

UGN-3035U HALL EFFECT ASSEMBLY —Magnetically Biased Bipolar Digital Latch

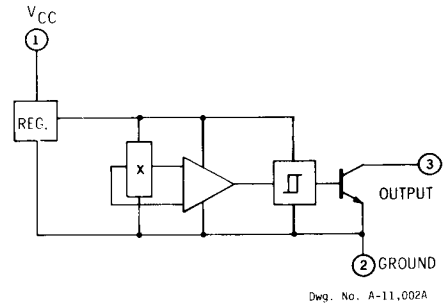
FEATURES

- Extreme Sensitivity
- For Use with Multipole Ring Magnets
- High Reliability—No Moving Parts
- Small Size
- Output Compatible with All Digital Logic Families
- Symmetrical Output

DEVELOPED for use with multipole ring magnets in applications requiring extreme sensitivity to magnetic field reversal, the Type UGN-3035U Hall Effect latch assembly provides rugged, reliable interface between electromechanical equipment and bipolar or MOS logic circuits at switching frequencies of up to 100 kHz.

The bipolar output of the magnetically biased device saturates when the Hall cell is exposed to a magnetic flux density greater than the ON threshold (25 G typical, 50 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 (–25 G typical, –50 G minimum). Because the operating state switches only with magnetic field reversal, and not merely with a change in its strength, the integrated circuit qualifies as a true Hall Effect latch.

Each circuit consists of a voltage regulator, Hall voltage generator, signal amplifier, Schmitt trigger circuit, and an open-collector output driver on a sin-



FUNCTIONAL BLOCK DIAGRAM

gle silicon chip. The on-board regulator permits operation over a wide range of supply voltages. The components of the monolithic circuit are carefully matched to provide accurate operation with wide variations in temperature.

The Type UGN-3035U assembly is a single-output Hall Effect digital latch in a three-pin plastic "U" package with a bias magnet (0.065" or 1.65 mm long) epoxy-glued to its rear surface.

Note that the operational symmetry of this sensitive device will be lost if the latch is exposed to magnetic flux density greater than 500 Gauss. Symmetry can also be affected by ferrous materials near the assembly.

ABSOLUTE MAXIMUM RATINGS

Power Supply, V_{CC}	25 V
Magnetic Flux Density, B	500 G
Output OFF Voltage	25 V
Output ON Current, I_{SINK}	25 mA
Operating Temperature Range, T_A	–20°C to +85°C
Storage Temperature Range, T_S	–65°C to +150°C

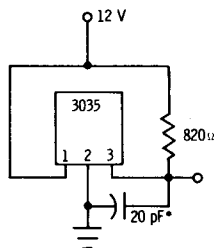
*Selected devices are available with a maximum T_A rating of +150°C.

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	Limits			
			Min.	Typ.	Max.	Units
Operate Point*	B_{OP}		—	+ 25	+ 50	Gauss
Release Point*	B_{RP}		- 50	- 25	—	Gauss
Hysteresis*	B_H		20	50	—	Gauss
Output Saturation Voltage	V_{SAT}	$B \geq +50\text{ Gauss}$, $I_{SINK} = 15\text{ mA}$	—	85	400	mV
Output Leakage Current	I_{OFF}	$B \leq -50\text{ Gauss}$, $V_{OUT} = 24\text{ V}$	—	0.05	10	μA
Supply Current	I_{CC}	$B \leq 50\text{ Gauss}$, $V_{CC} = 4.5\text{ V}$, Output open	—	2.3	5.0	mA
		$B \leq 50\text{ Gauss}$, $V_{CC} = 24\text{ V}$, Output open	—	3.0	5.0	mA
Output Rise Time	t_r	$V_{CC} = 12\text{ V}$, $R_L = 820\Omega$, $C_L = 20\text{ pF}$	—	150	—	ns
Output Fall Time	t_f	$V_{CC} = 12\text{ V}$, $R_L = 820\Omega$, $C_L = 20\text{ pF}$	—	400	—	ns

*Magnetic flux density is measured at most sensitive area of device located $0.016" \pm 0.002"$ ($0.41\text{ mm} \pm 0.05\text{ mm}$) below the branded face of the package.

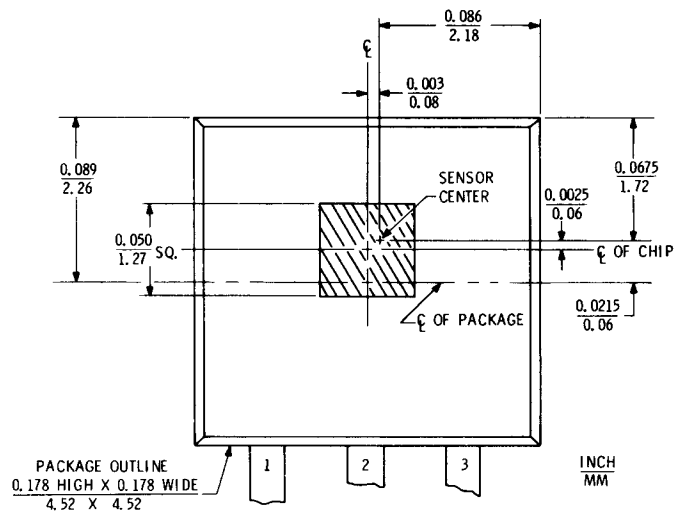
TEST CIRCUIT



Dwg. No. A-12,424

*Includes probe and test fixture capacitance.

SENSOR-CENTER LOCATION



Dwg. No. A-12,399

OPERATION

Under power-up conditions, and in the absence of an externally applied magnetic field, the output transistor of most UGN-3035U assemblies is ON and capable of sinking 25 mA of current. This is, however, a formally ambiguous state and should be treated as such.

In normal operation, the output transistor turns ON as the strength of the magnetic field perpendicular to the surface of the chip reaches the Operate Point. The output transistor switches OFF as magnetic field reversal takes magnetic flux density to the Release Point.

Note that the device latches: That is, a south pole of sufficient strength, presented to the branded face of the assembly, turns the device ON. Removal of the south pole leaves the device ON. The presence of a north magnetic pole of sufficient strength is required to turn the switch OFF.

The UGN-3035U digital latch is primarily intended for operation with a multipole ring magnet, as shown in Figure 1. Other methods of operation are possible.

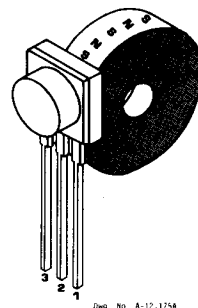
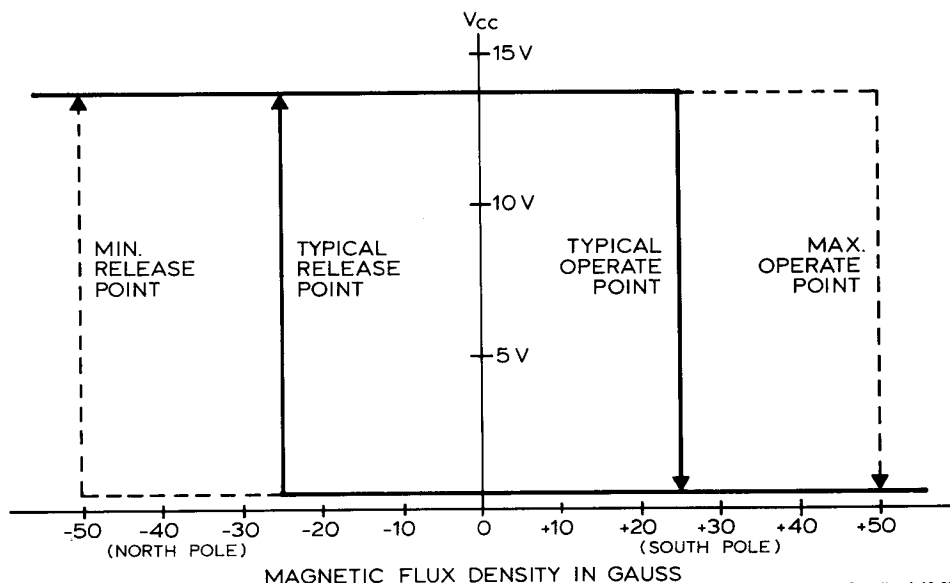


Figure 1

With the branded surface of the assembly facing you, and with pins pointing down, "U" package pin-outs are: 1— V_{CC} , 2—Ground, 3— V_{OUT} .

The magnetic flux densities indicated in the operating-points graph below are measured at the active area of the device, which is 0.016 in. (0.41 mm) below the branded surface of the "U" package.

TYPICAL TRANSFER CHARACTERISTICS AT $T_A = +25^\circ\text{C}$

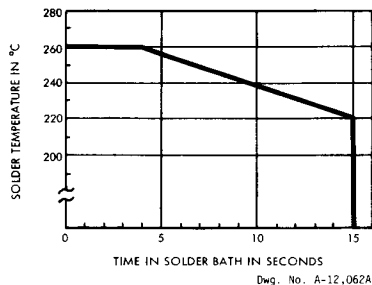


Dwg. No. A-12,274

GUIDE TO INSTALLATION

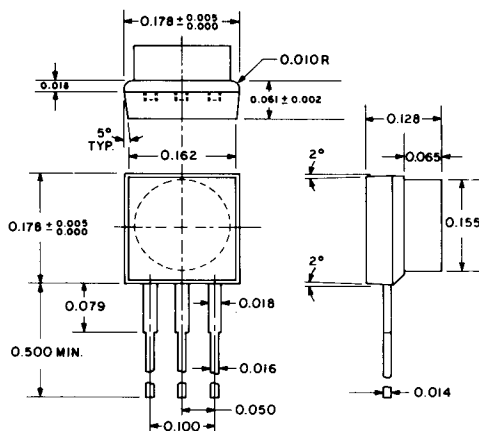
1. All Hall Effect integrated circuits are susceptible to mechanical stress effects. Caution should be exercised to minimize the application of stress to the leads or the epoxy package. Use of epoxy glue is recommended. Other types may deform the epoxy package.

2. To prevent permanent damage to the Hall cell, heat-sink 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.



'U' PACKAGE/MAGNET ASSEMBLY

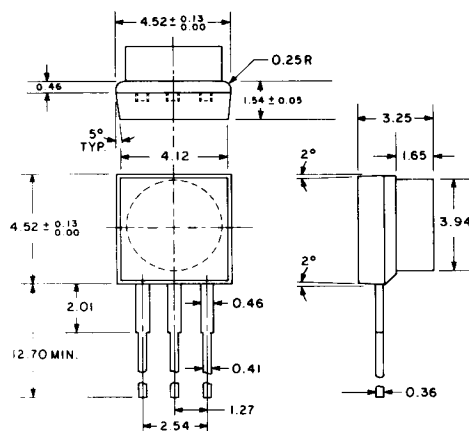
DIMENSIONS IN INCHES



INQ. NO. A-14,231N

DIMENSIONS IN MILLIMETRES

Based on 1" = 25.4 mm



Doc. No. A-22,273

NOTES:

1. Tolerances on package height and width represent allowable mold offsets. Dimensions given are measured at the widest point (parting line).
2. Tolerances, unless otherwise specified, are $\pm 0.005"$ (0.13 mm) and $\pm 1/2^\circ$.