

**Description**

ATS177 is an integrated Hall-Effect latch 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-collector output. An internal bandgap regulator provides a temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

When the magnetic flux density (**B**) is larger than operate point (**Bop**), output is switched on (DO pin is pulled low). The output state is held on until a magnetic flux density reversal falls below Brp. When **B** is less than Brp, the output is switched off.

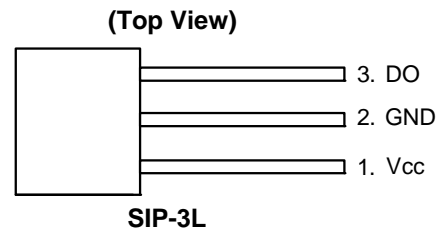
The ATS177 is available in SIP-3L package.

**Features**

- Bipolar Hall-Effect latch sensor
- 3.5V to 20V DC operating voltage
- Temperature compensation
- Open-collector pre-driver
- 25mA maximum output sink current
- Built-in reverse polarity protection
- Operating temperature: -40°C to +125°C
- SIP-3L package
- Green Molding Compound (No Br, Sb) (Note 1)

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).

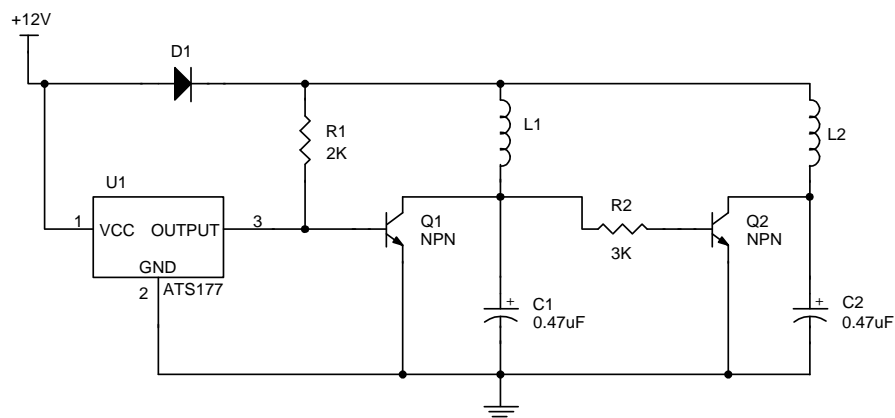
**Pin Assignments**



**Applications**

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

**Typical Application Circuit**

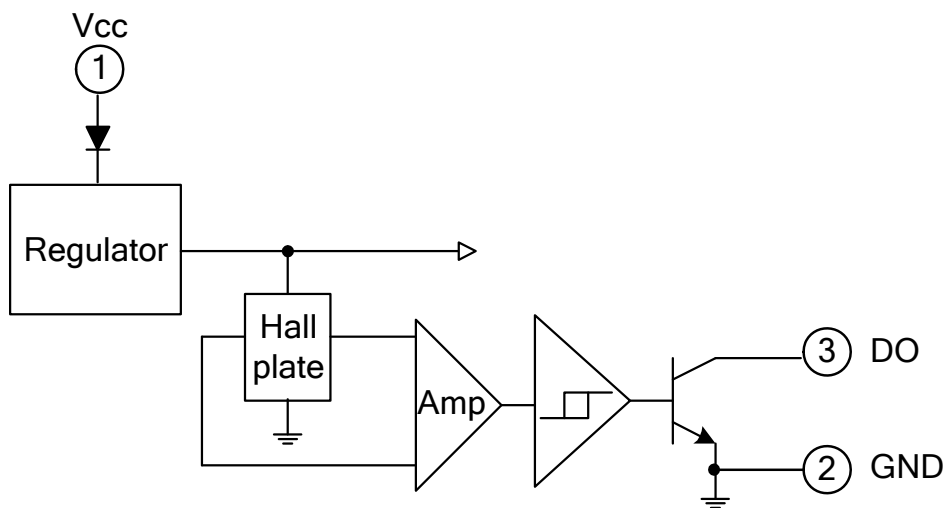


**Brush-less DC Fan**

**Pin Descriptions**

| Pin name        | P/I/O | Pin # | Description           |
|-----------------|-------|-------|-----------------------|
| V <sub>CC</sub> | P     | 1     | Positive power supply |
| GND             | P     | 2     | Ground                |
| DO              | O     | 3     | Digital output        |

**Functional Block Diagram**



**Absolute Maximum Ratings (T<sub>A</sub> = 25°C)**

| Symbol              | Characteristics                          |            | Rating    | Unit |
|---------------------|--|------------|-----------|------|
| V <sub>CC</sub>     | Supply Voltage                           |            | 20        | V    |
| V <sub>RCC</sub>    | Reverse V <sub>CC</sub> Polarity Voltage |            | -20       | V    |
| B                   | Magnetic Flux Density                    |            | Unlimited |      |
| V <sub>CE</sub>     | Output OFF Voltage                       |            | 30        | V    |
| P <sub>D</sub>      | Package Power Dissipation                | SIP-3L     | 550       | mW   |
| I <sub>C</sub>      | Output "ON" Current                      | Continuous | 25        | mA   |
| T <sub>J(MAX)</sub> | Maximum Junction Temperature             |            | 150       | °C   |
| T <sub>S</sub>      | Storage Temperature Range                |            | -65~+150  | °C   |

**Recommended Operating Conditions**

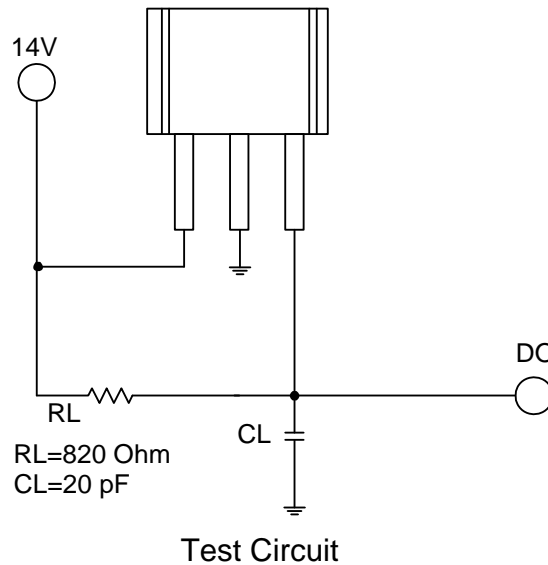
| Symbol          | Characteristic                         | Conditions | Min | Max | Unit |
|-----------------|--|------------|-----|-----|------|
| V <sub>CC</sub> | Supply Voltage                         | Operating  | 3.5 | 20  | V    |
| T <sub>A</sub>  | Operating Ambient Temperature (Note 2) | Operating  | -20 | 85  | °C   |

Notes: 2. Shall not exceed P<sub>D</sub> and Safety Operation Area.

**Electrical Characteristics (T<sub>A</sub> = 25°C)**

| Symbol                | Characteristic            | Test Conditions   | Min | Typ. | Max | Unit |
|-----------------------|---------------------------|---|-----|------|-----|------|
| V <sub>CE (sat)</sub> | Output Saturation Voltage | V <sub>CC</sub> = 14V, I <sub>c</sub> = 20mA                        | -   | 300  | 700 | mV   |
| I <sub>cex</sub>      | Output Leakage Current    | V <sub>CE</sub> = 14V, V <sub>CC</sub> = 14V                        | -   | <0.1 | 10  | uA   |
| I <sub>cc</sub>       | Supply Current            | V <sub>CC</sub> = 20V, Output Open                                  | -   | 5    | 10  | mA   |
| t <sub>r</sub>        | Output Rise Time          | V <sub>CC</sub> = 14V, R <sub>L</sub> = 820Ω, C <sub>L</sub> = 20pF | -   | 0.3  | 1.5 | us   |
| t <sub>f</sub>        | Output Falling Time       | V <sub>CC</sub> = 14V, R <sub>L</sub> = 820Ω, C <sub>L</sub> = 20pF | -   | 0.3  | 1.5 | us   |

**Test Circuit**



**Magnetic Characteristics (T<sub>A</sub> = 25°C, Note 3)**

(1mT=10 Gauss)

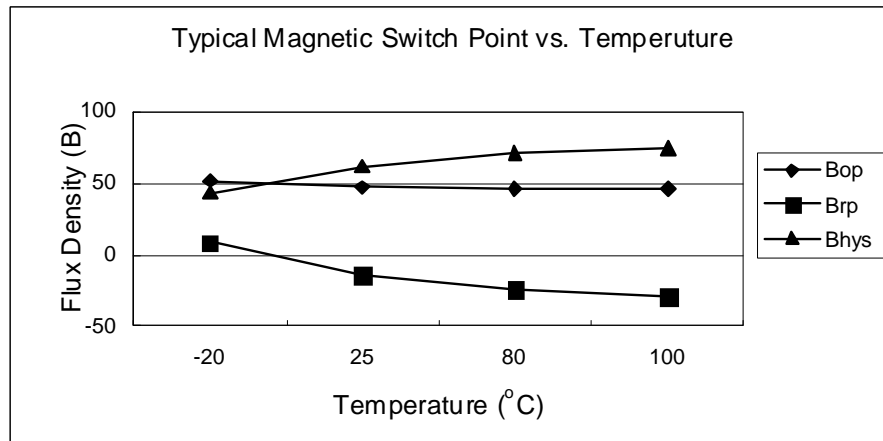
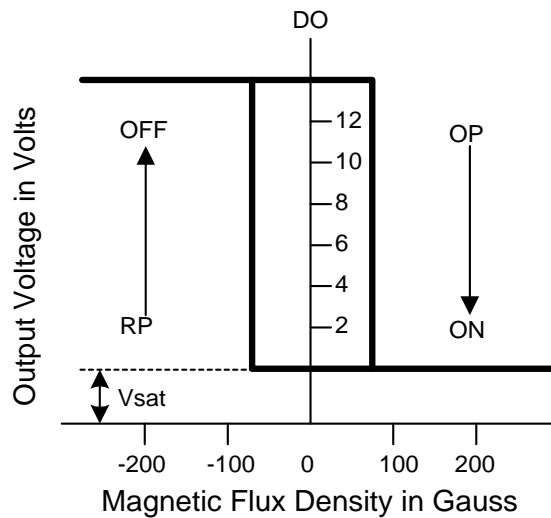
**A grade**

| Symbol                         | Parameter       | Min | Typ. | Max | Unit  |
|--------------------------------|-----------------|-----|------|-----|-------|
| Bops(south pole to brand side) | Operation Point | 5   | -    | 70  | Gauss |
| Brps(south pole to brand side) | Release Point   | -70 | -    | -5  | Gauss |
| Bhy( Bopx - Brpx )             | Hysteresis      | -   | 80   | -   | Gauss |

**B grade**

| Symbol                         | Parameter       | Min  | Typ. | Max | Unit  |
|--------------------------------|-----------------|------|------|-----|-------|
| Bops(south pole to brand side) | Operation Point | -    | -    | 100 | Gauss |
| Brps(south pole to brand side) | Release Point   | -100 | -    | -   | Gauss |
| Bhy( Bopx - Brpx )             | Hysteresis      | -    | 80   | -   | Gauss |

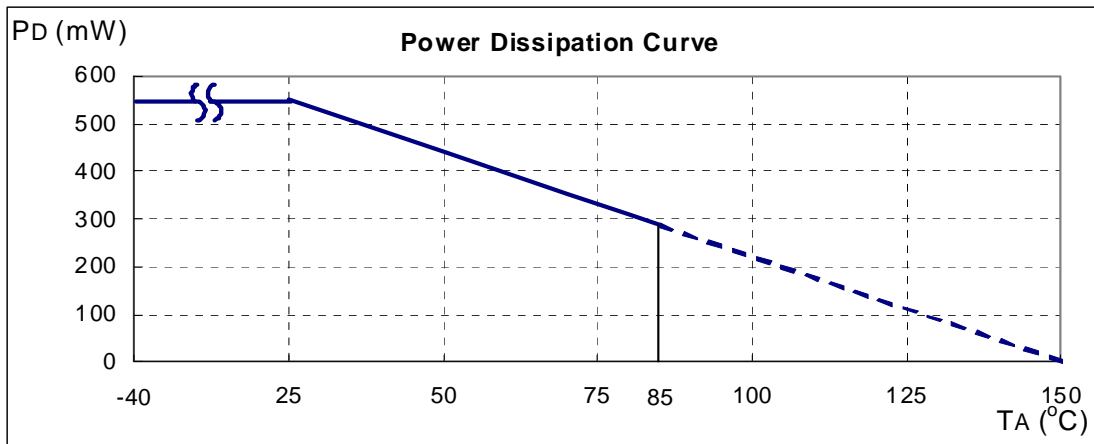
Notes: 3. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



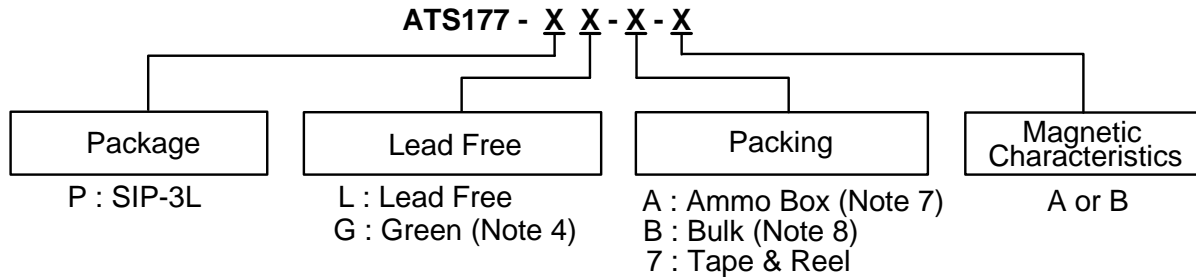
**Performance Characteristics**

**(1) SIP-3L**

|                           |            |            |            |            |            |            |            |            |            |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>T<sub>A</sub> (°C)</b> | <b>25</b>  | <b>50</b>  | <b>60</b>  | <b>70</b>  | <b>80</b>  | <b>85</b>  | <b>90</b>  | <b>95</b>  | <b>100</b> |
| P <sub>D</sub> (mW)       | 550        | 440        | 396        | 352        | 308        | 286        | 264        | 242        | 220        |
| <b>T<sub>A</sub> (°C)</b> | <b>105</b> | <b>110</b> | <b>115</b> | <b>120</b> | <b>125</b> | <b>130</b> | <b>135</b> | <b>140</b> | <b>150</b> |
| P <sub>D</sub> (mW)       | 198        | 176        | 154        | 132        | 110        | 88         | 66         | 44         | 0          |



**Ordering Information**

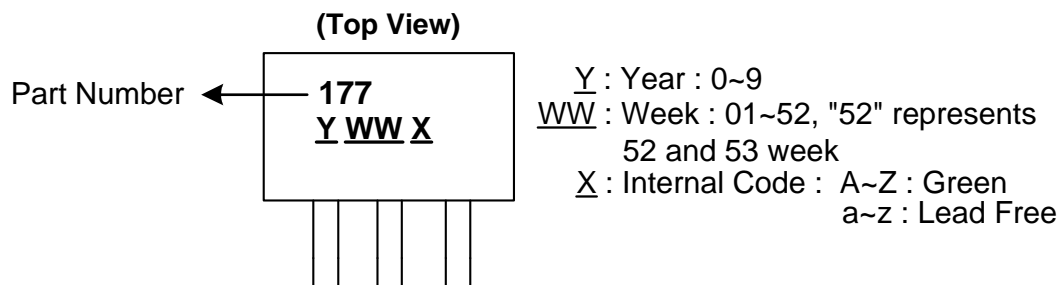


| Device        | Package Code | Packaging (Note 5, 6) | Tube/Bulk |                    | 7" Tape and Reel |                    | Ammo Box |                    | Magnetic Characteristics |
|---------------|--------------|-----------------------|-----------|--------------------|------------------|--------------------|----------|--------------------|--------------------------|
|               |              |                       | Quantity  | Part Number Suffix | Quantity         | Part Number Suffix | Quantity | Part Number Suffix |                          |
| ATS177-PL-A-A | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | A                        |
| ATS177-PL-A-B | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | B                        |
| ATS177-PG-A-A | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | A                        |
| ATS177-PG-A-B | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | B                        |
| ATS177-PL-B-A | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | A                        |
| ATS177-PL-B-B | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | B                        |
| ATS177-PG-B-A | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | A                        |
| ATS177-PG-B-B | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | B                        |

- Notes:
4. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).
  5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  6. Reverse taping as shown on Diodes Inc. Surface Mount (SMD) Packaging document AP02007, which can be found on our website <http://www.diodes.com/datasheets/ap02007.pdf>.
  7. Ammo Box is for SIP-3L Spread Lead.
  8. Bulk is for SIP-3L Straight Lead.

**Marking Information**

**(1) SIP-3L**

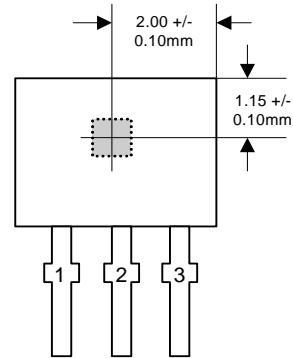


**Package Outline Dimensions (All Dimensions in mm)**

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

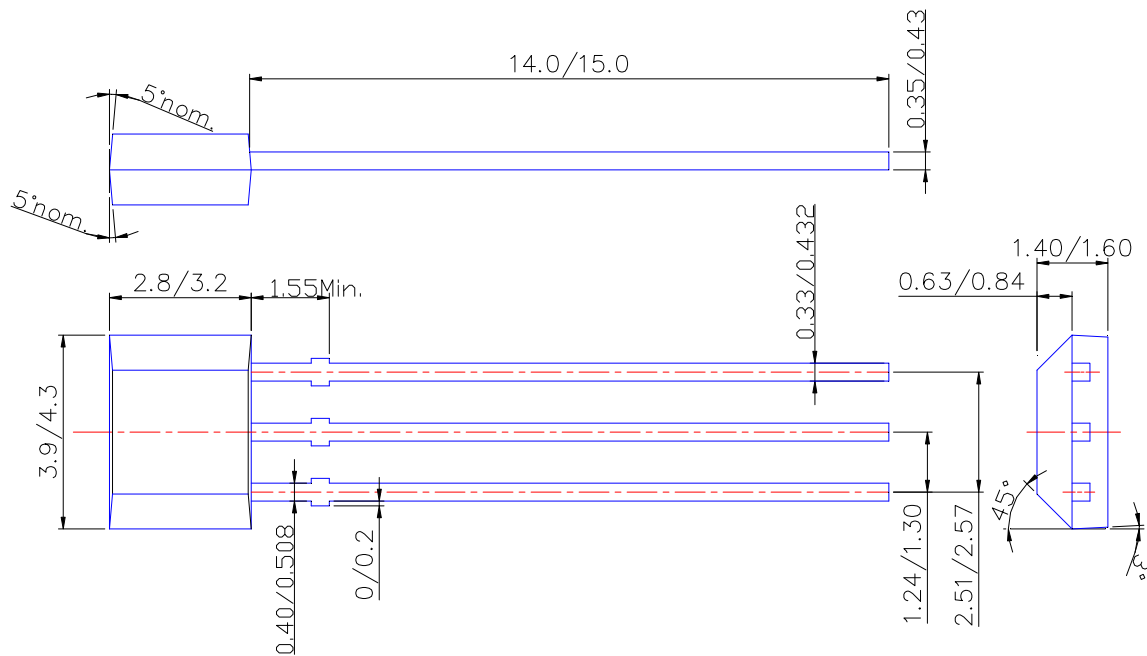


Active Area Depth



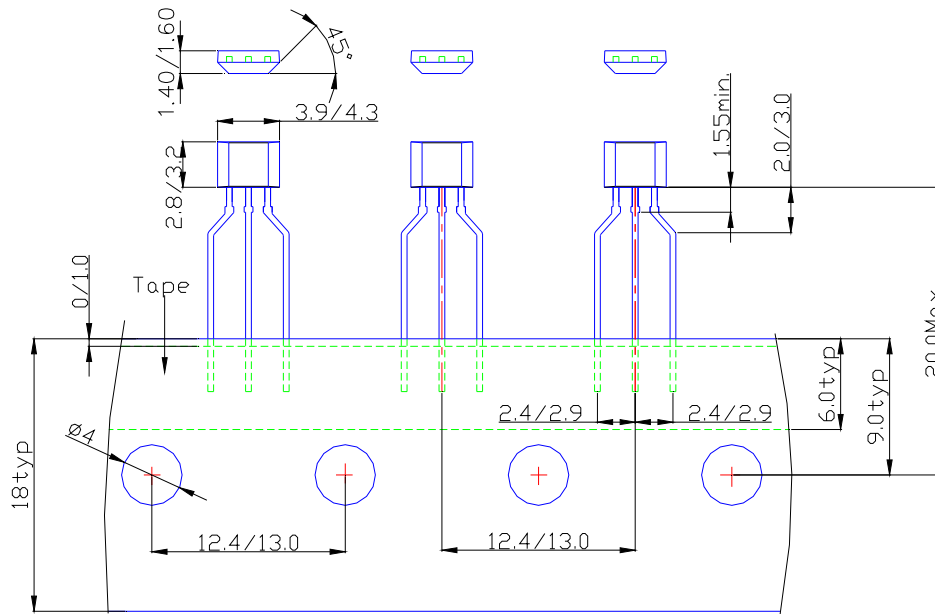
Sensor Location

**Package Dimension**



**Package Outline Dimensions (Continued)**

**(2) Package Type: SIP-3L for Ammo pack**





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