# Description

The BDH8181 is an integrated Hall-effect latched sensor designed for electronic commutation of brushless DC motor applications.

The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifiers the Hall voltage, and a Schmitt to provide switching hysteresis for noise rejection and open -collector output.

An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

A north pole of sufficient strength will turn the output ON. In the absence of a magnetic field, the output is OFF.

This IC is available in TO-92S-3 and SOT-23-3 package.

# Features

- On-chip Hall Sensor
- Wide Operating Voltage Range: 3.5V to 24V
- Internal Bandgap Regulator for Temperature Compensation
- Maximum Output Sink Current: 25mA
- Operating Temperature: -40°C to 125°C
- ESD Rating: 3000V (Human Body Model) 300V (Machine Model)

# Application

- Brushless DC Motor

## Functional Block Diagram

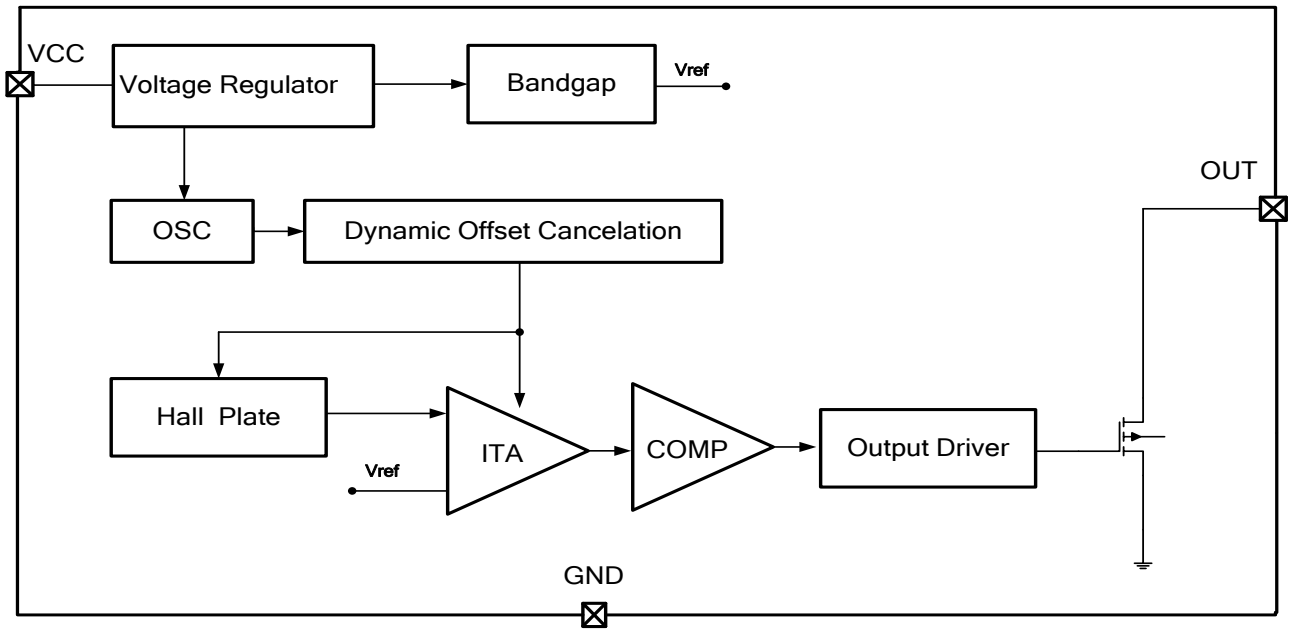



Figure1. Functional Block Diagram of BDH8181

## Test Circuit

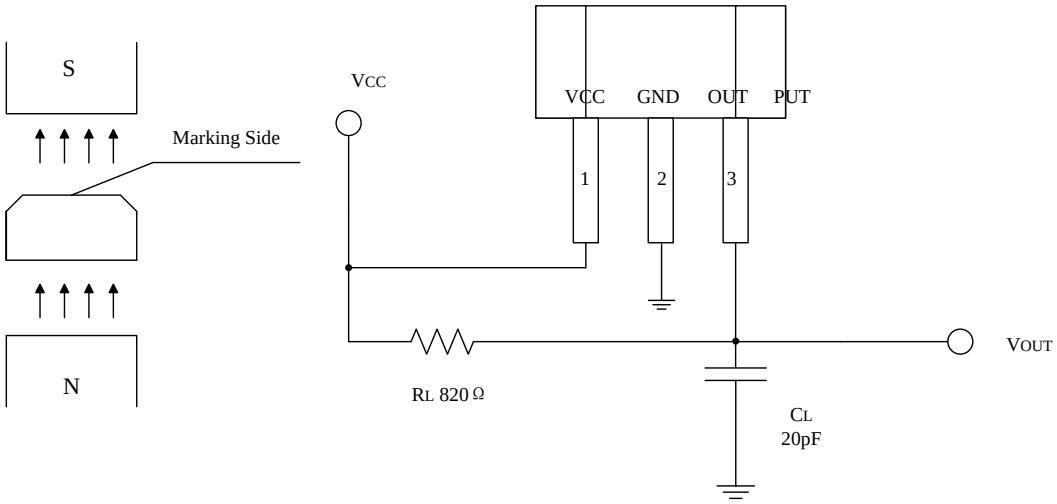



Figure 2. Basic Test Circuit of BDH8181

# Package Information

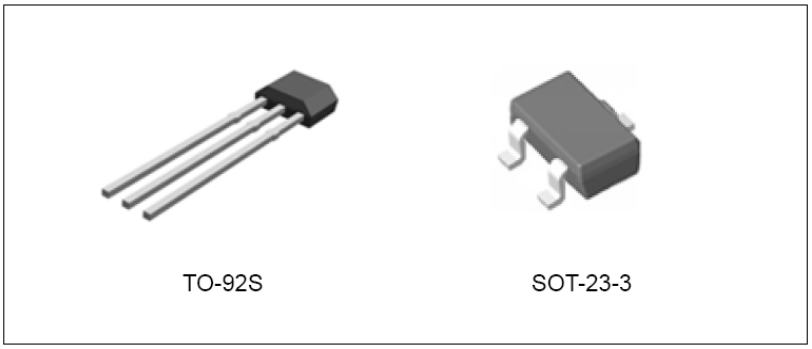
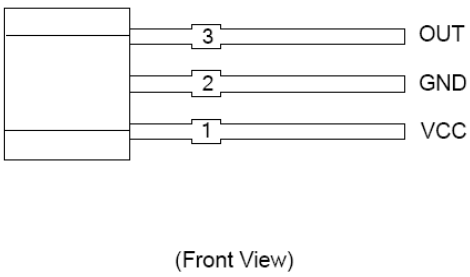



Figure 3. Package Type of BDH8181

Package (TO-92S)




Package (SOT-23-3)

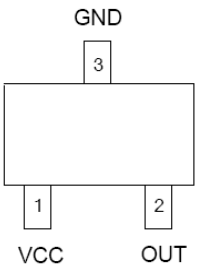



Figure4. Pin Configuration of BDH8181

## Pin Description

| Pin Number | | Name | Function |
|---|---|---|---|
| TO-92S | SOT23-3L | | |
| 1 | 1 | VCC | Supply voltage |
| 2 | 3 | GND | Ground pin |
| 3 | 2 | OUT | Output |

## Absolute Maximum Ratings (Note 1)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | -5 to 30 | V |
| Output Off Voltage | $V_{CE}$ | 30 | V |
| Output Sink Current (Continuous Current) | $I_{OUT}$ | 25 | mA |
| Power Dissipation | PD | 400 | mW |
| Storage Temperature | $T_S$ | -55 to 150 | °C |
| Junction Temperature | $T_J$ | 125 | °C |
| ESD (Machine Model) | ESD | 300 | V |
| ESD (Human Body Model) | ESD | 4000 | V |

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 under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

## Recommended Operating Conditions (TA=25°C)

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 3.5 | 24 | V |
| Operating Temperature | $T_{OP}$ | -40 | 125 | °C |

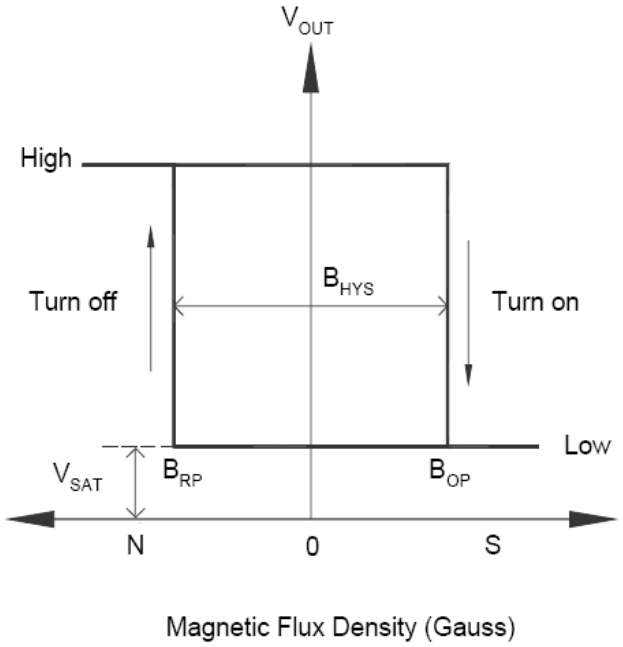
## Electrical Characteristics

VCC =12V, TA =25°C, unless otherwise specified.

| Parameter | Symbol | Conditions | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | Operating | 3.5 | | 24 | V |
| Supply Current | $I_{CC}$ | Awake | | 2.5 | 5 | mA |
| Output Leakage Current | $I_{LEAK}$ | B< \| BRP \| | | <0.1 | 10 | μA |
| Output Saturation Voltage | $V_{SAT}$ | IOUT =1.0mA | | 110 | 300 | mV |
| Rise Time | tr | Operating | | 0.2 | | μs |
| Fall Time | Tf | Operating | | 0.2 | | μs |

## Magnetic Characteristics (TA=25°C)

| Parameter | Symbol | Min | Type | Max | Unit |
|---|---|---|---|---|---|
| Operating point | $B_{OP}$ | - | 20 | 50 | Gauss |
| Releasing Point | $B_{RP}$ | -50 | -20 | - | Gauss |
| Hysteresis | $B_{HYS}$ | | 40 | | Gauss |



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| Supply Current | $I_{CC}$ | Awake | | 2.5 | 5 | mA |
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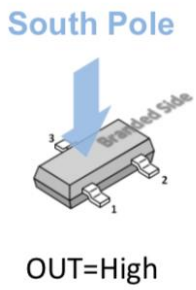
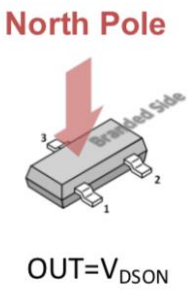
| Hysteresis | $B_{HYS}$ | | 40 | | Gauss |

## Definition of Switching Function

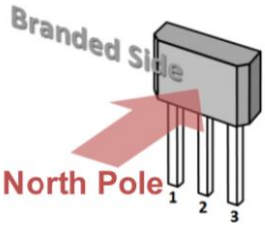



OUT=High

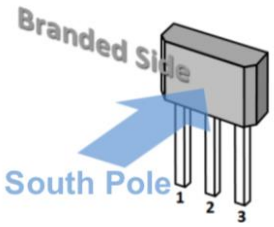



OUT=$V_{DSON}$

Switching Point of SOT-23-3




OUT=High




OUT=$V_{DSON}$

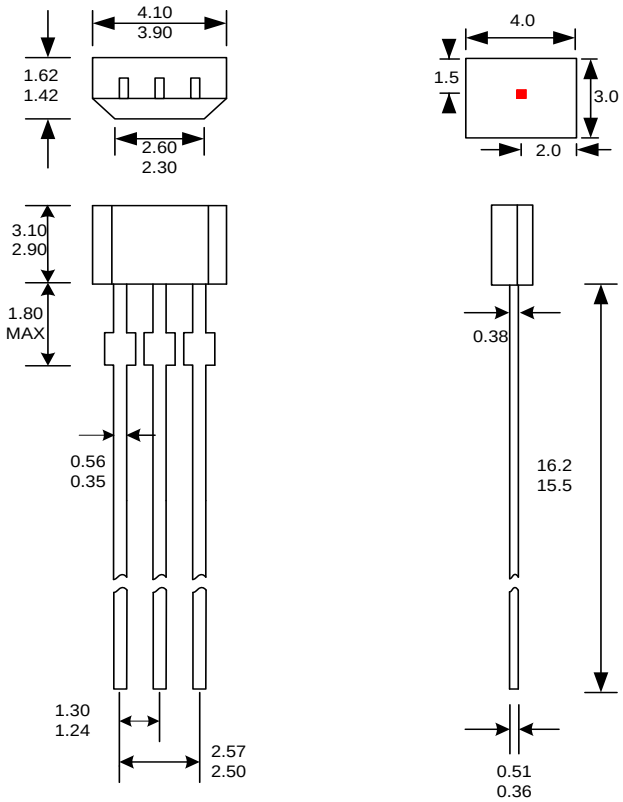
Switching Point of TO-92S

## Package Dimensions

### 1.TO-92S

3-Terminal
UA Package

Dimension:mm



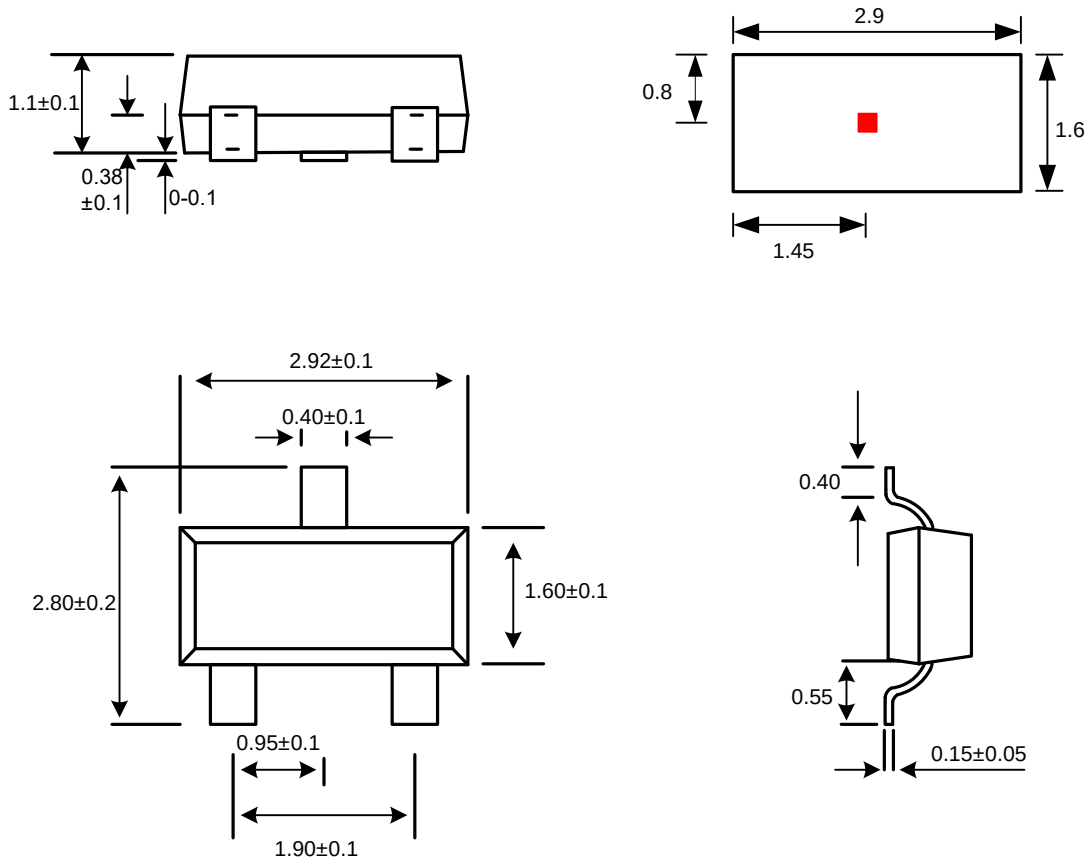

Notes:
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

## 2、SOT-23-3

3-Terminal
SO Package

Dimension:mm




Notes:
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

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