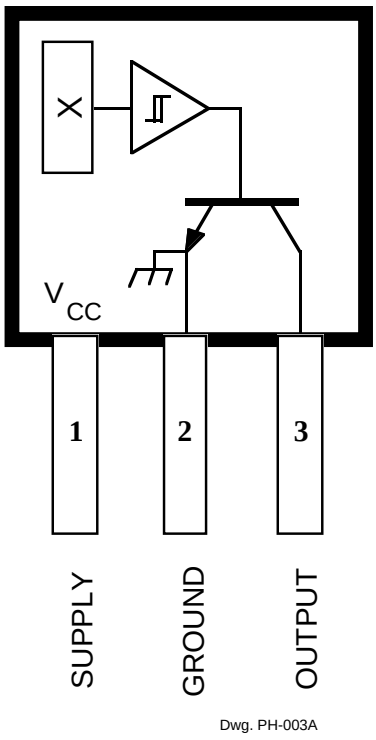
3132 AND 3133

Data Sheet 27631.2B†

ULTRA-SENSITIVE BIPOLAR HALL-EFFECT SWITCHES



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**

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.

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

The UGx3132U is not for new design.
The UGx3133U is discontinued — shown for reference only.

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

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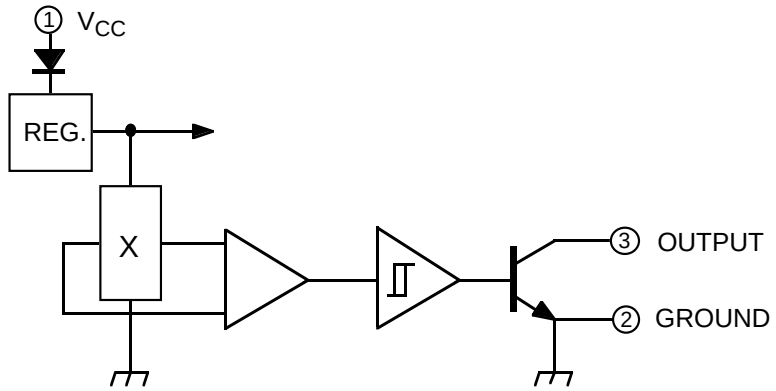
HALL-EFFECT SWITCHES

FUNCTIONAL BLOCK DIAGRAM



Dwg. FH-005-2

ELECTRICAL CHARACTERISTICS at T_A = +25°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 mA, B ≥ B_{OP}	—	145	400	mV
Output Leakage Current	I_{OFF}	V_{OUT} = 24 V, B ≤ B_{RP}	—	<1.0	10	µA
Supply Current	I_{CC}	V_{CC} = 24 V, B ≤ B_{RP}	—	4.3	9.0	mA
Output Rise Time	t_r	V_{CC} = 12 V, R_L = 820 Ω, C_L = 20 pF	—	0.04	2.0	µs
Output Fall Time	t_f	V_{CC} = 12 V, R_L = 820 Ω, C_L = 20 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°C and V_{CC} = 12 V.
1 gauss (G) is exactly equal to 0.1 millitesla (mT).

* 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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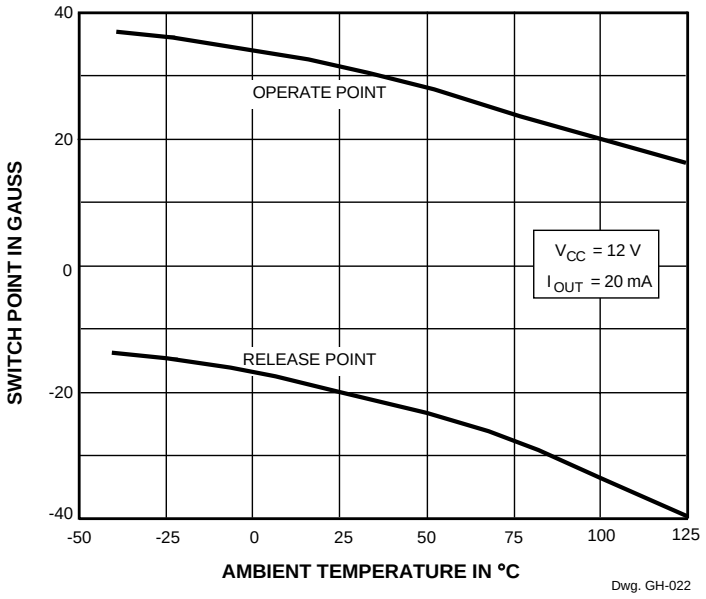
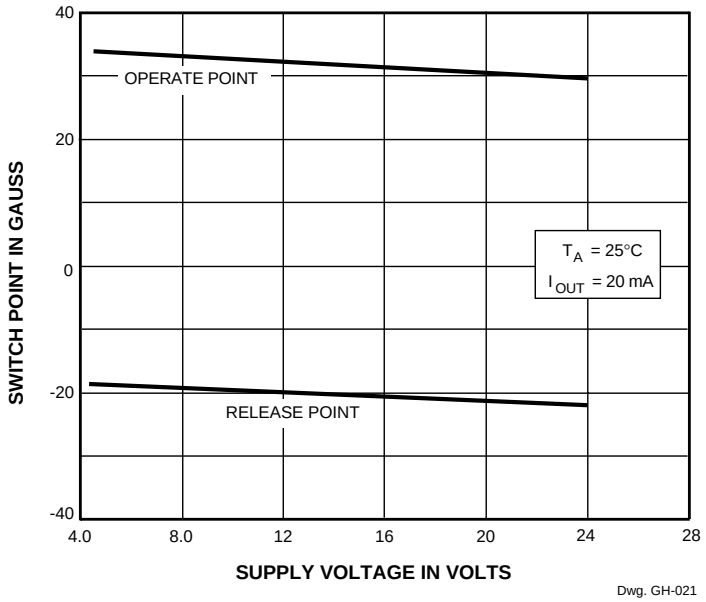
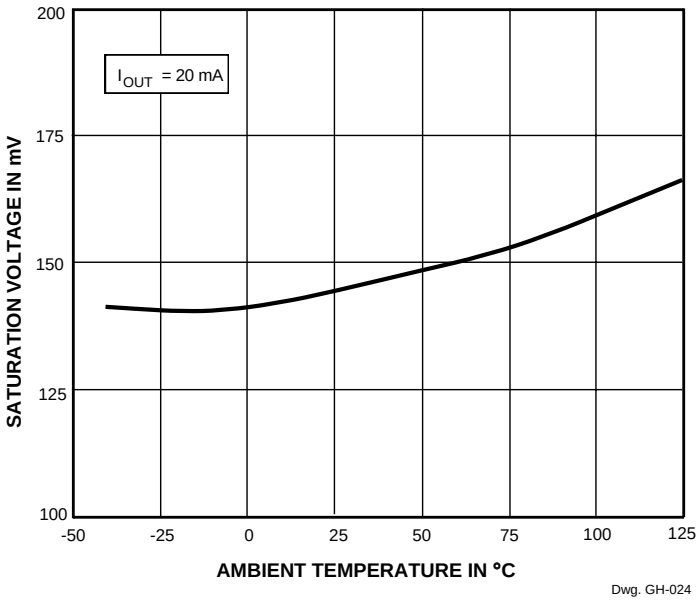
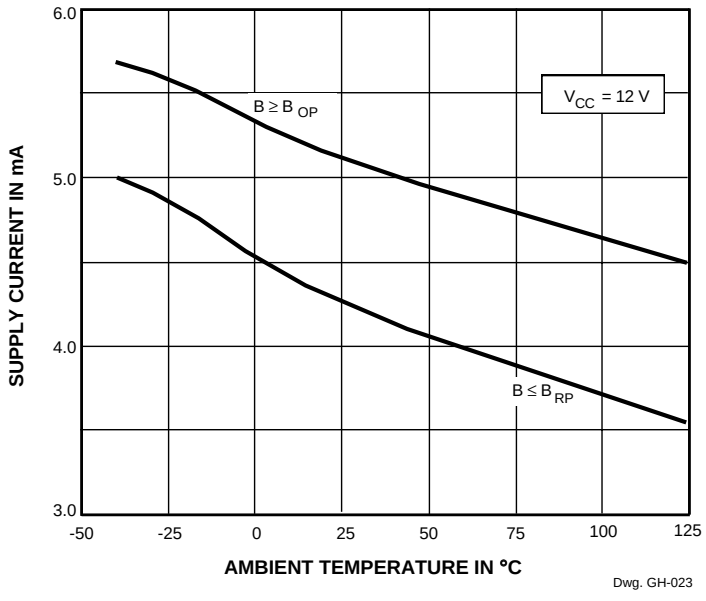
TYPICAL CHARACTERISTICS









Powering up in the absence of a magnetic field (less than B_{OP} and higher than B_{RP}) will allow an indeterminate output state. The correct state is warranted after the first excursion beyond B_{OP} or B_{RP}.

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

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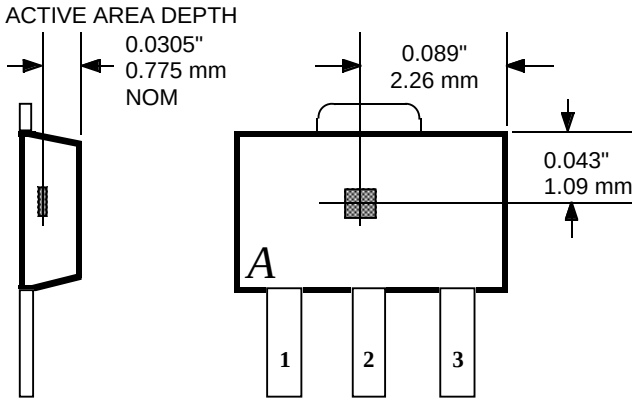
SENSOR LOCATIONS

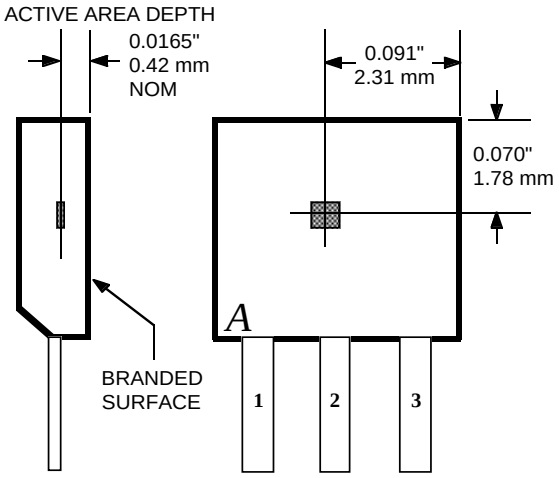
(±0.005” [0.13mm] die placement)

SUFFIX “LT”



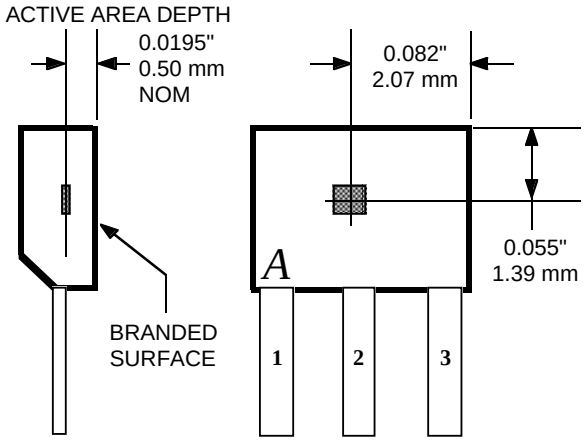
Dwg. MH-008-2D

SUFFIX “U”



Dwg. MH-002-2C

SUFFIX “UA”



Dwg. MH-011-10A

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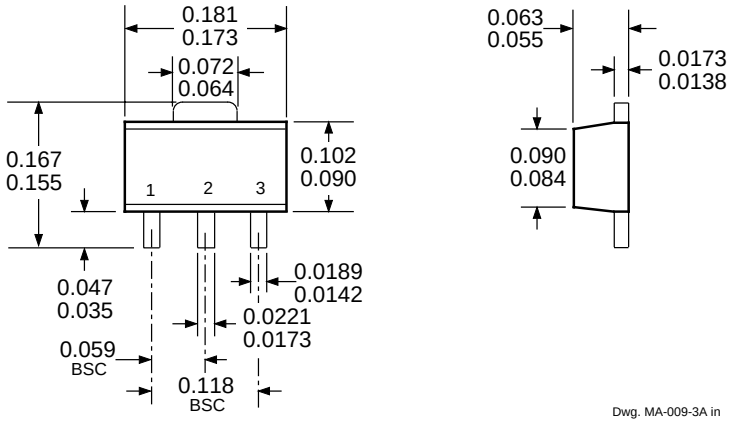
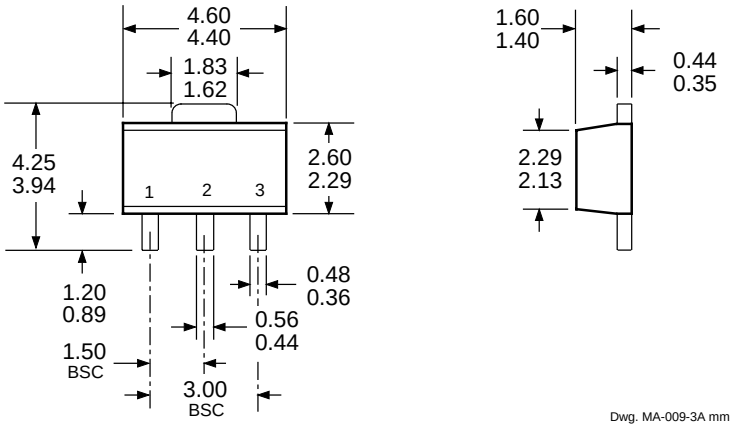
PACKAGE DESIGNATOR 'LT'
(SOT89/TO-243AA)

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

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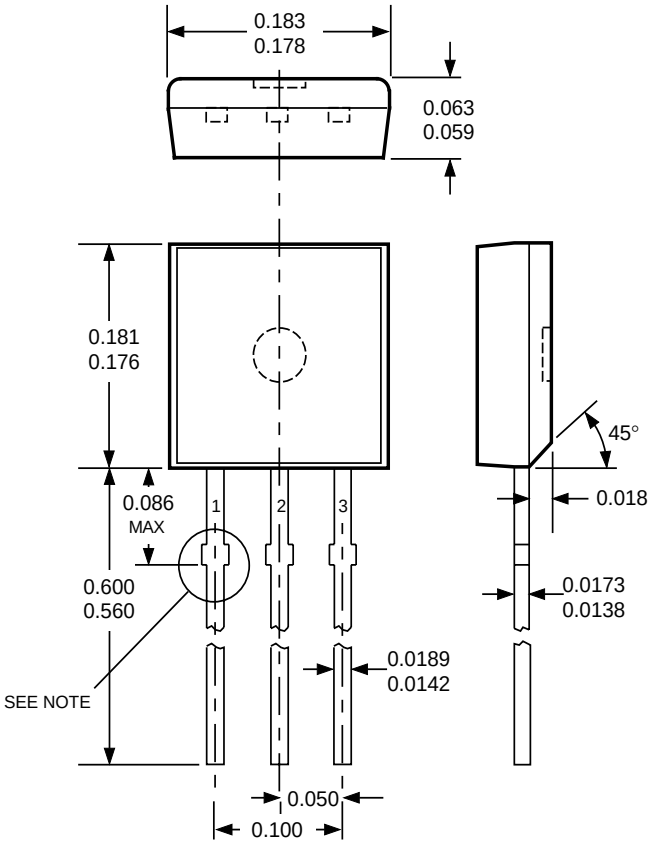
HALL-EFFECT SWITCHES

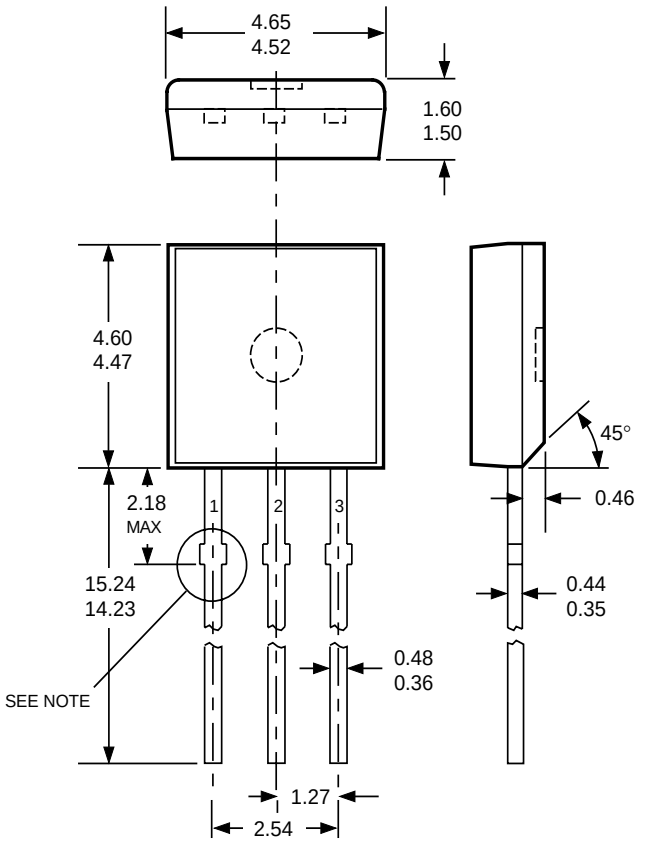
PACKAGE DESIGNATOR 'U'

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.

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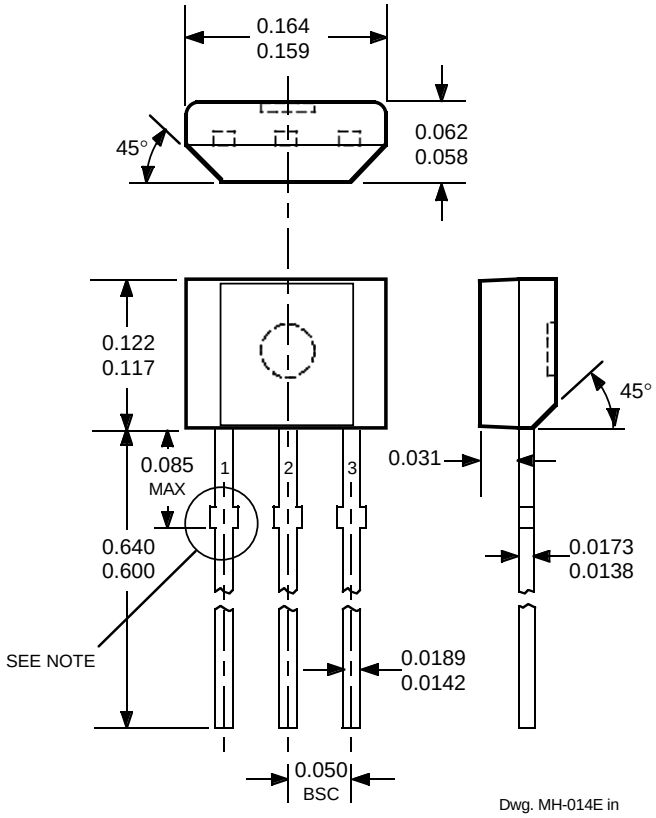
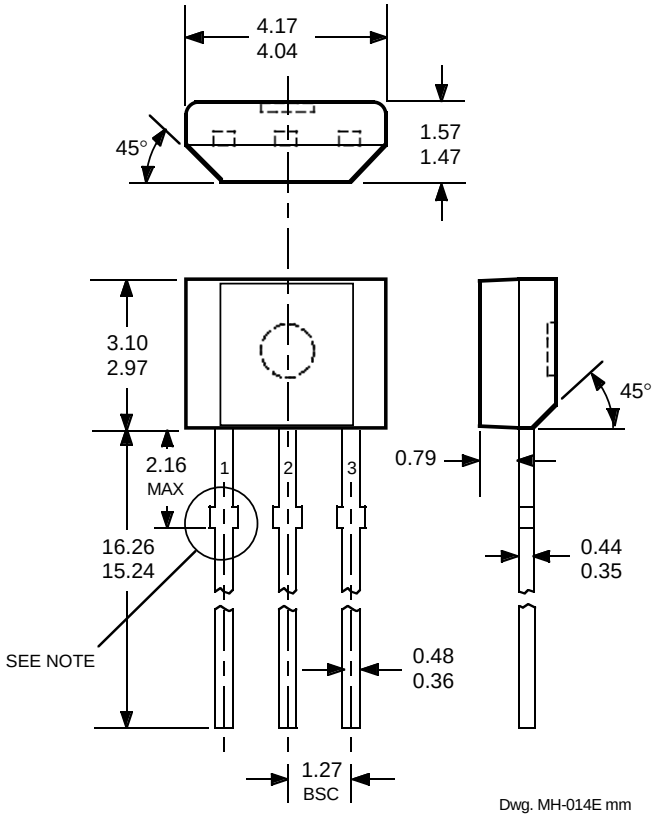
PACKAGE DESIGNATOR 'UA'

Dimensions in Inches
(controlling dimensions)



Dwg. MH-014E in

Dimensions in Millimeters
(for reference only)



Dwg. MH-014E 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 (500 pieces per bag).

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HALL-EFFECT SENSORS

BIPOLAR HALL-EFFECT DIGITAL SWITCHES

Partial Part Number	Operate Point (G) Over Oper. Voltage & Temp. Range	Release Point (G)	Hysteresis (G)	Oper. Temp.	Packages	Replaces and Comments
UGx3132	<95 (Typ 32)	>-95 (Typ -20)	>30 (Typ 52)	K, L, S	LT, UA	3030, 3130, 3131
UGx3133	<75 (Typ 32)	>-75 (Typ -20)	>30 (Typ 52)	K, L, S	LT, UA	
UGx3134	-40 to 50	-50 to 40	5 to 55	E, L	LT, UA	
A3260x	<30 (Typ 10)	>-30 (Typ -10)	Typ 20	E, L	LH, LT, UA	2 wire, chopper stabilized

LATCHING HALL-EFFECT DIGITAL SWITCHES

Partial Part Number	Operate Point (G) Over Oper. Voltage & Temp. Range	Release Point (G)	Hysteresis (G)	Oper. Temp.	Packages	Replaces and Comments
UGN3175	15 to 180	-180 to -15	>80 (Typ 180)	S	LT, UA	
UGN3177	25 to 150	-150 to -25	>50 (Typ 180)	S	LT, UA	
A3185x	140 to 300	-300 to -140	280 to 600	E/L	LT, UA	
A3187x	50 to 175	-175 to -50	100 to 350	E/L	LT, UA	3077, 3175, 3177
A3188x	80 to 200	-200 to -80	160 to 400	E/L	LT, UA	
A3189x	50 to 250	-250 to -50	100 to 500	E/L	LT, UA	3075, 3076
A3280x	5 to 40	-40 to -5	10 to 80	E/L	LH, LT, UA	chopper stabilized
A3281x	15 to 90	-90 to -15	30 to 180	E/L	LH, LT, UA	chopper stabilized
A3283x	100 to 180	-180 to -100	<400 (Typ 300)	E/L	LH, LT, UA	chopper stabilized

"PROTECTED" LATCHING HALL-EFFECT DIGITAL SWITCHES

Partial Part Number	Operate Point (G) Over Oper. Voltage & Temp. Range	Release Point (G)	Hysteresis (G)	Oper. Temp.	Packages	Comments
A3195x	40 to 200	-200 to -40	>110 (Typ 220)	E, L	U, LT	active pulldown
A3197x	40 to 200	-200 to -40	>110 (Typ 230)	E, L	U, LT	open-collector output

Notes: 1) Typical data is at T_A = +25°C and nominal operating voltage.

2) "x" = Operating Temperature Range [suffix letter or (prefix)]: S (UGN) = -20°C to +85°C, E = -40°C to +85°C, J = -40°C to +115°C, K (UGS) = -40°C to +125°C, L (UGL) = -40°C to +150°C.

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