65037 HIGH RELIABILITY BACK BIASED HALL EFFECT STUD, NON-LATCHING OUTPUT, INTEGRAL CONNECTOR

09/05/06

Features:
- Wide operating temperature range -55 °C to +150°C
- High magnetic sensitivity
- Wide operating voltage range 18 to 32 V
- Chopper stabilized amplifier minimizes amplifier offset resulting in improved temperature stability
- MIL-STD-202 and MIL-STD-461E Qualified

Applications:
- Proximity sensing of Ferrous targets
- Gear tooth sensing
- Speed sensing
- Angular Position sensing
- Linear Position Sensing

DESCRIPTION
The 65037 Hall effect stud sensor detects the presence of a ferrous material and provides a switched output. The sensor switches LOW in the presence of a ferrous target and switches HIGH when the target is removed. The sensor is built into a threaded stainless steel tube and contains a single element Hall effect IC with an integral Samarium Cobalt magnet and pole piece to optimize sensor performance. Additional circuitry is added to expand the operating supply voltage range and provide surge protection against outside induced transients.

ABSOLUTE MAXIMUM RATINGS
Supply Voltage Range ......................................................................................................................................... 18.0 V to 32.0 V
Supply Current (Fault) .........................................................................................................................................………... 30 mA.
Power Dissipation, @ T_\text{A} = 25°C (P_D) .........................................................................................................100 mW
Output Current (Fault) ………………………………………………………………………………………………………….....20 mA
Storage Temperature .........................................................................................................................................……... -65°C to +150°C
Operating Free-Air Temperature Range ..............................................................................................................-55°C to +150°C

Package Dimensions

0.070 X 0.035 KEYWAY

2.500 MAX

1.975

0.469

HARDWARE SUPPLIED SEPARATELY, NOT ASSEMBLED TO THE PART.
TOLERANCE: ±0.010 UNLESS OTHERWISE SPECIFIED. ALL DIMENSIONS ARE IN INCHES.

Schematic Diagram
09/05/06

ELECTRICAL CHARACTERISTICS

\( T_A = 25^\circ C \) unless otherwise specified.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>( V_{CC} )</td>
<td>18.0</td>
<td></td>
<td>32.0</td>
<td>V</td>
<td>Continuous Operating</td>
</tr>
<tr>
<td>Supply Current</td>
<td>( I_{CC} )</td>
<td></td>
<td></td>
<td>30</td>
<td>mA</td>
<td>( V_{CC} = 28.0 ) V</td>
</tr>
<tr>
<td>Output Saturation Voltage</td>
<td>( V_{OL} )</td>
<td>0.9</td>
<td></td>
<td>1.0</td>
<td>V</td>
<td>( V_{CC} = 28 ) V, ( I_{OL} = 20 ) mA</td>
</tr>
<tr>
<td>Output Leakage Current</td>
<td>( I_{OH} )</td>
<td></td>
<td></td>
<td>100</td>
<td>( \mu A )</td>
<td>( V_{CC} = 28 ) V, Output High</td>
</tr>
<tr>
<td>Power on Response Time</td>
<td>( t_{ON} )</td>
<td>20</td>
<td></td>
<td></td>
<td>ms</td>
<td>( V_{CC} &gt; 18 ) V</td>
</tr>
</tbody>
</table>

MAGNETIC CHARACTERISTICS

\( T_A = 25^\circ C \)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta ) Field Change for Sensing</td>
<td>( \Delta B )</td>
<td>120</td>
<td></td>
<td></td>
<td>G</td>
<td>Target Present to Removed</td>
</tr>
<tr>
<td>Operating Air Gap</td>
<td>AG</td>
<td>0.25</td>
<td></td>
<td>2.03</td>
<td>mm</td>
<td>Output Switching</td>
</tr>
<tr>
<td>Polarity</td>
<td>P</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td>Ferrous Target Present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td>Ferrous Target Removed</td>
</tr>
</tbody>
</table>

NOTES:
1. Operating Air Gap is dependant on magnetic properties of target. A high grade A2 steel target was used for datasheet characterization. A high end magnet incorporated into the target can increase operating Air Gap by a factor of 5 or more.

Qualified to the following requirements:

Environmental

- MIL-STD-202 METHOD 105C Altitude, Test Condition B
- MIL-STD-202 METHOD 214A Random Vibration, 3 Hrs/Axis
- 3 Impact Shocks, 6 Orthogonal Axis Mechanical Shock, 20 G’s for 11 seconds
- MIL-STD-202 METHOD 103B Humidity, Condition B, 96 Hours
- MIL-STD-202 METHOD 109C Explosive Atmosphere
- MIL-STD-202 METHOD 110A Sand and Dust
- ASTM G85.A4 Salt Spray, SO\(_2\), 336 Hours
- MIL-STD-202 METHOD 112 Helium Leak Test, \(< 1 \times 10^{-6}\) Torr, Condition D
- MIL-STD-202 METHOD 107G Thermal Shock, -65°C to +125°C

EMI / EMC

- MIL-STD-461E RS103 Radiated Susceptability, 200 V/m (30 MHz to 18 GHz)
- MIL-STD-461E CS114 Conducted Susceptability, Limit Curve 5
- MIL-STD-461E CS115 Conducted Susceptability, \( I_{MAX} \) 5 A
- MIL-STD-461E CS116 Conducted Susceptability, \( I_{MAX} \) 10 A

Lightning Strike

- RTCA DO-160 Section 22, Waveform A Induced Indirect Differential Transient, 70 V or 5 A
65037
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ORDERING INFORMATION:

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>65037-001</td>
<td>Commercial</td>
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<tr>
<td>65037-101</td>
<td>Screened</td>
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</tbody>
</table>

TARGET

HEAD-ON MOTION

TURN OFF HEAD-ON MOTION

TURN ON HEAD-ON MOTION

SLIDE-BY MOTION

TARGET

TURN OFF

TURN ON

SWITCH DIAMETER

Ø0.470