### Linear Hall Effect Sensor IC

**Features:**
- Wide operating range 3.0~12V, -40°C~125°C
- Flat Response to 23kHz
- High Sensitivity 8.3 mV/G
- Wide sensible magnetic field range on different supplied voltage
  - ±200 Gauss on 5V supplied voltage
  - ±500 Gauss on 12V supplied voltage. Low operating current 3mA
- Two package styles TO-92S/SOT-23 available.
- Built-in temperature compensated circuit to minimize temperature’s effect

**Functional Description:**

The W138 integrates Hall sensing element, linear amplifier, sensitivity controller and emitter follower output stage. It accurately tracks extremely small change in magnetic flux density—generally too small to operate Hall effect switch.

W138 can be applied as current sensor, tooth sensor, proximity detectors and motion detectors. As sensitive monitor of magnetic flux, it can effectively measure a system’s performance with negligible system loading while providing isolation from contaminated and electrically noisy environments.

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**Electrical Characteristics:**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>Vcc</td>
<td>—</td>
<td>3.0</td>
<td></td>
<td>12</td>
<td>V</td>
</tr>
<tr>
<td>Supply Current</td>
<td>Isupply</td>
<td>B=0 Gauss</td>
<td>3.0</td>
<td>5.0</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Quiescent Vout</td>
<td>V0G</td>
<td>B=0 G (A Grade)</td>
<td>2.4</td>
<td>2.5</td>
<td>2.6</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B=0 G (B Grade)</td>
<td>2.3</td>
<td>2.5</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>△Vout</td>
<td>B= 0 to ± 200 G</td>
<td>7.4</td>
<td>8.3</td>
<td>9.2</td>
<td>mV/G</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>BW</td>
<td>—</td>
<td>23</td>
<td></td>
<td></td>
<td>kHz</td>
</tr>
<tr>
<td>Measurable Guass Range</td>
<td>MGR</td>
<td>Vdd=5V</td>
<td>±200</td>
<td></td>
<td></td>
<td>Guass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vdd=12V</td>
<td>±500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Drift</td>
<td>△Vout</td>
<td>B=0 Gauss</td>
<td>±1.0</td>
<td></td>
<td></td>
<td>mV/°C</td>
</tr>
</tbody>
</table>

All output-voltage measurements are made with a voltmeter having an input impedance of at least 100kΩ.

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Characteristic Diagrams:

**WSH138 Sensitivity standardization of 30°C VS. Temperature**

| Temperature (°C) | Ratio  
|------------------|--------
| -40              | 0.877  
| -30              | 0.929  
| -20              | 0.973  
| -10              | 0.997  
| 0                | 1.013  
| 10               | 1.019  
| 20               | 1.016  
| 30               | 1.000  
| 40               | 0.986  
| 50               | 0.961  
| 60               | 0.933  
| 70               | 0.901  
| 80               | 0.866  
| 90               | 0.829  
| 100              | 0.786  
| 110              | 0.743  
| 120              | 0.698  
| 130              | 0.629  

**WSH138 Vout vs. Magnetic field with Vdd 5V**

\[ y = 0.0072x + 2.5217 \]

\[ R^2 = 0.9994 \]

**WSH138 Vout vs. Magnetic field with Vdd 3.3V**

\[ y = 0.0054x + 1.7188 \]

\[ R^2 = 0.9982 \]

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