LB1909MC

Monolithic Digital IC

Stepping Motor Driver IC

ON Semiconductor®

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Overview

The LB1909MC is motor driver IC 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 : SOIC10

Specifications

Absolute Maximum Ratings at Ta = 25°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	Pd max	Mounted on the specified board *	820	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-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.

Allowable Operating Range at Ta = 25°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 Ta = 25°C, V_{CC} = 12V

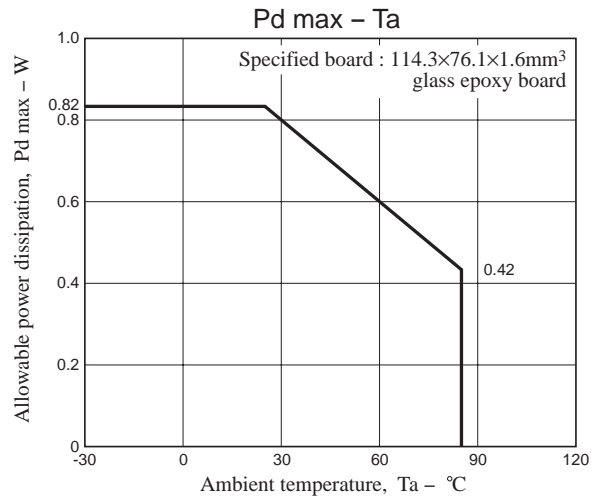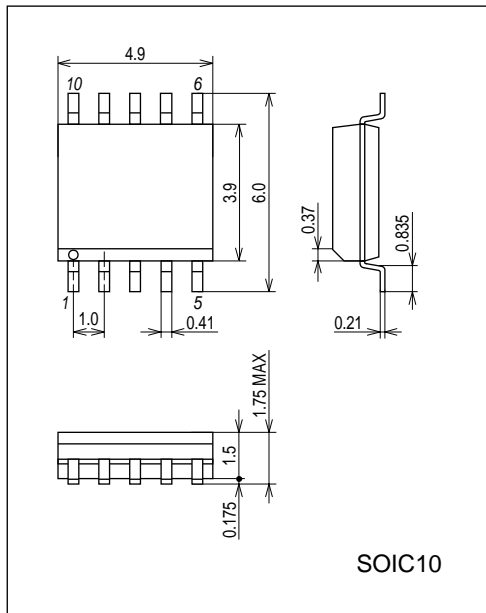| Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Power source current	$I_{CC}0$	ENA = L		0.1	10	μA
	$I_{CC}1$	ENA = H		25	35	mA
Output saturation voltage	$V_{OUT}1$	I_{OUT} = 200mA		0.25	0.35	V
	$V_{OUT}2$	I_{OUT} = 400mA		0.50	0.75	V
Input current	I_{IN}	V_{IN} = 5V		120	160	μA
Thermal protection block *1						
Thermal shutdown operation temperature	Ttsd	Design guarantee *2		180		°C
Temperature hysteresis width	ΔTtsd			60		°C
Spark killer diode						
Reverse current	I_S(leak)				30	μA
orward voltage	V_{SF}	I_{OUT} = 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.

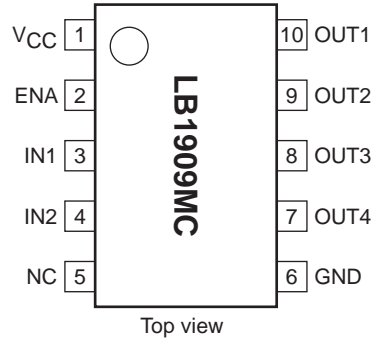*2 Design guarantee is not tested in individual units.
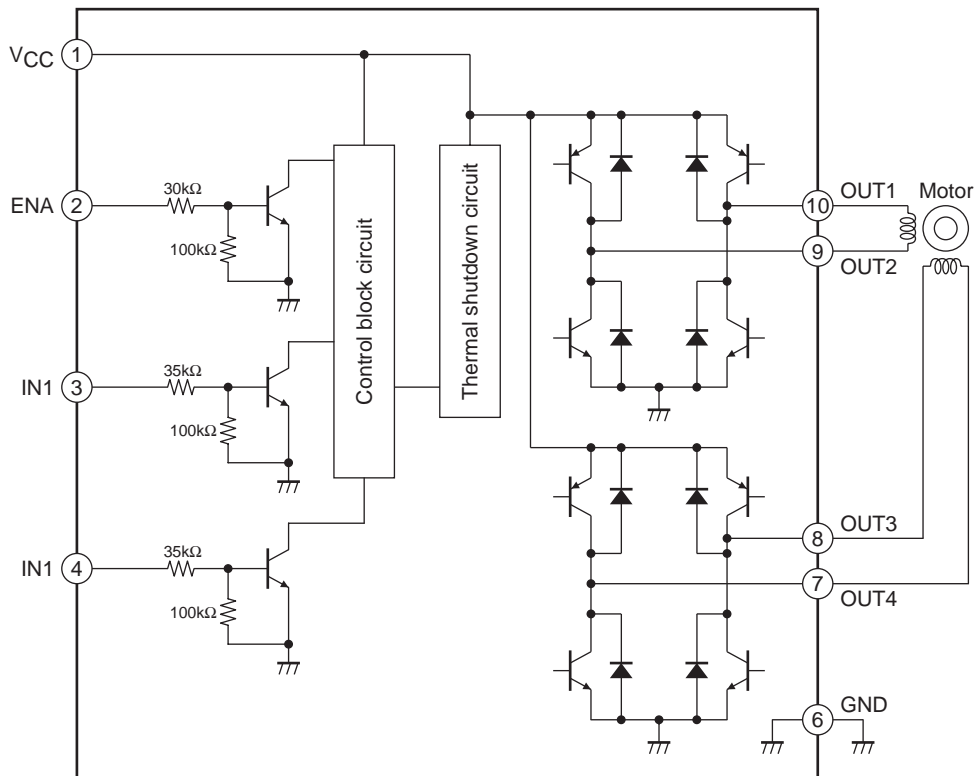
Package Dimensions

unit : mm (typ)

3426A

SOIC10

Pd max – Ta

Specified board : 114.3×76.1×1.6mm³ glass epoxy board

LB1909MC

Pin Assignment

```
VCC  1        LB1909MC    10  OUT1
ENA  2                     9  OUT2
IN1  3                     8  OUT3
IN2  4                     7  OUT4
NC   5                     6  GND
```

Top view

Truth table

Input			Output				Remarks	
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4		
L	×	×	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

LB1909MC

Timing Chart (2 phase excitation drive)

		ENA						

ENA

IN1

IN2

Channel 1 output		Forward	Reverse	Forward	Reverse	Forward	
Standby							Standby
Channel 2 output	Reverse	Forward	Reverse	Forward	Reverse		

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