



LB1837M

Low-voltage/Low-saturation Bidirectional Constant-Voltage Regulated Motor Driver

Overview

The LB1837M is a low-voltage, low-saturation, two-channel motor driver with a bidirectional braking function that provides constant-voltage regulated output for bidirectional operation. The design of the LB1837M is ideal for video equipment, cameras, and other portable equipment.

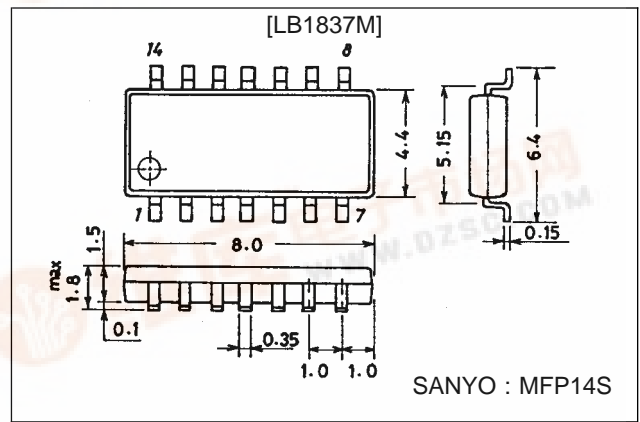
Features

- Wide operating voltage range (3.0 to 9.0 V).
- Low saturation voltage
 $V_O(\text{sat}) = 0.40 \text{ V}$ at $I_O = 200 \text{ mA}$.
- Consumes almost no current in standby mode (0.1 μA or less).
- Permits setting of bidirectional constant-voltage regulated value.
- Built-in reference voltage coupled to input.
- Brake function built in.
- Compact MFP14S package.

Package Dimensions

unit: mm

3111-MFP14S



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		10.5	V
Output current	$I_m \text{ max}$		250	mA
Applied input voltage	V_{IN}		-0.3 to +10	V
Allowable power dissipation	$P_d \text{ max}$	With board (30 x 30 x 1.5 mm ³)	800	mW
Operating temperature	T_{opr}		-20 to +80	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		3.0 to 9.0	V
Input [H] voltage	V_{IH}		3.0 to 9.0	V
Input [L] voltage	V_{IL}		-0.3 to +0.7	V
Control voltage	V_C		0.2 to 6.0	V



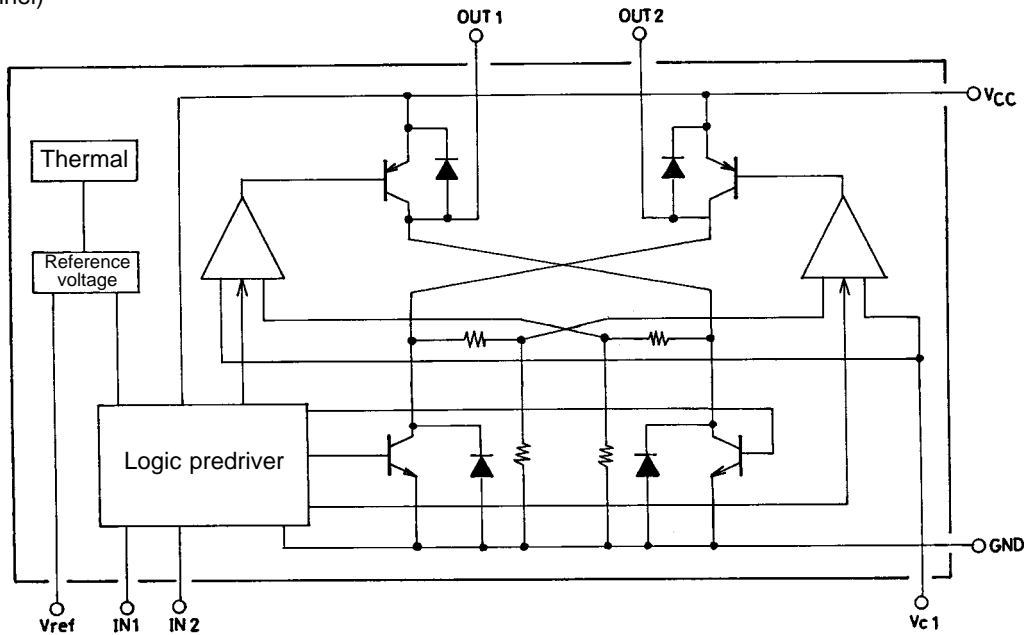
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Electrical Characteristics at $T_a = 25\text{ }^\circ\text{C}$, $V_{CC} = 6\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply current	I_{CC0}	During standby		0.1	10	μA
	I_{CC1}	(For one channel) During bidirectional operation during control, load open		2	3	mA
	I_{CC2}	(For one channel) During bidirectional operation during saturation, load open		3	5	mA
	I_{CC3}	During braking (for one channel)		6.5	9	mA
Output saturation voltage	V_{sat1}	$I_O = 100\text{ mA}$ (upper side + lower side)		0.3	0.4	V
	V_{sat2}	$I_O = 200\text{ mA}$ (upper side + lower side)		0.4	0.55	V
	V_{sat3}	$I_O = 200\text{ mA}$ (lower side)	0.07	0.10	0.15	V
Reference voltage	V_{ref}	$I_{vref} = 1\text{ mA}$	1.85	2.0	2.15	V
Output voltage voltage characteristics	$\frac{\Delta V_O}{\Delta V_{CC}}$	$V_O = 5\text{ V}$, $V_{CC} = 5.5\text{ to }9\text{ V}$, $I_O = 100\text{ mA}$			20	mV
Output voltage current characteristics	$\frac{\Delta V_O}{\Delta I_{CC}}$	$V_O = 5\text{ V}$, $V_{CC} = 6\text{ V}$, $I_O = 10\text{ to }100\text{ mA}$			50	mV
Input current	I_{IN}	$V_{IN} = 5\text{ V}$		90	150	μA
Output voltage	V_O	Between OUT and GND	$2.5 \times V_C$		$2.7 \times V_C$	V

Equivalent Circuit Block Diagram

(For one channel)

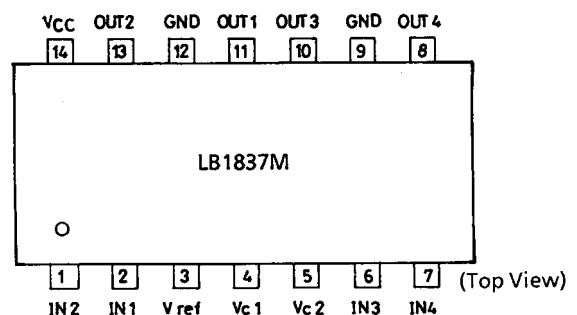


Truth Table

Input		Output		Mode
IN 1/3	IN 2/4	OUT 1/3	OUT 2/4	
L	L	OFF	OFF	Standby
H	L	H	L	Constant-voltage regulated forward operation
L	H	L	H	Constant-voltage regulated reverse operation
H	H	L	L	Brake

The constant-voltage regulated output V_O (= voltage between H side output and GND) is controlled by $2.5 \times V_C$. The output is in the saturated state when the V_C input range is $0.2\text{ to }6\text{ V}$ and $V_O \cong V_{CC}$.

Pin Assignment



Note: Both GND pins must be grounded.

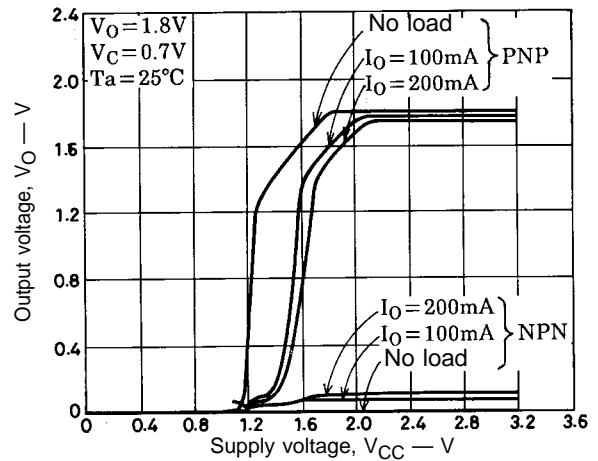
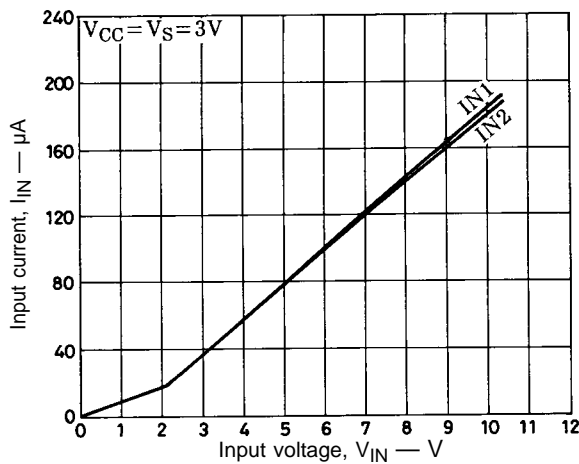
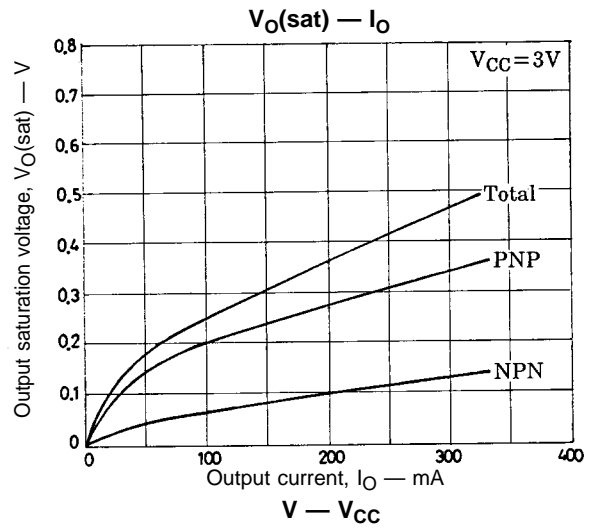
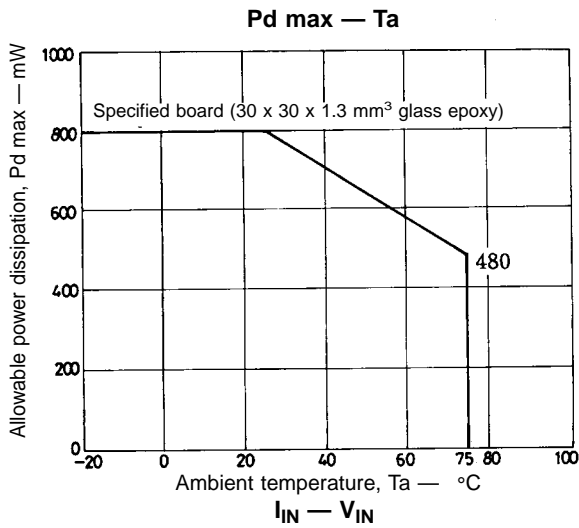
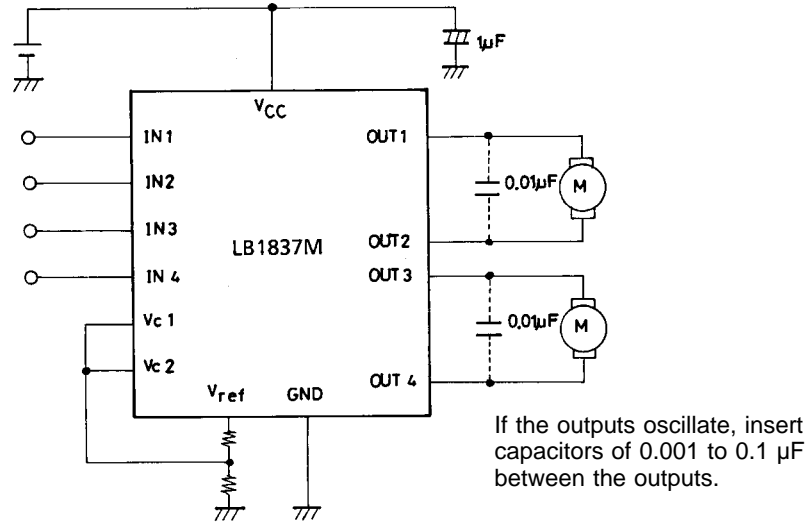
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Pin Functions

Pin No.	Symbol	Equivalent Circuit Diagram	Pin Function
14	V_{CC}		Power supply pin for output and controller.
9 12	GND		GND pins for output and controller. Both must be grounded.
1 2 6 7	IN2 IN1 IN3 IN4		<p>Input pins that determine the excitation of the outputs. IN1 and IN2 control outputs OUT1 and OUT2; IN3 and IN4 control outputs OUT3 and OUT4.</p> <p>When inputs IN1 through IN4 are all low or open, the device goes into standby mode and current consumption drops to 10 μA or less.</p> <p>L: -0.3 to +0.7 V H: 3.0 to 9.0 V</p> <p>There are no limitations on the magnitude relationships between the V_{CC} and V_{IN} supply voltages.</p>
8 10 11 13	OUT4 OUT3 OUT1 OUT2		<p>Output pins. Have built-in spark killer diodes. Braking provides short braking that turns on the lower transistor.</p>
3	V_{ref}		Reference voltage (= 2.0 V).
4 5	V_{C1} V_{C2}		<p>Input pins that determine the constant-voltage regulated output level. The constant-voltage regulated output V_O (= voltage between H side output and GND) is controlled by $V_O = 2.5 \times V_C$. There are no limitations on the magnitude relationships between the V_{CC}, V_{C1} and V_{C2} supply voltages.</p>

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Sample Application Circuit



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