SS39ET/SS49E/SS59ET Series
Linear Hall-effect Sensor ICs

Datasheet
Magnetoresistive Sensor ICs

The SS39ET/SS49E/SS59ET Series low-cost linear Hall-effect sensor ICs are small, versatile devices that are operated by the magnetic field from a permanent magnet or an electromagnet. They are designed and manufactured for cost competitiveness.

The linear sourcing output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field. Low voltage capability as low as 2.7 Vdc and reduced current consumption of only 6 mA typically at 5 Vdc help make this product energy efficient.

The integrated circuitry features low noise output, which makes it unnecessary to use external filtering. These sensor ICs interface with many electrical components without buffering. They also include thin film resistors to provide increased temperature stability and accuracy.

These linear Hall-effect sensor ICs have an operating temperature range of -40 °C to 100°C [-40 °F to 212 °F], appropriate for industrial and medical environments. Thermal balancing allows for stable operation over the full temperature range.

They are available in three package styles, all of which may be supplied on tape for automated, lower-cost assembly:
- **SOT-23**: SS39ET. This small footprint takes up less space on the PC board, typically allowing for more components.
- **Flat TO-92-style, with different lead configurations**: SS49E, SS49E-L, SS49E-F.
- **SOT-89B**: SS59ET.

Key Features

- **Miniature and subminiature construction**: Designed for compact designs with tight space requirements
- **Energy efficient**: Low current consumption of 6 mA at 5 Vdc
- **Easy PC board interface**: Single current sourcing output for common electronic circuits
- **Circuit design flexibility**: Voltage range of 2.7 Vdc to 6.5 Vdc
- **Low noise output**: Virtually eliminates the need for filtering
- **Stable output**: Thin film resistors improve accuracy
- **Wide range of environments**: Temperature range of -40 °C to 100 °C [-40 °F to 212 °F]
- **Application flexibility**: Responds to either positive or negative Gauss

Potential Applications

**INDUSTRIAL**
- Basic current sensing for motor load monitoring, detection
- Anti-tampering magnetic field sensor in smart remote utility meters
- Pump control in heavy-duty equipment and household appliances
- Simple linear or angular displacement sensing
- Handlebar/throttle position sensing in e-bikes and scooters
- Current sensing in appliances
- Speed adjustment trigger in tools and appliances
- Magnetic code reading in safes, security and building access control systems

**MEDICAL**
- Position sensing in infusion pumps
SS39ET/SS49E/SS59ET Series

Table 1. Operating Characteristics (Vs = 5.0 V, TA = -40 °C to 85 °C [-40 °F to 185 °F], except where noted.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>linear, sourcing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetics type</td>
<td>analog</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>25 °C [77 °F]</td>
<td>2.7</td>
<td>6</td>
<td>6.5</td>
<td>Vdc</td>
</tr>
<tr>
<td>Supply current</td>
<td>25 °C [77 °F]</td>
<td>6</td>
<td>10</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Output voltage</td>
<td>0 Gauss, 25 °C</td>
<td>1.0</td>
<td>1.4</td>
<td>1.75</td>
<td>mV/Gauss</td>
</tr>
<tr>
<td>Output current</td>
<td>Vs &gt; 3.0 V</td>
<td>2.25</td>
<td>2.50</td>
<td>2.75</td>
<td>Vdc</td>
</tr>
<tr>
<td>Output voltage span</td>
<td>1.05 to (Vs - 1.05)</td>
<td>0.95 to (Vs - 0.95)</td>
<td></td>
<td>Vdc</td>
<td></td>
</tr>
<tr>
<td>Magnetic range</td>
<td>±650</td>
<td>±1000</td>
<td></td>
<td></td>
<td>Gauss</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>25 °C</td>
<td>1.0</td>
<td>1.4</td>
<td>1.75</td>
<td>mV/Gauss</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 [-40]</td>
<td></td>
<td></td>
<td>100 [212]</td>
<td>°C [°F]</td>
</tr>
<tr>
<td>Temperature error:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Null drift</td>
<td>-0.10</td>
<td></td>
<td></td>
<td>0.10</td>
<td>%/°C</td>
</tr>
<tr>
<td>Sensitivity drift</td>
<td>≥25 °C</td>
<td>-0.15</td>
<td></td>
<td>0.05</td>
<td>%/°C</td>
</tr>
<tr>
<td></td>
<td>≤25 °C</td>
<td>-0.04</td>
<td></td>
<td>0.185</td>
<td>%/°C</td>
</tr>
<tr>
<td>Linearity</td>
<td>-0.7</td>
<td></td>
<td></td>
<td></td>
<td>% of span</td>
</tr>
<tr>
<td>Response time</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>μs</td>
</tr>
</tbody>
</table>

Table 2. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
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</thead>
<tbody>
<tr>
<td>Supply voltage (Vs)</td>
<td>-5.0 Vdc to 8.0 Vdc</td>
</tr>
<tr>
<td>Output current</td>
<td>10 mA</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-55 °C to 165 °C [-67 °F to 329 °F]</td>
</tr>
</tbody>
</table>

**NOTICE**

Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate at absolute maximum ratings.

**CAUTION**

ELECTROSTATIC SENSITIVE DEVICES

DO NOT OPEN OR HANDLE EXCEPT AT A STATIC FREE WORKSTATION

ESD SENSITIVITY: CLASS 3

Figure 1. Current Sourcing Output Block Diagram

Figure 2. Transfer Characteristics (Vs = 5.0 Vdc)
Linear Hall-effect Sensor ICs

Figure 3. Performance Graphics

Null Shift vs Temperature

- Minimum shift from 25 °C (%)
- Maximum shift from 25 °C (%)

Sensitivity Shift vs Temperature

- Minimum shift from 25 °C (%)
- Maximum shift from 25 °C (%)

Typical Frequency Response

- Frequency (kHz): 0, 10, 20, 30, 40, 50, 60
- Ratio (Vout/Vout at 1 kHz):
  - 1.0
  - 0.9
  - 0.8
  - 0.7

Supply Current vs Temperature

- Supply Current (mA): 0, 5, 10
- Temperature (°C): -40, 25, 100
- Supply Voltage (Vdc): Max. Vs = 6.5 V, Max. Vs = 5.0 V, Max. Vs = 3.0 V

Sensitivity per Volt vs Vsupply

- Sensitivity per Volt (mV/Gauss/V):
  - Maximum
  - Nominal
  - Minimum
- Supply Voltage (Vdc): 2.7, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5
Figure 4. Mounting Dimensions (For reference only. mm/[in].)

SS39ET

Tape

Reel
SS39ET/SS49E/SS59ET Series

Figure 4. Mounting Dimensions (continued)

SS59ET

Tape

Reel
### Linear Hall-effect Sensor ICs

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>SS39ET</td>
<td>Linear Hall-effect sensor IC, SOT-23, tape and reel packaging (3000 units per reel)</td>
<td>SS59ET</td>
<td>Linear Hall-effect sensor IC, SOT-89B, tape and reel packaging (1000 units per reel)</td>
</tr>
<tr>
<td>SS49E</td>
<td>Linear Hall-effect sensor IC, flat TO-92-style, straight leads, 14.99 mm [0.59 in] lead length, 1.30 mm [0.05 in] spacing, bulk packaging (1000 units per bag)</td>
<td>SS49E-T3</td>
<td>Linear Hall-effect sensor IC, flat TO-92-style, tape-in-box (ammopack) packaging, straight leads (5000 units per box)</td>
</tr>
<tr>
<td>SS49E-F</td>
<td>Linear Hall-effect sensor IC, flat TO-92-style, formed leads, 14.99 mm [0.59 in] lead length, 2.54 mm [0.10 in] spacing, bulk packaging (1000 units per bag)</td>
<td>SS49E-T2</td>
<td>Linear Hall-effect sensor IC, flat TO-92-style, tape-in-box (ammopack) packaging, formed leads (5000 units per box)</td>
</tr>
<tr>
<td>SS49E-L</td>
<td>Linear Hall-effect sensor IC, flat TO-92-style, straight leads, 18.67 mm [0.75 in] lead length, 1.30 mm [0.05 in] spacing, bulk packaging (1000 units per bag)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ADDITIONAL INFORMATION

The following associated literature is available at sensing.honeywell.com:

- Product line guide
- Product range guide
- Product installation instructions
- Application note

⚠️ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠️ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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