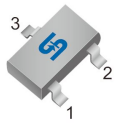
# TSH248

Micropower Omni-Polar Hall Effect Switch

**TSOT-23**




**Pin Definition:**

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

## Description

TSH248 Hall-effect sensor is a temperature stable, stress-resistant, micro-power switch. Superior high-temperature performance is made possible through a dynamic offset cancellation that utilizes chopper-stabilization. This method reduces the offset voltage normally caused by device over-molding, temperature dependencies and thermal stress.

TSH248 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, open-drain output. Advanced CMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors and small component geometries.

## Features

- CMOS Hall IC Technology
- Solid-State Reliability
- Low power consumption for battery applications
- Operation voltage range from 2.5V~3.5V

## Ordering Information

| Part No. | Package | Packing |
|---|---|---|
| TSH248CX RFG | TSOT-23 | 3kpcs / 7” Reel |

**Note:** “G” denote for Halogen Free Product

## Application

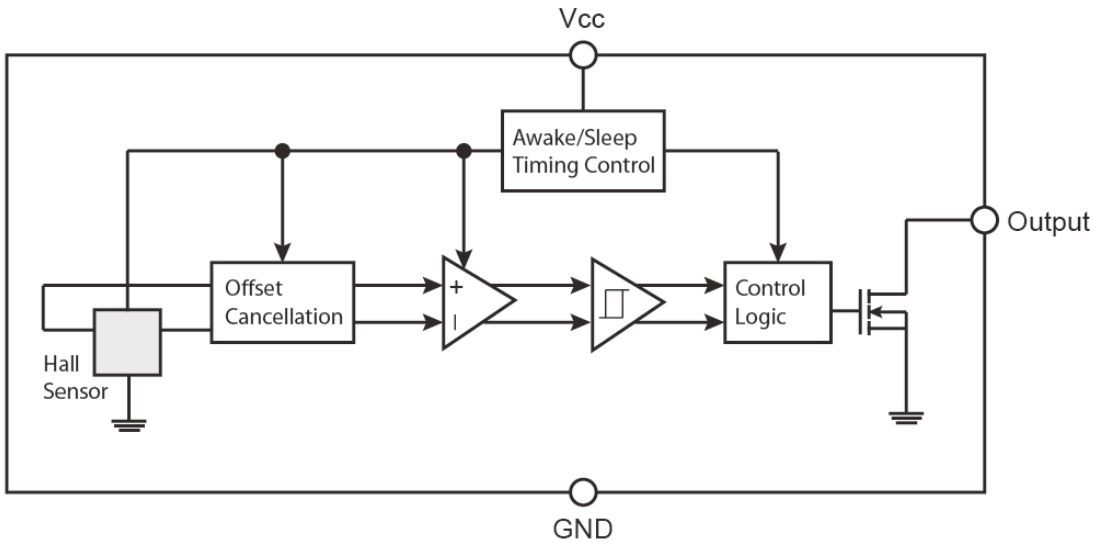
- Solid state switch
- Lid close sensor for power supply devices
- Magnet proximity sensor for reed switch replacement in high duty cycle applications.
- Handheld Wireless Handset Awake Switch (Flip Cell/PHS Phone/Note Book/Flip Video Set)

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

| Characteristics | Limit | Value | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 5 | V |
| Output Voltage | $V_{OUT}$ | 5 | V |
| Reverse voltage | $V_{CC/OUT}$ | -0.3 | V |
| Magnetic flux density | | Unlimited | G |
| Output current | $I_{OUT}$ | 2 | mA |
| Operating Temperature Range | $T_{OPR}$ | -40 to +85 | °C |
| Storage temperature range | $T_{STG}$ | -55 to +150 | °C |
| Maximum Junction Temp | $T_J$ | 150 | °C |
| Thermal Resistance - Junction to Ambient | $R\theta_{JA}$ | 543 | °C/W |
| Thermal Resistance - Junction to Case | $R\theta_{JC}$ | 410 | °C/W |
| Package Power Dissipation | $P_D$ | 230 | mW |

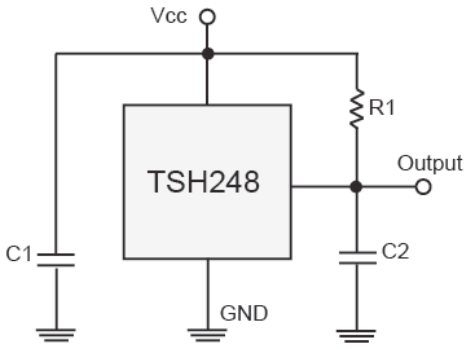
**Note:** Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

## Block Diagram




**Note:** Static sensitive device; please observe ESD precautions. Reverse $V_{CC}$ protection is not included. For reverse voltage protection, a 100Ω resistor in series with $V_{CC}$ is recommended.

## Typical Application Circuit




C1：10nF
C2：100pF
R1：100KΩ

## Electrical Specifications (DC Operating Parameters: $T_A$=+25°C,$V_{CC}$=3V)

| Parameters | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Supply Voltage | Operating | 2.5 | -- | 3.5 | V |
| Supply Current | Awake State | -- | 2.5 | 4.0 | mA |
| | Sleep State | -- | 8.0 | 12 | μA |
| | Average | -- | 10 | 16 | μA |
| Output Low Voltage | $I_{OUT}$=1mA | -- | -- | 0.3 | V |
| Output Leakage Current | Output off | -- | -- | 1 | μA |
| Awake Mode Time | Operating | -- | 70 | -- | μs |
| Sleep Mode Time | Operating | -- | 70 | -- | ms |
| Duty Cycle | | -- | 0.1 | -- | % |

## Magnetic Specifications

DC Operating Parameters $T_A$=25 °C, $V_{CC}$=3.0V

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Operating Point** | $B_{OPS}$ | N pole to branded side, B > $B_{OP}$, $V_{OUT}$ On | 6 | -- | 60 | G |
| | $B_{OPN}$ | S pole to branded side, B > $B_{OP}$, $V_{OUT}$ On | -60 | -- | -6 | G |
| **Release Point** | $B_{RPS}$ | N pole to branded side, B < $B_{RP}$, $V_{OUT}$ Off | 5 | -- | -59 | G |
| | $B_{RPN}$ | S pole to branded side, B < $B_{RP}$, $V_{OUT}$ Off | -60 | -- | -5 | G |
| **Hysteresis** | $B_{HYS}$ | \|BOPx - BRPx\| | -- | 7 | -- | G |

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

## Output Behavior versus Magnetic Pole

DC Operating Parameters: $T_A$ = -40 to 85°C, $V_{CC}$ = 2.5V ~ 3.5V

| Parameter | Test condition | OUT |
|---|---|---|
| **South pole** | B<Bop[(-60)~(-6)] | Low |
| **Null or weak magnetic field** | B=0 or B<$B_{RP}$ | Open (Pull-up Voltage) |
| **North pole** | B>Bop(60~6) | Low |

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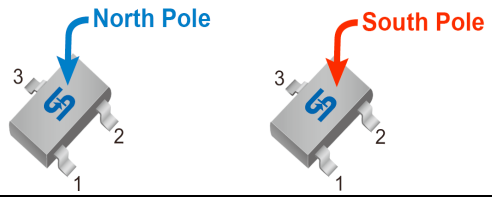


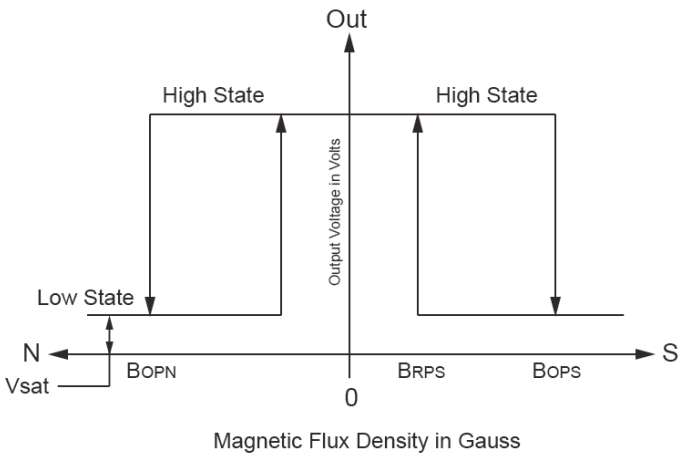

## Characteristic Performance

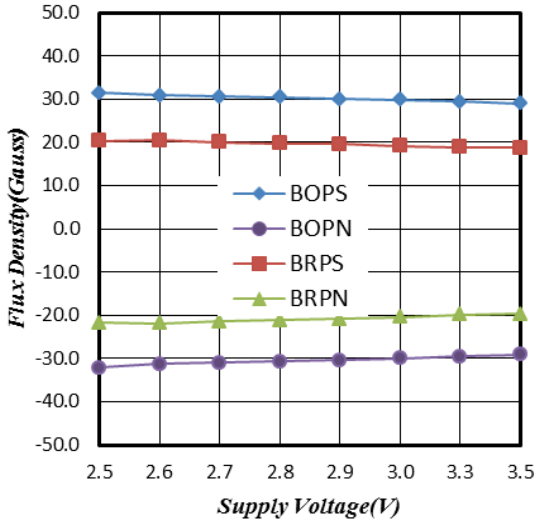


**Figure 1. Flux Density vs. Supply Voltage**

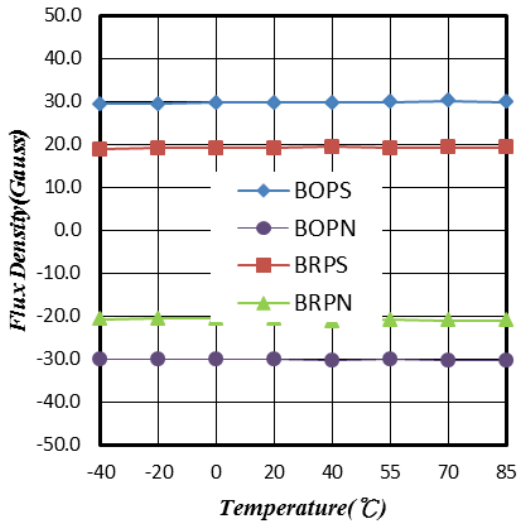


**Figure 2. Flux Density vs. Temperature**

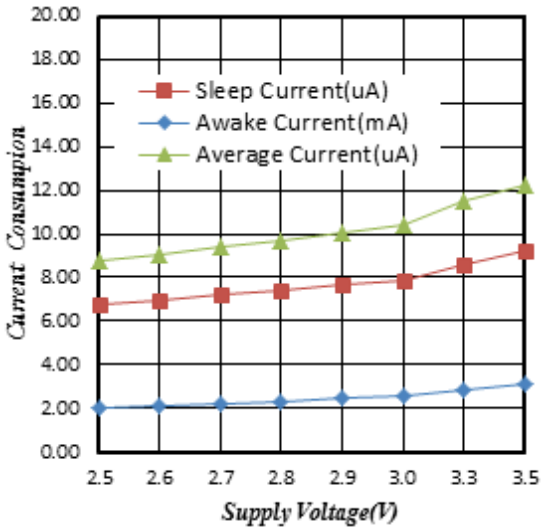


**Figure 3. Supply Current vs. Supply Voltage**

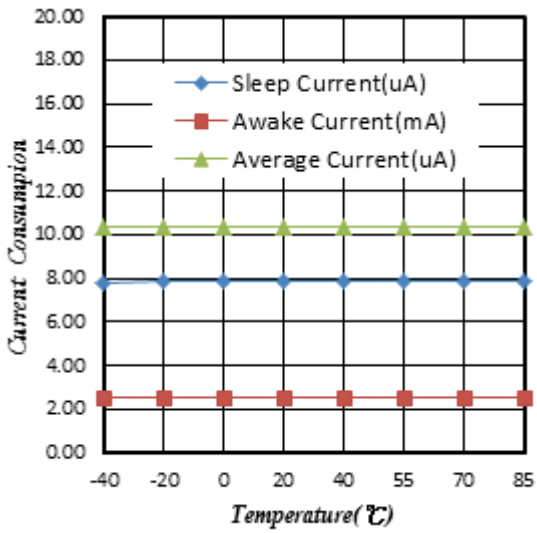


**Figure 4. Supply Current vs. Temperature**

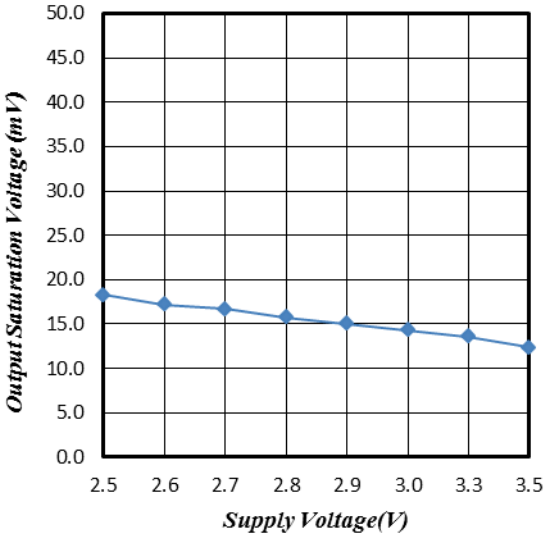


**Figure 5. Output Saturation Voltage vs. Supply Voltage**

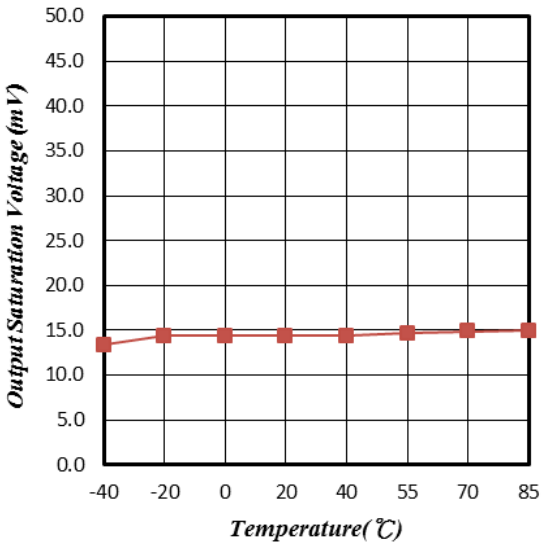


**Figure 6. Output Saturation Voltage vs. Temperature**

## Characteristic Performance

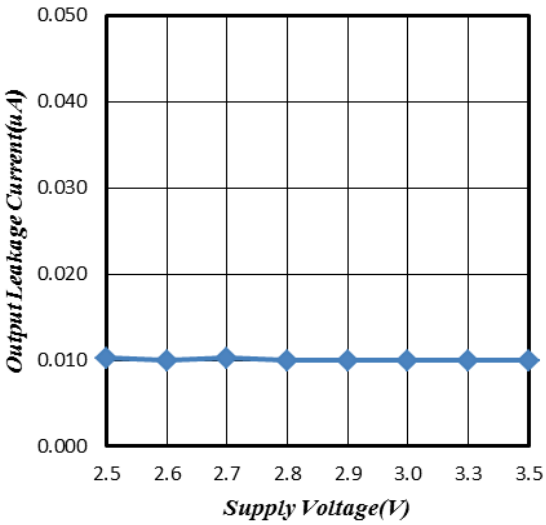


**Figure 7. Output Leakage Current vs. Supply Voltage**

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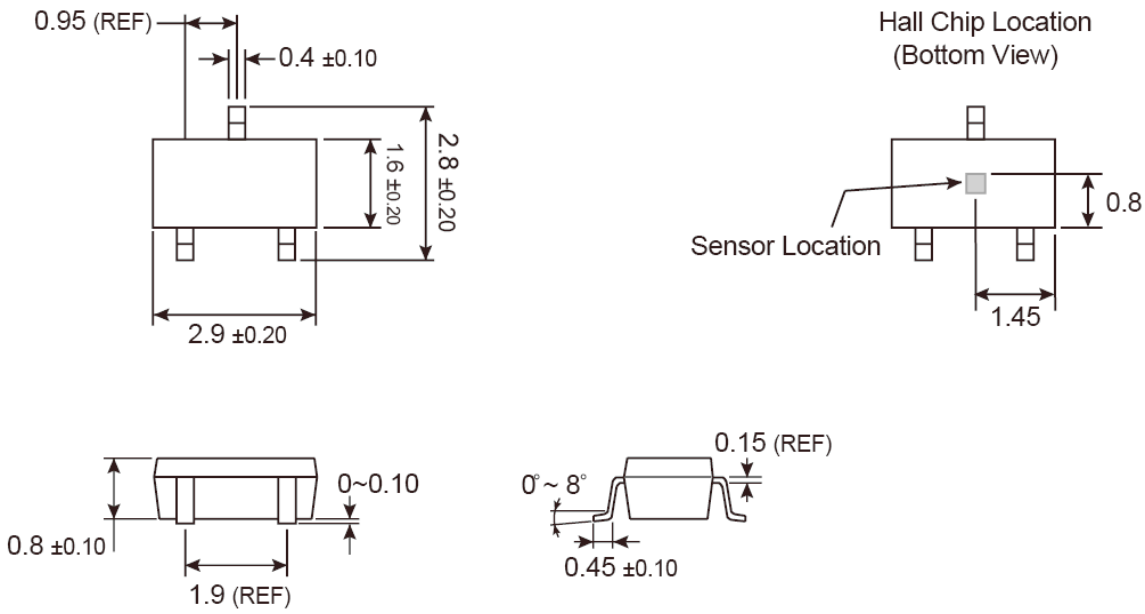
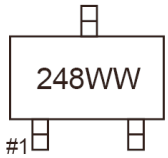
## TSOT-23 Mechanical Drawing




Unit: Millimeters

## Marking Diagram




**248** = Device Code
**WW** = Week Code Table

| week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| code | OA | OB | OC | OD | OE | OF | OG | OH | OI | OJ | OK | OL | OM |
| week | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| code | ON | OO | OP | OQ | OR | OS | OT | OU | OV | OW | OX | OY | OZ |
| week | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| code | PA | PB | PC | PD | PE | PF | PG | PH | PI | PJ | PK | PL | PM |
| week | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| code | PN | PO | PP | PQ | PR | PS | PT | PU | PV | PW | PX | PY | PZ |

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