



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 : $V_{O(sat)} = 0.25V$ 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 $T_a = 25^\circ C$

| 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 | Mounted on the specified board * | 820 | 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.

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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<http://semicon.sanyo.com/en/network>

LB1909MC

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 _{CC0} | ENA = L | | 0.1 | 10 | μA |
| | I _{CC1} | ENA = H | | 25 | 35 | mA |
| Output saturation voltage | V _{OUT1} | I _{OUT} = 200mA | | 0.25 | 0.35 | V |
| | V _{OUT2} | 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 | T _{tSD} | Design guarantee *2 | | 180 | | °C |
| Temperature hysteresis width | ΔT _{tSD} | | | 60 | | °C |
| Spark killer diode | | | | | | |
| Reverse current | I _S (leak) | | | | 30 | μA |
| Forward voltage | V _{SF} | I _{OUT} = 400mA | | | 1.7 | V |

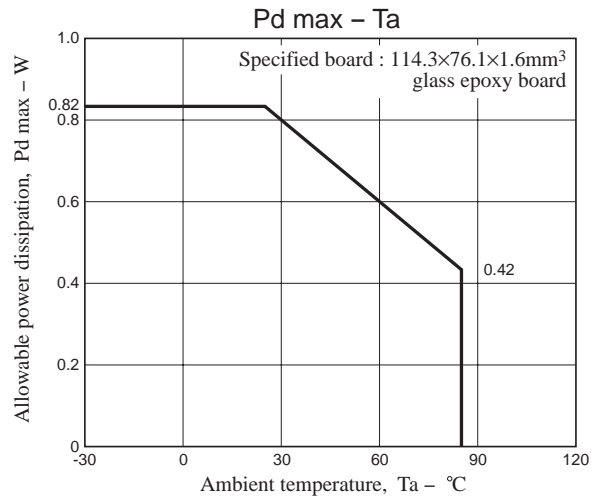
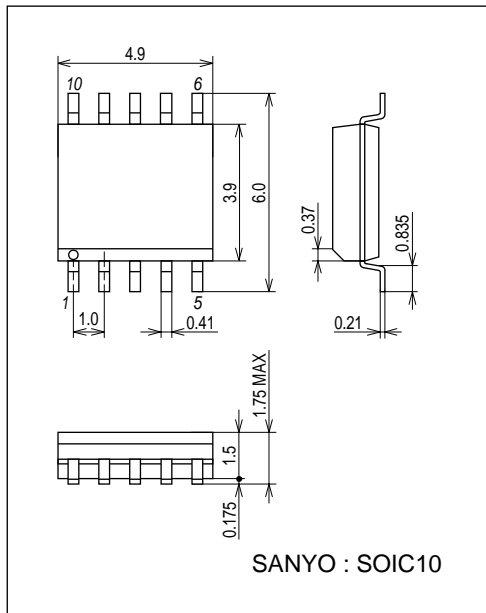
*1 The thermal protection function is a feature to prevent the product from smoking and firing under unusual conditions. It is not intended to guarantee operation of the product under an ambient temperature exceeding the operating temperature range.

*2 Design guarantee is not tested in individual units.

Package Dimensions

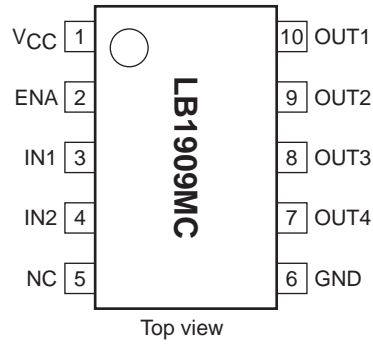
unit : mm (typ)

3426A



LB1909MC

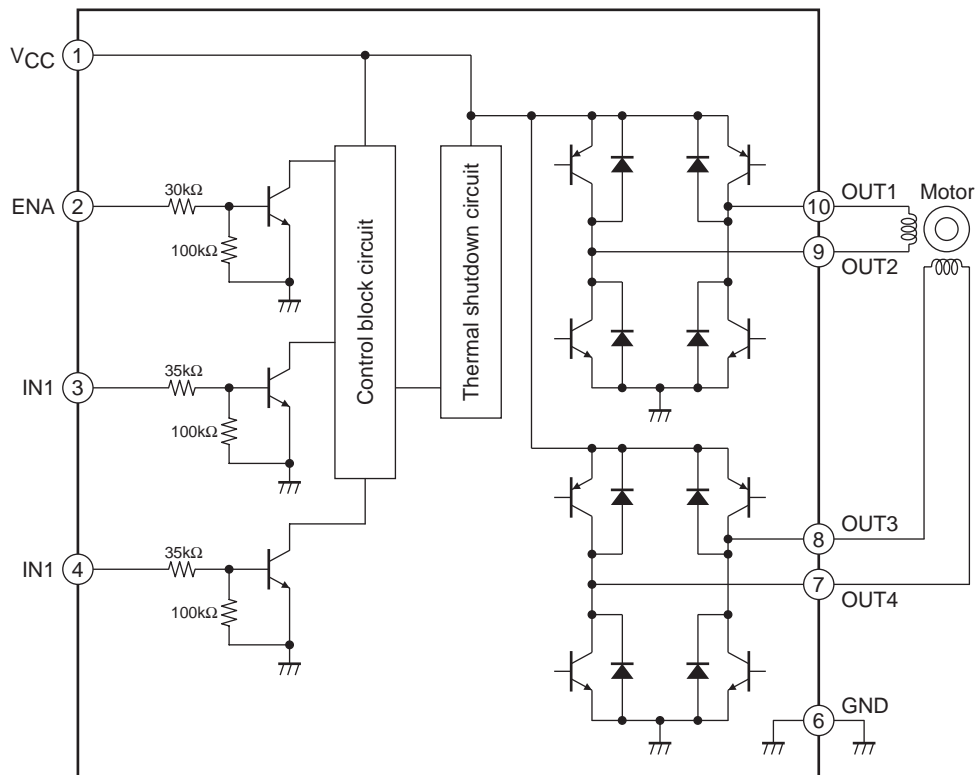
Pin Assignment



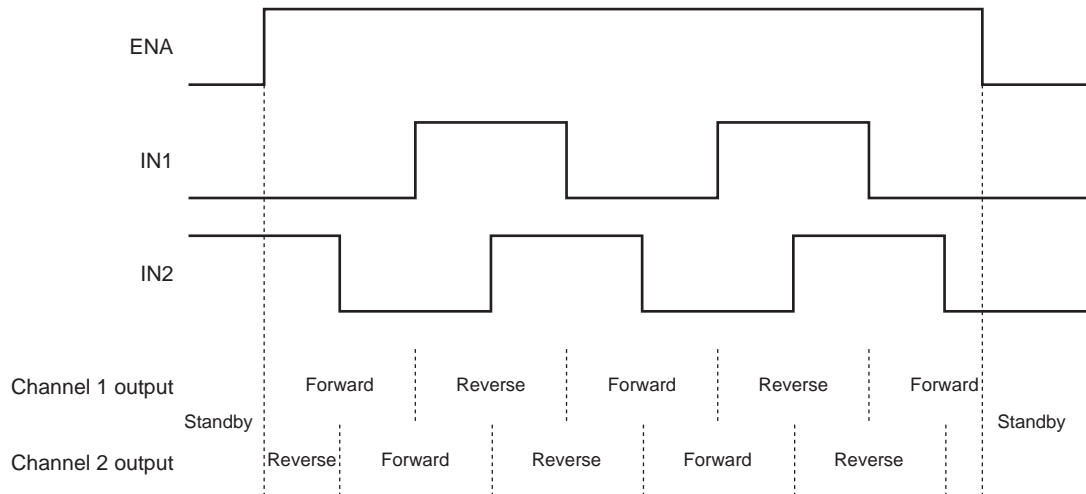
Truth table

| 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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