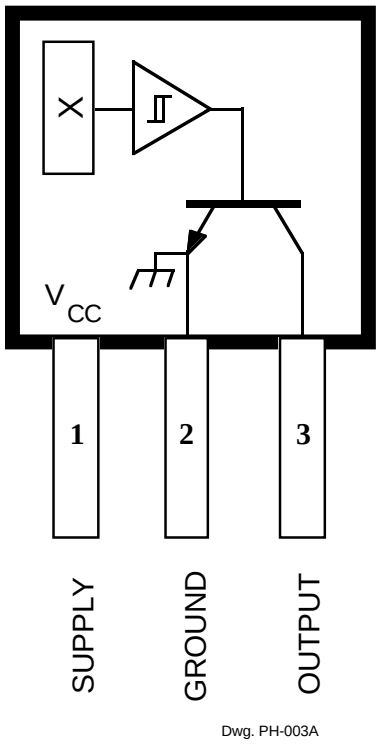
3175 AND 3177

Data Sheet
27609.4

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 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.

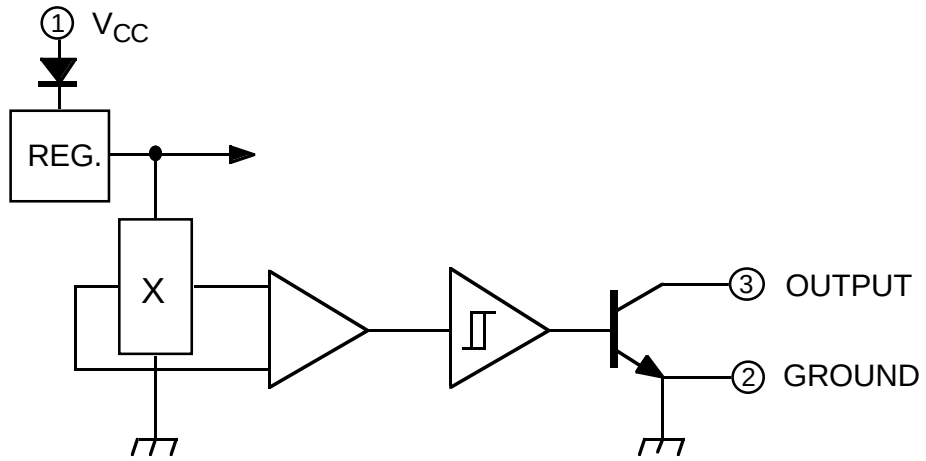
The four package styles available provide a magnetically optimized package for most applications. Suffix LT is a surface-mount SOT 89 (TO-243AA) package; suffixes LL, U, and UA feature wire leads for through-hole mounting.

FEATURES

- 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., **UGN3175LL** .
See Magnetic Characteristics table for differences between devices.

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	300	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 (LL, LT, U, or UA).

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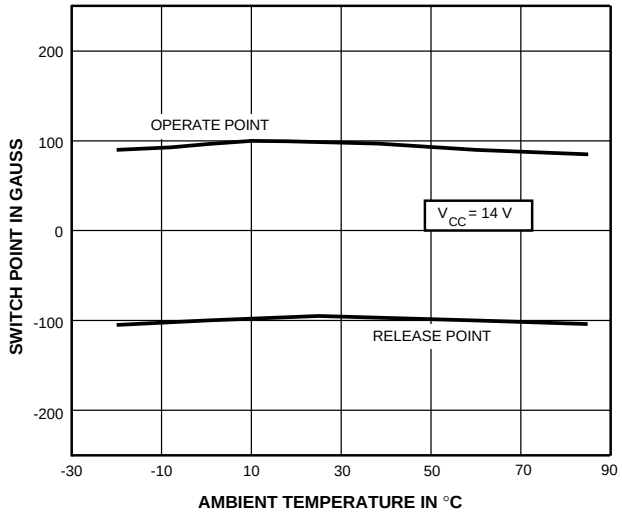
TYPICAL OPERATING CHARACTERISTICS

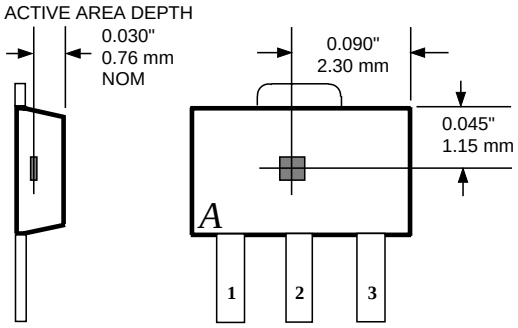


Dwg. GH-020

SENSOR LOCATIONS

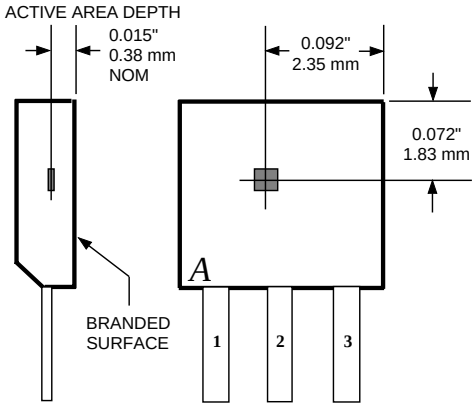
(±0.005” [0.13mm] die placement)

Suffix “LL” & Suffix “LT”



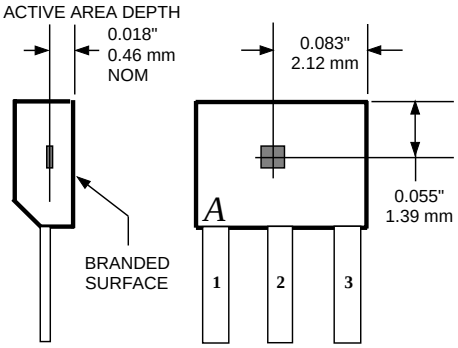
Dwg. MH-008-1B

Suffix “U”



Dwg. MH-002-3B

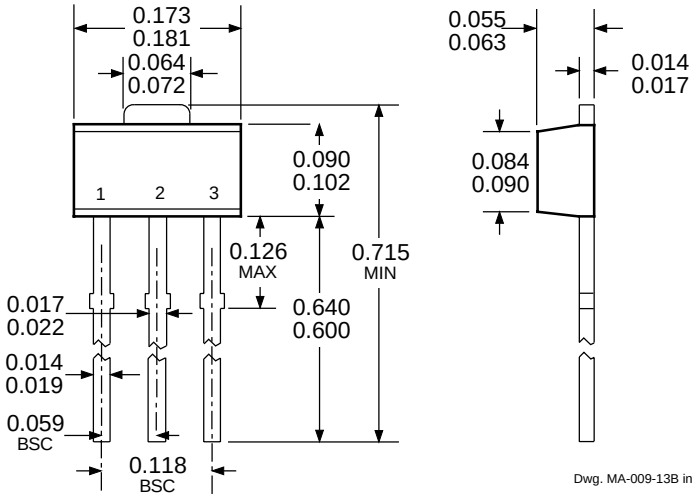
Suffix “UA”



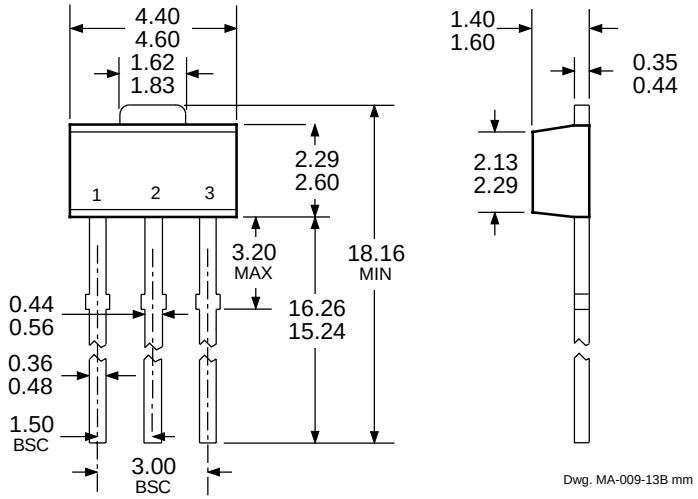
Dwg. MH-011B

PACKAGE DESIGNATOR LL

Dimensions in Inches
(for reference only)



Dimensions in Millimeters
(controlling dimensions)



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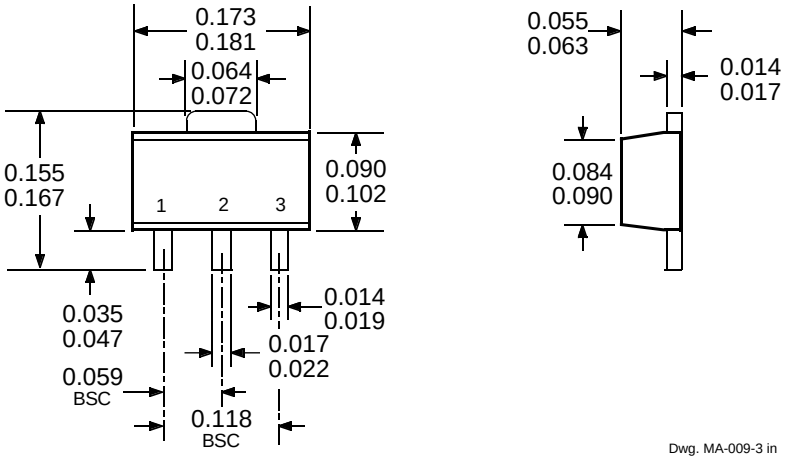
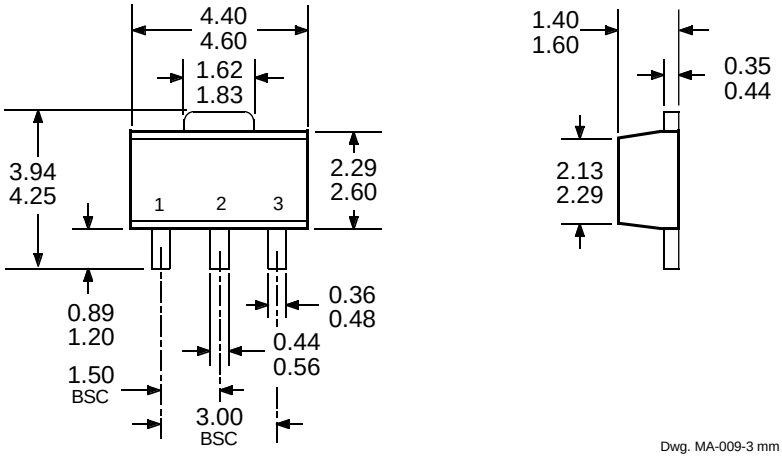
PACKAGE DESIGNATOR LT

Dimensions in Inches
(for reference only)



Dwg. MA-009-3 in

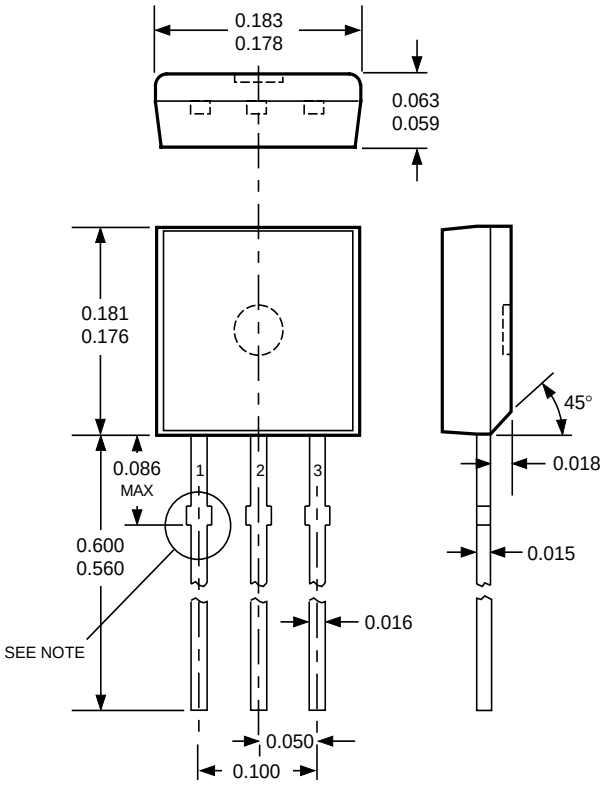
Dimensions in Millimeters
(controlling dimensions)



Dwg. MA-009-3 mm

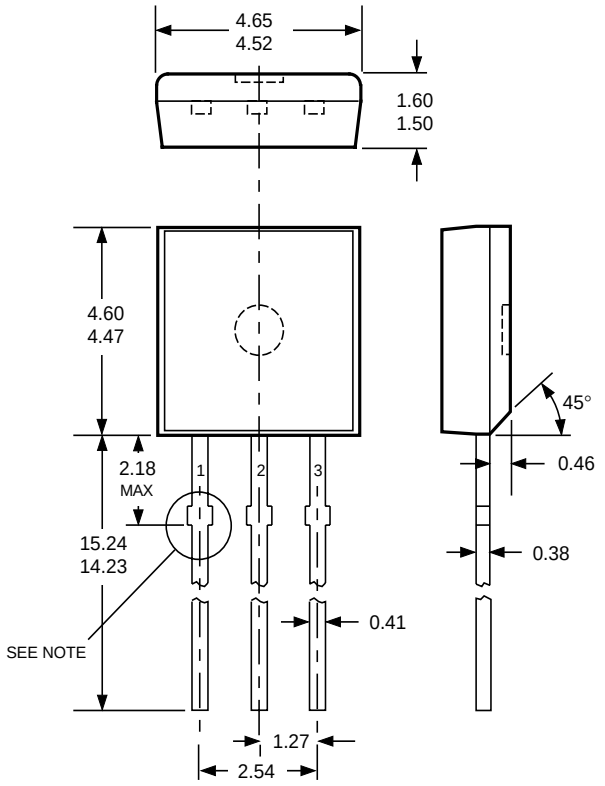
PACKAGE DESIGNATOR U

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).

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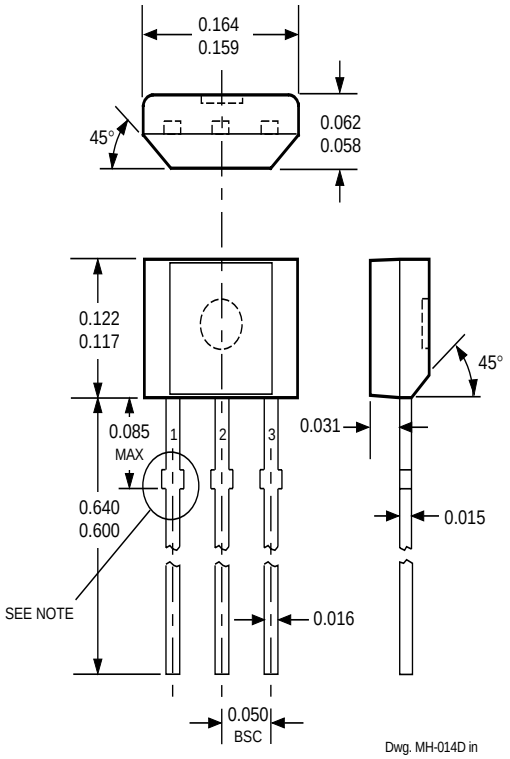
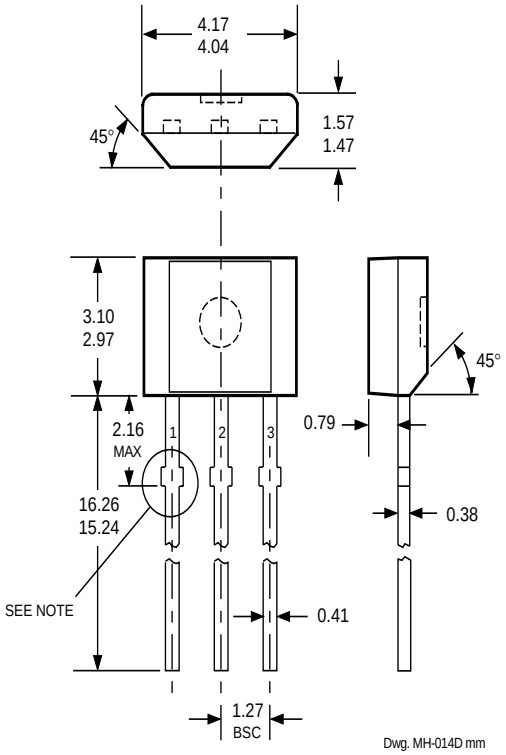
PACKAGE DESIGNATOR UA

Dimensions in Inches
(controlling dimensions)



Dwg. MH-014D in

Dimensions in Millimeters
(for reference only)



Dwg. MH-014D 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.

HALL-EFFECT SENSORS SELECTION GUIDE

Partial Part Number	Avail. Oper. Temp.	Operate Limits Over Temp. B_{OP} max	B_{RP} min	B_{hys} min	Function†	Notes
3046	E/L	+200	-200	15	Gear-Tooth Sensor	
3054	K/S	+300	+5	5.0	Unipolar Multiplex	1
3056	E/L	+225	-225	15	Gear-Tooth Sensor	
3058	E/L	+300	-300	150	Gear-Tooth Sensor	
3059	K/S	+100	-100	20	AC Gear-Tooth Sensor	
3060	K/S	+35	-35	10	AC Gear-Tooth Sensor	
3121	E/L	+500	+80	60	Unipolar Switch	
3122	E/L	+430	+120	70	Unipolar Switch	
3123	E/L	+470	+160	70	Unipolar Switch	
3132	K/L/S	+95	-95	30	Bipolar Switch	
3133	K/L/S	+75	-75	30	Bipolar Switch	
3134	E/L	+50	-40	10	Bipolar Switch	
3141	E/L	+175	+10	20	Unipolar Switch	
3142	E/L	+245	+60	30	Unipolar Switch	
3143	E/L	+355	+150	30	Unipolar Switch	
3144	E/L	+450	+25	20	Unipolar Switch	
3161	E	+160	+30	5.0	2-Wire Unipolar Switch	
3175	S	+180	-180	80	Latch	
3177	S	+150	-150	50	Latch	
3185	E/K/L/S	+300	-300	280	Latch	
3186	E/K/L/S	+350	-350	100	Latch	
3187	E/K/L/S	+175	-175	100	Latch	
3188	E/K/L/S	+200	-200	160	Latch	
3189	E/K/L/S	+250	-250	100	Latch	
3195	E/L	+200	-200	110	Latch	2, 3
3197	L	+200	-200	110	Latch	3
3235	S	+200	+15	15	Unipolar Switch	4
		-15	-200	15	Unipolar Switch	
3275	S	+250	-250	100	Latch	5
3421	E/L	+300	-300	240	Direction Detection	
3422	E/L	+85	-85	10	Direction Detection	
3503	S	Typ. 1.3 mV/G		–	Linear Sensor	
3515	E/L	Typ. 5.0 mV/G		–	Chopper-Stabilized Linear Sensor	
3516	E/L	Typ. 2.5 mV/G		–	Chopper-Stabilized Linear Sensor	
3517	L/S	Typ. 5.0 mV/G		–	Chopper-Stabilized Linear Sensor	
3518	L/S	Typ. 2.5 mV/G		–	Chopper-Stabilized Linear Sensor	
3625	S	+150	-150	200*	900 mA Latch	3, 5, 6
3626	S	+150	-150	200*	400 mA Latch	3, 5, 6
5140	E	+240	+25	20	300 mA Unipolar Switch	3, 6

Operating Temperature Ranges:
C = 0°C to +70°C, S = -20°C to +85°C, E = -40°C to +85°C, K = -40°C to +125°C, L = -40°C to +150°C

Notes
1. Multiplexed two-wire sensor; after proper address, power/signal bus current indicates magnetic field condition.
2. Active pull down.
3. Protected.
4. Output 1 switches on south pole, output 2 switches on north pole for 2-phase, bifilar-wound, unipolar-driven brushless dc motor control.
5. Complementary outputs for 2-phase bifilar-wound, unipolar-driven brushless dc motor control.
6. Power driver output.
* Typical.
† 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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