Linear High Precision

Analog Hall Sensors

Overview

AST works with High End Analog Hall Sensors
Magnetic field range from a few µ-Tesla up to 10 Tesla or even more!
Measures both strong and weak magnetic fields with high precision
No linearization needed - linearity error typically 0.1 % up to 1.5 T

Two basic platforms:

**HE144**
- Resolution in the order mT
- Low noise
- Wide temperature range
- Typical 1000 Ohm and 0.2 Volt/Tesla at 1 mA

**HE244**
- Resolution in the order µT
- Very low noise
- Very wide temperature range
- Typical 500 Ohm and 0.2 Volt/Tesla at 2 mA
- Extremely low offset - no offset compensation needed
- Very low temperature coefficient

Package types:
- SMD, lead frame, wired, ceramic

Temperature ranges:
- Standard range: up to 180°C
- Extended range: up to 250°C
3-dimensional Hall sensor

Makes it possible to measure both magnetic field strength and 3D direction using one sensor. All axes crosses in the same center point. Axes do not influence each other and they are separately accessible without PHE errors.

Some typical applications for our Hall sensors:

- Magnetic field measurements
- Position sensing
- Rotation sensing
- Movement sensing
- 3D compass
- Pressure measurement
- Precise current and power sensors
- Multi-sensor and differential usage
- Control of motors
- Wind generators
- Oil drill direction measurement
- Measurements in small metal, magnet and ferrite gaps
- Sensing low DC current in strong AC current, as for example in windmills
- NMR, MRI

AST can offer custom made packages

- to improve performance in customer applications
- to optimize for customer production
- We can for example make packages down to 0,4 mm thickness, ceramic packages for high temp applications, integrate temperature sensors...
Available in two basic platforms:

HE144
- Platform: HE144
- Size: 3.0 x 3.0 mm
- Max thickness: 0.70 mm
- Only on request

HE244
- Platform: HE244
- Size: 3.0 x 3.0 mm
- Max thickness: 1.0 mm
- Only on request

VERTICAL SMD version
- HE144SV
  - Size: 3.0 x 3.0 mm
  - Max thickness: 0.70 mm
- Only on request

HE244SV
- Size: 3.0 x 3.0 mm
- Max thickness: 1.0 mm

SMD version
- HE144SH
  - Size: 3.0 x 3.0 mm
  - Max thickness: 0.50 mm
- HE144SV
  - Size: 3.0 x 3.0 mm
  - Max thickness: 0.70 mm

TWISTED WIRE version
- HE144T / HE144HT
  - Identical to HE144S, 200 mm twisted wires attached
  - Other lengths on demand
- HE244T / HE244HT
  - Identical to HE244S, 200 mm twisted wires attached
  - Other lengths on demand

SOLDER PAD version
- HE144S
  - Size: 3.0 x 5.0 mm
  - Max thickness: 0.45 mm
- HE244S
  - Size: 3.0 x 5.0 mm
  - Max thickness: 0.80 mm

3D HALL SENSOR PACKAGES:
All 3D Hall sensors are based on the HE244 platform x 3

HE444
- Size: 3.3 mm - cubic

HE444T
- Size: 3.3 mm - cubic
- 200 mm twisted wires attached

HE444 with T-PCB
- Size: 3.3 mm - cubic
- Mounted on T-shaped PCB

Detailed drawings showing the exact position of the magnetic center are available upon request.
### Electrical specifications

<table>
<thead>
<tr>
<th></th>
<th>HE144 series</th>
<th>HE244 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advised supply current</td>
<td>0.1 to 2.0 mA</td>
<td>0.2 to 4.0 mA</td>
</tr>
<tr>
<td>Recommended 1.0 mA*</td>
<td></td>
<td>recommended 2.0 mA*</td>
</tr>
<tr>
<td>Open-circuit Hall voltage</td>
<td>typical 200 mV</td>
<td>typical 200 mV</td>
</tr>
<tr>
<td>@ I=1 mA</td>
<td>@ I=1 mA</td>
<td>@ I=2 mA</td>
</tr>
<tr>
<td>Temperature coefficient of open-circuit Hall voltage</td>
<td>typical -0.015 %/K</td>
<td>typical -0.015 %/K</td>
</tr>
<tr>
<td>@ I=1 mA</td>
<td>@ I=2 mA</td>
<td></td>
</tr>
<tr>
<td>Ohmic offset voltage</td>
<td>≤± 12 mV @ I=1 mA</td>
<td>≤± 250 µV @ I=1 mA</td>
</tr>
<tr>
<td>@ I=1 mA</td>
<td>typical 10 mV **</td>
<td>≤± 500 µV @ I=2 mA</td>
</tr>
<tr>
<td>Temperature coefficient of ohmic offset voltage</td>
<td>typical 6.7 µT/K</td>
<td>typical &lt;± 0.5 µV/K</td>
</tr>
<tr>
<td>@ I=1 mA</td>
<td>@ I=2 mA</td>
<td></td>
</tr>
<tr>
<td>Linearity of Hall voltage at advised currents</td>
<td>≤± 0.2 %</td>
<td>≤± 0.2 %</td>
</tr>
<tr>
<td>B=± 0 to 1 T</td>
<td>typical ≤± 0.1 %</td>
<td>typical ≤± 0.1 %</td>
</tr>
<tr>
<td>B=± 1 to 2.4 T</td>
<td>Limit not specified</td>
<td>Limit not specified</td>
</tr>
<tr>
<td>Supply side internal resistance</td>
<td>900 to 1250 Ω</td>
<td>450 to 650 Ω</td>
</tr>
<tr>
<td>B=0 T</td>
<td>typical 1000 Ω</td>
<td>typical 500 Ω</td>
</tr>
<tr>
<td>Hall side internal resistance</td>
<td>900 to 1700 Ω</td>
<td>450 to 850 Ω</td>
</tr>
<tr>
<td>B=0 T</td>
<td>typical 1000 Ω</td>
<td>typical 500 Ω</td>
</tr>
<tr>
<td>Thermal conductivity in air</td>
<td>≥ 1.5 mW/K</td>
<td>≥ 1.5 mW/K</td>
</tr>
<tr>
<td>Thermal conductivity soldered</td>
<td>≥ 2.2 mW/K</td>
<td>≥ 2.2 mW/K</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>Tested up to 200 kHz</td>
<td>Not specified yet</td>
</tr>
</tbody>
</table>

* Optimal signal to noise ratio
** Variations within the same production batch are very small.

### Absolute maximum ratings

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<tr>
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<th>HE144 series</th>
<th>HE244 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply current</td>
<td>5 mA</td>
<td>10 mA</td>
</tr>
<tr>
<td>Operating temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-version</td>
<td>-40 to +170 °C</td>
<td>N/A</td>
</tr>
<tr>
<td>T-version, SH-version</td>
<td>-40 to +125 °C</td>
<td>-40 to +125 °C</td>
</tr>
<tr>
<td>HT-version</td>
<td>-40 to +200 °C</td>
<td>-40 to +200 °C</td>
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</tbody>
</table>

For low temperature applications, contact us for more information.

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