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SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## LB1930M

### Monolithic Digital IC Low-Voltage, Low-Saturation Bidirectional Motor Driver

#### Overview

The LB1930M is single-channel forward/reverse DC brush motor driver. This device is optimal for CD, DVD and Blue Ray Disk player loading motors. And it is possible to use it for others as a general-purpose product.

#### 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:  $V_{sat1} = 0.25V$  typical ( $I_O = 0.2A$ )
  - (High side + low side):  $V_{sat2} = 0.55V$  typical ( $I_O = 0.5A$ )
  - Operating temperature range:  $T_a = -30$  to  $+85^\circ C$
- The LB1930M features the wide operating voltage range of 2.2 to 10.8V and the low standby current drain of  $0.1\mu A$ , 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  $V_{CC} = 3V$ , and  $V_{IN} = 5V$ .
- If the IC chip exceeds  $180^\circ C$  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  $P_d = 800mW$ .

#### Specifications

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

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

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# LB1930M

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Parameter	Symbol	Conditions	Ratings	Unit
Allowable power dissipation	Pd max	Mounted on a specified board *	800	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

\* Specified board: 114.3mm × 76.1mm × 1.5mm, glass epoxy board.

## Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>		2.2 to 10.8	V
High-level input voltage	V <sub>IH</sub>		2.0 to 10	V
Low-level input voltage	V <sub>IL</sub>		-0.3 to +0.3	V

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

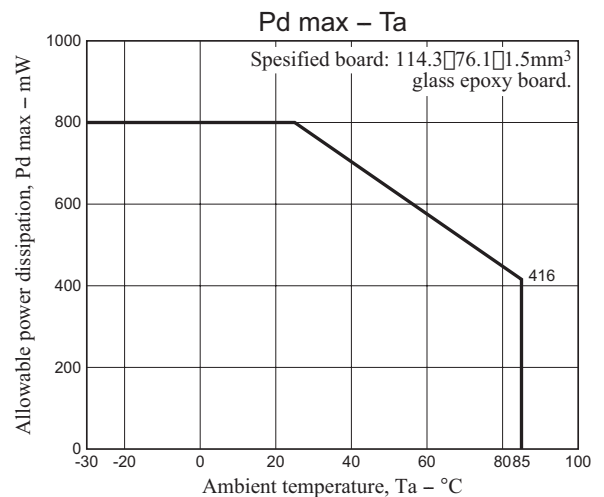
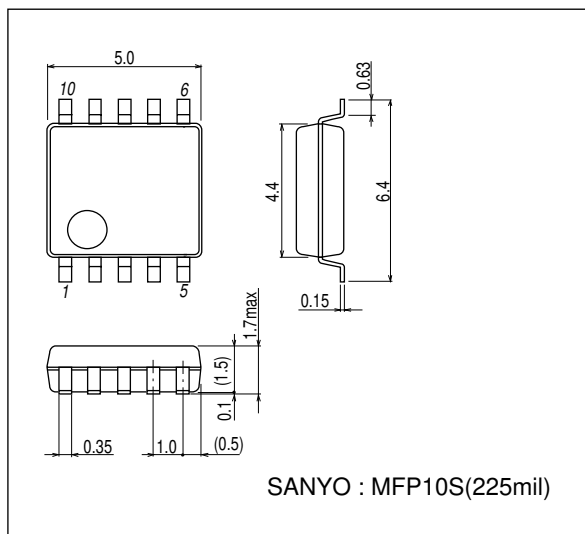
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I <sub>CC1</sub>	Standby mode		0.1	5	μA
	I <sub>CC2</sub>	Forward or reverse drive operation		15	21	mA
	I <sub>CC3</sub>	Braking		22	31	mA
Output saturation voltage	V <sub>O(sat)1</sub>	Forward or reverse drive: High side + low side, I <sub>O</sub> = 200mA		0.25	0.35	V
	V <sub>O(sat)2</sub>	Forward or reverse drive: High side + low side, I <sub>O</sub> = 500mA		0.55	0.75	V
	V <sub>O(sat)3</sub>	Forward or reverse drive: High side only, I <sub>O</sub> = 200mA		0.15	0.25	V
Input current	I <sub>IN</sub>	V <sub>IN</sub> = 5V		70	95	μA
Thermal detection operating temperature	THD	Design guarantee value*	150	180	200	°C
<b>Spark killer diode</b>						
Forward voltage	V <sub>SF</sub>	I <sub>O</sub> = 200mA		0.9	1.7	V
Reverse current	I <sub>RS</sub>	V <sub>OUT</sub> = 10V		0.1	5	μA

\* Design guarantee value, Do not measurement.

## Package Dimensions

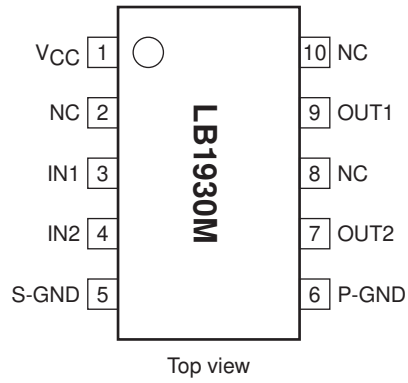
unit : mm (typ)

3086B

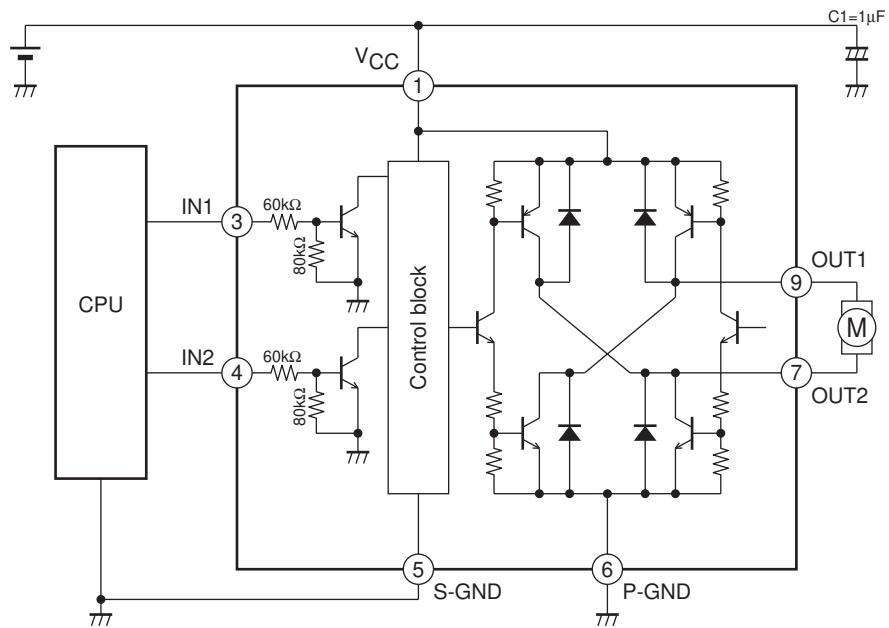


# LB1930M

## Pin Assignment



## Block Diagram and Application Circuit Example

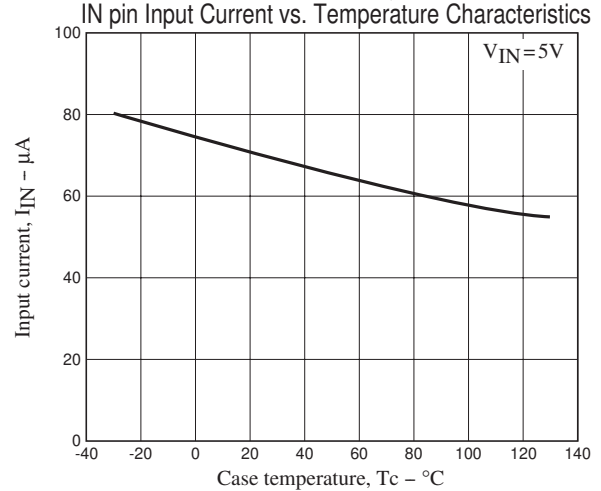
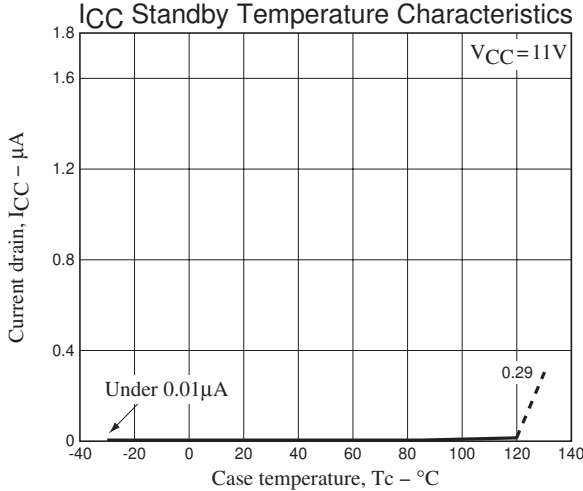
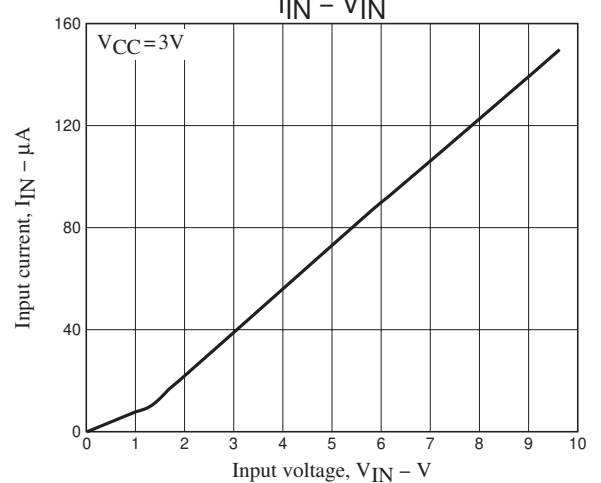
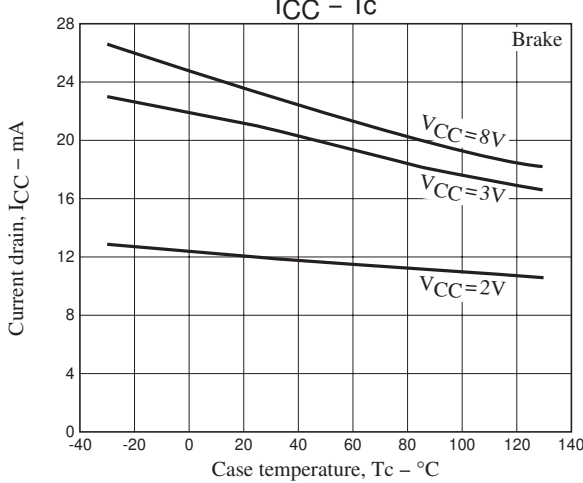
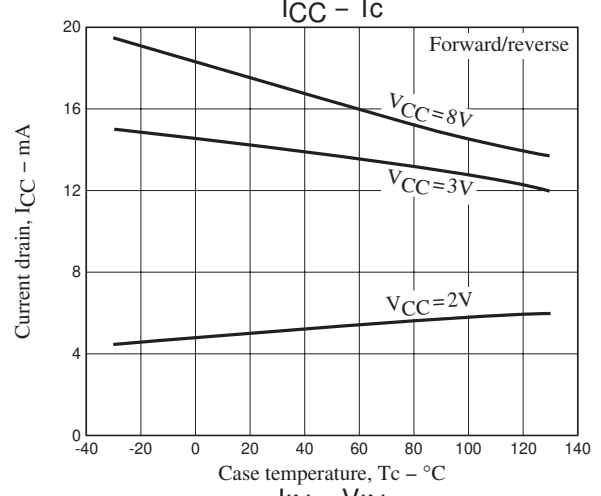
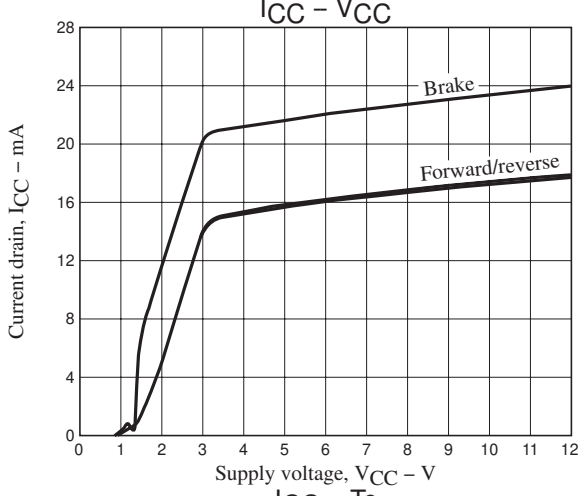
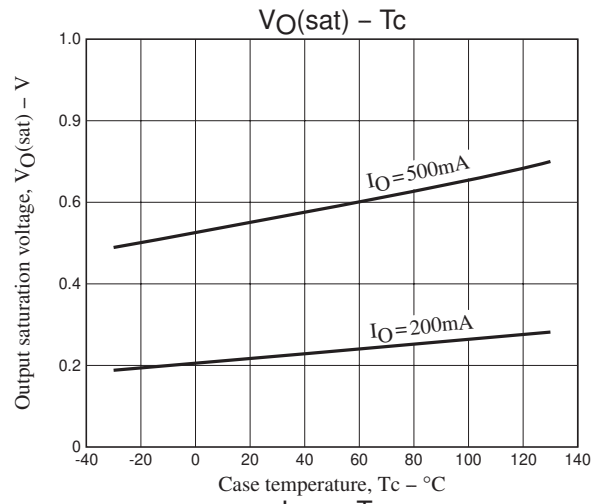
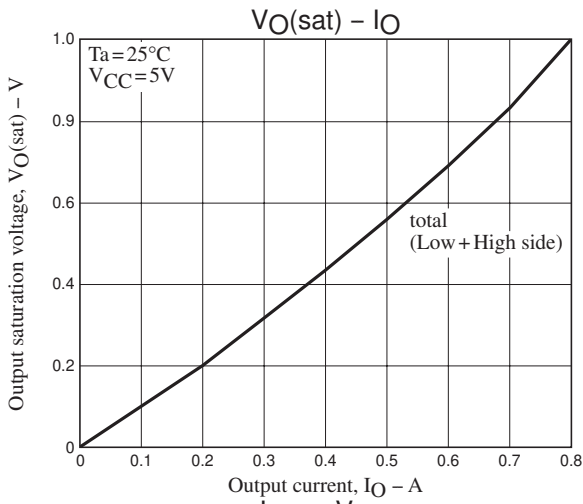


## Truth Table

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



# LB1930M



## 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.

- (1) Lower the inductance of the wiring by making lines wider and shorter.
- (2) Insert capacitors with good frequency characteristics close to the IC.
- (3) 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 10k $\Omega$  in series between the controller outputs and the inputs on this IC.

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