Ordering number : EN6068A

Monolithic digital IC

# LB1930M

## Single-Channel Low Saturation Voltage Forward/Reverse Motor Driver

## Overview

The LB1930M is a low saturation voltage H-bridge forward/reverse motor driver that supports low-voltage drive. This device is optimal for CD, MD, and cassette player loading motors.

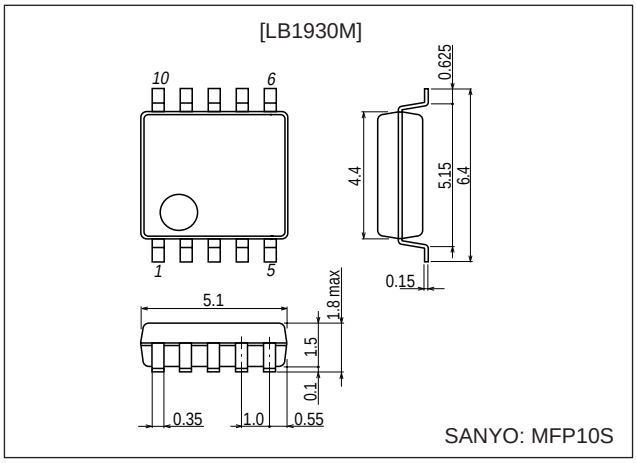
## Functions and Features

- The low saturation voltage reduces IC internal heating and allows a high voltage to be applied to the motor. Thus this device can be used even in environments with a high operating ambient temperature.
  Output saturation voltage:
  Vsat1 = 0.25 V typical ($I_O$ = 0.2 A)
  (High side + low side):
  Vsat2 = 0.55 V typical ($I_O$ = 0.5 A)
  Operating temperature range:
  Ta = -30 to +85°C
- The LB1930M features the wide operating voltage range of 2.2 to 10.8 V and the low standby current drain of 0.1 µA, and therefore can easily be used in battery operated systems.
- To minimize through currents, the LB1930M internal logic passes through an internal standby state when switched by the input signals between forward/reverse and brake, or between forward and reverse.
- There are no constraints on the relationship between the input voltage and the supply voltage. For example, the LB1930M can be used with $V_{CC}$ = 3 V, and $V_{IN}$ = 5 V.
- If the IC chip exceeds 180°C due to an output short causing a large current flow, the built-in thermal protection circuit suppresses the drive current to prevent fires or destruction of the IC.
- MFP-10S miniature package. Also, the LB1930M features the high allowable power dissipation of Pd = 800 mW.

## Package Dimensions

unit: mm

**3148-MFP10S**



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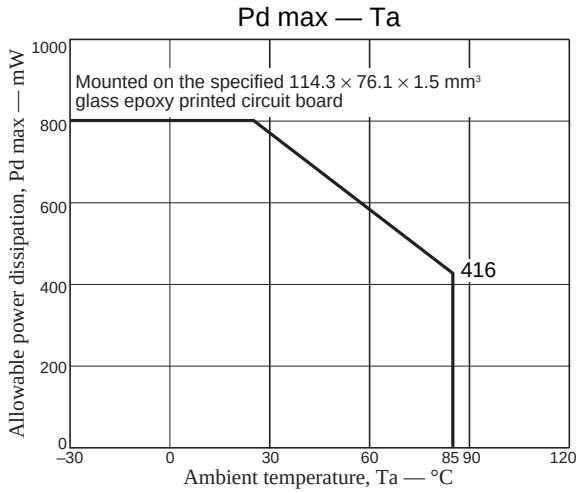
# Specifications

## Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ max | | 11 | V |
| Output current | $I_{OUT}$ max | | 1000 | mA |
| Output voltage handling | $V_{OUT}$ max | | Vcc + $V_{SF}$ | V |
| Applied input voltage | $I_H$ max | | 10.5 | V |
| Allowable power dissipation | Pd max | Mounted on the specified printed circuit board* | 800 | mW |
| Operating temperature | Topr | | –30 to +85 | °C |
| Storage temperature | Tstg | | –55 to +150 | °C |

Note *: 114.3 × 76.1 × 1.5 mm³ glass epoxy printed circuit board




## Allowable Operating Ranges at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | | 2.2 to 10.8 | V |
| High-level input voltage | $V_{IH}$ | | 2.0 to 10 | V |
| Low-level input voltage | $V_{IL}$ | | –0.3 to +0.3 | V |

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

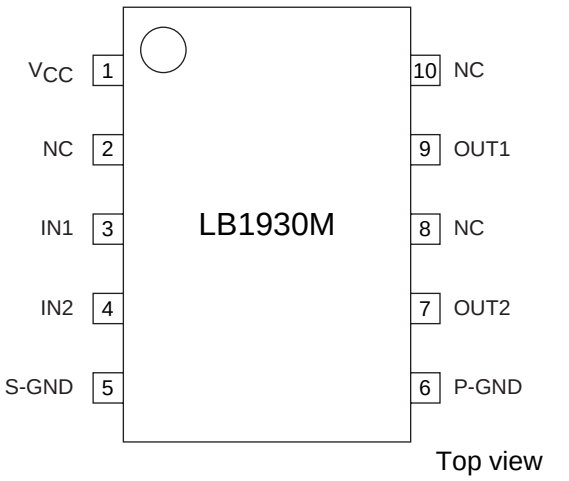
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Supply current | $I_{CC}1$ | Standby mode | | 0.1 | 5 | µA |
| | $I_{CC}2$ | Forward or reverse drive operation | | 15 | 21 | mA |
| | $I_{CC}3$ | Braking | | 22 | 31 | mA |
| Output saturation voltage | $V_O$ (sat)1 | Forward or reverse drive: High side + low side, $I_O$ = 200 mA | | 0.25 | 0.35 | V |
| | $V_O$ (sat)2 | Forward or reverse drive: High side + low side, $I_O$ = 500 mA | | 0.55 | 0.75 | V |
| | $V_O$ (sat)3 | Forward or reverse drive: High side only, $I_O$ = 200 mA | | 0.15 | 0.25 | V |
| Spark killer diode forward voltage | $V_{SF}$ | $I_O$ = 200 mA | | 0.9 | 1.7 | V |
| Spark killer diode reverse current | $I_{RS}$ | $V_{OUT}$ = 10 V | | 0.1 | 5 | µA |
| Input current | $I_{IN}$ | $V_{IN}$ = 5 V | | 70 | 95 | µA |
| Thermal detection operating temperature | THD | Design target value* | 150 | 180 | 200 | °C |

Note *: This value is a design guarantee and is not measured.

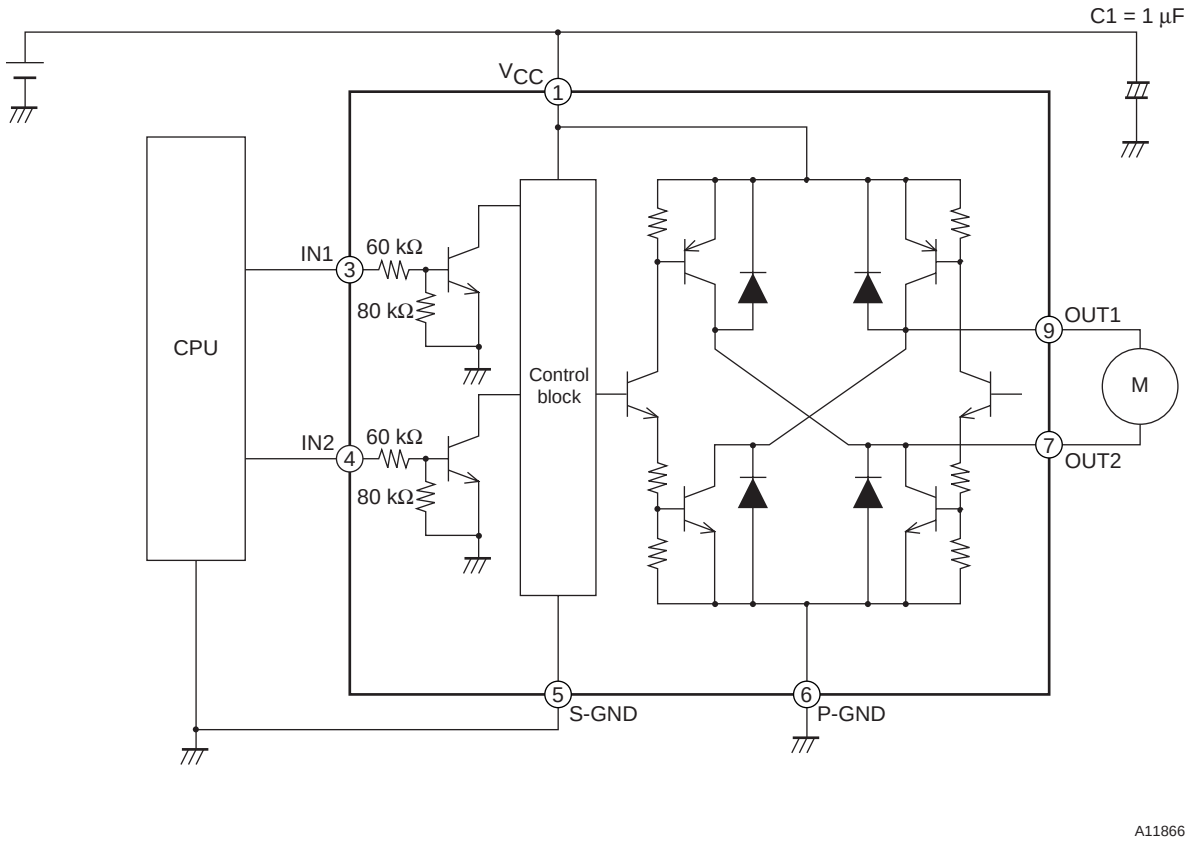
## Truth Table

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

## Pin Assignment



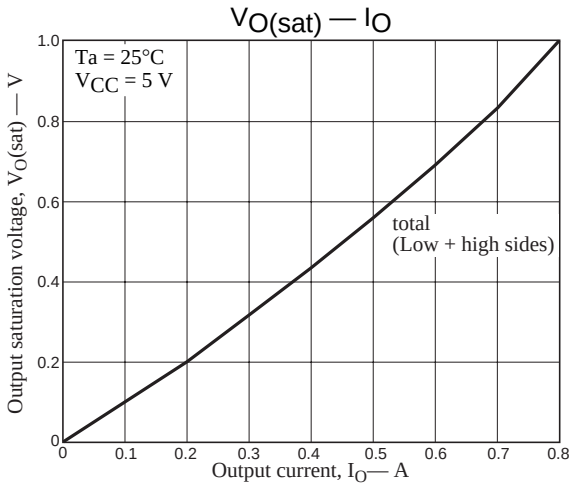

## Block Diagram and Sample Application Circuit

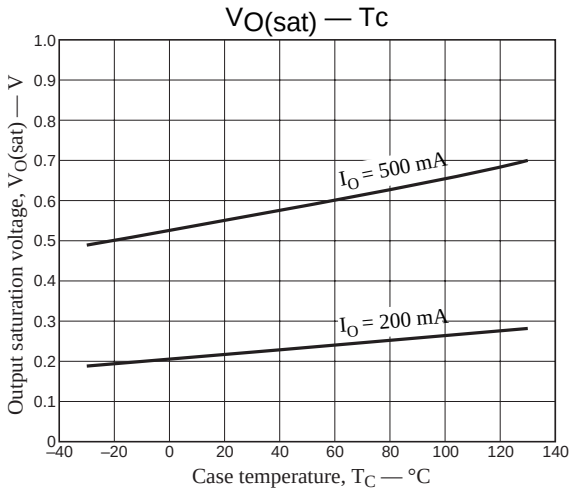


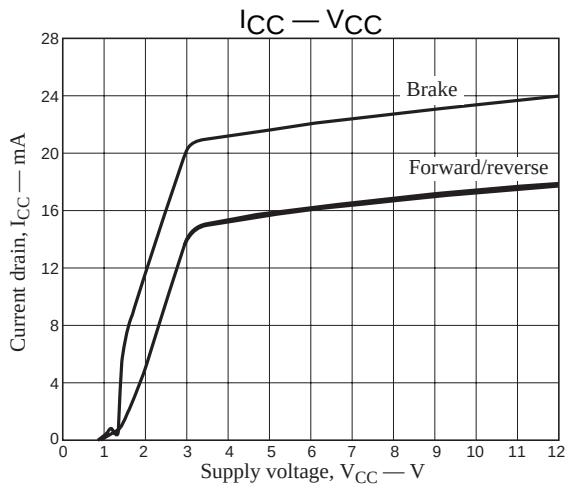
## Usage Notes

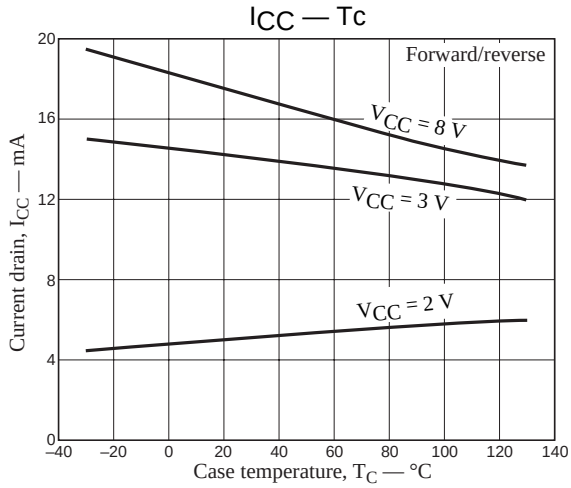
Oscillation may occur in the $V_{CC}$ and P-GND lines, since these lines carry a wide range of currents. The following may help if this is a problem.

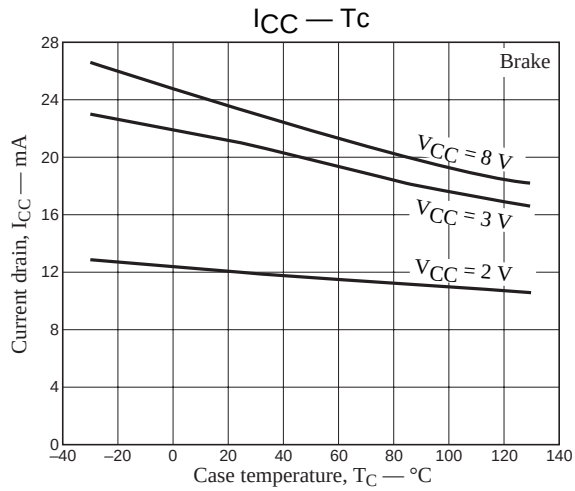
- Lower the inductance of the wiring by making lines wider and shorter.
- Insert capacitors with good frequency characteristics close to the IC.
- Consider adopting the following methods if the CPU and this IC are mounted on different printed circuit boards that could easily have different ground potentials.
  Connect S-GND to the CPU ground and connect P-GND to the power system ground.
  Insert resistors of about 10 kΩ in series between the controller outputs and the inputs on this IC.

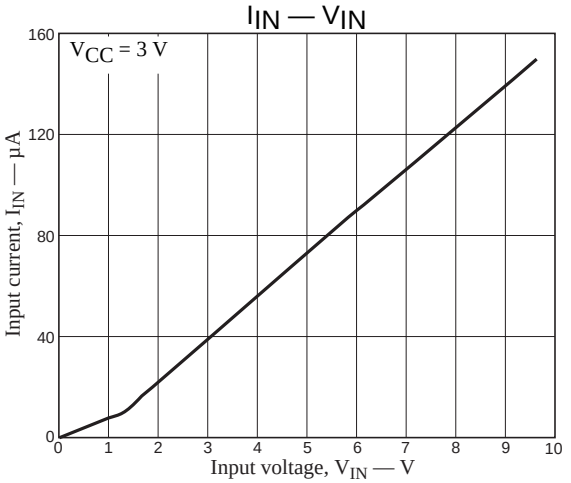


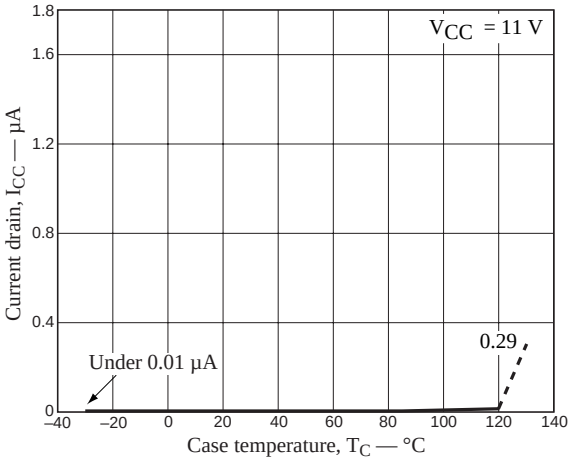



$I_{CC}$ Standby Temperature Characteristics




IN Pin Input Current vs. Temperature Characteristics