Solid State Sensors
Hall Effect Gear Tooth Sensors

FEATURES
- Senses ferrous metal targets
- Digital current sinking output (open collector)
- Better signal-to-noise ratio than variable reluctance sensors, excellent low speed performance, output amplitude not dependent on RPM
- Sensor electronically self-adjusts to slight variations in runout and variations in temperature, simplifying installation and maintenance
- Fast operating speed – over 100 kHz
- EMI resistant
- Reverse polarity protection and transient protection (integrated into Hall I.C.)
- Wide continuous operating temperature range (−40° to 150°C), short term to 160°C

GENERAL INFORMATION
1GT1 Series Gear Tooth Sensors use a magnetically biased Hall effect integrated circuit to accurately sense movement of ferrous metal targets. This specially designed I.C., with discrete capacitor and bias magnet, is sealed in a probe type package for physical protection and cost effective installation.

Units will function from a 4.5 to 24 VDC power supply. Output is digital, current sinking (open collector). Reverse polarity protection is standard. If power is inadvertently wired backwards, the sensor will not be damaged. Built-in protection against pulsed transients to +60V, −40V is also included.

Optimum sensor performance is dependent on the following variables which must be considered in combination:
- Target material, geometry, and speed
- Sensor/target gap
- Ambient temperature
- Magnetic material in close proximity

TYPICAL APPLICATIONS
Automotive and Heavy Duty Vehicles:
- Camshaft and crankshaft speed/position
- Transmission speed
- Tachometers
- Anti-skid/traction control

Industrial:
- Sprocket speed
- Chain link conveyor speed and distance
- Stop motion detector
- High speed low cost proximity
- Tachometers, Counters

GT1 ORDER GUIDE

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1GT101DC</td>
<td>Gear Tooth Sensor</td>
</tr>
</tbody>
</table>

MOUNTING DIMENSIONS (For reference only)
Solid State Sensors
Hall Effect Gear Tooth Sensors

SENSOR SPECIFICATIONS
All values were measured using 1 K pull-up resistor.

<table>
<thead>
<tr>
<th>Electrical Characteristics</th>
<th>Supply Voltage</th>
<th>4.5 to 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supply Current</td>
<td>10 mA typ., 20 mA max.</td>
</tr>
<tr>
<td></td>
<td>Output Voltage (output low)</td>
<td>0.4 V max.</td>
</tr>
<tr>
<td></td>
<td>Output Current (output high)</td>
<td>10 µA max. leakage into sensor</td>
</tr>
<tr>
<td></td>
<td>Switching Time Rise (10 to 90%)</td>
<td>15 µsec. max.</td>
</tr>
<tr>
<td></td>
<td>Fall (90 to 10%)</td>
<td>1.0 µsec. max.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Absolute Maximum Ratings*</th>
<th>Supply Voltage (Vs)</th>
<th>±30 VDC continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage Externally Applied To Output (output high)</td>
<td>–0.5 to +30 V</td>
</tr>
<tr>
<td></td>
<td>Output Current</td>
<td>40 mA sinking</td>
</tr>
<tr>
<td></td>
<td>Temperature Range Storage</td>
<td>–40 to 150° (–40 to 302°F)</td>
</tr>
<tr>
<td></td>
<td>Operating</td>
<td>–40 to 150°C (–40 to 302°F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switching Characteristics**</th>
<th>Operate Point</th>
<th>3.7 ± 1.25° (3.28 ± 1.13 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Release Point</td>
<td>4.7 ± 2.50° (4.16 ± 2.21 mm)</td>
</tr>
<tr>
<td></td>
<td>Differential Travel</td>
<td>8.4 ± 3.70° (7.45 ± 3.34 mm)</td>
</tr>
</tbody>
</table>

* As with all solid state components, sensor performance can be expected to deteriorate as rating limits are approached; however, sensors will not be damaged unless the limits are exceeded.

** See Reference Target table.

TARGET GUIDELINES
The Target Guidelines table provides basic parameters when an application is not restricted to a specific target.

Any target wheel that exceeds the following minimum specifications can be sensed over the entire temperature range of –40° to 150°C with any sensing gap up to .080 in. (2.0 mm). This data is based on a 4 in. (102 mm) diameter wheel, rotating 10 to 3600 RPM.

Reference Target Dimensions
Tooth Height: .200 in. (5.06 mm) min.
Tooth Width: .100 in. (2.54 mm) min.
Tooth Spacing: .400 in. (10.16 mm) min.
Target Thickness: .250 in. (6.35 mm)

Sensor Output (with pull-up resistor added to output circuit)

REFERENCE TARGET/CONDITIONS
Characteristics will vary due to target size, geometry, location, and material. Sensor specifications were derived using a cold-rolled steel reference target. See table, right, for reference target configuration and evaluation conditions.

Target
Diameter: 4 in. (101.6 mm)
Tooth Width: .350 in. (8.89 mm)
Thickness: .250 in. (6.35 mm)

Test Conditions
Air Gap: .040 to .080 in. (1.02 to 2.03 mm)
V Supply: 4.5 to 24 V
RPM: 10 min., 3600 max.