

### Features

- On-Chip Hall Sensor with Two Different Sensitivity and Hysteresis Settings for ATS276
- 3.5V to 20V Operating Voltage
- 400mA (avg.) Output Sink Current
- Built-in Protecting Diode Only for Chip Reverse Power Connecting
- -20°C to 85°C Operating Temperature
- Low Profile 4 Pin SIP Package
- Lead Free package: SIP-4L
- SIP-4L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant (Note 1)

### General Description

ATS276 are integrated Hall sensors with output drivers, mainly designed for electronic commutation of brush-less DC Fan. This IC internally includes the regulator, protecting diode, Hall plate, amplifier, comparator, and a pair of complementary open-collector outputs (**DO**, **DOB**).

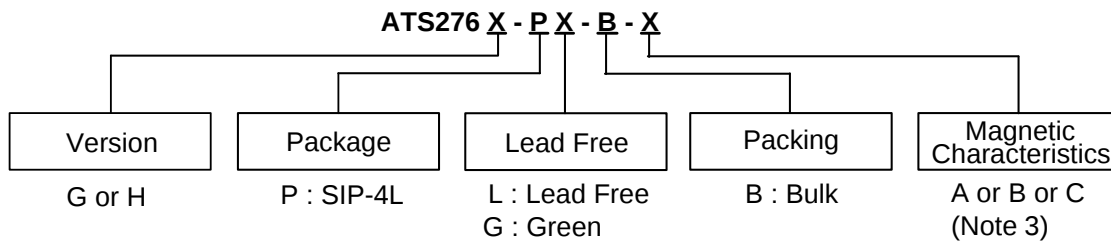
While the magnetic flux density (**B**) is larger than operate point (**Bop**), **DO** will turn on (low), and meanwhile **DOB** will turn off (high). Each output is latched until **B** is lower than release point (**Brp**), and then **DO**, **DOB** transfer each state.

For DC fan application, sometimes need to test power reverse connection condition. Internal diode only protects chip-side but not for coil-side. If necessary, add one external diode to block the reverse current from coil-side.

### Applications

- Dual-Coil Brush-Less DC Motor
- Dual-Coil Brush-Less DC Fan
- Revolution Counting
- Speed Measurement

### Ordering Information

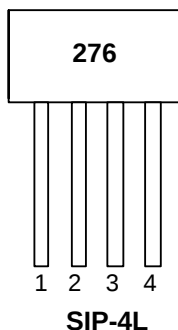


| Device         | Package Code | Packaging (Note 2) | Bulk     |                    | Magnetic Characteristics |
|----------------|--------------|--------------------|----------|--------------------|--------------------------|
|                |              |                    | Quantity | Part Number Suffix |                          |
| ATS276G-PL-B-A | P            | SIP-4L             | 1000     | -B                 | A                        |
| S276G-PL-B-B   | P            | SIP-4L             | 1000     | -B                 | B                        |
| ATS276G-PL-B-C | P            | SIP-4L             | 1000     | -B                 | C                        |
| ATS276H-PL-B-A | P            | SIP-4L             | 1000     | -B                 | A                        |
| ATS276H-PL-B-B | P            | SIP-4L             | 1000     | -B                 | B                        |
| ATS276H-PG-B-A | P            | SIP-4L             | 1000     | -B                 | A                        |
| TS276H-PG-B-B  | P            | SIP-4L             | 1000     | -B                 | B                        |

- Notes:
1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied, see *EU Directive 2002/95/EC Annex Notes*.
  2. 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>.
  3. Please refer to page 5 (Magnetic Characteristics table).

## Pin Assignments

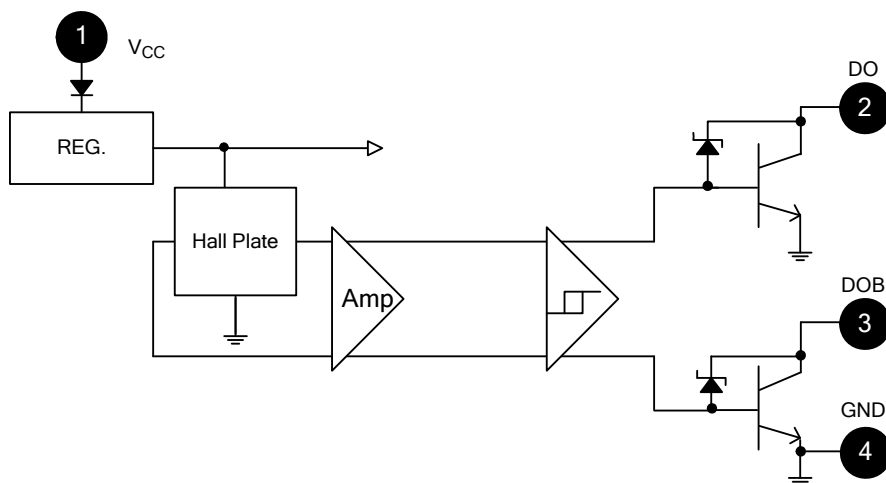
( Top View )



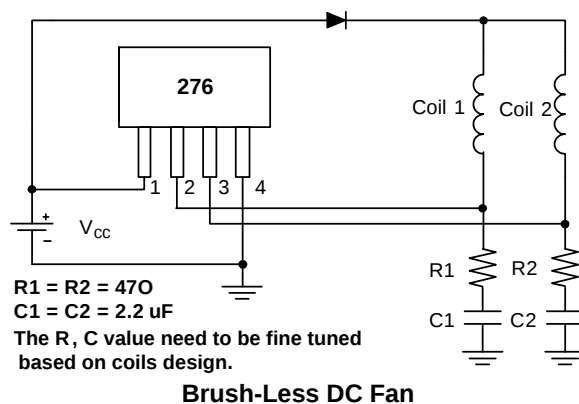
## Pin Descriptions

| Name            | P/I/O | Pin # | Description        |
|-----------------|-------|-------|--------------------|
| V <sub>CC</sub> | P     | 1     | Power Supply Input |
| DO              | O     | 2     | Output Pin         |
| DOB             | O     | 3     | Output Pin         |
| GND             | P     | 4     | Ground             |

## Block Diagram



## Typical Application Circuit



## Absolute Maximum Ratings $(T_A = 25^\circ C)$

| Symbol    | Characteristics                   | Values          | Unit       |
|-----------|-----------------------------------|-----------------|------------|
| $V_{CC}$  | Supply Voltage                    | 20              | V          |
| $V_{RCC}$ | Reverse $V_{CC}$ Polarity Voltage | -20             | V          |
| B         | Magnetic Flux Density             | Unlimited       |            |
| $I_C$     | Output "on" Current               | Continuous      | A          |
|           |                                   | Hold            |            |
|           |                                   | Peak (Start Up) |            |
| $T_S$     | Storage Temperature Range         | -65~+150        | $^\circ C$ |
| $P_D$     | Package Power Dissipation         | 550             | mW         |
| $T_J$     | Maximum Junction Temperature      | 150             | $^\circ C$ |

## Recommended Operating Conditions

| Symbol   | Characteristic                         | Conditions | Min | Max | Unit       |
|----------|----------------------------------------|------------|-----|-----|------------|
| $V_{CC}$ | Supply Voltage (Note 4)                | Operating  | 3.5 | 20  | V          |
| $T_A$    | Operating Ambient Temperature (Note 5) | Operating  | -20 | 85  | $^\circ C$ |

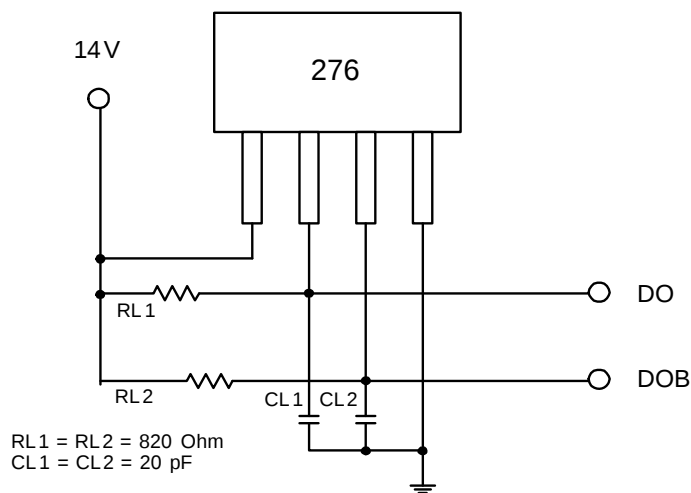
Notes: 4. The output DO/DOB is switching as magnetic field change (S>300G, N<-300G).  
 5. Shall not exceed  $P_D$  and Safety Operation Area.

**Electrical Characteristics** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 4.0\text{V}$  to  $20\text{V}$ )

| Symbol        | Characteristic            | Conditions                                                      | Min | Typ. | Max | Units         |
|---------------|---------------------------|-----------------------------------------------------------------|-----|------|-----|---------------|
| $V_{CE}$      | Low Supply Voltage        | $V_{CC} = 3.5\text{V}$ , $I_L = 100\text{mA}$                   |     | 0.4  |     | V             |
| $V_Z$         | Output Zener Breakdown    | (Note 6)                                                        |     | 46   |     | V             |
| $V_{CE(SAT)}$ | Output Saturation Voltage | $V_{CC} = 14\text{V}$ , $I_L = 300\text{mA}$                    |     | 0.3  | 0.6 | V             |
| $I_{CEX}$     | Output Leakage Current    | $V_{CE} = 14\text{V}$ , $V_{CC} = 14\text{V}$                   |     | <0.1 | 10  | $\mu\text{A}$ |
| $I_{CC}$      | Supply Current            | $V_{CC} = 20\text{V}$ , Output Open                             |     | 16   | 25  | mA            |
| $t_r$         | Output Rise Time          | $V_{CC} = 14\text{V}$ , $R_L = 820\Omega$ , $C_L = 20\text{pF}$ |     | 3.0  | 10  | $\mu\text{s}$ |
| $t_f$         | Output Falling Time       | $V_{CC} = 14\text{V}$ , $R_L = 820\Omega$ , $C_L = 20\text{pF}$ |     | 0.3  | 1.5 | $\mu\text{s}$ |
| $\Delta t$    | Switch Time Differential  | $V_{CC} = 14\text{V}$ , $R_L = 820\Omega$ , $C_L = 20\text{pF}$ |     | 3.0  | 10  | $\mu\text{s}$ |

Notes: 6. The  $V_Z$  may vary with the inductance/resistance of DC Fan. In order to reduce the risk of dynamic operation, the capacitor/ resistor is recommended to add below the DO/DOB as Application Circuit (see General Description on page 1).

**Test Circuit**



**Magnetic Characteristics** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 14\text{V}$ )

( 1mT = 10 Gauss )

**A grade**

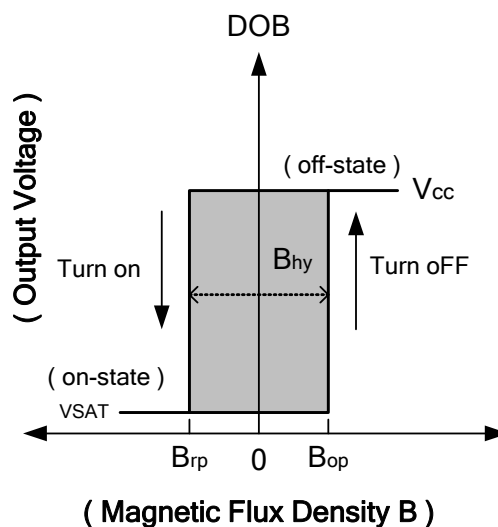
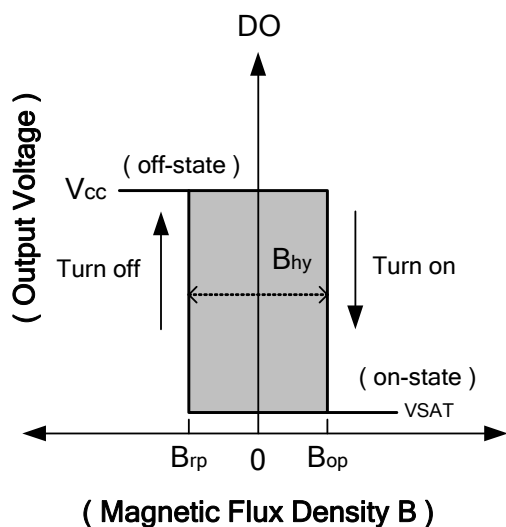
| Symbol | Characteristic  | Min | Typ. | Max | Unit  |
|--------|-----------------|-----|------|-----|-------|
| Bop    | Operation Point | 10  | -    | 50  | Gauss |
| Brp    | Release Point   | -50 | -    | -10 | Gauss |
| Bhy    | Hysteresis      | -   | 75   | -   | Gauss |

**B grade**

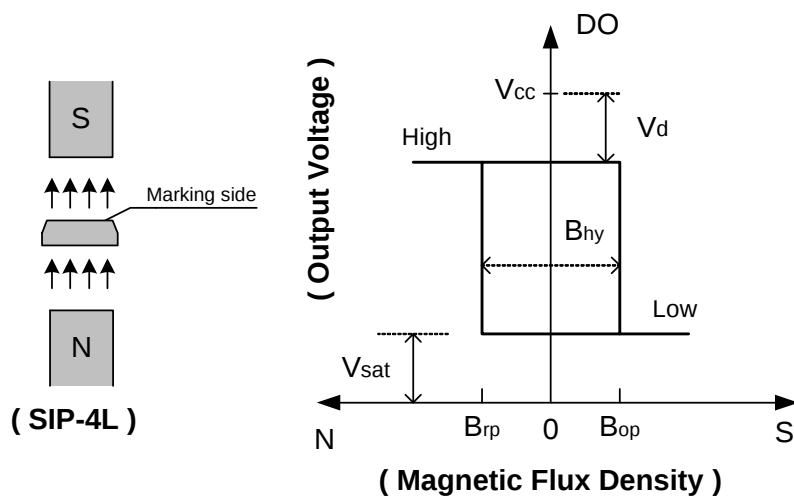
| Symbol | Characteristic  | Min | Typ. | Max | Unit  |
|--------|-----------------|-----|------|-----|-------|
| Bop    | Operation Point | 5   | -    | 70  | Gauss |
| Brp    | Release Point   | -70 | -    | -5  | Gauss |
| Bhy    | Hysteresis      | -   | 75   | -   | Gauss |

**C grade**

| Symbol | Characteristic  | Min  | Typ. | Max | Unit  |
|--------|-----------------|------|------|-----|-------|
| Bop    | Operation Point | -    | -    | 100 | Gauss |
| Brp    | Release Point   | -100 | -    | -   | Gauss |
| Bhy    | Hysteresis      | -    | 75   | -   | Gauss |

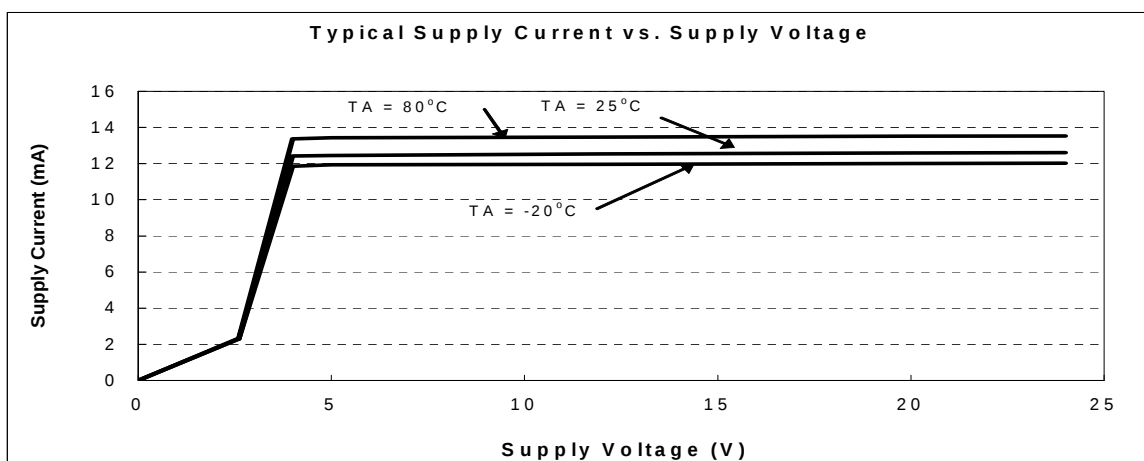
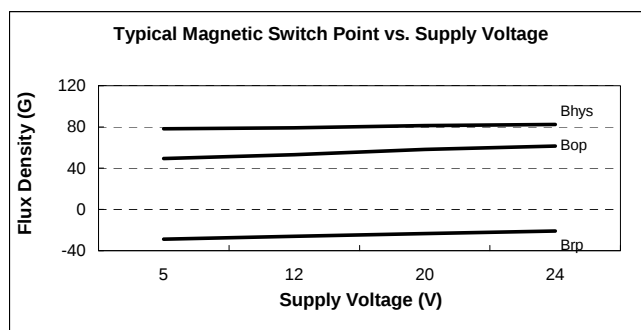
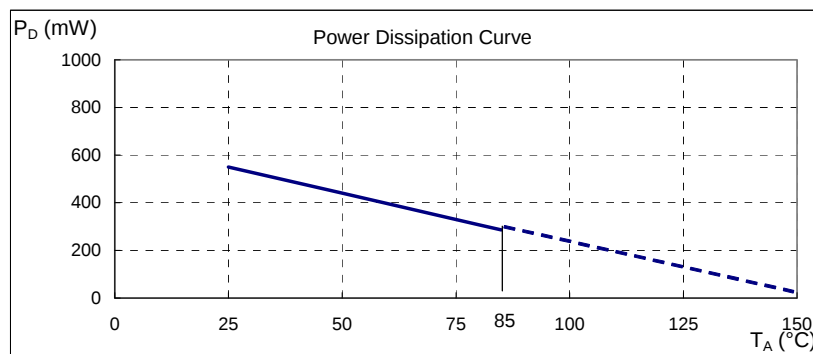


## Operating Characteristics

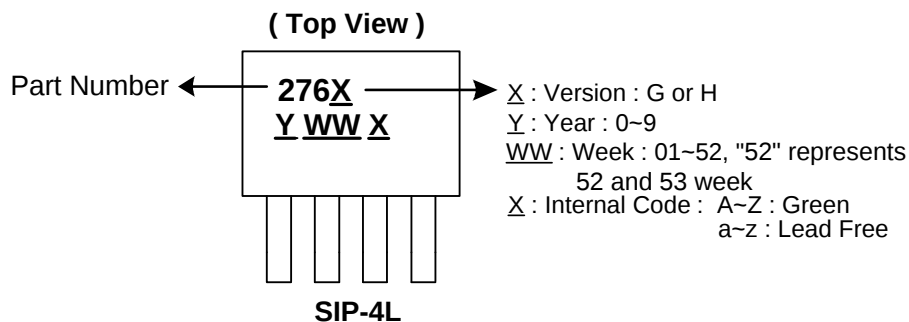


## Performance Characteristics

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

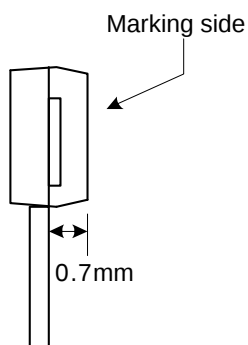


## Marking Information

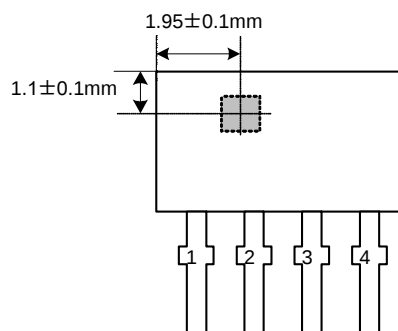


## Package Information (All Dimensions in mm)

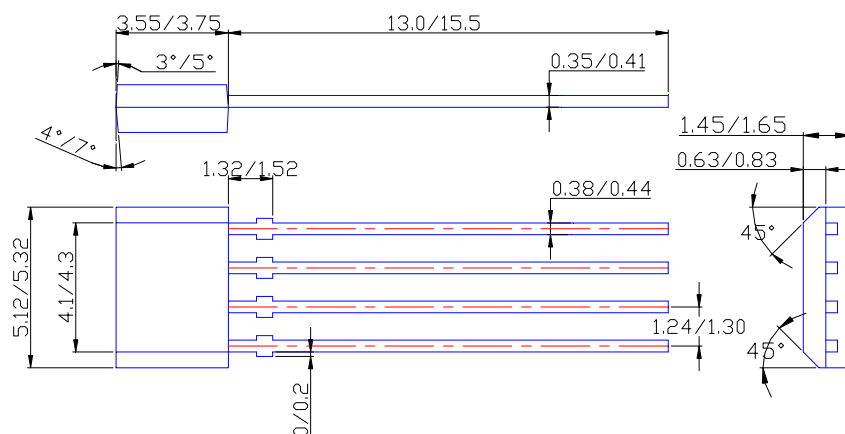
Active Area Depth



Package Sensor Location



Package Dimension



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