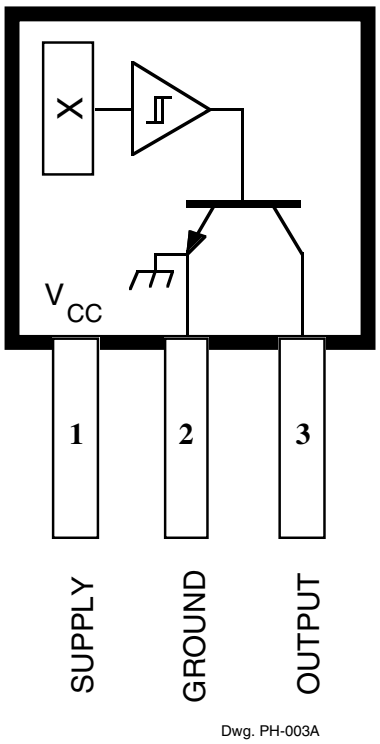
3175 AND 3177

Data Sheet 27609.4B

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.

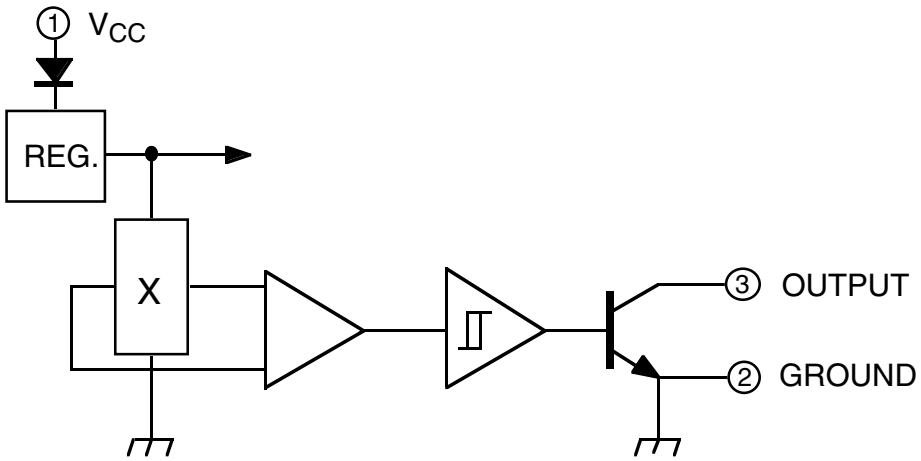
FEATURES

- 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°C, V_{CC} = 4.5 V to 18 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 V, I_{OUT} = 10 mA, B > B_{OP}	—	200	400	mV
Output Leakage Current	I_{OFF}	V_{OUT} = 18 V, B < B_{RP}	—	0.05	5.0	µA
Supply Current	I_{CC}	V_{CC} = 4.5 V, B < B_{RP} (Output OFF)	—	5.0	10	mA
Output Rise Time	t_r	V_{CC} = 12 V, R_L = 1.1 kΩ, C_L = 20 pF	—	0.04	2.0	µs
Output Fall Time	t_f	V_{CC} = 12 V, R_L = 1.1 kΩ, C_L = 20 pF	—	0.18	2.0	µs

MAGNETIC CHARACTERISTICS in gauss; V_{CC} = 4.5 V to 18 V.

Characteristic	Part Number*	T_A = +25°C			T_A = -20°C to +85°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).

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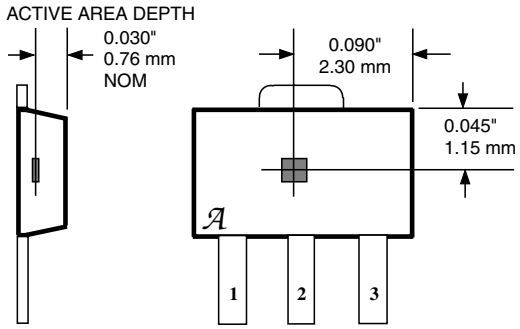
SENSOR LOCATIONS

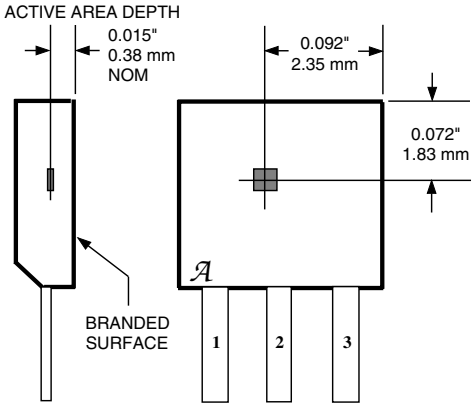
(±0.005” [0.13mm] die placement)

Suffix “LT”



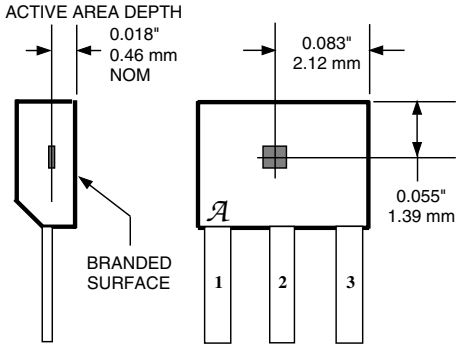
Dwg. MH-008-1B

Suffix “U”



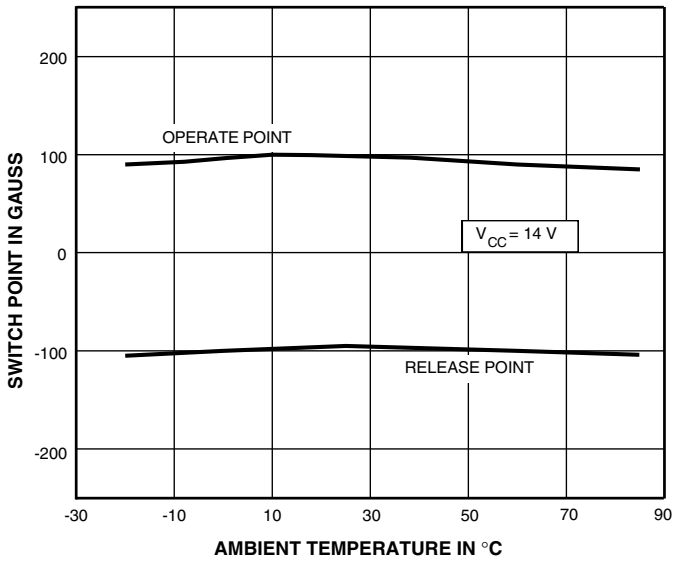
Dwg. MH-002-3B

Suffix “UA”



Dwg. MH-011B

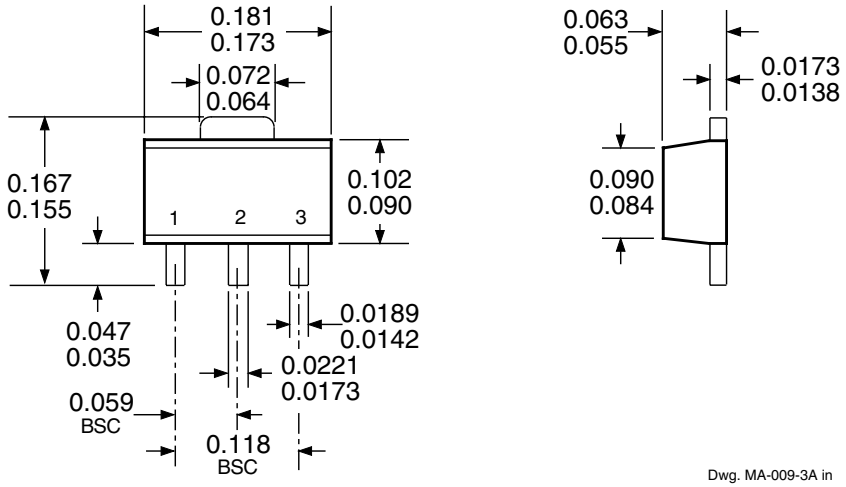
TYPICAL OPERATING CHARACTERISTICS



Dwg. GH-020

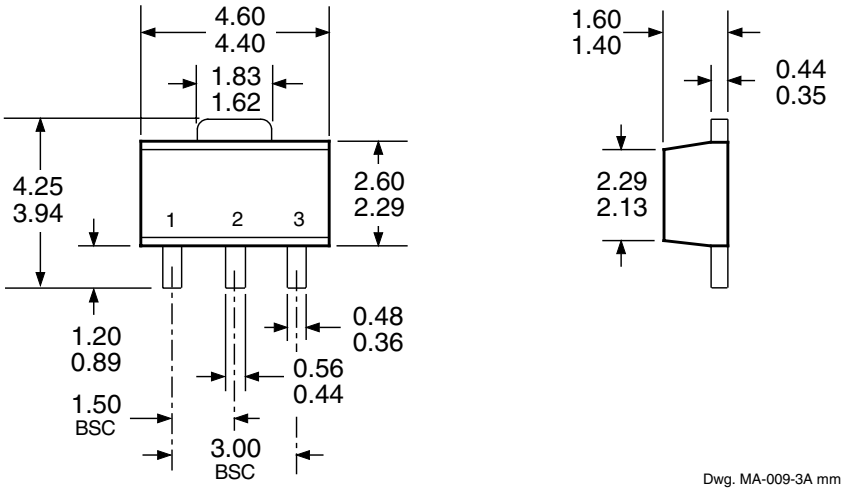
PACKAGE DESIGNATOR 'LT'

Dimensions in Inches
(for reference only)



Dwg. MA-009-3A in

Dimensions in Millimeters
(controlling dimensions)



Dwg. MA-009-3A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.

2. Supplied in bulk pack of 500 pieces per bag or add "TR"to part number for tape and reel (1000 devices).

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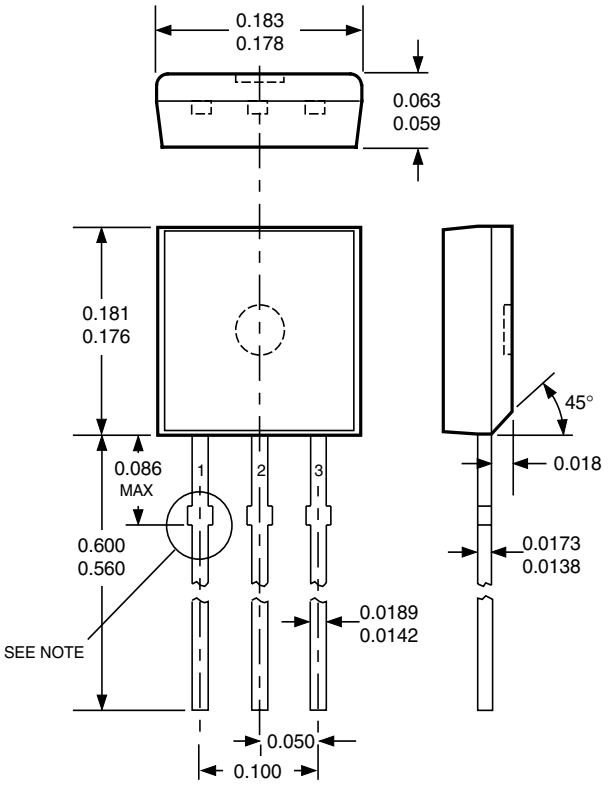
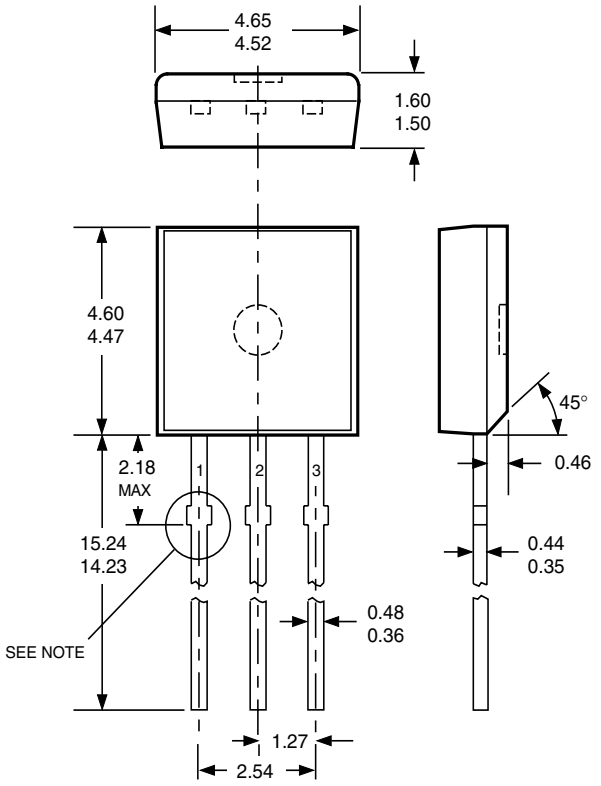
PACKAGE DESIGNATOR 'U'

Dimensions in Inches
(controlling dimensions)



Dwg. MH-003E in

Dimensions in Millimeters
(for reference only)



Dwg. MH-003E 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.

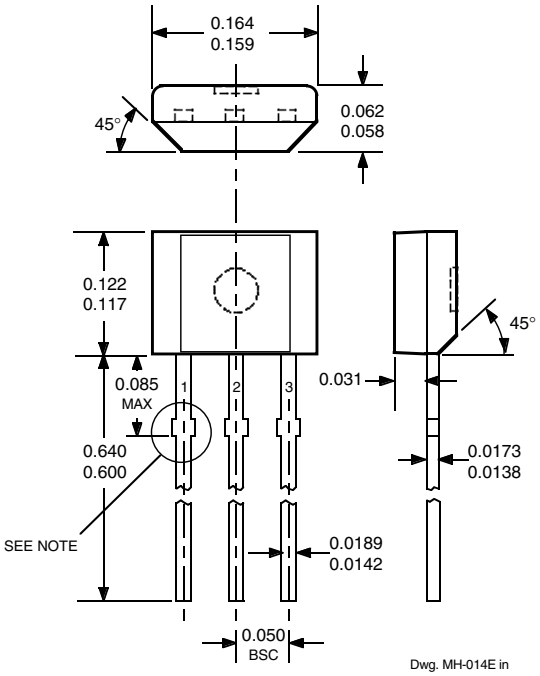
3. Height does not include mold gate flash.

4. Recommended minimum PWB hole diameter to clear transition area is 0.035" (0.89 mm).

5. Supplied in bulk pack of 500 pieces per bag.

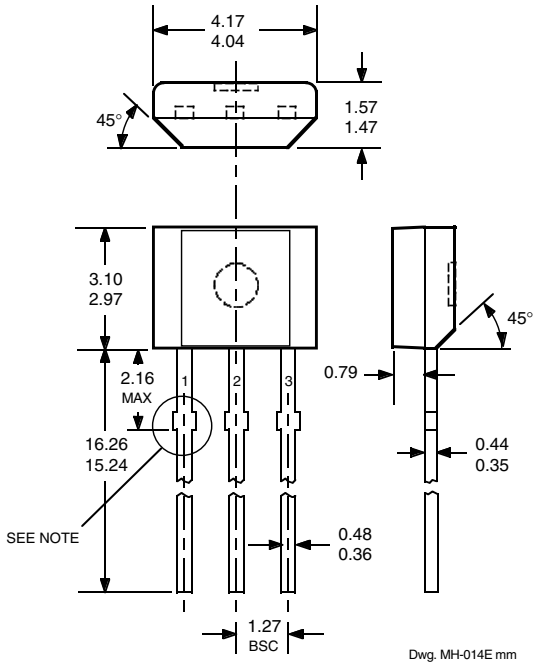
PACKAGE DESIGNATOR 'UA'

Dimensions in Inches
(controlling dimensions)



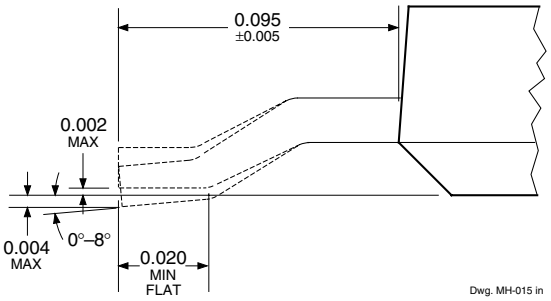
Dwg. MH-014E in

Dimensions in Millimeters
(for reference only)

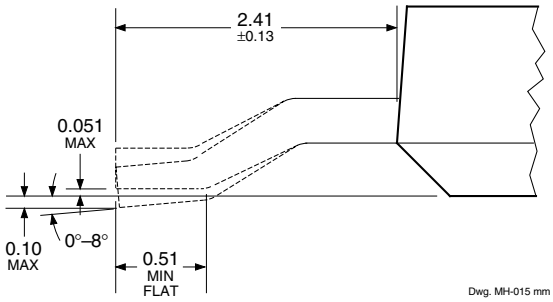


Dwg. MH-014E mm

Surface-Mount Lead Form (add '-TL' or '-TS' to part number).



Dwg. MH-015 in



Dwg. MH-015 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 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 (no suffix or suffix '-TL', 500 pieces per bag) or tape and reel (suffix '-TS', 4000 devices per reel).

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HALL-EFFECT SENSORS

Partial Part Number	Avail. Oper. Temp.	Characteristics at T_A = +25°C B_{OP} max	B_{RP} min	B_{hys} typ	Features	Notes
HALL-EFFECT UNIPOLAR & OMNIPOLAR SWITCHES in order of B_{OP} and B_{hys}						
3240	E/L	+50	+5.0	10	chopper stabilized	1
3209	E	±60	±5.0	7.7	400 µW, chopper stabilized	
3210	E	±60	±5.0	7.7	25 µW, chopper stabilized	
3361	E	+125	+40	5.0*	2-wire, chopper stabilized, inverted output	
3362	E	+125	+40	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 power driver output	1
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		
HALL-EFFECT LATCHES & BIPOLAR SWITCHES† in order of B_{OP} and B_{hys}						
3260	E/L	+30	-30	20	bipolar switch, 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		
3195	E/L	+160	-160	220	active pulldown	1
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*		3
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. Outputs may be tied together for omnipolar operation.
3. Complementary outputs for 2-phase bifilar-wound, unipolar-driven brushless dc motor control.

* Minimum. ‡ Maximum

† 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

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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