

Single Phase Hall Effect Latch

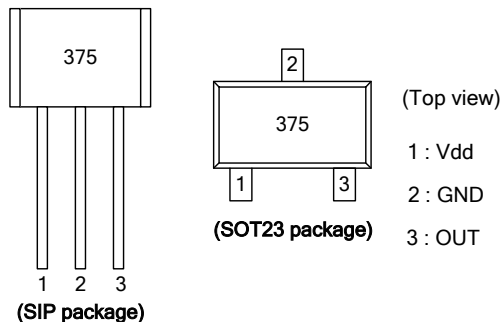
■ Features

- 2.2V to 20V DC operation voltage
- Temperature compensation
- Wide operating voltage range
- Open drain pre-driver
- 25mA maximum sinking output current
- Package: SIP3, SOT23

■ Applications

- Brush-less DC Motor
- Brush-less DC Fan
- Revolution counting
- Speed measurement

■ Pin Assignments



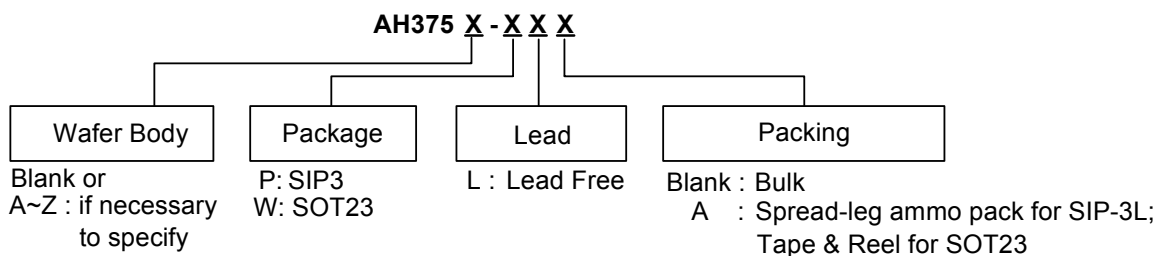
■ General Description

AH375 is an integrated Hall effect latched sensor designed for electronic commutation of brush-less DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a schmitt trigger to provide switching hysteresis for noise rejection, and open drain output. An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range. If a magnetic flux density larger than threshold B_{op} , DO is turned on(low). The output state is held until a magnetic flux density reversal falls below B_{rp} causing DO to be turned off (high).

■ Pin Descriptions

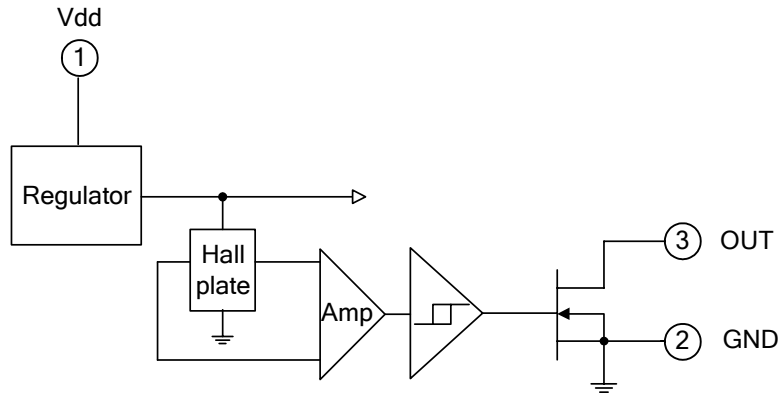
| Name | P/I/O | Pin # | Description |
|------|-------|-------|-----------------------|
| Vdd | P | 1 | Positive Power Supply |
| GND | P | 2 | Ground |
| OUT | O | 3 | Output Pin |

■ Ordering Information



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■ Functional Block Diagrams



■ Absolute Maximum Ratings (at Ta=25°C)

| Characteristics | | Symbol | Values | Unit |
|-----------------------------|------------|-----------------|-----------|------|
| Supply Voltage | | Vdd | 20 | V |
| Magnetic Flux Density | | B | Unlimited | |
| Output OFF Voltage | | V _{DS} | 30 | V |
| Output "On" Current | Continuous | I _d | 25 | mA |
| Operating Temperature Range | | T _a | -40~+125 | °C |
| Storage Temperature Range | | T _s | -65~+150 | °C |
| Maximum Junction Temp. | | T _j | 150 | °C |
| Package Power Dissipation | SIP-3L | P _d | 550 | mW |
| | SOT23-3L | | 230 | mW |
| Thermal Resistance | SIP-3L | θ _{jc} | 227 | °C/W |
| | SOT23-3L | | 543 | |

■ Recommended Operating Conditions

| Paramter | Symbol | Conditions | Rating | Unit |
|----------------|--------|------------|---------|------|
| Supply Voltage | Vdd | Operating | 2.2*~20 | V |

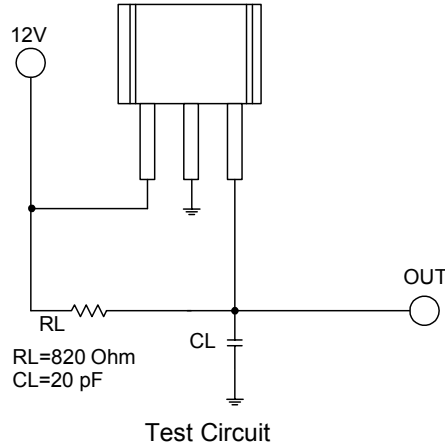
*Note: The output of IC will be switched after the supply voltage is over 2.2V, but the magnetic characteristics won't be normal until the supply is over 2.5V.

■ Electrical Characteristics (Ta=+ 25°C, Vdd =12V)

| Characteristic | Symbol | Test Conditions | Min | Typ | Max | Units |
|---------------------------|----------------------|--|-----|------|-----|-------|
| Output Saturation Voltage | V _{ds(sat)} | I _{out} =20mA | - | 300 | 700 | mV |
| Output Leakage Current | I _{off} | V _{DD} =14V | - | <0.1 | 10 | uA |
| Supply Current | I _{dd} | Output Open | - | 2 | 4 | mA |
| Output Rise Time | t _r | R _L =820Ω, C _L =20Pf | - | 0.1 | 1 | us |
| Output Falling Time | t _f | R _L =820Ω, C _L =20pF | - | 0.1 | 1 | us |

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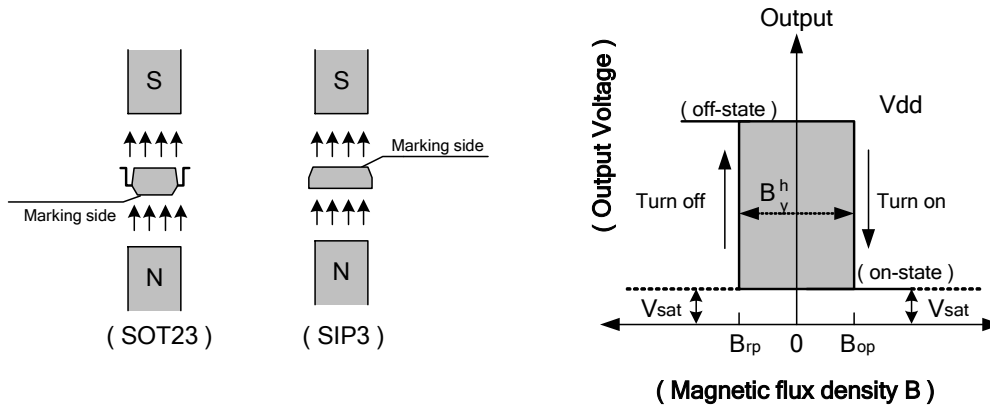
■ Test Circuit



■ Magnetic Characteristics (Ta=25°C, Vdd =2.5V to 20V)

(1mT=10Gauss)

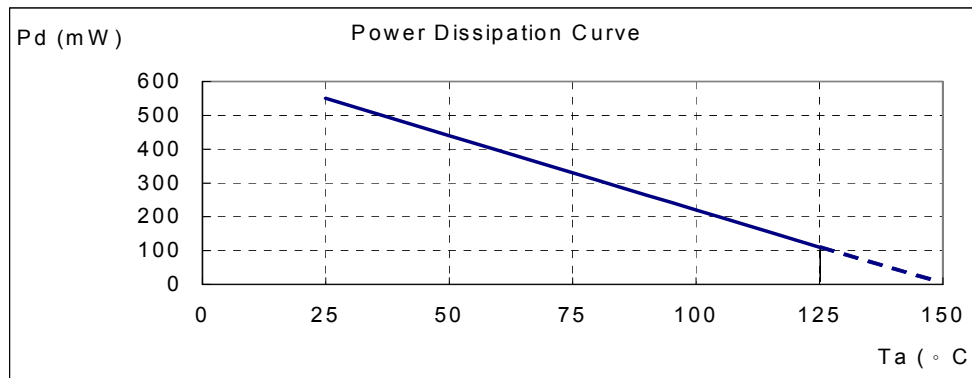
| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---------------|--------|------|------|------|-------|
| Operate Point | Bop | 5 | 30 | 60 | Gauss |
| Release Point | Brp | -60 | -30 | -5 | Gauss |
| Hysteresis | Bhys | - | 60 | - | Gauss |



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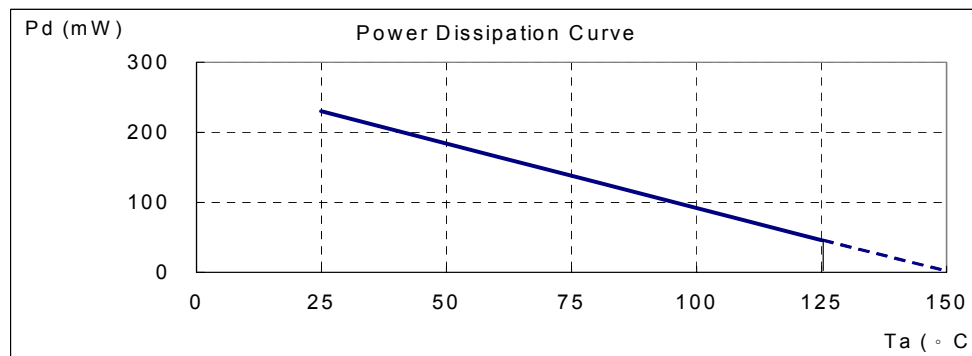
■ Performance Characteristics (SIP3)

| | | | | | | | | | |
|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Ta (°C) | 25 | 50 | 60 | 70 | 80 | 85 | 90 | 95 | 100 |
| Pd (mW) | 550 | 440 | 396 | 352 | 308 | 286 | 264 | 242 | 220 |
| Ta (°C) | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 150 |
| Pd (mW) | 198 | 176 | 154 | 132 | 110 | 88 | 66 | 44 | 0 |



■ Performance Characteristics (SOT23-3)

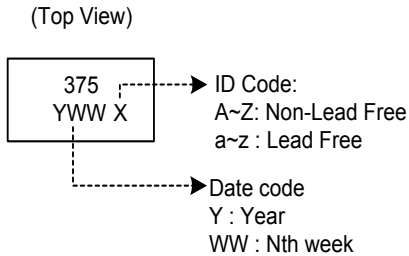
| | | | | | | | | | | | | | |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|
| Ta (°C) | 25 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 125 | 130 | 140 | 150 |
| Pd (mW) | 230 | 184 | 166 | 147 | 129 | 110 | 92 | 74 | 55 | 46 | 37 | 18 | 0 |



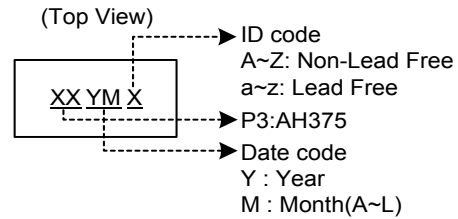
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■ Marking Information

(1) SIP3

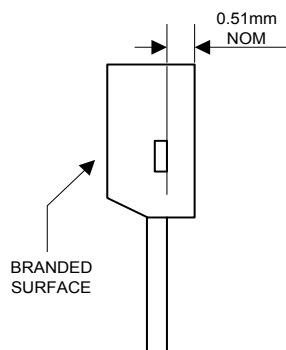


(2) SOT23

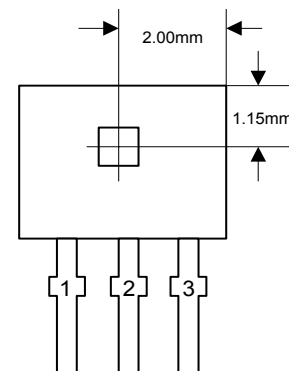


■ Package Information (unit: mm)

(1) Package Type: SIP-3L for Bulk Pack

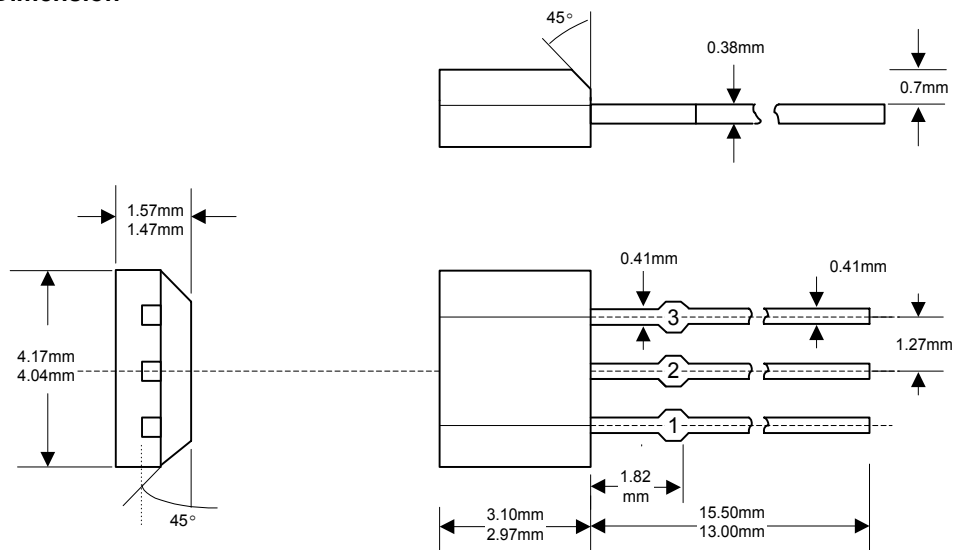


Active Area Depth



Sensor Location

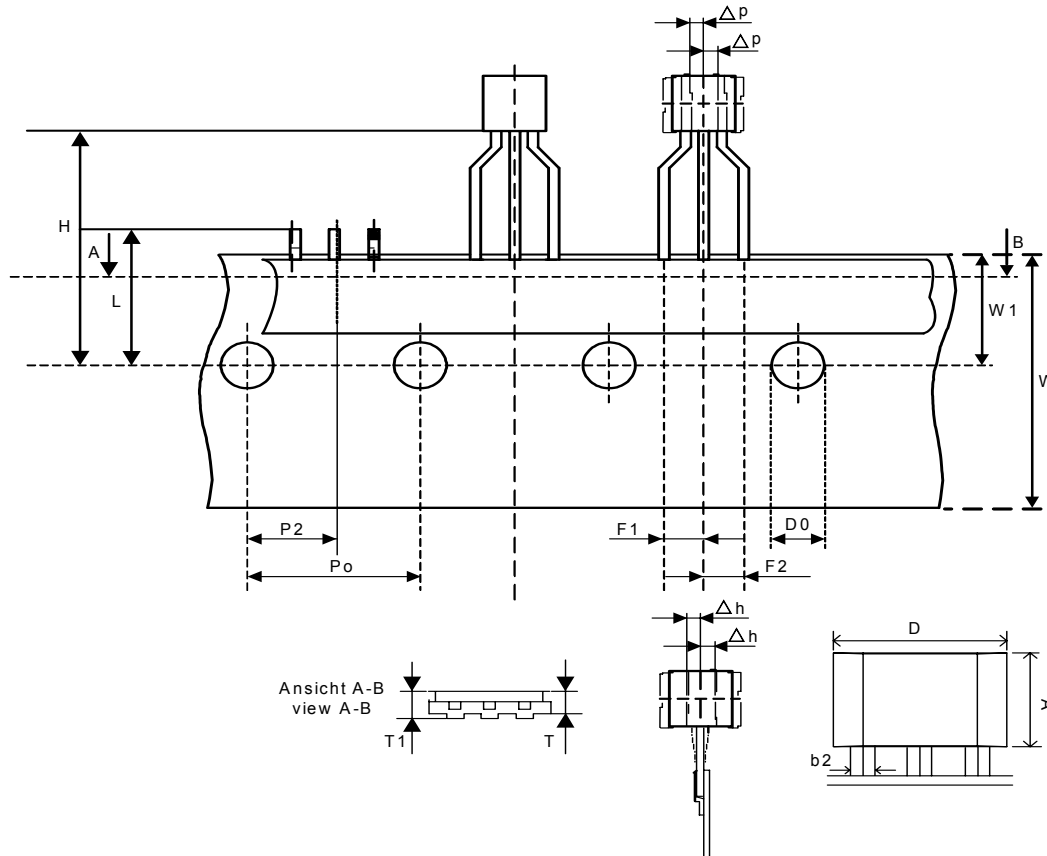
Package Dimension



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■ Package Information (Continued)

(2) Package Type: Spread leg SIP-3L for Ammo-Pack only

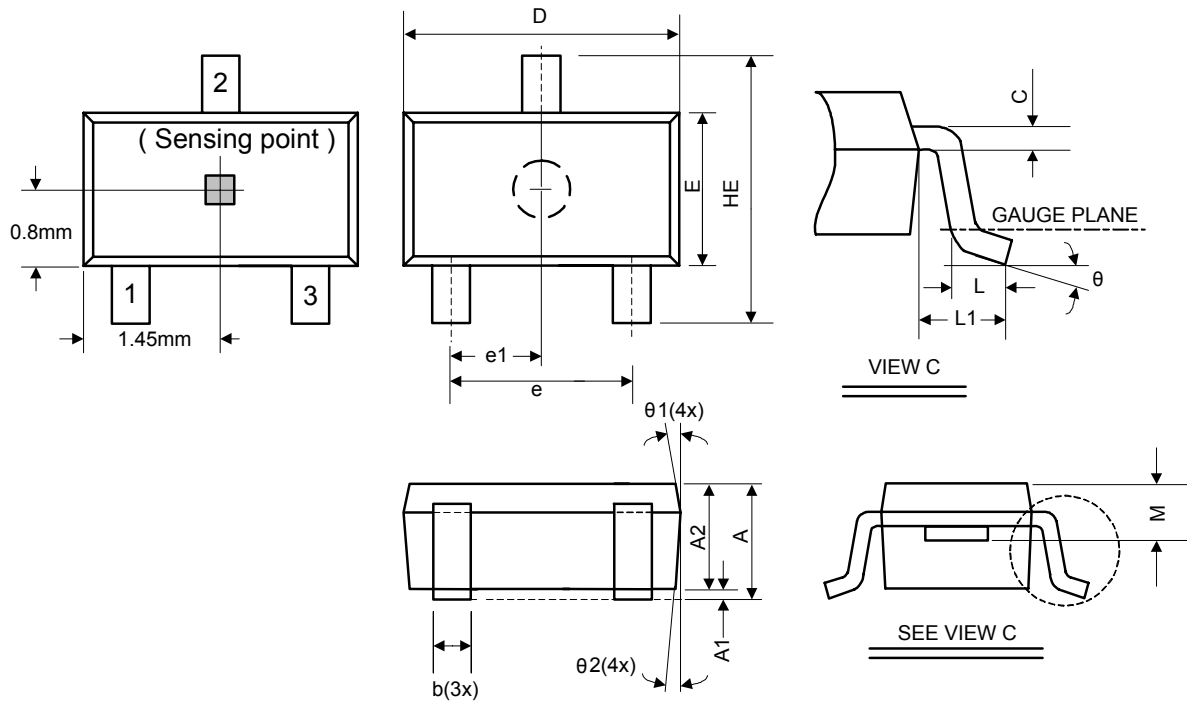


| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|--------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 2.80 | 3.00 | 3.20 | 0.110 | 0.118 | 0.125 |
| D | 3.90 | 4.10 | 4.30 | 0.153 | 0.161 | 0.169 |
| b2 | 0.33 | 0.38 | 0.42 | 0.012 | 0.014 | 0.016 |
| D0 | 3.80 | 4.00 | 4.20 | 0.149 | 0.157 | 0.165 |
| F1 | 2.35 | 2.55 | 2.75 | 0.092 | 0.100 | 0.108 |
| F2 | 2.45 | 2.55 | 2.85 | 0.096 | 0.100 | 0.112 |
| H | - | - | 20 | - | - | 0.787 |
| Δh | - | - | 1 | - | - | 0.039 |
| L | - | - | 11 | - | - | 0.433 |
| P0 | 12.2 | 12.7 | 13.2 | 0.480 | 0.5 | 0.519 |
| P2 | 5.95 | 6.35 | 6.75 | 0.234 | 0.25 | 0.265 |
| Δp | - | - | 1 | - | - | 0.039 |
| T | - | - | 0.55 | - | - | 0.021 |
| T1 | - | - | 1.42 | - | - | 0.055 |
| W | 17.5 | 18.0 | 18.5 | 0.688 | 0.708 | 0.728 |
| W1 | 5.5 | 6.0 | 6.5 | 0.216 | 0.236 | 0.255 |

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■ Package Information (Continued)

(3) Package Type: SOT23-3L



| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|------------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 1.05 | - | 1.35 | 0.041 | - | 0.053 |
| A1 | 0.05 | - | 0.15 | 0.002 | - | 0.006 |
| A2 | 1.00 | 1.10 | 1.20 | 0.039 | 0.043 | 0.047 |
| b | 0.25 | - | 0.50 | 0.010 | - | 0.020 |
| C | 0.08 | - | 0.20 | 0.003 | - | 0.008 |
| D | 2.70 | 2.90 | 3.00 | 0.106 | 0.114 | 0.118 |
| E | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| HE | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| L | 0.30 | - | 0.60 | 0.012 | - | 0.024 |
| L1 | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |
| M | 0.73 | 0.78 | 0.83 | 0.029 | 0.031 | 0.033 |
| e | 1.80 | 1.90 | 2.00 | 0.071 | 0.075 | 0.079 |
| e1 | 0.85 | 0.95 | 1.05 | 0.033 | 0.037 | 0.041 |
| θ | 0° | 5° | 10° | 0° | 5° | 10° |
| $\theta 1$ | 3° | 5° | 7° | 3° | 5° | 7° |
| $\theta 2$ | 6° | 8° | 10° | 6° | 8° | 10° |