

Low Cost Linear Hall Effect Sensor ICs

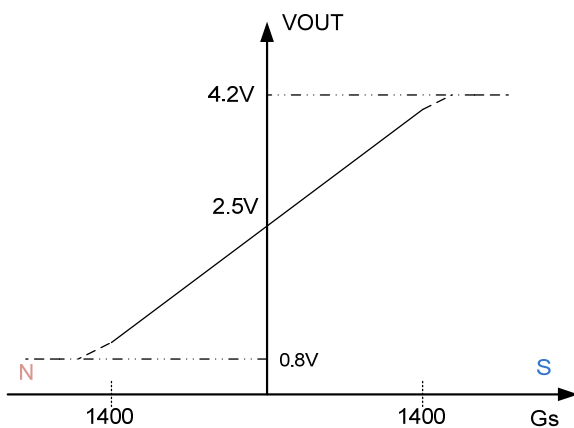
Features

- 4.5 to 5.5V wide supply voltage range
- Single current sourcing output
- Low noise output eliminates the need for filtering
- -40°C to 125°C wide ambient temperature range
- Responds to either positive or negative gauss
- Resistant to mechanical stress
- 3-pin SIP package is available

Applications

- Motor control
- Position sensing
- Current sensing
- Magnetic code reading
- Ferrous metal detector
- Weigh and liquid level sensing

Output State



Description

The SC4001 Economical Linear Hall-effect sensor is small, versatile linear Hall-effect device that are operated by the magnetic field from a permanent magnet or an electromagnet. The linear sourcing output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field. The quiescent output voltage of the SC4001 is 50% of the supply voltage, and the sensitivity is 1.4mV/Gs.

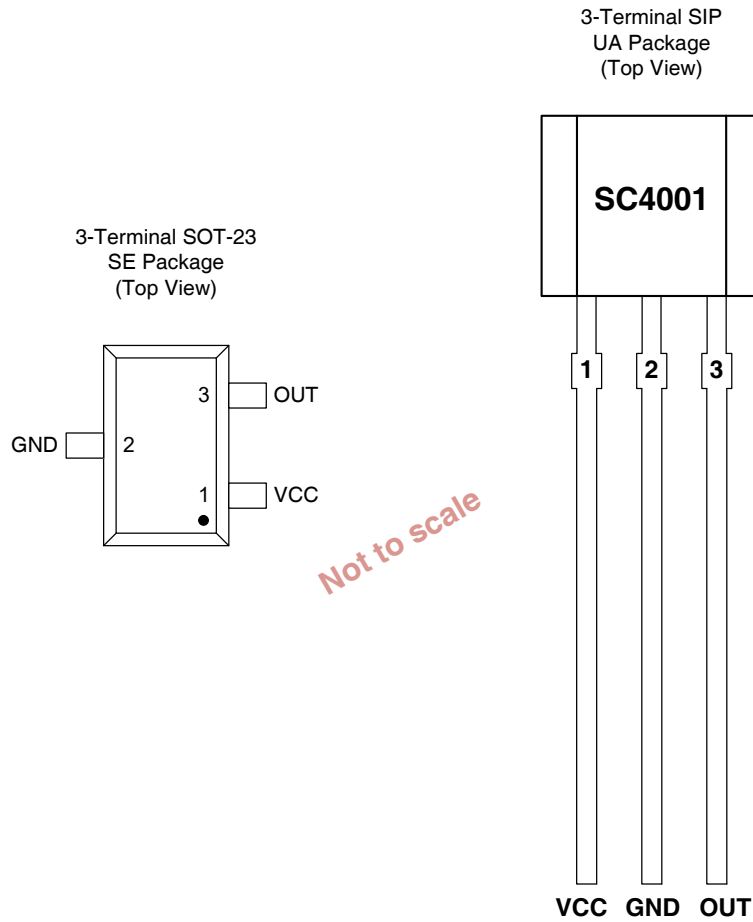
The integrated circuitry features low noise output, which makes it unnecessary to use external filtering. It also includes thin film resistors to provide increased temperature stability and accuracy. The linear Hall sensor has an operating temperature range of -40°C to 125°C, appropriate for commercial, consumer, and industrial environments.

These devices are available in a 3-pin SIP package(UA) and a 3-pin TSOT-23 style package(SE). Both packages are lead(Pb) free, with 100% matte tin leadframe plating.

Device Information

| Part Number | Packing | Mounting | Ambient, T _A | Marking |
|-------------|------------------|----------|-------------------------|---------|
| SC4001UA | 1000 pieces/Bag | SIP3 | -40°C to 125°C | 4001 |
| SC4001SE | 3000 pieces/Reel | TSOT23 | -40°C to 125°C | 4001 |

Terminal Configuration and Functions



| Terminal | | Type | Description |
|----------|--------|--------|---------------------------|
| Name | Number | | |
| VCC | 1 | PWR | 4.5 to 5.5 V power supply |
| GND | 2 | Ground | Ground terminal |
| OUT | 3 | Output | Output terminal |

Absolute Maximum Ratings

over operating free-air temperature range

| Parameter | Symbol | Min. | Max. | Units |
|--------------------------------|-----------|------|------|-------|
| Power supply voltage | V_{CC} | -0.5 | 10.0 | V |
| Output terminal voltage | V_{OUT} | -0.3 | 10.0 | V |
| Supply current | I_{CC} | -- | 15 | mA |
| Output current | I_{OUT} | -- | 2 | mA |
| Operating ambient temperature | T_A | -40 | 125 | °C |
| Operating junction temperature | T_J | -50 | 165 | °C |
| Storage temperature | T_{STG} | -65 | 175 | °C |

Note: Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ESD Protection

Human Body Model (HBM) tests according to: standard EIA/JESD22-A114-B HBM

| Parameter | Symbol | Min. | Max. | Units |
|------------------------|-----------|-------|------|-------|
| HBM ESD stress voltage | V_{ESD} | -4000 | 4000 | V |

Operating Characteristics

over operating free-air temperature range ($V_{CC}=5V$, unless otherwise noted)

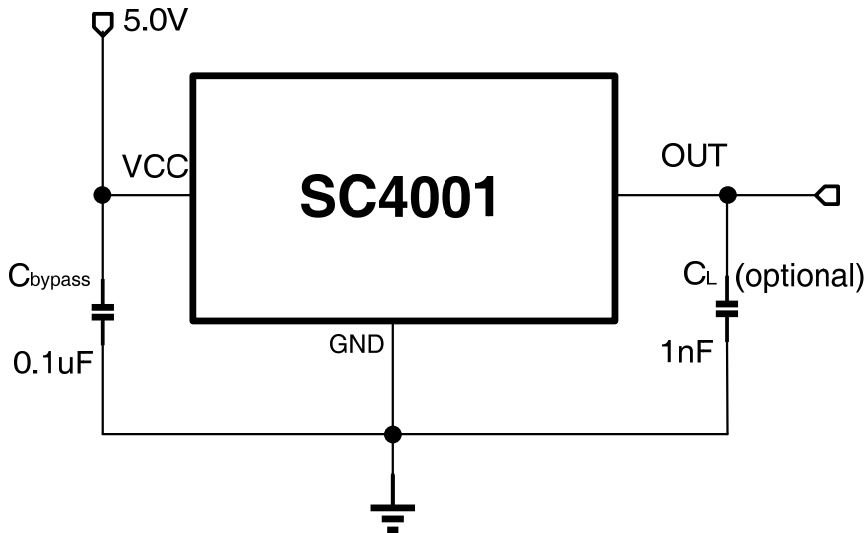
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|-----------------------------|---------------|--------------------------------------|------|------|----------|------------|
| Supply voltage | V_{CC} | $T_J < T_{J(Max)}$ | 4.5 | 5.0 | 5.5 | V |
| Supply current | I_{CC} | $V_{CC}=5.0V, T_A=25^\circ C$ | 4.5 | 6.5 | 10.0 | mA |
| Output load resistance | R_L | OUT to GND | 4 | -- | -- | k Ω |
| Output voltage range | $V_{OUT(H)}$ | $T_A=25^\circ C, B=1000Gs$ | 4.0 | 4.2 | -- | V |
| | $V_{OUT(L)}$ | $T_A=25^\circ C, B=-1000Gs$ | 0 | 0.8 | 1.0 | V |
| Quiescent voltage output | $V_{OUT(Q)}$ | $B=0\ Gs, T_A=25^\circ C$ | 2.45 | 2.5 | 2.55 | V |
| Sensitivity | Sens | $T_A=25^\circ C$ | 1.0 | 1.4 | 1.9 | mV/Gs |
| Linearity | Lin | | -- | -- | ± 5 | % |
| Delta sensitivity vs. temp. | Δ Sens | $T_A = -40^\circ C$ to $105^\circ C$ | -- | -- | ± 20 | % |
| Step response time | t_{resp} | Delay the output signal reaching 90% | -- | 1 | -- | μS |

1Gs = 0.1mT

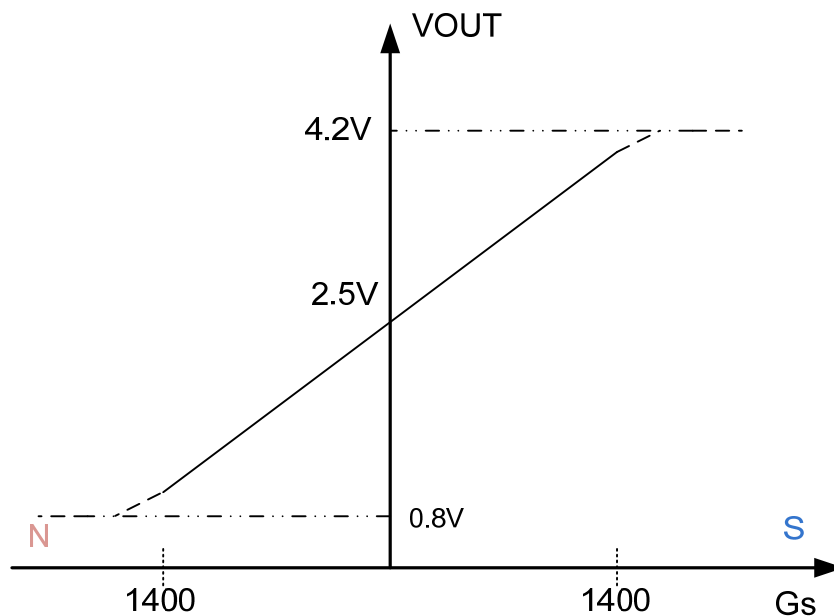
Thermal Characteristics

| Parameter | Symbol | Test Conditions | Rating | Units |
|----------------------------|----------------|--|--------|--------------|
| Package thermal resistance | $R_{\theta A}$ | Single-layer PCB, with copper limited to solder pads | 166 | $^\circ C/W$ |

Typical Application Drawing



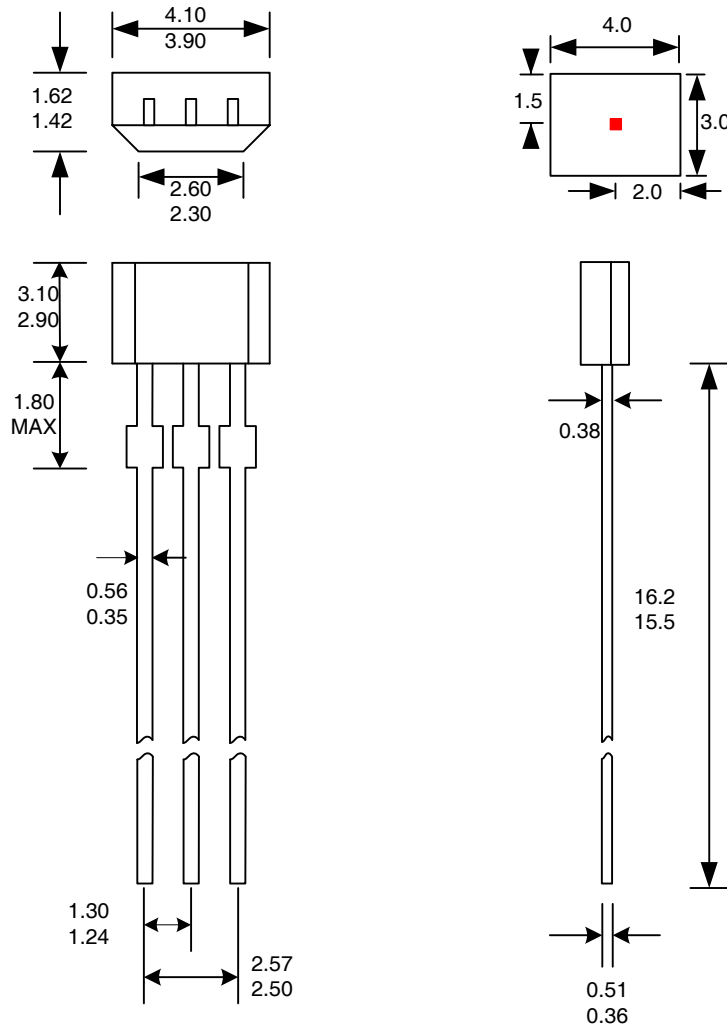
In the quiescent state (that is, with no significant magnetic field: $B=0$), the output, $V_{OUT(Q)}$, equals to half of the supply voltage, V_{CC} , throughout the entire operating range of V_{CC} . The presence of a South-polarity magnetic field perpendicular to the branded surface of the package increases the output voltage from its quiescent value toward the supply voltage rail. The amount of the output voltage increase is proportional to the magnitude of the magnetic field applied. Conversely, the application of a North polarity field will decrease the output voltage from its quiescent value. This proportionality is specified as the magnetic sensitivity, $Sens$ (mV/Gs), of the device.



Package Designator

3-Terminal
UA Package

Dimension:mm



Notes:

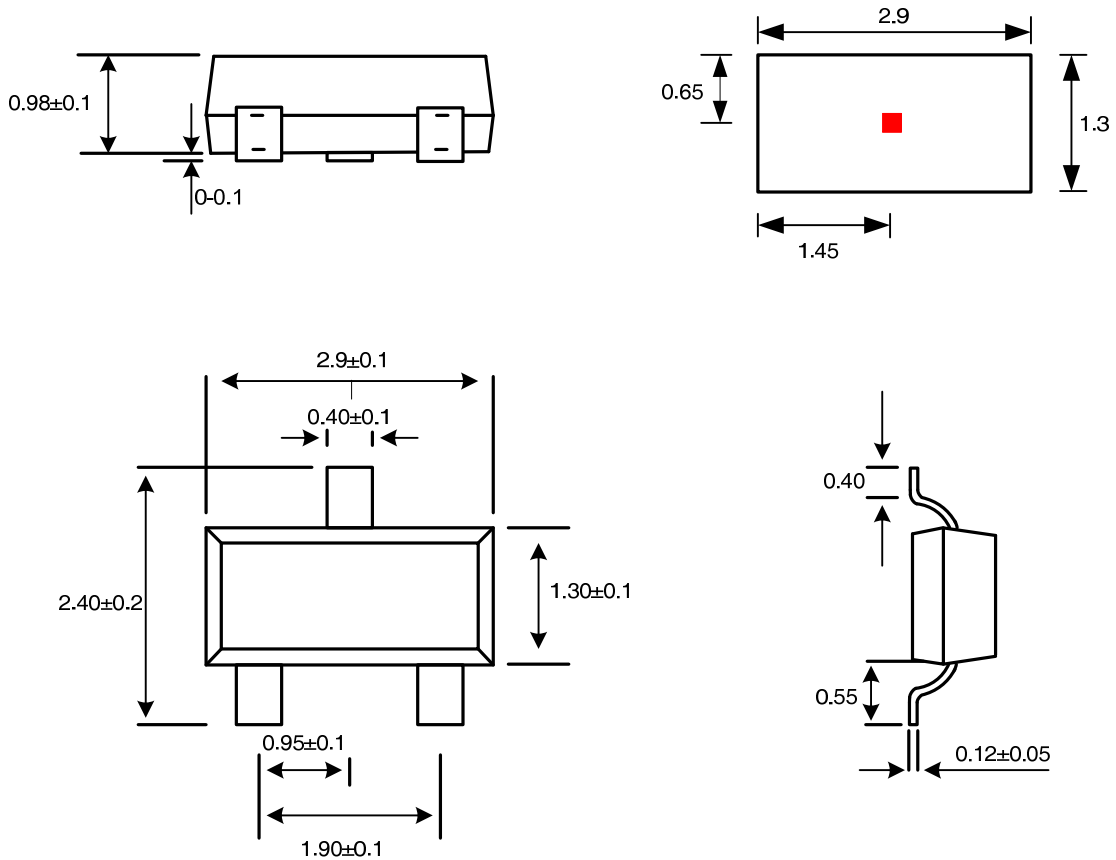
1. Exact body and lead configuration at vendor's option within limits shown.
2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

Package Designator

3-Terminal
SE 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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