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Ordering number: EN3948B

Monolithic Digital IC

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.

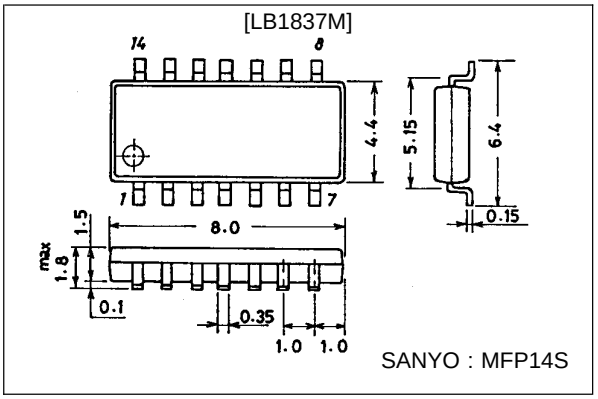
Features

- Wide operating voltage range (3.0 to 9.0 V).
- Low saturation voltage
  V_O (sat) = 0.40 V at I_O = 200 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 Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		10.5	V
Output current	Im max		250	mA
Applied input voltage	V_{IN}		–0.3 to +10	V
Allowable power dissipation	Pd max	With board (30 x 30 x 1.5 mm^3)	800	mW
Operating temperature	Topr		–20 to +80	°C
Storage temperature	Tstg		–40 to +125	°C

Allowable Operating Ranges at Ta = 25 °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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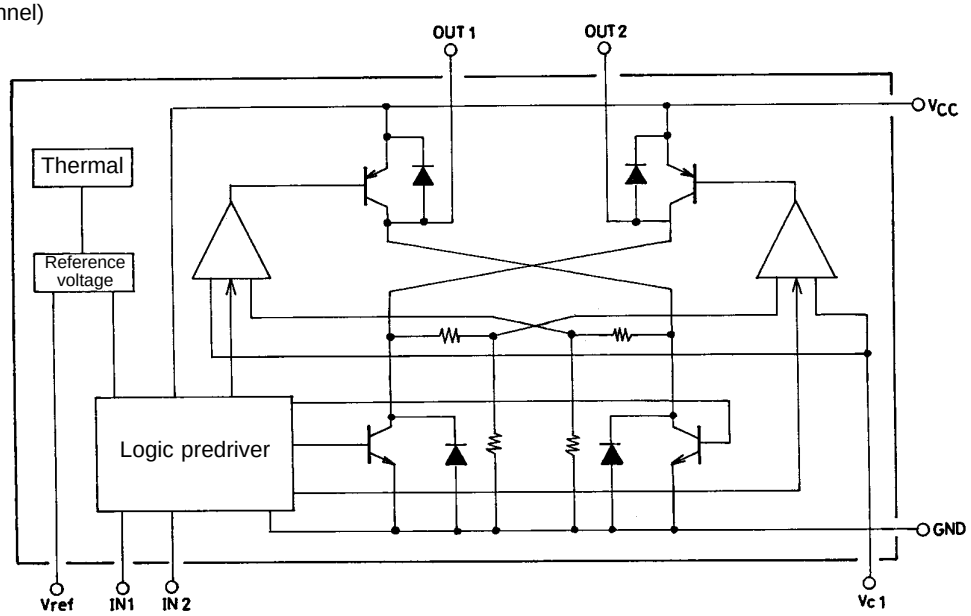
Electrical Characteristics at Ta = 25 °C, V_{CC} = 6 V

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply current	$I_{CC}0$	During standby		0.1	10	µA
	$I_{CC}1$	(For one channel) During bidirectional operation during control, load open		2	3	mA
	$I_{CC}2$	(For one channel) During bidirectional operation during saturation, load open		3	5	mA
	$I_{CC}3$	During braking (for one channel)		6.5	9	mA
Output saturation voltage	Vsat1	I_O = 100 mA (upper side + lower side)		0.3	0.4	V
	Vsat2	I_O = 200 mA (upper side + lower side)		0.4	0.55	V
	Vsat3	I_O = 200 mA (lower side)	0.07	0.10	0.15	V
Reference voltage	Vref	Ivref = 1 mA	1.85	2.0	2.15	V
Output voltage voltage characteristics	$\frac{\Delta V_O}{\Delta V_{CC}}$	V_O = 5 V, V_{CC} = 5.5 to 9 V, I_O = 100 mA			20	mV
Output voltage current characteristics	$\frac{\Delta V_O}{\Delta I_{CC}}$	V_O = 5 V, V_{CC} = 6 V, I_O = 10 to 100 mA			50	mV
Input current	I_{IN}	V_{IN} = 5 V		90	150	µA
Output voltage	V_O	Between OUT and GND	2.5 x V_C		2.7 x V_C	V

Equivalent Circuit Block Diagram

(For one channel)

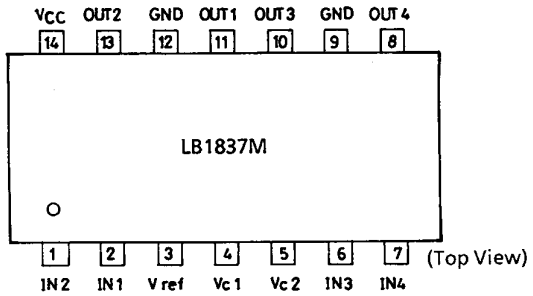


Truth Table

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 x V_C. The output is in the saturated state when the V_C input range is 0.2 to 6 V and $V_O \geqq V_{CC}$.

Pin Assignment



Note: Both GND pins must be grounded.

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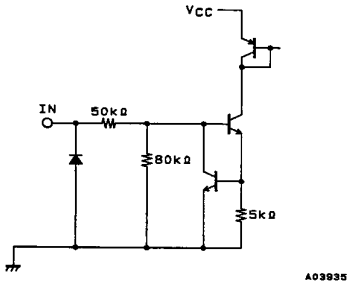
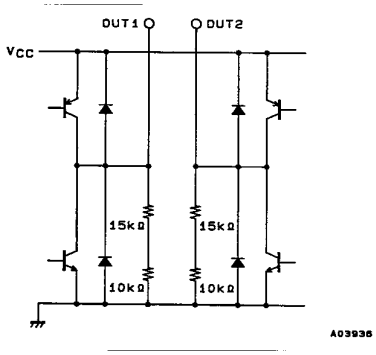
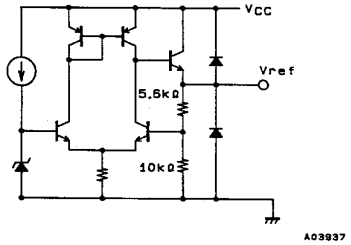
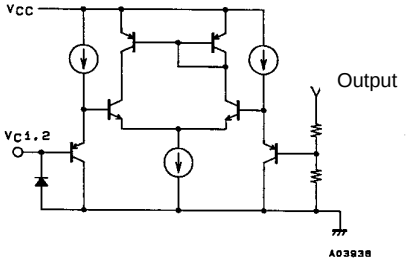
Pin Functions

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		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_{CC} and V_{IN} supply voltages.
8 10 11 13	OUT4 OUT3 OUT1 OUT2		Output pins. Have built-in spark killer diodes. Braking provides short braking that turns on the lower transistor.
3	Vref		Reference voltage (= 2.0 V).
4 5	V_C1 V_C2		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 x V_C. There are no limitations on the magnitude relationships between the V_{CC}, V_C1 and V_C2 supply voltages.

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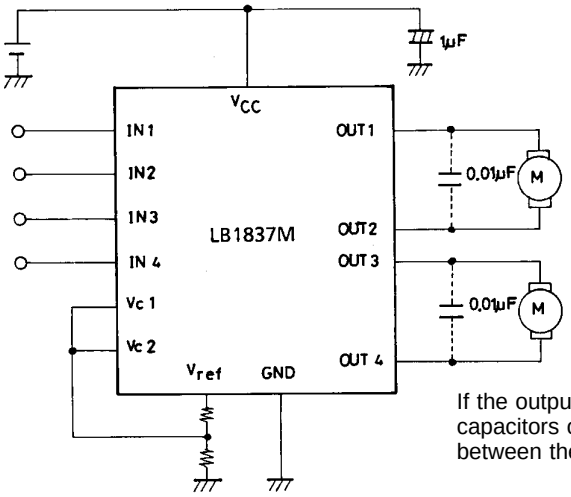
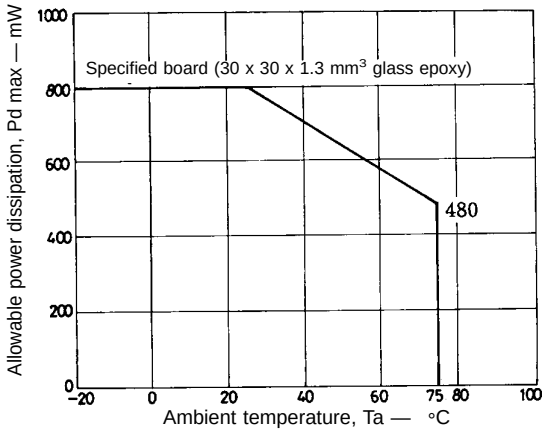
Sample Application Circuit

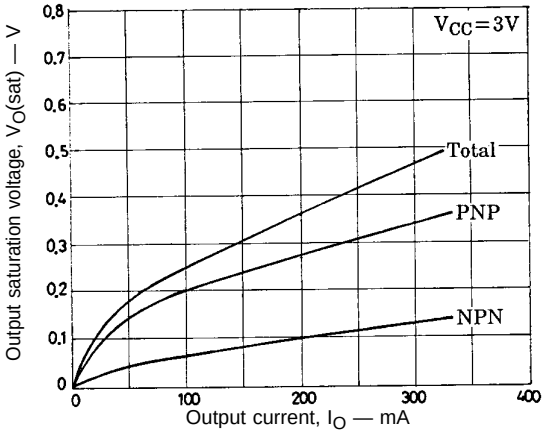


If the outputs oscillate, insert capacitors of 0.001 to 0.1 µF between the outputs.

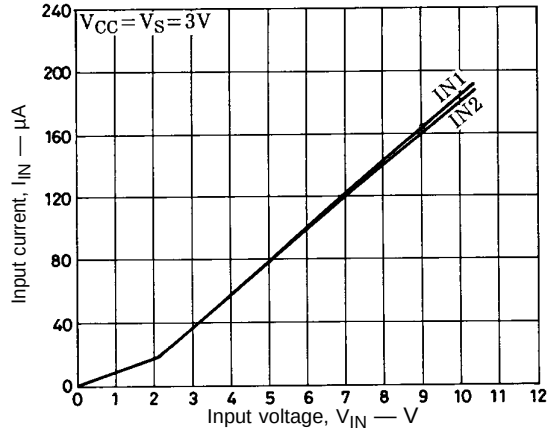
Pd max — Ta



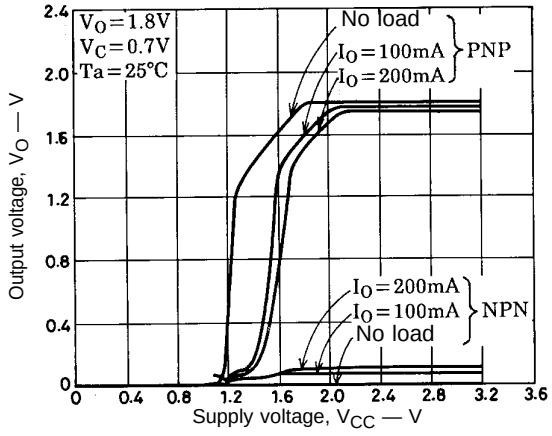
V_O(sat) — I_O



I_{IN} — V_{IN}



V — V_{CC}



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