



**LB1638, 1638M**

**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.

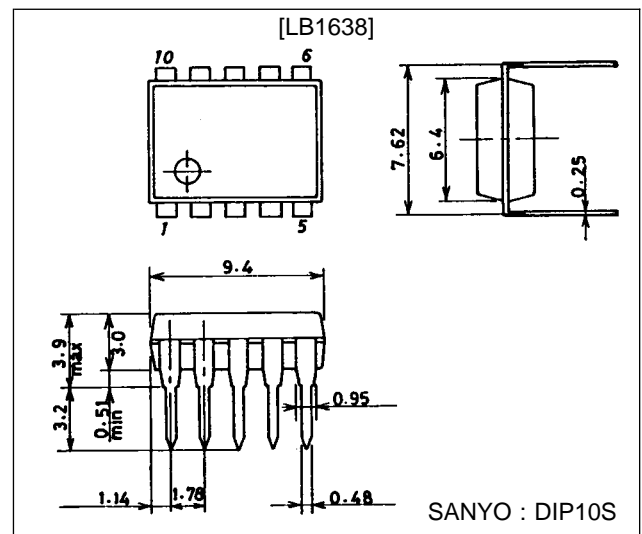
**Features**

- Low voltage operation (2.5 V min.)
- Low saturation voltage (upper transistor + lower transistor residual voltage; at  $I_O = 500$  mA,  $V_{O(sat)} = 0.75$  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**

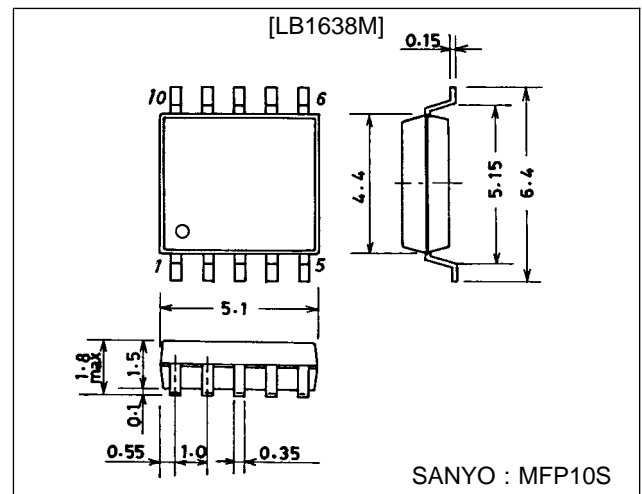
unit : mm

**3098B-DIP10S**



unit : mm

**3086A-MFP10S**



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### Specifications

#### Absolute Maximum Ratings at $T_a = 25\text{ }^\circ\text{C}$

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	Pd max	LB1638	1.0	W
		LB1638M: Independent IC	440	mW
		LB1638M: *With 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 ( $30 \times 30 \times 1.5\text{ mm}^3$  glass epoxy)

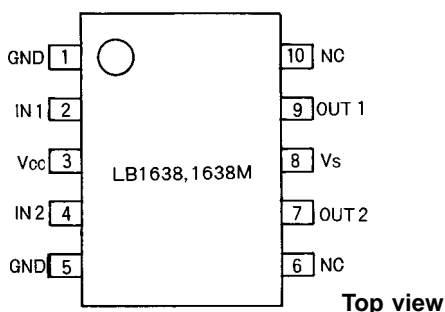
#### Allowable Operating Ranges at $T_a = 25\text{ }^\circ\text{C}$

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 voltage	$V_{IL}$		-0.3 to +0.7	V

#### Electrical Characteristics at $T_a = 25\text{ }^\circ\text{C}$ , $V_{CC} = V_S = 3\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Current drain	$I_{CC0}$	$V_{IN}$ 1, 2			10	$\mu\text{A}$
	$I_{CC1}$	$V_{IN}$ 1 = 3 V, $V_{IN}$ 2 = 0 V			20	mA
	$I_{CC2}$	$V_{IN}$ 1, 2 = 3 V			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
[Spark killer diode]						
Reverse current	$I_S$ (leak)	$V_{CC}$ , $V_S = 7\text{ V}$			10	$\mu\text{A}$
Forward voltage	$V_{SF}$	$I_{OUT} = 200\text{ mA}$			1.7	V

#### Pin Assignment



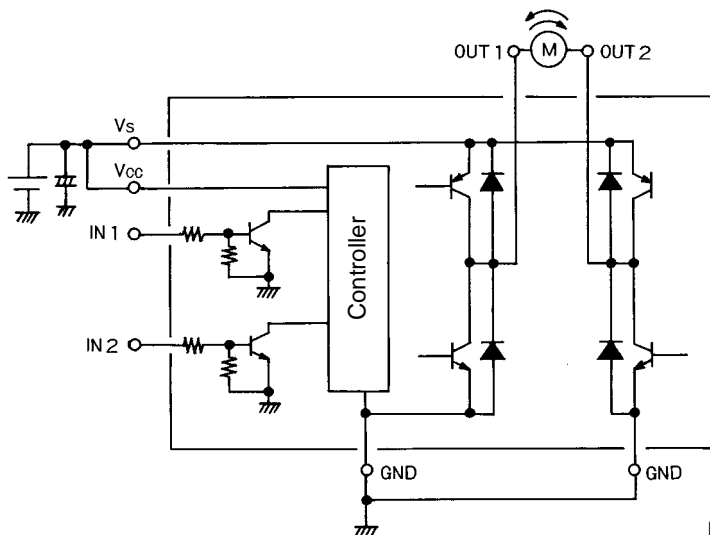
Note: both ground pins must be grounded.

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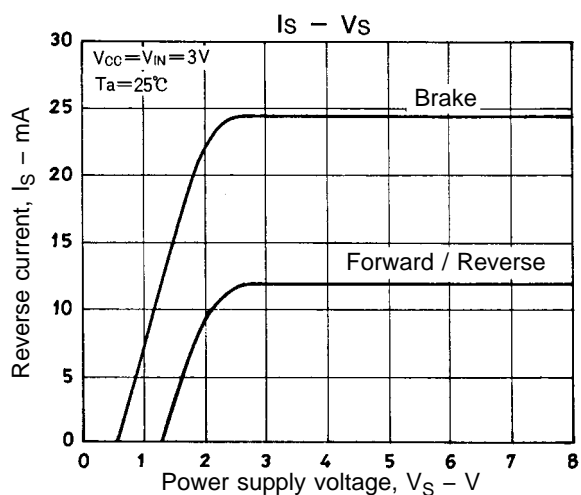
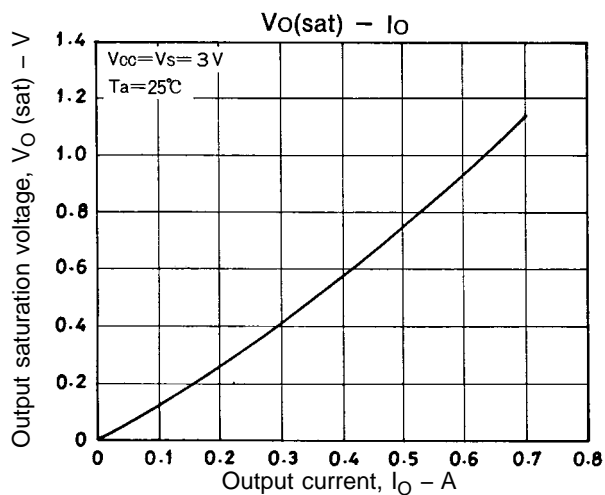
### Truth Table

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

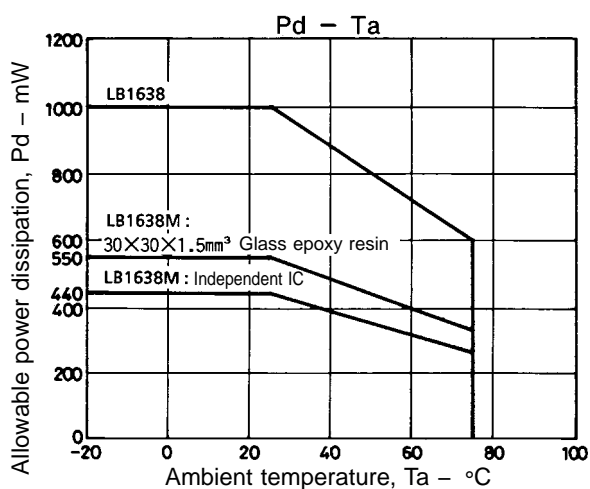
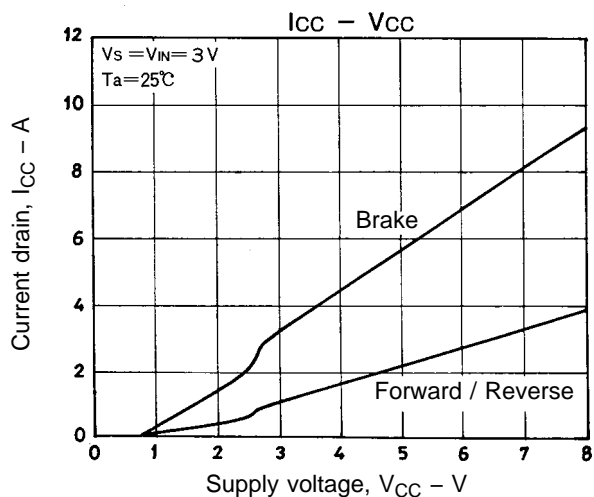
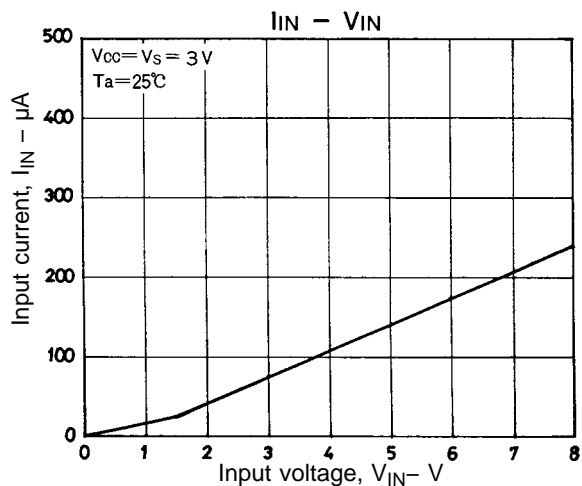
### Sample Application Circuit



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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