



SANYO Semiconductors

DATA SHEET

Monolithic Digital IC

LB1836M — Low-Saturation Bidirectional Motor Driver for Low-Voltage Drive

Overview

The LB1836M is a low-saturation two-channel bidirectional motor driver IC for use in low-voltage applications.

The LB1836M is a bipolar stepper-motor driver IC that is ideal for use in printers, FDDs, cameras and other portable devices.

Features

- Low voltage operation (2.5V min)
- Low saturation voltage (upper transistor + lower transistor residual voltage ; 0.40V typ at 400mA).
- Parallel connection (Upper transistor + lower transistor residual voltage ; 0.5V typ at 800mA).
- Separate logic power supply and motor power supply
- Brake function
- Spark killer diodes built in
- Thermal shutdown circuit built in
- Compact package (14-pin MFP)

Specifications

Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|-----------------------|----------------------------------|------|
| Maximum supply voltage | V _{CC} max | | -0.3 to +10.5 | V |
| | V _S max | | -0.3 to +10.5 | V |
| Output supply voltage | V _{OUT} | | V _S + V _{SF} | V |
| Input supply voltage | V _{IN} | | -0.3 to +10 | V |
| GNP pin flow-out current | IGND | Per channel | 1.0 | A |
| Allowable power dissipation | Pd max | * Mounted on a board. | 800 | mW |
| Operating temperature | T _{opr} | | -40 to +85 | °C |
| Storage temperature | T _{stg} | | -55 to +150 | °C |

* Mounted on a substrate: 30×30×1.5mm³, glass epoxy board.

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LB1836M

Allowable Operating Ranges at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-------------------------|-----------------|------------|--------------|------|
| Supply voltage | V _{CC} | | 2.5 to 9.0 | V |
| | V _S | | 1.8 to 9.0 | V |
| Input "H"-level voltage | V _{IH} | | 1.8 to 9.0 | V |
| Input "L"-level voltage | V _{IL} | | -0.3 to +0.7 | V |

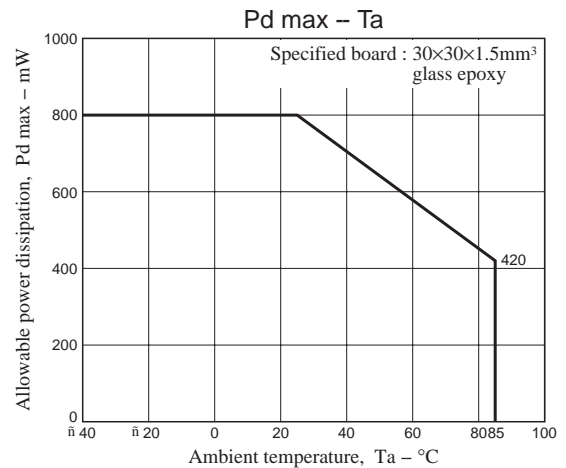
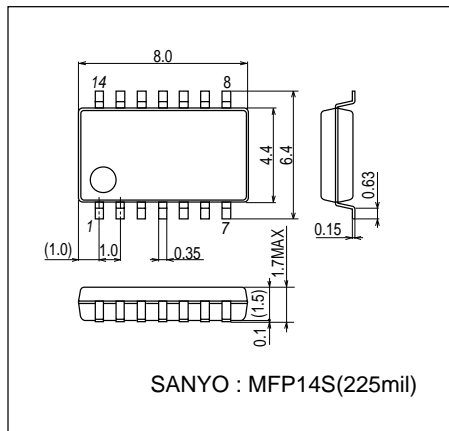
Electrical Characteristics at Ta = 25°C, V_{CC} = V_S = 3V

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|-----------------------|--|---------|------|------|------|
| | | | min | typ | max | |
| Supply current | I _{CC0} | V _{IN1, 2, 3, 4} = 0V, I _{CC} + I _S | | 0.1 | 10 | μA |
| | I _{CC1} | V _{IN1} = 3V, V _{IN2, 3, 4} = 0V, I _{CC} + I _S | | 14 | 20 | mA |
| | I _{CC2} | V _{IN1, 2} = 3V, V _{IN3, 4} = 0V, I _{CC} + I _S | | 22 | 35 | mA |
| Output saturation voltage (upper + lower) | V _{OUT1} | I _{OUT} = 200mA | | 0.20 | 0.28 | V |
| | V _{OUT2} | I _{OUT} = 400mA | | 0.40 | 0.60 | V |
| | V _{OUT3} | I _{OUT} = 400mA, Parallel connection | | 0.25 | 0.35 | V |
| | V _{OUT4} | I _{OUT} = 800mA, Parallel connection | | 0.50 | 0.70 | V |
| Output sustain voltage | V _O (SUS) | I _{OUT} = 400mA | 9 | | | V |
| Input current | I _{IN} | V _{IN} = 2V, V _{CC} = 6V | | | 80 | μA |
| Spark killer diode | | | | | | |
| Reverse current | I _S (leak) | V _{CC1, 2} = 9V | | | 30 | μA |
| Forward voltage | V _{SF} | I _{OUT} = 400mA | | | 1.7 | V |

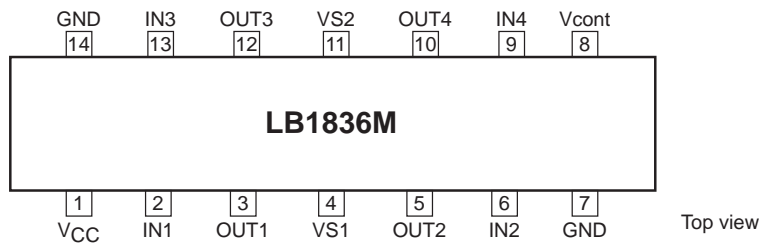
Package Dimensions

unit : mm (typ)

3111A

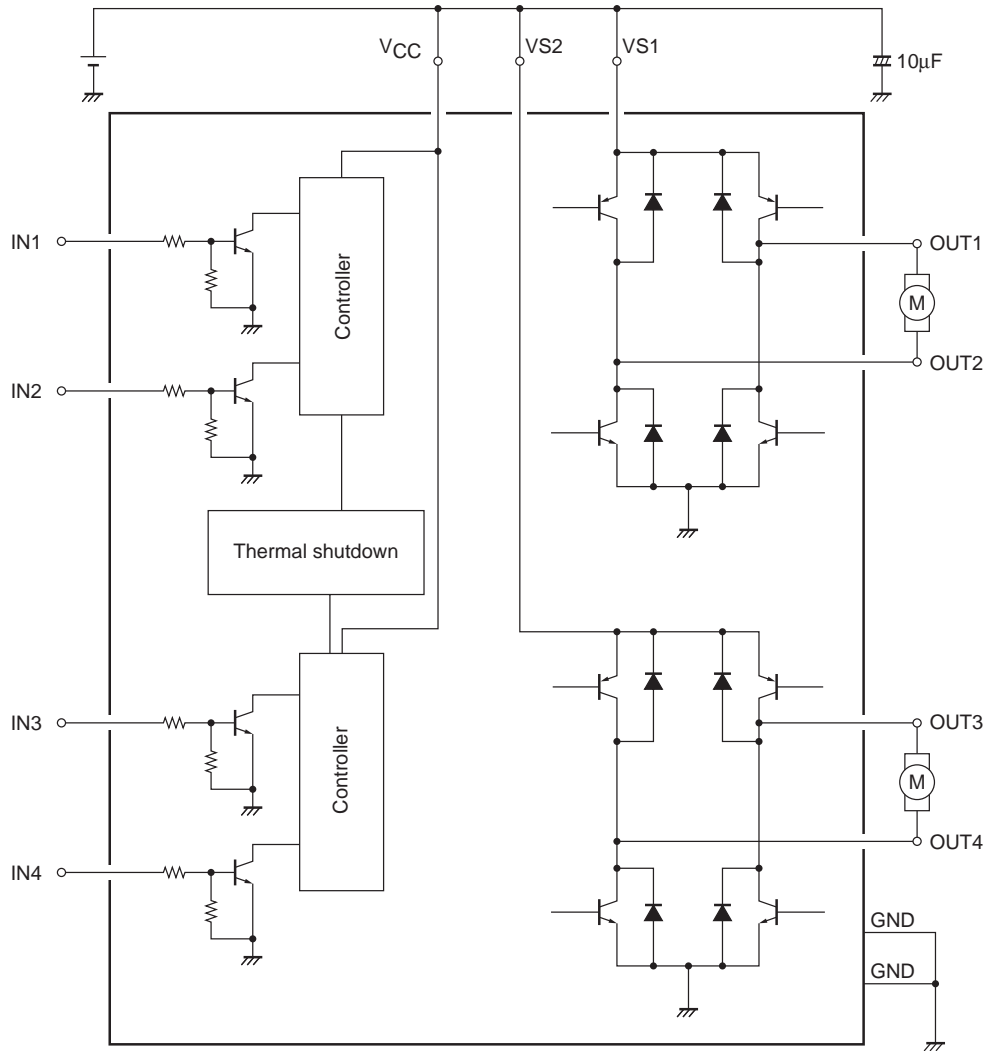


Pin Assignment



Note) Ground both GND pins.

Block Diagram



Truth Table

| IN1/3 | IN2/4 | OUT1/3 | OUT2/4 | Mode |
|-------|-------|--------|--------|---------|
| H | L | H | L | Forward |
| L | H | L | H | Reverse |
| H | H | L | L | Brake |
| L | L | OFF | OFF | Standby |

Design Notes

If large current flows on the power supply (V_S) line and the GND line, then in some applications and layouts, misoperation due to line oscillation may result.

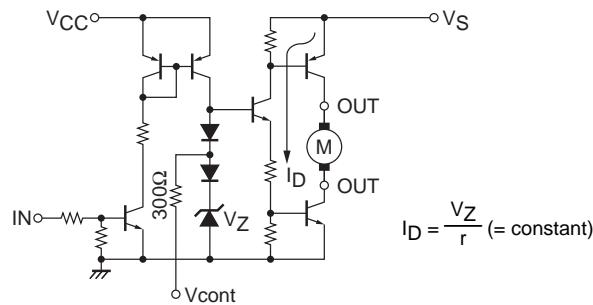
The modes during which large current flows are as follows :

- Motor surge current when the DC motor starts up or when it shifts rotation directions (forward \leftrightarrow reverse).
- Passthrough current generated within the IC when shifting rotation directions (forward \leftrightarrow reverse) or when shifting from forward/reverse rotation to braking, or vice versa.

The following points should be kept in mind regarding the pattern layout :

- Keep the wiring lines thick and short in order to reduce wiring inductance between the power supply (V_S) and GND.
- Insert a passthrough capacitor near the IC. (Maximum effect is obtained by inserting the passthrough capacitor between V_S and the pin 7 GND at the closest distance possible.
- If the CPU and the LB1836M are mounted on separate boards and the difference between the ground potential of each board is large, install resistors of about $10k\Omega$ in series between the CPU and the LB1836M inputs.

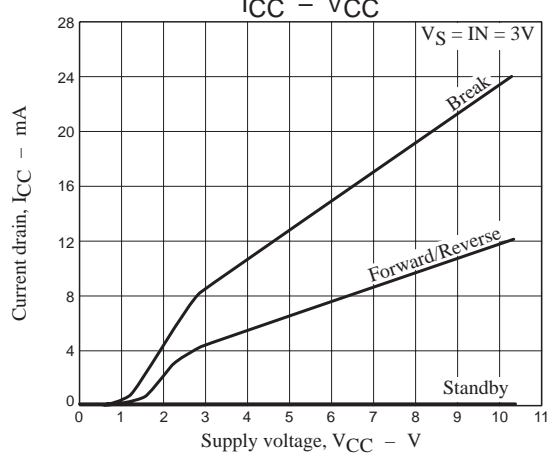
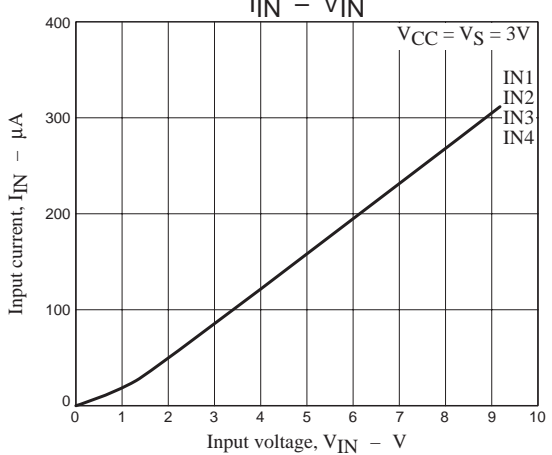
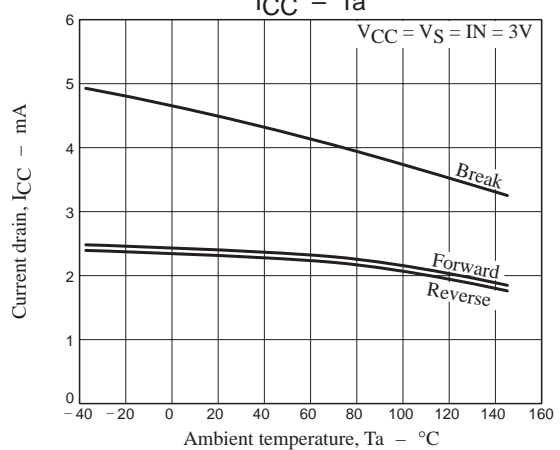
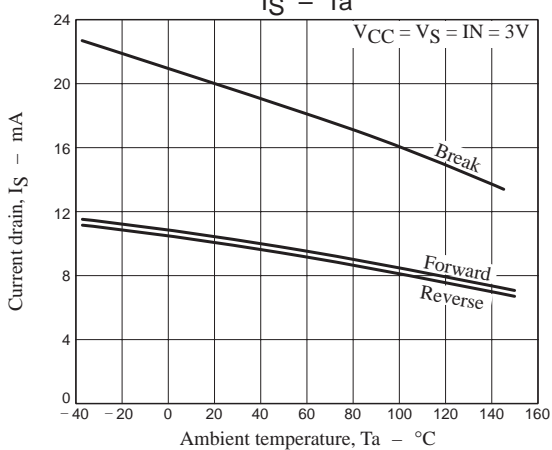
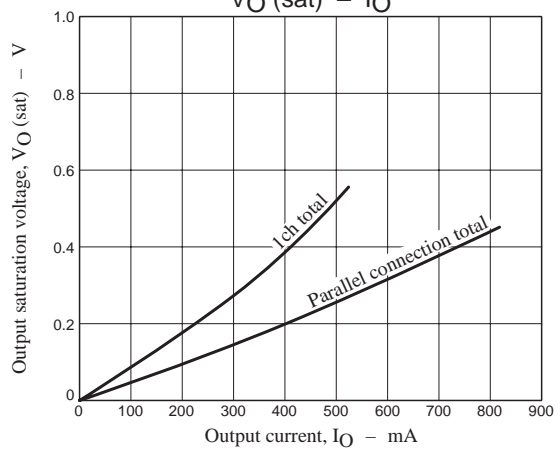
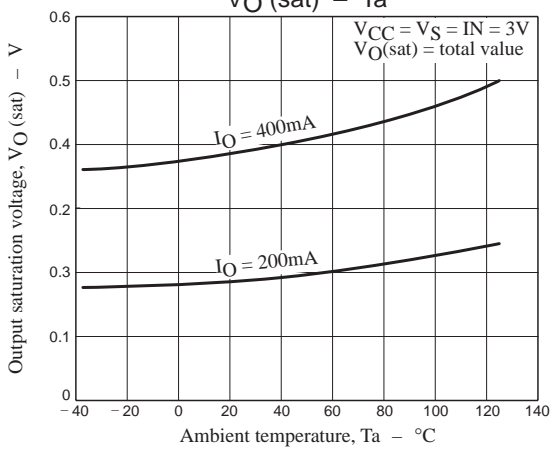
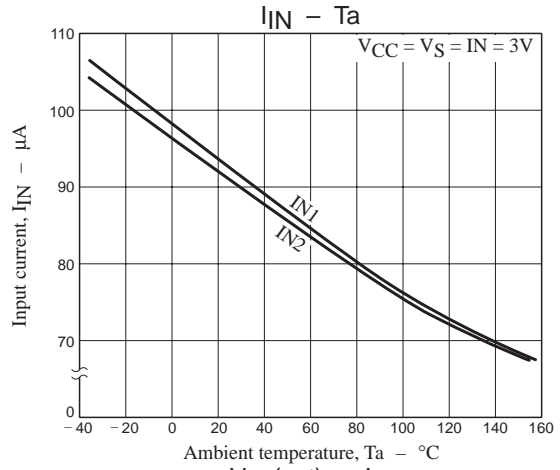
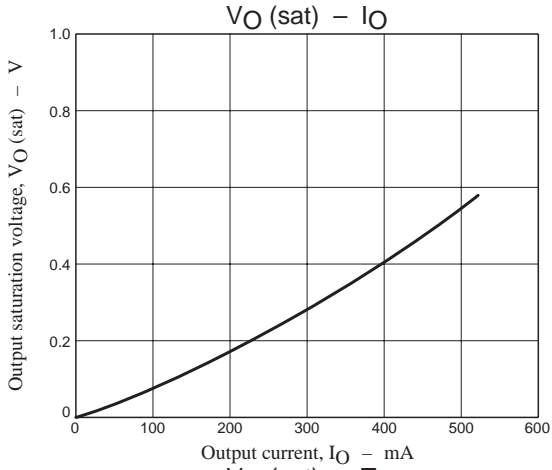
Vcont pin

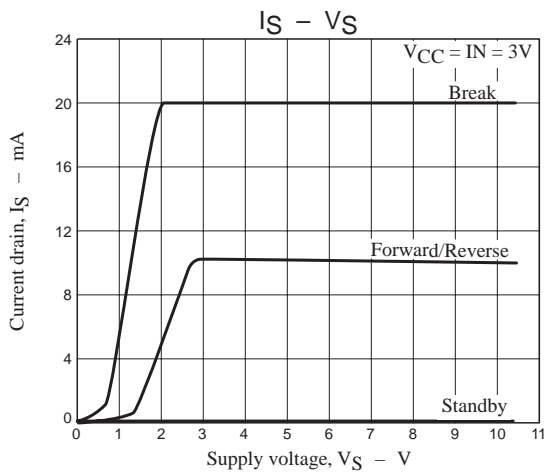


As shown in the above diagram, the Vcont pin outputs the voltage of the band gap Zener $V_Z + V_F (=1.93V)$.

In normal use, this pin is left open.

The drive current I_D is varied by the Vcont voltage. However, because the band gap Zener is shared, it functions as a bridge.





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