

SANYO Semiconductors DATA SHEET

An ON Semiconductor Company

LV8402GP — 2ch Forward/Reverse Motor Driver

Overview

LV8402GP 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 $(0.75\Omega \text{ typ})$ 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 ON resistance 0.75Ω .

- Built-in low voltage reset and thermal shutdown circuit.
- 4 mode function forward/reverse, brake and standby.
- Built-in charge pump.
- Built-in EXTRA mode for PWM port reduction when a motor drives by two phase excitation.

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	Α
Output peak current	I _O peak	t ≤ 10ms	2.5	Α
Input voltage	V _{IN} max		-0.5 to V _{CC} +0.5	V
Allowable power dissipation	Pd max	Mounted on a specified board*	1050	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

^{*} Specified board: 40.0mm \times 50.0mm \times 0.8mm, 4 Layer glass epoxy board.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

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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)	VCC		2.8 to 5.5	V
Input signal voltage	V _{IN}		0 to V _{CC}	V
Input signal frequency	f max		200	kHz

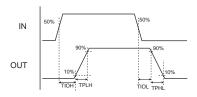
Electrical Characteristics Ta = 25°C, V_{CC} = 3.0V, VM = 6.0V, SGND = PGND = 0V, unless otherwise specified.

Parameter		O. make a l	0 ""		Ratings			
		Symbol	Conditions	Remarks	min	typ	max	Unit
Standby load current drain		IMO	EN1=EN2=0V, EXTRA=3V	1			1.0	μА
Standby control current drain		ICO	EN1=EN2=IN1=IN2=IN3=IN4=0V	2			1.0	μА
Operating contr	rol current drain	IC1	EN=3V, with no load	3		0.85	1.2	mA
High-level input	t voltage	V _{IH}	$2.7 \le V_{CC} \le 5.5V$		0.6×V _{CC}		Vcc	V
Low-level input	voltage	V _{IL}	2.7 ≤ V _{CC} ≤ 5.5V		0		0.2×V _{CC}	V
High-level input	t current , IN4 , EN1, EN2)	lін	V _{IN} = 3V	4		15	25	μА
Low-level input (IN1, IN2, IN3,	current IN4 , EN1, EN2)	I _{IL}	V _{IN} = 0V	4	-1.0			μА
Pull-down resis	tance value	RDN	IN1, IN2, IN3 , IN4 , EN1, EN2	4	100	200	400	kΩ
High-level input current 2 (IN1, IN2, IN3, IN4, EN1, EN2)		I _{IH} 2	V _{IN} = 3V	5			1.0	μА
Low-level input current 2 (IN1, IN2, IN3, IN4, EN1, EN2)		I _{IL} 2	V _{IN} = 0V	5	-25	-15		μА
Pull-up resistance value		RUP	EXTRA	5	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.	6		0.75	1.2	Ω
Output ON resistance 2		RON2	Sum of top and bottom sides ON resistance. V _{CC} = 2.8V	6		1.0	1.5	Ω
Low-voltage detection voltage		VCS	V _{CC} pin voltage is monitored	7	2.15	2.30	2.45	V
Thermal shutdown temperature		Tth	Design guarantee value *	8	150	180	210	°C
Output block	Turn-on time	TPLH	When no load. Design guarantee value *	9		0.3	0.5	μS
			When no load.	10		100	200	nS
	Turn-off time	TPHL	When no load. Design guarantee value *	9		0.35	0.6	μS
			When no load.	10		100	200	nS

^{*:} Design guarantee value and no measurement is preformed.

Remarks

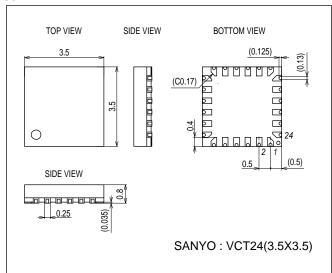
- 1. Current consumption when output at the VM pin is off.
- 2. Current consumption at the $\ensuremath{V_{CC}}$ for standby mode.
- 3. EN1=3V (IC starts) shows the current consumption of the V_{CC} pin.
- 4. Pins IN 1, 2, 3, 4, EN1, and EN2 are all pulled down according to resistance.
- 5. EXTRA pin is pulled up according to resistance.
- 6. Sum of upper and lower saturation voltages of OUT pin divided by the current.
- 7. All power transistors are turned off if a low V_{CC} condition is detected.
- 8. All output transistors are turned off if the thermal protection circuit is activated. They are turned on again as the temperature goes down.
- 9. Rising time from 10 to 90% and falling time from 90 to 10% are specified.
- 10. The change of the voltage of the input pin provides for time until the voltage of the terminal OUT changes by 10% at the time of 50% of V_{CC}.

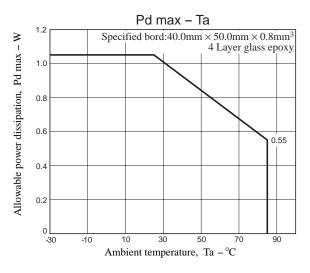


Package Dimensions

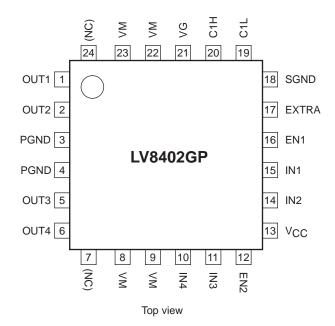
unit: mm (typ)

3322A

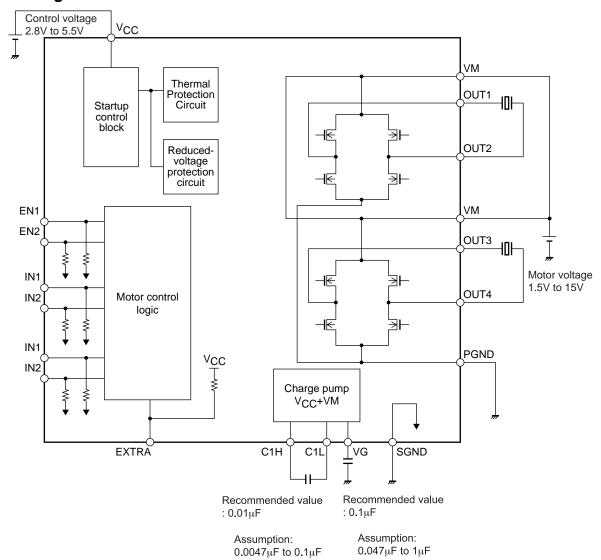




Pin Assignment



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

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EXTRA	EN1 (EN2)	IN1 (IN3)	IN2 (IN4)	OUT1 (OUT3)	OUT2 (OUT4)	Charge pump	Mode
Н	Н	Н	Н	Z	Z	ON	Stand-by
		Н	L	L	Н		Reverse
		L	Н	Н	L		Forward
		L	L	L	L		Brake
	L	-	-	L	L	OFF	Stand-by
L	Н	Н	-	L	Н	ON	Reverse
		L	-	Н	L		Forward
	L	-	-	L	L		Brake

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

- In the standby mode, current consumption vanishes.
- * All power transistors turn off and the motor stops driving when the IC is detected in low voltage or thermal protection mode.

LV8402GP

Pin Functions

Pin Fun	CHOIIS		
Pin No.	Pin name	Description	Equivalent circuit
20 21	C1H VG	Step-up capacitor connection pin.	C1H VG
17	EXTRA	Extra logic pin. (Logic switch for PWM)	EXTRA \$ 200kΩ
16 12 15 14 11	EN1 EN2 IN1 IN2 IN3 IN4	Driver output switching. Logic enable pin. (Pull-down resistor incorporated)	VCC ▼ ▼ 200kΩ
1 2 5 6	OUT1 OUT2 OUT3 OUT4	Driver output.	OUT OUT OUT PGND
8, 9, 22, 23	VM	Motor block power supply.	
13	Vcc	Logic block power supply.	
18	SGND	Control block ground.	
3, 4	PGND	Driver block ground.	

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