HALL EFFECT SWITCHES

FEATURES

- 4.5V to 24V Operation
- High Reliability—No Moving Parts
- Constant Output Amplitude
- Output Compatible with All Digital Logic Families
- Superior Temperature Stability
- Highly Resistant to Physical Stress

Type 3120 Hall Effect switches are highly temperature-stable and stress-resistant sensors best utilized in applications that provide steep magnetic slopes and require precise switch points. The magnetically activated integrated circuits are available with two operating temperature ranges and with several package options.

Each Hall Effect circuit includes a voltage regulator, quadratic Hall voltage generator, temperature stability circuit, signal amplifier, Schmitt trigger, and open-collector output on a single silicon chip. The on-board regulator permits operation with supply voltages of 4.5 to 24 V. The switches' output can sink up to 20 mA at a conservatively-rated repetition rate of 100kHz. They can be used directly with bipolar or MOS logic circuits. Selected devices, with outputs capable of sinking 50 mA, are available on special order.

Types UGN-3120T and UGN-3120U are rated for operation over the temperature range of -20°C to +85°C. Types UGS-3120T and UGS-3120U have an operating range of -40°C to +125°C.

The Hall Effect switches are offered in two three-pin plastic packages—a 60-mil (1.54 mm) magnetically-optimized "U" package, and one 40-mil (1.02 mm) thick specified by the suffix "T".

Type 3120 is also available in SOT 89 (TO-243AA) for surface-mount applications as UGN-3120L and UGS-3120L, and in a hermetically sealed three-pin ceramic package. The high-temperature hermetic device (UGS3120H) can be supplied with Sprague Hykelt screening as UGS-3120HH. For more information on surface-mount and hermetic switches, contact the factory.

ABSOLUTE MAXIMUM RATINGs

- Power Supply, Vcc .................................. 25V
- Magnetic Flux Density, B .............................. Unlimited
- Output OFF Voltage ................................. 25V
- Output ON Current, I<sub>sink</sub> .................. 25mA
- Operating Temperature Range, T<sub>a</sub> .................
  UGN-3120T ................................ -20°C to +85°C
  UGN-3120U ................................ -20°C to +85°C
  UGS-3120T ................................ -40°C to +125°C
  UGS-3120U ................................ -40°C to +125°C
- Storage Temperature Range, T<sub>s</sub> ................
  -65°C to +150°C *

*Devices can be stored at +25°C for short periods of time.
**ELECTRICAL CHARACTERISTICS** at $T_A = +25^\circ C$, $V_{CC} = 4.5$ V to 24 V (unless otherwise noted)

<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>$V_{CC}$</td>
<td></td>
<td>4.5</td>
<td>24</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Output Saturation Voltage</td>
<td>$V_{CE(SAT)}$</td>
<td>$B = 200G$, $I_{SINK} = 20mA$</td>
<td></td>
<td>150</td>
<td>400</td>
<td>mV</td>
</tr>
<tr>
<td>Output Leakage Current</td>
<td>$I_{OFF}$</td>
<td>$B = 50G$, $V_{OUT} = 24V$</td>
<td></td>
<td>0.05</td>
<td>10</td>
<td>μA</td>
</tr>
<tr>
<td>Supply Current</td>
<td>$I_{CC}$</td>
<td>$B = 50G$, $V_{CC} = 4.5V$, Output Open</td>
<td></td>
<td>4.7</td>
<td>8.0</td>
<td>mA</td>
</tr>
<tr>
<td>Output Rise Time</td>
<td>$t_r$</td>
<td>$V_{CC} = 12V$, $R_L = 820\Omega$, $C_L = 20pF$</td>
<td></td>
<td>0.04</td>
<td>2.0</td>
<td>μs</td>
</tr>
<tr>
<td>Output Fall Time</td>
<td>$t_f$</td>
<td>$V_{CC} = 12V$, $R_L = 820\Omega$, $C_L = 20pF$</td>
<td></td>
<td>0.18</td>
<td>2.0</td>
<td>μs</td>
</tr>
</tbody>
</table>

**MAGNETIC CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>$T_A = +25^\circ C$</th>
<th>$T_A = -20^\circ C$ to $+85^\circ C$</th>
<th>$T_A = -40^\circ C$ to $+125^\circ C$</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate Point</td>
<td>$B_{OP}$</td>
<td>Min.</td>
<td>Max.</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>$B_{H}$</td>
<td></td>
<td>20</td>
<td>350</td>
<td>70</td>
<td>425</td>
</tr>
</tbody>
</table>

**TEST CIRCUIT**

![Test Circuit Diagram](image1)

*Includes probe and test fixture capacitance.

**SENSOR LOCATION**

![Sensor Location Diagram](image2)

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TYPICAL CHARACTERISTICS
AS FUNCTIONS OF TEMPERATURE

OPERATE POINT

AMBIENT TEMPERATURE IN °C

RELEASE POINT

AMBIENT TEMPERATURE IN °C

OUTPUT SATURATION VOLTAGE

AMBIENT TEMPERATURE IN °C

SUPPLY CURRENT

AMBIENT TEMPERATURE IN °C

GUIDE TO INSTALLATION

1. All Hall Effect integrated circuits are susceptible to mechanical stress effects. Caution should be exercised to minimize the application of stress to the leads or the epoxy package. Use of epoxy glue is recommended. Other types may deform the epoxy package.

2. To prevent permanent damage to the Hall cell, heatsink the leads during hand-soldering. Recommended maximum conditions for wave soldering are shown in the graph at right. Solder flow should be no closer than 0.125" (3.18 mm) to the epoxy package.
'T' PACKAGE

DIMENSIONS IN INCHES

DIMENSIONS IN MILLIMETERS

'U' PACKAGE

DIMENSIONS IN INCHES

DIMENSIONS IN MILLIMETERS

In the construction of all the components described, it is the intent of the manufacturer to supply the wanted material in accordance with S. L. 

The S. L. E. E. C. (S. L. E. E. C.) assumes no responsibility for errors or omissions in this work. If errors or omissions are found, the company reserves the right to make such changes as may be necessary without notice.

NOTES:
1. Ejector pin indent is centrally located.
2. Tolerances on package height and width represent allowable mold offsets. Dimensions given are measured at the widest point (parting line).
3. Tolerances, unless otherwise specified, are ± 0.005" (0.13 mm) and ± 1/32".