

## MICROPOWER, HIGH SENSITIVITY, UNIPOLAR HALL-EFFECT SWITCH

### ◆ General Description

The SL1271 is an ultra-sensitive Hall-effect unipolar switch IC with digital latched output, mainly designed for battery-operation, hand-held equipment.

Special CMOS process is used for low-voltage and low-power requirement. A chopper stabilized amplifier improves stability of magnetic switch points. The circuit design provides an internally controlled clocking mechanism to cycle power to the Hall sensor and analog signal processing circuits. This serves to place the high current-consuming portions of the circuit into a “Sleep” mode. Periodically the device is “Awakened” by this internal logic and the magnetic flux from the Hall sensor is evaluated against the predefined thresholds. If the flux density is above or below the  $B_{OP}/B_{RP}$  thresholds then the output transistor is driven to change states accordingly. While in the “Sleep” cycle the output transistor is latched in its previous state. The design has been optimized for service in applications requiring extended operating lifetime in battery powered systems.

The IC switching behaviour is unipolar, it means the south pole sufficient strength will turn the output

on. If the magnetic flux density is larger than operating point ( $B_{OP}$ ), the output will be turned on; if it is less than releasing point ( $B_{RP}$ ), the output will be turned off.

The SL1271 is available in SIP-3L (or TO-92S), SOT23-3L and DFN1010-3 packages which are optimized for most applications.

### ◆ Features

- On Chip Hall Effect Sensor
- Micropower Operation
- 1.5 to 5.5V Power Supply
- Switching for South Pole Magnet
- Chopper Stabilized amplifier stage
- Superior Temperature Stability
- Digital Output Signal
- Built-in Pull-up Resistor (SL1248/SL1250)
- Push-Pull CMOS Output Stage

### ◆ Applications

- Solid State Switch
- Handheld Wireless Headset Awake Switch
- Lid Close Sensor for Battery-Powered Devices

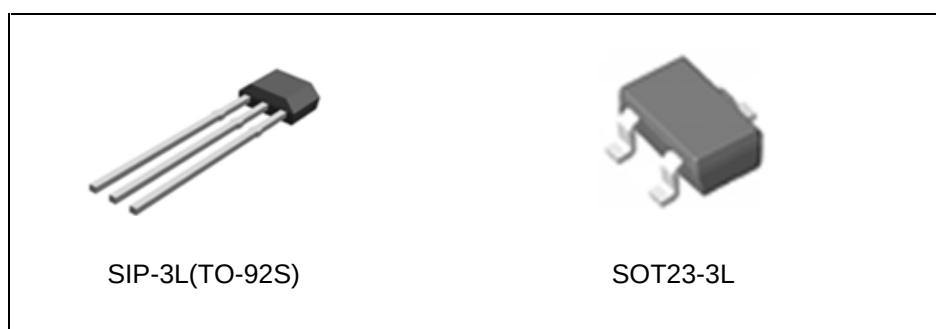


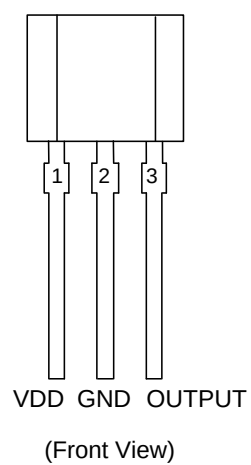
Figure 1. Package Type of SL1271

◆ **Ordering Information**

| Package        | Temperature Range | Part Number | Marking ID | Packing Type  |
|----------------|-------------------|-------------|------------|---------------|
| SIP-3L(TO-92S) | -40 to 85 °C      | SL1271EUA   | G271       | Bulk          |
| SOT23-3L       | -40 to 85 °C      | SL1271ESW   | G271       | Tape and Reel |
| DFN1010-3      | -40 to 85 °C      | SL1271XXX   | G271       | Tape and Reel |

◆ **Pin Configuration** (Not to Scale)

SIP-3L(TO-92S)



SOT23-3L

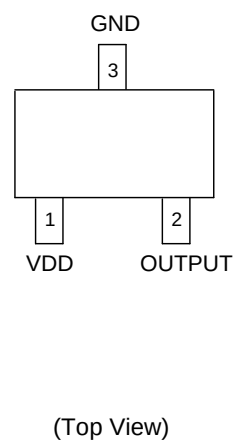


Figure 2. Pin Configuration of SL1271

### ◆ Pin Description

| Pin Number |          |           | Pin Name | Function     |
|------------|----------|-----------|----------|--------------|
| SIP-3L     | SOT23-3L | DFN1010-4 |          |              |
| 1          | 1        | 2         | VDD      | Power Supply |
| 2          | 3        | 4         | GND      | Ground pin   |
| 3          | 2        | 1         | OUTPUT   | Output pin   |
| -          | -        | 3         | N/C      | N/C          |

### ◆ Functional Block Diagram

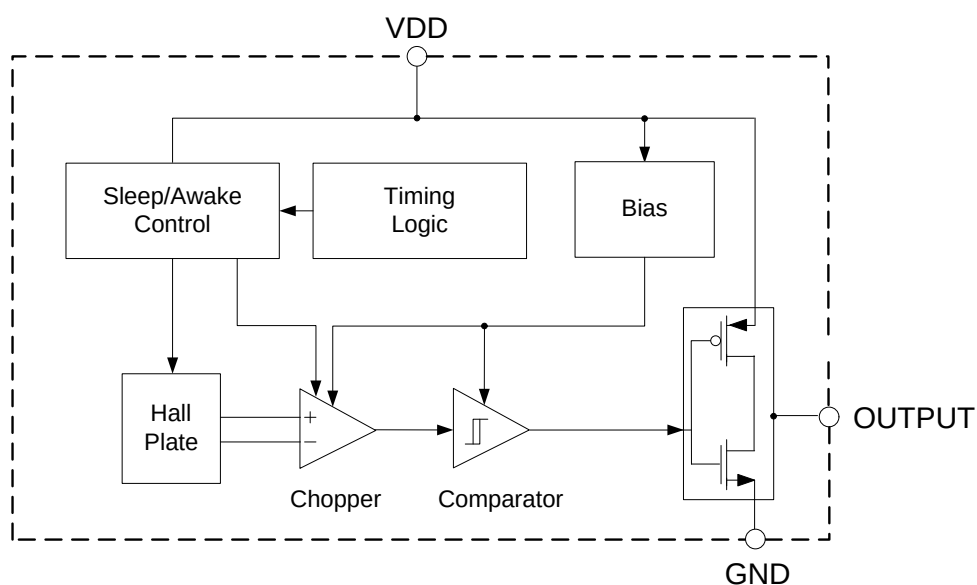


Figure 3. Functional Block Diagram of SL1271

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

| Parameter              | Symbol    | Value      |     | Unit               |
|------------------------|-----------|------------|-----|--------------------|
| Supply Voltage         | $V_{DD}$  | -0.3~6.0   |     | V                  |
| Supply Current (Fault) | $I_{DD}$  | 2.5        |     | mA                 |
| Output Voltage         | $V_{OUT}$ | -0.3~6.0   |     | V                  |
| Output Current         | $I_{OUT}$ | 5.0        |     | mA                 |
| Magnetic Flux Density  | B         | Unlimited  |     | Gauss              |
| Power Dissipation      | $P_D$     | SIP-3L     | 400 | mW                 |
|                        |           | SOT23-3L   | 230 |                    |
| Storage Temperature    | $T_{STG}$ | -55 to 150 |     | $^{\circ}\text{C}$ |
| Junction Temperature   | $T_J$     | 150        |     | $^{\circ}\text{C}$ |

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

Note 2: Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

◆ **Recommended Operating Conditions**

| Parameter             | Symbol   | Min | Max | Unit               |
|-----------------------|----------|-----|-----|--------------------|
| Supply Voltage        | $V_{DD}$ | 1.5 | 5.5 | V                  |
| Operating Temperature | $T_{OP}$ | -40 | 85  | $^{\circ}\text{C}$ |

## ◆ Electrical Characteristics

$V_{DD}=3.0V$ ,  $T_A = 25^{\circ}C$ , unless otherwise specified.

| Parameter              | Symbol     | Conditions        | Min | Typ   | Max  | Unit    |
|------------------------|------------|-------------------|-----|-------|------|---------|
| Supply Voltage         | $V_{DD}$   | Operating         | 1.5 | 2.0   | 5.5  | V       |
| Supply Current         | $I_{SOP}$  | AWake(Operating)  | -   | 1.0   | 2.0  | mA      |
|                        | $I_{SL}$   | Sleep(Standby)    | -   | 1.0   | 2.0  | $\mu A$ |
|                        | $I_{SAVG}$ | Average           | -   | 2.5   | 10.0 | $\mu A$ |
| Output Current         | $I_{OUT}$  |                   | 1.0 | -     | 5.0  | mA      |
| Output Leakage Current | $I_{LEAK}$ | $B < B_{RP}$      | -   | <0.01 | 1.0  | $\mu A$ |
| Saturation Voltage     | $V_{SAT}$  | $I_{OUT} = 1.0mA$ | -   | 0.05  | 0.25 | V       |
| Awake Time             | $t_{AW}$   | AWake(Operating)  | 100 | 300   | 500  | $\mu s$ |
| Sleep Time             | $t_{SL}$   | Sleep(Standby)    | 50  | 100   | 150  | ms      |

## ◆ Magnetic Characteristics

$V_{DD}=3.0V$ ,  $T_A = 25^{\circ}C$ , unless otherwise specified.

| Parameter       | Symbol    | Conditions                                                | Min | Typ | Max | Unit  |
|-----------------|-----------|-----------------------------------------------------------|-----|-----|-----|-------|
| Operating point | $B_{OP}$  | $B > B_{OP}$ , $V_{OUT} = \text{low}(\text{output on})$   |     | 40  | 50  | Gauss |
| Releasing Point | $B_{RP}$  | $B < B_{RP}$ , $V_{OUT} = \text{high}(\text{output off})$ | 20  | 30  |     | Gauss |
| Hysteresis      | $B_{HYS}$ |                                                           | 5   | 10  | 15  | Gauss |

◆ **Magnetic Characteristics (Continued)**

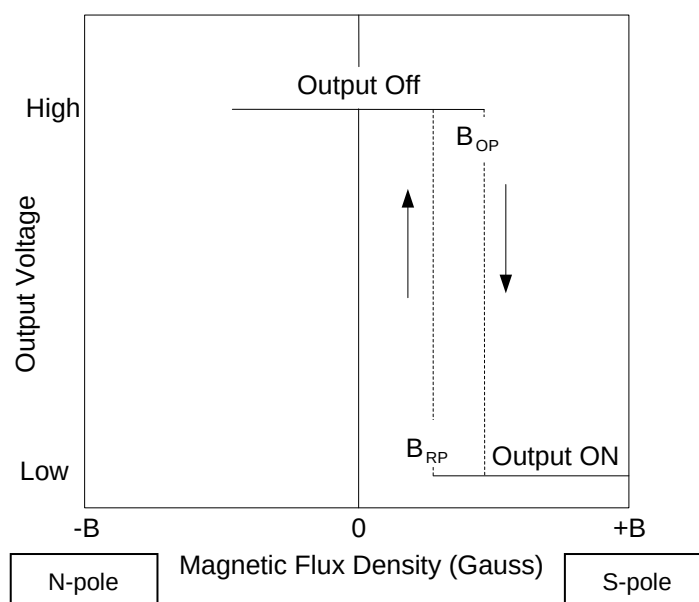


Figure 4. Output Voltage vs. Magnetic Flux Density

◆ **Typical Application Circuit**

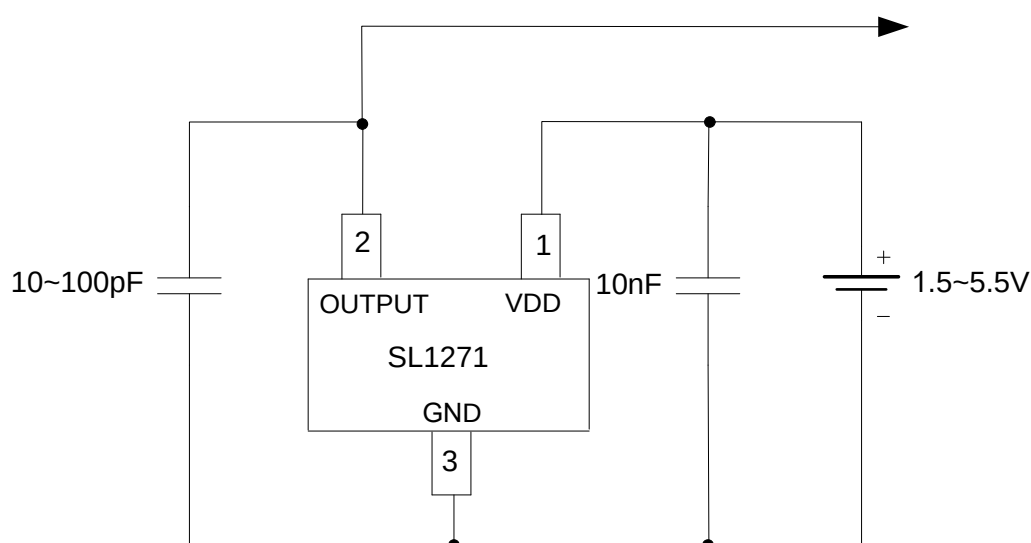
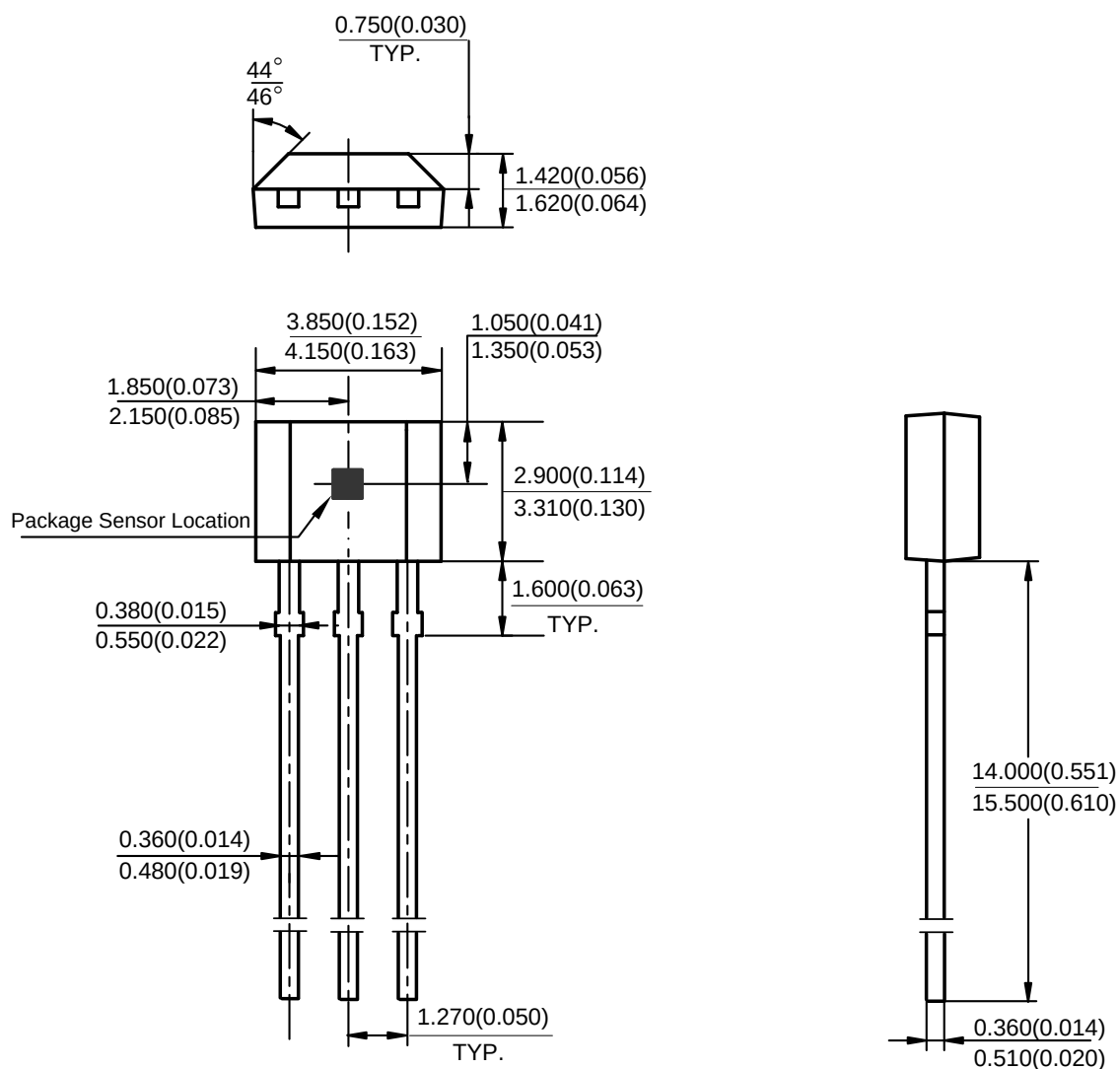


Figure 5. Typical Application of SL1271

◆ **Mechanical Dimensions**

SIP-3L(TO-92S) Unit: mm(inch)



◆ **Mechanical Dimensions (Continued)**

SOT23-3L Unit: mm(inch)

