

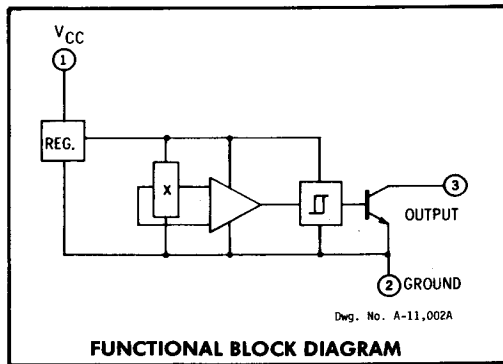
UGN-3075T/U AND UGS-3075T/U BIPOLAR HALL EFFECT DIGITAL LATCHES

FEATURES

- Operable with Inexpensive Multipole Ring Magnets
- High Reliability — No Moving Parts
- Small Size
- Output Compatible with All Digital Logic Families
- Symmetrical Output
- High Hysteresis Level Minimizes Stray-Field Problems

THESE MAGNETICALLY-ACTIVATED, solid-state latches are designed for use with inexpensive multipole ring magnets and brushless d-c motors. They provide effective, reliable interface between electromechanical equipment and bipolar or MOS logic circuits at switching frequencies of up to 100 kHz.

The bipolar output of these devices saturates when the Hall cell is exposed to a magnetic flux density greater than the ON threshold (100 G typical, 250 G maximum). The output transistor remains in the ON state until magnetic field reversal exposes the Hall cell to a magnetic flux density below the OFF threshold (−100 G typical, −250 G minimum). Because the operating state switches only with magnetic field reversal, and not merely with a change in its strength, these integrated circuits qualify as true Hall Effect latches.



Type UGN-3075T/U is rated for operation over the temperature range of -20°C to $+85^{\circ}\text{C}$. For applications in more severe environments, Type UGS-3075T/U has an operating temperature range of -55°C to $+125^{\circ}\text{C}$. Both types work with supply voltages of 4.5 to 24 V.

Both Hall Effect latches are supplied in either the 80-mil (2.03 mm) three-pin plastic "T" package or the magnetically optimized 60.5-mil (1.54 mm) three-pin plastic "U" package.

ABSOLUTE MAXIMUM RATINGS

| | |
|------------------------------------|---|
| Power Supply, V_{CC} | 25 V |
| Magnetic Flux Density, B | Unlimited |
| Output OFF Voltage | 25 V |
| Output ON Current, I_{SINK} | 50 mA |
| Operating Temperature Range, T_A | |
| UGS-3075T/U* | -55°C to $+125^{\circ}\text{C}$ |
| UGN-3075T/U | -20°C to $+85^{\circ}\text{C}$ |
| Storage Temperature Range, T_S | -65°C to $+150^{\circ}\text{C}$ |

*Selected devices are available with a maximum T_A rating of $+150^{\circ}\text{C}$.

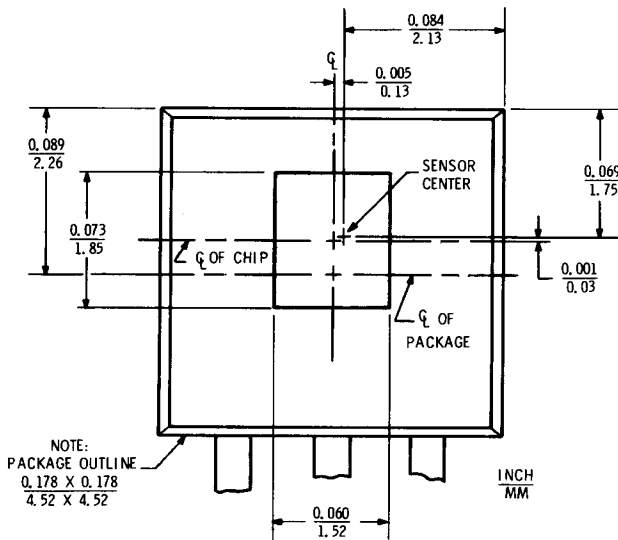
These Hall Effect sensors are also supplied in SOT 89 (TO-243AA) packages for surface-mount applications. The regular SOT-89 package is specified by substituting an "LT" for the last character of the part number. The long leaded SOT 89 package is specified by substituting an "LL" for the last character of the part number and the Low profile "U" package is available by substituting "UA" for the last character of the part number (E. G., UGN3XXXLT, UGN3XXXLL, UGN3XXXUA).

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $V_{CC} = 4.5\text{ V to }24\text{ V}$ (unless otherwise noted)

| Characteristic | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---------------------------|-----------|--|------|------|------|---------------|
| Operate Point* | B_{OP} | | 50 | 100 | 250 | Gauss |
| Release Point* | B_{RP} | | -250 | -100 | -50 | Gauss |
| Hysteresis* | B_H | | 100 | 200 | — | Gauss |
| Output Saturation Voltage | V_{SAT} | $B \approx 250\text{ Gauss}$, $I_{SINK} = 20\text{ mA}$ | — | 85 | 400 | mV |
| Output Leakage Current | I_{OFF} | $B \approx -250\text{ Gauss}$, $V_{OUT} = 24\text{ V}$ | — | 0.2 | 1.0 | μA |
| Supply Current | I_{CC} | $B \approx -250\text{ Gauss}$, $V_{CC} = 24\text{ V}$, Output Open | — | 3.0 | 7.0 | mA |
| Output Rise Time | t_r | $V_{CC} = 12\text{ V}$, $R_L = 820\Omega$, $C_L = 20\text{ pF}$ | — | 100 | — | ns |
| Output Fall Time | t_f | $V_{CC} = 12\text{ V}$, $R_L = 820\Omega$, $C_L = 20\text{ pF}$ | — | 200 | — | ns |

*Magnetic flux density is measured at most sensitive area of device located 0.032" \pm 0.002" (0.81 mm \pm 0.05 mm) below the branded face of the 'T' package and 0.012" \pm 0.002" (0.31 mm \pm 0.05 mm) below the branded face of the 'U' package.

SENSOR-CENTER LOCATION



Dwg. No. A-11,896A

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.

2. To prevent permanent damage to the Hall cell, heat sink the leads during hand soldering. For wave soldering, the part should not experience more than 260°C for more than five seconds. Solder flow should be no closer than 0.125" (3.18 mm) to the epoxy package.

OPERATION

The output transistor is normally OFF when the strength of the magnetic field perpendicular to the surface of the chip is below threshold or the Operate Point. When the field strength exceeds the Operate Point, the output transistor switches ON and is capable of current sinking 50 mA of current.

The output transistor switches OFF when magnetic field reversal results in a magnetic flux density below the OFF threshold. This is illustrated in the transfer characteristics graph.

The simplest form of magnet that will operate Types UGN-3075T/U and UGS-3075T/U is a ring magnet, as shown in Figure 1. Other methods of operation are possible.

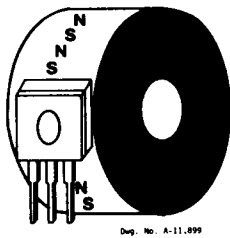


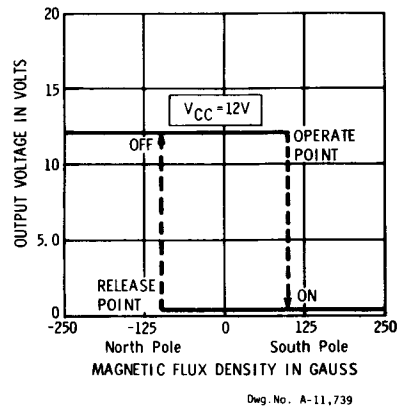
Figure 1

Note that the device latches; that is, a south pole of sufficient strength will turn the device ON. Removal of the south pole will leave the device ON. The presence of a north pole of sufficient strength is required to turn the device OFF.

ACTIVE AREA DEPTH (AAD)

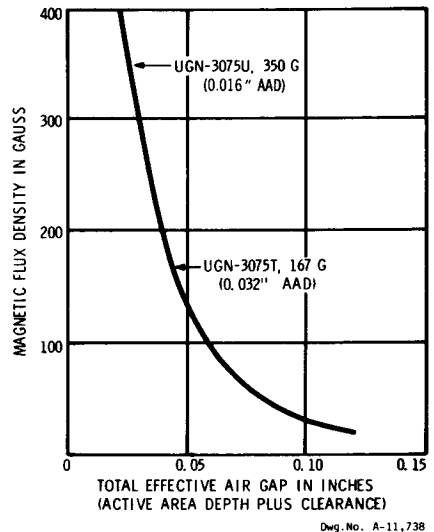
The magnetic flux density is indicated in the operating-points graph for the active area of the device, which is located 0.032" (0.81 mm) below the branded surface of the "T" package and 0.016" (0.4 mm) below the branded surface of the "U" package. Note that, as shown in the plot of magnetic flux density as a function of total effective air gap, the "U" package offers a significant advantage in marginal flux density conditions for certain magnetic configurations.

TYPICAL TRANSFER CHARACTERISTICS



PEAK FLUX DENSITY AS A FUNCTION OF TOTAL EFFECTIVE AIR GAP

Plastic 20-Pole Pair Ring (Radial Poles)
1" (25.4 mm) in diameter
and 0.2" (5.1 mm) long
with 0.01" (0.25 mm) clearance



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