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

DESCRIPTION
The SS39ET/SS49E/SS59ET Series Low-cost Linear Hall-effect sensors are small, versatile devices 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. 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.

VALUE PROPOSITION
- Designed and manufactured for cost competitiveness
- All packages can be supplied on tape for automated, lower-cost assembly
- SS39ET’s small footprint takes up less space on the PC board, typically allowing for more components
- Interfaces with many electrical components without buffering
- Thermally balanced integrated circuit for stable operation over a full temperature range

FEATURES AND BENEFITS
- **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 ($V_S = 5.0 \, V$, $TA = -40 \, ^\circ C$ to $85 \, ^\circ C$ [-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>2.7</td>
<td></td>
<td></td>
<td>6.5</td>
<td>Vdc</td>
</tr>
<tr>
<td>Supply current $25 , ^\circ C$ [77 °F]</td>
<td>6</td>
<td></td>
<td>10</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>1.0</td>
<td></td>
<td>1.4</td>
<td>1.75</td>
<td>mV/Gauss</td>
</tr>
<tr>
<td>Output current $V_S &gt; 3.0 , V$</td>
<td>1.0</td>
<td></td>
<td>1.5</td>
<td>–</td>
<td>mA</td>
</tr>
<tr>
<td>Null $0 , Gauss$, $25 , ^\circ C$</td>
<td>2.25</td>
<td></td>
<td>2.50</td>
<td>2.75</td>
<td>Vdc</td>
</tr>
<tr>
<td>Output voltage span</td>
<td>1.05 to ($V_S - 1.05$)</td>
<td>0.95 to ($V_S - 0.95$)</td>
<td>–</td>
<td>Vdc</td>
<td></td>
</tr>
<tr>
<td>Magnetic range</td>
<td>±650</td>
<td>±1000</td>
<td>–</td>
<td>Gauss</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>1.0</td>
<td>1.4</td>
<td>1.75</td>
<td>mV/Gauss</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 [-40]</td>
<td>–</td>
<td>100 [212]</td>
<td>°C [°F]</td>
<td></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>0.10</td>
<td>%/°C</td>
<td></td>
</tr>
<tr>
<td>Sensitivity drift $\geq 25 , ^\circ C$</td>
<td>-0.15</td>
<td>–</td>
<td>0.05</td>
<td>%/°C</td>
<td></td>
</tr>
<tr>
<td>$&lt; 25 , ^\circ C$</td>
<td>-0.04</td>
<td>–</td>
<td>0.185</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>–</td>
<td>–</td>
<td>-0.7</td>
<td>% of span</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>–</td>
<td>–</td>
<td>3</td>
<td>μs</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage ($V_S$)</td>
<td>-0.5 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>

Figure 1. Current Sourcing Output Block Diagram

Figure 2. Transfer Characteristics ($V_S = 5.0 \, Vdc$)

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.
Linear Hall-Effect Sensor ICs

Figure 3. Null Shift versus Temperature

Figure 4. Sensitivity Shift versus Temperature

Figure 5. Typical Frequency Response

Figure 6. Supply Current versus Temperature

Figure 7. Sensitivity per Volt versus $V_s$
SS39ET/SS49E/SS59ET Series

Figure 8. SS39ET Mounting Dimensions (for reference only, mm/[in])

Figure 9. SS39ET Tape and Reel Dimensions (for reference only, mm/[in])
Figure 10. SS49E Mounting Dimensions (for reference only, mm/[in])

<table>
<thead>
<tr>
<th>SS49E, SS49E-T3</th>
<th>SS49E-L</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="SS49E, SS49E-T3 Diagram" /></td>
<td><img src="image2" alt="SS49E-L Diagram" /></td>
</tr>
</tbody>
</table>

| SS49E-T2 | ![SS49E-T2 Diagram](image3) |

HALL ELEMENT CENTER
N S

2,5
[0.10]
0,64
[0.025]
0,38
[0.015]
1,3
[0.05]
1,7
[0.07]
4,1
[0.16]
2,5
[0.10]
0,76
[0.03]
0,3
[0.015]
14,99
[0.59]
3,0
[0.12]
18,669
[0.735]
0,76
[0.03]
0,3
[0.015]
SS39ET/SS49E/SS59ET Series

Figure 11. Tape Style T2

Figure 12. Tape Style T3

Figure 13. SS59ET Mounting Dimensions (for reference only, mm/in)

Figure 14. Tape and Reel Dimensions
Order Guide

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

Note: Products ordered in bulk packaging (plastic bags) may not have perfectly straight leads as a result of normal handling and shipping operations. Please order a tape packaging option for applications with critical requirements for straight leads.

**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.

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.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: sensing.honeywell.com

Phone and Fax:
Asia Pacific +65 6355-2828
+65 6445-3033 Fax
Europe +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada +1-800-537-6945
+1-815-235-6847
+1-815-235-6545 Fax