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TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

# TSH481

## Ratio-metric Linear Hall Effect Switch

**TO-92S**


**Pin Definition:**

1. $V_{CC}$
2. GND
3. Output

## Description

TSH481 is a linear Hall-effect sensor which is composed of Hall sensor, linear amplifier and Totem-Pole output stage. It features low noise output, which makes it unnecessary to use external filtering. It also can provide increased temperature stability and accuracy. The linear Hall sensor has a wide operating temperature range of -40 °C to +105 °C, appropriate for commercial, consumer, and industrial environments.

The high sensitivity of Hall-effect sensor accurately tracks extremely weak changes in magnetic flux density. The linear sourcing output voltage is set by the supply voltage and in proportion of variation of the magnetic flux density. Typical operation current is 2.5mA and operating voltage range is 3.0V to 6.5V

## Features

- Operating Voltage Range: 3.0V~6.5V
- Low-Noise Operation
- Linear output for circuit design flexibility
- Totem-Pole for a stable and accurate output
- Responds to either positive or negative magnetic flux density
- Robust ESD performance

## Ordering Information

| Part No. | Package | Packing |
|---|---|---|
| TSH481CT B0G | TO-92S | 1kpcs / Bulk Bag |

**Note:** "G" denote for Halogen Free Product

## Application

- Current sensing
- Motor control
- Position sensing
- Magnetic code reading
- Rotary encoder
- Ferrous metal detector
- Vibration sensing
- Liquid level sensing
- Weight sensing

## Absolute Maximum Ratings ($T_A$ = 25°C unless otherwise noted)

| Characteristics | Limit | Value | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 8 | V |
| Reverse voltage | $V_{CC}$ | -0.5 | V |
| Magnetic flux density | | Unlimited | G |
| Output current | $I_{OUT}$ | 10 | mA |
| Operating Temperature Range | $T_{OPR}$ | -40 to +85 | °C |
| Storage temperature range | $T_{STG}$ | -65 to +150 | °C |
| Maximum Junction Temp | $T_J$ | 150 | °C |
| Thermal Resistance - Junction to Ambient | $R\theta_{JA}$ | 206 | °C/W |
| Thermal Resistance - Junction to Case | $R\theta_{JC}$ | 148 | °C/W |
| Package Power Dissipation | $P_D$ | 606 | mW |

**Note:** Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

# TSH481
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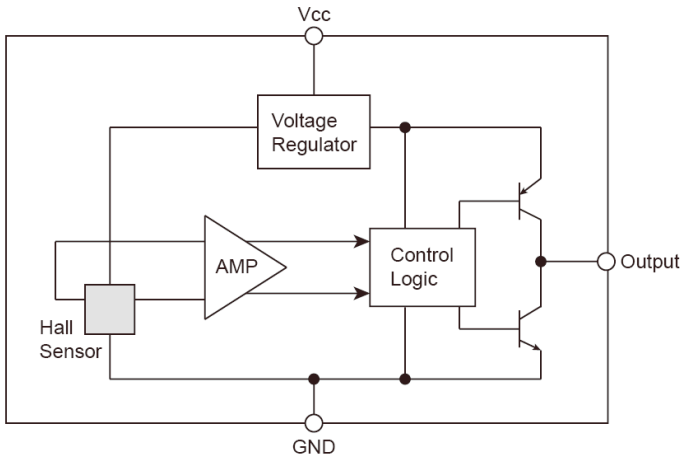
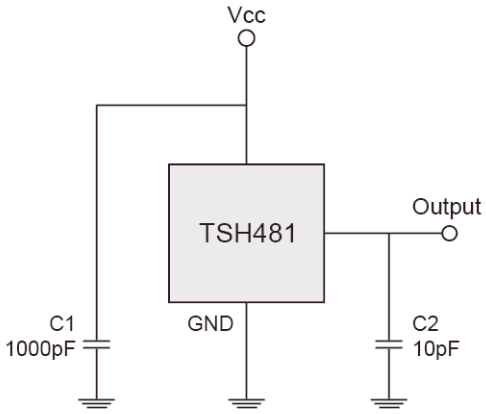
## Block Diagram




## Typical Application Circuit




## Electrical Specifications (DC Operating Parameters: $T_A$=+25°C,$V_{CC}$=5V)

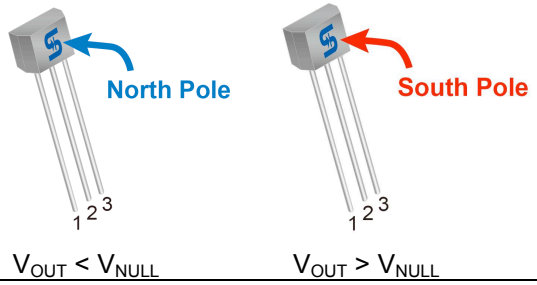
| Parameters | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Supply Voltage | Operating | 3.0 | -- | 6.5 | V |
| Supply Current | B=0 G | -- | 2.5 | 5.0 | mA |
| Output Current | $V_{CC}$>3V | 1.0 | 1.5 | -- | mA |
| Null Output Voltage | B=0 G | 2.3 | 2.5 | 2.7 | V |
| Output Bandwidth | | -- | 20 | -- | kHz |
| Output Voltage Span | | 2.95 | 3.2 | -- | V |
| Magnetic Range Gauss | | ±500 | ±800 | -- | G |
| Linearity | % of Span | -- | 0.7 | -- | |
| Response Time | | -- | 3 | -- | μs |
| Sensitivity | | 1.8 | -- | 2.2 | mV/G |
| Electro-Static Discharge | HBM | 3 | -- | -- | kV |

**Note:** 1G (Gauss) = 0.1mT (millitesla)

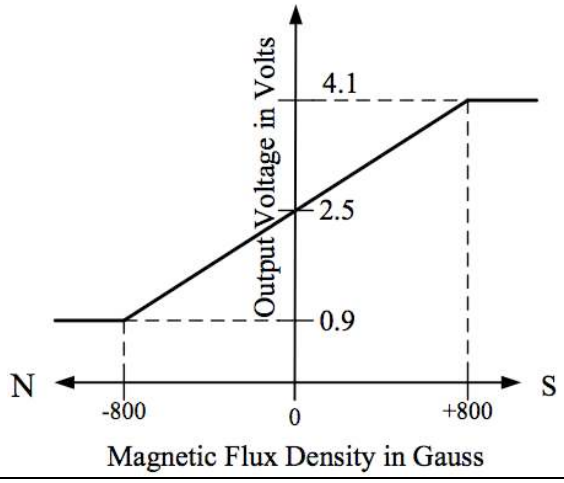
## Output Behavior versus Magnetic Pole

DC Operating Parameters: $T_A$=+25°C, $V_{CC}$=5V

**TO-92S**




$V_{OUT} < V_{NULL}$ $V_{OUT} > V_{NULL}$



## Characteristic Performance

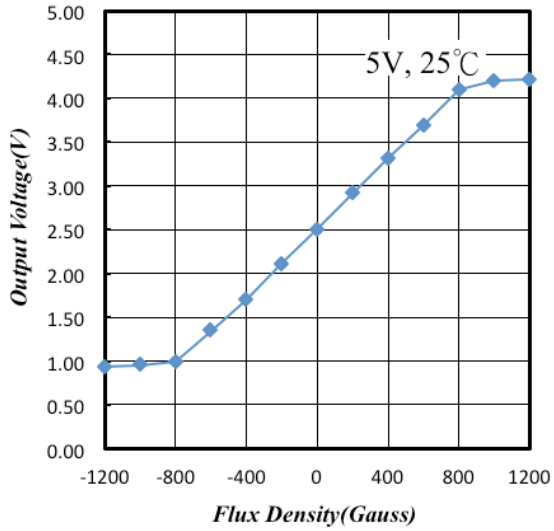



**Figure 1. Output Voltage vs. Flux Density**

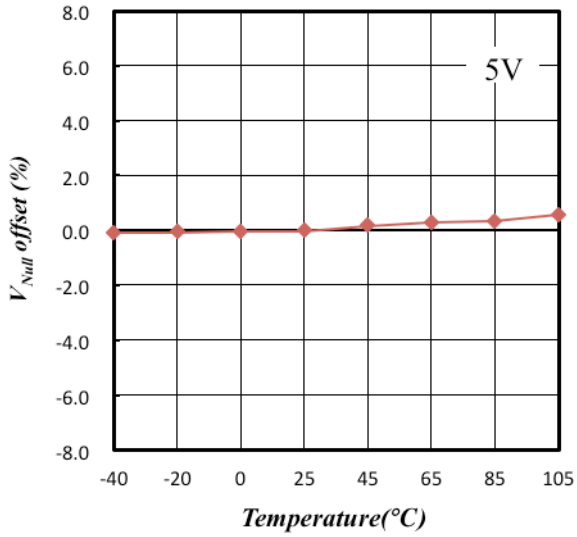



**Figure 2. Output Voltage Offset vs. Temperature**

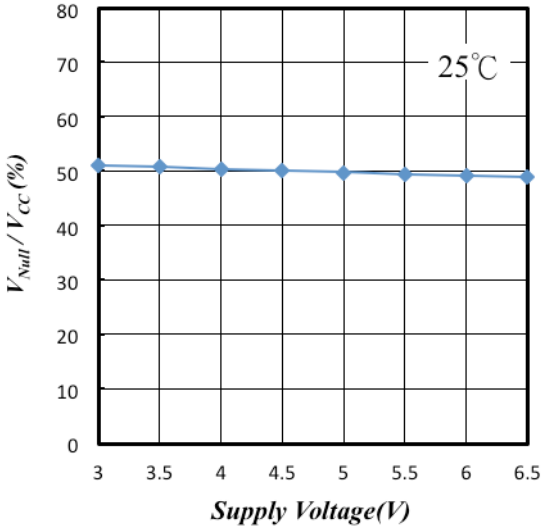



**Figure 3. Vout/Vcc Ratio vs. Supply Current**

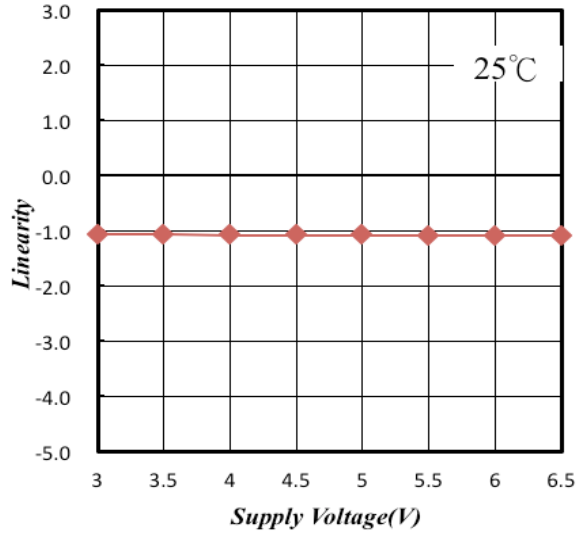



**Figure 4. Linearity vs. Supply Voltage**

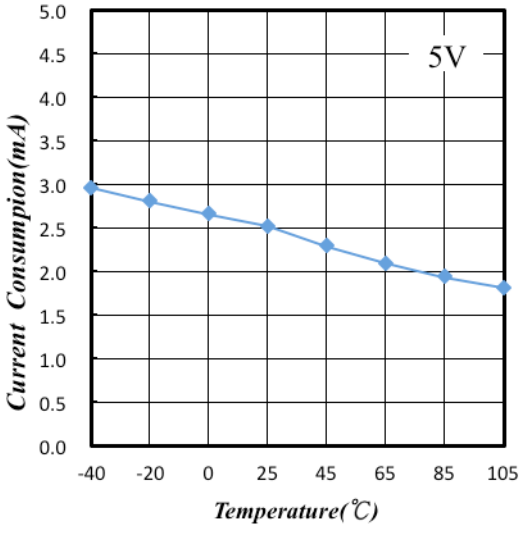



**Figure 5. Supply Current vs. Temperature**

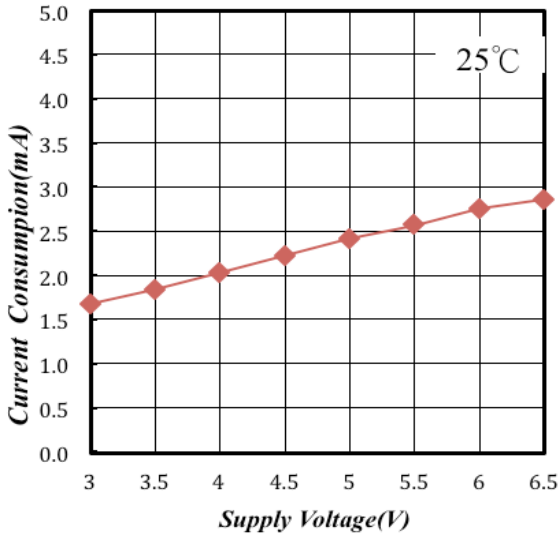



**Figure 6. Supply Current vs. Supply Voltage**

## Characteristic Performance

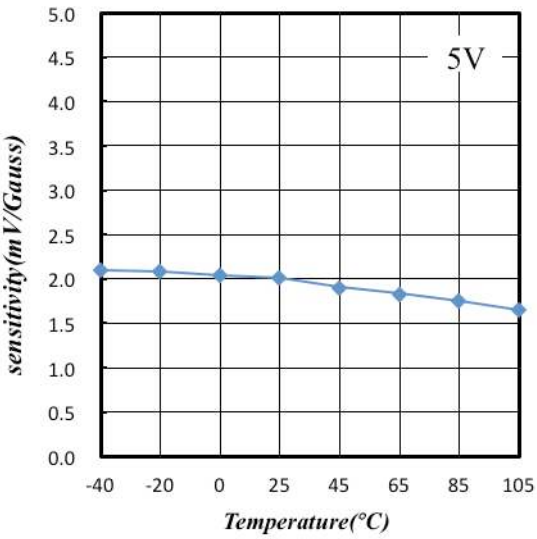



Figure 7. Sensitivity vs. Temperature

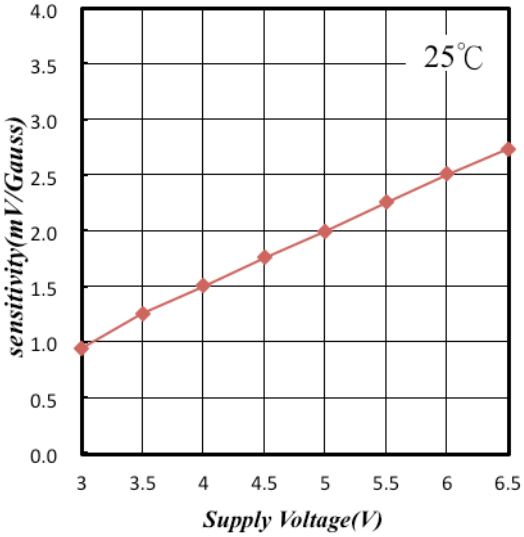



Figure 8. Sensitivity vs. Supply Voltage

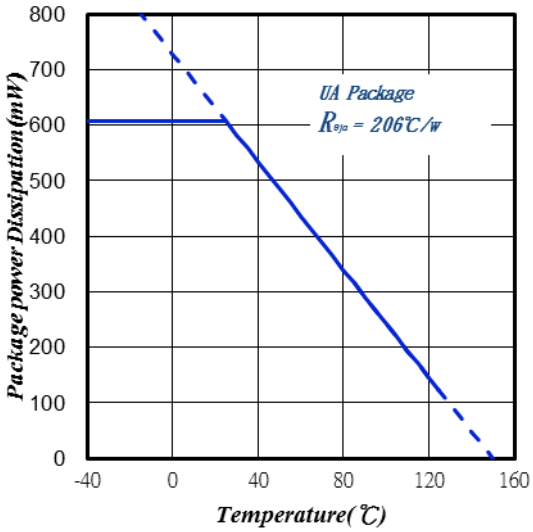



Figure 8. Power Dissipation vs. Temperature

# TSH481
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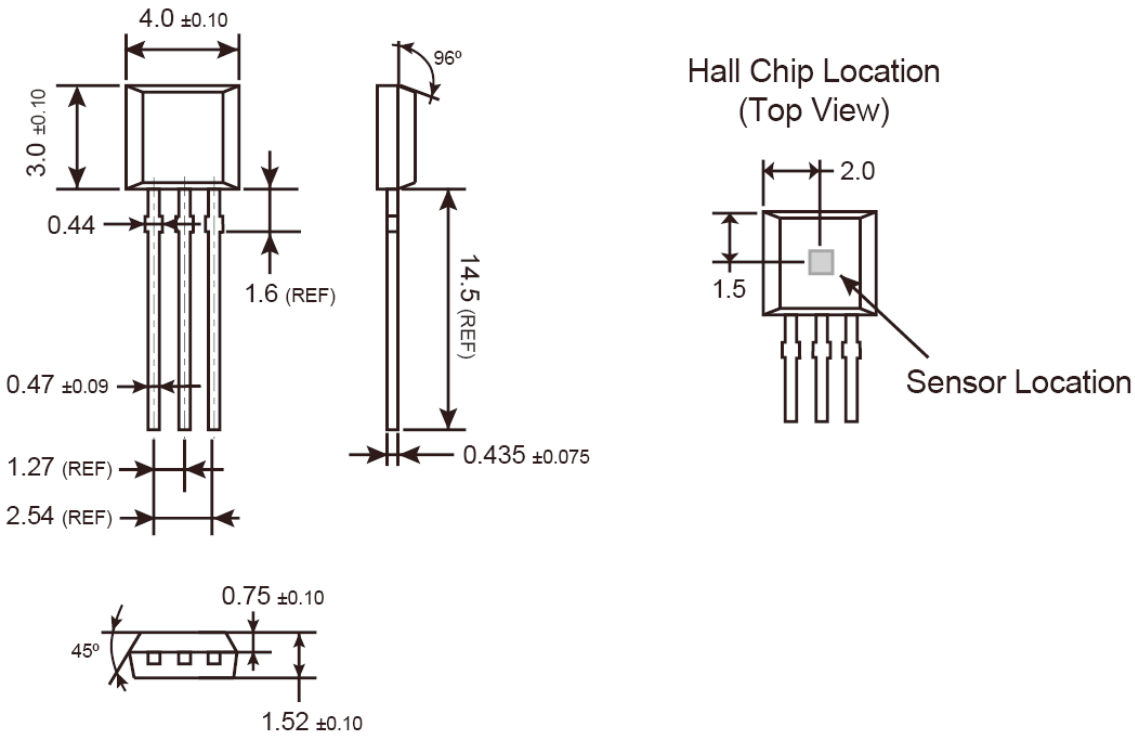
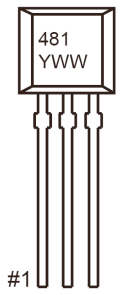
## TO-92S Mechanical Drawing




Unit: Millimeters

## Marking Diagram




**481** = Device Code
**Y** = Year Code (3=2013, 4=2014….)
**WW** = Week Code (01~52)

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