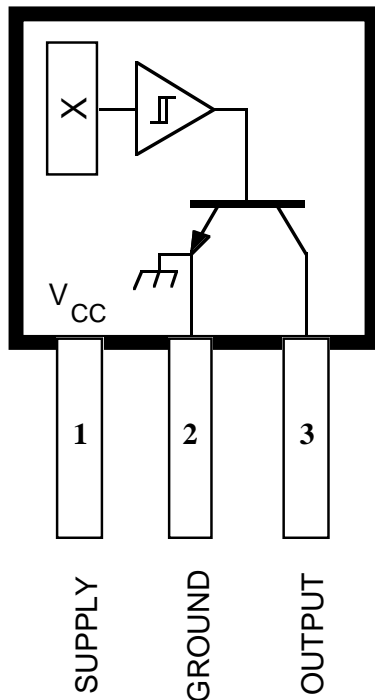


3175 AND 3177

HALL-EFFECT LATCHES



Dwg. PH-003A

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 SOT-89/TO-243AA package; suffixes 'U' and 'UA' feature wire leads for through-hole mounting.

FEATURES

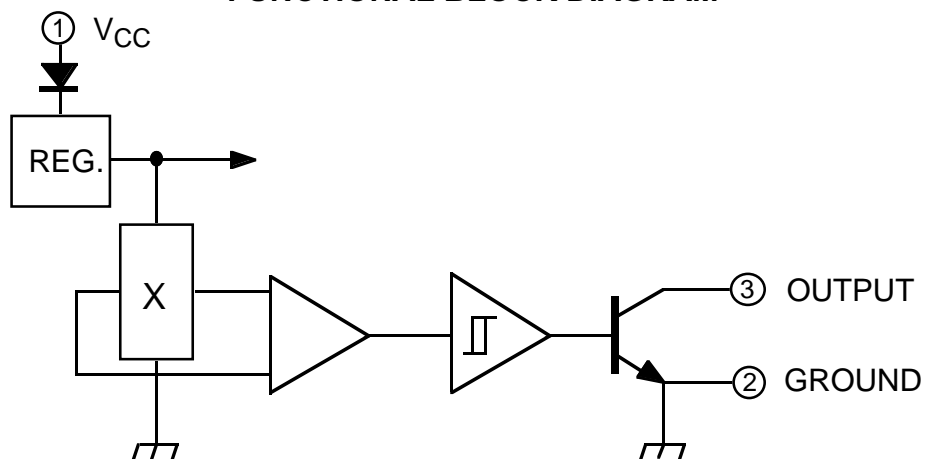
- Symmetrical Response
- 4.5 V to 18 V Operation
- Open-Collector Output
- Reverse Battery Protection
- Activate With Small, Commercially Available Permanent Magnets
- Solid-State Reliability
- Small Size
- Superior Temperature Stability
- Resistant to Physical Stress

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 | μA |
| 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 | μs |
| 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 | μs |

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, U, or UA).



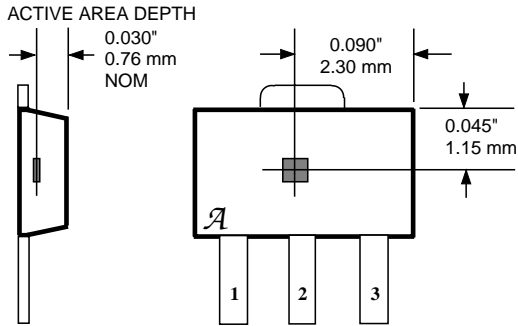
115 Northeast Cutoff, Box 15036
Worcester, Massachusetts 01615-0036 (508) 853-5000
Copyright © 1991, 1999, Allegro MicroSystems, Inc.

3175 AND 3177 HALL-EFFECT LATCHES

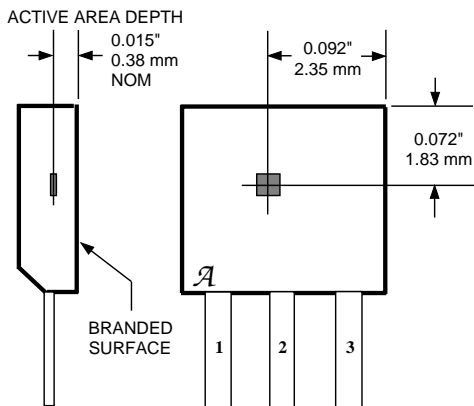
SENSOR LOCATIONS

(± 0.005 " [0.13mm] die placement)

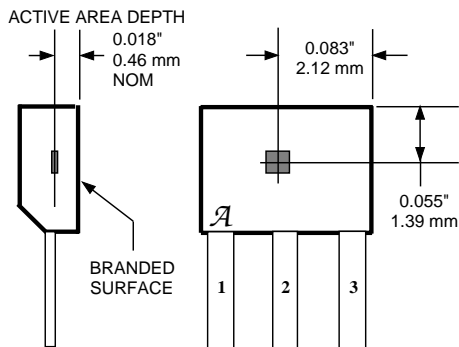
Suffix "LT"



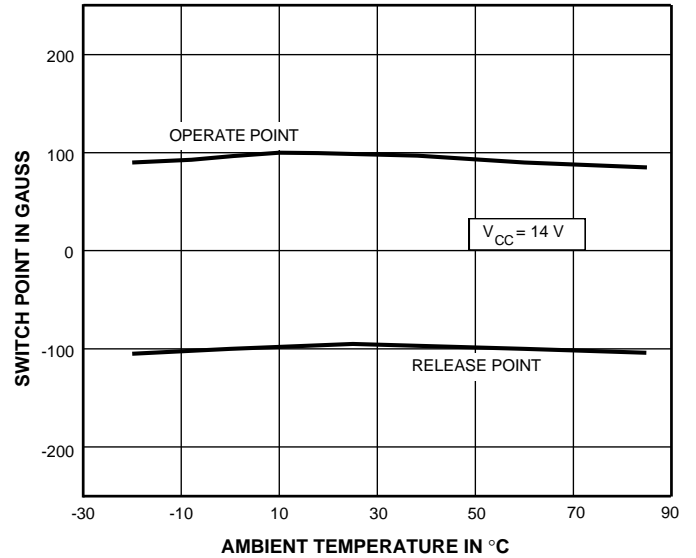
Suffix "U"



Suffix "UA"



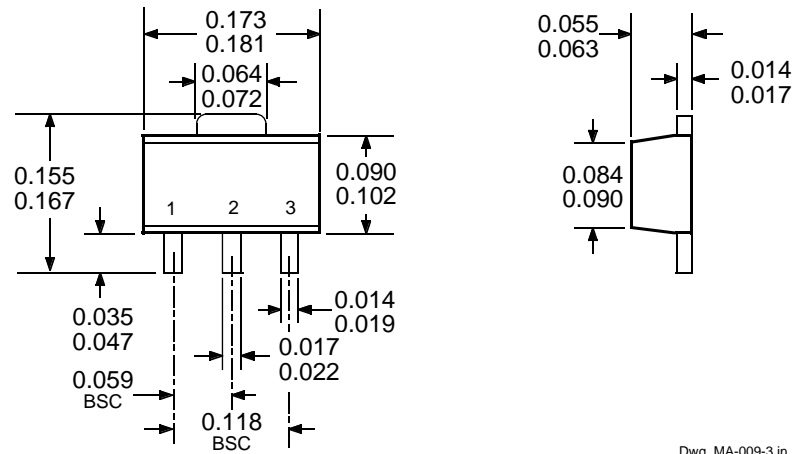
TYPICAL OPERATING CHARACTERISTICS



3175 AND 3177 HALL-EFFECT LATCHES

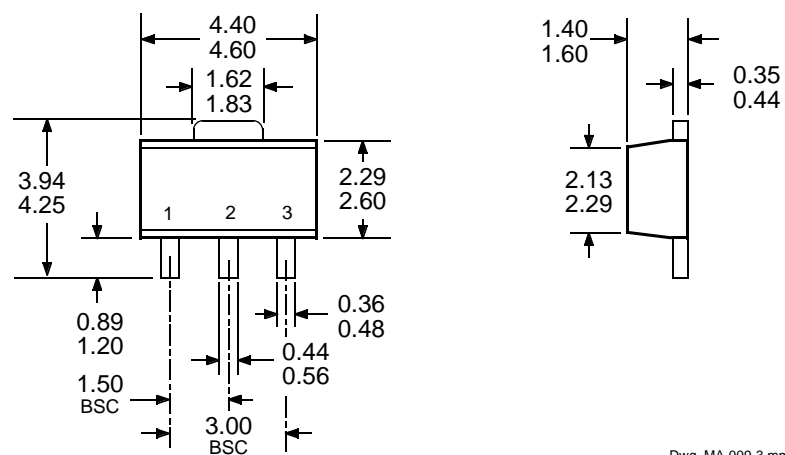
PACKAGE DESIGNATOR 'LT'

Dimensions in Inches
(for reference only)



Dwg. MA-009-3 in

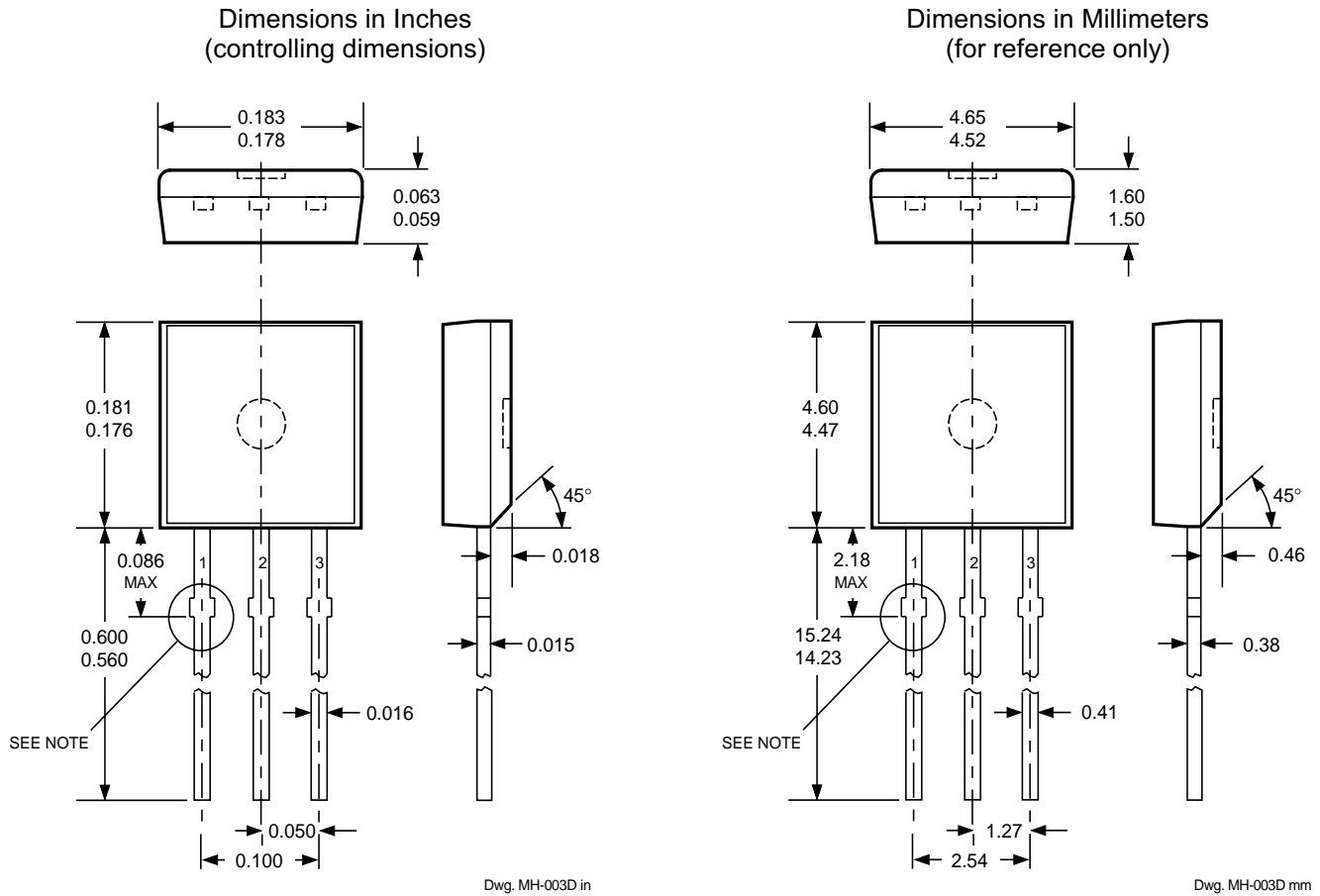
Dimensions in Millimeters
(controlling dimensions)



Dwg. MA-009-3 mm

3175 AND 3177 HALL-EFFECT LATCHES

PACKAGE DESIGNATOR 'U'



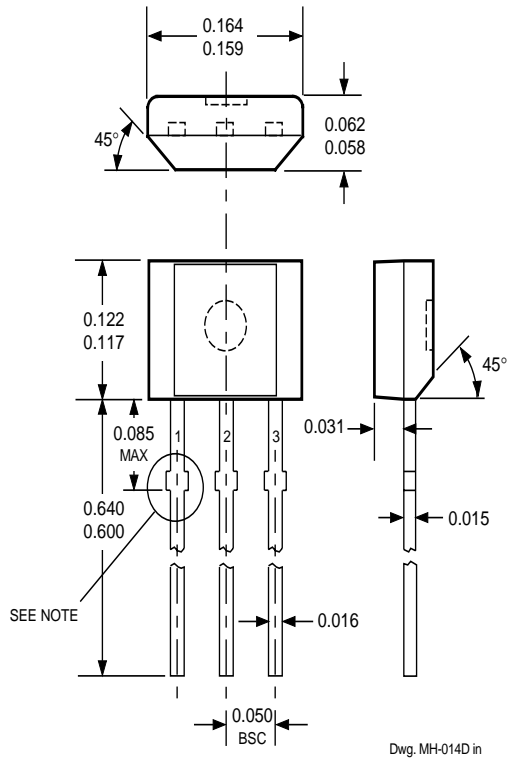
**Devices in the 'U' package are
NOT RECOMMENDED FOR NEW DESIGN**

- 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).

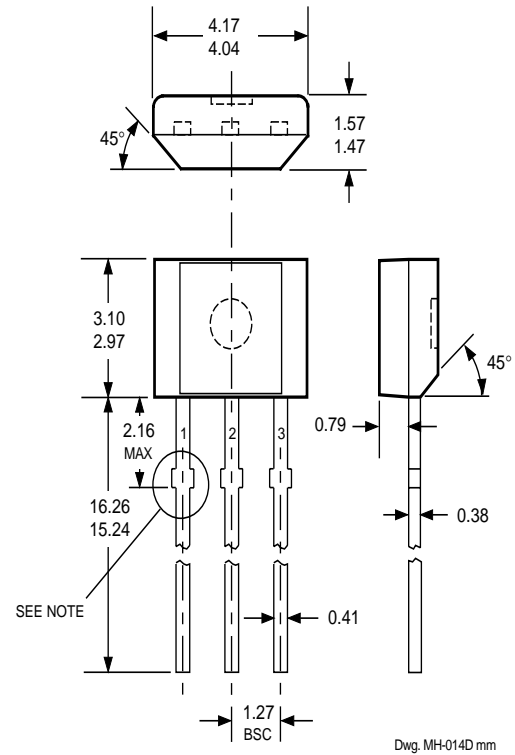
3175 AND 3177 HALL-EFFECT LATCHES

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.

**3175 AND 3177
HALL-EFFECT
LATCHES**

HALL-EFFECT SENSORS SELECTION GUIDE

| Partial Part Number | Avail. Oper. Temp. | Characteristics at T _A = +25°C | | | Features | Notes |
|--|--------------------|---|----------|------------------------|----------------------------------|---------|
| | | BOP(max) | BRP(min) | B _{hys} (typ) | | |
| HALL-EFFECT UNIPOLAR SWITCHES in order of B_{OP} and B_{hys} | | | | | | |
| 3240 | E/L | +50 | +5.0 | 10 | chopper stabilized | 1 |
| 3210 | E | ±70 | ±5.0 | 7.7 | micropower, chopper stabilized | |
| 3361 | E | +120 | +50 | 5.0* | 2-wire, chopper stabilized | |
| 3362 | E | +120 | +50 | 5.0* | 2-wire, chopper stabilized | |
| 3161 | E | +160 | +30 | 20 | 2-wire | |
| 3141 | E/L | +160 | +10 | 55 | | |
| 3235 | S | +175 | +25 | 15* | output 1 | 2 |
| | | -25 | -175 | 15* | output 2 | 2 |
| 5140 | E | +200 | +50 | 55 | 300 mA output | 1, 3 |
| 3142 | E/L | +230 | +75 | 55 | | |
| 3143 | E/L | +340 | +165 | 55 | | |
| 3144 | E/L | +350 | +50 | 55 | | |
| 3122 | E/L | +400 | +140 | 105 | | |
| 3123 | E/L | +440 | +180 | 105 | | |
| 3121 | E/L | +450 | +125 | 105 | | |
| 3150 | J | +40 to +850 | - | 20 | programmable, chopper stabilized | 1 |
| HALL-EFFECT LATCHES & BIPOLAR SWITCHES[†] in order of B_{OP} and B_{hys} | | | | | | |
| 3260 | E/L | +30 | -30 | 20 | bipolar, chopper stabilized | |
| 3280 | E/L | +40 | -40 | 45 | chopper stabilized | |
| 3134 | E/L | +50 | -50 | 27 | bipolar switch | |
| 3133 | K/L/S | +75 | -75 | 52 | bipolar switch | |
| 3281 | E/L | +90 | -90 | 100 | chopper stabilized | |
| 3132 | K/L/S | +95 | -95 | 52 | bipolar switch | |
| 3187 | E/L | +150 | -150 | 100* | | |
| 3177 | S | +150 | -150 | 200 | | |
| 3625 | S | +150 | -150 | 200 | 900 mA outputs | 1, 3, 5 |
| 3626 | S | +150 | -150 | 200 | 400 mA outputs | 1, 3, 5 |
| 3195 | E/L | +160 | -160 | 220 | | 1, 4 |
| 3197 | L | +160 | -160 | 230 | | 1 |
| 3175 | S | +170 | -170 | 200 | | |
| 3188 | E/L | +180 | -180 | 200* | | |
| 3283 | E/L | +180 | -180 | 300 | chopper stabilized | |
| 3189 | E/L | +230 | -230 | 100* | | |
| 3275 | S | +250 | -250 | 100* | | 5 |
| 3185 | E/L | +270 | -270 | 340* | | |

Operating Temperature Ranges:

S = -20°C to +85°C, E = -40°C to +85°C, J = -40°C to +115°C, K = -40°C to +125°C, L = -40°C to +150°C

Notes 1. Protected.

2. Output 1 switches on south pole, output 2 switches on north pole for 2-phase, bifilar-wound, unipolar-driven brushless dc motor control.

3. Power driver output.

4. Active pull down.

5. Complementary outputs for 2-phase bifilar-wound, unipolar-driven brushless dc motor control.

* Minimum.

Latches will not switch on removal of magnetic field; bipolar switches may switch on removal of field but require field reversal for reliable operation over operating temperature range.

**3175 AND 3177
HALL-EFFECT
LATCHES**

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