

**LB1838M**

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

### Overview

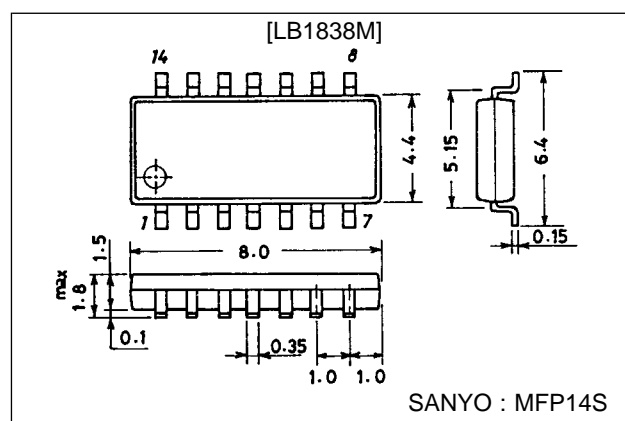
The LB1838M is a low-saturation two-channel bidirectional motor driver IC for use in low-voltage applications.  
The LB1838M is a bipolar stepper-motor driver IC that is ideal for use in printers, FDDs, cameras and other portable devices.

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

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 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	$P_d$ max1	Independent IC	550	mW
	$P_d$ max2	* With board	800	mW
Operating temperature	$T_{opr}$		-20 to +75	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

\*Note: Mounted on  $20 \times 30 \times 1.5 \text{ mm}^3$  glass epoxy PCB

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

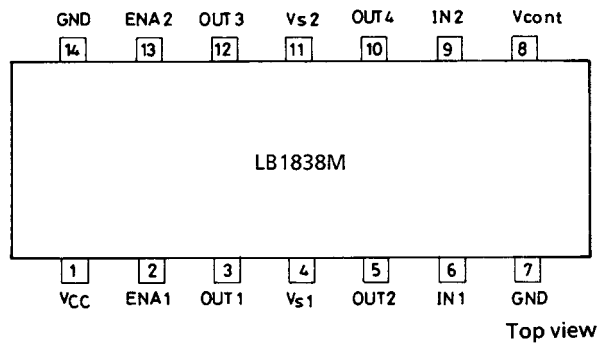
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}$		2.5 to 9.0	V
	$V_S$		1.8 to 9.0	V
Input high-level voltage	$V_{IH}$		1.8 to 9.0	V
Input low-level voltage	$V_{IL}$		-0.3 to +0.7	V

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### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply current 1	$I_{CC0}$	ENA1, 2 = 0 V, $V_{IN1} = 3\text{ V}$ or 0 V		0.1	10	$\mu\text{A}$
Supply current 2	$I_{CC1}$	ENA1 = 3 V, $V_{IN1} = 3\text{ V}$ or 0 V		12	18	mA
Output saturation voltage	$V_{OUT1}$	ENA = 3 V, $V_{IN} = 3\text{ V}$ or 0 V, $I_{OUT} = 200\text{ mA}$		0.2	0.28	V
	$V_{OUT2}$	ENA = 3 V, $V_{IN} = 3\text{ V}$ or 0 V, $I_{OUT} = 400\text{ mA}$		0.4	0.6	V
Input current 1	$I_{IN}$	$V_{CC} = 6\text{ V}$ , $V_{IN} = 6\text{ V}$			200	$\mu\text{A}$
Input current 2	$I_{ENA}$	$V_{CC} = 6\text{ V}$ , ENA = 6 V			200	$\mu\text{A}$
Output sustaining voltage	$V_O$ (sus)	$I_{OUT} = 400\text{ mA}$	9			V
Spark killer diode reverse current	$I_S$ (leak)	$V_{CC1}$ , $V_S = 7\text{ V}$			30	$\mu\text{A}$
Spark killer diode forward voltage	$V_{SF}$	$I_{OUT} = 400\text{ mA}$			1.7	V

### Pin Assignment

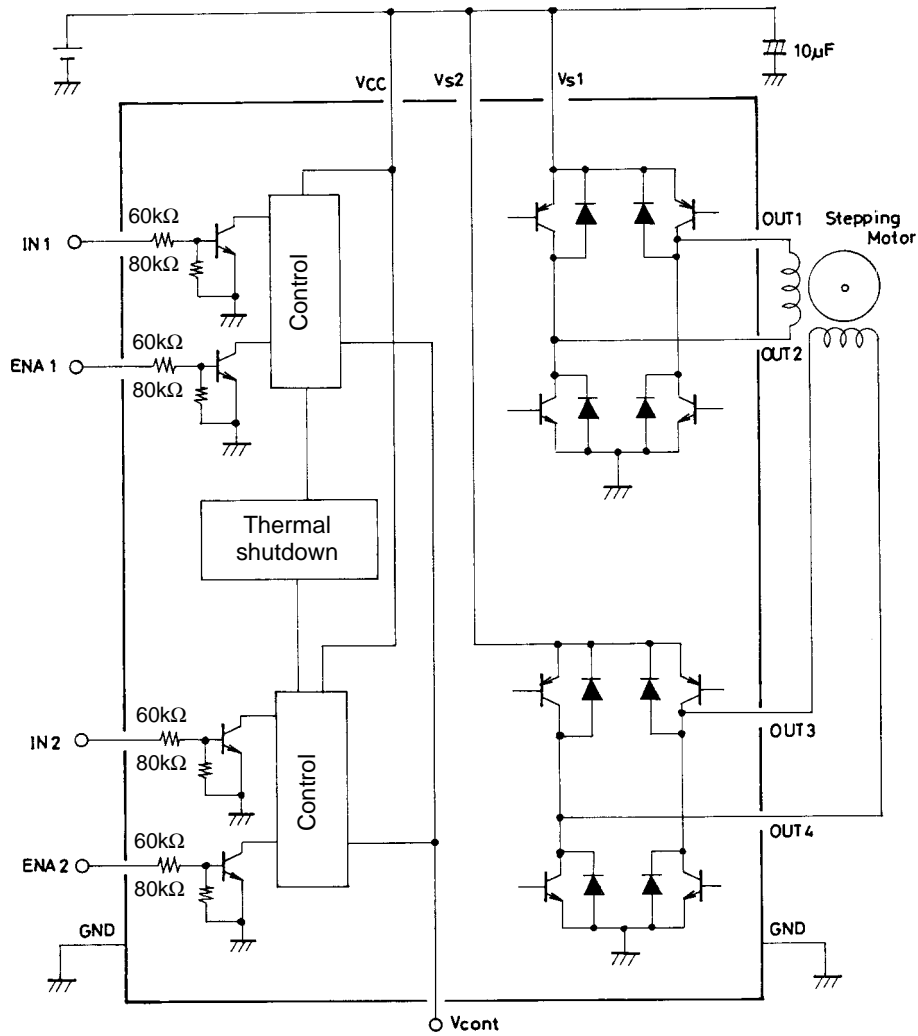


Note: Both GND pins should be connected to ground.

### Truth Table

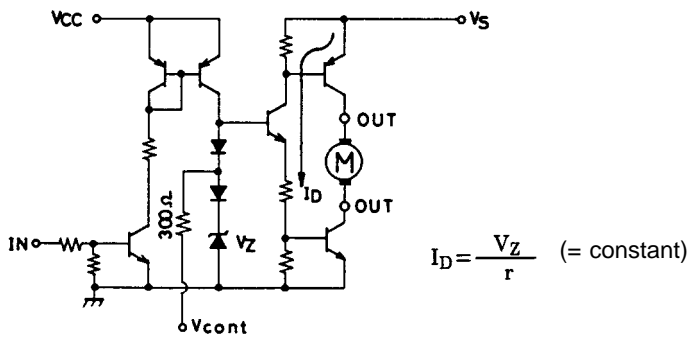
IN 1, 2	ENA 1, 2	OUT 1, 3	OUT 2, 4	Mode
L	H	H	L	Forward
H	H	L	H	Reverse
L	L	OFF	OFF	Standby
H	L	OFF	OFF	Standby

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.  $V_{CC} = 3\text{ V}$ ,  $V_{S1, 2} = 2\text{ V}$ ,  $ENA = IN = 5\text{ V}$ )

Vcont pin

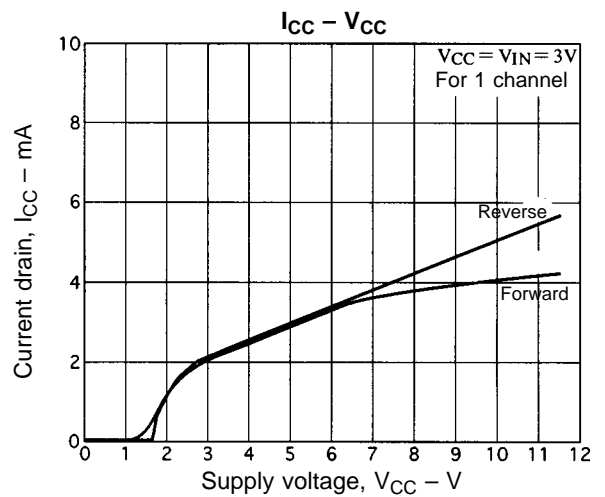
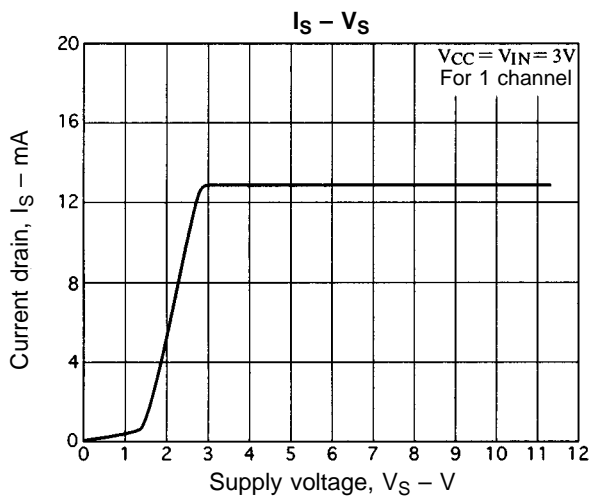
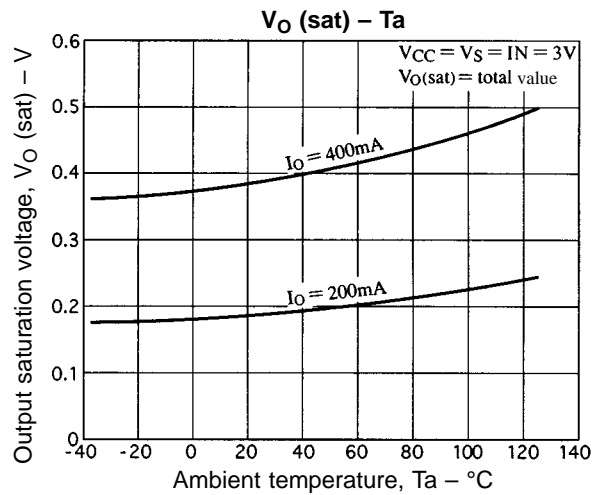
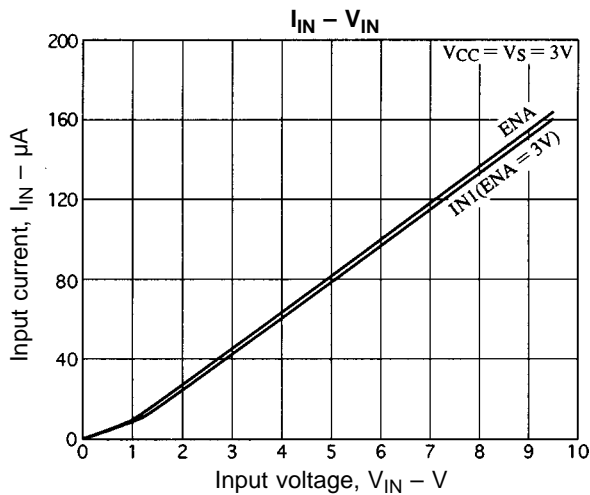
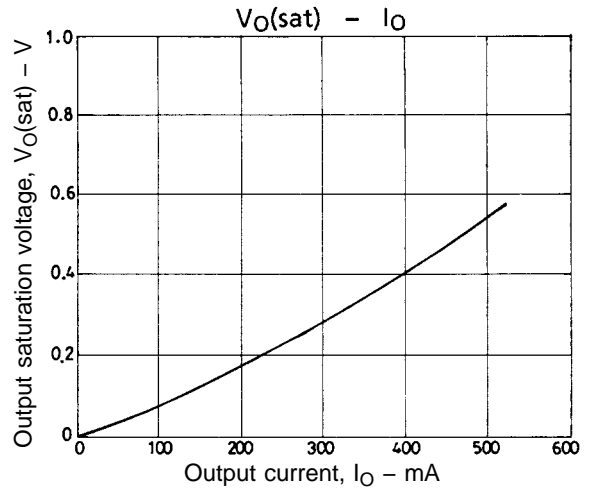
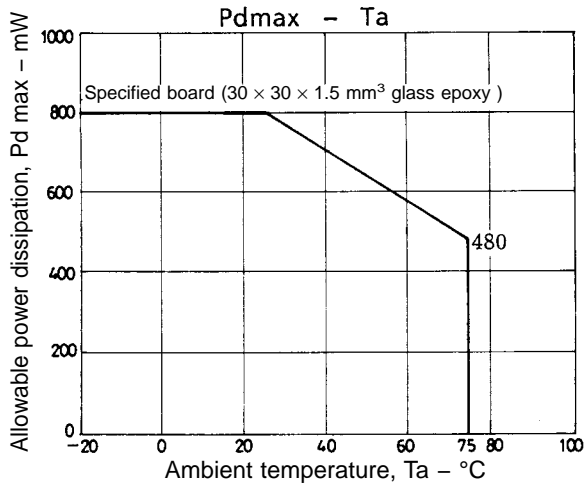


As shown in the above diagram, the  $V_{cont}$  pin outputs the voltage of the band gap Zener  $V_Z + V_F (= 1.93\text{ V})$ .

In normal use, this pin is left open.

The drive current  $I_D$  is varied by the  $V_{cont}$  voltage. However, because the band gap Zener is shared, it functions as a bridge.

# LB1838M



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