

**LB1837M****Low-voltage/Low-saturation Bidirectional Constant-Voltage Regulated Motor Driver****Overview**

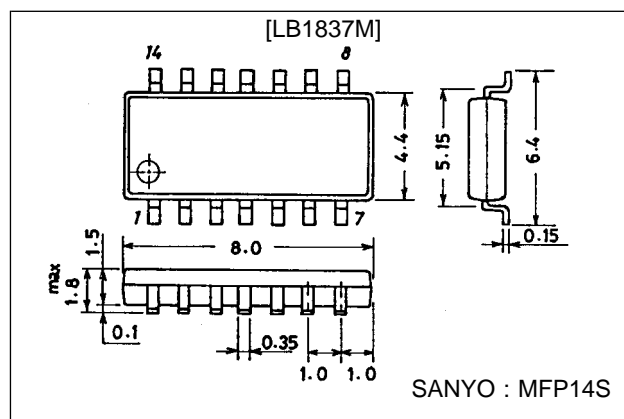
The LB1837M is a low-voltage, low-saturation, two-channel motor driver with a bidirectional braking function that provides constant-voltage regulated output for bidirectional operation. The design of the LB1837M is ideal for video equipment, cameras, and other portable equipment.

**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  $\mu\text{A}$  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 <sup>3</sup> )	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

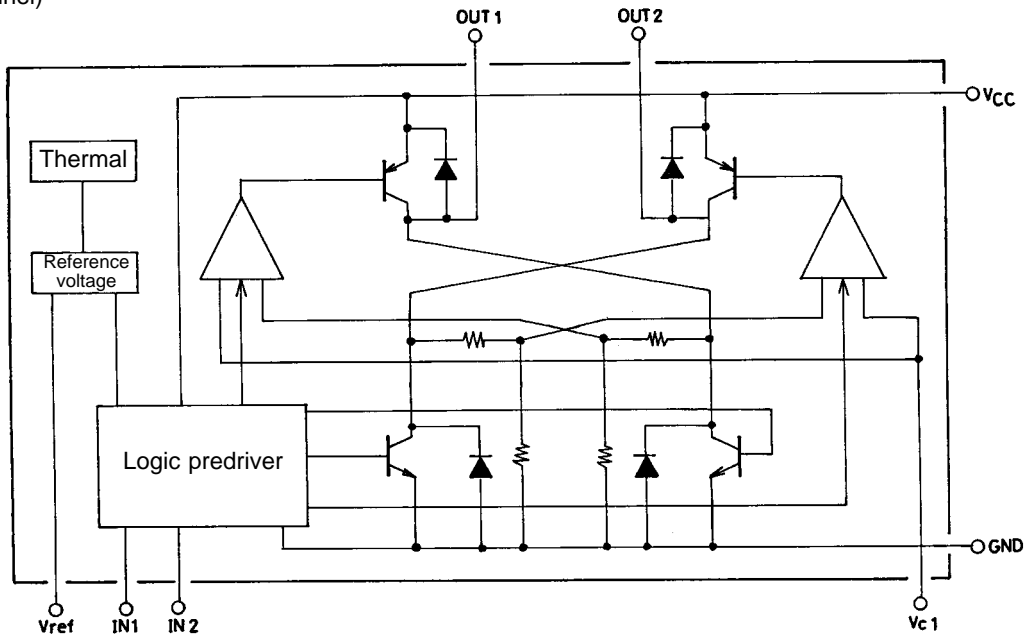
# LB1837M

## 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	$\mu\text{A}$
	$I_{CC1}$	(For one channel) During bidirectional operation during control, load open		2	3	$\text{mA}$
	$I_{CC2}$	(For one channel) During bidirectional operation during saturation, load open		3	5	$\text{mA}$
	$I_{CC3}$	During braking (for one channel)		6.5	9	$\text{mA}$
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	$\text{mV}$
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	$\text{mV}$
Input current	$I_{IN}$	$V_{IN} = 5\text{ V}$		90	150	$\mu\text{A}$
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)

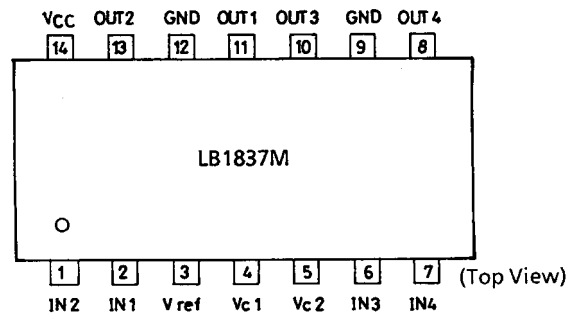


### Truth Table

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



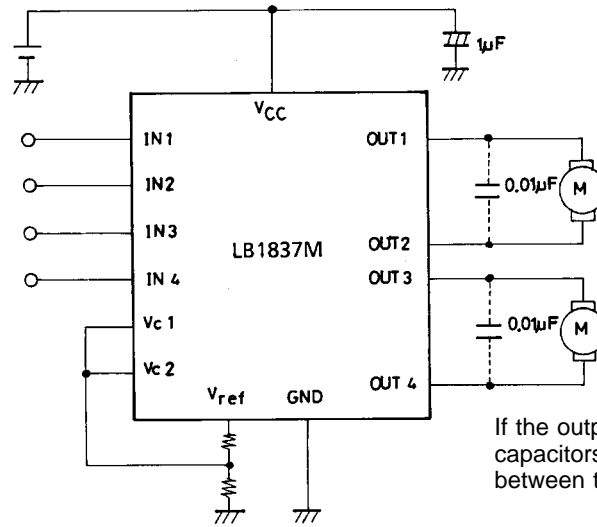
Note: Both GND pins must be grounded.

Pin Functions

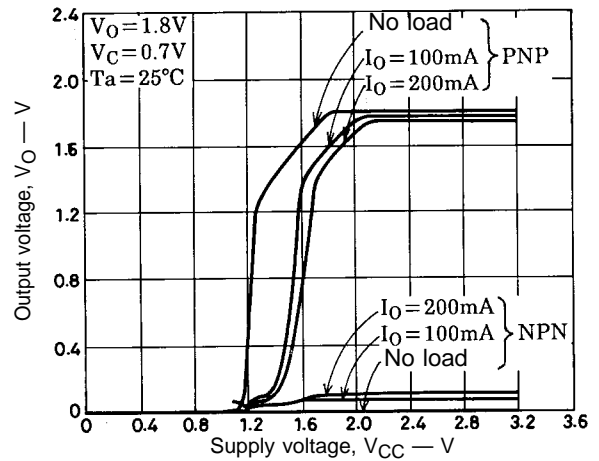
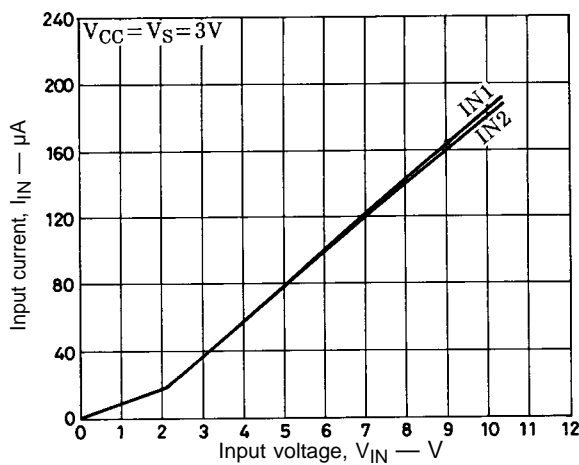
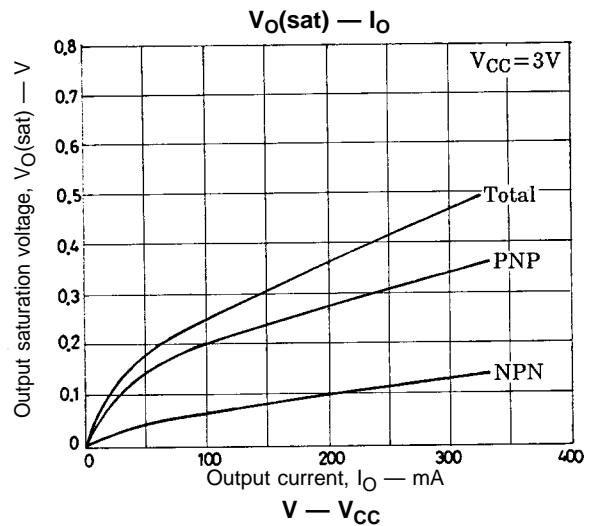
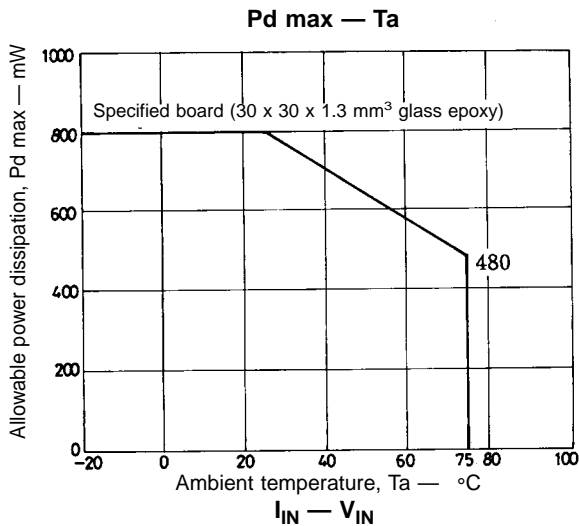
Pin No.	Symbol	Equivalent Circuit Diagram	Pin Function
14	V <sub>CC</sub>		Power supply pin for output and controller.
9 12	GND		GND pins for output and controller. Both must be grounded.
1 2 6 7	IN2 IN1 IN3 IN4		<p>Input pins that determine the excitation of the outputs.                      IN1 and IN2 control outputs OUT1 and OUT2; IN3 and IN4 control outputs OUT3 and OUT4.                      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.                      L: -0.3 to +0.7 V                      H: 3.0 to 9.0 V                      There are no limitations on the magnitude relationships between the V<sub>CC</sub> and V<sub>IN</sub> 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 <sub>ref</sub>		Reference voltage (= 2.0 V).
4 5	V <sub>C1</sub> V <sub>C2</sub>		<p>Input pins that determine the constant-voltage regulated output level.                      The constant-voltage regulated output V<sub>O</sub> (= voltage between H side output and GND) is controlled by V<sub>O</sub> = 2.5 x V<sub>C</sub>. There are no limitations on the magnitude relationships between the V<sub>CC</sub>, V<sub>C1</sub> and V<sub>C2</sub> supply voltages.</p>

# LB1837M

## Sample Application Circuit



If the outputs oscillate, insert capacitors of 0.001 to 0.1  $\mu\text{F}$  between the outputs.



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