

**SANYO****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:

$V_{sat1} = 0.25 \text{ V typical (I}_O = 0.2 \text{ A)}$

(High side + low side):

$V_{sat2} = 0.55 \text{ V typical (I}_O = 0.5 \text{ A)}$

Operating temperature range:

$T_a = -30 \text{ to } +85^\circ\text{C}$

- The LB1930M features the wide operating voltage range of 2.2 to 10.8 V and the low standby current drain of 0.1  $\mu\text{A}$ , 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  $V_{CC} = 3 \text{ V}$ , and  $V_{IN} = 5 \text{ V}$ .

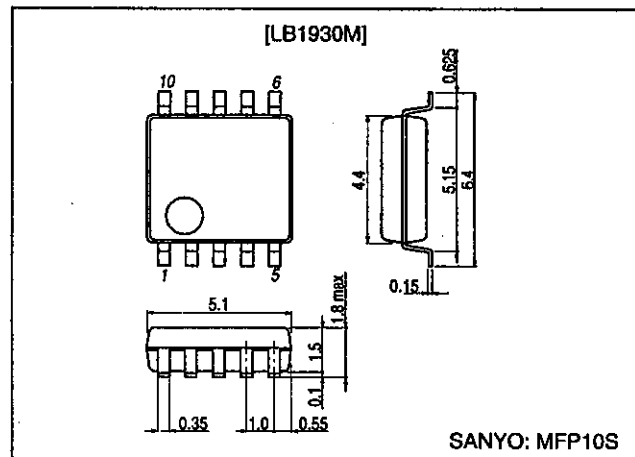
- If the IC chip exceeds  $180^\circ\text{C}$  due to an output short causing a large current flow, the built-in thermal protection circuit suppresses the drive current to prevent fires or destruction of the IC.

- MFP-10S miniature package. Also, the LB1930M features the high allowable power dissipation of  $P_d = 800 \text{ mW}$ .

**Package Dimensions**

unit: mm

**3148-MFP10S**



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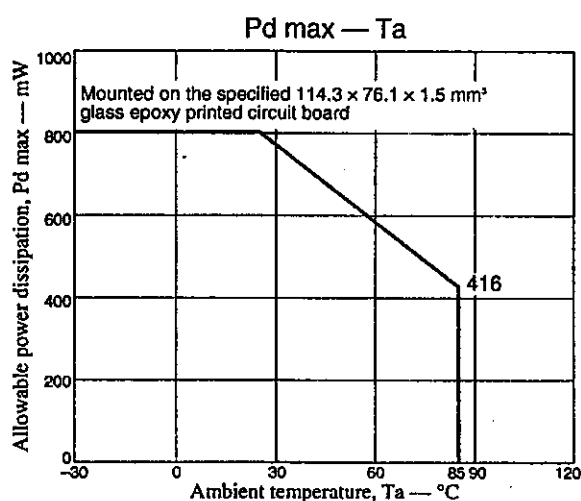
51199RM (OT) No. 6068-1/5

## Specifications

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

| 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 |                                                 | $V_{CC} + V_{SF}$ | V                |
| Applied input voltage       | $I_H$ max     |                                                 | 10.5              | V                |
| Allowable power dissipation | $P_d$ max     | Mounted on the specified printed circuit board* | 800               | mW               |
| Operating temperature       | $T_{opr}$     |                                                 | -30 to +85        | $^\circ\text{C}$ |
| Storage temperature         | $T_{stg}$     |                                                 | -55 to +150       | $^\circ\text{C}$ |

Note \*:  $114.3 \times 76.1 \times 1.5 \text{ mm}^3$  glass epoxy printed circuit board



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

| 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 $T_a = 25^\circ\text{C}$ , $V_{CC} = 3 \text{ V}$

| Parameter                               | Symbol             | Conditions                                                             | Ratings |      |      | Unit             |
|-----------------------------------------|--------------------|------------------------------------------------------------------------|---------|------|------|------------------|
|                                         |                    |                                                                        | min     | typ  | max  |                  |
| Supply current                          | $I_{CC1}$          | Standby mode                                                           |         | 0.1  | 5    | $\mu\text{A}$    |
|                                         | $I_{CC2}$          | Forward or reverse drive operation                                     |         | 15   | 21   | mA               |
|                                         | $I_{CC3}$          | Braking                                                                |         | 22   | 31   | mA               |
| Output saturation voltage               | $V_O(\text{sat})1$ | Forward or reverse drive: High side + low side, $I_O = 200 \text{ mA}$ |         | 0.25 | 0.35 | V                |
|                                         | $V_O(\text{sat})2$ | Forward or reverse drive: High side + low side, $I_O = 500 \text{ mA}$ |         | 0.55 | 0.75 | V                |
|                                         | $V_O(\text{sat})3$ | Forward or reverse drive: High side only, $I_O = 200 \text{ mA}$       |         | 0.15 | 0.25 | V                |
| Spark killer diode forward voltage      | $V_{SF}$           | $I_O = 200 \text{ mA}$                                                 |         | 0.9  | 1.7  | V                |
| Spark killer diode reverse current      | $I_{RS}$           | $V_{OUT} = 10 \text{ V}$                                               |         | 0.1  | 5    | $\mu\text{A}$    |
| Input current                           | $I_{IN}$           | $V_{IN} = 5 \text{ V}$                                                 |         | 70   | 95   | $\mu\text{A}$    |
| Thermal detection operating temperature | THD                | Design target value*                                                   | 150     | 180  | 200  | $^\circ\text{C}$ |

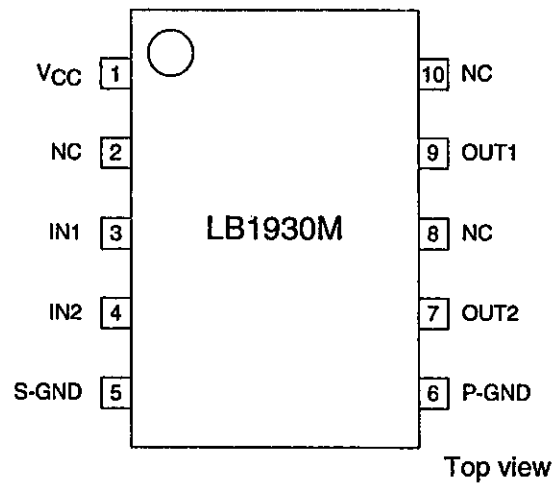
Note \*: This value is a design guarantee and is not measured.

# LB1930M

## Truth Table

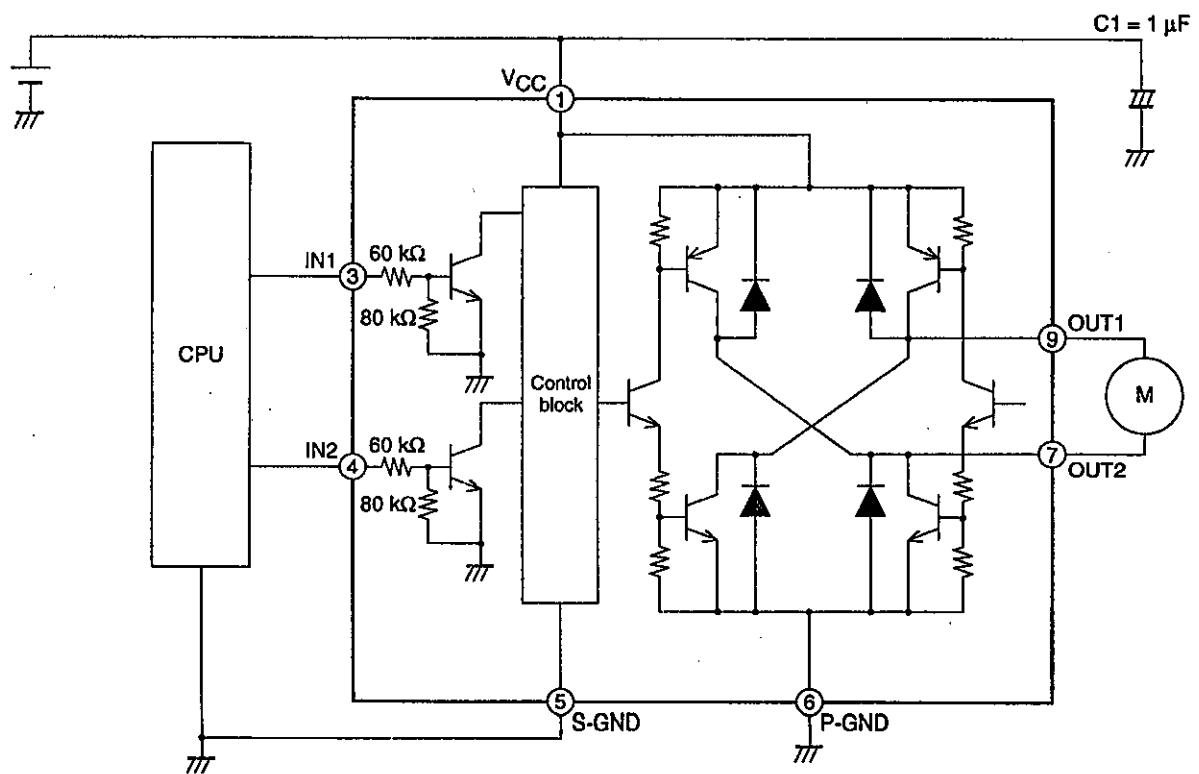
| IN1 | IN2 | OUT1 | OUT2 | Mode    |
|-----|-----|------|------|---------|
| L   | L   | OFF  | OFF  | Standby |
| H   | L   | H    | L    | Forward |
| L   | H   | L    | H    | Reverse |
| H   | H   | H    | H    | Brake   |

## Pin Assignment



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## Block Diagram and Sample Application Circuit



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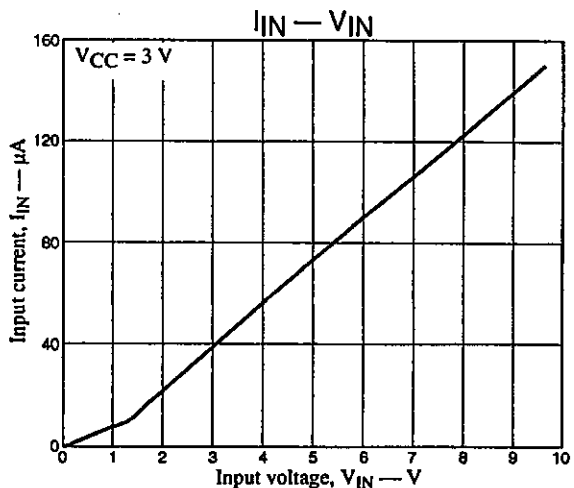
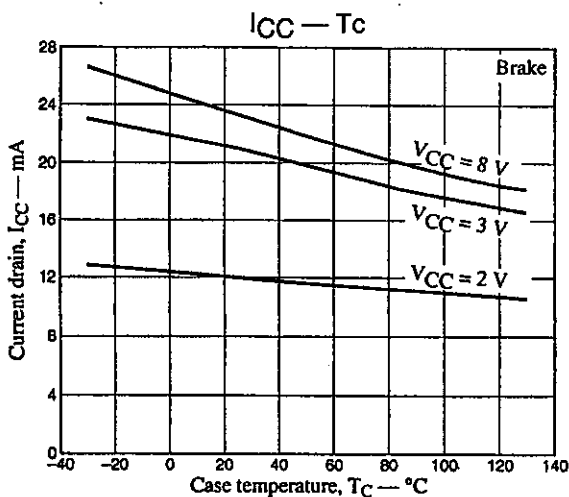
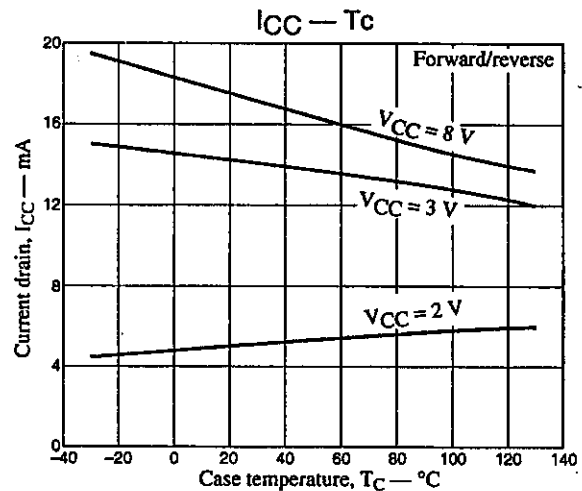
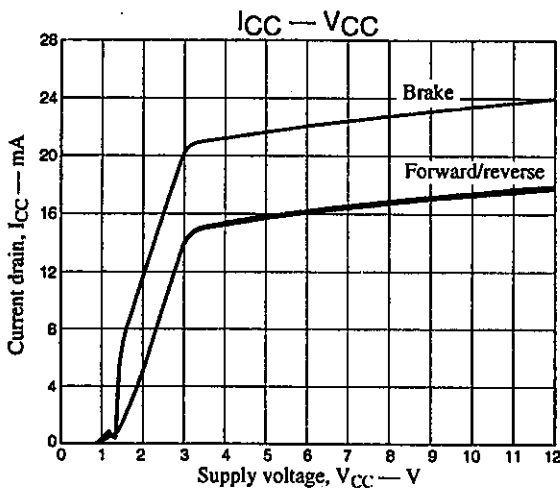
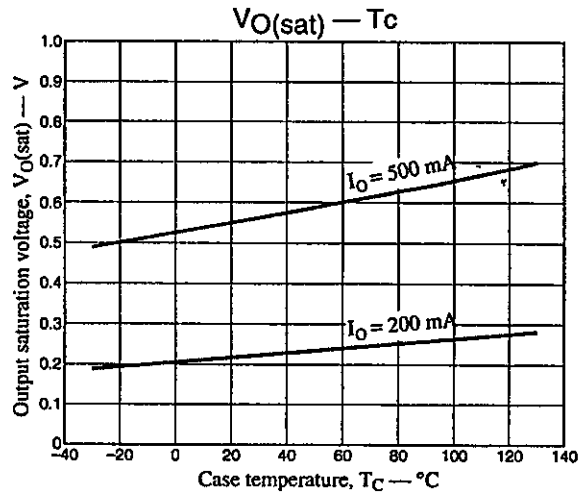
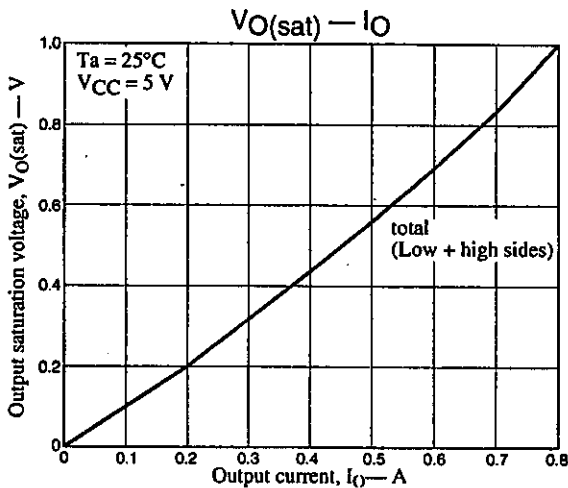
## Usage Notes

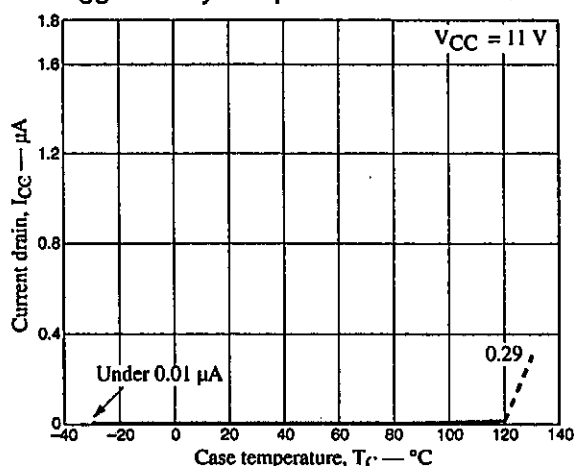
Oscillation may occur in the  $V_{CC}$  and P-GND lines, since these lines carry a wide range of currents. The following may help if this is a problem.

- 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.

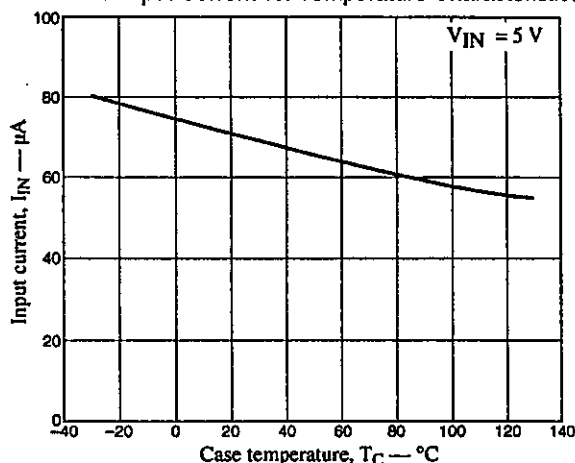
Connect S-GND to the CPU ground and connect P-GND to the power system ground.

Insert resistors of about 10 k $\Omega$  in series between the controller outputs and the inputs on this IC.



$I_{CC}$  Standby Temperature Characteristics

IN Pin Input Current vs. Temperature Characteristics



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