# LB1838JM

# Monolithic Digital IC Low-Saturation Bidirectional Motor Driver for Low-Voltage Drive



### Overview

The LB1838JM is a low-saturation two-channel bidirectional motor driver IC for use in low-voltage applications. It has a wide operating temperature range of -40 to 80°C and is ideal for 2-phase excitation bipolar stepping motor driver IC used in automotive components (other than critical safety parts), consumer and industrial products, and many other applications.

# Features

- Low voltage operation (2.5V min)
- Low saturation voltage (upper transistor + lower transistor residual voltage ; 0.40V typ at 400mA).
- 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)

# **Specifications**

#### Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		-0.3 to +10.5	V
	V <sub>S</sub> max		-0.3 to +10.5	V
Output supply voltage	VOUT		V <sub>S</sub> to V <sub>SF</sub>	V
Input supply voltage	VIN		-0.3 to +10	V
GND pin flow-out current	IGND	Per channel	1.0	А
Allowable power dissipation	Pd max1	Independent IC	550	mW
	Pd max2	* Mounted on a board.	800	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

\* Mounted on a substrate : 30×30×1.5mm<sup>3</sup>, glass epoxy board.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

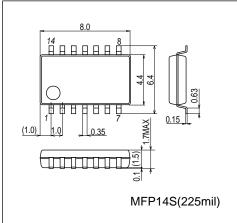
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>		2.5 to 9.0	V
	VS		1.8 to 9.0	V
Input high-level voltage	VIH		1.8 to 9.0	V
Input low-level voltage	VIL		-0.3 to +0.7	V

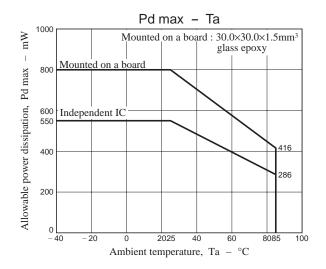
#### **Electrical Characteristics** at $Ta = 25^{\circ}C$ , $V_{CC} = 3V$

Parameter	Symbol	Symbol Conditions	Ratings			Unit
	Symbol	Conditions		typ	max	Unit
Supply current	ICC0	EMA1, 2 = 0V, V <sub>IN</sub> 1 = 3V or 0V		0.1	10	μΑ
	I <sub>CC</sub> 1	EMA1 = 3V, V <sub>IN</sub> 1 = 3V or 0V		12	18	mA
Output saturation voltage	VOUT1	EMA1 = 3V, V <sub>IN</sub> 1 = 3V or 0V, I <sub>OUT</sub> = 200mA		0.20	0.28	V
	V <sub>OUT</sub> 2	EMA1 = 3V, V <sub>IN</sub> 1 = 3V or 0V, I <sub>OUT</sub> = 400mA		0.40	0.60	V
Input current	IIN	$V_{CC} = 6V, V_{IN} = 6V$			200	μΑ
	IENA	$V_{CC} = 6V, ENA = 6V$			200	μΑ
Output sustaining voltage	V <sub>O</sub> (SUS)	I <sub>OUT</sub> = 400mA	9			V
Spark killer diode						
Reverse current	I <sub>S</sub> (leak)	$V_{CC}1, V_{S} = 7V$			30	μΑ
Forward voltage	V <sub>SF</sub>	I <sub>OUT</sub> = 400mA			1.7	V

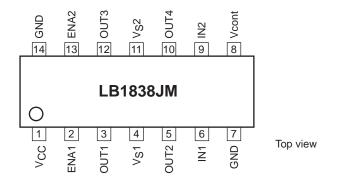
# **Package Dimensions**

unit : mm (typ) 3111A



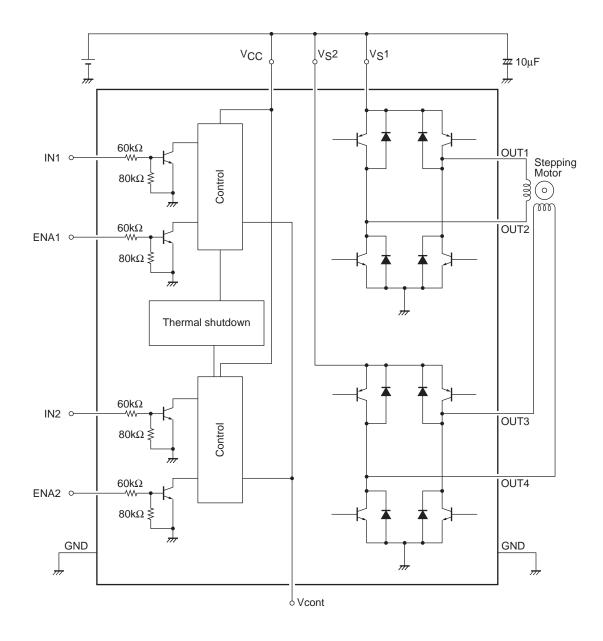


# **Pin Assignment**



Note) Ground both GND pins.

# **Block Diagram**

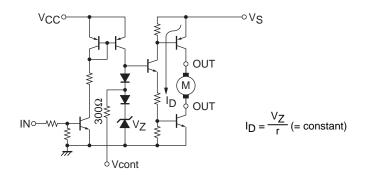


\* : As long as the voltages applied to V<sub>CC</sub>, V<sub>S</sub>1, V<sub>S</sub>2, ENA1, ENA2, IN1 and IN2 are within the limits set by the absolute maximum ratings, there are no restrictions on the relationship of each voltage level in comparison with the others (regarding which is higher or lower). (ex. V<sub>CC</sub> = 3V, V<sub>S</sub>1, 2 = 2V, ENA = IN = 5V)

#### **Truth Table**

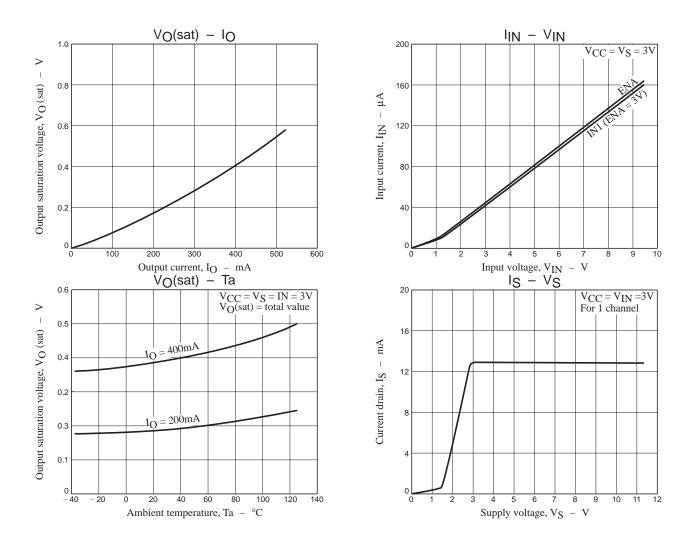
IN1/2	ENA1/2	OUT1/3	OUT2/4	Mode
L	Н	Н	L	Forward
н	н	L	н	Reverse
L	L	OFF	OFF	Standby
н	L	OFF	OFF	Standby

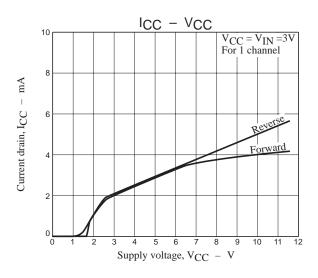
#### Vcont pin



As shown in the above diagram, the V cont pin outputs the voltage of the band gap Zener  $V_Z + V_F$  (=1.93V). In normal use, this pin is left open.

The drive current I<sub>D</sub> is varied by the Vcont voltage. However, because the band gap Zener is shared, it functions as a bridge.





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