



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

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 $T_a = 25^\circ\text{C}$

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
GND pin flow-out current	IGND	Per channel	1.0	A
Allowable power dissipation	$P_d\ max$	* Mounted on a board.	800	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Mounted on a substrate: $30 \times 30 \times 1.5\text{mm}^3$, glass epoxy board.

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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

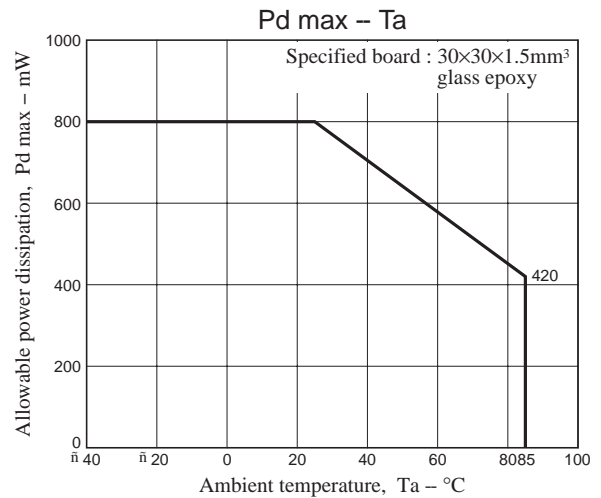
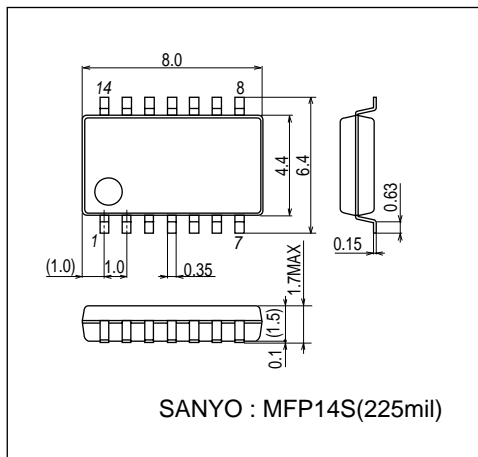
Electrical Characteristics at Ta = 25°C, V_{CC} = V_S = 3V

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

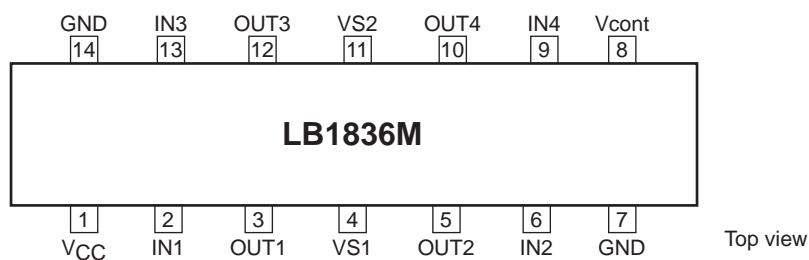
Package Dimensions

unit : mm (typ)

3111A

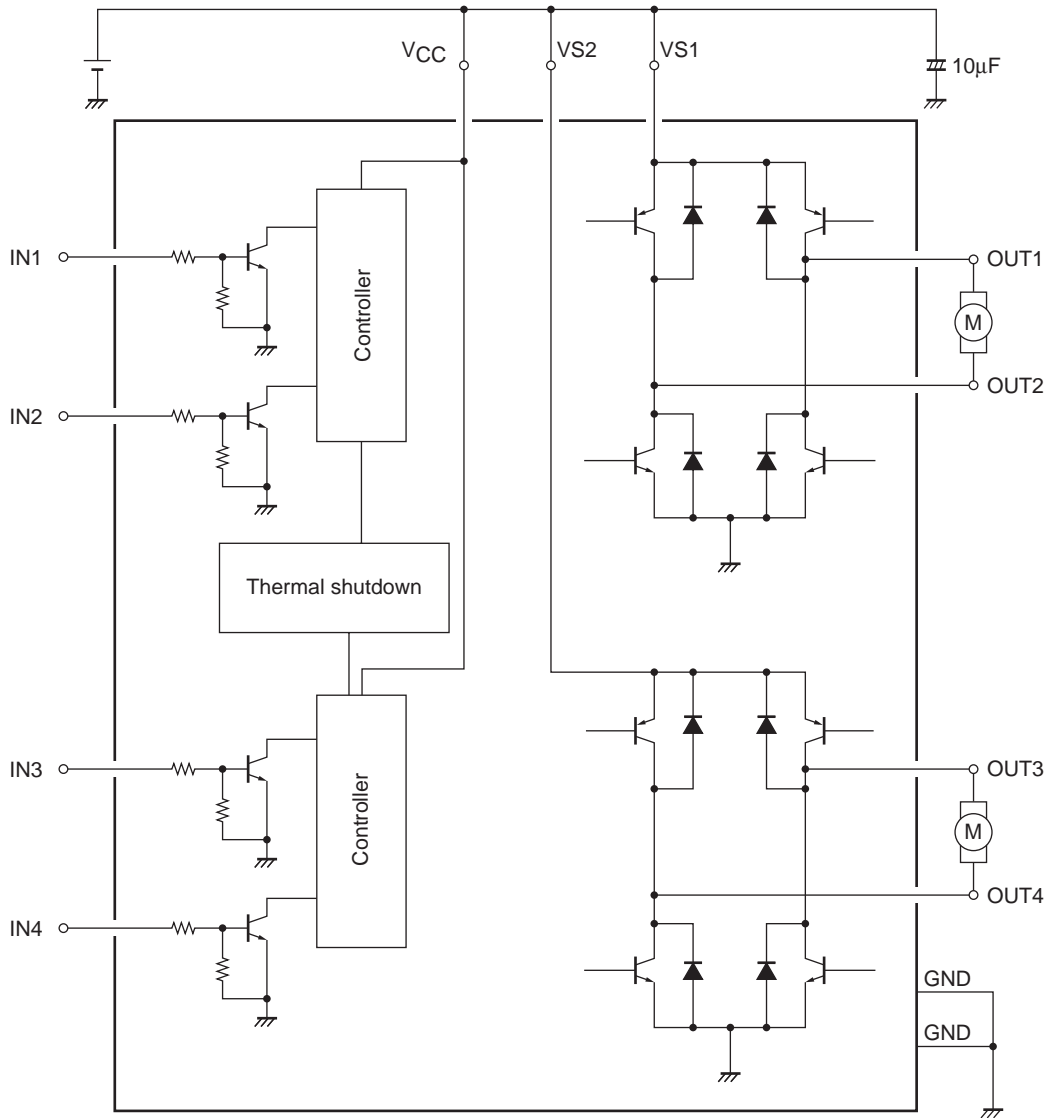


Pin Assignment



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.

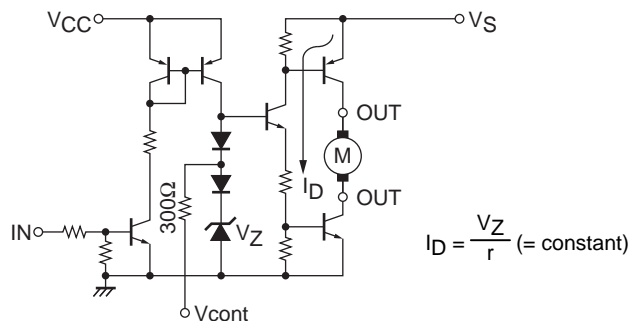
The modes during which large current flows are as follows :

- 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

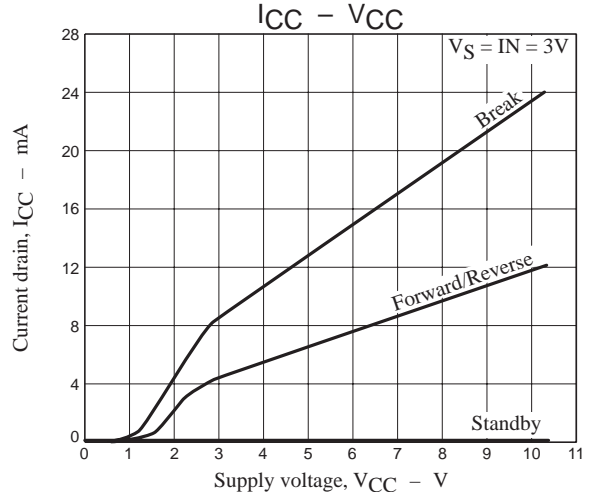
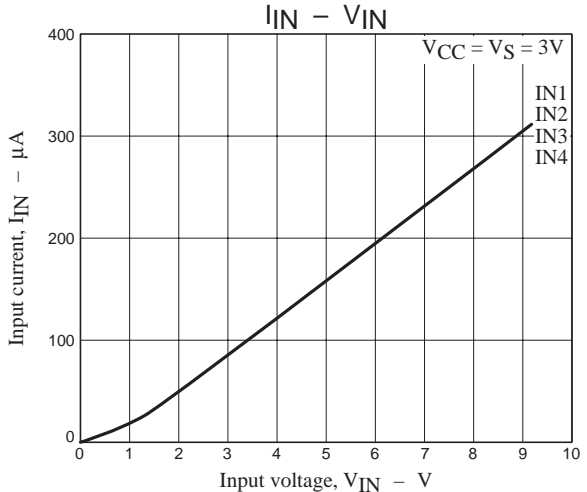
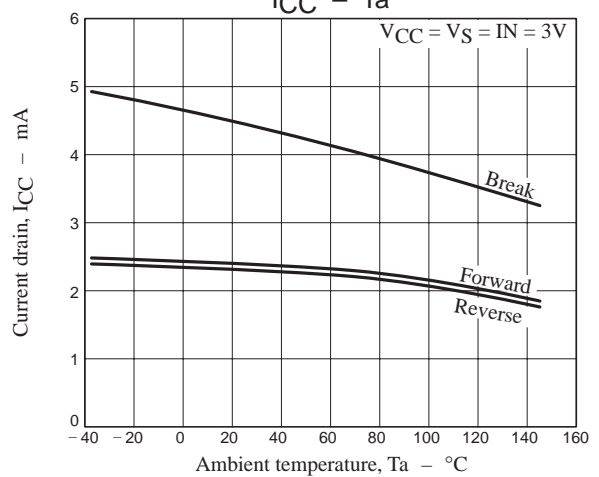
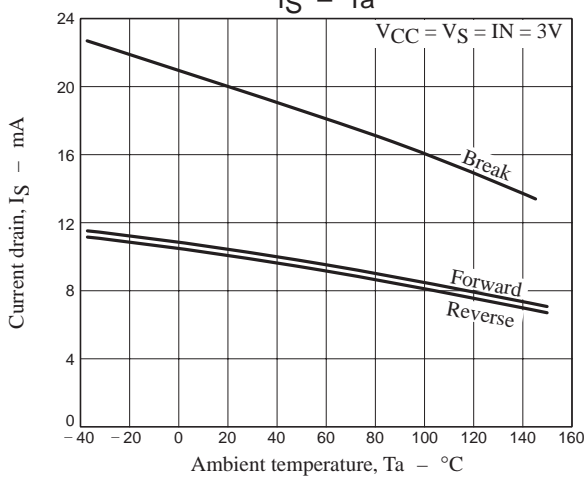
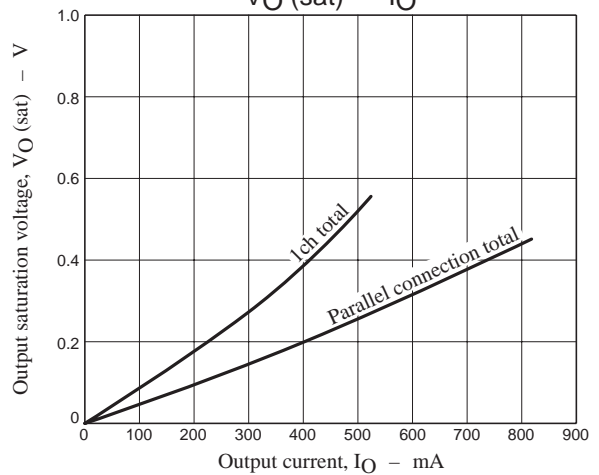
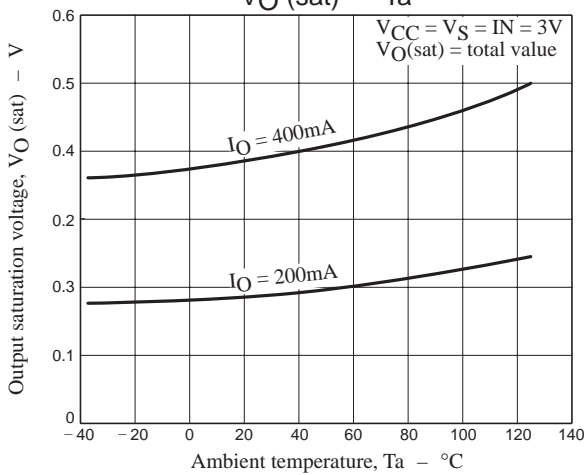
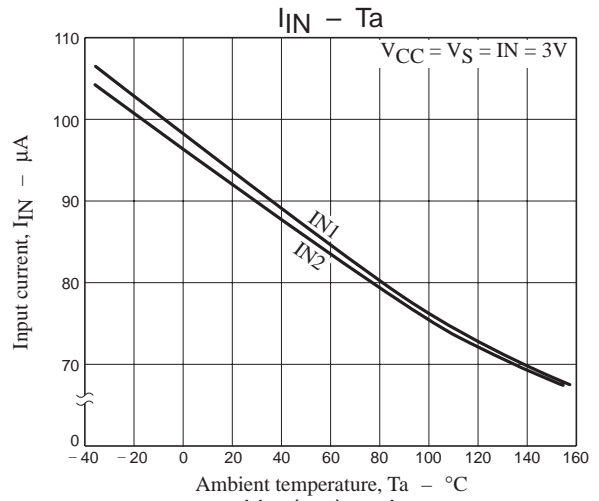
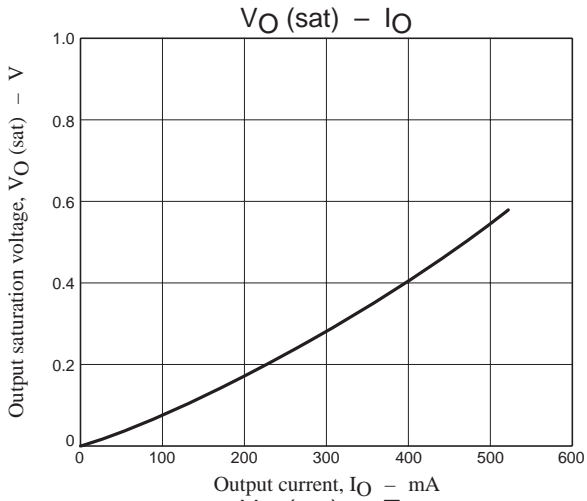


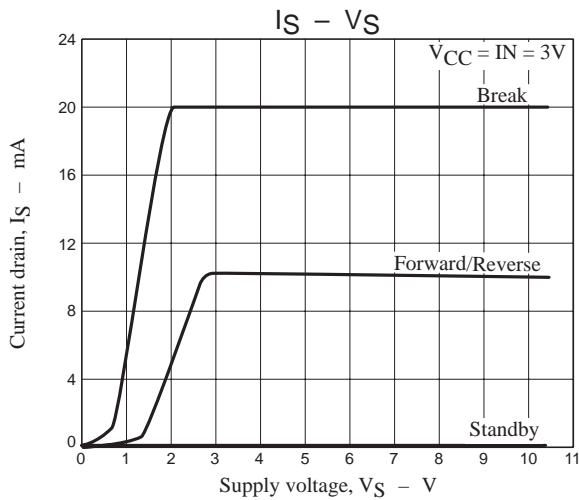
As shown in the above diagram, the Vcont pin outputs the voltage of the band gap Zener $V_Z + V_F (=1.93V)$.

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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