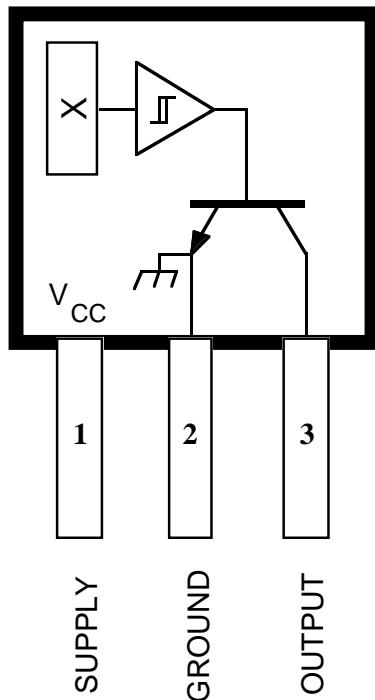


# 3175 AND 3177

## HALL-EFFECT LATCHES



Pinning is shown viewed from branded side.

### ABSOLUTE MAXIMUM RATINGS

Supply Voltage, $V_{CC}$ .....	18 V
Reverse Battery Voltage, $V_{RCC}$ .....	-18 V
Magnetic Flux Density, B .....	Unlimited
Output OFF Voltage, $V_{OUT}$ .....	18 V
Continuous Output Current, $I_{OUT}$ ..	15 mA
Operating Temperature Range, $T_A$ .....	-20°C to +85°C
Storage Temperature Range, $T_S$ .....	-65°C to +150°C

These Hall-effect latches are temperature-stable and stress-resistant sensors especially suited for electronic commutation in brushless dc motors using multipole ring magnets. Each device includes a voltage regulator, quadratic Hall voltage generator, temperature compensation circuit, signal amplifier, Schmitt trigger, and an open-collector output on a single silicon chip. The on-board regulator permits operation with supply voltages of 4.5 volts to 18 volts. The switch output can sink 10 mA. With suitable output pull up, they can be used directly with bipolar or MOS logic circuits.

The three package styles available provide a magnetically optimized package for most applications. Suffix 'LT' is a surface-mount SOT89/TO-243AA package; suffix 'UA' features wire leads for through-hole mounting.

### FEATURES

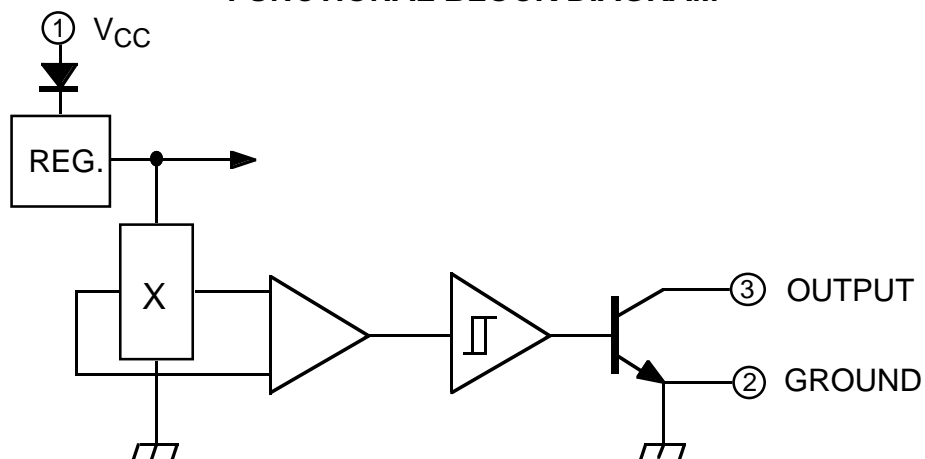
- Symmetrical Response
- 4.5 V to 18 V Operation
- Open-Collector Output
- Reverse Battery Protection
- Activate With Small, Commercially Available Permanent Magnets
- Solid-State Reliability
- Small Size
- Superior Temperature Stability
- Resistant to Physical Stress

Always order by complete part number, e.g., **UGN3175LT**.

See Magnetic Characteristics table for differences between devices.

# 3175 AND 3177 HALL-EFFECT LATCHES

## FUNCTIONAL BLOCK DIAGRAM



Dwg. FH-005-2

### ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$ , $V_{CC} = 4.5\text{ V to }18\text{ V}$ (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Supply Voltage	$V_{CC}$	Operating	4.5	—	18	V
Output Saturation Voltage	$V_{OUT(SAT)}$	$V_{CC} = 18\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $B > B_{OP}$	—	200	300	mV
Output Leakage Current	$I_{OFF}$	$V_{OUT} = 18\text{ V}$ , $B < B_{RP}$	—	0.05	5.0	$\mu\text{A}$
Supply Current	$I_{CC}$	$V_{CC} = 4.5\text{ V}$ , $B < B_{RP}$ (Output OFF)	—	5.0	10	mA
Output Rise Time	$t_r$	$V_{CC} = 12\text{ V}$ , $R_L = 1.1\text{ k}\Omega$ , $C_L = 20\text{ pF}$	—	0.04	2.0	$\mu\text{s}$
Output Fall Time	$t_f$	$V_{CC} = 12\text{ V}$ , $R_L = 1.1\text{ k}\Omega$ , $C_L = 20\text{ pF}$	—	0.18	2.0	$\mu\text{s}$

### MAGNETIC CHARACTERISTICS in gauss; $V_{CC} = 4.5\text{ V to }18\text{ V}$ .

Characteristic	Part Number*	$T_A = +25^\circ\text{C}$			$T_A = -20^\circ\text{C to }+85^\circ\text{C}$		
		Min.	Typ.	Max.	Min.	Typ.	Max.
Operate Point, $B_{OP}$	UGN3175	25	—	170	15	—	180
	UGN3177	50	—	150	25	—	150
Release Point, $B_{RP}$	UGN3175	-170	—	-25	-180	—	-15
	UGN3177	-150	—	-50	-150	—	-25
Hysteresis, $B_{hys}$	UGN3175	100	200	—	80	180	—
	UGN3177	100	200	—	50	180	—

NOTE: As used here, negative flux densities are defined as less than zero (algebraic convention).  
Complete part number includes a suffix denoting package type (LT or UA).

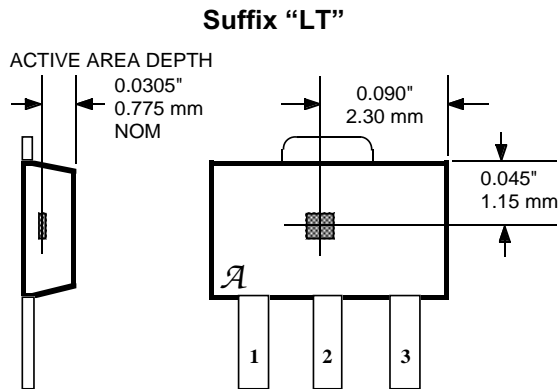


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# 3175 AND 3177 HALL-EFFECT LATCHES

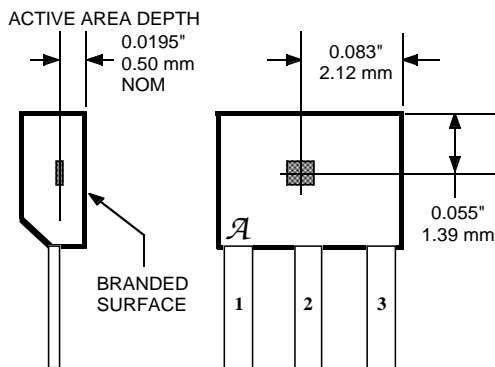
## SENSOR LOCATIONS

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



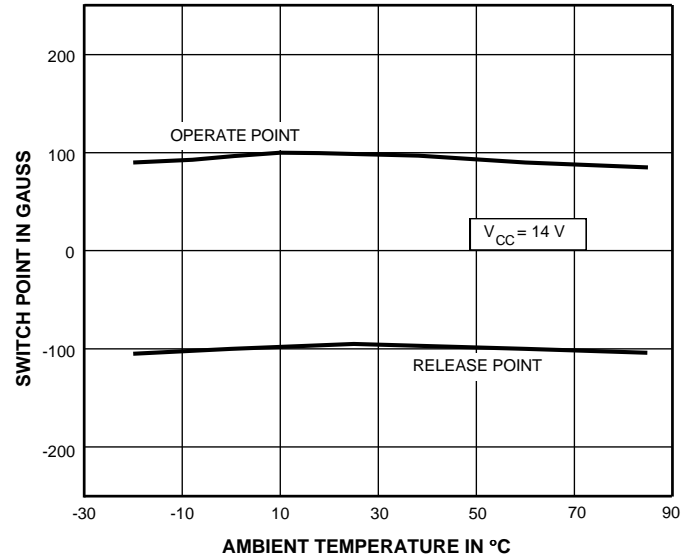
Dwg. MH-008-1C

## Suffix "UA"



Dwg. MH-011C

## TYPICAL OPERATING CHARACTERISTICS



Dwg. GH-020

The products described herein are manufactured under one or more of the following U.S. patents: 5,045,920; 5,264,783; 5,442,283; 5,389,889; 5,581,179; 5,517,112; 5,619,137; 5,621,319; 5,650,719; 5,686,894; 5,694,038; 5,729,130; 5,917,320; and other patents pending.

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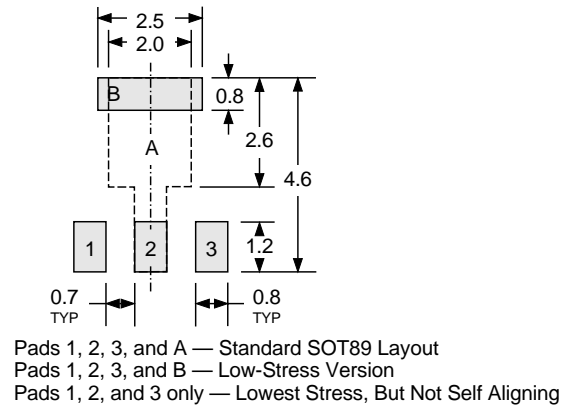
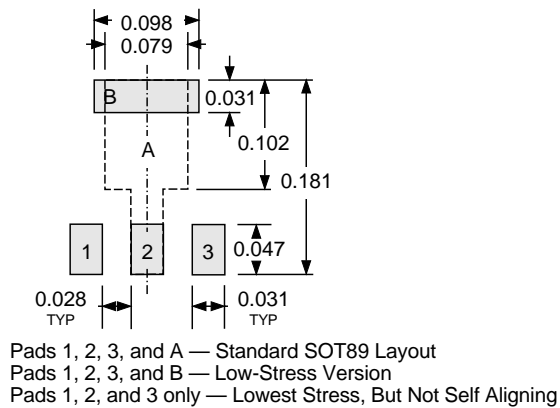
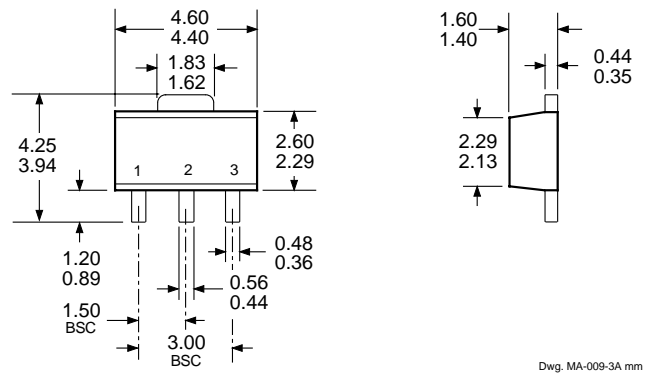
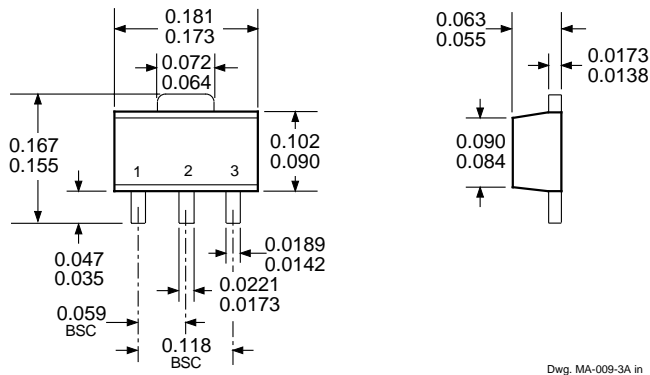
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# 3175 AND 3177 HALL-EFFECT LATCHES

## PACKAGE DESIGNATOR 'LT' (SOT89/TO-243AA)

**Dimensions in Inches**  
(for reference only)

**Dimensions in Millimeters**  
(controlling dimensions)

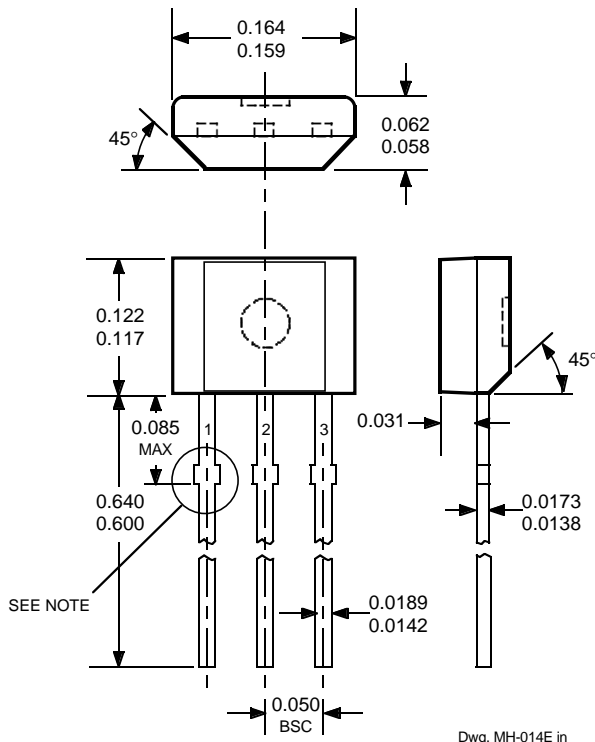


- NOTES:
- Exact body and lead configuration at vendor's option within limits shown.
  - Supplied in bulk pack (500 pieces per bag) or add "TR" to part number for tape and reel.
  - Only low-temperature ( $\leq 240^{\circ}\text{C}$ ) reflow-soldering techniques are recommended for SOT89 devices.

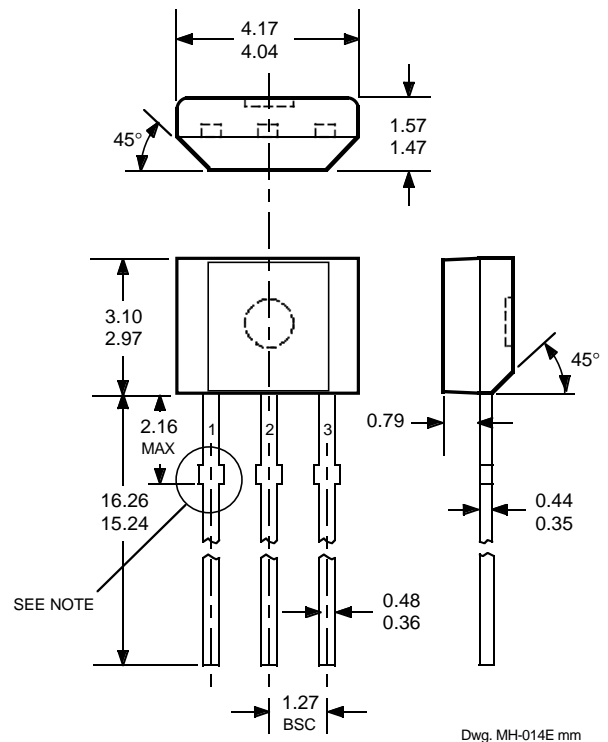
# 3175 AND 3177 HALL-EFFECT LATCHES

## PACKAGE DESIGNATOR 'UA'

**Dimensions in Inches**  
(controlling dimensions)

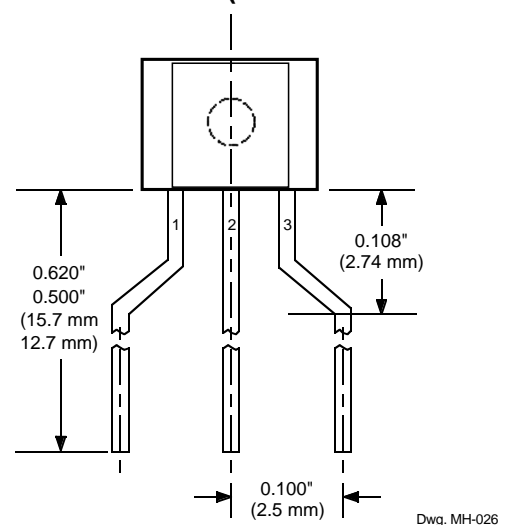


**Dimensions in Millimeters**  
(for reference only)



- 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 flash.
  4. Recommended minimum PWB hole diameter to clear transition area is 0.035" (0.89 mm).
  5. Where no tolerance is specified, dimension is nominal.
  6. Supplied in bulk pack (500 pieces per bag).

## Radial Lead Form (order A317xxUA-LC)



NOTE: Lead-form dimensions are the nominals produced on the forming equipment. No dimensional tolerance is implied or guaranteed for bulk packaging (500 pieces per bag).

# 3175 AND 3177 HALL-EFFECT LATCHES

## HALL-EFFECT SENSORS

UNIPOLAR HALL-EFFECT DIGITAL SWITCHES						
Partial Part Number	Operate Point (G) Over Oper. Voltage	Release Point (G) & Temp. Range	Hysteresis (G) Range	Oper. Temp.	Packages	Replaces and Comments
A3121x	220 to 500	80 to 410	60 to 150	E, L	LT, UA	3019, 3113, 3119
A3122x	260 to 430	120 to 360	70 to 140	E, L	LT, UA	
A3123x	230 to 470	160 to 330	70 to 140	E, L	LT, UA	
A3141x	30 to 175	10 to 145	20 to 80	E, L	LT, UA	3040, 3140
A3142x	115 to 245	60 to 190	30 to 80	E, L	LT, UA	
A3143x	205 to 355	150 to 300	30 to 80	E, L	LT, UA	
A3144x	35 to 450	25 to 430	>20	E, L	LT, UA	3020, 3120
A3161E	<160 (Typ 130)	>30 (Typ 110)	5 to 80	E	LT, UA	2-wire operation
A3163E	<160 (Typ 98)	>30 (Typ 79)	5 to 40	E	LT, UA	2-wire
A3240x	<50 (Typ 35)	>5 (Typ 25)	Typ 10	E, L	LH, LT, UA	chopper stabilized
A3250x	<50 to >350	—	5 to 35	J, L	UA	programmable, chopper stabilized
A3251x	<50 to >350	—	5 to 35	J, L	UA	programmable, chopper stabilized
A3361E	<125	>40	5 to 30	E	LH, LT, UA	2-wire, chopper stabilized, output normally high
A3362E	<125	>40	5 to 30	E	LH, LT, UA	2-wire, chopper stabilized, output normally low
MICROPOWER OMNIPOLAR HALL-EFFECT DIGITAL SWITCHES						
Partial Part Number	Operate Points (G) Over Oper. Voltage	Release Points (G) & Temp. Range	Hysteresis (G) Range	Oper. Temp.	Packages	Average Supply Current (µA)
A3209E	>-60, <60	<-5, >5	Typ 7.7	E	LH, UA	<425 (Typ 145)
A3210E	>-60, <60	<-5, >5	Typ 7.7	E	LH, UA	<60 (Typ 8.8)
A3212E	>-55, <55	<-10, >10	Typ. 8	E	LH, UA	<10 (Typ 4.2)
BIPOLAR HALL-EFFECT DIGITAL SWITCHES						
Partial Part Number	Operate Point (G) Over Oper. Voltage	Release Point (G) & Temp. Range	Hysteresis (G) Range	Oper. Temp.	Packages	Replaces and Comments
UGx3132	<95 (Typ 32)	>-95 (Typ -20)	>30 (Typ 52)	K, L, S	LT, UA	3030, 3130, 3131
UGx3133	<75 (Typ 32)	>-75 (Typ -20)	>30 (Typ 52)	K, L, S	LT, UA	
UGx3134	-40 to 50	-50 to 40	5 to 55	E, L	LT, UA	
A3260x	<30 (Typ 10)	>-30 (Typ -10)	Typ 20	E, L	LH, LT, UA	2 wire, chopper stabilized

Notes: 1) Typical data is at  $T_A = +25^\circ\text{C}$  and nominal operating voltage.

2) "x" = Operating Temperature Range [suffix letter or (prefix)]: S (UGN) =  $-20^\circ\text{C}$  to  $+85^\circ\text{C}$ , E =  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ , J =  $-40^\circ\text{C}$  to  $+115^\circ\text{C}$ , K (UGS) =  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ , L (UGL) =  $-40^\circ\text{C}$  to  $+150^\circ\text{C}$ .

