Ordering number: EN3949C

Monolithic Digital IC

LB1838M

Low-saturation, Bidirectional Motor Driver for Low-voltage Applications

Overview

The LB1838M is a low-saturation two-channel bidirectional motor driver IC for use in low-voltage applications.
The LB1838M is a bipolar stepper-motor driver IC that is ideal for use in printers, FDDs, cameras and other portable devices.

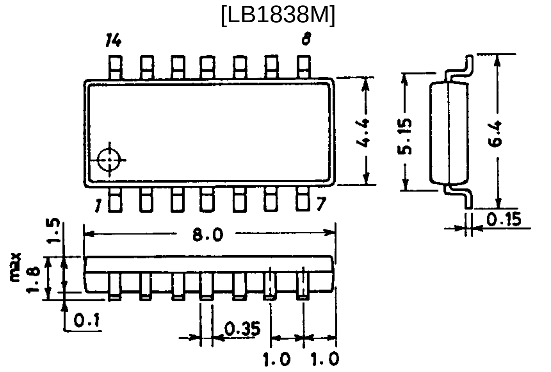
Features

- Low voltage operation (2.5 V min)
- Low saturation voltage (upper transistor + lower transistor residual voltage; 0.40 V at 400 mA).
- Through-current prevention circuit built in
- Separate logic power supply and motor power supply
- Spark killer diodes built in
- Thermal shutdown circuit built in
- Compact package (14-pin MFP)

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		–0.3 to +10.5	V
	V_S max		–0.3 to +10.5	V
Output applied voltage	V_{OUT}		$V_S + V_{SF}$	V
Input applied voltage	V_{IN}		–0.3 to +10	V
Ground pin flow-out current	IGND	Per channel	1.0	A
Allowable power dissipation	Pd max1	Independent IC	550	mW
	Pd max2	* With board	800	mW
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–40 to +125	°C

*Note: Mounted on 20 × 30 × 1.5 mm^3 glass epoxy PCB

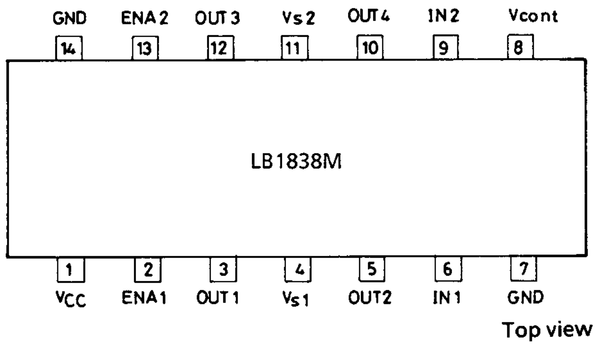
Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		2.5 to 9.0	V
	V_S		1.8 to 9.0	V
Input high-level voltage	V_{IH}		1.8 to 9.0	V
Input low-level voltage	V_{IL}		–0.3 to +0.7	V

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

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply current 1	$I_{CC}0$	ENA1, 2 = 0 V, $V_{IN}1$ = 3 V or 0 V		0.1	10	µA
Supply current 2	$I_{CC}1$	ENA1 = 3 V, $V_{IN}1$ = 3 V or 0 V		12	18	mA
Output saturation voltage	$V_{OUT}1$	ENA = 3 V, V_{IN} =3 V or 0 V, I_{OUT} = 200 mA		0.2	0.28	V
	$V_{OUT}2$	ENA = 3 V, V_{IN} = 3 V or 0 V, I_{OUT} = 400 mA		0.4	0.6	V
Input current 1	I_{IN}	V_{CC} = 6 V, V_{IN} = 6 V			200	µA
Input current 2	I_{ENA}	V_{CC} = 6 V, ENA = 6 V			200	µA
Output sustaining voltage	V_O (sus)	I_{OUT} = 400 mA	9			V
Spark killer diode reverse current	Is (leak)	$V_{CC}1$, V_S = 7 V			30	µA
Spark killer diode forward voltage	V_{SF}	I_{OUT} = 400 mA			1.7	V

Pin Assignment

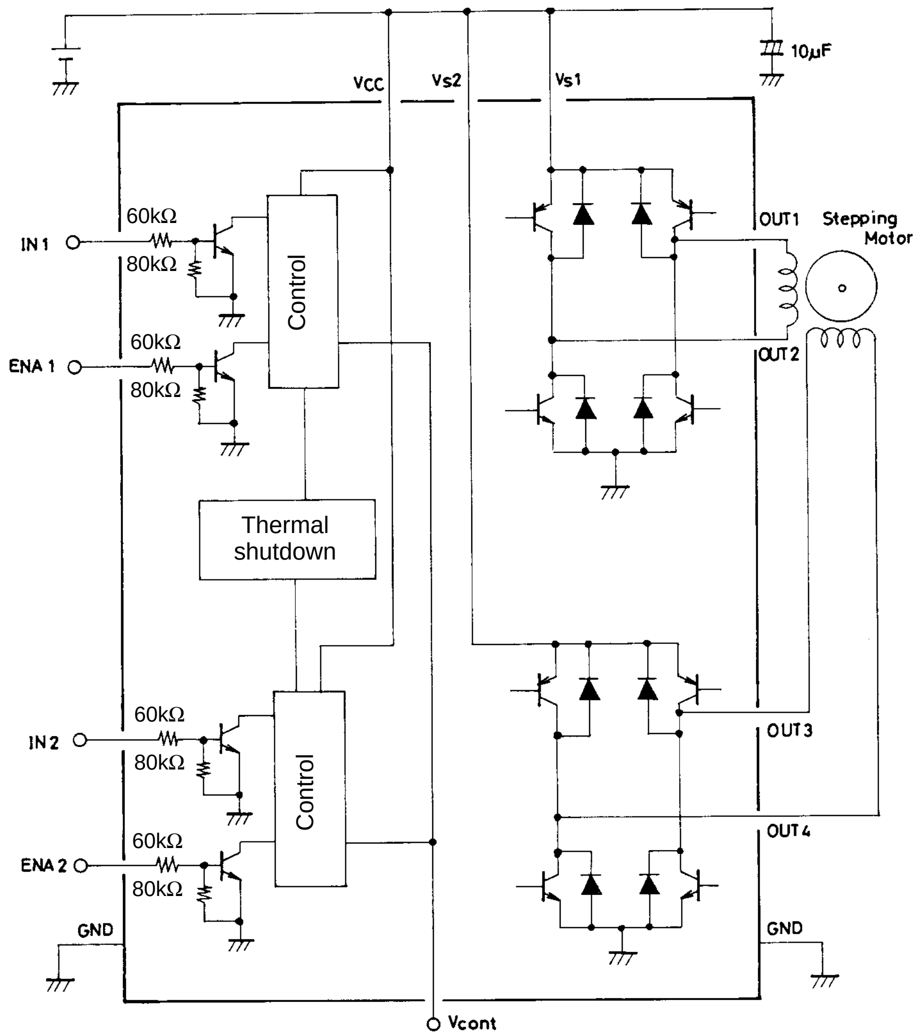


Note: Both GND pins should be connected to ground.

Truth Table

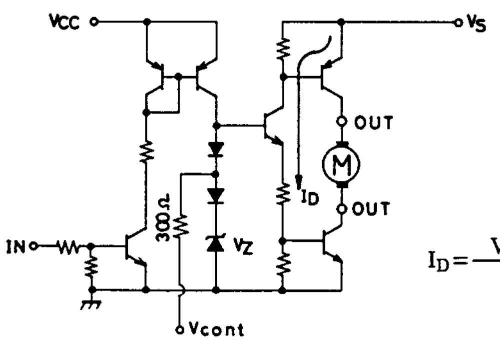
IN 1, 2	ENA 1, 2	OUT 1, 3	OUT 2, 4	Mode
L	H	H	L	Forward
H	H	L	H	Reverse
L	L	OFF	OFF	Standby
H	L	OFF	OFF	Standby

Block Diagram



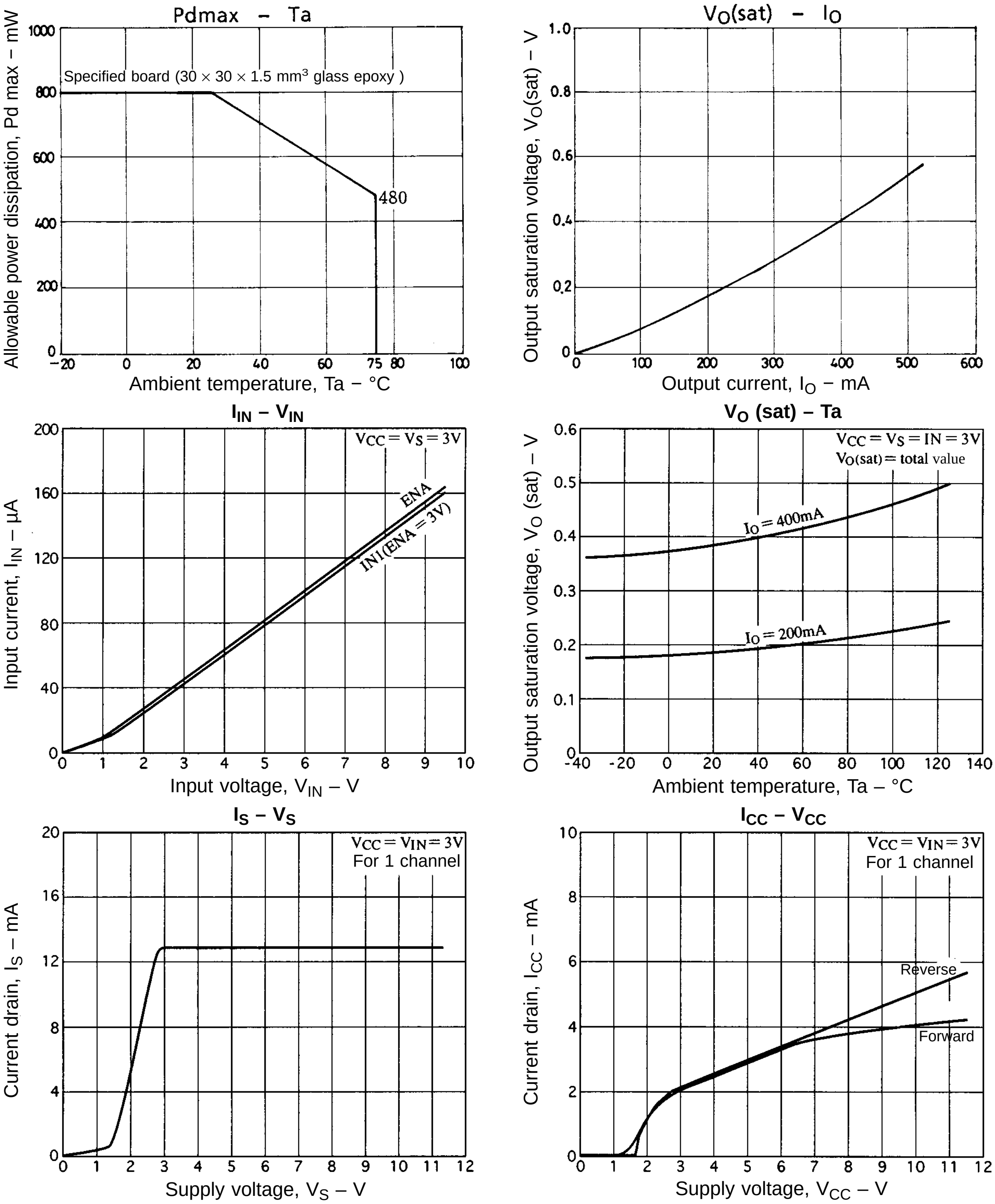
Note: As long as the voltages applied to V_{CC}, V_S1, V_S2, ENA1, ENA2, IN1, and IN2 are within the limits set by the absolute maximum ratings, there are no restrictions on the relationship of each voltage level in comparison with the others (regarding which is higher or lower). (ex. V_{CC} = 3 V, V_S1, 2 = 2 V, ENA = IN = 5 V)

Vcont pin



$$I_D = \frac{V_Z}{r}$$ (= constant)

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


Pdmax – Ta
Specified board (30 × 30 × 1.5 mm3 glass epoxy)
480
Allowable power dissipation, Pd max – mW
Ambient temperature, Ta – °C
VO(sat) – IO
Output saturation voltage, VO(sat) – V
Output current, IO – mA
IIN – VIN
VCC = VS = 3V
ENA
IN1(ENA = 3V)
Input current, IIN – µA
Input voltage, VIN – V
VO (sat) – Ta
VCC = VS = IN = 3V
VO(sat) = total value
IO = 400mA
IO = 200mA
Output saturation voltage, VO (sat) – V
Ambient temperature, Ta – °C
IS – VS
VCC = VIN = 3V
For 1 channel
Current drain, IS – mA
Supply voltage, VS – V
ICC – VCC
VCC = VIN = 3V
For 1 channel
Reverse
Forward
Current drain, ICC – mA
Supply voltage, VCC – V