Ordering number : EN3949E

LB1838M

ON Semiconductor®

http://onsemi.com

Monolithic Digital IC

Low-Voltage, Low-Saturation

Bidirectional Motor Driver

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, cameras and other portable devices.

Functions

- Low voltage operation (2.5V min)
- Low saturation voltage (upper transistor + lower transistor residual voltage: 0.40V at 400mA)
- Built-in through-current prevention circuit
- Separate logic power supply and motor power supply
- Built-in spark killer diodes
- Built-in thermal shutdown circuit
- Compact package: 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	I_{GND}	Per channel	1.0	A
Allowable power dissipation	Pd max	Independent IC	550	mW
		Mounted on a specified board *	800	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-40 to +125	°C

* Specified board: 20mm × 30mm × 1.6mm, 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

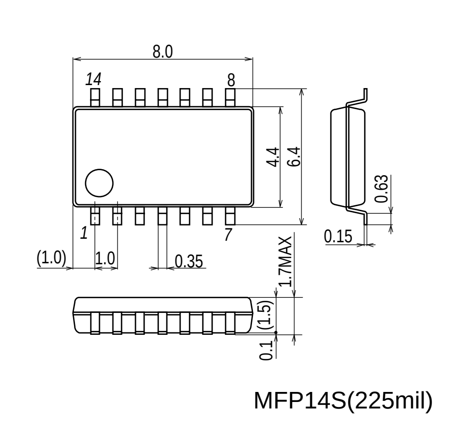
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		2.5 to 9.0	VV
	V_S		1.8 to 9.0	V
Input high-level voltage	V_{IH}		1.8 to 9.0	V
Input Low-level voltage	V_{IL}		-0.3 to +0.7	V

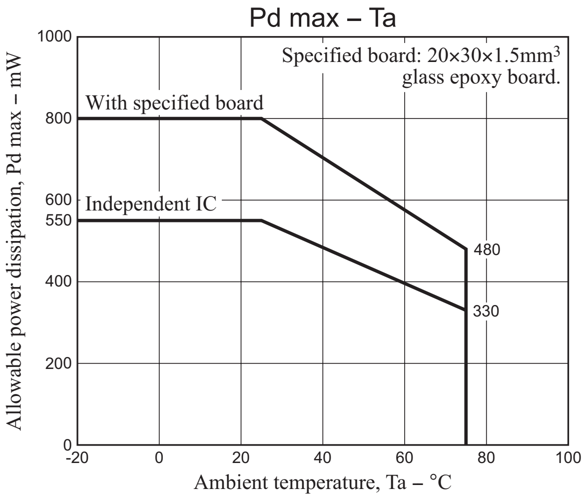
Electrical Characteristics at Ta = 25°C, V_{CC} = 3V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CC}0$	ENA1,2 = 0V, $V_{IN}1$ = 3V or 0V		0.1	10	µA
	$I_{CC}1$	ENA1 = 3V, $V_{IN}1$ = 3V or 0V		12	18	mA
Output saturation voltage	$V_{OUT}1$	ENA = 3V, V_{IN} = 3V or 0V, I_{OUT} = 200mA		0.2	0.28	V
	$V_{OUT}2$	ENA = 3V, V_{IN} = 3V or 0V, I_{OUT} = 400mA		0.4	0.6	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

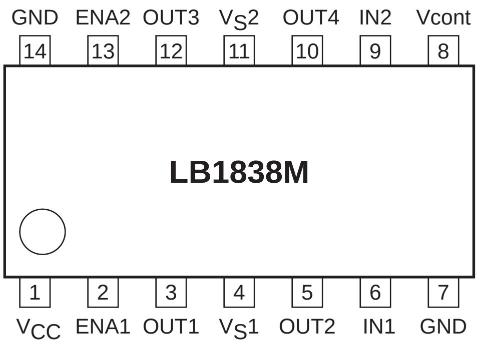
Package Dimensions

unit : mm (typ)
3111A



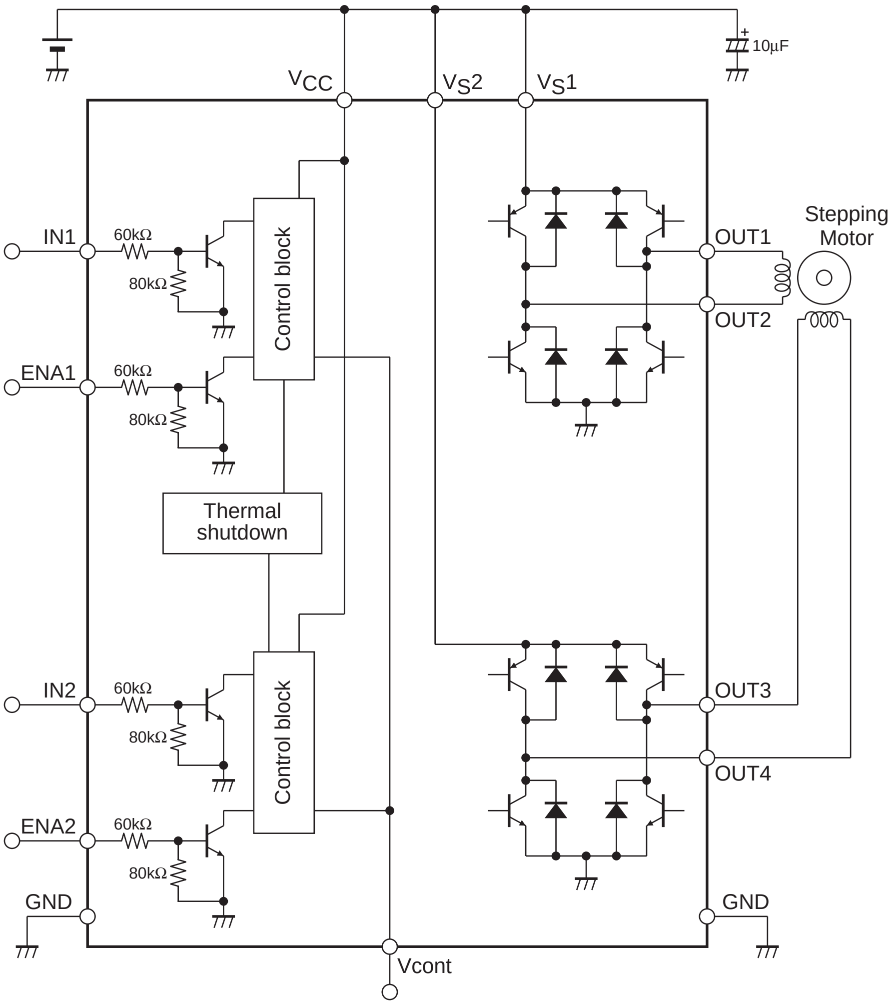


Pin Assignment



Note: Both GND pins should be connected to ground.

Block Diagram

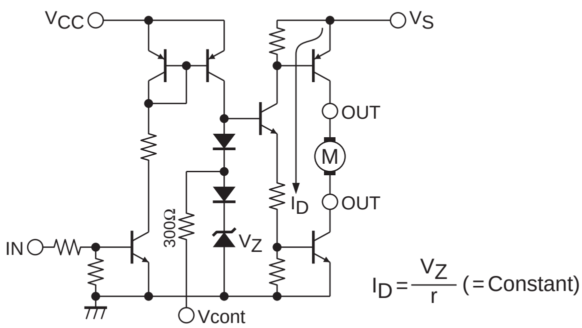


Note: As long as the voltages applied to V_{CC}, V_S1, V_S2, ENA1, ENA2, IN1, and IN2 are within the limits set by the absolute maximum ratings, there are no restrictions on the relationship of each voltage level in comparison with the others (regarding which is higher or lower). (ex. V_{CC} = 3V, V_S1,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

Truth Table

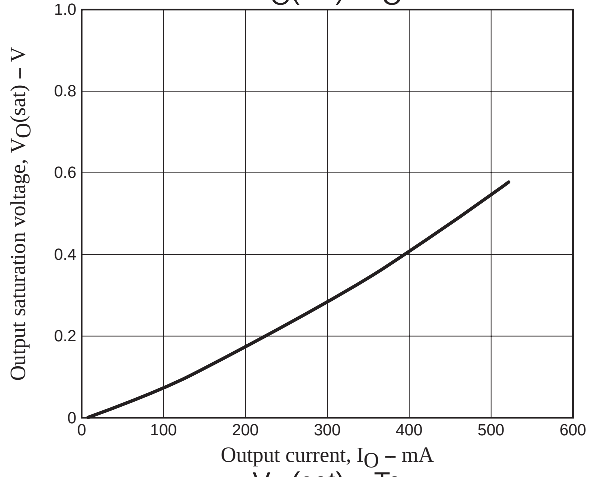
IN1,2	ENA1,2	OUT1,3	OUT2,4	Mode
L	H	H	L	Forward
H	H	L	H	Reverse
L	L	OFF	OFF	Standby
H	L	OFF	OFF	Standby

Vcont pin

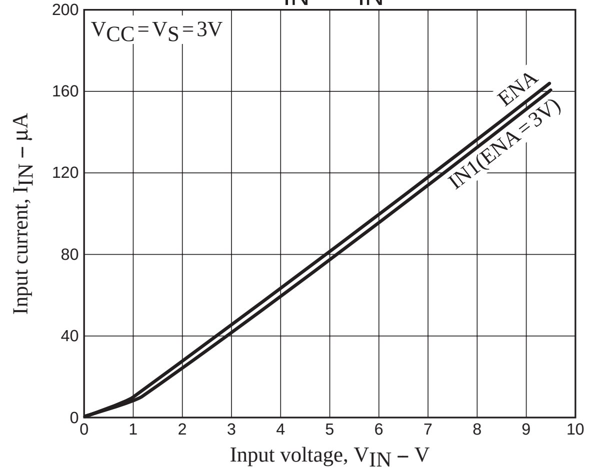


As shown in the left diagram, the Vcont pin outputs the voltage of the band gap Zener $V_Z + V_F$ (= 1.93V).
In normal use, this pin is left open.
The drive current I_D is varied by the Vcont voltage. However, because the band gap Zener is shared, it functions as a bridge.

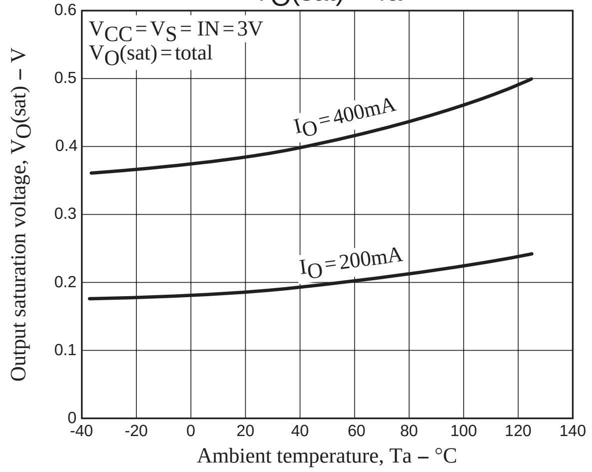
$V_O(sat) - I_O$



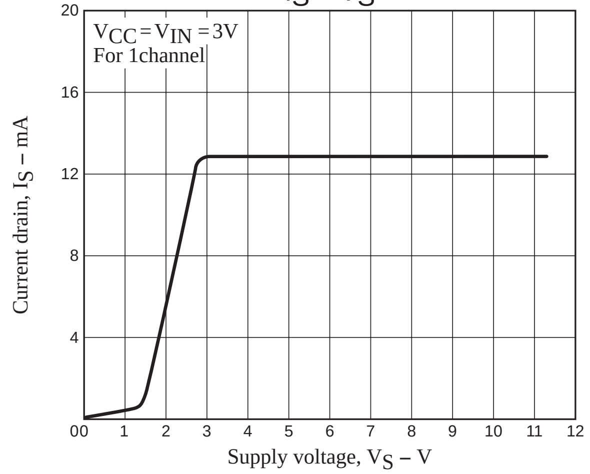
$I_{IN} - V_{IN}$



$V_O(sat) - Ta$



$I_S - V_S$



$I_{CC} - V_{CC}$