High-Sensitive Unipolar Hall Effect Switch CYD9639

Applications
- Automotive brake pedal position detection
- Proximity detection
- Speed measurement
- Weak magnetic field applications
- Solid state switches etc.

Features
- 3.8V to 24V operation voltage
- High accuracy unipolar switch
- Built-in dynamic offset cancellation
- Open drain output
- Low thermal drift of magnetic sensing

Order Information
- CYD9639-PA-T
  - Package (PA): UA, LH or LT
  - Temperature (T): A or K

Absolute Maximum Ratings (TA=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum supply voltage</td>
<td>V_DDMAX</td>
<td>TO-92 (UA)</td>
<td>28</td>
<td>V</td>
</tr>
<tr>
<td>Allowable power dissipation</td>
<td>P_D</td>
<td>SOT-23-3L(LH)</td>
<td>300*</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOT-89-3L(LT)</td>
<td>500*</td>
<td>mW</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>T_A</td>
<td>Suffix ‘A’</td>
<td>-40~+150</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suffix ‘K’</td>
<td>-40~+125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>T_S</td>
<td></td>
<td>-55~+150</td>
<td>°C</td>
</tr>
<tr>
<td>Maximum output current</td>
<td>I_OMAX</td>
<td></td>
<td>50</td>
<td>mA</td>
</tr>
</tbody>
</table>

Electrical Characteristics (TA=25°C, V_DD=12VDC)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>V_DD</td>
<td></td>
<td>3.8</td>
<td>24</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output sink voltage</td>
<td>V_O(LON)@I_OUT = 20mA</td>
<td></td>
<td>130</td>
<td>280</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Output leakage current</td>
<td>I_OH</td>
<td>Output switch off</td>
<td>0.1</td>
<td>1</td>
<td>µA</td>
<td></td>
</tr>
<tr>
<td>Output breakdown voltage</td>
<td>V_BV</td>
<td></td>
<td>28</td>
<td>30</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply current</td>
<td>I_DD</td>
<td>Output open</td>
<td>4</td>
<td>6</td>
<td>mA</td>
<td></td>
</tr>
</tbody>
</table>

Magnetic Characteristics (TA=25°C, V_DD=12VDC)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating point</td>
<td>B_OP</td>
<td>-72</td>
<td>-55</td>
<td>-38</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Release point</td>
<td>B_RP</td>
<td>-50</td>
<td>-35</td>
<td>-20</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>B_HYS</td>
<td>15</td>
<td>20</td>
<td>27</td>
<td>G</td>
<td></td>
</tr>
</tbody>
</table>

Magnetic Characteristics (TA=-40°C~+150°C, V_DD=12VDC)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating point</td>
<td>B_OP</td>
<td>-77</td>
<td>-34</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Release point</td>
<td>B_RP</td>
<td>-54</td>
<td>-18</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>B_HYS</td>
<td>10</td>
<td>28</td>
<td>G</td>
<td></td>
</tr>
</tbody>
</table>
General Specifications

The CYD9639 is a high sensitive unipolar Hall Effect switch IC. The built-in dynamic offset cancellation and temperature compensation of pre-amplifier stage achieves accuracy magnetic sensing. The supply voltage range is from 3.8V to 24VDC and the maximum output current is 50mA.

This Hall Effect switch IC integrates a Hall plate, pre-amplifier with dynamic offset cancellation, hysteresis comparator and protection circuit in single chip. The architecture block diagram is shown in Fig. 1.
NOTE:

D0: general diode
C0: decoupling capacitor 1μF (recommended)
R1: 1k~10k Ω
Package Outline
SOT-23(LH)

Sensor Location
Bottom view

Marking:
Part Number : 639  Temperature code : x
Date Code : xx(Year) xx(Week)

1. VDD/DC power supply
2. OUT/output pin
3. GND/DC ground

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>DIMENSIONS IN MILLIMETERS (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN</td>
</tr>
<tr>
<td>A</td>
<td>1.00</td>
</tr>
<tr>
<td>A1</td>
<td>0.00</td>
</tr>
<tr>
<td>A2</td>
<td>0.70</td>
</tr>
<tr>
<td>b</td>
<td>0.35</td>
</tr>
<tr>
<td>C</td>
<td>0.10</td>
</tr>
<tr>
<td>D</td>
<td>2.70</td>
</tr>
<tr>
<td>E</td>
<td>1.40</td>
</tr>
<tr>
<td>F</td>
<td>0.35</td>
</tr>
<tr>
<td>H</td>
<td>2.60</td>
</tr>
<tr>
<td>e</td>
<td>1.7</td>
</tr>
<tr>
<td>L</td>
<td>0.20</td>
</tr>
</tbody>
</table>
## Package Outline

**SOT-89(LT)**

### Sensor Location

- **Bottom view**
- **0.95mm**

### Marking:
- **Part Number:** 639
- **Temperature code:** x
- **Date Code:** xx(Year) xx(Week)

### Dimensions in Millimeters (mm)

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>MIN</th>
<th>NOM</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.40</td>
<td>1.50</td>
<td>1.60</td>
</tr>
<tr>
<td>B</td>
<td>0.44</td>
<td>0.50</td>
<td>0.56</td>
</tr>
<tr>
<td>B1</td>
<td>0.36</td>
<td>0.42</td>
<td>0.48</td>
</tr>
<tr>
<td>C</td>
<td>0.35</td>
<td>0.40</td>
<td>0.44</td>
</tr>
<tr>
<td>D</td>
<td>4.40</td>
<td>4.50</td>
<td>4.60</td>
</tr>
<tr>
<td>D1</td>
<td>1.52</td>
<td>1.67</td>
<td>1.83</td>
</tr>
<tr>
<td>E</td>
<td>2.30</td>
<td>2.45</td>
<td>2.60</td>
</tr>
<tr>
<td>E1</td>
<td>2.13</td>
<td>2.21</td>
<td>2.29</td>
</tr>
<tr>
<td>e</td>
<td>-</td>
<td>1.50</td>
<td>-</td>
</tr>
<tr>
<td>e1</td>
<td>-</td>
<td>3.00</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>3.94</td>
<td>4.10</td>
<td>4.25</td>
</tr>
<tr>
<td>L</td>
<td>0.89</td>
<td>1.05</td>
<td>1.20</td>
</tr>
</tbody>
</table>