



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LV8549M

 Bi-CMOS integrated circuit
 12V Low Saturation Voltage Drive
 Stepping Motor Driver

Overview

The LV8549M is a stepping motor driver IC of low saturation voltage. It is optimal for motor drive in 12V system product a 2-phase bipolar stepping motor.

Functions

- DMOS output transistor adoption (Upper and lower total $R_{ON}=1\Omega$ typ)
- The compact package (MFP-10S) is adopted. • $V_{CC\ max}=20v$, $I_O\ max=1A$
- For one power supply (The control system power supply is unnecessary.)
- Current consumption 0 when standing by

Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|---------------|------------|-------------|------------|
| Maximum power supply voltage | $V_{CC\ max}$ | | -0.3 to +20 | V |
| Output impression voltage | V_{OUT} | | -0.3 to +20 | V |
| Input impression voltage | V_{IN} | | -0.3 to +6 | V |
| GND pin outflow current | I_{GND} | For ch | 1.0 | A |
| Allowable Power dissipation | $P_d\ max$ | * | 1.05 | W |
| Operating temperature | T_{opr} | | -30 to +85 | $^\circ C$ |
| Storage temperature | T_{stg} | | -40 to +150 | $^\circ C$ |

*: When mounted on the specified printed circuit board (57.0mm x57.0mm x 1.6mm), glass epoxy, both sides

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.

Recommended Operating Range at $T_a = 25^\circ C$

| Parameter | Symbol | Conditions | Ratings | Unit |
|-------------------------|-----------|------------|--------------|------|
| Power supply voltage | V_{CC} | | 4.0 to 16 | V |
| Input "H" level voltage | V_{INH} | | +1.8 to +5.5 | V |
| Input "L" level voltage | V_{INL} | | -0.3 to +0.7 | V |

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LV8549M

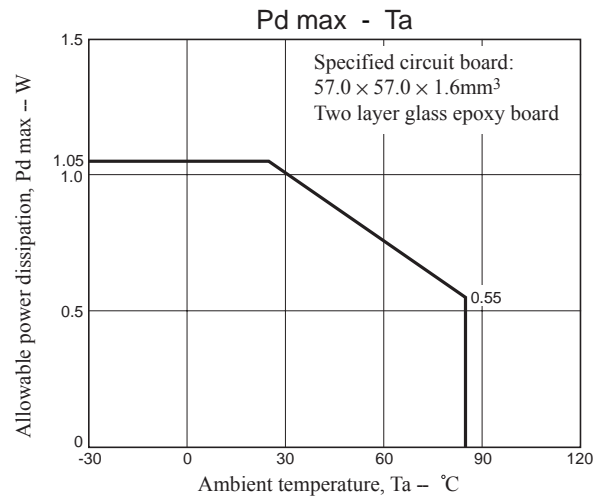
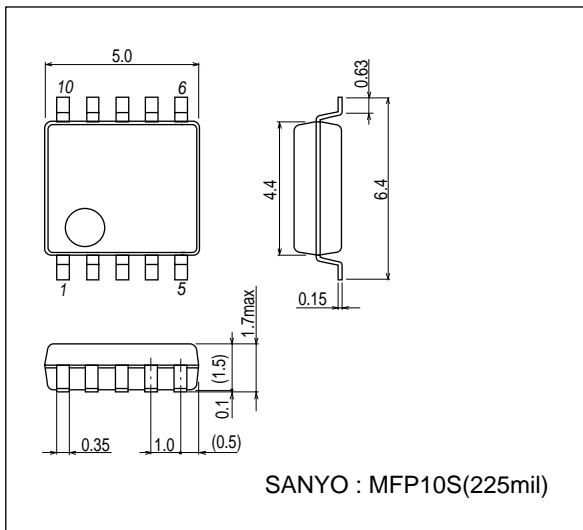
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{V}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|------------------|-----------------------|---------|-----|------|------------------|
| | | | min | typ | max | |
| Power supply voltage | I_{CC0} | Standby mode ENA=L | | | 1 | μA |
| | I_{CC1} | ENA=H | | 1.7 | 2.3 | mA |
| Input current | I_{IN} | $V_{IN}=5\text{V}$ | 30 | 50 | 65 | μA |
| Thermal shutdown operating temperature | T_{tsd} | Design certification | 150 | 180 | 210 | $^\circ\text{C}$ |
| Width of temperature hysteresis | ΔT_{tsd} | Design certification | | 40 | | $^\circ\text{C}$ |
| Low voltage protection function operation voltage | $V_{th}V_{CC}$ | | 3.3 | 3.5 | 3.65 | V |
| Release voltage | V_{thret} | | 3.55 | 3.8 | 3.95 | V |
| Output ON resistance (Upper and lower total) | R_{ON} | $I_{OUT}=1.0\text{A}$ | 0.7 | 1 | 1.25 | Ω |
| Output leak current | I_{Oleak} | $V_O=16\text{V}$ | | | 10 | μA |
| Diode forward voltage | V_D | $I_D=1.0\text{A}$ | | 1.0 | 1.2 | V |

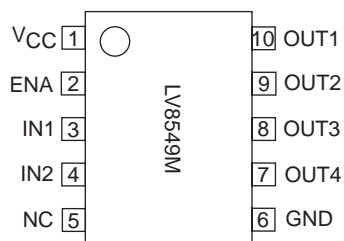
Package Dimensions

unit : mm (typ)

3086B

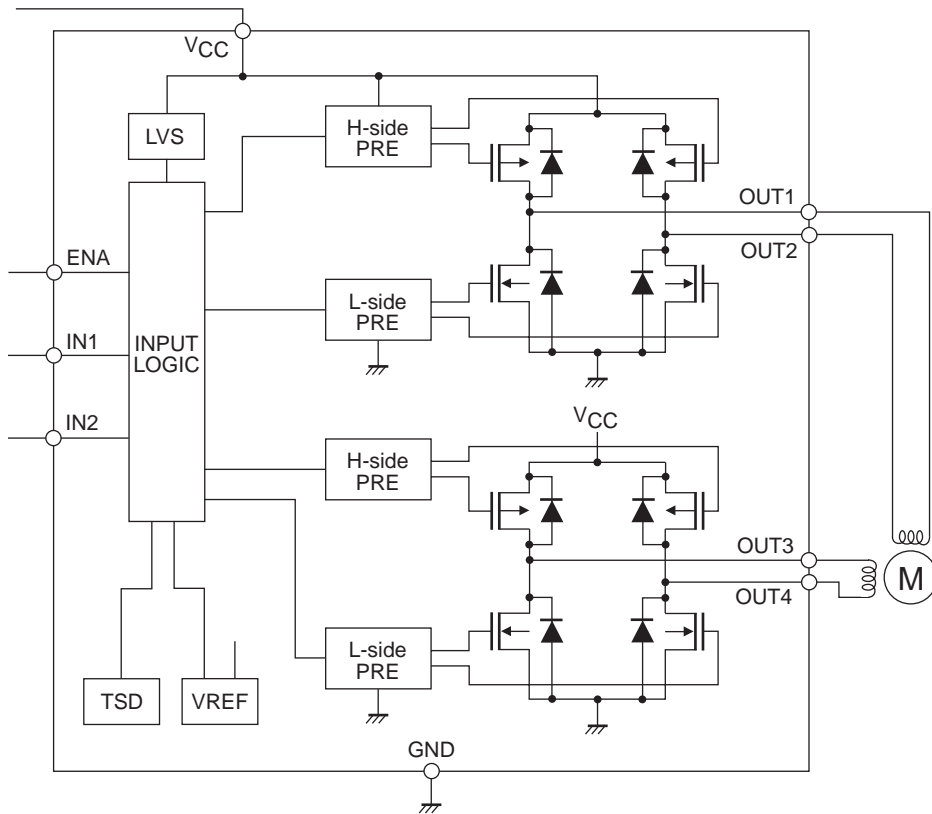


Pin Assignment



LV8549M

Block Diagram



Pin function

| Pin No. | Pin name | Pin function | Equivalent Circuit |
|---------|----------|---|--------------------|
| 1 | VCC | Power-supply voltage pin. V _{CC} voltage is impressed. The permissible operation voltage is from 4.0 to 16.0(V). The capacitor is connected for stabilization for GND pin (6pin). | |
| 2 | ENA | Motor drive control input pin. It shifts from the stand-by state to a prescribed output operation corresponding to the state of the input when the ENA pin becomes a standby mode by L, the circuit current can be adjusted to 0, and it makes it to H. It is a digital input, and the range of L level input is 0 to 0.7(V) and the range of H level input are 1.8 to 5.5(V). PWM can be input. Pull-down resistance 100(kΩ) is built into in the terminal. | |
| 3 | IN1 | Motor drive control input pin. Driving control input pin of OUT1 (10pin) and OUT2 (9pin). PWM can be input. With built-in pull-down resistance. | |
| 4 | IN2 | Motor drive control input pin. Driving control input pin of OUT3 (8pin) and OUT4 (7pin). PWM can be input. With built-in pull-down resistance. | |
| 5 | NC | | |
| 6 | GND | Ground pin. | |
| 7 | OUT4 | Driving output pin. The motor coil is connected between terminal OUT3 (8pin). | |
| 8 | OUT3 | Driving output pin. The motor coil is connected between terminal OUT4 (7pin). | |
| 9 | OUT2 | Driving output pin. The motor coil is connected between terminal OUT1 (10pin). | |
| 10 | OUT1 | Driving output pin. The motor coil is connected between terminal OUT2 (9pin). | |

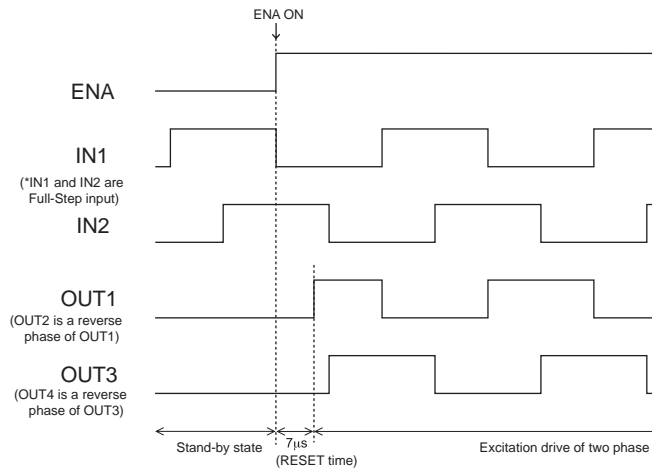
Operation explanation

1. STM output control logic

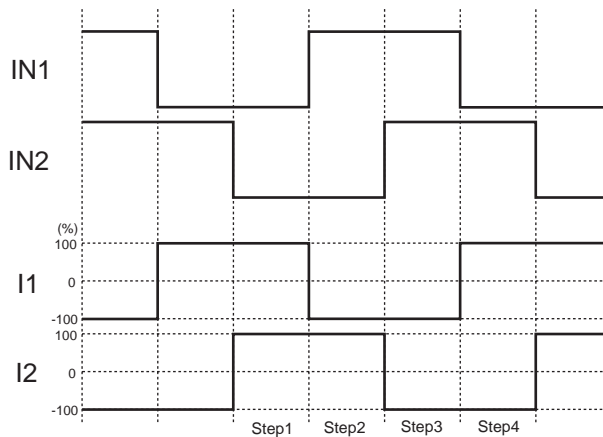
| Input | | | Output | | | | State |
|-------|-----|-----|--------|------|------|------|----------|
| ENA | IN1 | IN2 | OUT1 | OUT2 | OUT3 | OUT4 | |
| L | - | - | OFF | OFF | OFF | OFF | Stand-by |
| H | L | L | H | L | H | L | Step 1 |
| | H | L | L | H | H | L | Step2 |
| | H | H | L | H | L | H | Step3 |
| | L | H | H | L | L | H | Step4 |

2. About the switch time from the stand-by state to the state of operation

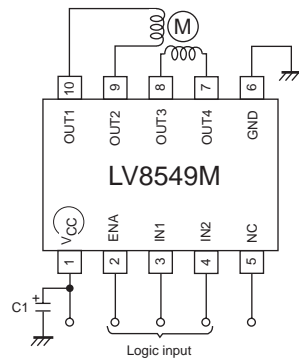
When ENA pin are "L", this IC has completely stopped operating. After the time of reset (about 7μs of an internal setting) it shifts to a prescribed output status corresponding to the state of the input when the signal enters the ENA pin.



3. Example of current wave type in each excitation mode when stepping motor parallel input is controlled.



Application Circuit Example



* Bypass capacitor (C1) connected between V_{CC}-GND of all examples of applied circuit recommends the electric field capacitor of 0.1μA to 10μA.

Confirm there is no problem in operation in the state of the motor load including the temperature property about the value of the capacitor.

Mount the position where the capacitor is mounted on nearest IC.

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