Ordering number : ENN*7230

Preliminary

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

LV8011V — Bi-CMOS IC Forward/Reverse Motor Driver

Overview

LV8011V is a 1ch forward/reverse motor driver IC using D-MOS FET for output stage. As MOS circuit is used, it supports the PWM input. Its features are that the on resistance (0.37Ω typ) and current dissipation are low.
It also provides protection functions such as heat protection circuit and reduced voltage detection and is optimal for the motors that need high-current (maximum peak current : 5A).

Absolute Maximum Ratings at Ta = 25°C, SGND = PGND = 0V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Power Source Voltage (For load)	VM max		-0.5 to 7.5	V
Maximum Power Source Voltage (For control)	V_{CC} max		-0.5 to 6.0	V
Maximum Output Current	I_O max	DC	1.0	A
	I_O peak1	t≤100ms, f = 2Hz	3.0	A
	I_O peak2	t≤10ms, f = 2Hz	5.0	A
Input Voltage	V_{IN} max		-0.5 to V_{CC}+0.5	V
Operating Temperature	Topr		-20 to +75	°C
Storage Temperature	Tstg		-55 to 150	°C
Allowable Power Dissipation	Pd	*Specified substrate	800	mW

* When mounting the glass epoxy substrate 30mm×50mm×1.6mm.

Allowable Operating Range at SGND = PGND = 0V

Parameter	Symbol	Conditions	Ratings	Unit
Power Source Voltage (For load)	VM		2.0 to 6.5	V
Power Source Voltage (For control)	V_{CC}		4.5 to 5.5	V
Input Signal Voltage	V_{IN}		0 to V_{CC}	V
Input Signal Frequency	f max	duty = 50%	100	kHz
Charge-Pump Capacitor	C1, C2, C3		0.001 to 0.1	µF

Electric Characteristics at Ta = 25°C, V_{CC} = VM = 5.0V, SGND = PGND = 0V

Parameter	Symbol	Conditions	Ratings			Unit	Remarks
			min	typ	max		
Standby Power Source Current for Load	IMO	EN = 0V			1.0	μA	1
Standby Power Source Current for Control	ICO	EN = 0V, IN1 = IN2 = TIN = 5V		50	100	μA	2
Operating Current Consumption	IC1	EN = 5V, VG when non-load.		0.7	1.2	mA	3
High Level Input Voltage	V_{IH}		2.5		V_{CC}	V	
Low Level Input Voltage	V_{IL}		0		0.8	V	
High Level Input Current (IN1, IN2)	I_{IH}				1.0	μA	4
Low Level Input Current (IN1, IN2)	I_{IL}		-1.0			μA	
Pull-up Resistance Value (EN, TIN)	RUP		50	100	200	kΩ	
Output ON Resistance	RON	Sum of top and bottom of ON resistance value.		0.37	0.60	Ω	5
Charge-Pump Voltage	VG		9.5	10.4	11	V	6
Low Voltage Detection Operating Voltage	VCS	V_{CC} Voltage	2.3	2.5	2.7	V	7
Thermal Shutdown Operating Temperature	TTSD	*Design Target	150	180	210	°C	8
Charge-Pump Capacity (IG = 500μA)	VGLOAD		9.0	9.9		V	9
IG Current Dissipation (Fin = 20kHz)	IG				350	μA	10
Charge Pump Start-up Time	TVG	C1 = C2 = 0.01μF, CVG = 0.1μF		0.5	1.0	ms	11
[Output Part]							
Turn-ON Time	TPLH			0.9	2.0	μs	12
Turn-OFF Time	TPHL			0.3	2.0	μs	12
[TOUT]							
Turn-ON Time	TOUT	C = 500pF		5.0	20	μs	12
Turn-OFF Time	TOFF	C = 500pF		5.0	20	μs	12

* It is a design target value and measurement is not carried out.

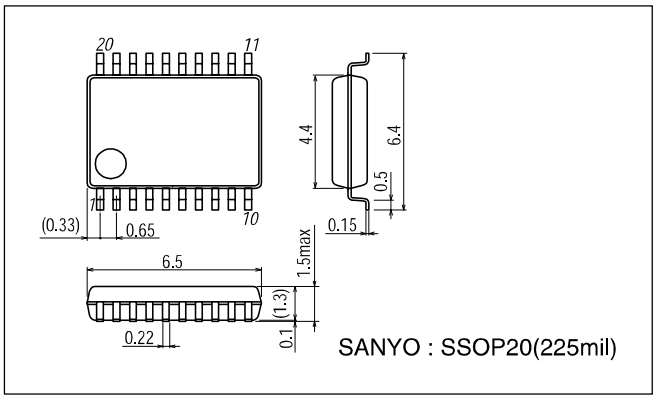
Remarks

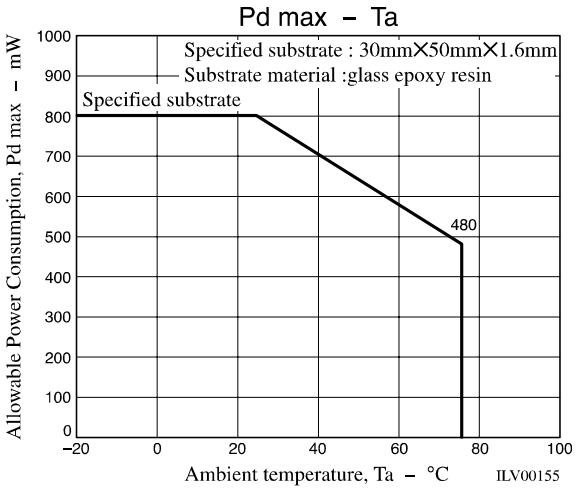
1. It shows current dissipation of VM pin in output OFF state.
2. It shows current dissipation of V_{CC} pin in stand-by state.
   (The standard current depends on EN pin pull-down resistance.)
3. It shows current dissipation of V_{CC} pin in state of EN = 5V (stand-by), including current dissipation of VG pin.
4. For IN1 and IN2 pins, no pull-down and pull-up resistance is needed. (High impedance pin)
5. It shows sum of upper and lower saturation voltages of OUT pin.
6. It controls charge-pump oscillation and makes specified voltage.
7. When low voltage is detected, the lower output is turned OFF.
8. When thermal protection circuit is activated, the lower output is turned OFF.
   When the heat temperature is fallen, it is turned ON again.
9. IG (VG pin load current) = 500μF
10. It shows VG pin current dissipation in state of PWM input for IN pin.
11. It specifies start-up time from 10% to 90% when VG is in non-load state
    (when setting the capacitor between VG and GND to 0.1μF and V_{CC} is 5V).
12. It specifies 10% to 90% for start-up and 90% to 10% for shut-down.

Package Dimensions

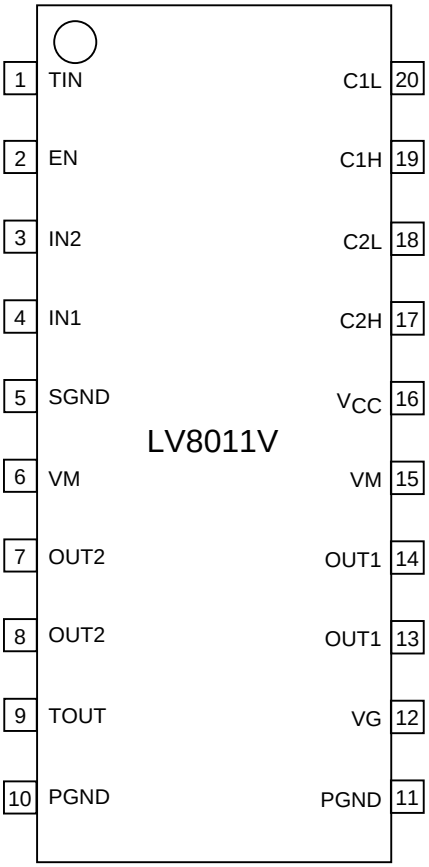
unit : mm

3179B



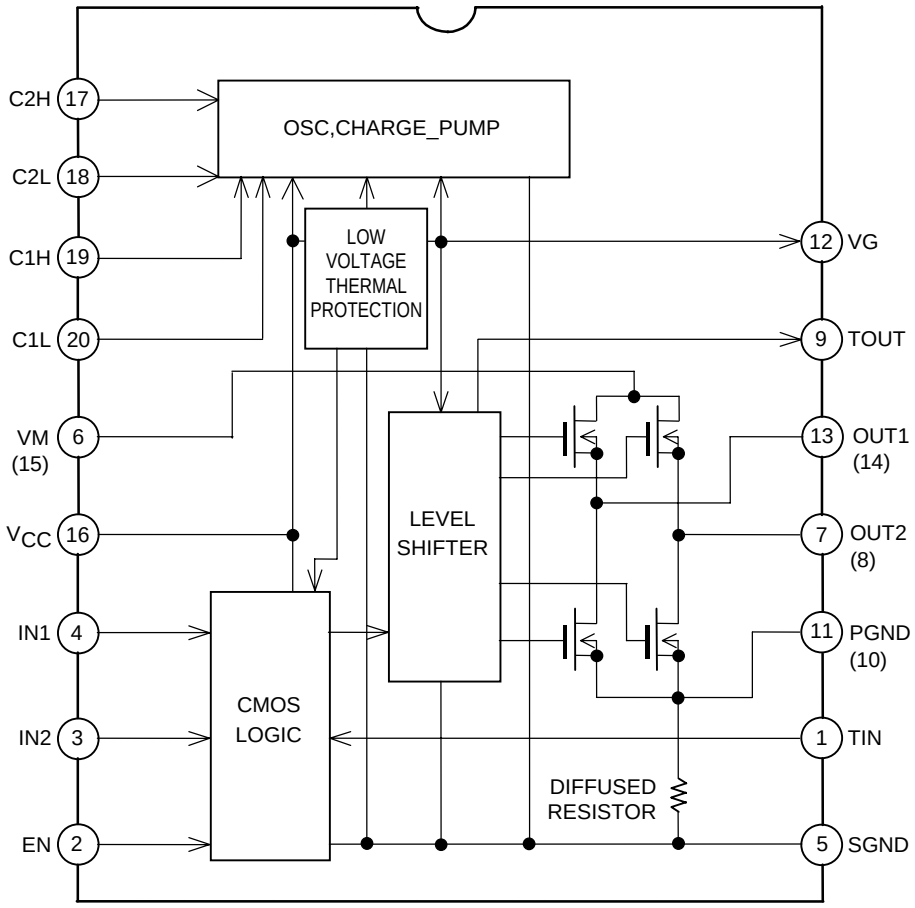


Pin Assignment



Top view

Block Diagram



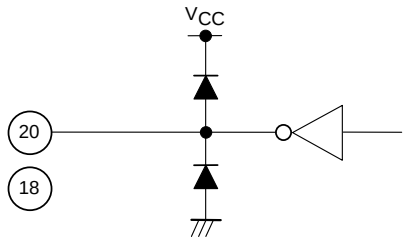
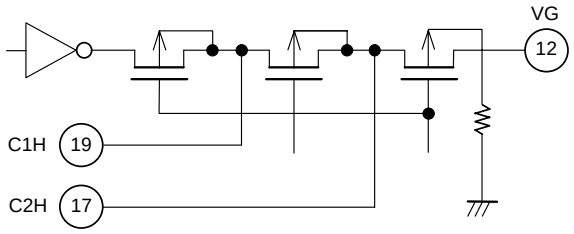
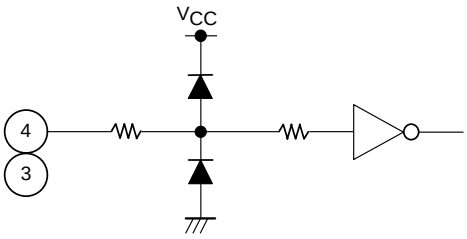
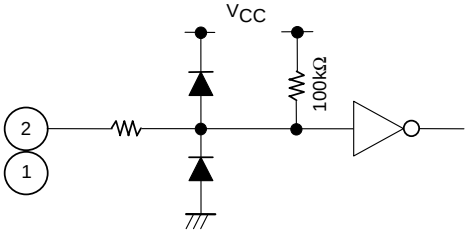
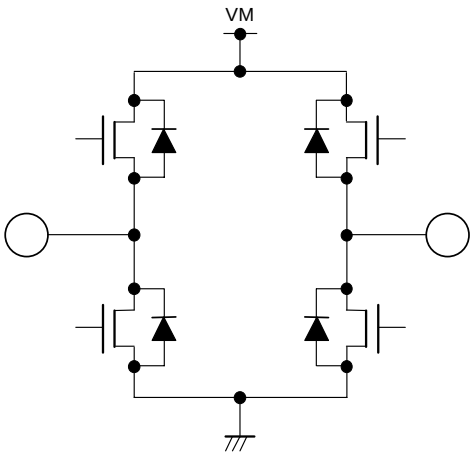
True Value Table

Z : High-Impedance - : Don't care

EN	IN1	IN2	TIN	OUT1	OUT2	TOUT	Mode
H	H	H	-	L	L	-	Brake
H	H	L	-	H	L	-	Forward evolution
H	L	H	-	L	H	-	Reverse rotation
H	L	L	-	Z	Z	-	Stand by
L	-	-	-	L	L	L	Stdby
H	-	-	H	-	-	L	TR-OFF
H	-	-	L	-	-	H	TR-ON

* For reduced voltage and thermal protection, the lower output is turned OFF and the motor drive stops.

Pin Description

Pin no.	Pin name	Equivalent Circuit	Pin Explanation
20 18	C1L C2L		Step-up Capacitor Connection Pin
19 17	C1H C2H		Step-up Capacitor Connection Pin
4 3	IN1 IN2		Driver Output Switch
2 1	EN TIN		Logic Enable Pin TOUT Output Control Pin (Built-in Pull-up Resistance)
13 14 7 8	OUT1 OUT2		Driver Output Pin (Both 2 pins are Connected.)

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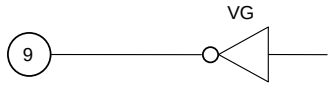
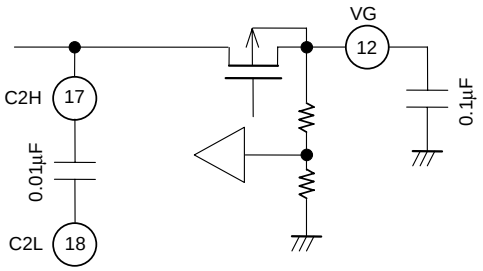
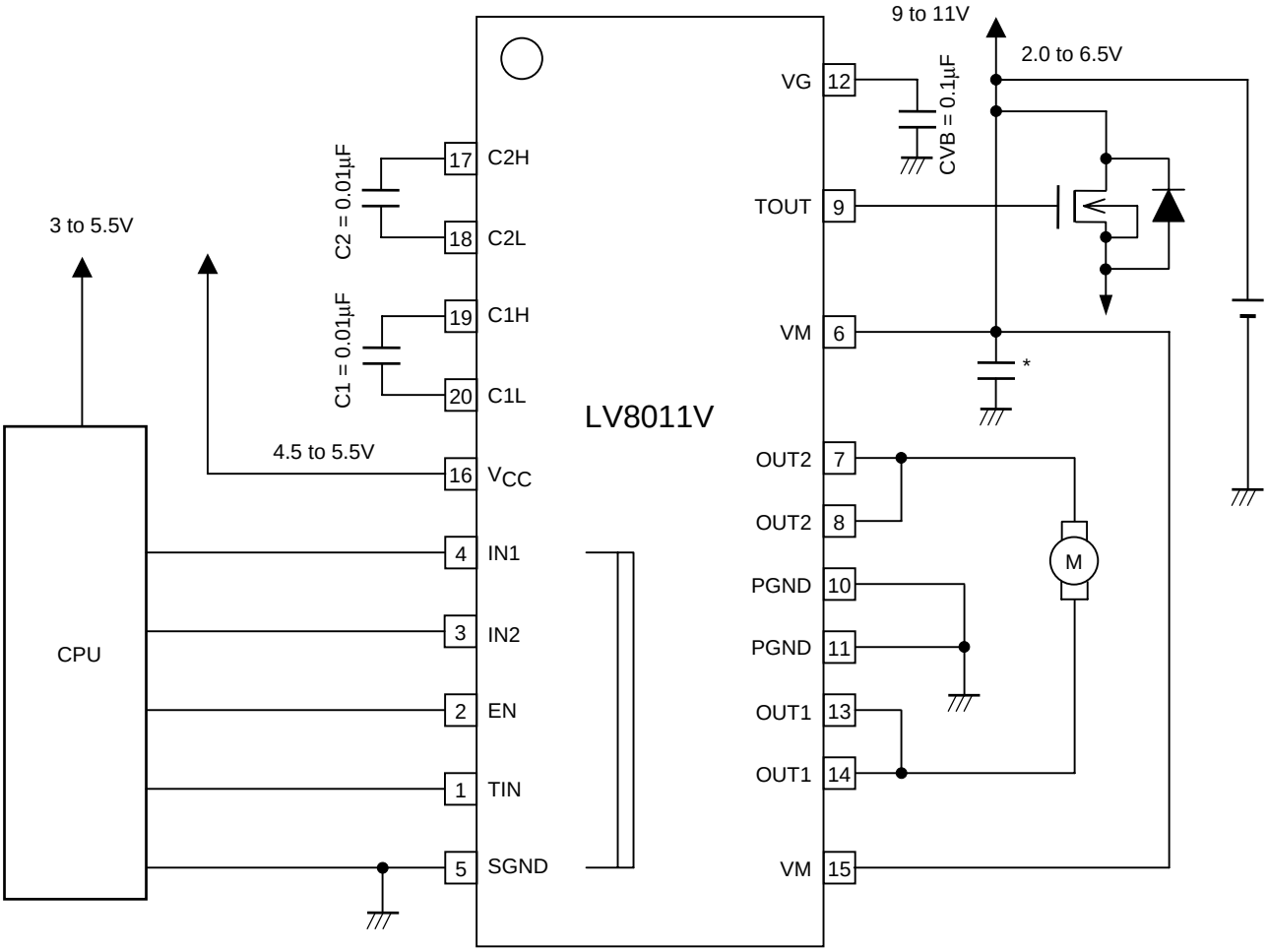
Pin no.	Pin name	Equivalent Circuit	Pin Explanation
9	TOUT		Step-up Voltage Output Pin
6 15	VM		Driver Power Source (Both 2 pins are Connected.)
16	V_{CC}		Logic Power Source
12	VG		Driving Circuit Unit Power Source for Driver
5	SGND		Logic GND
10 11	PGND		Driver GND (Both 2 pins are Connected.)

Application Circuit Diagram



* Place it as close as possible to VM and PGND pins of IC.

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