Ordering number : ENA0927A

LB1838JM

ON Semiconductor®

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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_{CC} max		-0.3 to +10.5	V
	V_S max		-0.3 to +10.5	V
Output supply voltage	V_{OUT}		V_S to V_{SF}	V
Input supply voltage	V_{IN}		-0.3 to +10	V
GND pin flow-out current	IGND	Per channel	1.0	A
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^3, 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°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

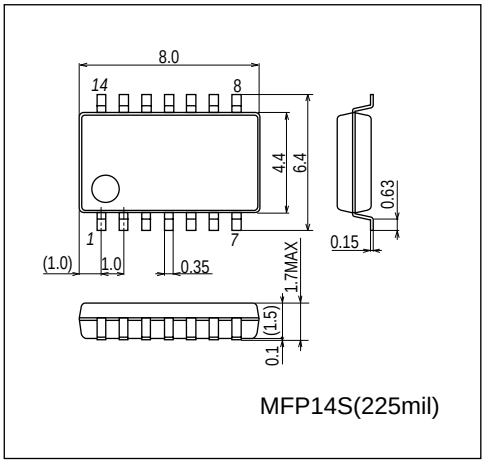
Electrical Characteristics at Ta = 25°C, V_{CC} = 3V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	$I_{CC}0$	EMA1, 2 = 0V, $V_{IN}1$ = 3V or 0V		0.1	10	μA
	$I_{CC}1$	EMA1 = 3V, $V_{IN}1$ = 3V or 0V		12	18	mA
Output saturation voltage	$V_{OUT}1$	EMA1 = 3V, $V_{IN}1$ = 3V or 0V, I_{OUT} = 200mA		0.20	0.28	V
	$V_{OUT}2$	EMA1 = 3V, $V_{IN}1$ = 3V or 0V, I_{OUT} = 400mA		0.40	0.60	V
Input current	I_{IN}	V_{CC} = 6V, V_{IN} = 6V			200	μA
	I_{ENA}	V_{CC} = 6V, ENA = 6V			200	μA
Output sustaining voltage	V_O (SUS)	I_{OUT} = 400mA	9			V
Spark killer diode						
Reverse current	I_S (leak)	$V_{CC}1$, V_S = 7V			30	μA
Forward voltage	V_{SF}	I_{OUT} = 400mA			1.7	V

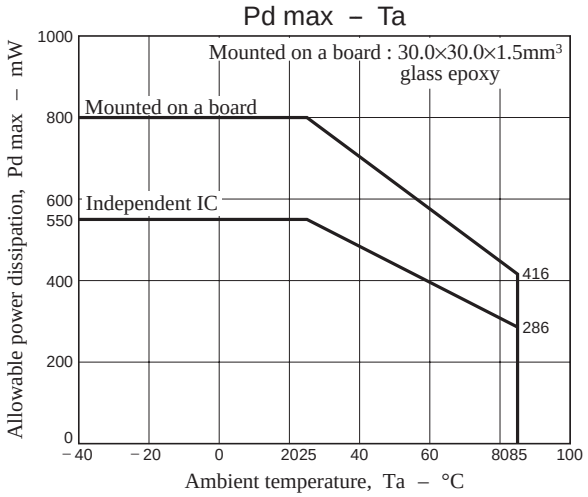
Package Dimensions

unit : mm (typ)

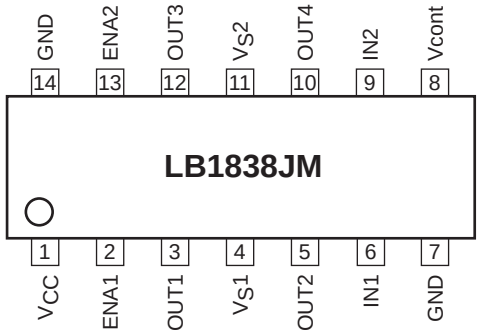
3111A



MFP14S(225mil)



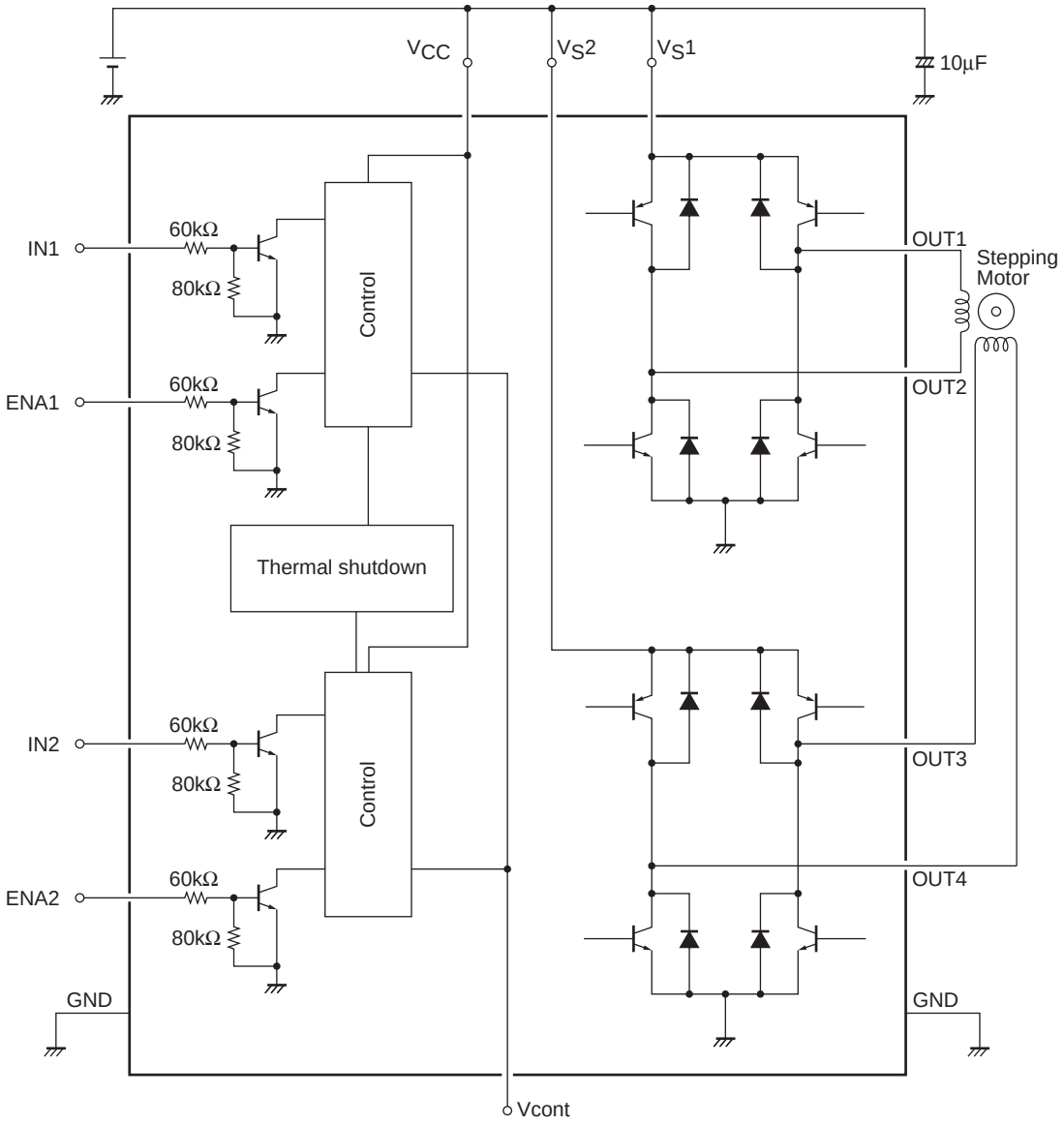
Pin Assignment



Top view

Note) Ground both GND pins.

Block Diagram

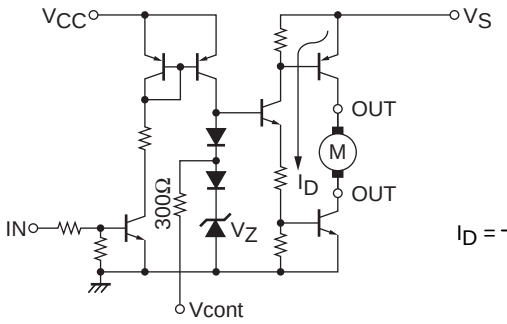


* : As long as the voltages applied to V_{CC}, V_S1, V_S2, ENA1, ENA2, IN1 and IN2 are within the limits set by the absolute maximum ratings, there are no restrictions on the relationship of each voltage level in comparison with the others (regarding which is higher or lower). (ex. V_{CC} = 3V, V_S1,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

Truth Table

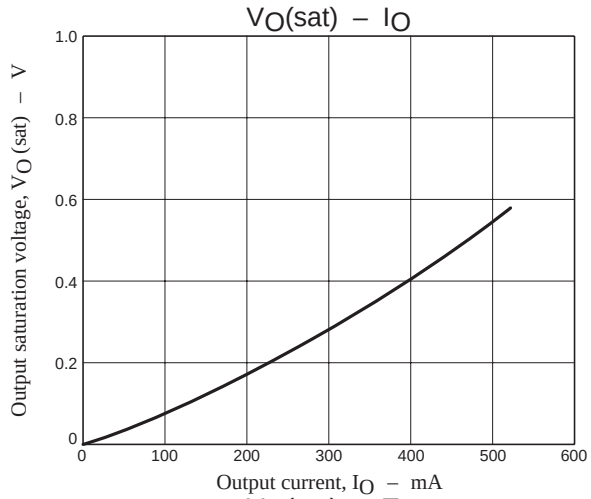
IN1/2	ENA1/2	OUT1/3	OUT2/4	Mode
L	H	H	L	Forward
H	H	L	H	Reverse
L	L	OFF	OFF	Standby
H	L	OFF	OFF	Standby

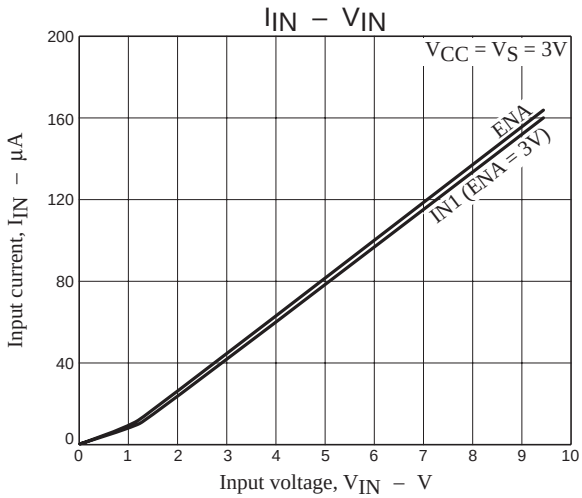
Vcont pin

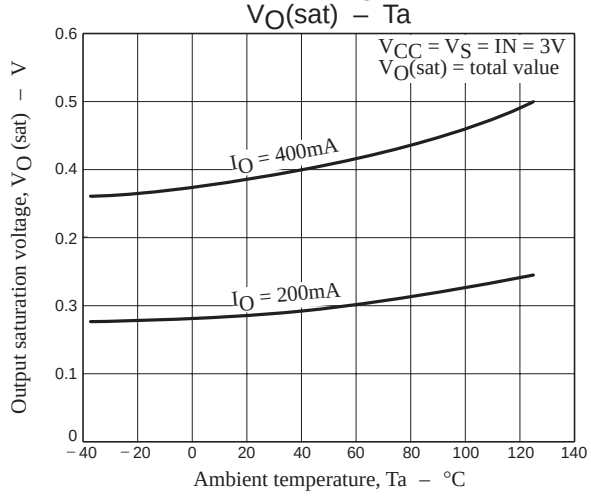


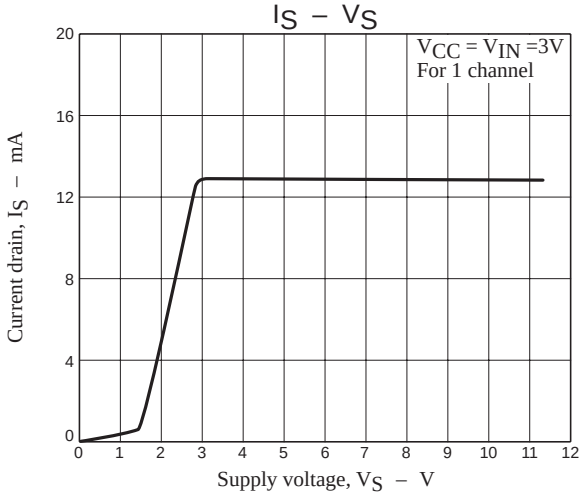
$$I_D = \frac{V_Z}{r} \text{ (= constant)}$$

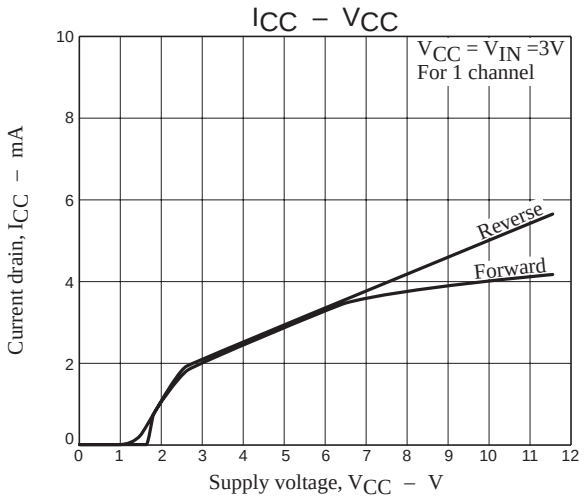
As shown in the above diagram, the Vcont pin outputs the voltage of the band gap Zener $V_Z + V_F$ (=1.93V).
In normal use, this pin is left open.
The drive current I_D is varied by the Vcont voltage. However, because the band gap Zener is shared, it functions as a bridge.











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