



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

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

| 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, $t \leq 10\text{msec}$, ON-duty $\leq 20\%$ | 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 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -55 to +150 | $^\circ\text{C}$ |

* 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.

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LV8411GR

Recommended Operating Conditions at Ta = 25°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 |

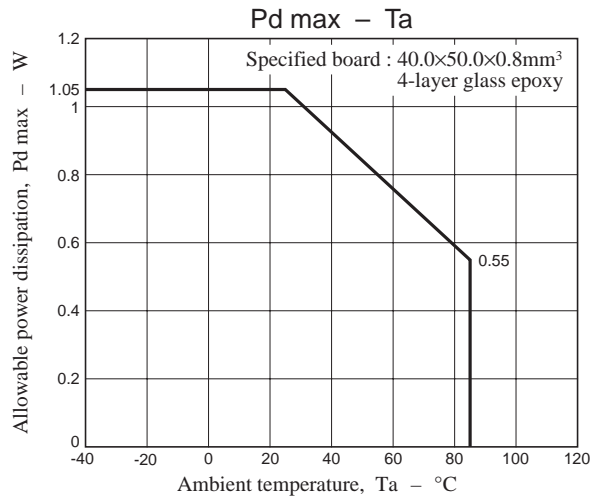
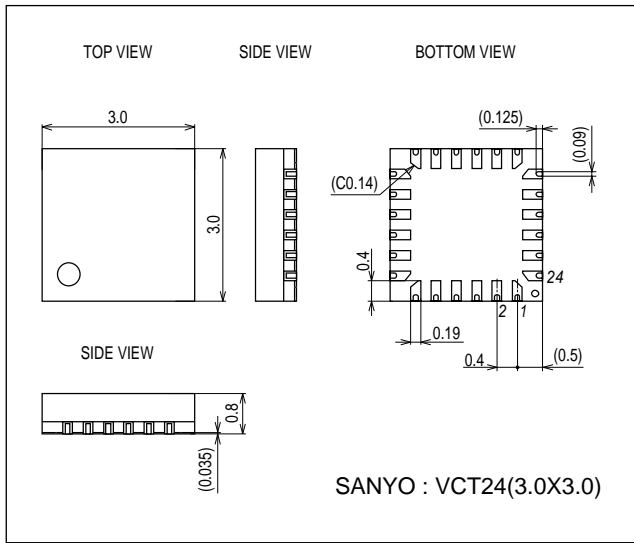
Electrical Characteristics at Ta = 25°C, V_M = 5V, V_{CC} = 3.3V, unless otherwise specified.

| 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 _{thV_{CC}} | | 2.0 | 2.25 | 2.5 | V |
| Low-voltage hysteresis voltage | V _{thHIS} | | 100 | 150 | 200 | mV |
| Thermal shutdown temperature | TSD | Design guarantee value * | 160 | 180 | 200 | °C |
| Thermal hysteresis width | ΔTSD | Design guarantee value * | 10 | 30 | 50 | °C |
| OUT1 to 8 | | | | | | |
| Logic pin internal pull-down resistance | R _{in} | IN1 to 8 | 50 | 100 | 200 | kΩ |
| Logic pin input current | I _{inL} | V _{IN} = 0V, IN1 to 8 | | | 1.0 | μA |
| | I _{inH} | V _{IN} = 3.3V, 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 | kΩ |
| Logic pin input current | I _{inL} | V _{IN} = 0V, INA | | | 1.0 | μA |
| | I _{inH} | V _{IN} = 3.3V, 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 |

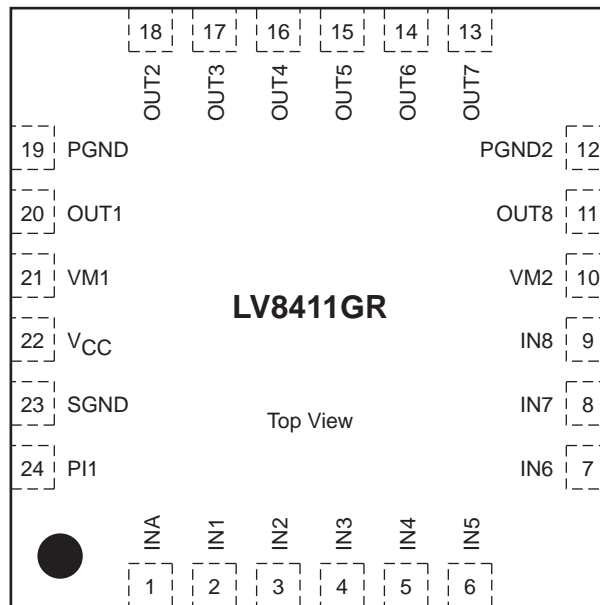
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Package Dimensions

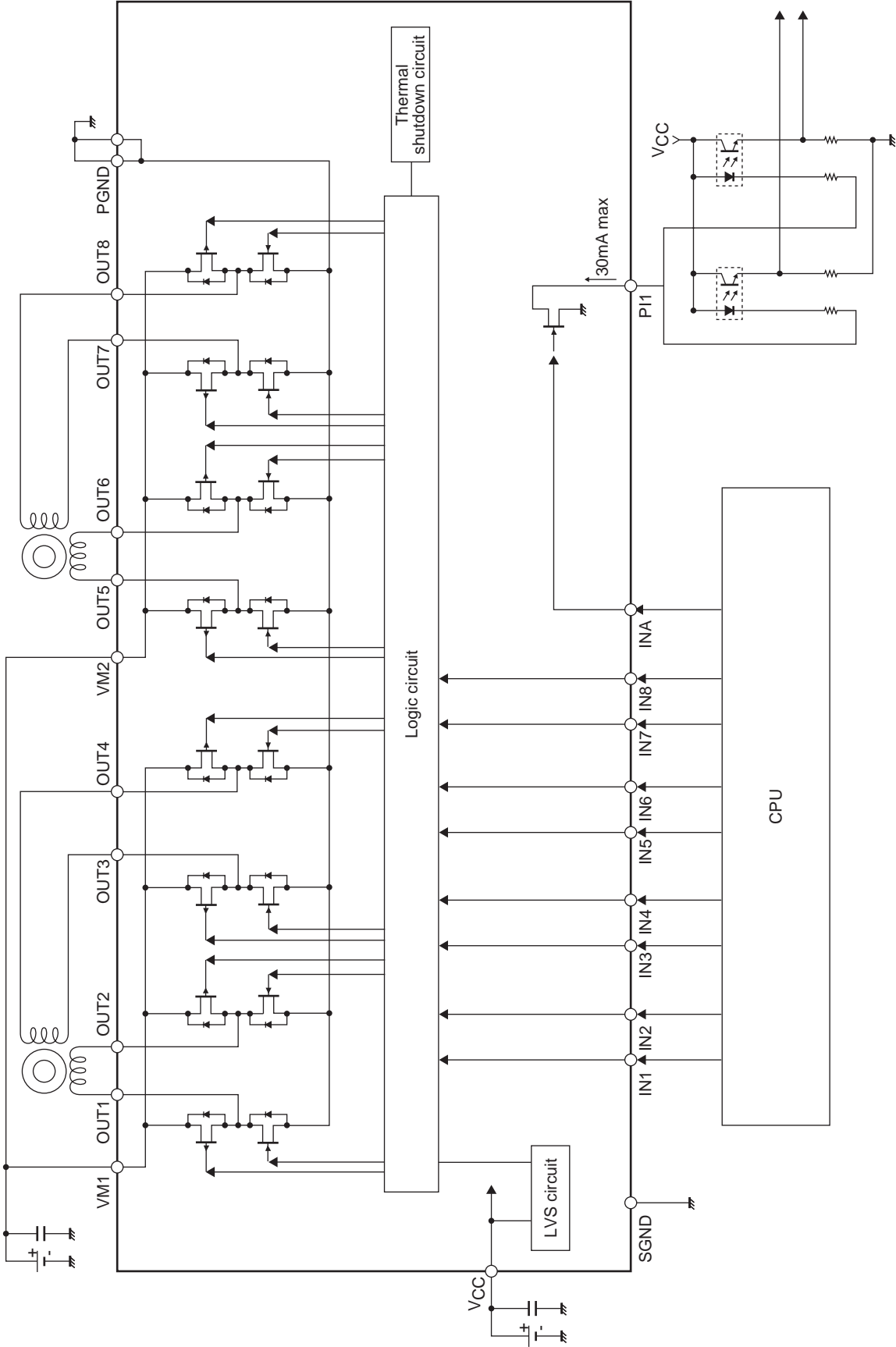
unit : mm (typ)
3366



Pin Assignment



Block Diagram



LV8411GR

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

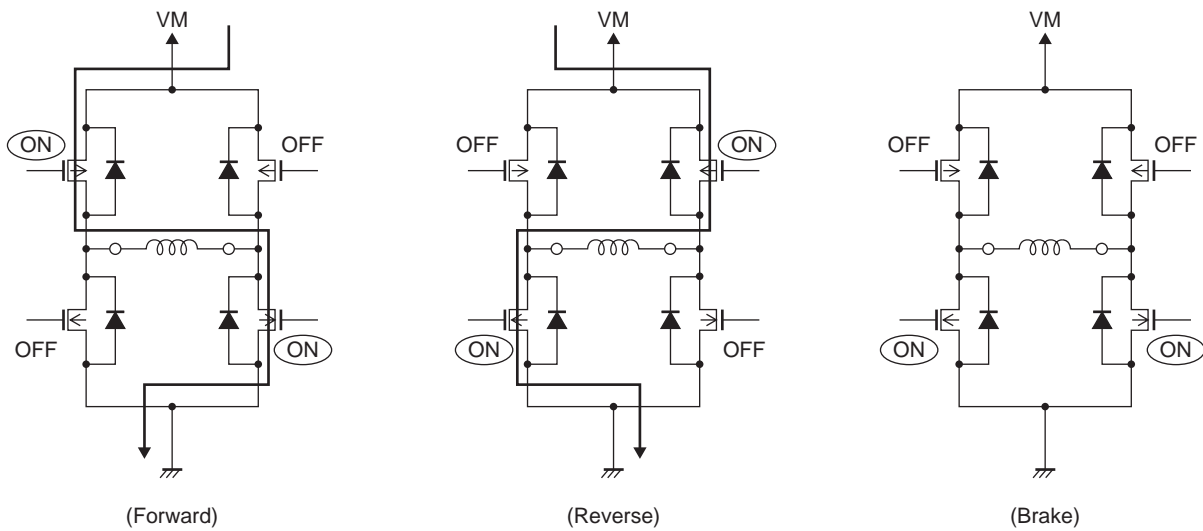
ch2 : IN3 to IN4, OUT3 to OUT4

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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