

# LA1909M — Monolithic Digital IC

## Stepping Motor Driver IC

### Overview

The LB1909M 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 :  $V_{O(sat)} = 0.25V$  typ at  $I_O = 200mA$ .
- Built-in shoot-through current protection circuit.
- No standby current consumption (or zero).
- Built-in thermal shutdown circuit.
- Small package : MFP10S (225mil)

### Specifications

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

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	Independent IC	350	mW
		Mounted on the specified board *	870	mW
Operating temperature	$T_{opr}$		-30 to +85	$^\circ C$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ C$

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

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## Allowable Operating Range at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>		2.5 to 16	V
Input high level voltage	V <sub>IH</sub>	Pins ENA, IN1, IN2	1.8 to 10	V
Input low level voltage	V <sub>IL</sub>		-0.3 to +0.7	V

## Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 12V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power source current	I <sub>CC0</sub>	ENA = L		0.1	10	μA
	I <sub>CC1</sub>	ENA = H		25	35	mA
Output saturation voltage	V <sub>OUT1</sub>	I <sub>OUT</sub> = 200mA		0.25	0.35	V
	V <sub>OUT2</sub>	I <sub>OUT</sub> = 400mA		0.50	0.75	V
Input current	I <sub>IN</sub>	V <sub>IN</sub> = 5V		120	160	μA
Thermal protection block *1						
Thermal shutdown operation temperature	T <sub>tSD</sub>	Design guarantee *2		180		°C
Temperature hysteresis width	ΔT <sub>tSD</sub>			60		°C
Spark killer diode						
Reverse current	I <sub>S(leak)</sub>				30	μA
Forward voltage	V <sub>SF</sub>	I <sub>OUT</sub> = 400mA			1.7	V

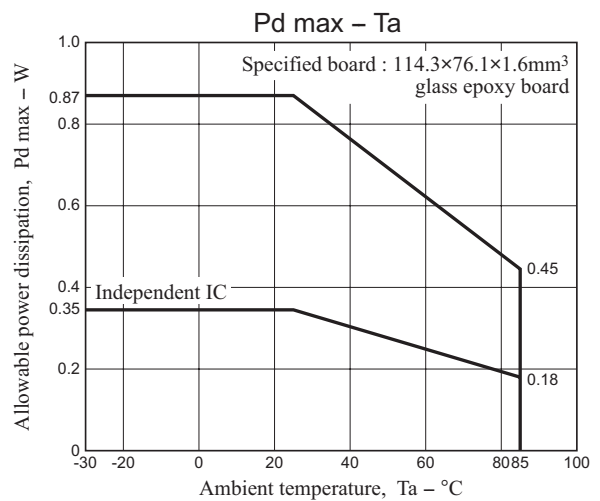
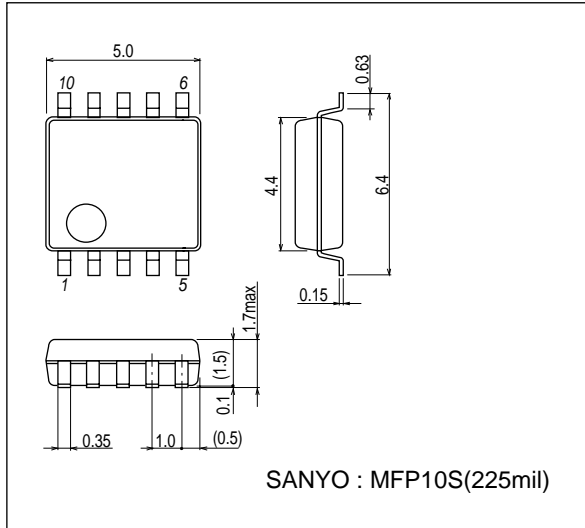
\*1 The thermal protection function is a feature to prevent the product from smoking and firing under unusual conditions. It is not intended to guarantee operation of the product under an ambient temperature exceeding the operating temperature range.

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

## Package Dimensions

unit : mm (typ)

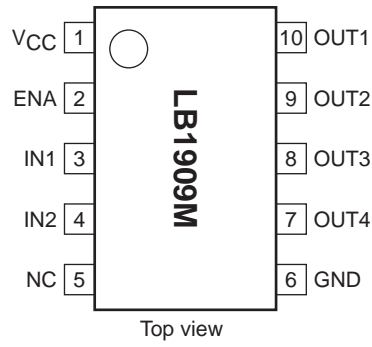
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# LB1909M

## Pin Assignment

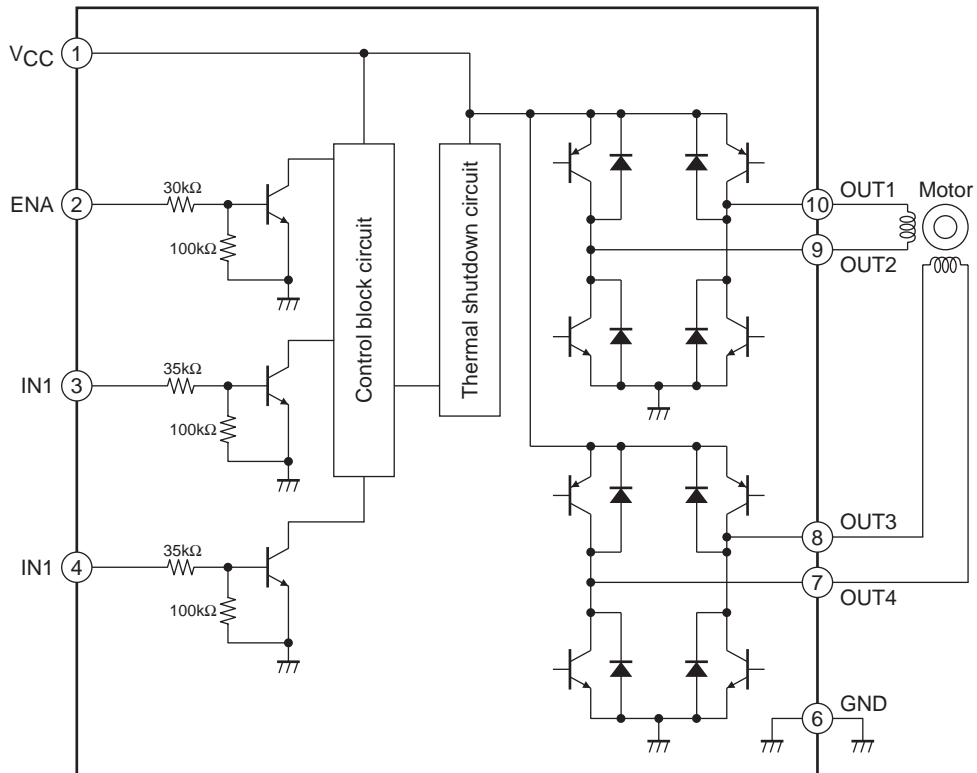
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## Truth table

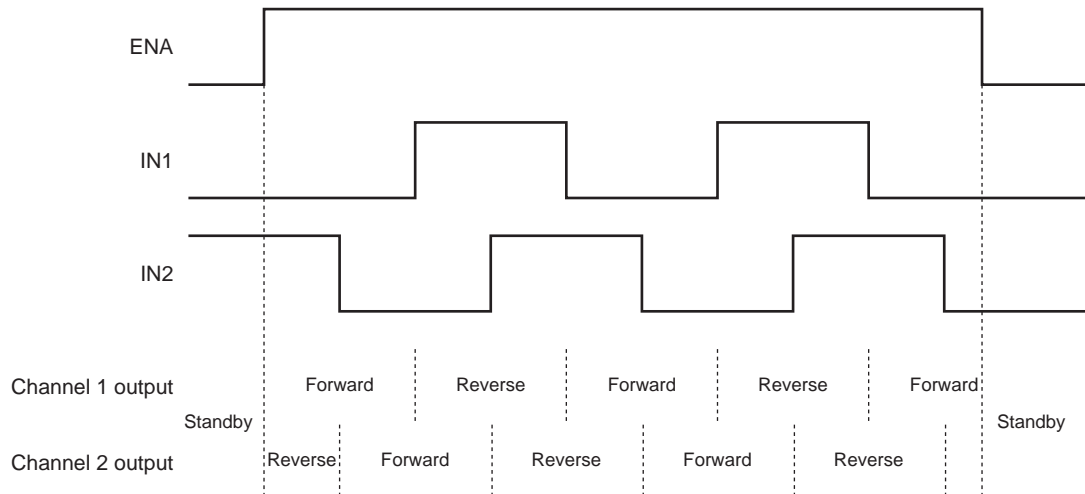
Input			Output				Remarks		
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4			
L	x	x	OFF	OFF	OFF	OFF	Standby mode		
H	L		H	L			Channel 1	Forward	
	H		L	H			Reverse		
		L				H	L	Channel 2	Forward
		H				L	H	Reverse	

## Block Diagram



## Timing Chart (2-phase excitation drive)

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