

# 3113, 3120, 3130, AND 3140

Data Sheet  
27621A

## HALL-EFFECT SWITCHES

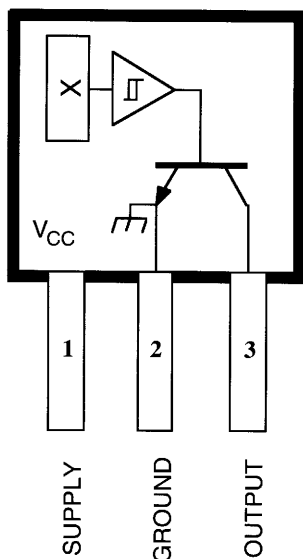
These Hall-effect switches are highly temperature stable and stress-resistant sensors best utilized in applications that provide steep magnetic slopes and low residual levels of magnetic flux density.

Each device 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 volts. The switch output can sink up to 20 mA. With suitable output pull up, they can be used directly with bipolar or MOS logic circuits.

The four package styles available provide a magnetically optimized package for most applications. Suffix LT is a surface-mount SOT-89 (TO-243AA) package; suffixes LL, U, and UA feature wire leads for through-hole mounting.

### FEATURES

- 4.5 V to 24 V Operation
- Activate With Small, Commercially Available Permanent Magnets
- Solid-State Reliability ... No Moving Parts
- Small Size
- Constant Output Amplitude
- Superior Temperature Stability
- Resistant to Physical Stress
- Directly Replace Series UGN and UGS 3001/U Switches



Dwg. PH-003A

Pinning is shown viewed from branded side.

### ABSOLUTE MAXIMUM RATINGS

Supply Voltage, $V_{CC}$	25 V
Magnetic Flux Density, B	Unlimited
Output OFF Voltage, $V_{OUT}$	25 V
Continuous Output Current, $I_{OUT}$	25 mA
Operating Temperature Range, $T_A$	
Prefix UGN	-20°C to +85°C
Prefix UGS	-40°C to +125°C
Storage Temperature Range, $T_S$	-65°C to +150°C*

\* Devices can be stored at +200°C for short periods of time.

Always order by complete part number, e.g., **UGN3113UA**.  
See Magnetic Characteristics table for differences between devices.

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**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
Supply Voltage	$V_{CC}$	Operating	4.5	—	24	V
Output Saturation Voltage	$V_{OUT(SAT)}$	$I_{OUT} = 20\text{ mA}$ , $B > B_{OP}$	—	150	400	mV
Output Leakage Current	$I_{OFF}$	$V_{OUT} = 24\text{ V}$ , $B < B_{RP}$	—	<1.0	10	$\mu\text{A}$
Supply Current	$I_{CC}$	$V_{CC} = 4.5\text{ V}$ , Output Open	—	4.7	8.0	mA
Output Rise Time	$t_r$	$V_{CC} = 12\text{ V}$ , $R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$	—	0.04	2.0	$\mu\text{s}$
Output Fall Time	$t_f$	$V_{CC} = 12\text{ V}$ , $R_L = 820\ \Omega$ , $C_L = 20\text{ pF}$	—	0.18	2.0	$\mu\text{s}$

## MAGNETIC CHARACTERISTICS in gauss

Characteristic	Part Number*	$T_A = +25^\circ\text{C}$		$T_A = -20^\circ\text{C to }+85^\circ\text{C}$		$T_A = -40^\circ\text{C to }+125^\circ\text{C}^\dagger$	
		Min.	Max.	Min.	Max.	Min.	Max.
Operate Point, $B_{OP}$	3113	—	450	—	510	—	—
	3120	70	350	70	425	35	450
	3130	—	150	—	175	—	200
	3140	70	200	45	260	45	270
Release Point, $B_{RP}$	3113	30	—	20	—	—	—
	3120	50	330	50	405	25	430
	3130	-150	—	-175	—	-200	—
	3140	50	180	25	240	25	250
Hysteresis, $B_{hys}$	3113	20	—	10	—	—	—
	3120	20	—	20	—	20	—
	3130	20	—	20	—	20	—
	3140	20	—	20	—	20	—

NOTE: As used here, negative flux densities are defined as less than zero (algebraic convention).

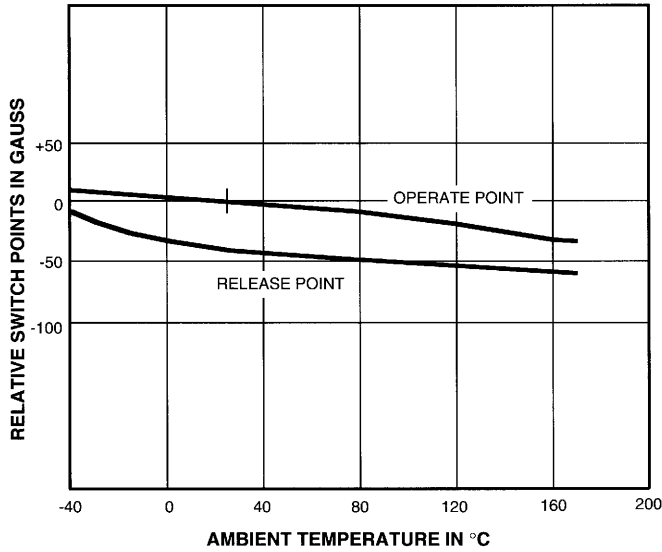
\* Complete part number includes a prefix denoting operating temperature range (UGN or UGS) and a suffix denoting package type (LL, LT, U, or UA).

† Applicable to prefix UGS devices only (available with all devices except 3113).



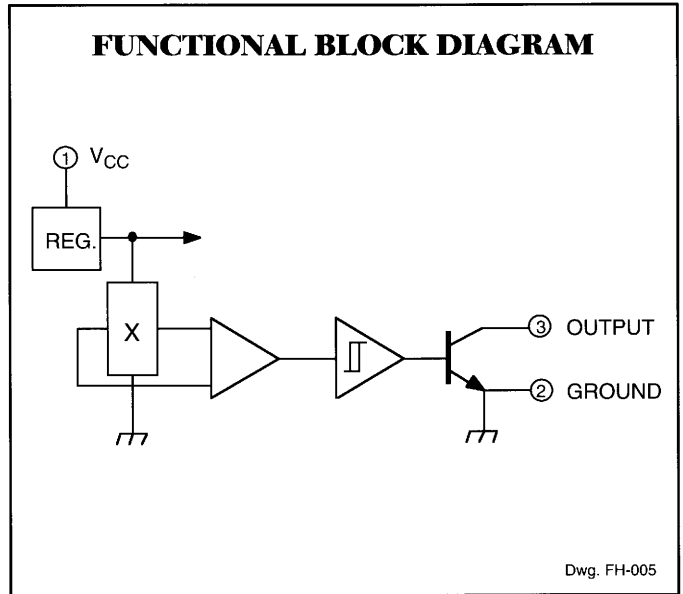
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## TYPICAL CHARACTERISTICS AS FUNCTIONS OF TEMPERATURE



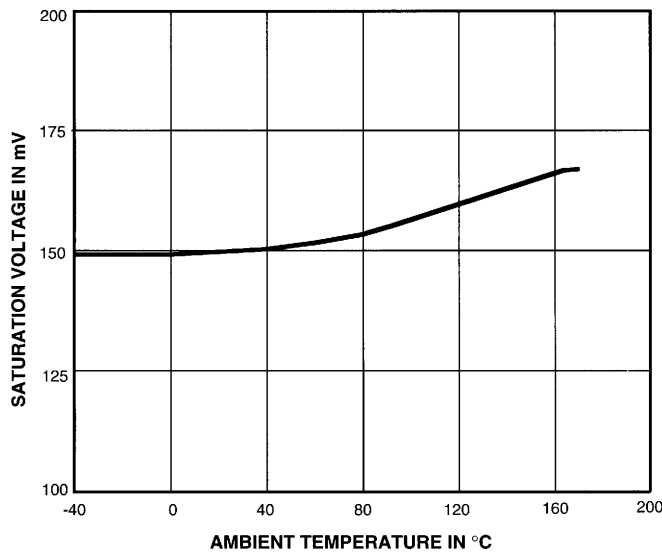
Dwg. GH-018

## FUNCTIONAL BLOCK DIAGRAM



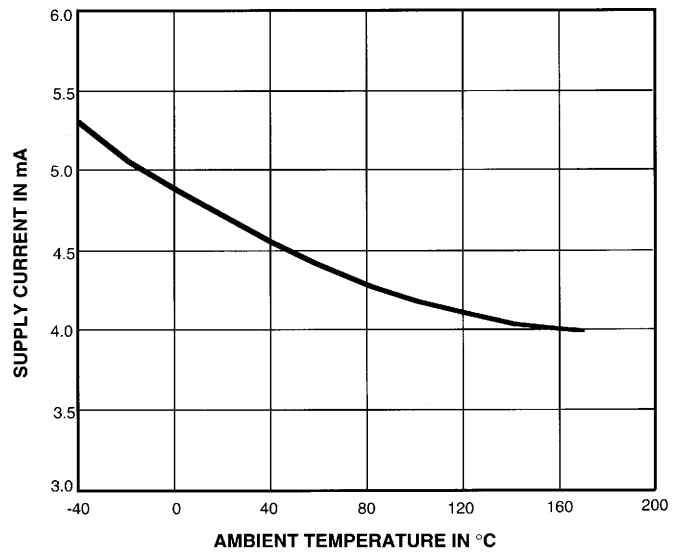
## TYPICAL CHARACTERISTICS AS FUNCTIONS OF TEMPERATURE

### OUTPUT SATURATION VOLTAGE



Dwg. GH-013

### SUPPLY CURRENT

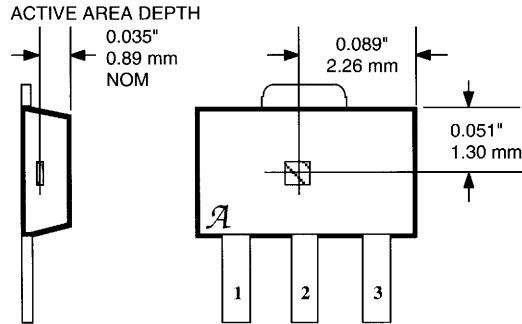


Dwg. GH-014

# 3113, 3120, 3130, AND 3140 HALL-EFFECT SWITCHES

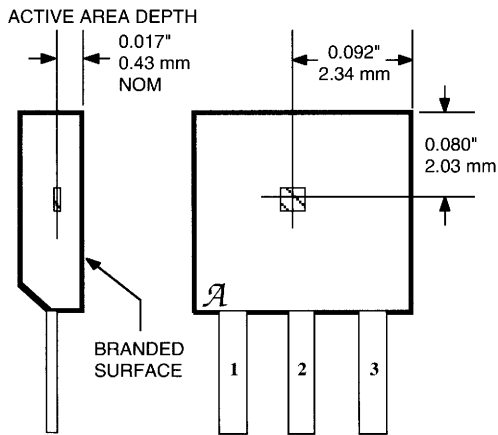
## SENSOR LOCATIONS ( $\pm 0.005$ " [0.13mm] die placement)

### SUFFIX "LL" AND "LT"



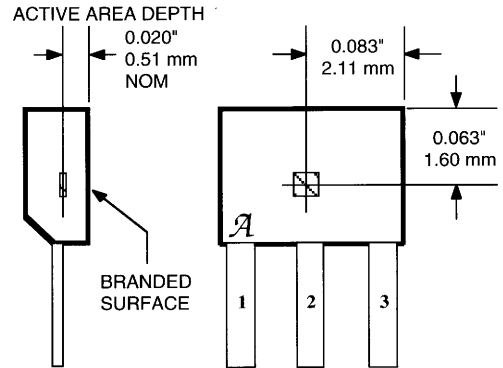
Dwg. MH-008A

### SUFFIX "U"



Dwg. MH-002-1A

### SUFFIX "UA"

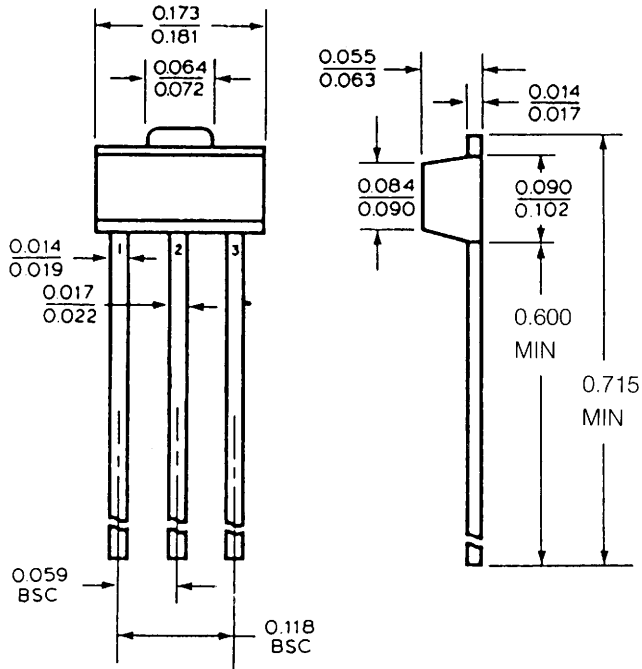


Dwg. MH-011-1A

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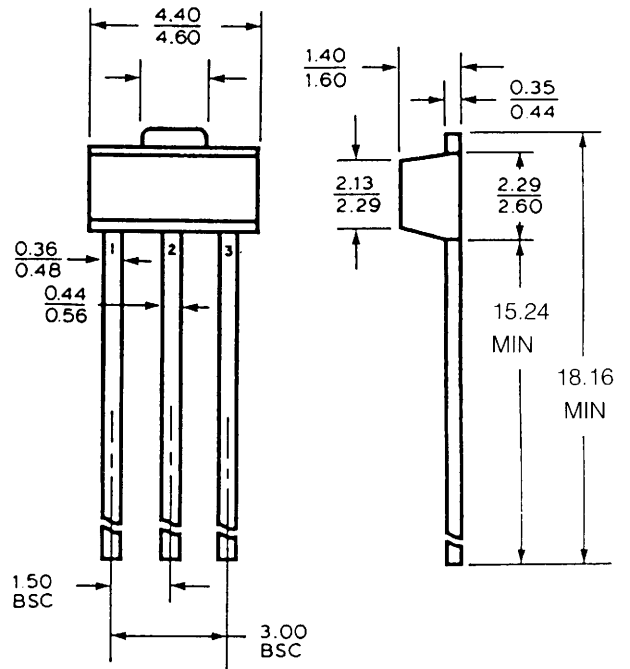
## PACKAGE DESIGNATOR LL

**Dimensions in Inches**  
(Based on 1 mm = 0.394")



Dwg. No. A-12,657A in

**Dimensions in Millimeters**

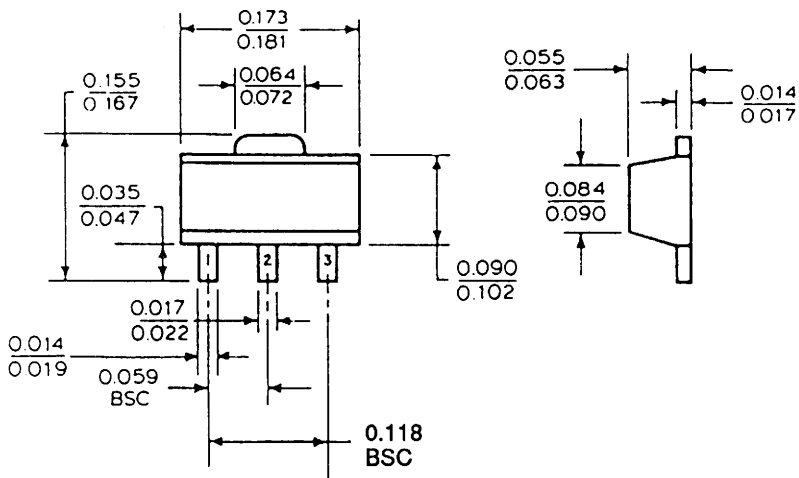


Dwg. No. A-12,657A mm

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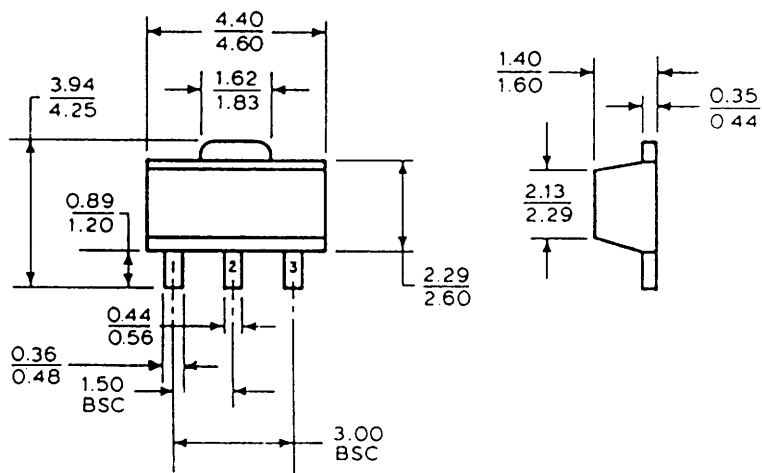
## PACKAGE DESIGNATOR LT

Dimensions in Inches  
(Based on 1 mm = 0.394")



Dwg. No. A-12.608A in

## Dimensions in Millimeters



Dwg. No. A-12.608A mm

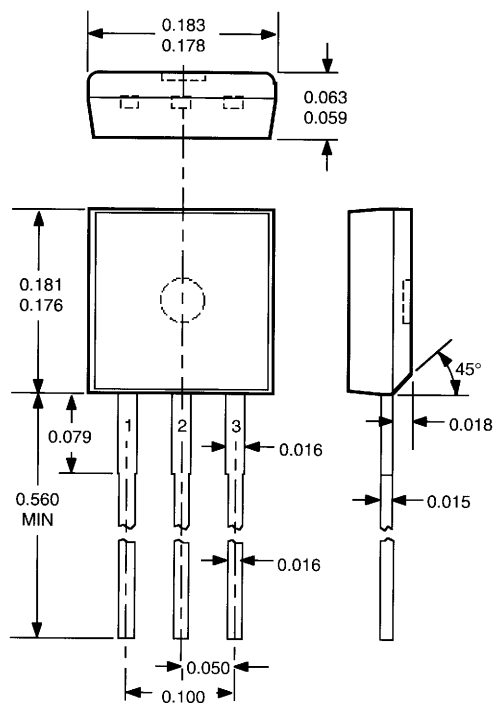


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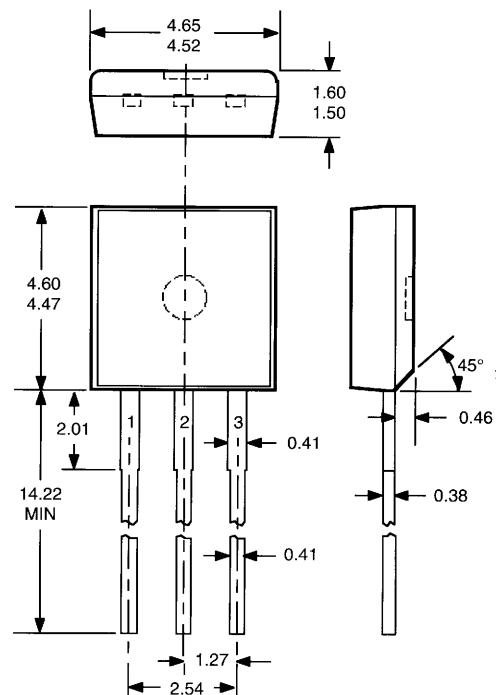
## PACKAGE DESIGNATOR U

### Dimensions in Inches



Dwg. MH-003A in

### Dimensions in Millimeters (Based on 1" = 2.54 mm)



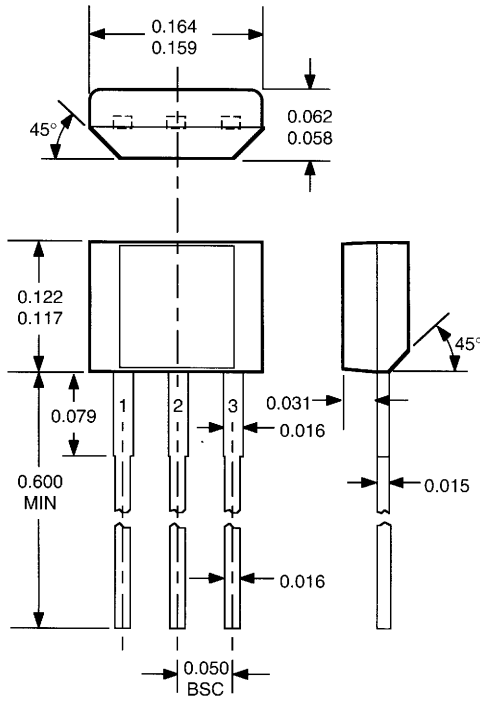
Dwg. MH-003A mm

- NOTES:
1. Tolerances on package height and width represent allowable mold offsets. Dimensions given are measured at the widest point (parting line).
  2. Exact body and lead configuration at vendor's option within limits shown.
  3. Height does not include mold gate flush.
  4. Minimum lead length was 0.500" (12.70 mm). If existing product to the original specifications is not acceptable, contact sales office before ordering.

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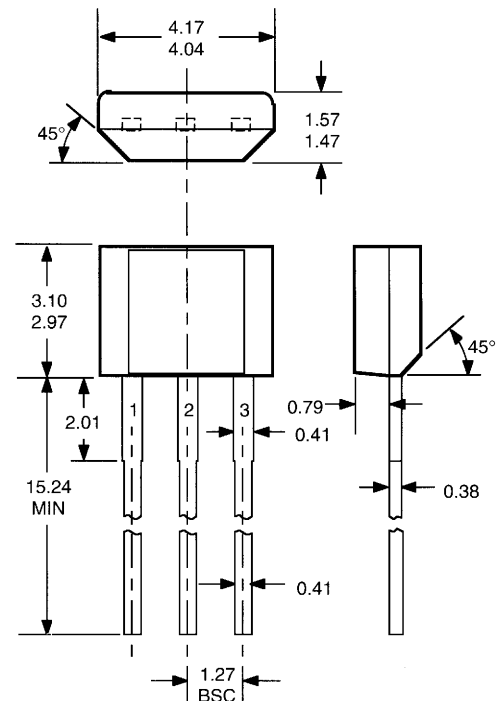
## PACKAGE DESIGNATOR UA

### Dimensions in Inches



Dwg. MH-014A in

### Dimensions in Millimeters (Based on 1" = 2.54 mm)



Dwg. MH-014A mm

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