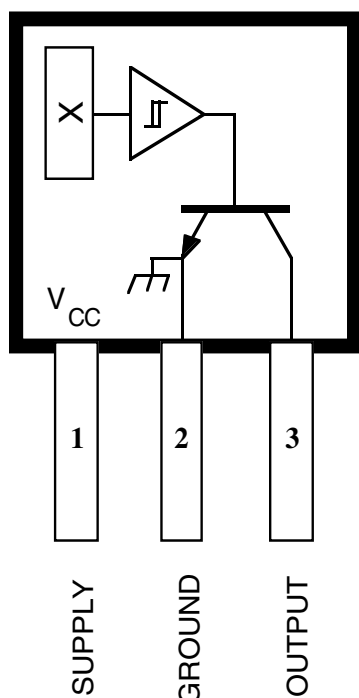


BIPOLAR HALL-EFFECT SWITCH FOR HIGH-TEMPERATURE OPERATION



Dwg. PH-003A

Pinning is shown viewed from branded side.

ABSOLUTE MAXIMUM RATINGS at $T_A = +25^\circ\text{C}$

| | |
|---|------------------------|
| Supply Voltage, V_{CC} | 30 V |
| Reverse Battery Voltage, V_{RCC} | -30 V |
| Magnetic Flux Density, B | Unlimited |
| Output OFF Voltage, V_{OUT} | 30 V |
| Reverse Output Voltage, V_{OUT} | -0.5 V |
| Continuous Output Current, I_{OUT} | 25 mA |
| Operating Temperature Range, T_A | |
| Suffix 'E-' | -40°C to +85°C |
| Suffix 'L-' | -40°C to +150°C |
| Storage Temperature Range, T_S | -65°C to +170°C |

This low-hysteresis bipolar Hall-effect switch is an extremely temperature-stable and stress-resistant sensor especially suited for operation over extended temperature ranges to $+150^\circ\text{C}$. Superior high-temperature performance is made possible through a novel Schmitt trigger circuit that maintains operate and release point stability by compensating for temperature changes in the Hall element. Additionally, internal compensation provides magnetic switch points that become more sensitive with temperature, hence offsetting the usual degradation of the magnetic field with temperature. Its low hysteresis makes this device ideal for detecting small changes in magnetic field strength or for use with inexpensive magnets.

The device includes on a single silicon chip a voltage regulator, quadratic Hall-voltage generator, temperature compensation circuit, signal amplifier, Schmitt trigger, and a buffered open-collector output to sink up to 25 mA. The on-board regulator permits operation with supply voltages of 3.8 volts to 24 volts.

The first character of the part number suffix determines the device operating temperature range. Suffix 'E-' is for -40°C to $+85^\circ\text{C}$, and suffix 'L-' is -40°C to $+150^\circ\text{C}$. Three package styles provide a magnetically optimized package for most applications. Suffix '-LT' is a miniature SOT-89/TO-243AA transistor package for surface-mount applications; suffix '-U' is a three-lead plastic mini-SIP while suffix '-UA' is a three-lead ultra-mini-SIP.

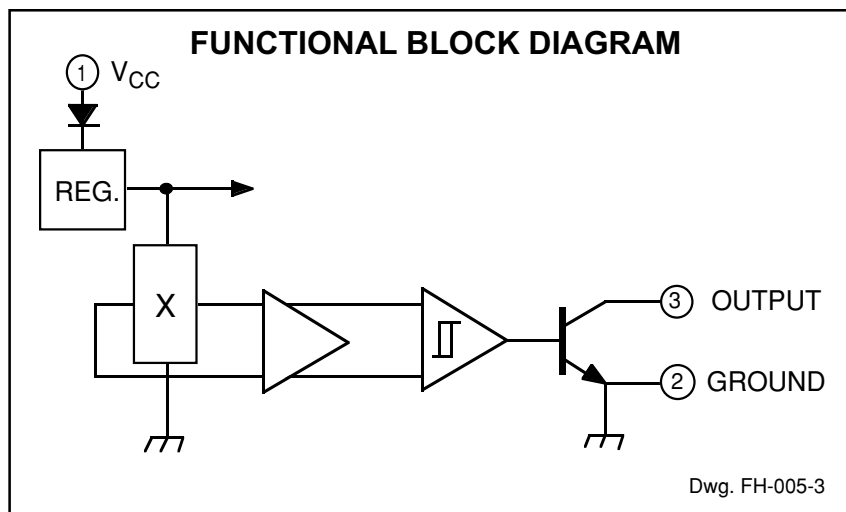
FEATURES

- Superior Temperature Stability
- Operation From Unregulated Supply
- Open-Collector 25 mA Output
- Reverse Battery Protection
- Activate With Small, Commercially Available Permanent Magnets
- Solid-State Reliability
- Small Size
- Resistant to Physical Stress

Always order by complete part number, e.g., **A3134ELT**.

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LOW-HYSTERESIS BIPOLAR HALL-EFFECT SWITCH FOR HIGH-TEMP. OPERATION



ELECTRICAL CHARACTERISTICS over operating temperature range, at $V_{CC} = 12\text{ V}$.

| Characteristic | Symbol | Test Conditions | Limits | | | |
|---------------------------|----------------|--|--------|------|------|---------------|
| | | | Min. | Typ. | Max. | Units |
| Supply Voltage | V_{CC} | Operating | 3.8 | — | 24 | V |
| Output Saturation Voltage | $V_{OUT(SAT)}$ | $I_{OUT} = 20\text{ mA}$, $B > B_{OP}$ | — | 175 | 400 | mV |
| Output Leakage Current | I_{OFF} | $V_{OUT} = 24\text{ V}$, $B < B_{RP}$ | — | 0.05 | 1.0 | μA |
| Supply Current | I_{CC} | $B < B_{RP}$ (Output OFF) | — | 3.2 | 9.0 | mA |
| | | $B > B_{OP}$ (Output ON) | — | 5.0 | — | mA |
| Output Rise Time | t_r | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$ | — | 100 | — | ns |
| Output Fall Time | t_f | $R_L = 820\ \Omega$, $C_L = 20\text{ pF}$ | — | 100 | — | ns |

MAGNETIC CHARACTERISTICS over operating supply voltage range.

| Characteristic | Symbol | Test Conditions | Limits | | | |
|----------------|-----------|------------------------------|--------|------|------|-------|
| | | | Min. | Typ. | Max. | Units |
| Operate Point | B_{OP} | at $T_A = +25^\circ\text{C}$ | -40 | 8.5 | 50 | G |
| | | Over Oper. Temp. Range | -40 | — | 50 | G |
| Release Point | B_{RP} | at $T_A = +25^\circ\text{C}$ | -50 | -19 | 40 | G |
| | | Over Oper. Temp. Range | -50 | — | 40 | G |
| Hysteresis | B_{hys} | at $T_A = +25^\circ\text{C}$ | 10 | 27 | 50 | G |
| | | Over Oper. Temp. Range | 5.0 | — | 55 | G |

NOTES: B_{OP} = operate point (output turns ON); B_{RP} = release point (output turns OFF); B_{hys} = hysteresis ($B_{OP} - B_{RP}$).

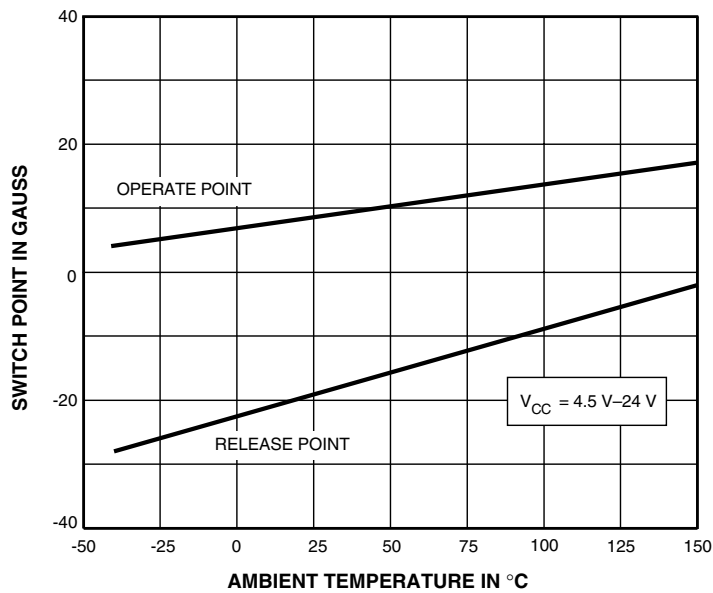
As used here, negative flux densities are defined as less than zero (algebraic convention).

Typical values are at $T_A = +25^\circ\text{C}$ and $V_{CC} = 12\text{ V}$.

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LOW-HYSTERESIS
BIPOLAR HALL-EFFECT SWITCH
FOR HIGH-TEMP. OPERATION

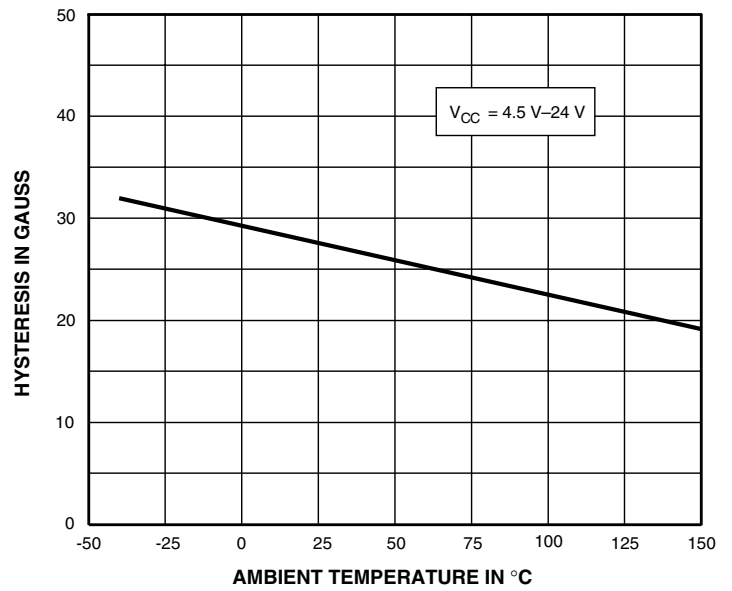
TYPICAL OPERATING CHARACTERISTICS

SWITCH POINTS



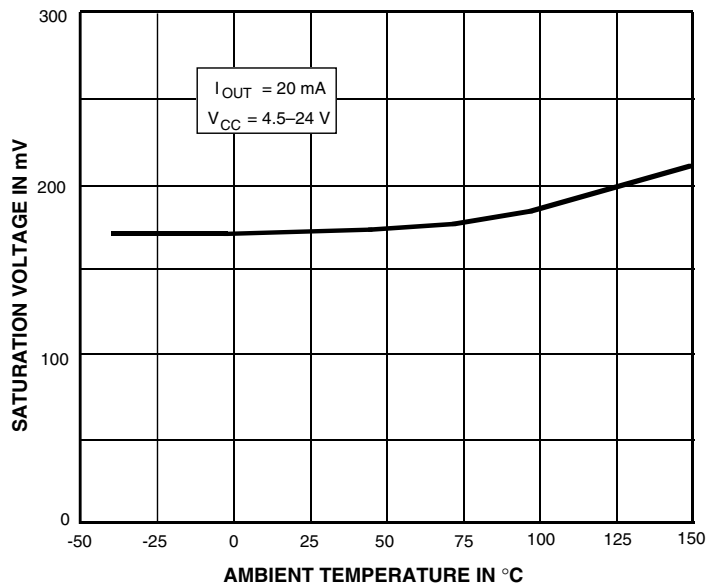
Dwg. GH-052

HYSTERESIS



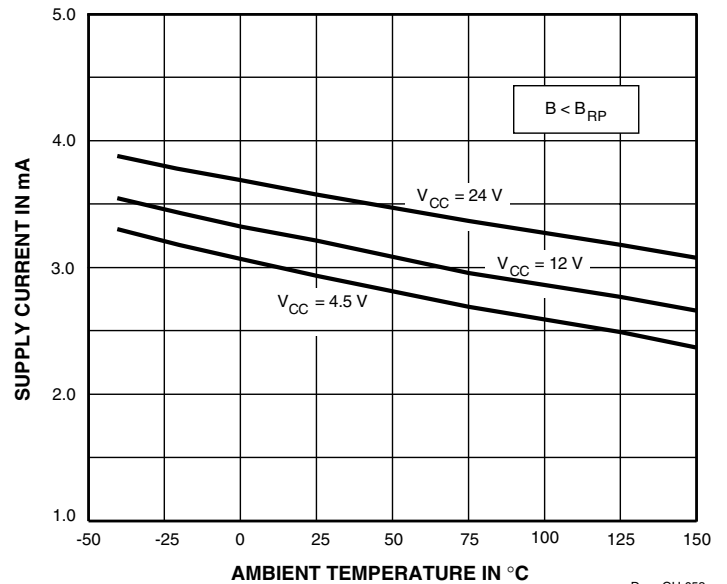
Dwg. GH-051

OUTPUT SATURATION VOLTAGE



Dwg. GH-029

SUPPLY CURRENT



Dwg. GH-053

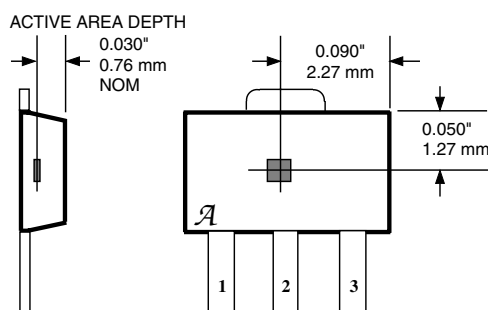
3134

LOW-HYSTERESIS BIPOLAR HALL-EFFECT SWITCH FOR HIGH-TEMP. OPERATION

SENSOR LOCATIONS

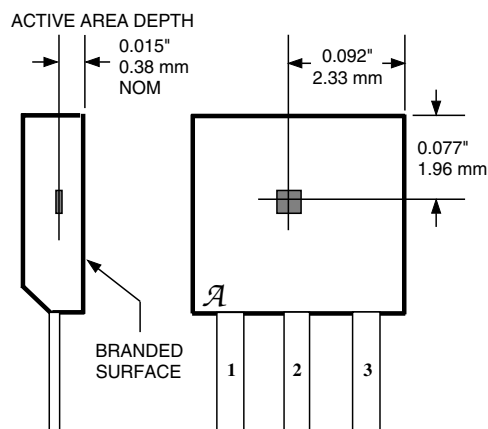
(± 0.005 " [0.13 mm] die placement)

Suffix "LT"



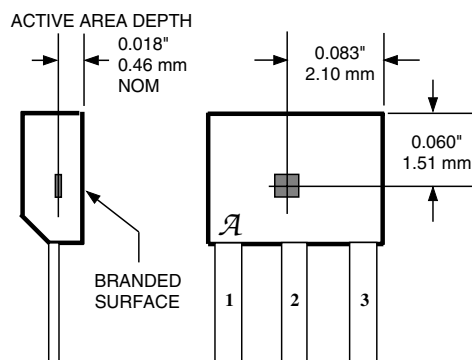
Dwg. MH-008-4B

Suffix "U"



Dwg. MH-002-7B

Suffix "UA"



Dwg. MH-011-4B

APPLICATIONS INFORMATION

Hall effect applications information is available in the "Hall-Effect IC Applications Guide" (AN 27701), which can be found in the latest issue of *Allegro MicroSystems Electronic Data Book*, AMS-702, or at www.allegromicro.com

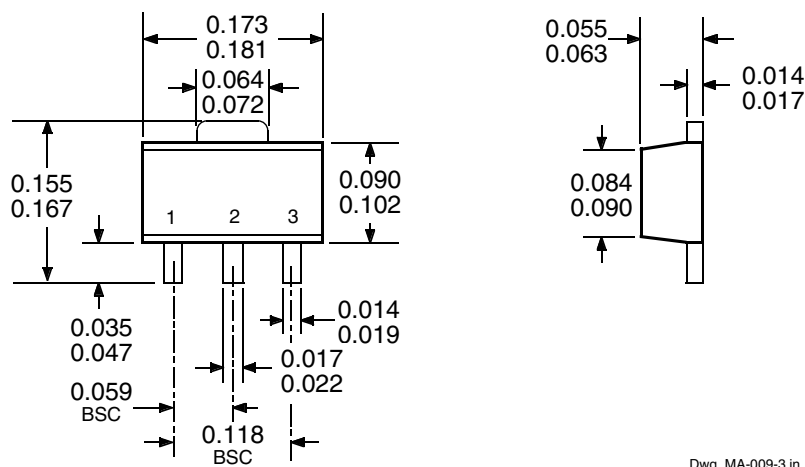
OPERATION

The output of these devices (pin 3) switches low when the magnetic field at the Hall sensor exceeds the operate point threshold (B_{OP}). At this point, the output voltage is $V_{OUT(SAT)}$. When the magnetic field is reduced to below the release point (B_{RP}) the device output goes high. Note especially that release can occur when the magnetic field is removed but to ensure release, a field reversal is required. The difference in the magnetic operate and release points is called the hysteresis (B_{hys}) of the device. This built-in hysteresis allows clean switching of the output even in the presence of external mechanical vibration and electrical noise.

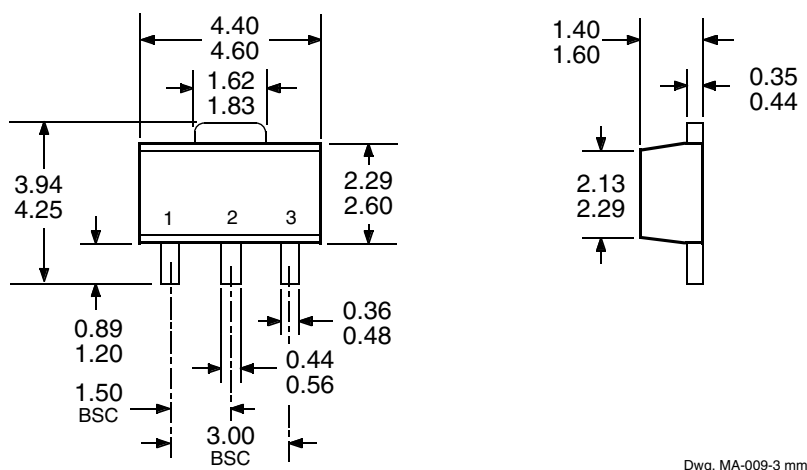
3134
LOW-HYSTERESIS
BIPOLAR HALL-EFFECT SWITCH
FOR HIGH-TEMP. OPERATION

PACKAGE DESIGNATOR 'LT'
(SOT-89/TO-243AA)

Dimensions in Inches
(for reference only)



Dimensions in Millimeters
(controlling dimensions)



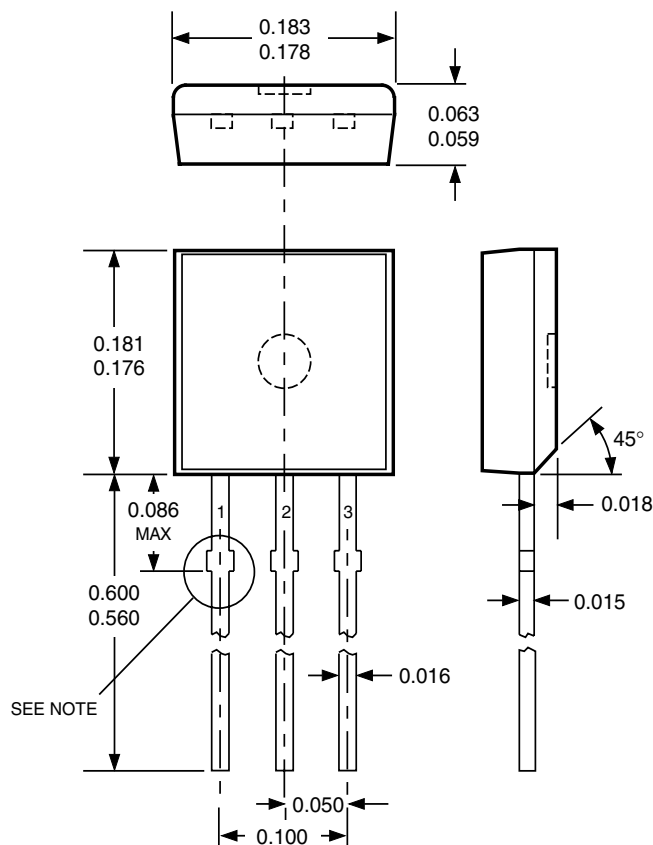
- NOTES: 1. Tolerances on package height and width represent allowable mold offsets. Dimensions given are measured at the widest point (parting line).
2. Exact body and lead configuration at vendor's option within limits shown.
3. Height does not include mold gate flash.

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LOW-HYSTERESIS BIPOLAR HALL-EFFECT SWITCH FOR HIGH-TEMP. OPERATION

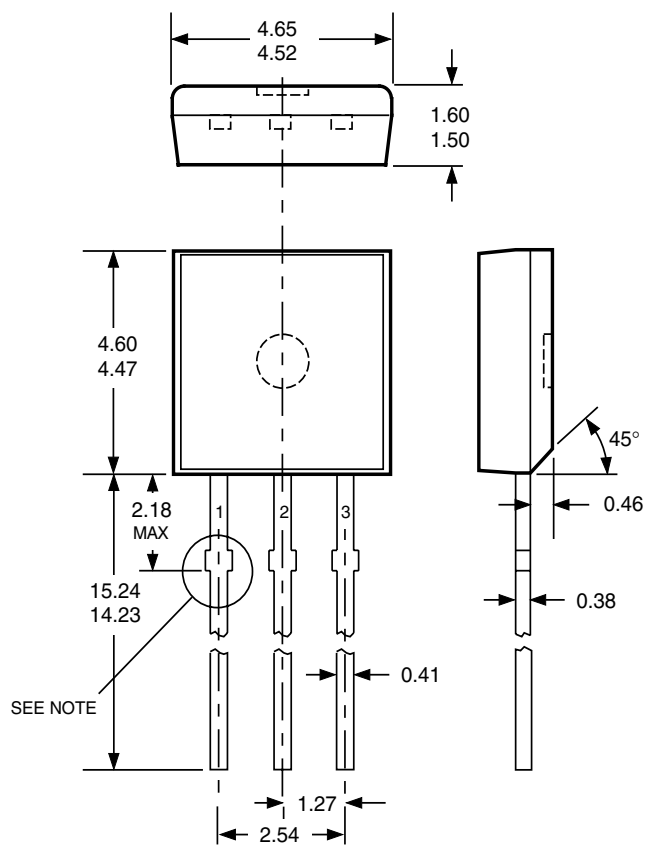
PACKAGE DESIGNATOR 'U'

Dimensions in Inches
(controlling dimensions)



Dwg. MH-003D in

Dimensions in Millimeters
(for reference only)



Dwg. MH-003D mm

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

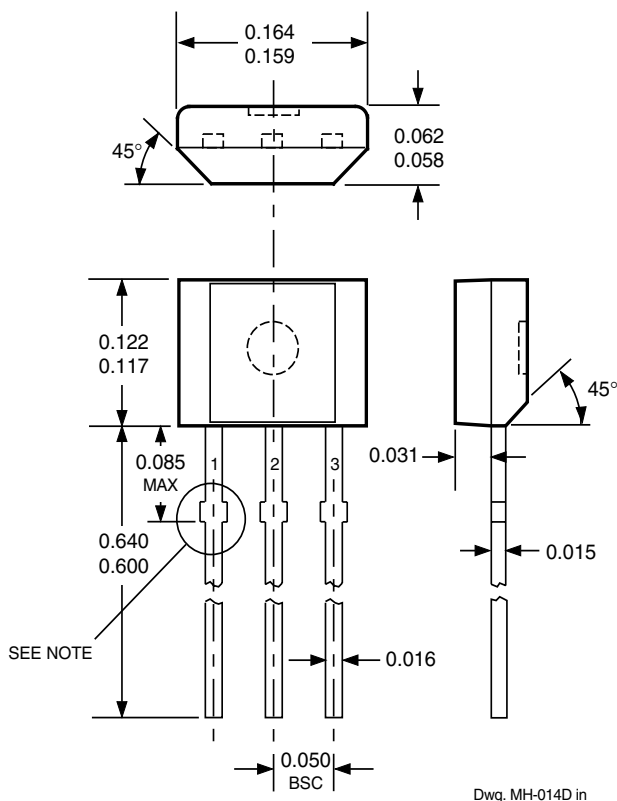
- NOTES:
1. Tolerances on package height and width represent allowable mold offsets. Dimensions given are measured at the widest point (parting line).
 2. Exact body and lead configuration at vendor's option within limits shown.
 3. Height does not include mold gate flash.
 4. Recommended minimum PWB hole diameter to clear transition area is 0.035" (0.89 mm).
 5. Where no tolerance is specified, dimension is nominal.

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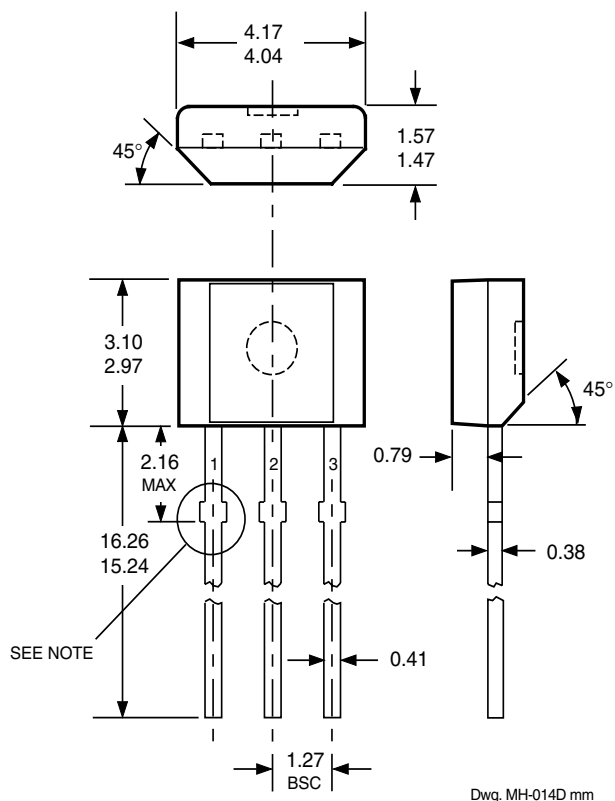
LOW-HYSTERESIS BIPOLAR HALL-EFFECT SWITCH FOR HIGH-TEMP. OPERATION

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.

Allegro MicroSystems, Inc. reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products.

The information included herein is believed to be accurate and reliable. However, Allegro MicroSystems, Inc. assumes no responsibility for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

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LOW-HYSTERESIS
BIPOLAR HALL-EFFECT SWITCH
FOR HIGH-TEMP. OPERATION

HALL-EFFECT SENSORS SELECTION GUIDE

| Partial Part Number | Avail. Oper. Temp. | Characteristics at T _A = +25°C | | | Features | Notes |
|--|--------------------|---|-----------------------|------------------------|----------------------------------|---------|
| | | B _{OP} (max) | B _{RP} (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.



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