



# SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

### LB1909MC — Monolithic Digital IC Stepping Motor Driver IC

#### Overview

The LB1909MC is a 2-channel low saturation voltage forward/reverse motor driver that can operate on a wide supply voltage range (2.5V to 16V). The IC is ideal for use in 2-phase excitation drive of general-purpose 2-phase bipolar stepping motors including dampers for refrigerators.

#### Features

- Wide supply voltage range : 2.5V to 16V
- Low saturation voltage :  $V_O(\text{sat}) = 0.25\text{V}$  typ at  $I_O = 200\text{mA}$ .
- Built-in shoot-through current protection circuit.
- No standby current consumption (or zero).
- Built-in thermal shutdown circuit.
- Small package : SOIC10

#### Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum power source voltage	$V_{CC}$ max		-0.3 to +20	V
Applied output voltage	$V_{OUT}$ max		-0.3 to +20	V
Applied input voltage	$V_{IN}$ max		-0.3 to +18	V
GND pin outflow current	$I_{GND}$		800	mA
Allowable power consumption	$P_d$ max	Mounted on the specified board *	820	mW
Operating temperature	$T_{opr}$		-30 to +85	°C
Storage temperature	$T_{stg}$		-40 to +150	°C

\* Specified board: 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

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

Parameter	Symbol	Conditions	Ratings		Unit
Supply voltage	$V_{CC}$		2.5 to 16		V
Input high level voltage	$V_{IH}$	Pins ENA, IN1, IN2	1.8 to 10		V
Input low level voltage	$V_{IL}$		-0.3 to +0.7		V

## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 12\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power source current	$I_{CC0}$	$\text{ENA} = \text{L}$		0.1	10	$\mu\text{A}$
	$I_{CC1}$	$\text{ENA} = \text{H}$		25	35	$\text{mA}$
Output saturation voltage	$V_{OUT1}$	$I_{OUT} = 200\text{mA}$		0.25	0.35	V
	$V_{OUT2}$	$I_{OUT} = 400\text{mA}$		0.50	0.75	V
Input current	$I_{IN}$	$V_{IN} = 5\text{V}$		120	160	$\mu\text{A}$
<b>Thermal protection block *1</b>						
Thermal shutdown operation temperature	$T_{tsd}$	Design guarantee *2		180		$^\circ\text{C}$
Temperature hysteresis width	$\Delta T_{tsd}$			60		$^\circ\text{C}$
<b>Spark killer diode</b>						
Reverse current	$I_S(\text{leak})$				30	$\mu\text{A}$
Forward voltage	$V_{SF}$	$I_{OUT} = 400\text{mA}$			1.7	V

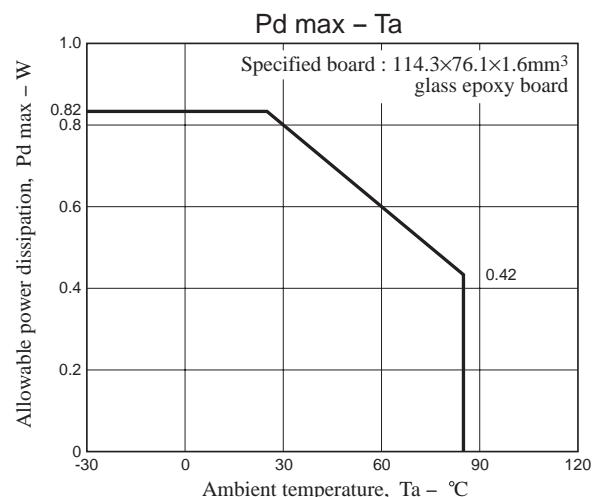
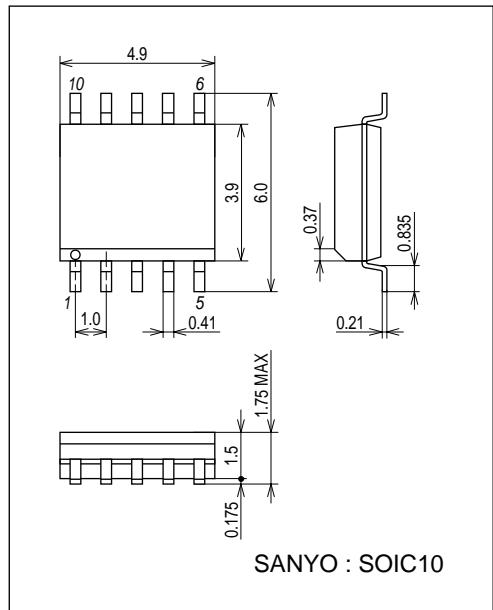
\*1 The thermal protection function is a feature to prevent the product from smoking and firing under unusual conditions. It is not intended to guarantee operation of the product under an ambient temperature exceeding the operating temperature range.

\*2 Design guarantee is not tested in individual units.

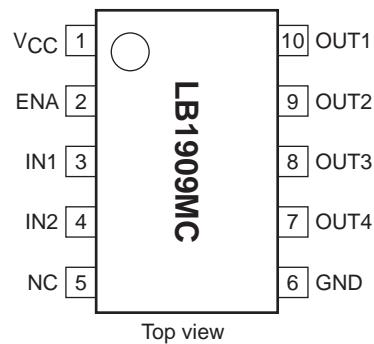
## Package Dimensions

unit : mm (typ)

3426A



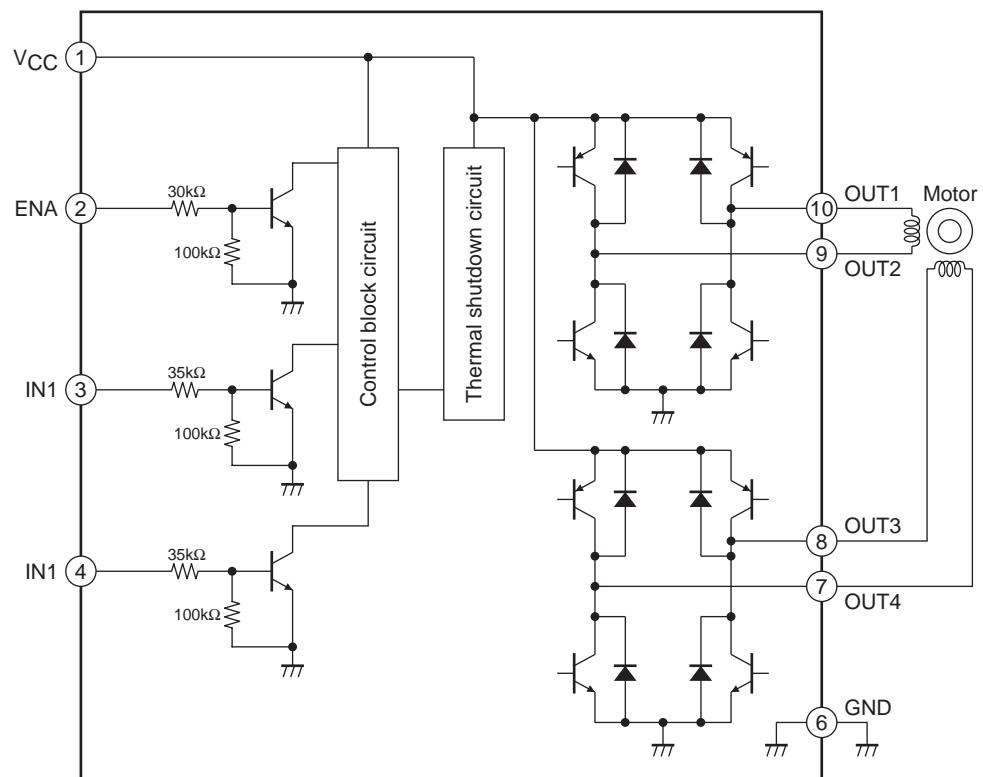
## Pin Assignment

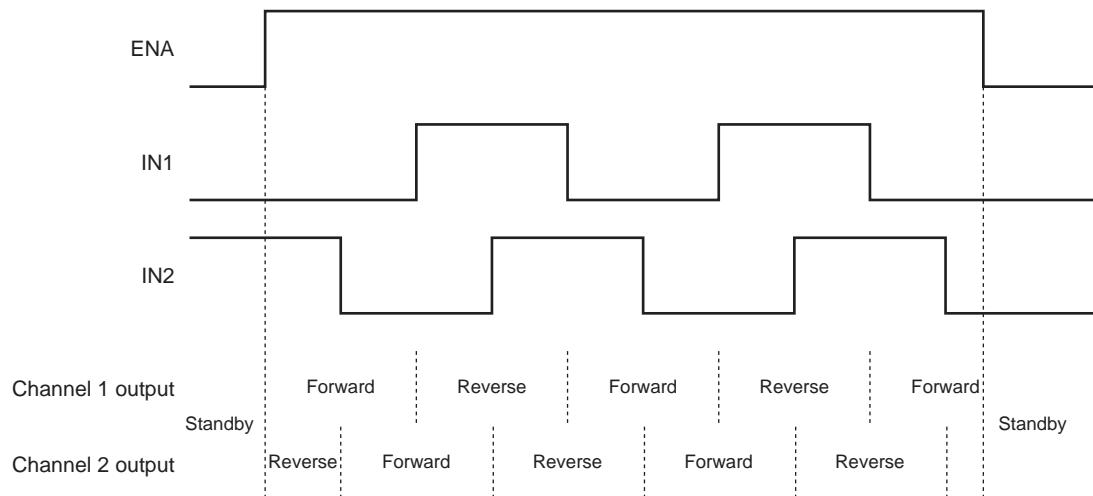


## Truth table

Input			Output				Remarks	
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4		
L	x	x	OFF	OFF	OFF	OFF	Standby mode	
H	L		H	L			Channel 1	Forward
	H		L	H				Reverse
		L			H	L	Channel 2	Forward
		H			L	H		Reverse

## Block Diagram



**Timing Chart** (2 phase excitation drive)

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