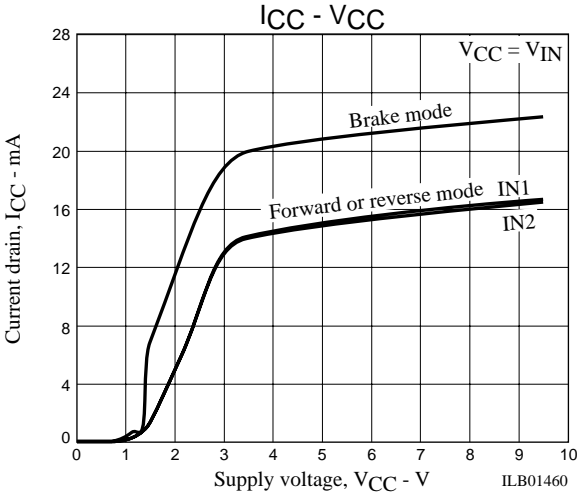
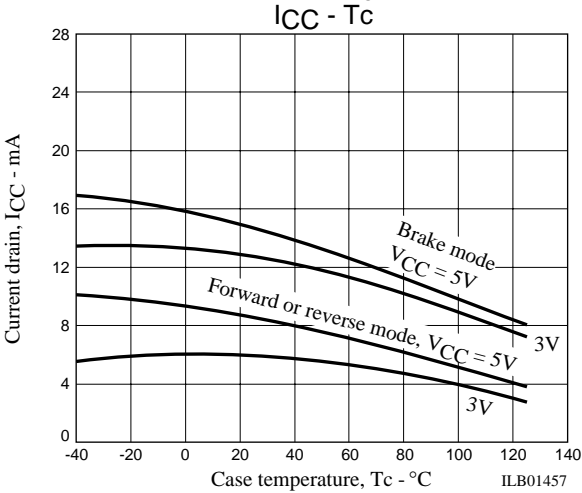
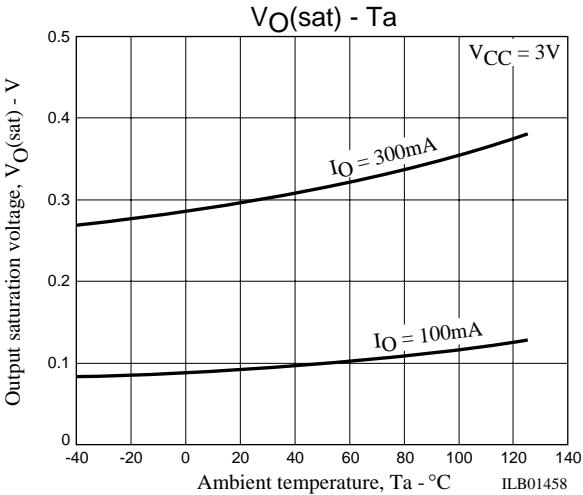
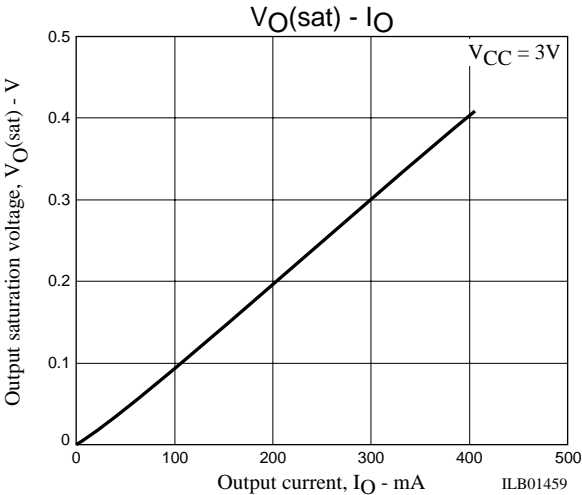
IN1	IN2	OUT1	OUT2	Mode
L	L	OFF	OFF	Standby
H	L	H	L	Forward rotation
L	H	L	H	Reverse rotation
H	H	H	H	Brake

## Sample Application Circuit



## Cautions:

- VCC and GND lines suffer substantial fluctuation in the current quantity, causing a problem of line oscillation in certain cases. In this case, take following points into account:
  - (1) Use a thick and short wiring to reduce the wiring inductance.
  - (2) Insert a capacitor with satisfactory frequency characteristics near IC.
  - (3) Connect S-GND to the control system GND on the CPU side and P-GND to the power system GND.



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