



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 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  $SGND = PGND = 0V$

| 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

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# LV8019V

## 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 |                | IMO                | EN = 0V, IN1 = IN2 = ICTRL = 0V                           |         |      | 1.0      | $\mu\text{A}$    |
| Control block current consumption             | Standby mode   | $I_{CCO}$          | EN = 0V, IN1 = IN2 = ICTRL = 0V                           |         | 0    | 1.0      | $\mu\text{A}$    |
|   | Operation mode | $I_{CC}$           | EN = 5V   |         | 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      | $\mu\text{A}$    |
| Low-level input current                       |                | $I_{INL}$          |   | -1.0    |      |          | $\mu\text{A}$    |
| High-level EN pin current                     |                | $I_{ENH}$          | EN pin  | 15      | 25   | 35       | $\mu\text{A}$    |
| Low-level EN pin current                      |                | $I_{ENL}$          | EN pin  |         |      | 1.0      | $\mu\text{A}$    |
| Output on resistance                          | 1              | $R_{ON1}$          | $V_M = 5\text{V}$ , sink + source                         |         | 0.45 | 0.55     | $\Omega$         |
|   | 2              | $R_{ON2}$          | $V_M = 3\text{V}$ , sink + source                         |         | 0.60 | 0.75     | $\Omega$         |
| ISET setting resistance                       |                | RSET               | Between ISET pin and SGND                                 | 80      |      |          | $\Omega$         |
| ISET pin voltage                              |                | VISET              | $R_{SET} > 80\Omega$                                      | 0.90    | 1.05 | 1.20     | V                |
| CC pin output saturation voltage              |                | VCSAT              | $R_{SET} > 150\Omega$ *1                                  |         |      | 1.5      | V                |
| CC pin output leakage current                 |                | ICONL              | CTRL = 0V   |         |      | 1.0      | $\mu\text{A}$    |
| Low voltage shutdown operation voltage        |                | VLVD               | $V_{CC}$ pin voltage detection                            | 2.10    | 2.35 | 2.60     | V                |
| High-level output turn-on time                |                | TOH                | The transition from 10% to 90% of the output amplitude *2 |         | 0.1  | 1.0      | $\mu\text{s}$    |
| Low-level output turn-on time                 |                | TOL                | The transition from 90% to 10% of the output amplitude *2 |         | 0.2  | 2.0      | $\mu\text{s}$    |
| Thermal shutdown temperature                  |                | TSD                | *2  | 150     | 180  |          | $^\circ\text{C}$ |
| Thermal shutdown hysteresis                   |                | $\Delta\text{TSD}$ | *2  |         | 40   |          | $^\circ\text{C}$ |

\*1 : Voltage between CC pin and ISET pin

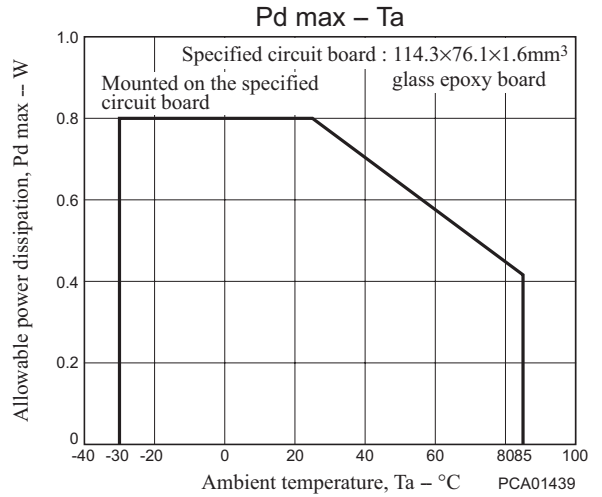
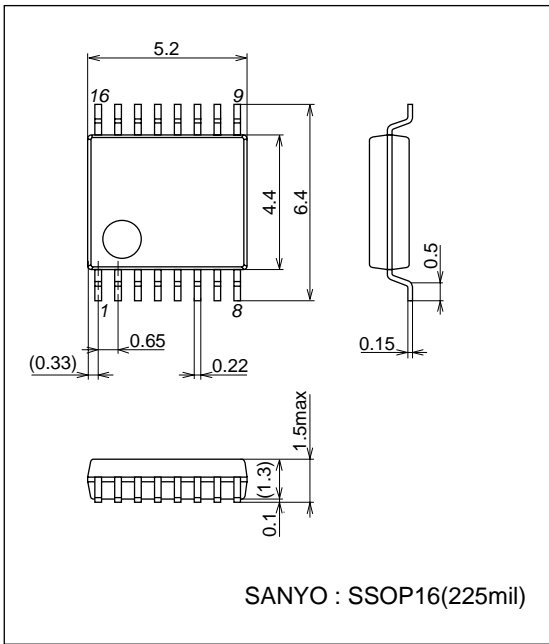
\*2 : Design guarantee: These characteristics are not measured.

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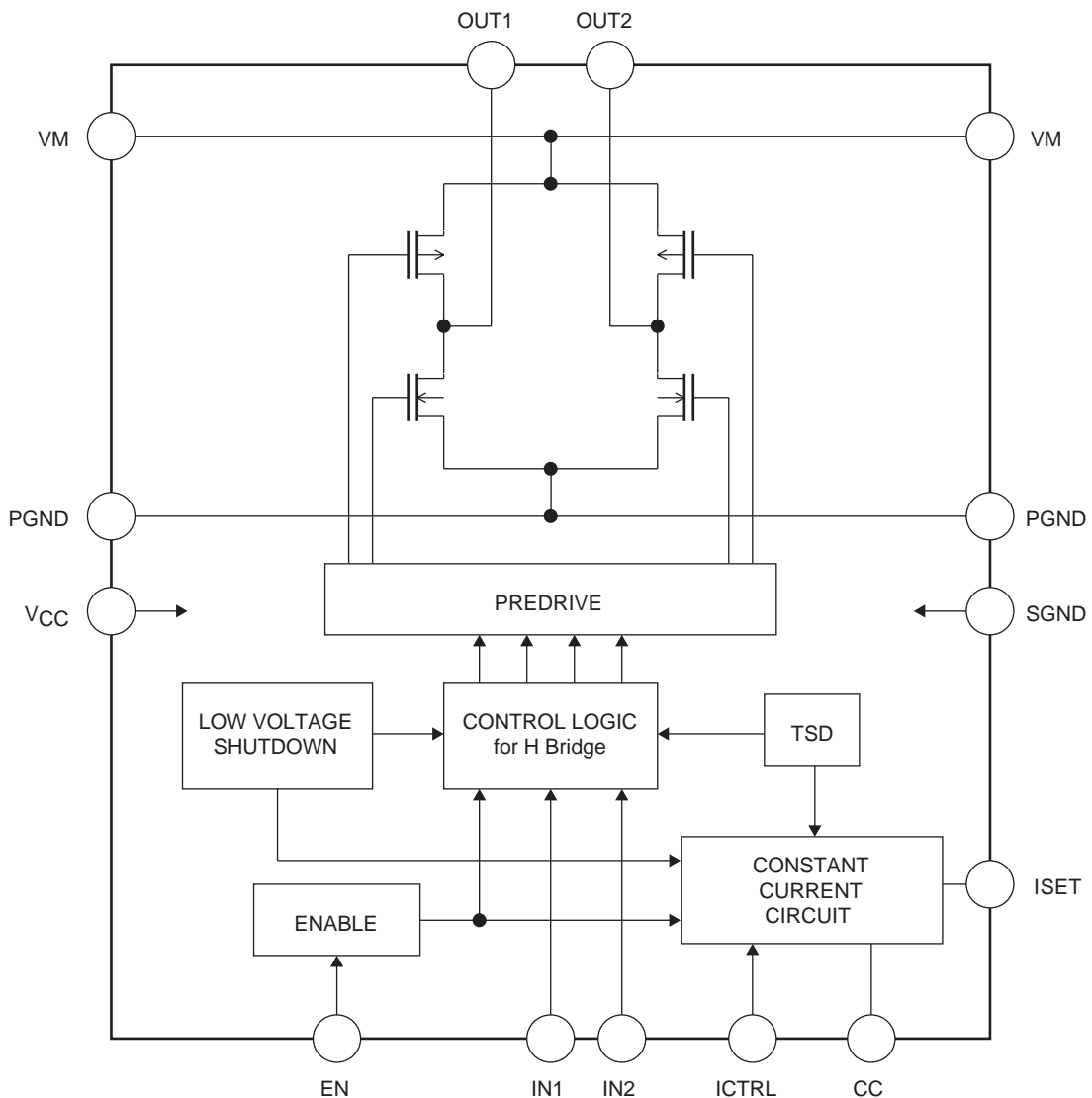
## Package Dimensions

unit : mm (typ)

3178B



## Block Diagram



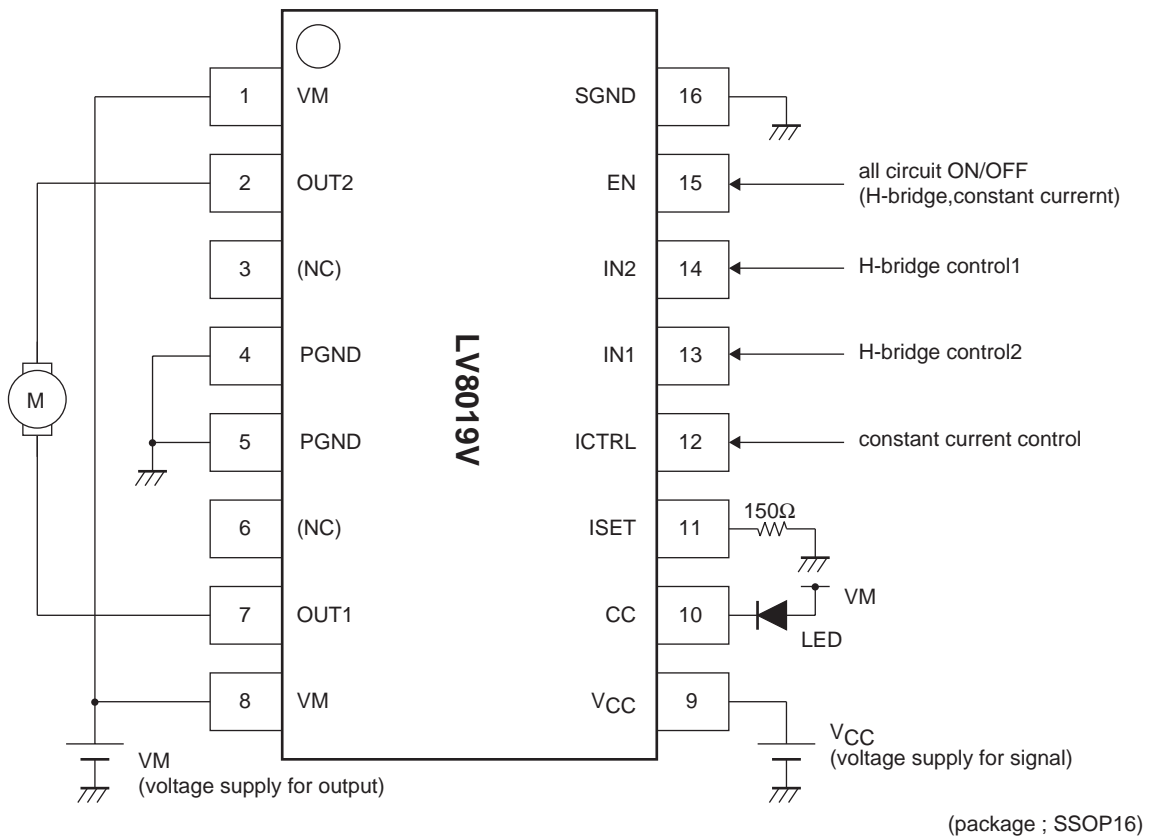
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## Truth Table

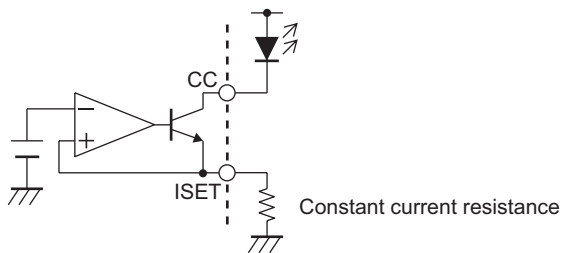
| EN | IN1 | IN2 | ICTRL | OUT1 | OUT2 | CC | Mode                        |
|----|-----|-----|-------|------|------|----|-----------------------------|
| H  | H   | H   | X     | L    | L    | X  | Break                       |
| H  | H   | L   | X     | H    | L    | X  | Forward                     |
| 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



# LV8019V

## Pin Functions

| Pin No.  | Pin          | Description   | Equivalent circuit |
|----------|--------------|---|--------------------|
| 13<br>14 | IN1<br>IN2   | Logic input 1<br>Logic input 2<br>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.<br>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<br>2   | OUT1<br>OUT2 | Output 1.<br>Output 2.<br>The source side is a p-channel transistor and sink side is an n-channel transistor.                                     |                    |
| 10<br>11 | CC<br>ISET   | Constant current output.<br>Constant current setting.<br>The output current (CC) is set by connecting a resistor between the ISET pin and ground. |                    |
| 9        | VCC          | 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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