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LV8411GR

Bi-CMOS LSI For DSC, and Cell Phone Camera Modules 4-channel Single-chip Motor Driver IC

Overview

The LV8411GR is an H bridge motor driver IC and is able to control 4 modes of forward, reverse, brake, and standby. This IC housed in a miniature package is optimum for use in a stepping motor driving system for DSC or a camera module of cell phones.

Features

- Saturation drive H bridge: 4 channels
- Built-in thermal protection circuit
- Built-in low voltage malfunction prevention circuit
- Incorporates a transistor for driving photosensors

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage 1	V _M max		6.0	V
Power supply voltage 2	V _{CC} max		6.0	V
Output peak current	I _O peak	Channels 1 to 4, t ≤ 10msec, ON-duty ≤ 20%	600	mA
Output continuous current 1	I _O max1	Channels 1 to 4	400	mA
Output continuous current 2	I _O max2	PI1	30	mA
Allowable power dissipation	P _d max	Mounted on a circuit board*	1.05	W
Operating temperature	T _{opr}		-40 to +85	°C
Storage temperature	T _{stg}		-55 to +150	°C

* Specified circuit board : 40mm×50mm×0.8mm : glass epoxy four-layer 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.

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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage range 1	V_M		2.5 to 5.5	V
Power supply voltage range 2	V_{CC}		2.5 to 5.5	V
Logic input voltage range	V_{IN}		0 to $V_{CC}+0.3$	V
Input frequency	f_{IN}	IN1 to 8, INA	to 100	kHz

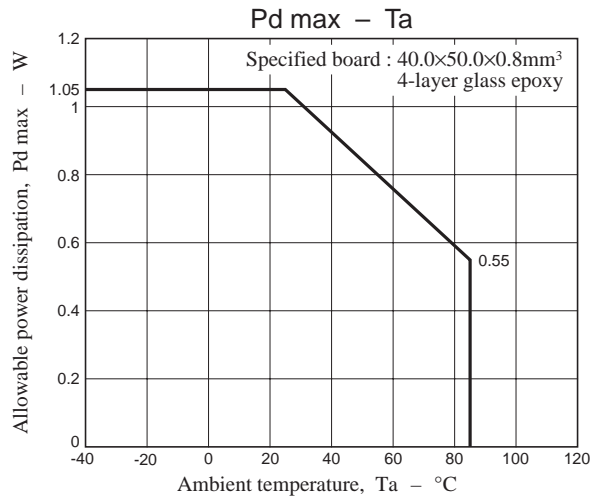
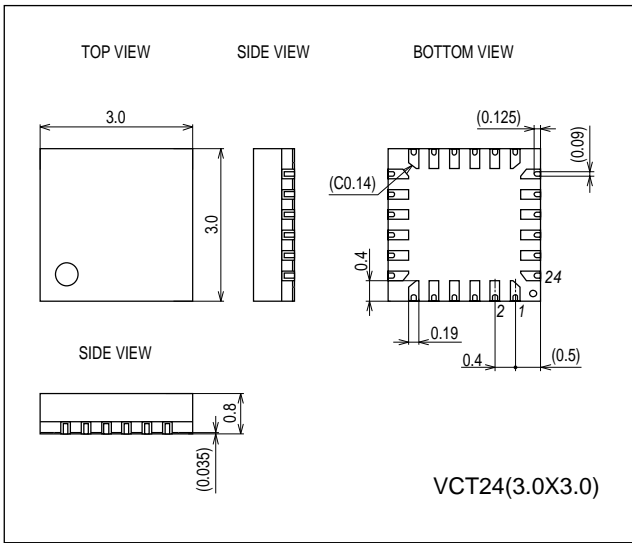
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_M = 5\text{V}$, $V_{CC} = 3.3\text{V}$, unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby mode current drain	I _{stn}	IN1 to 8 = "L"			1.0	μA
VM current drain	I _M	IN1 = "H", IM1 + IM2, with no load	50	100	200	μA
V_{CC} current drain	I _{CC}	IN1 = "H"	0.3	0.6	1.2	mA
V_{CC} low-voltage cutoff voltage	V _{th} V_{CC}		2.0	2.25	2.5	V
Low-voltage hysteresis voltage	V _{th} HIS		100	150	200	mV
Thermal shutdown temperature	TSD	Design guarantee value *	160	180	200	$^\circ\text{C}$
Thermal hysteresis width	ΔTSD	Design guarantee value *	10	30	50	$^\circ\text{C}$
OUT1 to 8						
Logic pin internal pull-down resistance	R _{in}	IN1 to 8	50	100	200	k Ω
Logic pin input current	I _{inL}	$V_{IN} = 0\text{V}$, IN1 to 8			1.0	μA
	I _{inH}	$V_{IN} = 3.3\text{V}$, IN1 to 8	16.5	33	60	μA
Logic input high-level voltage	V _{inh}	IN1 to 8	2.5			V
Logic input low-level voltage	V _{inl}	IN1 to 8			1.0	V
Output on-resistance	R _{onU}	I _O = 400mA, upper ON resistance		0.75	0.9	Ω
	R _{onD}	I _O = 400mA, lower ON resistance		0.45	0.6	Ω
Output leakage current	I _{Oleak}				1.0	μA
Diode forward voltage	V _D	I _D = -400mA	0.7	0.9	1.2	V
PI1						
Logic pin internal pull-down resistance	R _{in}	INA	50	100	200	k Ω
Logic pin input current	I _{inL}	$V_{IN} = 0\text{V}$, INA			1.0	μA
	I _{inH}	$V_{IN} = 3.3\text{V}$, INA	16.5	33	60	μA
Logic input high-level voltage	V _{inh}	INA	2.5			V
Logic input low-level voltage	V _{inl}	INA			1.0	V
Output on-resistance	R _{on}	I _O = 10mA		3.0	6.0	Ω
Output leakage current	I _{Oleak}				1.0	μA

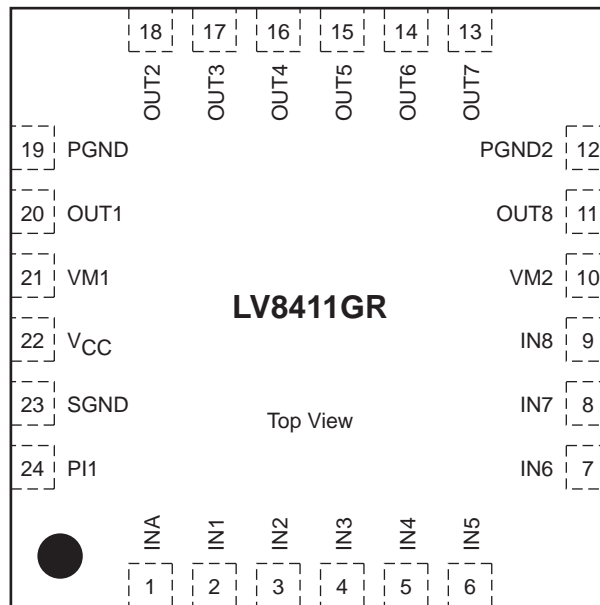
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Package Dimensions

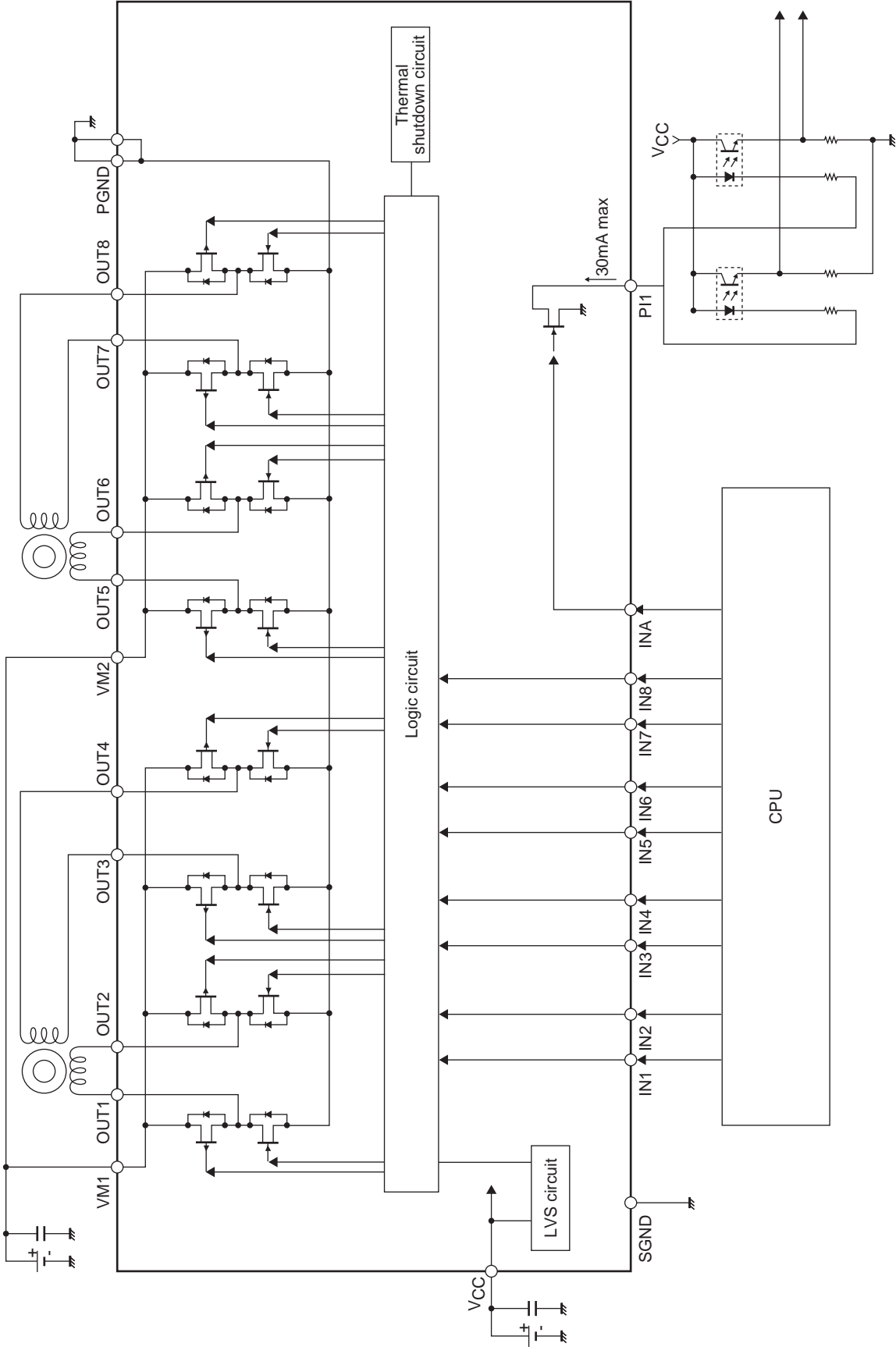
unit : mm (typ)
3366



Pin Assignment



Block Diagram



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Pin Functions

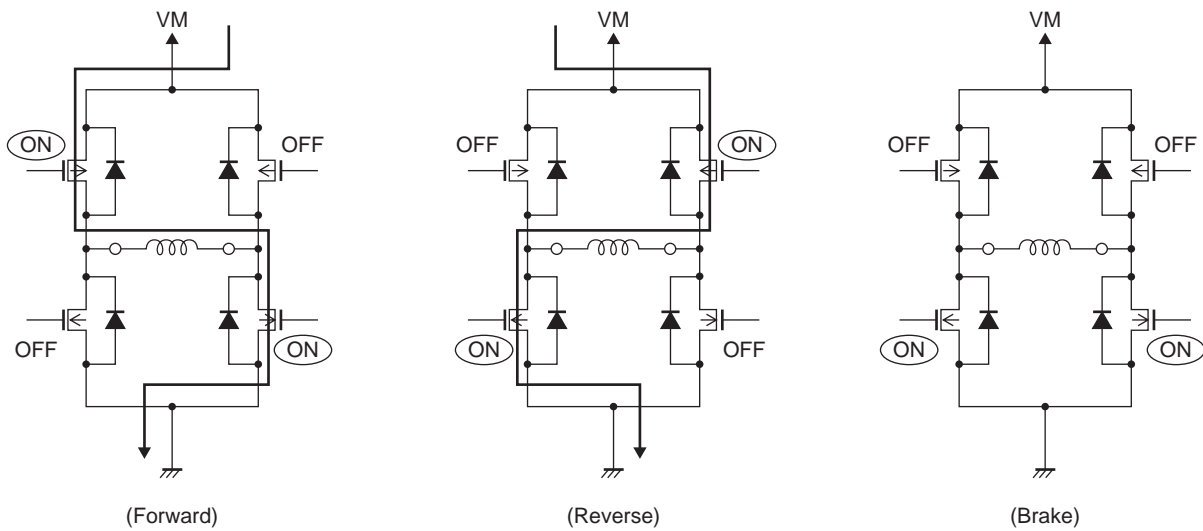
Pin No.	Pin name	Pin Function	Equivalent Circuit
1 2 3 4 5 6 7 8 9	INA IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8	Control signal input pin (Photo sensor driving transistor) Control signal input pin Control signal input pin Control signal input pin Control signal input pin Control signal input pin Control signal input pin Control signal input pin Control signal input pin	
11 13 14 15 16 17 18 20	OUT8 OUT7 OUT6 OUT5 OUT4 OUT3 OUT2 OUT1	Outpin Outpin Outpin Outpin Outpin Outpin Outpin Outpin	
24	PI1	Photo sensor driving transistor output pin	
22	VCC	Logic system power supply connection pin	
10 21	VM2 VM1	Motor power supply connection pin Motor power supply connection pin	
23	SGND	Signal ground	
12 19	PGND2 PGND1	Power ground Power ground	

Logic input specifications

- Common channels 1 to 4
 ch1 : IN1 to IN2, OUT1 to OUT2
 ch2 : IN3 to IN4, OUT3 to OUT4
 ch3 : IN5 to IN6, OUT5 to OUT6
 ch4 : IN7 to IN8, OUT7 to OUT8

Input		Output		Operation mode
IN1	IN2	OUT1	OUT2	
L	L	OFF	OFF	Standby
H	L	H	L	CW (forward)
L	H	L	H	CCW (reverse)
H	H	L	L	Brake

- Current limit control timing chart



- Photo sensor driving transistor

When thermal shutdown and V_{CC} low-voltage cut circuits are activated, OUT1 through OUT8 are turned OFF under control of the internal circuit. But the output (PI1) of photo sensor driving transistor continues operation.

Input	Photo sensor driving
INA	PI1
L	OFF
H	ON

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