

3132 AND 3133

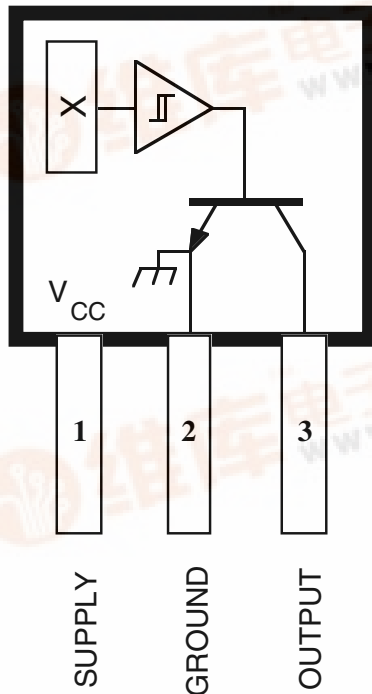
Data Sheet
27631.2B

ULTRA-SENSITIVE BIPOLAR HALL-EFFECT SWITCHES

These Hall-effect switches are designed for magnetic actuation using a bipolar magnetic field, i.e., a north-south alternating field. They combine extreme magnetic sensitivity with excellent stability over varying temperature and supply voltage. The high sensitivity permits their use with multi-pole ring magnets over relatively large distances.

Each device includes a voltage regulator, quadratic Hall voltage generator, temperature stability circuit, signal amplifier, Schmitt trigger, and open-collector output on a single silicon chip. The on-board regulator permits operation with supply voltages of 4.5 to 24 V. The switch output can sink up to 25 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 miniature SOT-89/TO-243AA transistor package for surface-mount applications; suffixes 'U', and 'UA' feature wire leads for through-hole mounting. Prefix 'UGN' devices are rated for continuous operation over the temperature range of -20°C to +85°C, prefix 'UGS' devices over an extended range of -40°C to +125°C, and prefix 'UGL' devices over the range of -40°C to +150°C.



Dwg. PH-003A

Pinning is shown viewed from branded side.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC}	25 V
Reverse Battery Voltage, V_{RCC}	-35 V
Magnetic Flux Density, B	Unlimited
Output OFF Voltage, V_{OUT}	25 V
Continuous Output Current, I_{OUT} .	25 mA
Operating Temperature Range, T_A	
Prefix UGL	-40°C to +150°C
Prefix UGN	-20°C to +85°C
Prefix UGS	-40°C to +125°C
Storage Temperature Range, T_S	-65°C to +150°C

FEATURES

- 4.5 V to 24 V Operation
- Reverse Battery Protection
- Superior Temperature Stability
- Superior Supply Voltage Stability
- Activate with Multi-Pole Ring Magnets
- Solid-State Reliability
- Small Size
- Constant Output Amplitude
- Resistant to Physical Stress

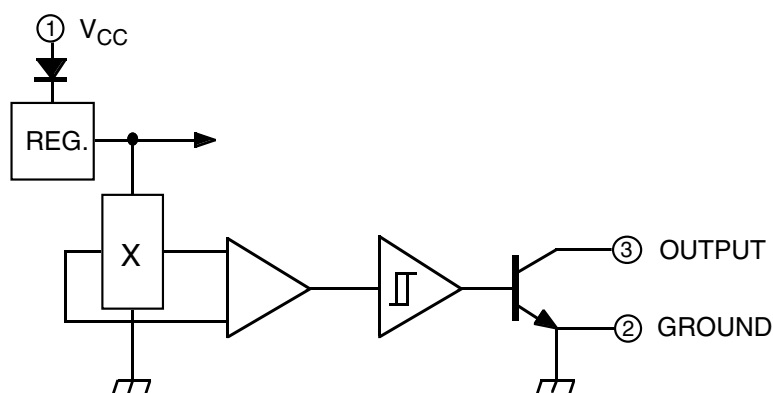
Always order by complete part number including prefix and suffix, e.g., **UGN3132LT**.

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BIPOLAR

HALL-EFFECT SWITCHES

FUNCTIONAL BLOCK DIAGRAM



Dwg. FH-005-2

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Supply Voltage	V_{CC}	Operating	4.5	—	24	V
Output Saturation Voltage	$V_{OUT(SAT)}$	$I_{OUT} = 20 \text{ mA}$, $B \geq B_{OP}$	—	145	400	mV
Output Leakage Current	I_{OFF}	$V_{OUT} = 24 \text{ V}$, $B \leq B_{RP}$	—	<1.0	10	μA
Supply Current	I_{CC}	$V_{CC} = 24 \text{ V}$, $B \leq B_{RP}$	—	4.3	9.0	mA
Output Rise Time	t_r	$V_{CC} = 12 \text{ V}$, $R_L = 820 \Omega$, $C_L = 20 \text{ pF}$	—	0.04	2.0	μs
Output Fall Time	t_f	$V_{CC} = 12 \text{ V}$, $R_L = 820 \Omega$, $C_L = 20 \text{ pF}$	—	0.18	2.0	μs

MAGNETIC CHARACTERISTICS over operating temperature and voltage range.

Characteristic	Symbol	Device Type*	Limits			
			Min.	Typ.	Max.	Units
Operate Point	B_{OP}	3132	—	32	95	G
		3133	—	32	75	G
Release Point	B_{RP}	3132	-95	-20	—	G
		3133	-75	-20	—	G
Hysteresis	B_{hys}	Both	30	52	—	G

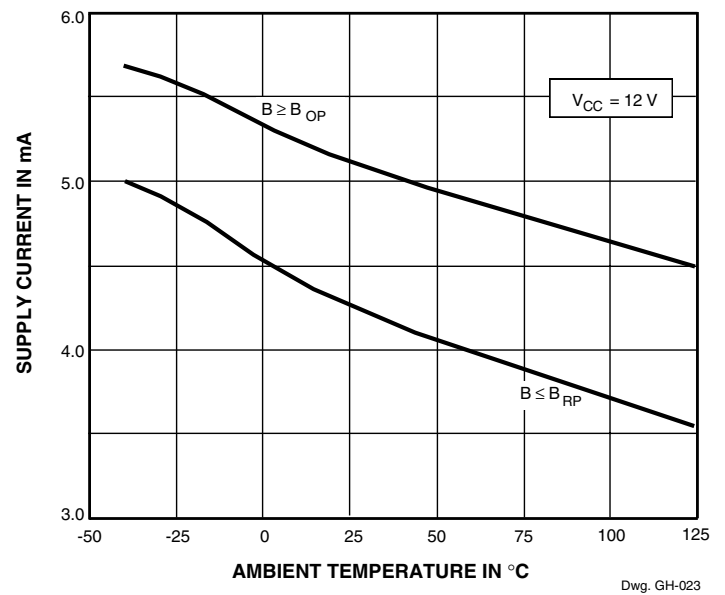
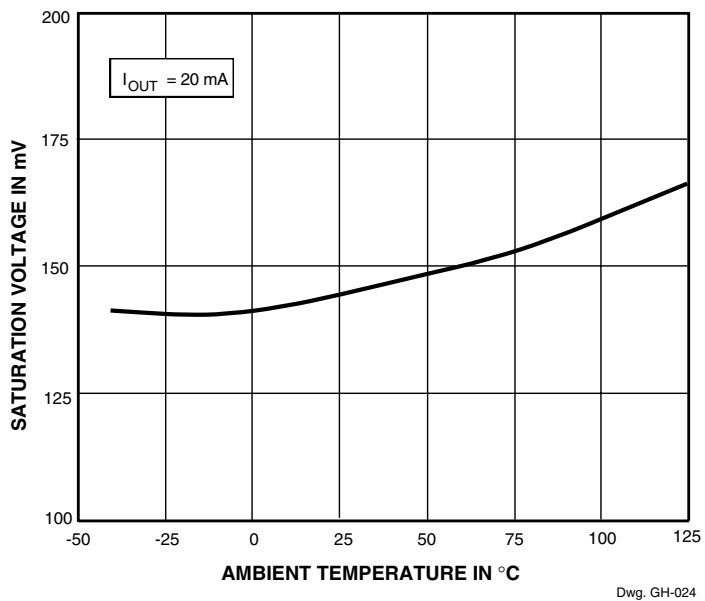
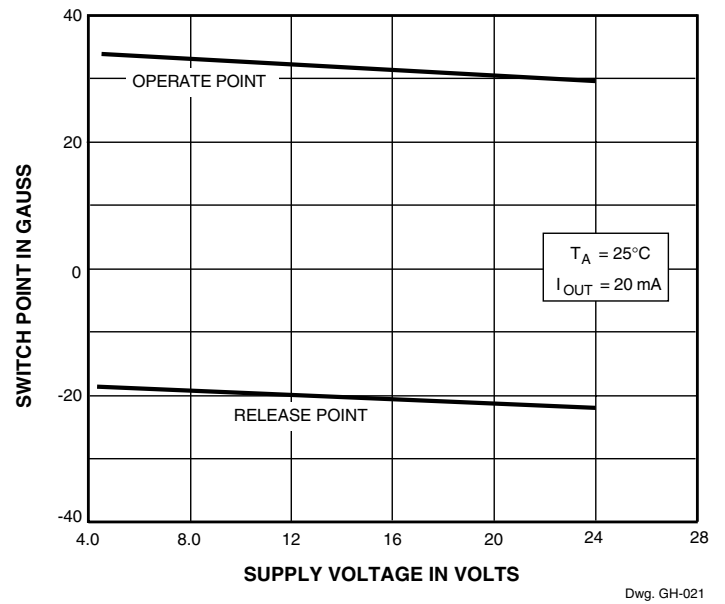
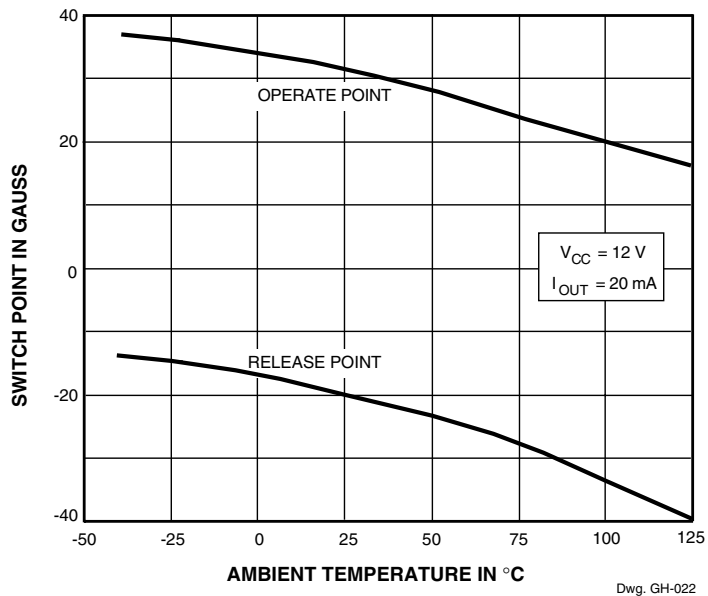
NOTE: As used here, negative flux densities are defined as less than zero (algebraic convention.)

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

* Complete part number includes a prefix denoting operating temperature range (UGL, UGN, or UGS) and a suffix denoting package type (LT, U, or UA).

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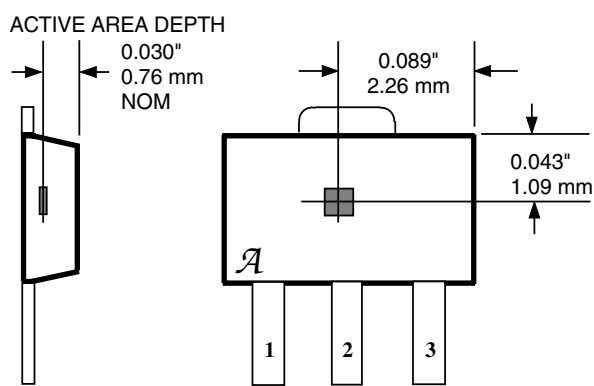
TYPICAL CHARACTERISTICS



3132 AND 3133 BIPOLAR HALL-EFFECT SWITCHES

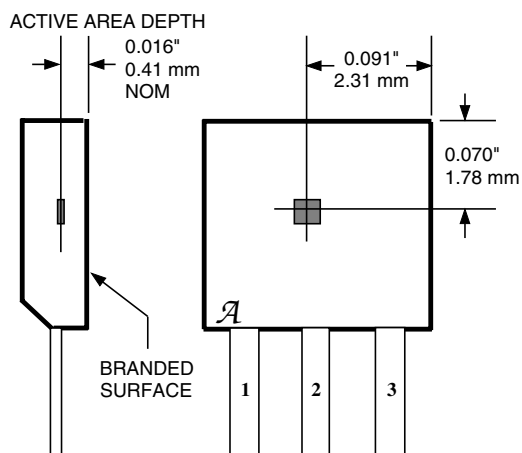
SENSOR LOCATIONS ($\pm 0.005"$ [0.13mm] die placement)

SUFFIX "LT"



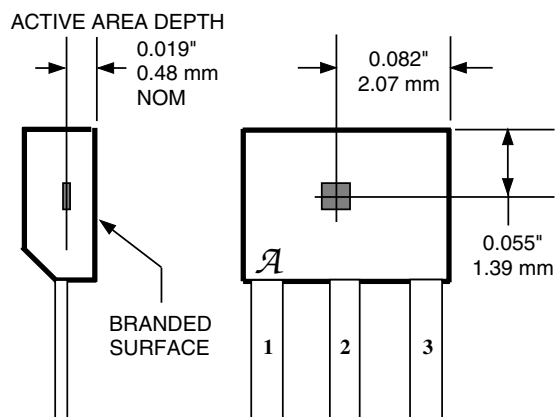
Dwg. MH-008-2C

SUFFIX "U"



Dwg. MH-002-2B

SUFFIX "UA"

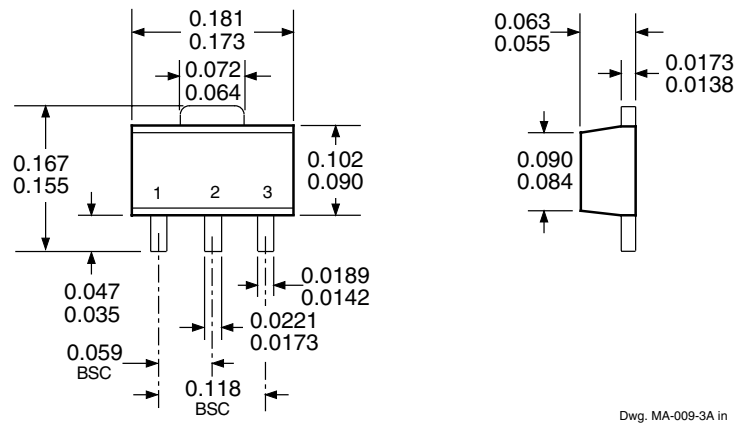


Dwg. MH-011-10

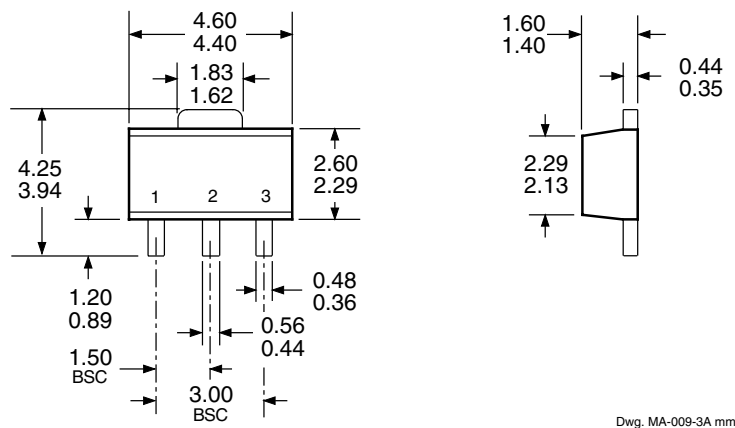
3132 AND 3133 BIPOLAR HALL-EFFECT SWITCHES

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).

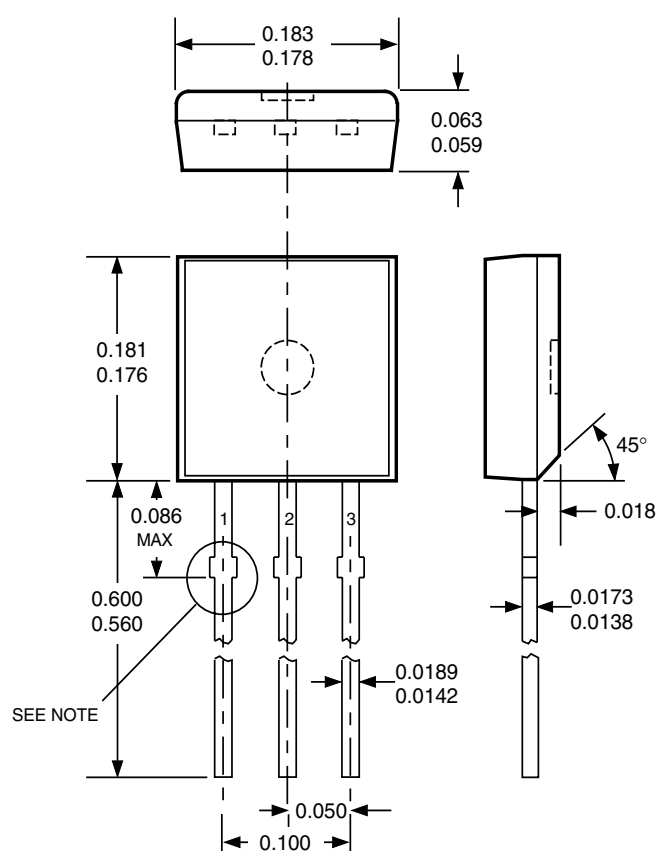
2. Exact body and lead configuration at vendor's option within limits shown.

3. Height does not include mold gate flash.

3132 AND 3133 BIPOLAR HALL-EFFECT SWITCHES

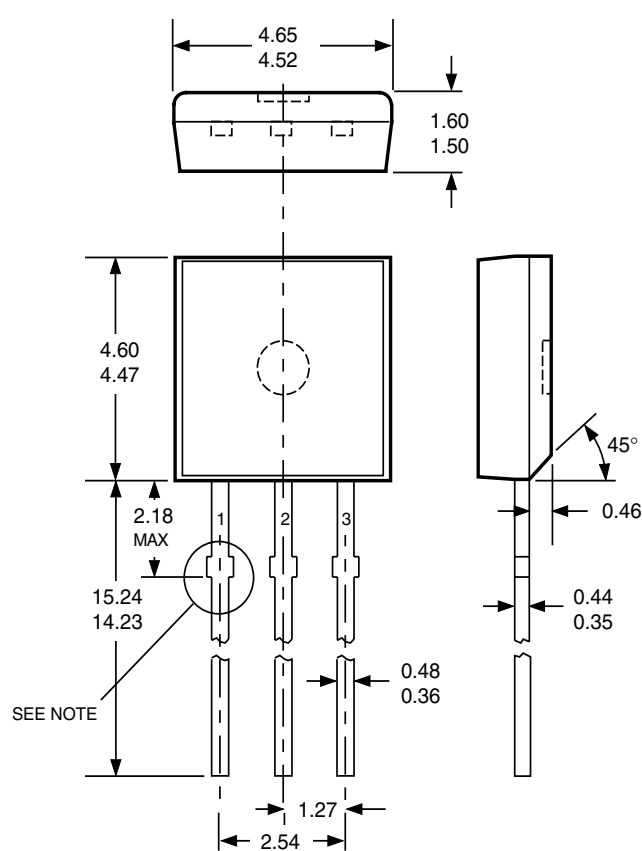
PACKAGE DESIGNATOR 'U'

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.

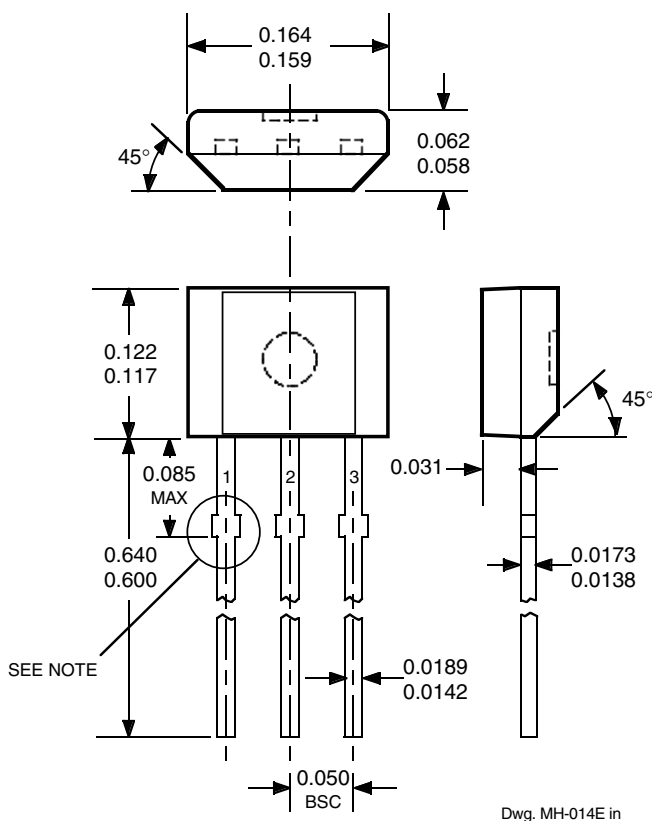
4. Recommended minimum PWB hole diameter to clear transition area is 0.035" (0.89 mm).

5. Where no tolerance is specified, dimension is nominal.

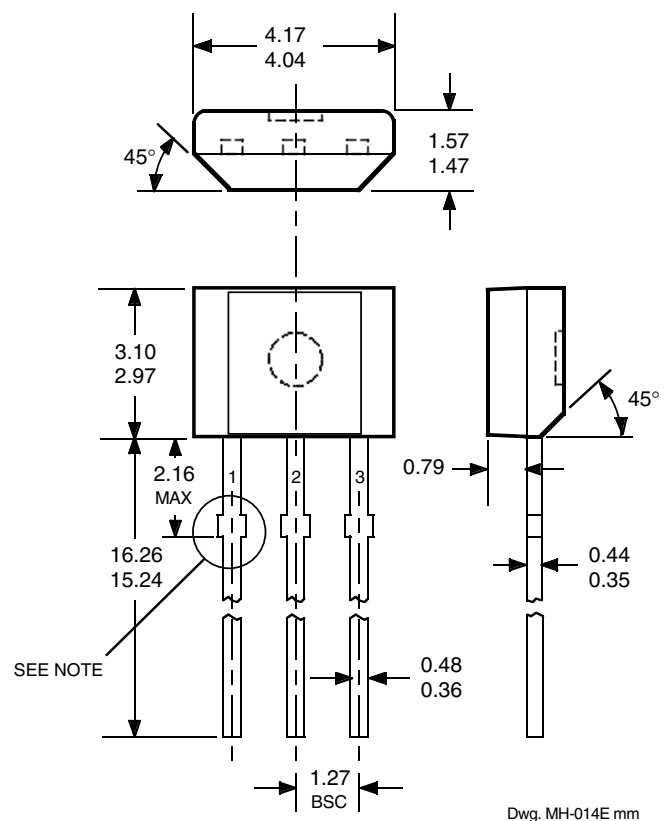
3132 AND 3133 BIPOLAR HALL-EFFECT SWITCHES

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.

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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BIPOLAR

HALL-EFFECT SWITCHES

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	2
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		1
3143	E/L	+340	+165	55		
3144	E/L	+350	+50	55		
3122	E/L	+400	+140	105		1
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	1, 3, 5
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	1, 3, 5
3281	E/L	+90	-90	100	chopper stabilized	
3132	K/L/S	+95	-95	52	bipolar switch	
3187	E/L	+150	-150	100*		1, 4
3177	S	+150	-150	200		
3625	S	+150	-150	200	900 mA outputs	
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		5
3188	E/L	+180	-180	200*		
3283	E/L	+180	-180	300	chopper stabilized	
3189	E/L	+230	-230	100*		5
3275	S	+250	-250	100*		
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.