Features

- Non-contacting sensor technology
- Programmable output characteristic

Introduction

Bourns® Non-contacting Angle Sensor is based on a two-axis Hall sensor element. The rotor is connected to a magnet that is mounted above the sensor ASIC-chip. Its angular position is measured and an output signal proportional to the rotor orientation is generated. The output characteristic can be programmed to meet specific customer specification.

Electrical Specifications (Prototype Samples)

Absolute Maximum Ratings:
Supply Voltage, $V_{dd}$ (Overvoltage) ..................................................................................................................................................... 20 V
Reverse Voltage Protection ...............................................................................................................................................................-10 V
Positive Output Voltage .........................................................................................................................................10 V, 14 V during 200 s
Positive Output Current, $I_{OUT}$ (Pull Down) ....................................................................................................................................... 20 mA
Reverse Output Voltage ...........................................................................................................................................-0.3 V
Reverse Output Current ................................................................................................................................................................... 50 mA
Operating Temperature, $T_A$ ....................................................................................................................................-40 °C to +150 °C
Storage Temperature Range, $T_s$ ....................................................................................................................................-40 °C to +150 °C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Comment</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Supply Voltage</td>
<td>$V_{dd}$</td>
<td>Programmable</td>
<td>4.5</td>
<td>5</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>Supply Current</td>
<td>$I_{dd}$</td>
<td>Programmable</td>
<td></td>
<td>10</td>
<td>16</td>
<td>mA</td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_{out}$</td>
<td>Pull-up to 14 V, Pull-up to 5 V (if required, the Output Signal of the sensor can be programmed as analog, PWM or pull-down to GND)</td>
<td>-8</td>
<td>8</td>
<td>14</td>
<td>mA</td>
</tr>
<tr>
<td>Output Load</td>
<td>$R_l$</td>
<td>Programmable</td>
<td>3.3</td>
<td>5.6</td>
<td>10</td>
<td>kΩ</td>
</tr>
<tr>
<td>Step Response Time</td>
<td>$T_s$</td>
<td>Programmable</td>
<td></td>
<td>300</td>
<td>500</td>
<td>μs</td>
</tr>
<tr>
<td>Watchdog</td>
<td>$W_d$</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>ms</td>
</tr>
<tr>
<td>Start-up Cycle</td>
<td>$T_{su}$</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>ms</td>
</tr>
<tr>
<td>Broken $V_{SS}$</td>
<td>&lt; 10k</td>
<td>Pull-up to 14 V, Pull-up to 5 V</td>
<td></td>
<td></td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>Broken $V_{dd}$</td>
<td>$V_{dd}$-100</td>
<td>Pull-up to 14 V, Pull-up to 5 V</td>
<td></td>
<td></td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>Clamp Low</td>
<td>Programmable</td>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Clamp High</td>
<td>Programmable</td>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>$R$</td>
<td>Over 360 °</td>
<td></td>
<td>&lt; 0.1</td>
<td></td>
<td>°</td>
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<tr>
<td>Linearity Error</td>
<td>$L_e$</td>
<td>Over -178 ° to 178 °</td>
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<td>0.6</td>
<td></td>
<td>%</td>
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<tr>
<td>Linearity Error</td>
<td>$L_e$</td>
<td>Over 0 ° to 94.5 °</td>
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<td>0.6</td>
<td></td>
<td>%</td>
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Electrical Connections

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<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>GND1</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>$V_{dd}$</td>
<td>4.5</td>
<td>5</td>
<td>5.5</td>
<td>V</td>
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<td>3</td>
<td>Output1</td>
<td>0.15</td>
<td>4.85</td>
<td>V</td>
<td></td>
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<tr>
<td>4</td>
<td>Output2</td>
<td>0.15</td>
<td>4.85</td>
<td>V</td>
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</tbody>
</table>

Programmable Items

The output of the sensor is programmable to offer an analog or PWM output, selectively. Furthermore, it can be programmed for offset, gain and clamping to meet any rotary position sensor output transfer characteristic.

The angular range is adaptable from 20 ° to 360 °.
Non-Contacting Angle Sensor

Product Dimensions

Specifications are subject to change without notice. Customers should verify actual device performance in their specific applications.
Non-Contacting Angle Sensor

### Pull-up Resistance Circuit

- **Vdd**
- **GND**
- **Output**

- Measuring point
- $R = 10 \, \text{k\Omega}$
- Pull-up resistance
- $V_{\text{Pull-up}} = 5 \, \text{V}$

### Characteristic Curve for a TPS Sensor (Example)

#### Characteristics Curve EGas (105 °)

- $U_a = 0.9524 \times \alpha + 5$

#### Calibration Points:

- I: (0.0 ° / 5.0 %)
- II: (31.5 ° / 33.0 %)
- III: (63.0 ° / 65.0 %)
- IV: (94.5 ° / 95.0 %)

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### Specifications

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