



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## LB1638

## LB1638M

Monolithic Digital IC

Low-Voltage, Low-Saturation

### Bidirectional Motor Driver

### Overview

The LB1638, LB1638M are low-saturation bidirectional motor driver ICs for use in low-voltage applications. At an  $I_O$  of 500mA, they have a low saturation output of  $V_O(\text{sat}) = 0.75\text{V}$ . They are especially suited for use in compact motor of portable equipment.

### Features

- Low voltage operation (2.5V min.)
- Low saturation voltage (upper transistor + lower transistor residual voltage; at  $I_O = 500\text{mA}$ ,  $V_O(\text{sat}) = 0.75\text{V}$  typ.)
- Low current drain at standby mode ( $I_{CCO} = 0.1\mu\text{A}$  typ. or less)
- Separate logic power supply and motor power supply
- Brake function
- Built-in spark killer diodes

### 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	$V_{OUT}$		-0.3 to $V_S+V_F$	V
Input applied voltage	$V_{IN}$		-0.3 to +10.0	V
Ground pin flow-out current	$I_{GND}$		1.0	A
Allowable power dissipation	$P_d$ max	LB1638	1.0	W
		LB1638M: Independent IC	440	mW
		LB1638M: Mounted on a specified board	550	mW
Operating temperature	$T_{opr}$		-20 to +75	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

\* Specified board: 30mm × 30mm × 1.5mm, glass epoxy board.

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# LB1638,1638M

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	$V_{CC}$		2.5 to 9.0	V
	$V_S$		2.2 to 9.0	V
Input high-level voltage	$V_{IH}$		2.0 to 9.0	V
Input low-level	$V_{IL}$		-0.3 to +0.7	V

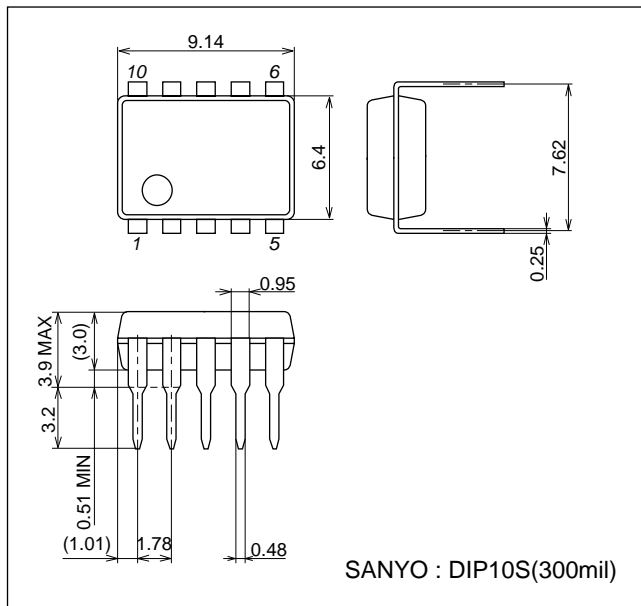
## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 5\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CC0}$	$V_{IN1,2}$	$I_{CC} + I_S$		10	$\mu\text{A}$
	$I_{CC1}$	$V_{IN1} = 3\text{V}, V_{IN2} = 0\text{V}$	$I_{CC} + I_S$		20	mA
	$I_{CC2}$	$V_{IN1,2} = 3\text{V}$	$I_{CC} + I_S$		40	mA
Output saturation voltage (upper + lower)	$V_{OUT1}$	$I_{OUT} = 200\text{mA}$		0.25	0.5	V
	$V_{OUT2}$	$I_{OUT} = 500\text{mA}$		0.70	1.3	V
Output pin voltage difference		$I_O = 200\text{mA}$			0.1	V
Output sustain voltage	$V_{O(sus)}$	$I_{OUT} = 500\text{mA}$	9			V
Input current	$I_{IN}$	$V_{IN} = 7\text{V}, V_{CC} = 7\text{V}$			0.5	mA
<b>Spark killer diode</b>						
Reverse current	$I_S(\text{leak})$	$V_{CC}, V_S = 7\text{V}$			10	$\mu\text{A}$
Forward voltage	$V_{SF}$	$I_{OUT} = 200\text{mA}$			1.7	V

## Package Dimensions

unit : mm (typ)

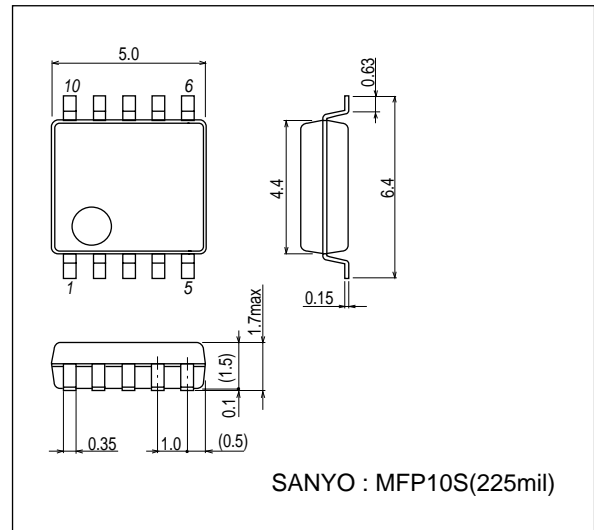
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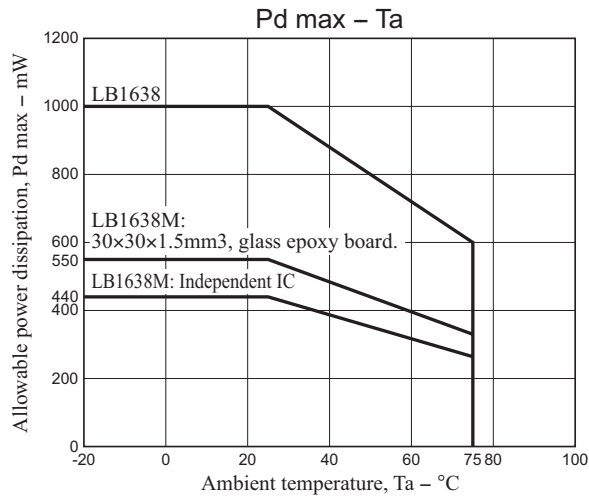
## Package Dimensions

unit : mm (typ)

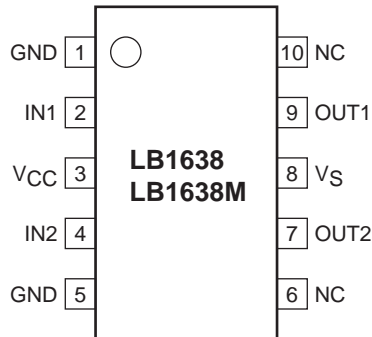
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# LB1638,1638M



## Pin Assignment

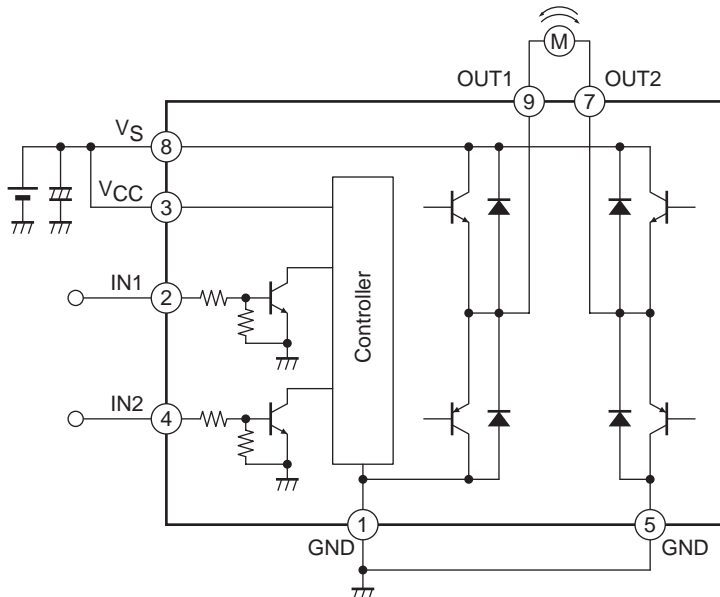


Note: both ground pins must be grounded.

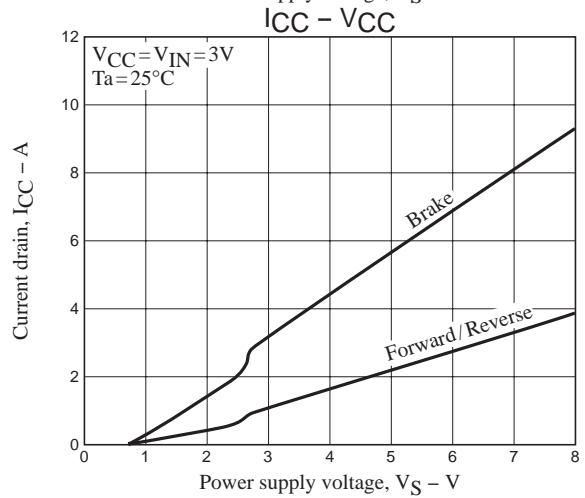
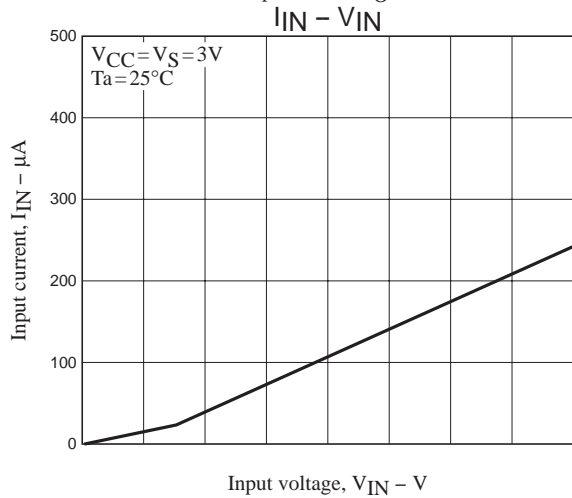
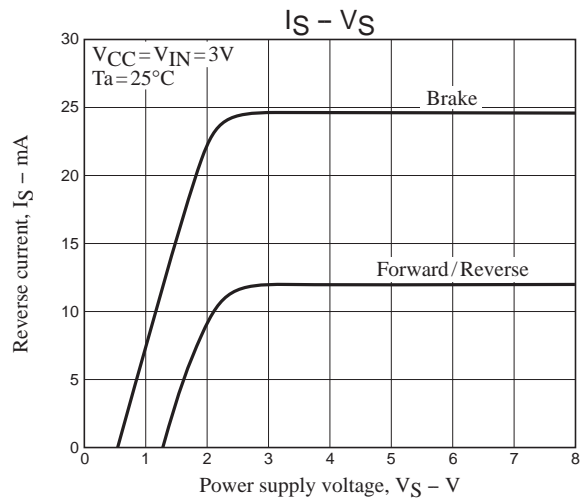
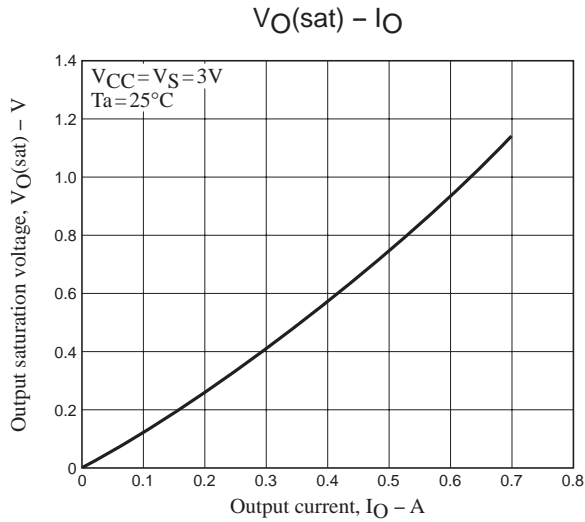
## Truth Table

IN1	IN2	OUT1	OUT2	MOde
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	L	L	Brake
L	L	OFF	OFF	Standby

## Block Diagram and Sample Application Circuit



Note: When using the same power supply for VS and VCC, short the VCC and VS pins to each other or insert a capacitor in the VCC line.



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