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LV8019V

Bi-CMOS IC Forward/Reverse Motor Driver

Overview

The LV8019V is a forward/reverse motor driver.

Features

- One H-bridge driver channel
- Provides a constant current output
- Built-in thermal shutdown circuit

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$ and $\text{SGND} = \text{PGND} = 0\text{V}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|--|--------------|--|----------------------|------------------|
| Output block supply voltage | V_M max | | -0.5 to 8.4 | V |
| Control block supply voltage | V_{CC} max | | -0.5 to 7.0 | V |
| Constant current output block supply voltage | V_{RG} max | | -0.5 to 6.0 | V |
| Maximum output current | I_O max | | 1.2 | A |
| | I_O peak1 | $t \leq 200\text{ms}$, $f = 2\text{Hz}$ | 3 | A |
| | I_O peak2 | $t \leq 10\text{ms}$, $f = 2\text{Hz}$ | 5 | A |
| Input signal voltage | V_{IN} max | | -0.5 to $V_{CC}+0.5$ | A |
| Allowable power dissipation | P_d max | When mounted on a circuit board *1 | 0.8 | W |
| Operating temperature | T_{opr} | | -30 to +85 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -55 to +150 | $^\circ\text{C}$ |

*1 Specified circuit board : $114.3 \times 76.1 \times 1.6\text{mm}^3$, glass epoxy

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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Recommended Operating Conditions at $T_a = 25^\circ\text{C}$ and $\text{SGND} = \text{PGND} = 0\text{V}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|--|------------|------------|-----------------|------|
| Output block supply voltage | V_M | | 3.0 to 7.4 | V |
| Control block supply voltage | V_{CC} | | 2.7 to 6.0 | V |
| Constant current output block supply voltage | V_{RGIN} | | 1.5 to V_{CC} | V |
| Input signal voltage | V_{IN} | | 0 to V_{CC} | V |
| Maximum input signal frequency | f_{max} | Duty = 50% | 100 | kHz |

Electrical Characteristics $T_a = 25^\circ\text{C}$, $V_{CC} = V_M = 5\text{V}$, and $\text{SGND} = \text{PGND} = 0\text{V}$ unless otherwise specified.

| Parameter | | Symbol | Conditions | Ratings | | | Unit |
|---|----------------|-----------------|--|---------|------|----------|------------------|
| | | | | min | typ | max | |
| Standby mode output block current consumption | | I_{MO} | $\text{EN} = 0\text{V}$, $\text{IN1} = \text{IN2} = \text{ICTRL} = 0\text{V}$ | | | 1.0 | μA |
| Control block current consumption | Standby mode | I_{CCO} | $\text{EN} = 0\text{V}$, $\text{IN1} = \text{IN2} = \text{ICTRL} = 0\text{V}$ | | 0 | 1.0 | μA |
| | Operation mode | I_{CC} | $\text{EN} = 5\text{V}$ | | 0.8 | 1.3 | mA |
| High-level input voltage | | V_{INH} | | 2.5 | | V_{CC} | V |
| Low-level input voltage | | V_{INL} | | 0 | | 0.8 | V |
| High-level input current | | I_{INH} | | | | 1.0 | μA |
| Low-level input current | | I_{INL} | | -1.0 | | | μA |
| High-level EN pin current | | I_{ENH} | EN pin | 15 | 25 | 35 | μA |
| Low-level EN pin current | | I_{ENL} | EN pin | | | 1.0 | μA |
| Output on resistance | 1 | R_{ON1} | $V_M = 5\text{V}$, sink + source | | 0.45 | 0.55 | Ω |
| | 2 | R_{ON2} | $V_M = 3\text{V}$, sink + source | | 0.60 | 0.75 | Ω |
| ISET setting resistance | | R_{SET} | Between ISET pin and SGND | 80 | | | Ω |
| ISET pin voltage | | V_{ISET} | $R_{SET} > 80\Omega$ | 0.90 | 1.05 | 1.20 | V |
| CC pin output saturation voltage | | V_{CSAT} | $R_{SET} > 150\Omega$ *1 | | | 1.5 | V |
| CC pin output leakage current | | I_{CONL} | $\text{CTRL} = 0\text{V}$ | | | 1.0 | μA |
| Low voltage shutdown operation voltage | | V_{LVD} | V_{CC} pin voltage detection | 2.10 | 2.35 | 2.60 | V |
| High-level output turn-on time | | T_{OH} | The transition from 10% to 90% of the output amplitude *2 | | 0.1 | 1.0 | μs |
| Low-level output turn-on time | | T_{OL} | The transition from 90% to 10% of the output amplitude *2 | | 0.2 | 2.0 | μs |
| Thermal shutdown temperature | | T_{SD} | *2 | 150 | 180 | | $^\circ\text{C}$ |
| Thermal shutdown hysteresis | | ΔT_{SD} | *2 | | 40 | | $^\circ\text{C}$ |

*1 : Voltage between CC pin and ISET pin

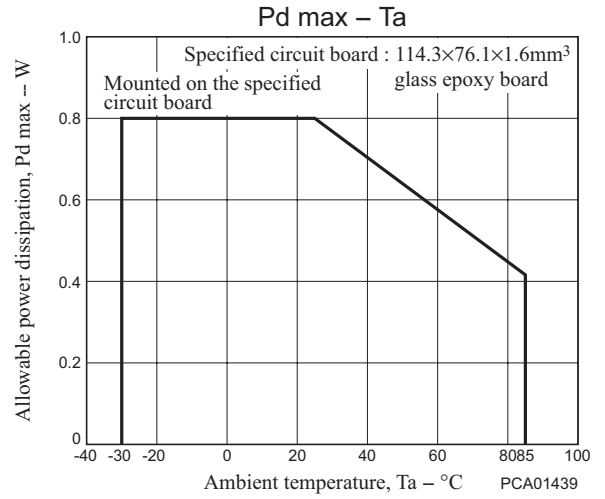
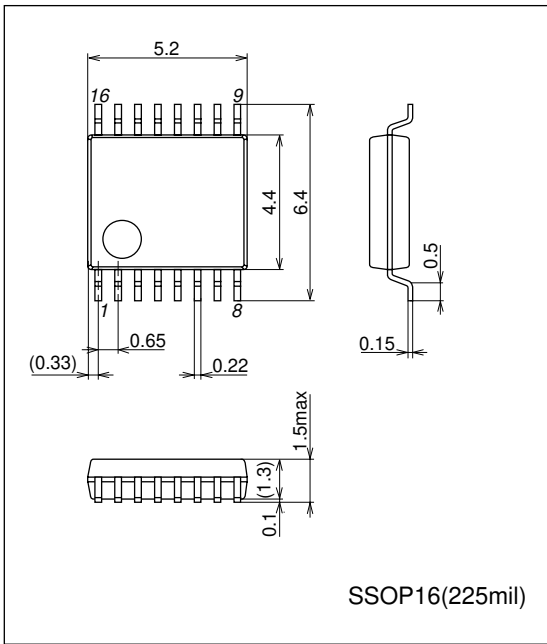
*2 : Design guarantee: These characteristics are not measured.

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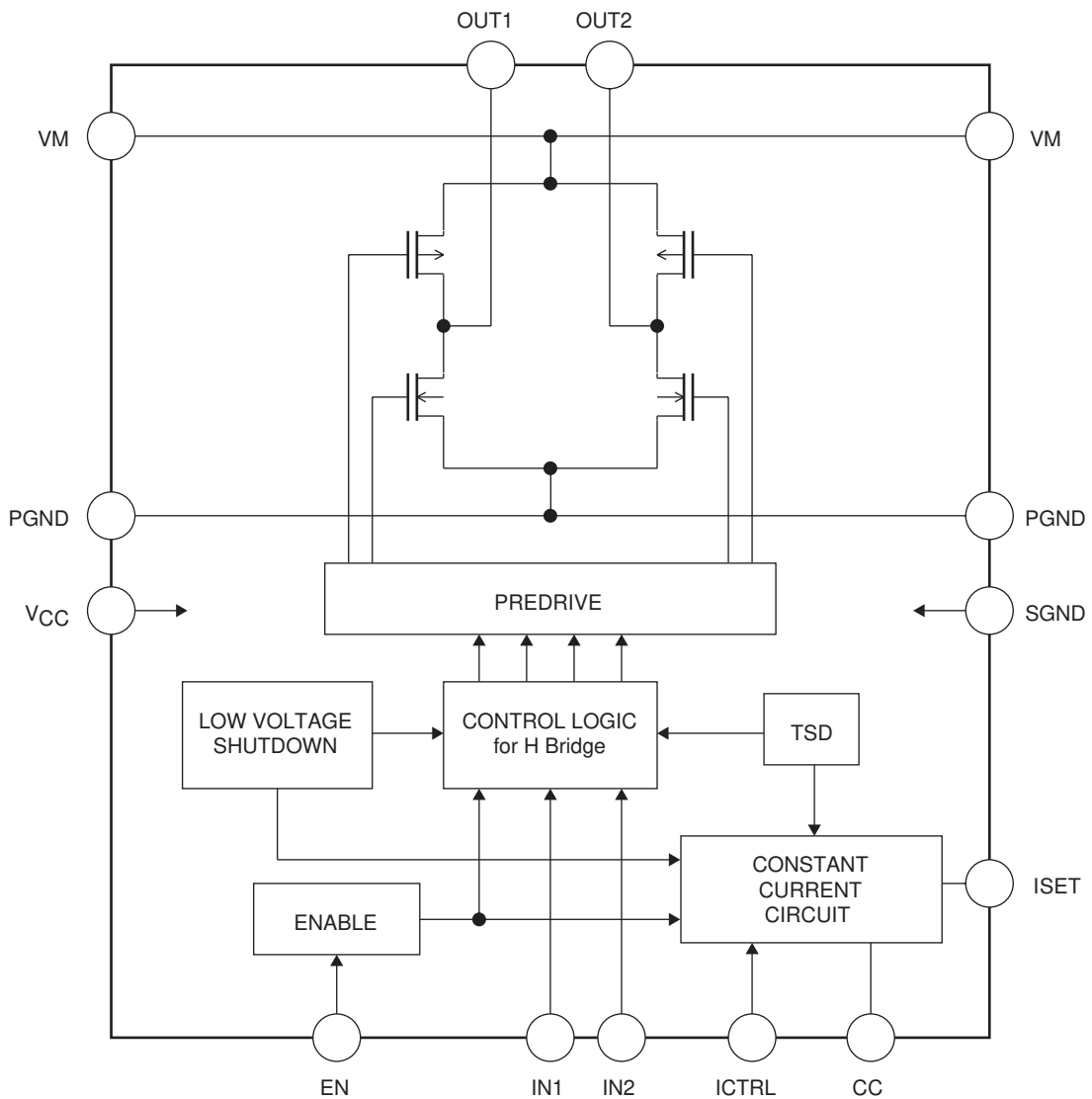
Package Dimensions

unit : mm (typ)

3178B



Block Diagram



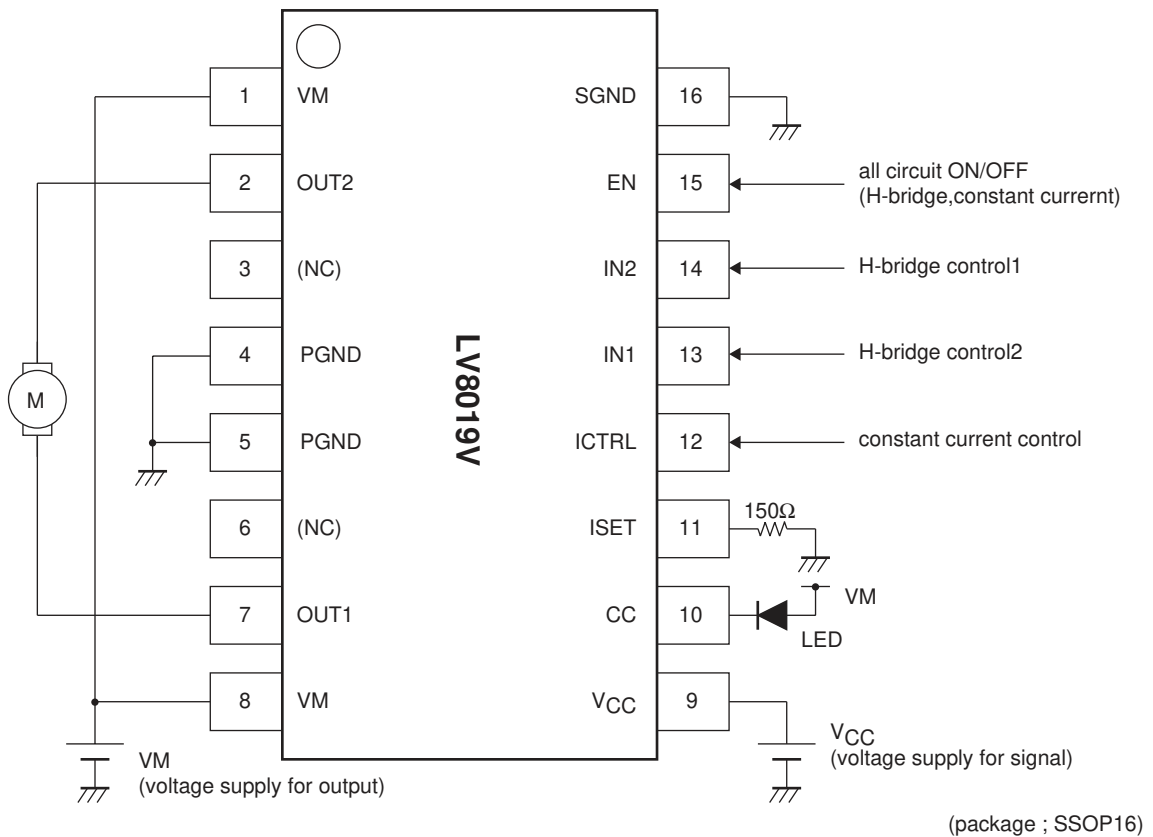
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Truth Table

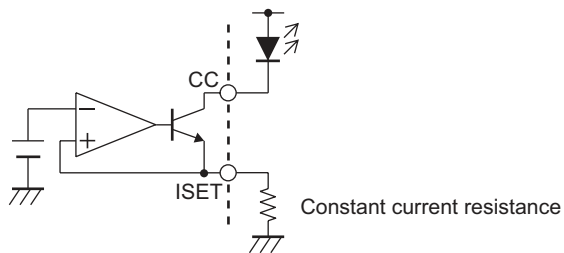
| EN | IN1 | IN2 | ICTRL | OUT1 | OUT2 | CC | Mode |
|----|-----|-----|-------|------|------|----|-----------------------------|
| H | H | H | X | L | L | X | Break |
| H | H | L | X | H | L | X | Forward |
| H | L | H | X | L | H | X | Reverse |
| H | L | L | X | Z | Z | X | Standby |
| L | X | X | X | L | L | L | Standby |
| H | X | X | L | X | X | Z | Constant current output off |
| H | X | X | H | X | X | ON | Constant current output on |

H : High level
 L : Low level
 Z : Hi-impedance
 X : Don't care

Pin Assignment and Application Example



Constant current output



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Pin Functions

| Pin No. | Pin | Description | Equivalent circuit |
|----------|-----------------|---|--------------------|
| 13 14 | IN1 IN2 | Logic input 1 Logic input 2 The output is set by the combination of the input 1 and 2 states. See the truth table for details. | |
| 12 | ICTRL | Controls the output on/off state of the constant current block. | |
| 15 | EN | EN pin. Controls the on/off state of the H-bridge output (OUT1 and OUT2) and the constant current output. See the truth table for details. | |
| 7 2 | OUT1 OUT2 | Output 1. Output 2. The source side is a p-channel transistor and sink side is an n-channel transistor. | |
| 10 11 | CC ISET | Constant current output. Constant current setting. The output current (CC) is set by connecting a resistor between the ISET pin and ground. | |
| 9 | V _{CC} | Signal system power supply. | |
| 8 | VM | Power system power supply. | |
| 16 | SGND | Signal system ground. | |
| 4,5 | PGND | Power system ground. | |

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