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# LV8019LP

## Bi-CMOS IC Forward/Reverse Motor Driver

### Overview

The LV8019LP 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	$P_d$ max1	Independent IC	0.2	W
	$P_d$ max2	When mounted on a circuit board *1	1.05	W
Operating temperature	$T_{opr}$		-30 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

\* : Specified substrate :  $40 \times 50 \times 0.8\text{mm}^3$ , glass epoxy four-layer (2S2P) board

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	$\mu\text{A}$
Control block current consumption	Standby mode	$I_{CCO}$	$\text{EN} = 0\text{V}$ , $\text{IN1} = \text{IN2} = \text{ICTRL} = 0\text{V}$		0	$\mu\text{A}$
	Operation mode	$I_{CC}$	$\text{EN} = 5\text{V}$		1.3	mA
High-level input voltage	$V_{INH}$	$\text{IN}^*$	2.5		$V_{CC}$	V
Low-level input voltage	$V_{INL}$	$\text{IN}^*$	0		0.8	V
High-level input current	$I_{INH}$	$\text{IN}^*$			1.0	$\mu\text{A}$
Low-level input current	$I_{INL}$	$\text{IN}^*$	-1.0			$\mu\text{A}$
High-level EN pin current	$I_{ENH}$	$\text{EN}$	15	25	35	$\mu\text{A}$
Low-level EN pin current	$I_{ENL}$	$\text{EN}$			1.0	$\mu\text{A}$
Output on resistance	1	$R_{ON1}$	$V_M = 5\text{V}$ , sink + source		0.30	$\Omega$
	2	$R_{ON2}$	$V_M = 3\text{V}$ , sink + source		0.45	$\Omega$
ISET setting resistance	$R_{SET}$	Between ISET pin and SGND	80			$\Omega$
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	$\mu\text{A}$
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	$\mu\text{s}$
Low-level output turn-on time	$T_{OL}$	The transition from 90% to 10% of the output amplitude *2		0.2	2.0	$\mu\text{s}$
Thermal shutdown temperature	$T_{SD}$	*2	150	180		$^\circ\text{C}$
Thermal shutdown hysteresis	$\Delta T_{SD}$	*2		40		$^\circ\text{C}$

\*1 : Voltage between CC pin and ISET pin

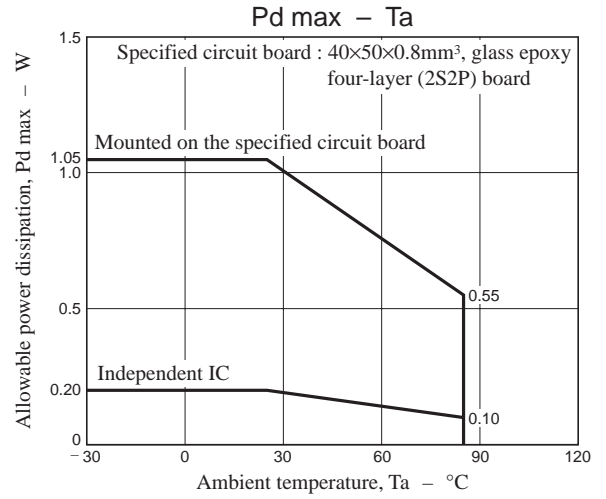
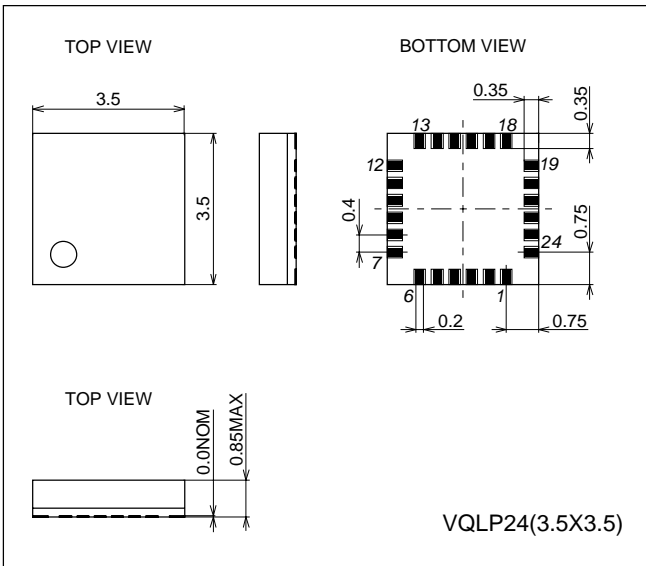
\*2 : Design guarantee: These characteristics are not measured.

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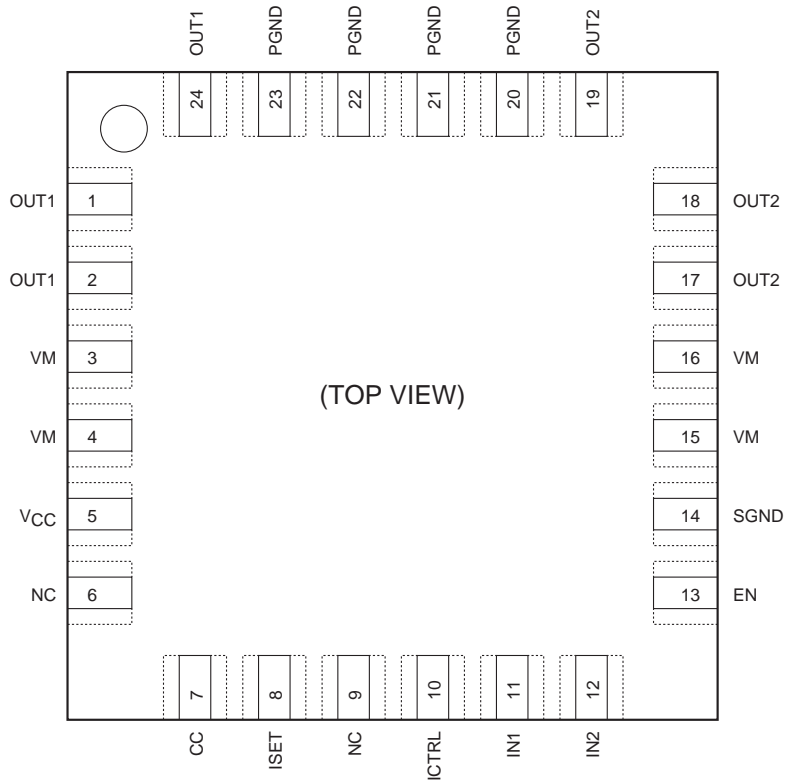
## Package Dimensions

unit : mm (typ)

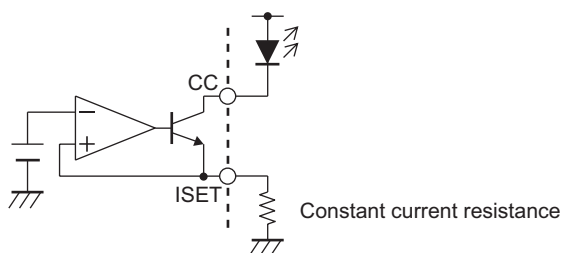
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## Pin Assignment

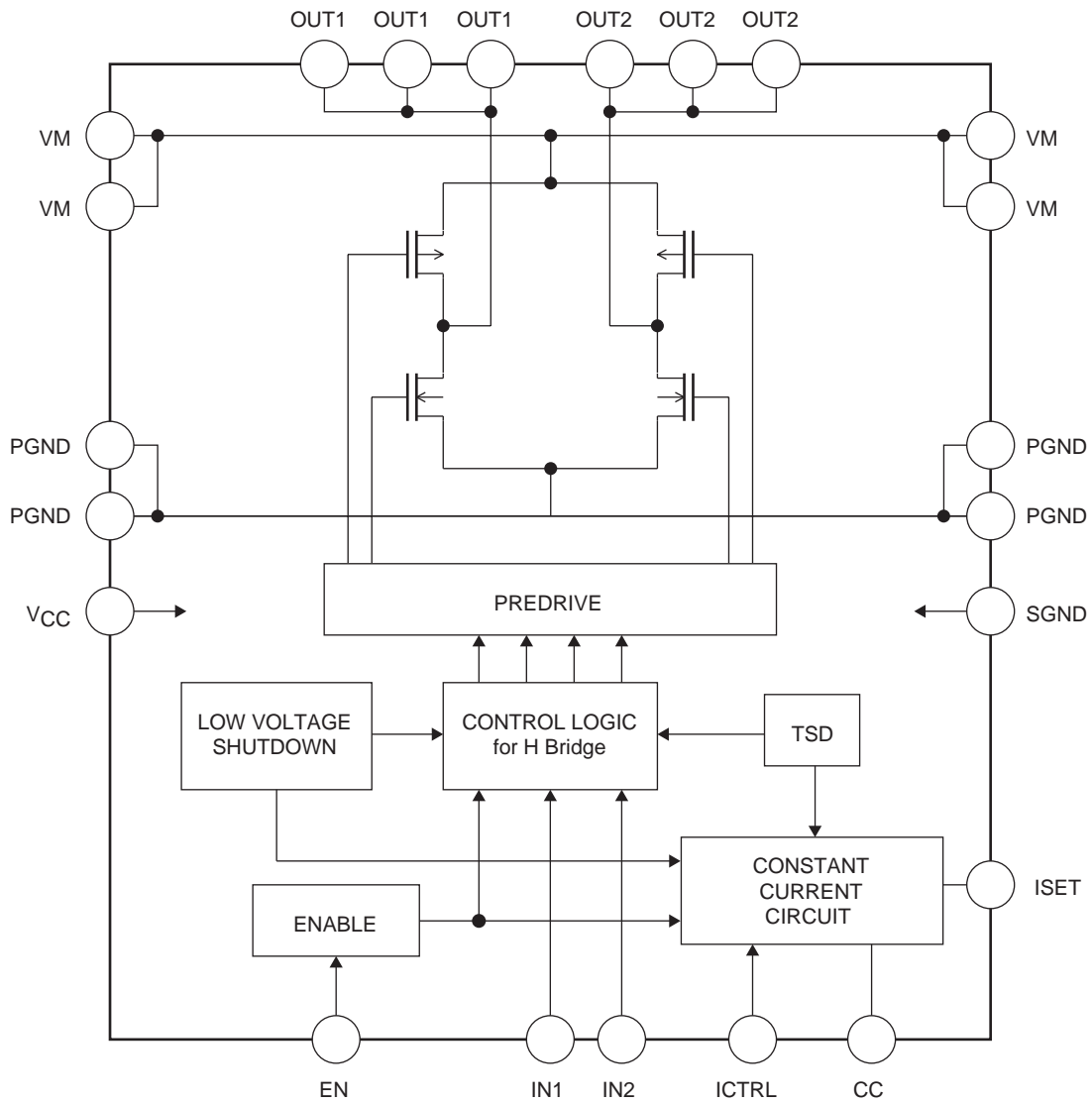


## Constant current output



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## Block Diagram



## Truth Table

EN	IN1	IN2	CTRL	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

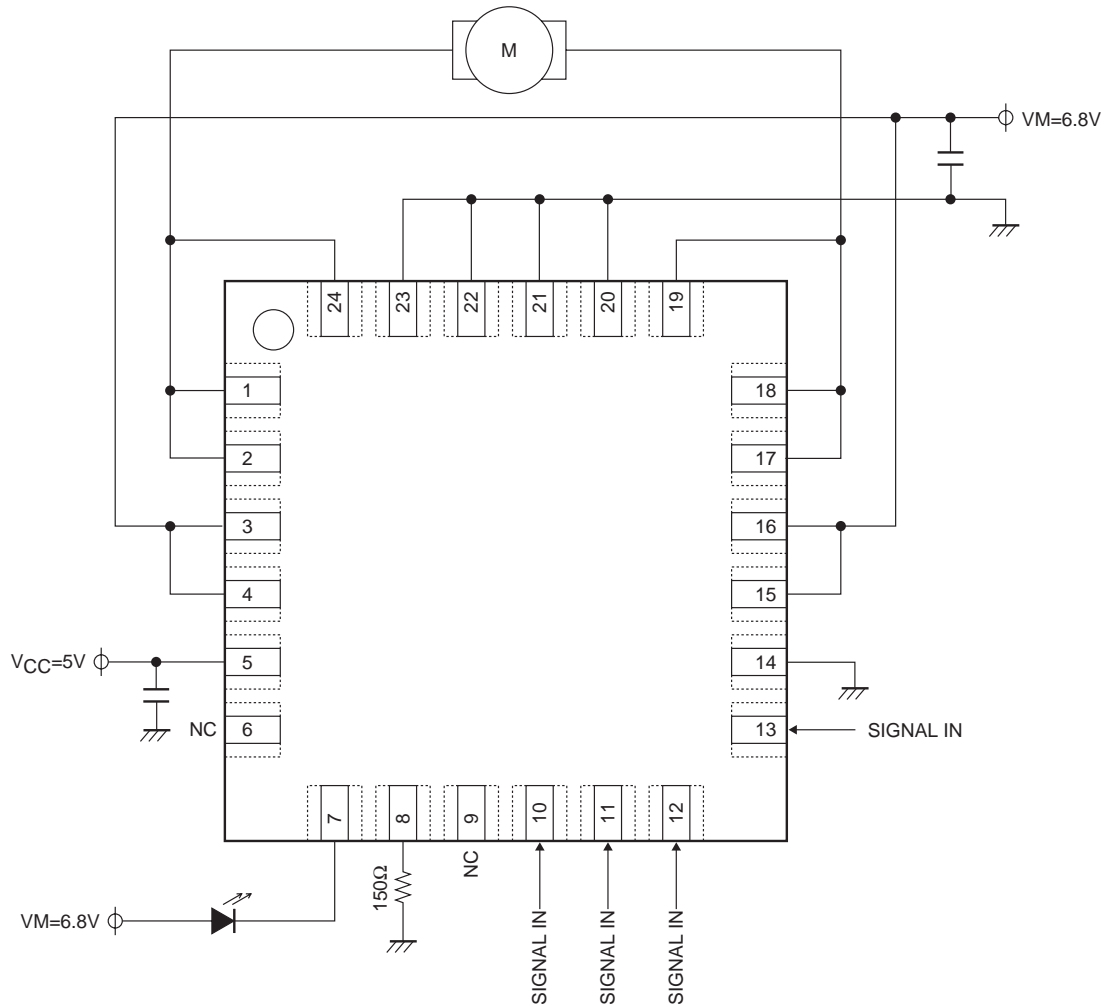
H : High level  
 L : Low level  
 Z : Hi-impedance  
 X : Don't care

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## Pin Functions

Pin No.	Pin	Description	Equivalent circuit
11 12	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.	
10	ICTRL	Controls the output on/off state of the constant current block.	
13	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.	
1, 2, 24, 17, 18, 19	OUT1 OUT2	Output 1 Output 2 The source side is a p-channel transistor and sink side is an n-channel transistor.	
7 8	CC ISET	Constant current output Constant current setting The output current (CC) is set by connecting a resistor between the ISET pin and ground.	
5	VCC	Signal system power supply	
3, 4, 15, 16	VM	Power system power supply	
14	SGND	Signal system ground	
21, 22, 23	PGND	Power system ground	

Application Example



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