



# SANYO Semiconductors

## DATA SHEET

# LB1938FA — Monolithic Digital IC

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

### Overview

The LB1938FA is an H-bridge motor driver that supports low-voltage drive and features low-saturation outputs in an ultraminiature slim package. The LB1938FA 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 Micro8 package
- 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    |

Continued on next page.

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment. The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for new introduction or other application different from current conditions on the usage of automotive device, communication device, office equipment, industrial equipment etc. , please consult with us about usage condition (temperature, operation time etc.) prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

■ Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

# LB1938FA

Continued from preceding page.

| Parameter                   | Symbol | Conditions                     | Ratings     | Unit |
|-----------------------------|--------|--------------------------------|-------------|------|
| Allowable power dissipation | Pd max | Mounted on a specified board * | 400         | mW   |
| Operating temperature range | Topr   |                                | -30 to +85  | °C   |
| Storage temperature range   | Tstg   |                                | -55 to +150 | °C   |

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

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

## Allowable Operating Range at Ta = 25°C

| Parameter                | Symbol          | Conditions | Ratings      | Unit |
|--------------------------|-----------------|------------|--------------|------|
| Supply voltage           | V <sub>CC</sub> |            | 2.2 to 10    | V    |
| Input high-level voltage | V <sub>IH</sub> |            | 2.0 to 9.5   | V    |
| Input low-level voltage  | V <sub>IL</sub> |            | -0.3 to +0.3 | V    |

## Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 3V

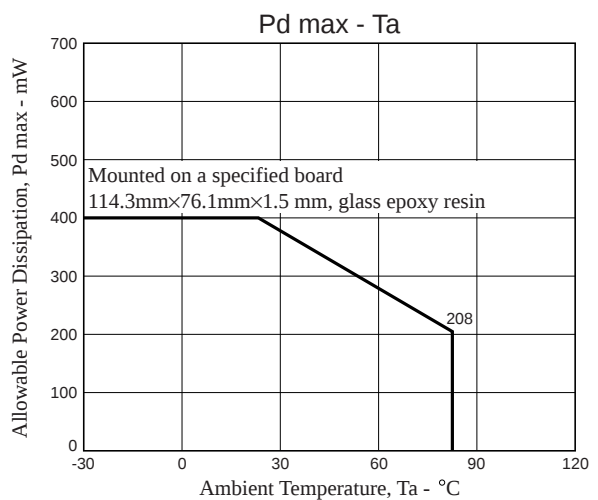
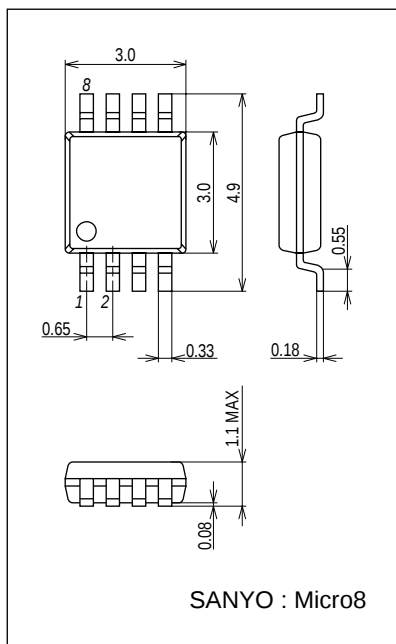
| Parameter                                | Symbol             | Conditions                                                      | Ratings |      |      | Unit |
|------------------------------------------|--------------------|-----------------------------------------------------------------|---------|------|------|------|
|                                          |                    |                                                                 | min     | typ  | max  |      |
| Circuit current                          | I <sub>CC1</sub>   | Standby                                                         |         | 0.1  | 5    | μA   |
|                                          | I <sub>CC2</sub>   | Forward/reverse drive                                           |         | 14   | 19   | mA   |
|                                          | I <sub>CC3</sub>   | Brake                                                           |         | 20   | 29   | mA   |
| Output saturation voltage                | V <sub>OSat1</sub> | Upper+lower I <sub>O</sub> = 100mA for forward/reverse rotation |         | 0.15 | 0.2  | V    |
|                                          | V <sub>OSat2</sub> | Upper+lower I <sub>O</sub> = 300mA for forward/reverse rotation |         | 0.35 | 0.5  | V    |
|                                          | V <sub>OSat3</sub> | Upper I <sub>O</sub> = 100mA for braking                        |         | 0.1  | 0.15 | V    |
| Spark killer diode forward voltage       | V <sub>SF</sub>    | I <sub>O</sub> = 300mA                                          |         | 0.9  | 1.7  | V    |
| Spark killer diode inverse current       | I <sub>RS</sub>    | V <sub>OUT</sub> = 10V                                          |         | 0.1  | 5    | μA   |
| Input current                            | I <sub>IN</sub>    | V <sub>IN</sub> = 5V                                            |         | 75   | 98   | μA   |
| Thermal protection operating temperature | TSD                | Design target value *                                           |         | 180  |      | °C   |

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

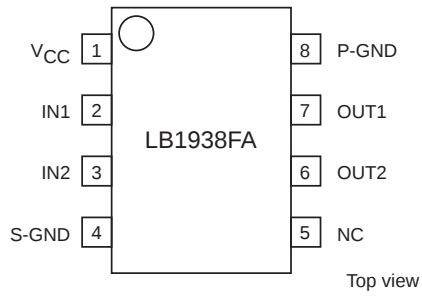
## Package Dimensions

unit : mm (typ)

3427



## Pin Assignment



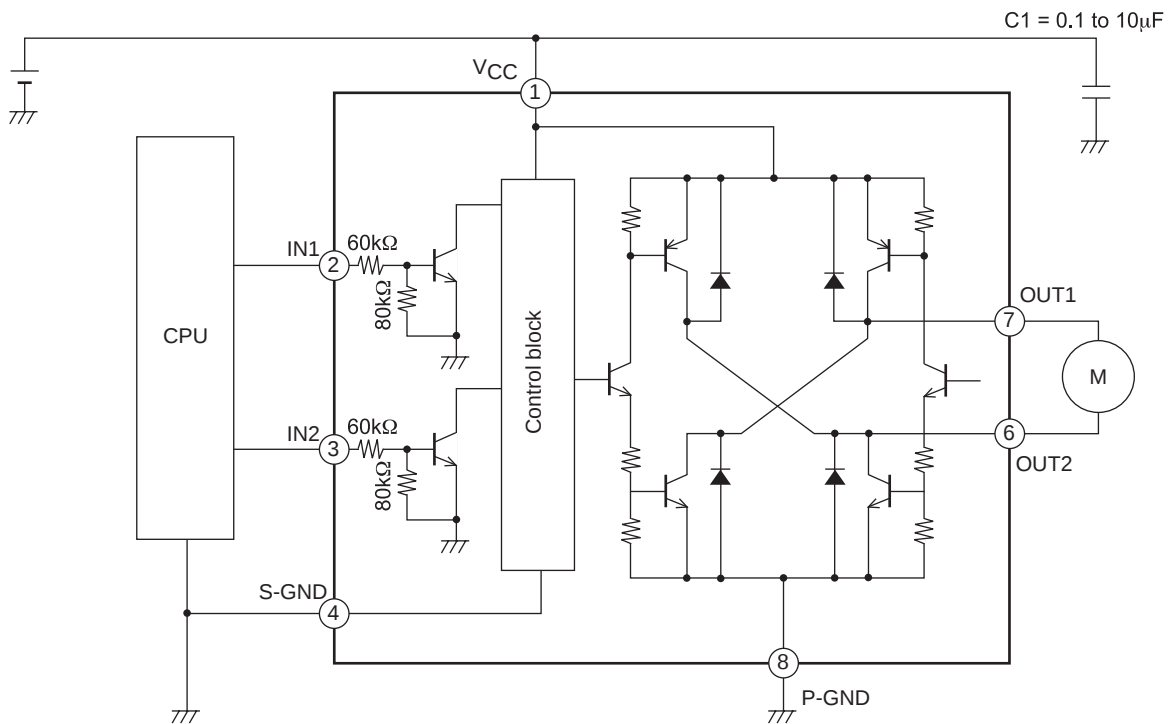
S-GND: GND for the control system

P-GND: GND for the power system

## Truth Table

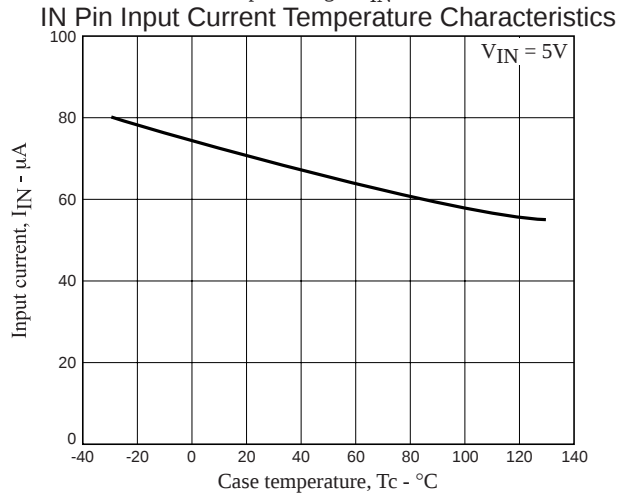
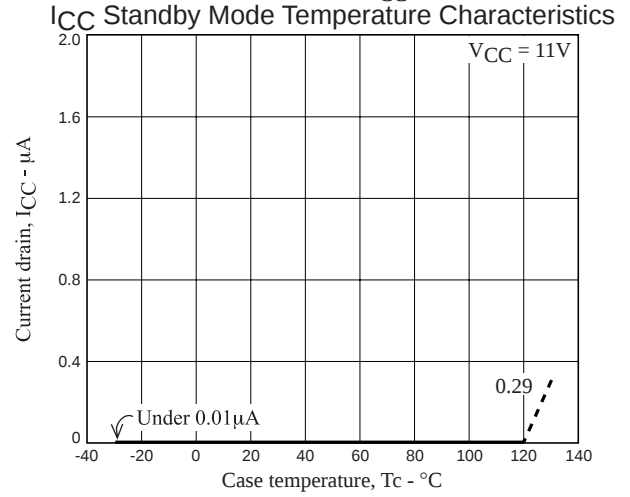
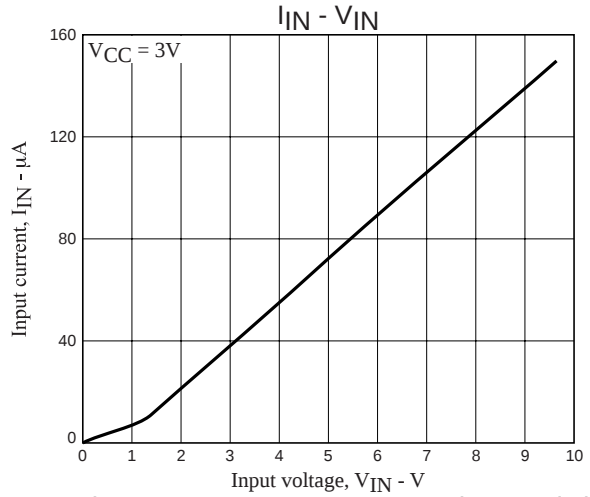
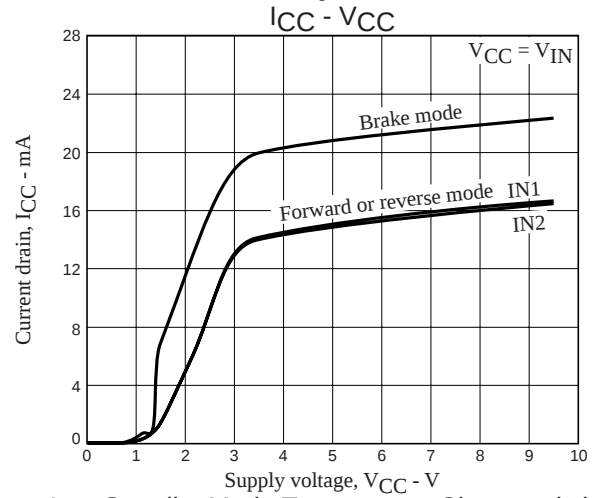
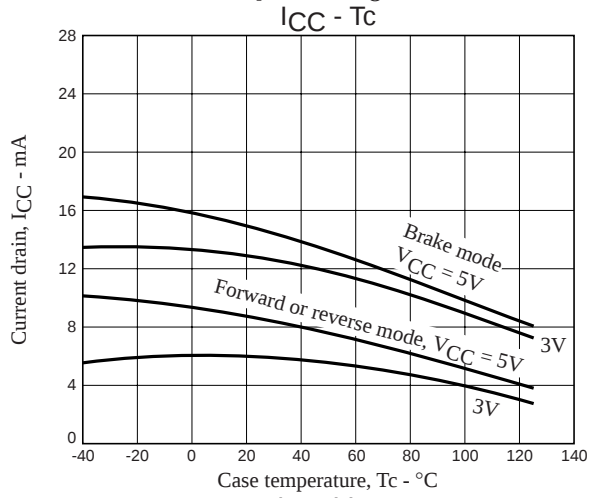
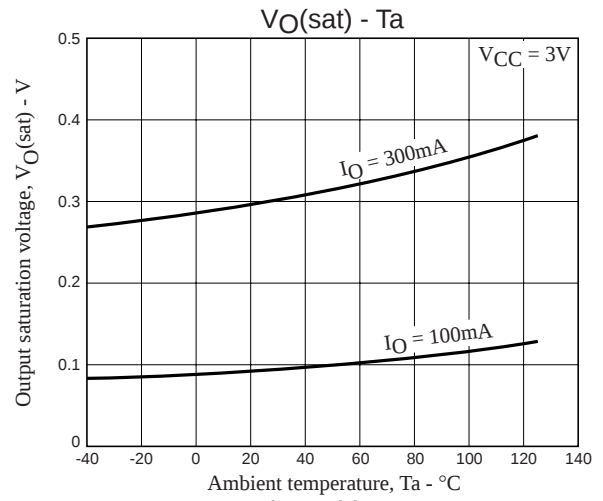
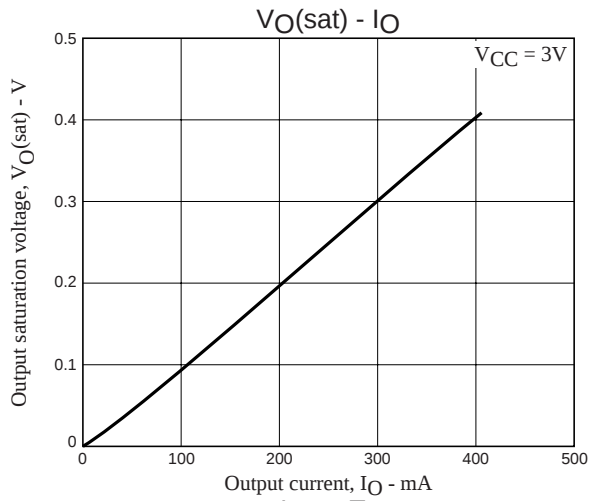
| IN1 | IN2 | OUT1 | OUT2 | Mode             |
|-----|-----|------|------|------------------|
| L   | L   | OFF  | OFF  | Standby          |
| H   | L   | H    | L    | Forward rotation |
| L   | H   | L    | H    | Reverse rotation |
| H   | H   | H    | H    | Brake            |

## Sample Application Circuit



## Cautions:

- $V_{CC}$  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.



- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of April, 2012. Specifications and information herein are subject to change without notice.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А