Ordering number : ENA2041

LB1938FA

Monolithic Digital IC

1ch, Low-saturation Forward/Reverse Motor Driver

ON Semiconductor®

http://onsemi.com

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): $V_O$sat = 0.15V typical (I_O = 100mA)
- The wide usable voltage range and the low standby mode current drain of 0.1 μA 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°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 Ta = 25°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
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.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Allowable Operating Range at Ta = 25°C

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

Electrical Characteristics at Ta = 25°C, V_{CC} = 3V

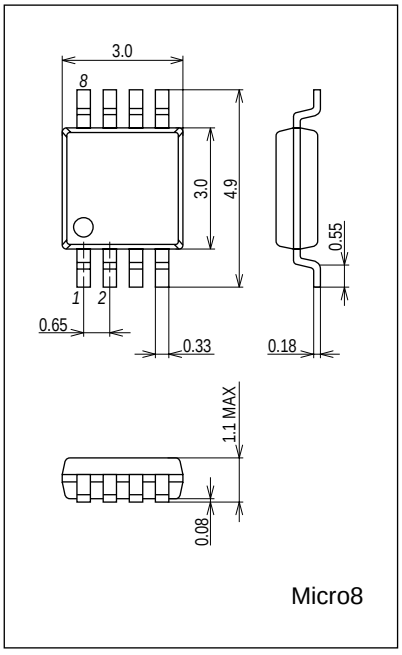
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	$I_{CC}1$	Standby		0.1	5	μA
	$I_{CC}2$	Forward/reverse drive		14	19	mA
	$I_{CC}3$	Brake		20	29	mA
Output saturation voltage	$V_O$sat1	Upper+lower I_O = 100mA for forward/reverse rotation		0.15	0.2	V
	$V_O$sat2	Upper+lower I_O = 300mA for forward/reverse rotation		0.35	0.5	V
	$V_O$sat3	Upper I_O = 100mA for braking		0.1	0.15	V
Spark killer diode forward voltage	V_{SF}	I_O = 300mA		0.9	1.7	V
Spark killer diode inverse current	I_{RS}	V_{OUT} = 10V		0.1	5	μA
Input current	I_{IN}	V_{IN} = 5V		75	98	μA
Thermal protection operating temperature	TSD	Design target value *		180		°C

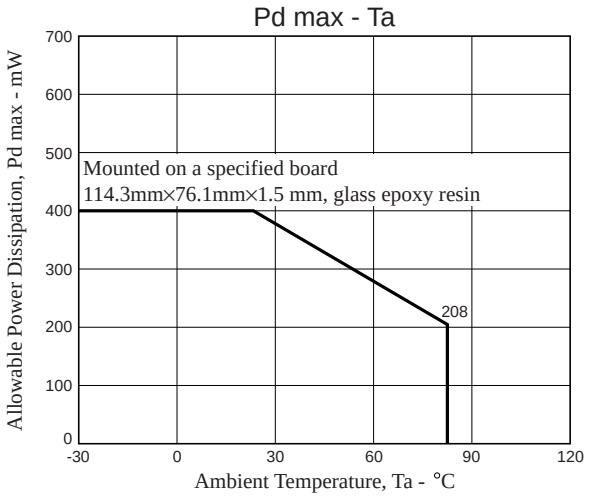
Note *: Design target value: Measurement with a single unit not made.

Package Dimensions

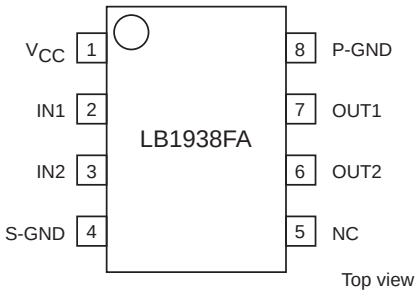
unit : mm (typ)

3427





Pin Assignment

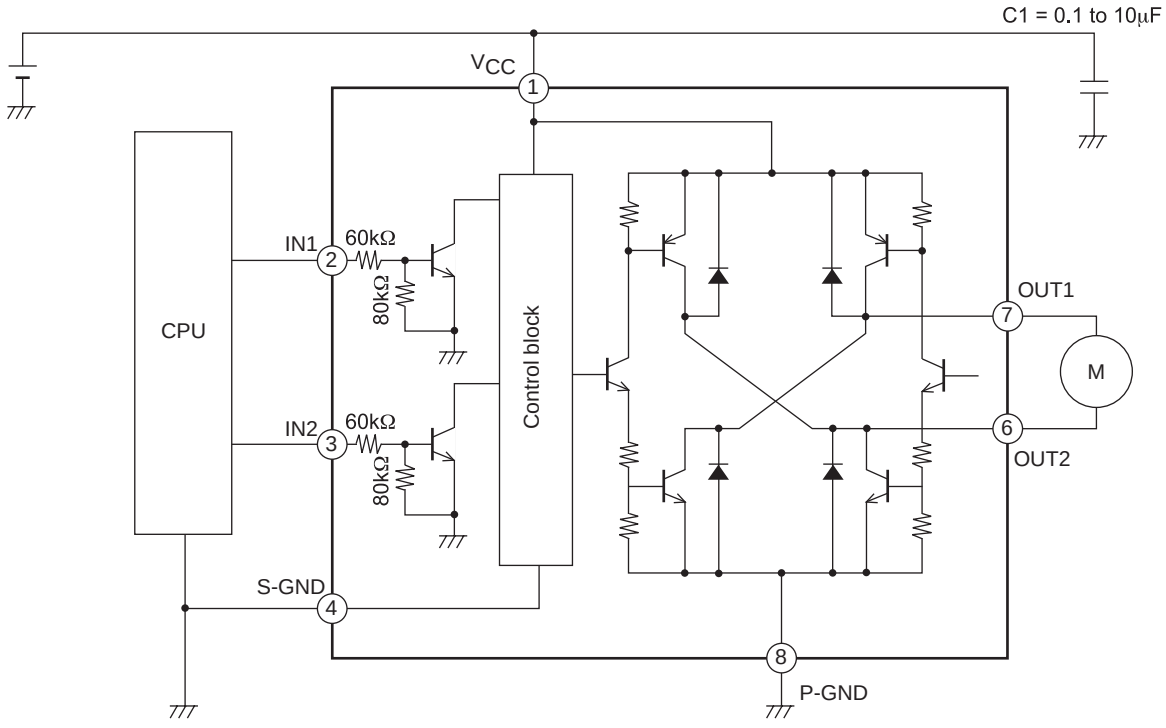


S-GND: GND for the control system
P-GND: GND for the power system

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

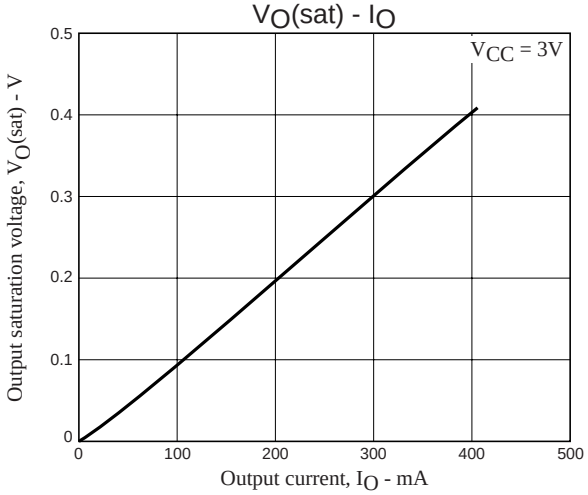
Sample Application Circuit



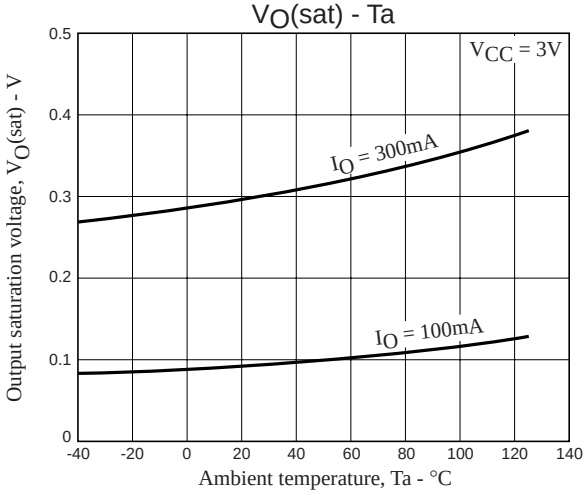
Cautions:

- 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.

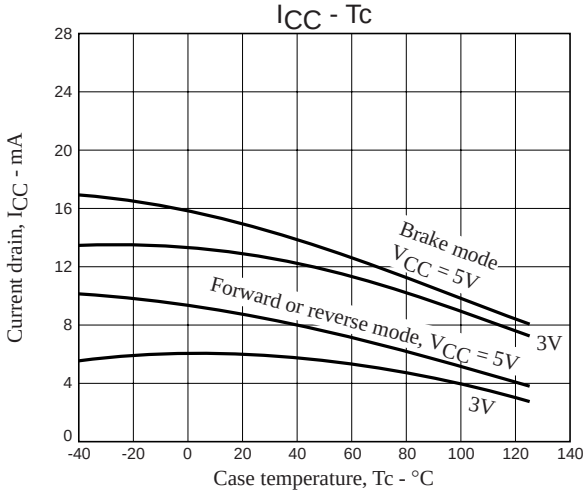
$V_O(sat) - I_O$



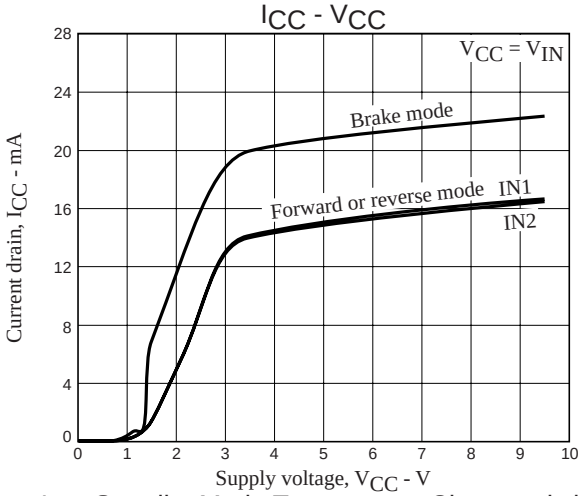
$V_O(sat) - Ta$



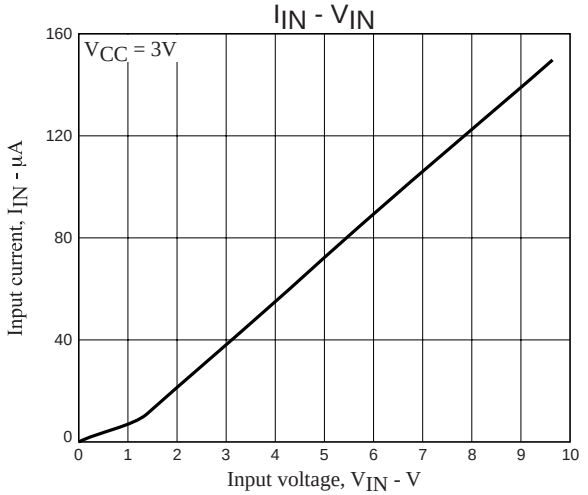
$I_{CC} - Tc$



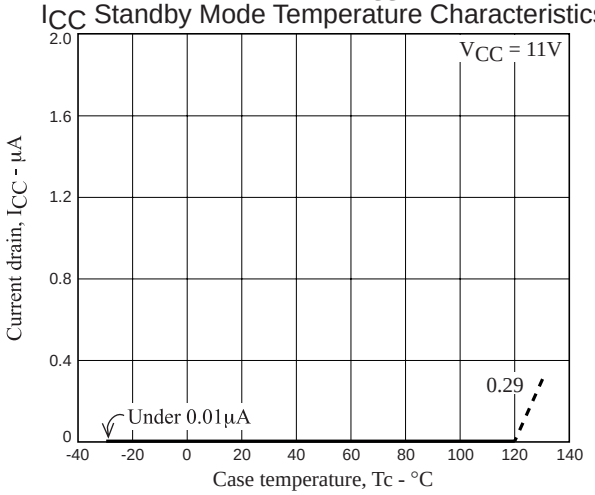
$I_{CC} - V_{CC}$



$I_{IN} - V_{IN}$



I_{CC} Standby Mode Temperature Characteristics



IN Pin Input Current Temperature Characteristics