Ordering number : ENA1340B

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

LV8405V — Bi-CMOS IC 2ch Forward/Reverse Motor Driver

Overview

LV8405T is a 2ch 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 (0.75Ω 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.

Functions

- 2ch forward/reverse motor driver.
- Low power consumption.
- Low-temperature resistance 0.75Ω.
- Built-in low voltage reset and thermal shutdown circuit.
- Four mode function forward/reverse, brake, stop.
- Built-in charge pump.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage (for load)	VM max		-0.5 to 16.0	V
Power supply voltage (for control)	V_{CC} max		-0.5 to 6.0	V
Output current	I_O max		1.4	A
Output peak current	I_O peak	t ≤ 10ms	2.5	A
Input voltage	V_{IN} max		-0.5 to V_{CC}+0.5	V
Allowable power dissipation	Pd max	Mounted on a specified board*	800	mW
Operating temperature	Topr		-20 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

* Specified board : 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

Allowable Operating Conditions at Ta = 25°C, SGND = PGND = 0V

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage (VM pin)	VM		1.5 to 15.0	V
Power supply voltage (V_{CC} pin)	V_{CC}		2.8 to 5.5	V
Input signal voltage	V_{IN}		0 to V_{CC}	V
Input signal frequency	f max		200	kHz

Electrical Characteristics Ta = 25°C, V_{CC} = 3.0V, VM = 6.0V, SGND = PGND = 0V, unless otherwise specified.

Parameter		Symbol	Conditions	Remarks	Ratings			Unit
					min	typ	max	
Standby load current drain		IMO	V_{CC} = 0V, VM = 6V	1			1.0	μA
Operating control current drain		IC1	When V_{CC} is applied, with no load	2		0.85	1.2	mA
High-level input voltage		V_{IH}	2.7 ≤ V_{CC} ≤ 5.5V		0.6×V_{CC}		V_{CC}	V
Low-level input voltage		V_{IL}	2.7 ≤ V_{CC} ≤ 5.5V		0		0.2×V_{CC}	V
High-level input current (IN1, IN2, IN3, IN4)		I_{IH}	IN1, IN2, IN3, IN4 = 3V	3		15	25	μA
Low-level input current (IN1, IN2, IN3, IN4)		I_{IL}	IN1, IN2, IN3, IN4 = 0V	3	-1.0			μA
Pull-down resistance value (IN1-4)		RPD1			100	200	400	kΩ
Charge pump voltage		VG	V_{CC} + VM		8.5	9.0	9.5	V
Output ON resistance 1		RON1	Sum of top and bottom sides ON resistance.	4		0.75	1.2	Ω
Output ON resistance 2		RON2	Sum of top and bottom sides ON resistance. V_{CC} = 2.8V	4		1.0	1.5	Ω
Low-voltage detection voltage		VCS	V_{CC} pin voltage is monitored	5	2.15	2.30	2.45	V
Thermal shutdown temperature		Tth	Design guarantee value *	6	150	180	210	°C
Output block	Turn-on time	TPLH		7		0.2	0.4	μS
	Turn-off time	TPHL		7		0.2	0.4	μS

* : Design guarantee value and no measurement is preformed.

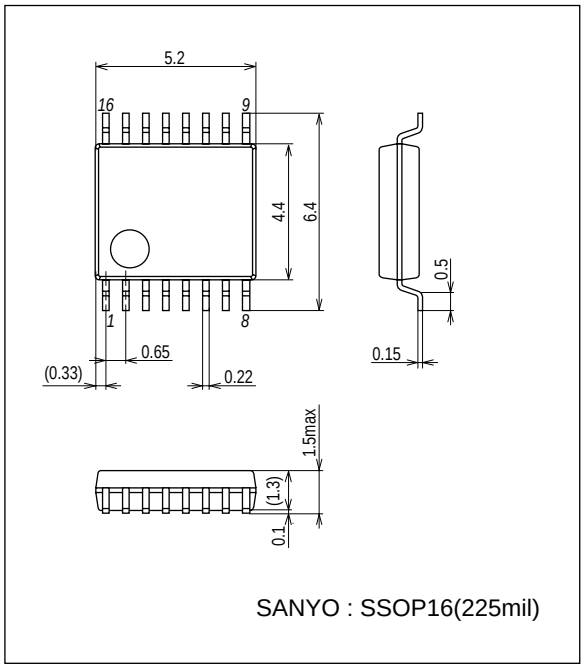
Remarks

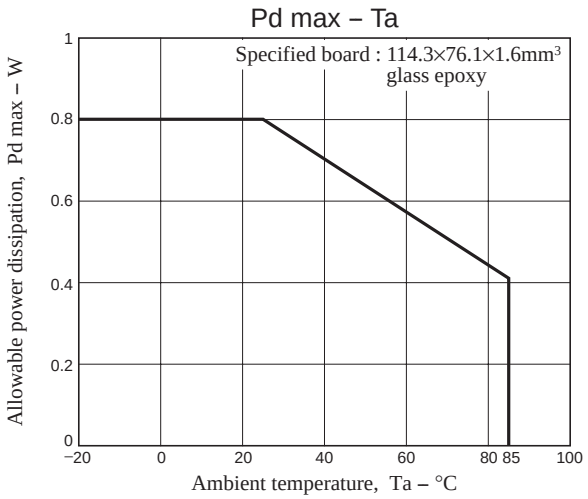
1. Current consumption when output at the VM pin is off.
2. Current consumption at the V_{CC} pin when V_{CC} is 3V and IN1 to IN4 are all 0V (standby mode).
3. Pins IN 1, 2, 3, and 4 are all pulled down.
4. Sum of upper and lower saturation voltages of OUT pin divided by the current.
5. All power transistors are turned off if a low V_{CC} condition is detected.
6. All output transistors are turned off if the thermal protection circuit is activated. They are turned on again as the temperature goes down.
7. Rising time from 10 to 90% and falling time from 90 to 10% are specified.

Package Dimensions

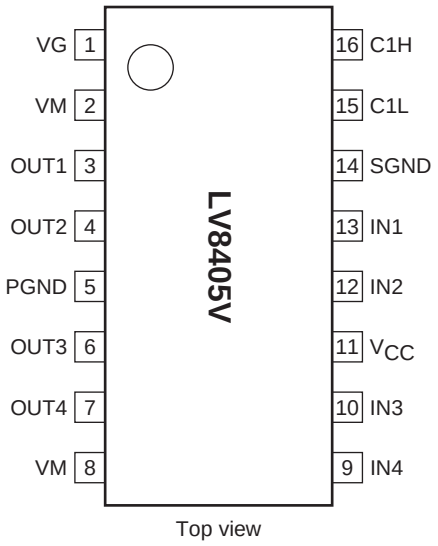
unit : mm (typ)

3178B

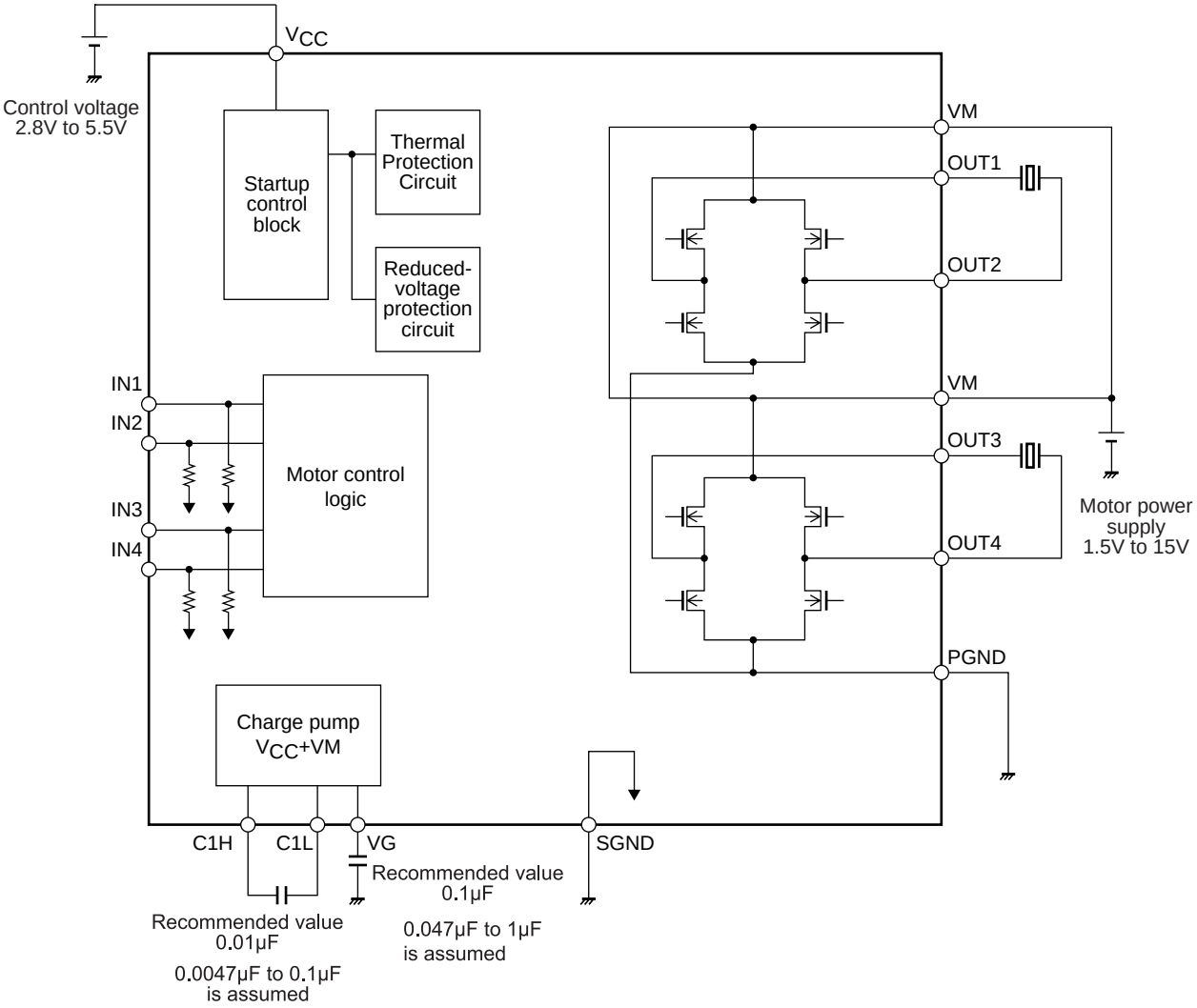




Pin Assignment



Block Diagram



* Connect a kickback absorption capacitor as near as possible to the IC. Coil kickback may cause increase in VM line voltage, and a voltage exceeding the maximum rating may be applied momentarily to the IC, which results in deterioration or damage of the IC

Truth Table

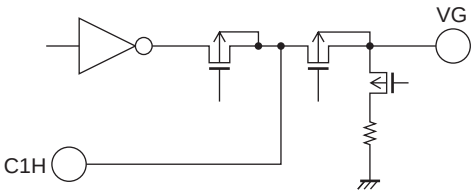
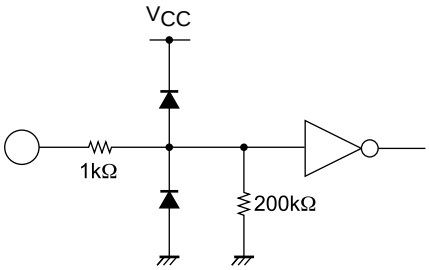
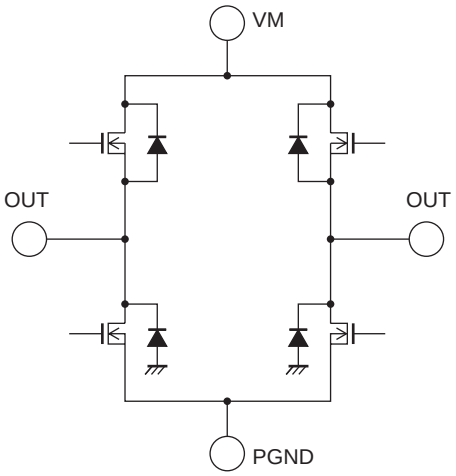
IN1 (IN3)	IN2 (IN4)	OUT1 (OUT3)	OUT2 (OUT4)	Charge pump	Mode
H	H	Z	Z	ON	Standby
H	L	L	H		Reverse
L	H	H	L		Forward
L	L	L	L		Brake

- : denotes a don't care value. Z : High-impedance

- The charge pump is always activated as long as V_{CC} is applied.

* All power transistors turn off and the motor stops driving when the IC is detected in low voltage or thermal protection mode.

Pin Functions

Pin No.	Pin name	Description	Equivalent circuit
16 1	C1H VG	Step-up capacitor connection pin.	
13 12 10 9	IN1 IN2 IN3 IN4	Driver output switching. (Pull-down resistor incorporated)	
3 4 6 7	OUT1 OUT2 OUT3 OUT4	Driver output.	
2 8	VM	Motor block power supply.	
11	V_{CC}	Logic block power supply.	
14	SGND	Control block ground.	
5	PGND	Driver block ground.	

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