



SANYO Semiconductors

DATA SHEET

Monolithic Digital IC

LB1948M — Low saturation voltage drive forward/reverse 12 V motor driver

Overview

The LB1948M is a two-channel low saturation voltage forward/reverse motor driver IC. It is optimal for motor drive in 12V system products and can drive either two DC motors, one DC motor using parallel connection, or a two-phase bipolar stepping motor with 1-2 phase excitation mode drive.

Applications

12V low saturation voltage forward/reverse motor drive

Features

- Supports 12V power supply systems
- Low saturation voltage: $V_O(\text{sat})=0.5\text{V}$ (typical) at $I_O=400\text{mA}$
- Zero current drawn in standby mode
- Braking function
- Supports parallel connection: $I_{O\text{max}}=1.6\text{A}$, $V_O(\text{sat})=0.6\text{V}$ (typical) at $I_O=800\text{mA}$
- Built-in spark killer diode
- Thermal shutdown circuit
- Miniature package: MFP-10S (6.5 × 5.1mm)

Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|-----------------------------|-------------|------------------|
| Maximum supply voltage | $V_{CC\text{ max}}$ | | -0.3 to +20 | V |
| Output voltage | V_{OUT} | | -0.3 to +20 | V |
| Input voltage | V_{IN} | | -0.3 to +18 | V |
| Ground pin source current | I_{GND} | Per channel | 800 | mA |
| Allowable power dissipation | $P_d\text{ max1}$ | Independent IC | 350 | mW |
| | $P_d\text{ max2}$ | Mounted on a circuit board* | 870 | mW |
| Operating temperature | T_{opr} | | -20 to +85 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -40 to +150 | $^\circ\text{C}$ |

*: On the stipulated circuit board (114.3 × 76.1 × 1.6mm, glass epoxy)

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LB1948M

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|--------------------------|----------|------------|--------------|------|
| Supply voltage | V_{CC} | | 2.5 to 16 | V |
| Input high-level voltage | V_{IH} | | 1.8 to 10 | V |
| Input low-level voltage | V_{IL} | | -0.3 to +0.7 | V |

Electrical Characteristics at $T_a=25^\circ\text{C}$, $V_{CC}=12\text{V}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------|---------------|---|---------|------|------|---------------|
| | | | min | typ | max | |
| Current drain | I_{CC0} | IN1, 2, 3, 4=0V (Standby mode) | | 0.1 | 10 | μA |
| | I_{CC1} | *1 (Forward or reverse mode) | | 15 | 21 | mA |
| | I_{CC2} | *2 (Brake mode) | | 30 | 40 | mA |
| Output saturation voltage | $V_{O(sat)1}$ | $I_{OUT}=200\text{mA}$ (High Side and Low Side) | — | 0.25 | 0.35 | V |
| | $V_{O(sat)2}$ | $I_{OUT}=400\text{mA}$ (High Side and Low Side) | — | 0.50 | 0.75 | V |
| Input current | I_{IN} | $V_{IN}=5\text{V}$ | | 85 | 110 | μA |
| [Spark Killer Diode] | | | | | | |
| Reverse current | IS (leak) | | | | 30 | μA |
| Forward voltage | V_{SF} | $I_{OUT}=400\text{mA}$ | | | 1.7 | V |

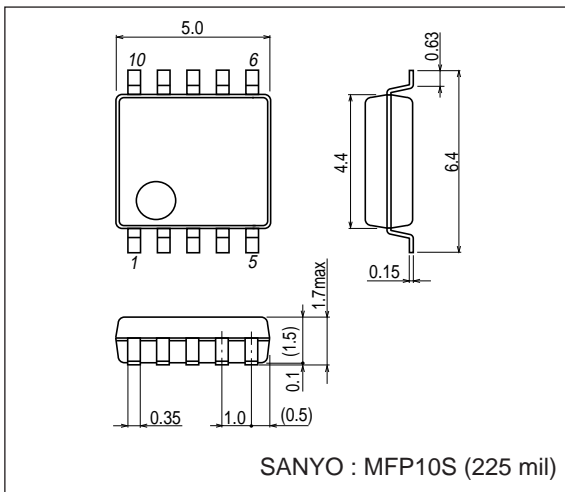
*1: IN1/IN2/IN3/IN4=H/L/L/L or L/H/L/L or L/L/H/L or L/L/L/H

*2: IN1/IN2/IN3/IN4=H/H/L/L or L/L/H/H

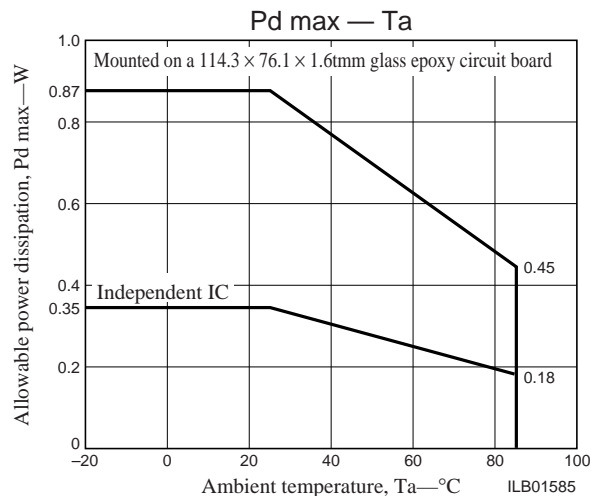
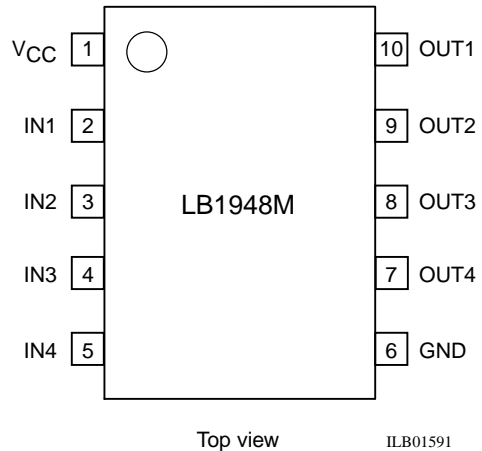
Package Dimensions

unit : mm

3086B



Pin Assignment

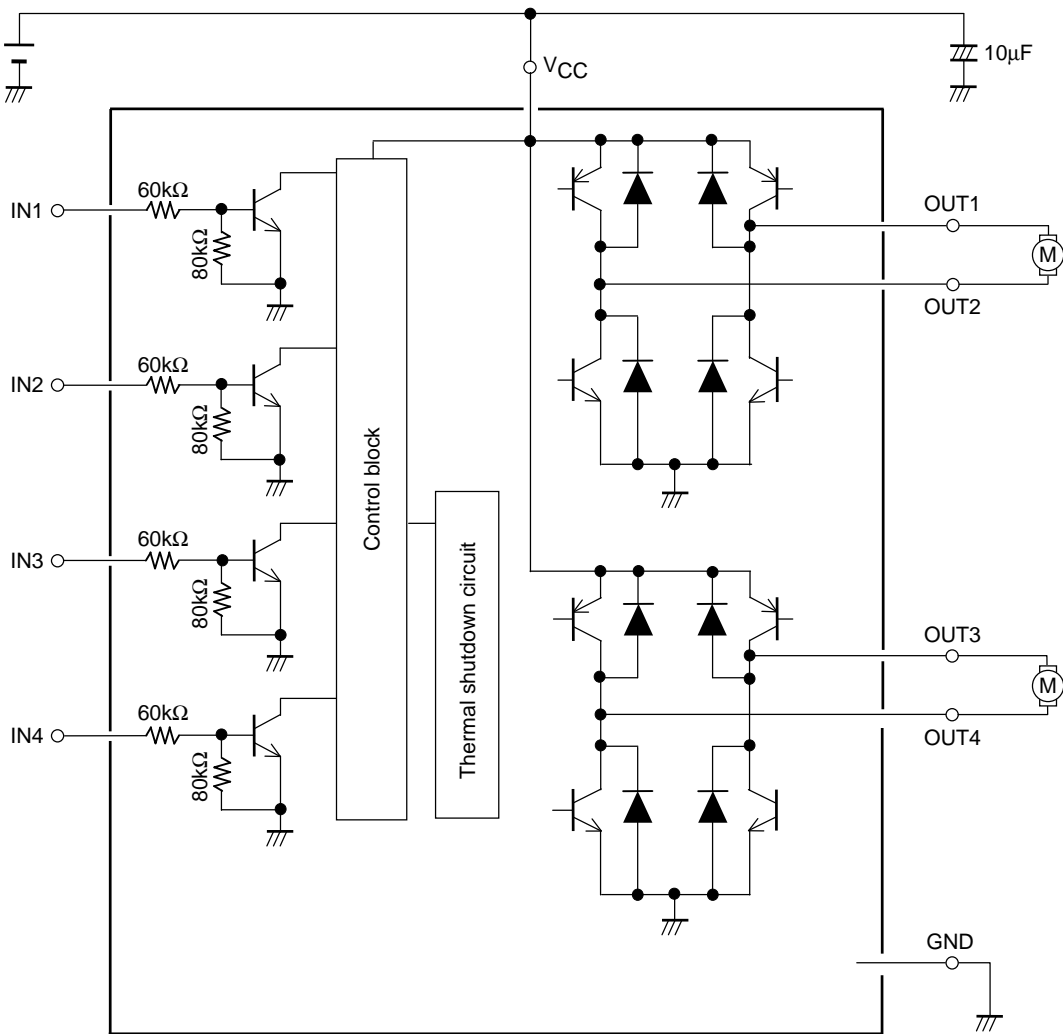


LB1948M

Truth Table

| Input | | | | Output | | | | Notes | |
|-------|-----|-----|-----|--------|------|------|------|--------------|--------------|
| IN1 | IN2 | IN3 | IN4 | OUT1 | OUT2 | OUT3 | OUT4 | | |
| L | L | L | L | OFF | OFF | OFF | OFF | Standby mode | |
| L | L | | | OFF | OFF | | | 1CH | Standby mode |
| H | L | | | H | L | | | | Forward |
| L | H | | | L | H | | | | Reverse |
| H | H | | | L | L | | | | Brake |
| | | L | L | | | OFF | OFF | 2CH | Standby mode |
| | | H | L | | | H | L | | Forward |
| | | L | H | | | L | H | | Reverse |
| | | H | H | | | L | L | | Brake |

Block Diagram



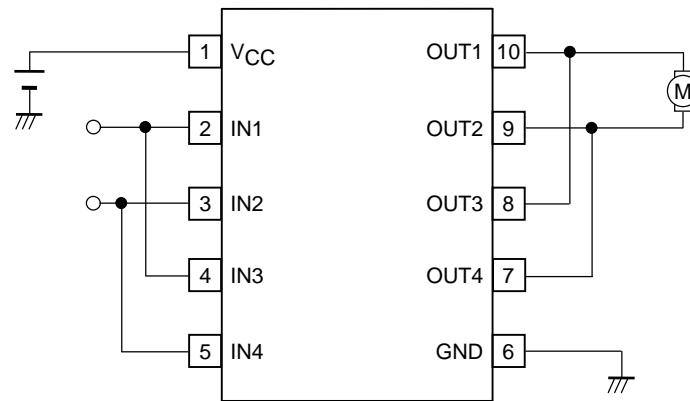
Design Documentation

- Voltage magnitude relationship

There are no restrictions on the magnitude relationships between the voltages applied to V_{CC} and IN1 to IN4.

- Parallel connection

The LB1948M can be used as a single-channel H-bridge power supply by connecting IN1 to IN3, IN2 to IN4, OUT1 to OUT3, and OUT2 to OUT4 as shown in the figure. ($I_{Omax}=1.6A$, $V_{O(sat)}=0.6V$ (typical) at $I_O=800mA$)

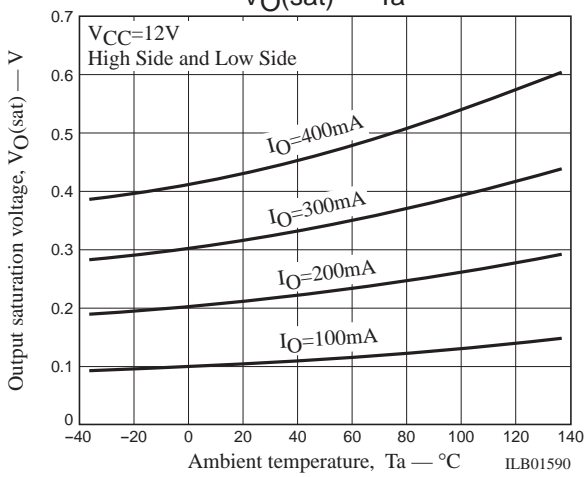
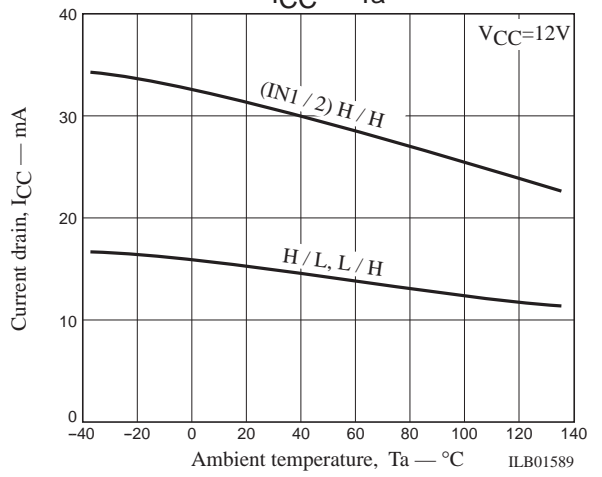
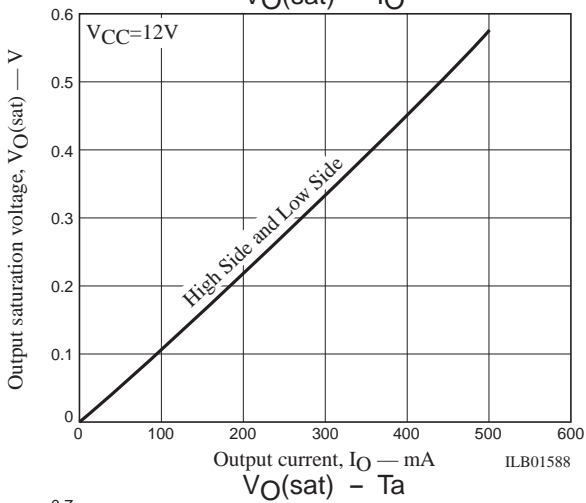
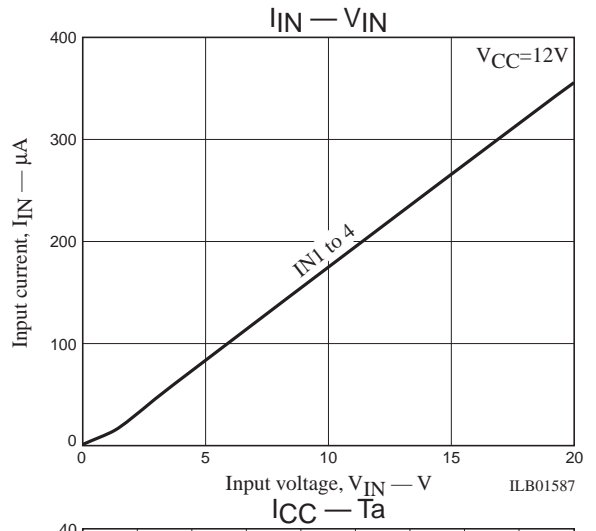
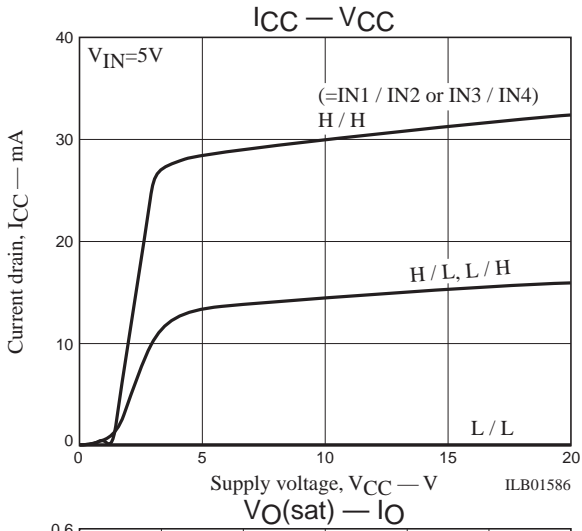


- Observe the following points when designing the printed circuit board pattern layout.

- Make the V_{CC} and ground lines as wide and as short as possible to lower the wiring inductance.

- Insert bypass capacitors between V_{CC} and ground mounted as close as possible to the IC.

- Resistors of about $10K\Omega$ must be inserted between the CPU output ports and the IN1 to IN4 pins if the microcontroller and the LB1948M are mounted on different printed circuit boards and the ground potentials differ significantly.



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