

## ◆ General Description

The GH211A is an integrated Hall sensor with output driver and frequency generation (FG) designed for electronic commutation of brush-less DC motor and DC fan applications. The device includes an on-chip Hall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a Schmitt trigger to provide switching hysteresis for noise rejection, a temperature compensation circuit to compensate the temperature drift of Hall sensitivity, two complementary open-drain drivers for sinking large load current. It also includes an internal voltage regulator which is used to provide bias voltage for internal circuits.

Place the device in a variable magnetic field, while the magnetic flux density is larger than threshold  $B_{OP}$ , OUT1 will be turned on (low) and OUT2 (and FG) will be turned off (high). This output state is held till

the magnetic flux density reversal falls below  $B_{RP}$  causing OUT1 to be turned off (high) and OUT2 (and FG) turned on (low).

GH211A is available in TO-94 (SIP-4L) package.

## ◆ Features

- On Chip Hall Effect Sensor
- 3.5~18V Power Supply Voltage
- Drivers Allow 400mA Without Overheating
- FG signal Output
- Zener Diodes Protection for Output Driver
- Embedded Over-Temperature Protection
- Precise Magnetic Switching Thresholds

## ◆ Applications

- Dual-coil Brushless DC Fan
- Dual-coil Brushless DC Motor

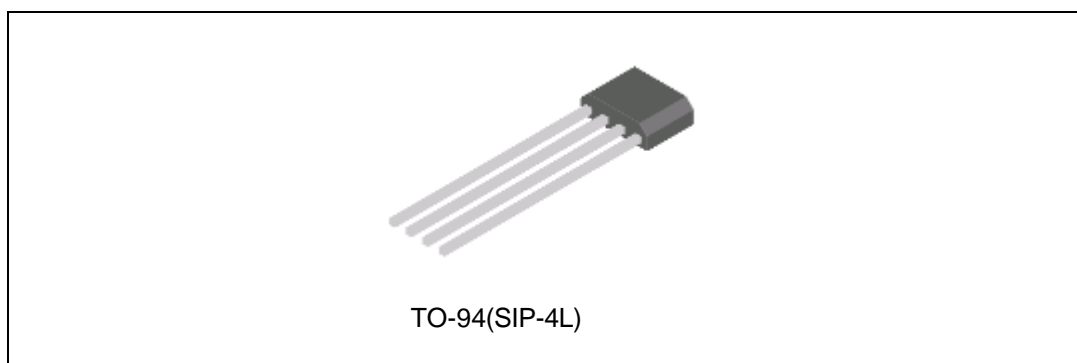


Figure 1. Package Type of GH211A

## ◆ Ordering Information

Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-94(SIP-4L)	-40 to 105 °C	GH211AHUB	GH211A	Bulk

### ◆ Pin Configuration

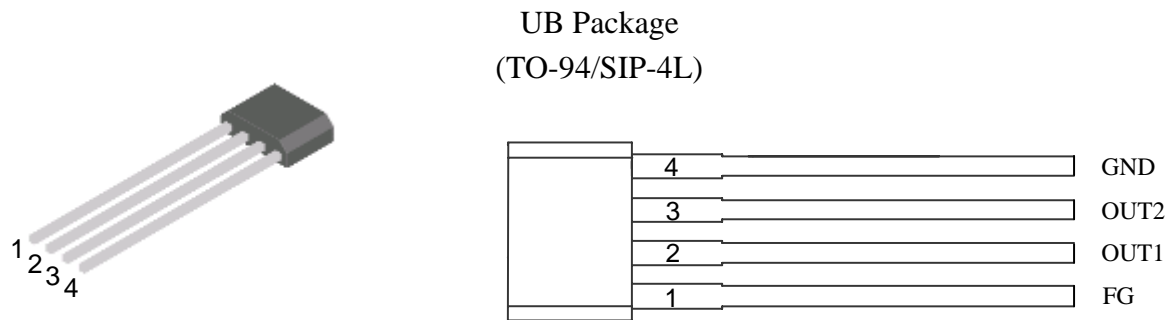


Figure 2. Pin Configuration of GH211A (Front View)

### ◆ Pin Description

Pin Number	Pin Name	Function
1	FG	FG signal Output Pin (Open-Drain)
2	OUT1	Output Pin 1 (Open-Drain)
3	OUT2	Output Pin 2 (Open-Drain)
4	GND	Ground Pin

◆ **Functional Block Diagram**

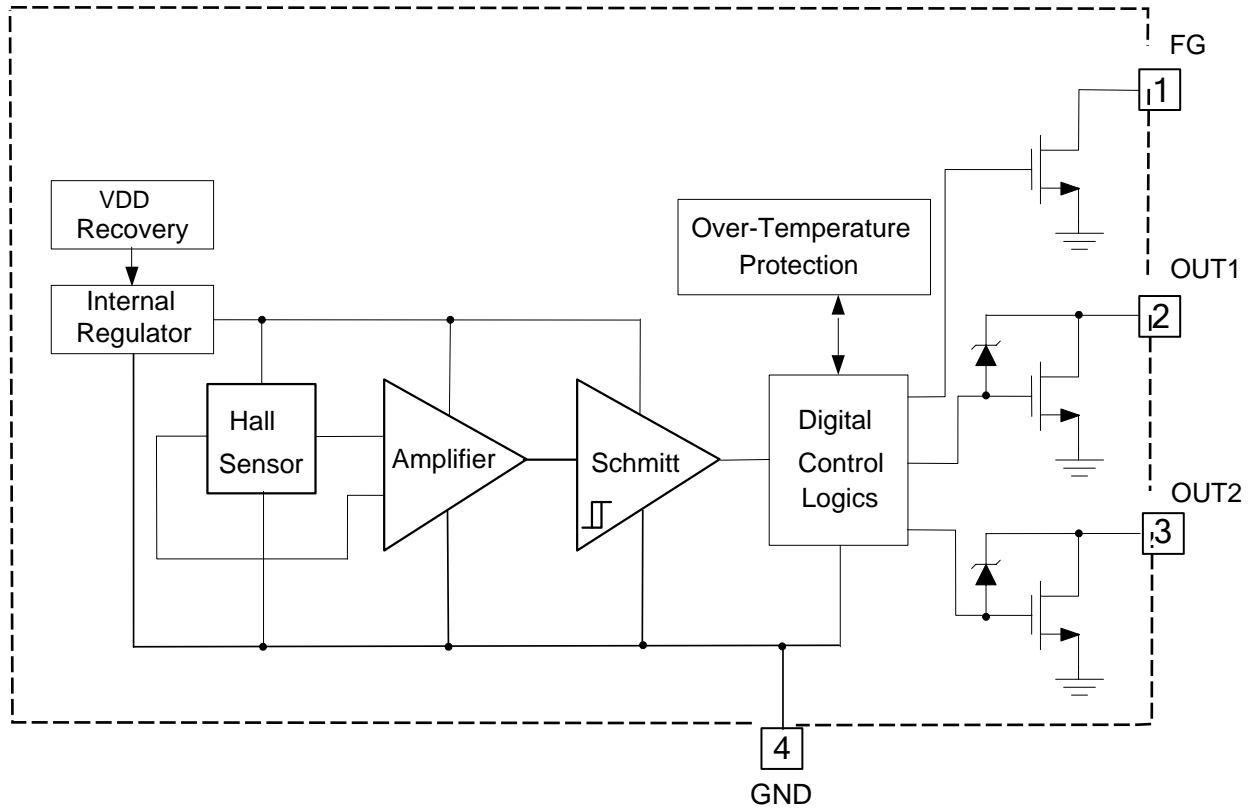


Figure 3. Functional Block Diagram of GH211A

◆ **Absolute Maximum Ratings**  $T_A = 25^\circ\text{C}$  (Note 1)

Parameter	Symbol	Condition	Value	Unit
Supply Voltage (Continuous)	$V_{DD(\text{CONT})}$		22	V
Supply Voltage (Peak)	$V_{DD(\text{PEAK})}$	$\leq 100\text{s}$	33	V
Supply current (Fault)	$I_{DD(\text{FAULT})}$		3.5	mA
Continuous current	$I_{\text{OUT}(\text{HOLD})}$		400	mA
Hold current	$I_{\text{OUT}(\text{HOLD})}$		600	mA
Peak current	$I_{\text{OUT}(\text{PEAK})}$	$\leq 200\mu\text{s}$	800	mA
FG pin sink current	$I_{\text{FG}}$		15	mA
Power dissipation	$P_D$	TO-94(SIP-4L)	550	mW
Thermal Resistance (Junction to Ambient)	$\theta_{JA}$	TO-94(SIP-4L)	227	$^\circ\text{C}/\text{W}$
Thermal Resistance (Junction to Case)	$\theta_{JC}$	TO-94(SIP-4L)	49	$^\circ\text{C}/\text{W}$
Operating Junction temperature	$T_J$		-40 to 150	$^\circ\text{C}$
Storage temperature	$T_{\text{STG}}$		-55 to 160	$^\circ\text{C}$
Output Clamp Voltage of Zener Diode	$V_Z$		33	V
Magnetic Flux Density	B		Unlimited	Gauss
IR-Reflow Lead Temperature	$T_P$	10s	260	$^\circ\text{C}$

◆ **Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	$V_{DD}$	3.5	18	V
Operation Temperature	$T_A$	-40	105	$^\circ\text{C}$

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated above “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

### ◆ Electrical Characteristics

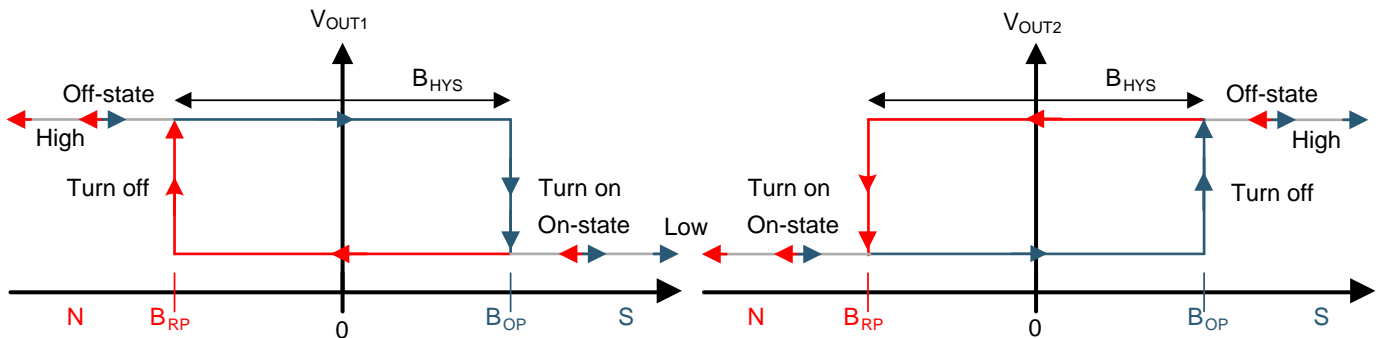
$V_{DD}=12V$ ,  $T_A=25^{\circ}C$ , unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{DD}$	Operating	(Note 2)		18	V
Supply Current	$I_{DD}$	Output open		1.3	2.5	mA
Output Current	$I_{OUT}$				400	mA
Output Leakage Current	$I_{LEAKAGE}$	$V_{OUT}=18V$		0.1	10	$\mu A$
FG Output Low Voltage	$V_{FG}$	$I_{FG}=5mA$		200	400	mV
Output Driver ON-Resistance	$R_{DSON}$	$T_A=25^{\circ}C$		1.4	1.8	Ohm
		$T_A=105^{\circ}C$		2.0	2.5	Ohm
Thermal Shutdown Threshold	$T_{SD}$		165			$^{\circ}C$

### ◆ Magnetic Characteristics

$V_{DD}=12V$ ,  $T_A=25^{\circ}C$ , unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit
Operating Point	$B_{OP}$	5	30	60	Gauss
Releasing Point	$B_{RP}$	-60	-30	-5	Gauss
Hysteresis	$B_{HYS}$		60		Gauss



Magnetic Pole (Note 3)	Conditions	OUT1	OUT2	FG
North Pole	$B_{OP} < B_{RP}$	High	Low	Low
South Pole	$B_{OP} > B_{RP}$	Low	High	High

Note 2: The minimal value of  $V_{DD}$  should be determined using the following equation:  $V_{DD} = 3.5V + R_{COIL} * I_{DD}$

Note 3: The magnetic pole is applied facing the marked side of the package.

◆ Typical Application

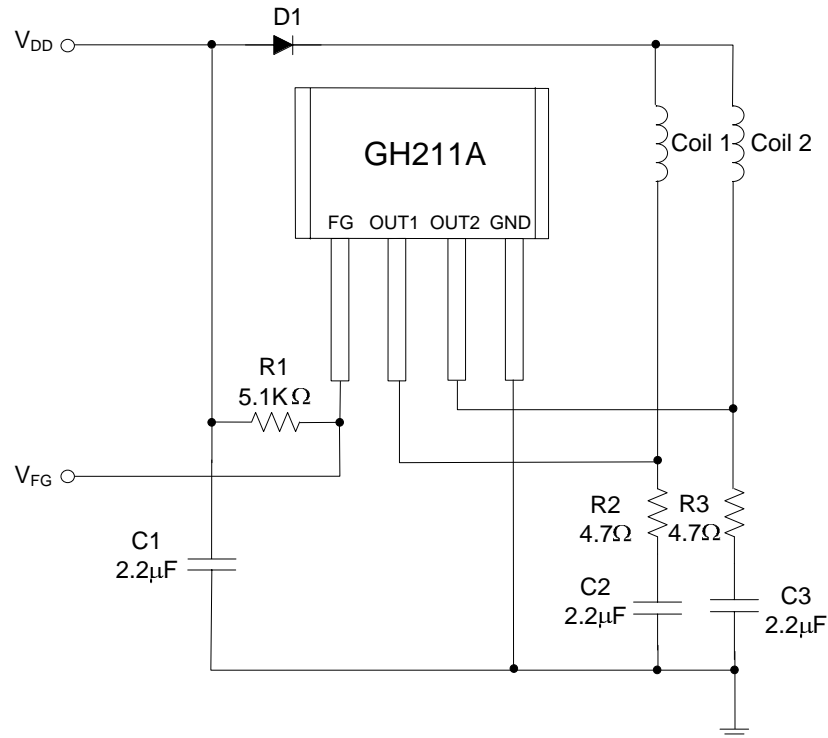


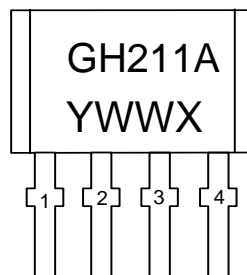
Figure6. Typical Application of GH211A

Note:

1. D1 is an ordinary diode used to filter the noise from VDD and It is optional.
2. C1=C2=C3=2.2μF typical, electrolytic capacitors are better. They should be fine tuned based on system design.
3. R1=5.1KΩ typical. It should be selected according to FG signal requirement.
4. R2=R3=4.7Ω typical. They can be cancelled according to system requirement.

◆ Marking Information

(TO-94/SIP-4L)



GH211A: Part No.  
Y: Year, 0~9, ex: "7"=2017  
WW: Nth Week, 01~52  
X: Internal Code

◆ Package Information (UB: TO-94/SIP-4L) Unit: mm

