



# Low-Saturation Bidirectional Motor Drive for Low-Voltage Applications

## **Overview**

The LB1638, 1638M are low-saturation bidirectional motor driver ICs for use in low-voltage applications. At an  $I_O$  of 500 mA, they have a low saturation output of  $V_O$  (sat) = 0.75 V. They are especially suited for use in compact motor of portable equipment.

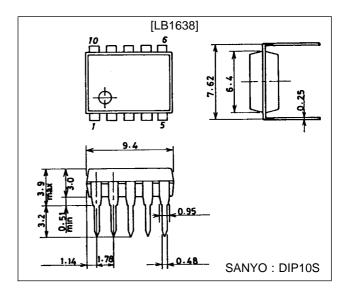
#### **Features**

- Low voltage operation (2.5 V min.)
- Low saturation voltage (upper transistor + lower transistor residual voltage; at I<sub>O</sub> = 500 mA, V<sub>O</sub>(sat) = 0.75 V typ.)
- Low current drain at standby mode ( $I_{CCO} = 0.1 \mu A$  typ. or less)
- Separate logic power supply and motor power supply
- · Brake function
- · Built-in spark killer diodes
- Compact package (MFP-10S) suited for surface mounting.

## **Package Dimensions**

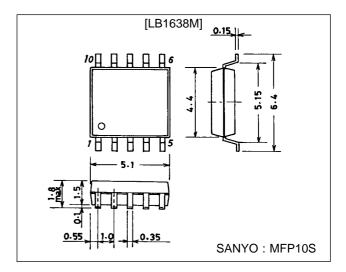
unit: mm

#### 3098B-DIP10S



unit: mm

#### 3086A-MFP10S



# **Specifications**

## Absolute Maximum Ratings at $Ta = 25 \,^{\circ}C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum aupply voltage	V <sub>CC</sub> max		-0.3 to +10.5	V
Maximum supply voltage	V <sub>S</sub> max		-0.3 to +10.5	V
Output applied voltage	V <sub>OUT</sub>		-0.3 to V <sub>S</sub> + VF	V
Input applied voltage	V <sub>IN</sub>		-0.3 to +10.0	V
Ground pin flow-out current	I <sub>GND</sub>		1.0	Α
Allowable power dissipation		LB1638	1.0	W
	Pd max	LB1638M: Independent IC	440	mW
		LB1638M: *With board	550	mW
Operating temperature	Topr		-20 to +75	∘C
Storage temperature	Tstg		-40 to +125	∘C

<sup>\*</sup> Specified board (30  $\times$  30  $\times$  1.5 mm<sup>3</sup> glass epoxy)

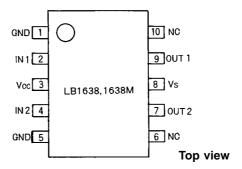
## Allowable Operating Ranges at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	V <sub>CC</sub>		2.5 to 9.0	V
Supply voltage range	V <sub>S</sub>		2.2 to 9.0	V
Input high-level voltage	V <sub>IH</sub>		2.0 to 9.0	V
Input low-level voltage	V <sub>IL</sub>		-0.3 to +0.7	V

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

Parameter	Symbol	Conditions		min	typ	max	Unit
	I <sub>CC</sub> 0	V <sub>IN</sub> 1, 2	I <sub>CC</sub> + I <sub>S</sub>			10	μΑ
Current drain	I <sub>CC</sub> 1	V <sub>IN</sub> 1 = 3 V, V <sub>IN</sub> 2 = 0 V	I <sub>CC</sub> + I <sub>S</sub>			20	mA
	I <sub>CC</sub> 2	V <sub>IN</sub> 1, 2 = 3 V	I <sub>CC</sub> + I <sub>S</sub>			40	mA
Output saturation voltage (upper + lower)	V <sub>OUT</sub> 1	I <sub>OUT</sub> = 200 mA			0.25	0.5	V
	V <sub>OUT</sub> 2	I <sub>OUT</sub> = 500 mA			0.70	1.3	V
Output pin voltage difference		I <sub>O</sub> = 200 mA				0.1	V
Output sustain voltage	V <sub>O</sub> (sus)	I <sub>OUT</sub> = 500 mA		9			V
Input current	I <sub>IN</sub>	$V_{IN} = 7 \text{ V}, V_{CC} = 7 \text{ V}$				0.5	mA
[Spark killer diode]							
Reverse current	I <sub>S</sub> (leak)	$V_{CC}$ , $V_{S} = 7 V$				10	μΑ
Forward voltage	V <sub>SF</sub>	I <sub>OUT</sub> = 200 mA				1.7	V

## **Pin Assignment**

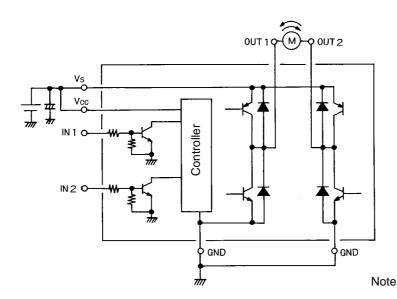


Note: both ground pins must be grounded.

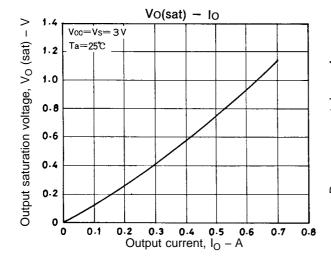
## **Truth Table**

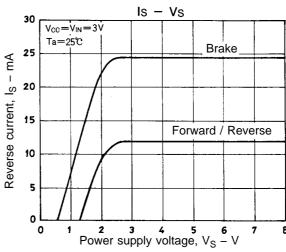
IN 1	IN 2	OUT 1	OUT 2	Mode	
Н	L	Н	L	Forward	
L	Н	L	Н	Reverse	
Н	Н	L	L	Brake	
L	L	OFF	OFF	Standby	

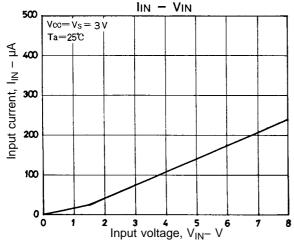
## **Sample Application Circuit**

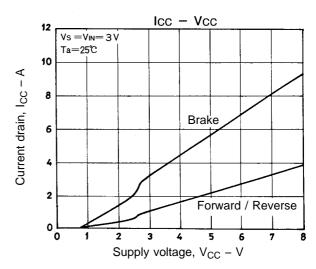


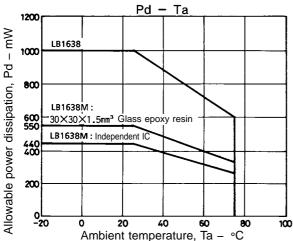
Note: When using the same power supply for  $V_S$  and  $V_{CC}$ , short the  $V_{CC}$  and  $V_S$  pins to each other or insert a capacitor in the  $V_{CC}$  line.











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