COMPLEMENTARY OUTPUT HALL EFFECT LATCH AH277A

General Description

The AH277A is an integrated Hall sensor with output driver designed for electronic commutation of brushless DC motor applications. The device includes an on-chip Hall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a Schmitt trigger to provide switching hysteresis for noise rejection, a temperature compensation circuit to compensate the temperature drift of Hall sensitivity and two complementary open-collector drivers for sinking large load current. It also includes an internal band-gap regulator which is used to provide bias voltage for internal circuits.

Placing the device in a variable magnetic field, if the magnetic flux density is larger than threshold B_{OP}, the pin DO will be turned low (on) and pin DOB will be turned high (off). This output state is held until the magnetic flux density reverses and falls below B_{RP}, then causes DO to be turned high (off) and DOB turned low (on).

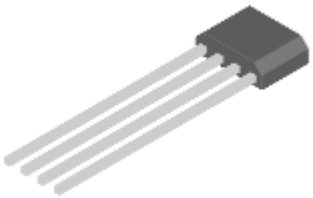
AH277A is available in TO-94 (SIP-4L) package.

Features

- On-Chip Hall Sensor
- 3.5V to 16V Supply Voltage
- 400mA (avg) Output Sink Current
- Reversed Supply Voltage Protection
- -20°C to 85°C Operating Temperature
- Low Profile TO-94 (SIP-4L) Package
- ESD Rating: 300V (Machine Model)

Applications

- Dual-Coil Brushless DC Motor
- Dual-Coil Brushless DC Fan
- Revolution Counting
- Speed Measurement



TO-94

Figure 1. Package Type of AH277A

Pin Configuration

Z4 Package
(TO-94)

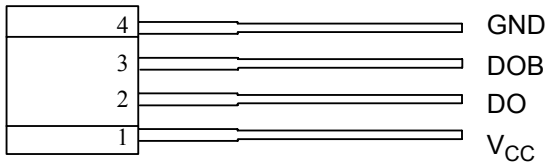


Figure 2. Pin Configuration of AH277A (Front View)

Pin Description

Pin Number	Pin Name	Function
1	V_{CC}	Supply voltage
2	DO	Output 1
3	DOB	Output 2
4	GND	Ground

Functional Block Diagram

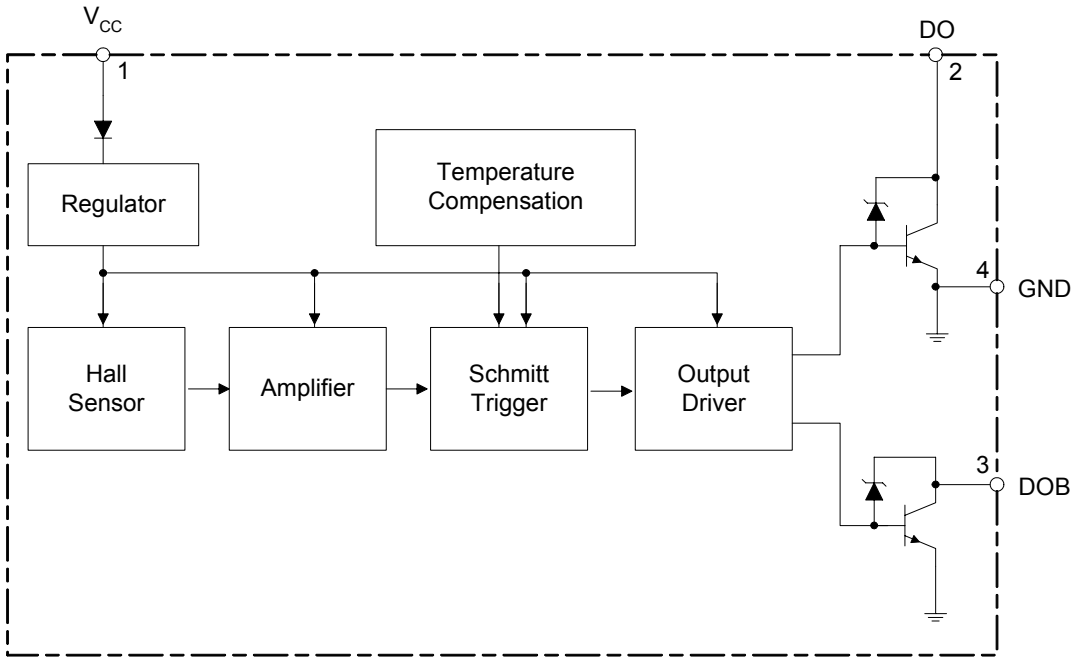


Figure 3. Functional Block Diagram of AH277A

Ordering Information

AH277A □ - □ □

Circuit Type

Package
Z4: TO-94 (SIP-4L)

E1: Lead Free
G1: Green

Magnetic Characteristics
A: 10 to 50Gauss
B: 5 to 70Gauss
C: 100Gauss

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TO-94	-20 to 85°C	AH277AZ4-AE1	AH277AZ4-AG1	AH277A	AH277A-G1	Bulk
		AH277AZ4-BE1	AH277AZ4-BG1	AH277A	AH277A-G1	Bulk
		AH277AZ4-CE1	AH277AZ4-CG1	AH277A	AH277A-G1	Bulk

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green package.

Absolute Maximum Ratings (Note 1)

(T_A=25°C)

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	20	V
Reverse Protection Voltage		V_{RCC}	-20	V
Magnetic Flux Density		B	Unlimited	Gauss
Output Current	Continuous	I_O	400	mA
	Hold		600	mA
	Peak (start up)		800	mA
Power Dissipation		P_D	550	mW
Thermal Resistance	Die to atmosphere	θJA	227	°C/W
	Die to package case	θJC	49	°C/W
Storage Temperature		T_{STG}	-50 to 150	°C
ESD (Machine Model)			300	V
ESD (Human Body Model)			2000	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. "Absolute Maximum Ratings" for extended period may affect device reliability.

Recommended Operating Conditions

(T_A=25°C)

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	3.5	16	V
Ambient Temperature	T_A	-20	85	°C

Electrical Characteristics

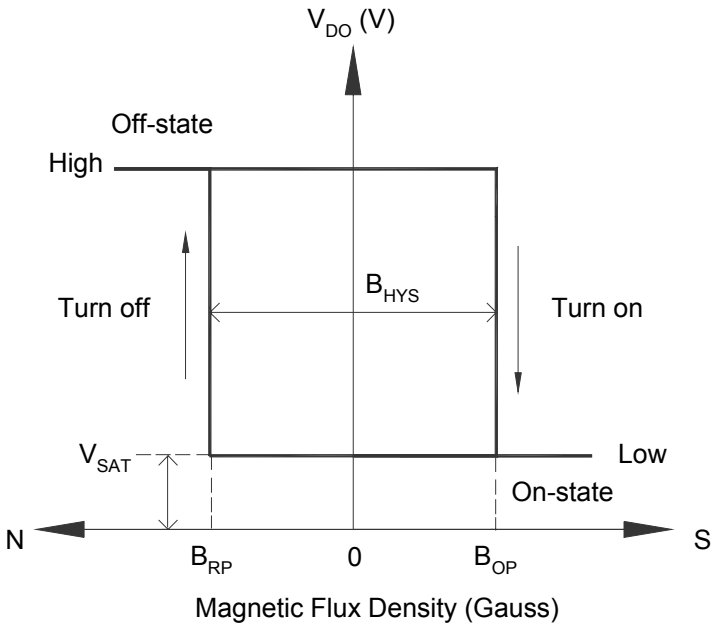
(T_A=25°C, V_{CC}=14V, unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output Saturation Voltage	V_{SAT}	V_{CC}=3.5V, I_O=100mA		0.4		V
		I_O=400mA		0.35	0.6	V
Output Leakage Current	I_{OL}	V_{CE}=16V		0.1	10	μA
Supply Current	I_{CC}	V_{CC}=16V, Output Open		12	16	mA
Output Rise Time	tr	R_L=820Ω, C_L=20pF		3.0	10	μs
Output Fall Time	tf	R_L=820Ω, C_L=20pF		0.3	1.5	μs
Switch Time Differential	Δt	R_L=820Ω, C_L=20pF		3.0	10	μs
Output Zener Breakdown Voltage	V_Z			55		V

Magnetic Characteristics

(T_A=25°C)

Parameter	Symbol	Grade	Min	Typ	Max	Unit
Operating Point	B_{OP}	A	10	30	50	Gauss
		B	5		70	Gauss
		C			100	Gauss
Releasing Point	B_{RP}	A	-50	-30	-10	Gauss
		B	-70		-5	Gauss
		C	-100			Gauss
Hysteresis	B_{HYS}			60		Gauss



Magnetic Characteristics (Continued)

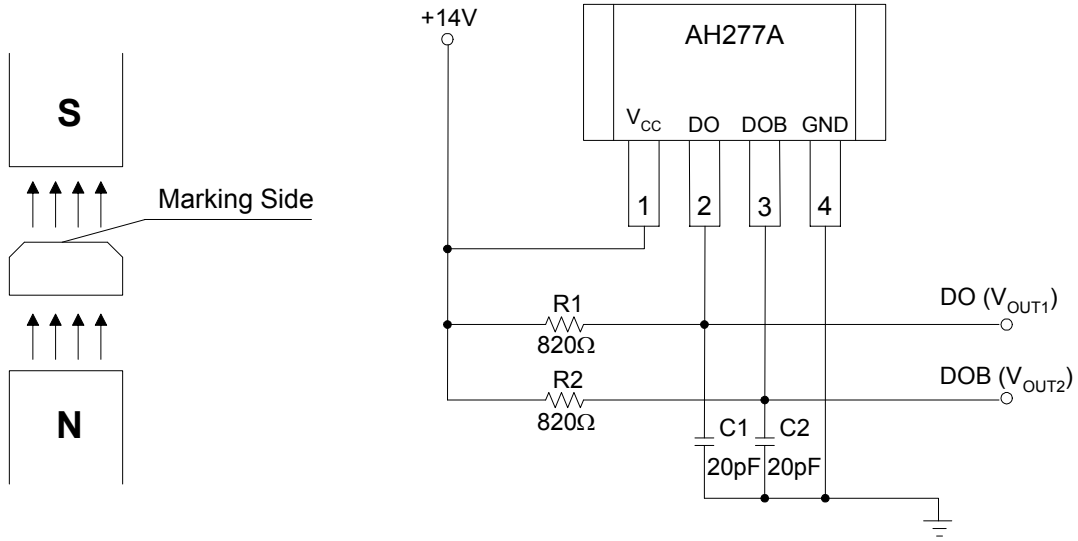


Figure 4. Basic Test Circuit

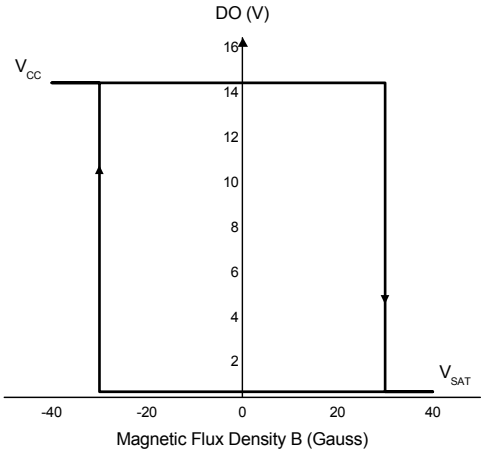


Figure 5. V_{DO} vs. Magnetic Flux Density

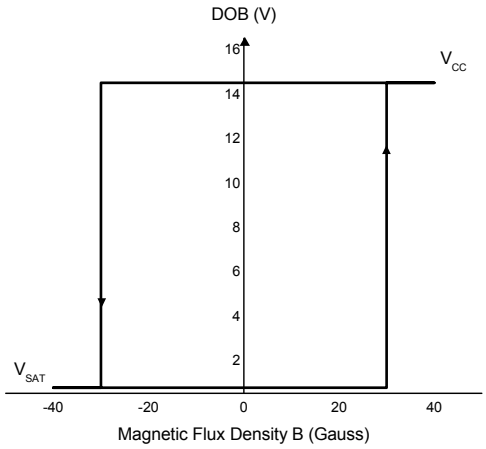


Figure 6. V_{DOB} vs. Magnetic Flux Density

Typical Performance Characteristics

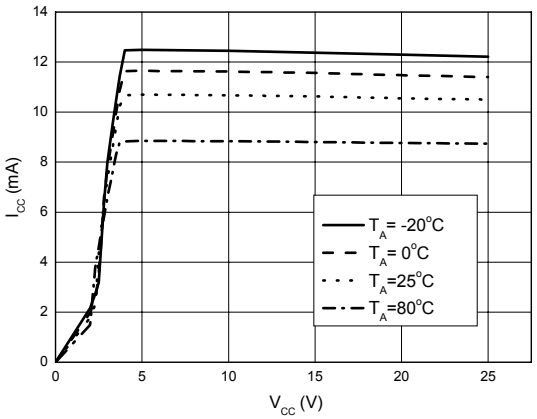


Figure 7. I_{CC} vs. V_{CC}

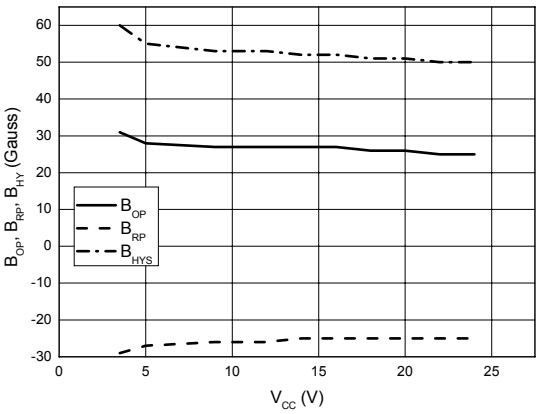


Figure 8. $B_{OP}/B_{RP}/B_{HYS}$ vs. V_{CC}

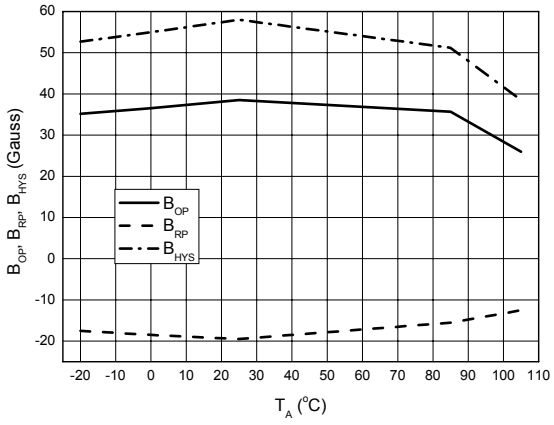


Figure 9. $B_{OP}/B_{RP}/B_{HYS}$ vs. Ambient Temperature

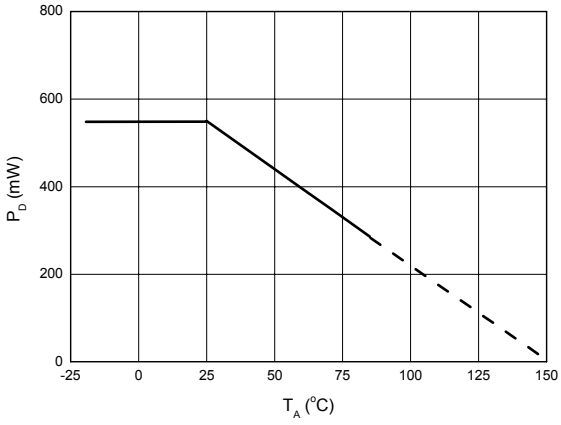


Figure 10. P_D vs. Ambient Temperature

Typical Performance Characteristics (Continued)

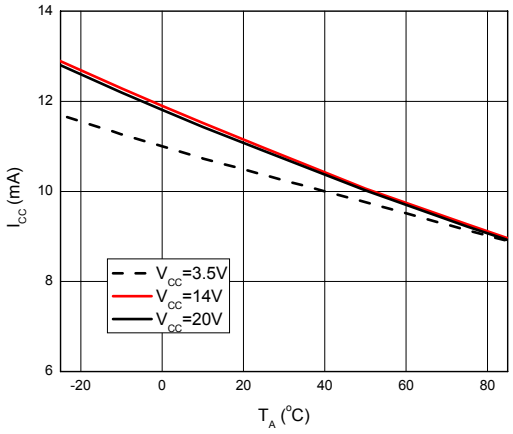


Figure 11. Supply Current vs. Ambient Temperature

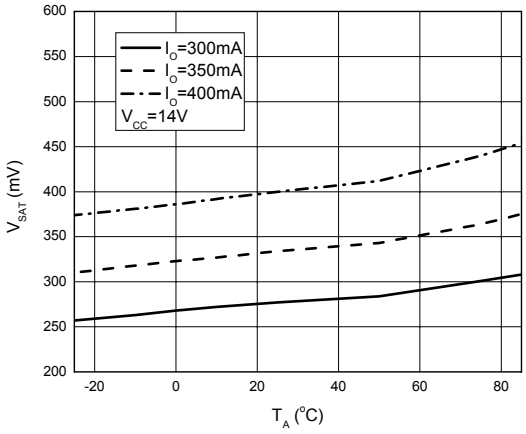


Figure 12. Saturation Voltage vs. Ambient Temperature

Typical Applications

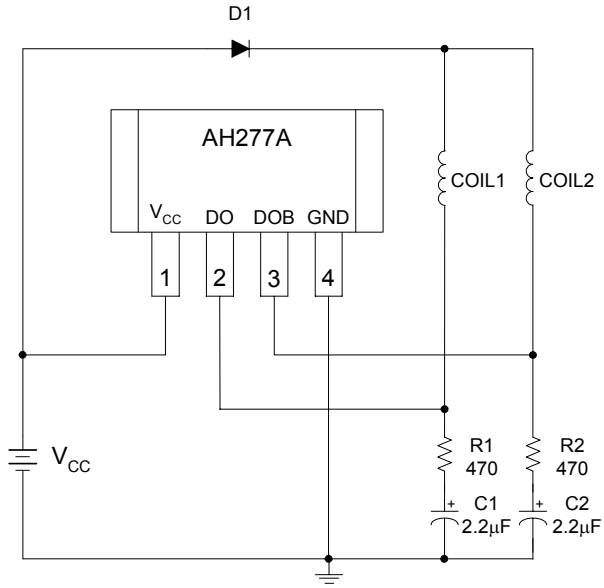
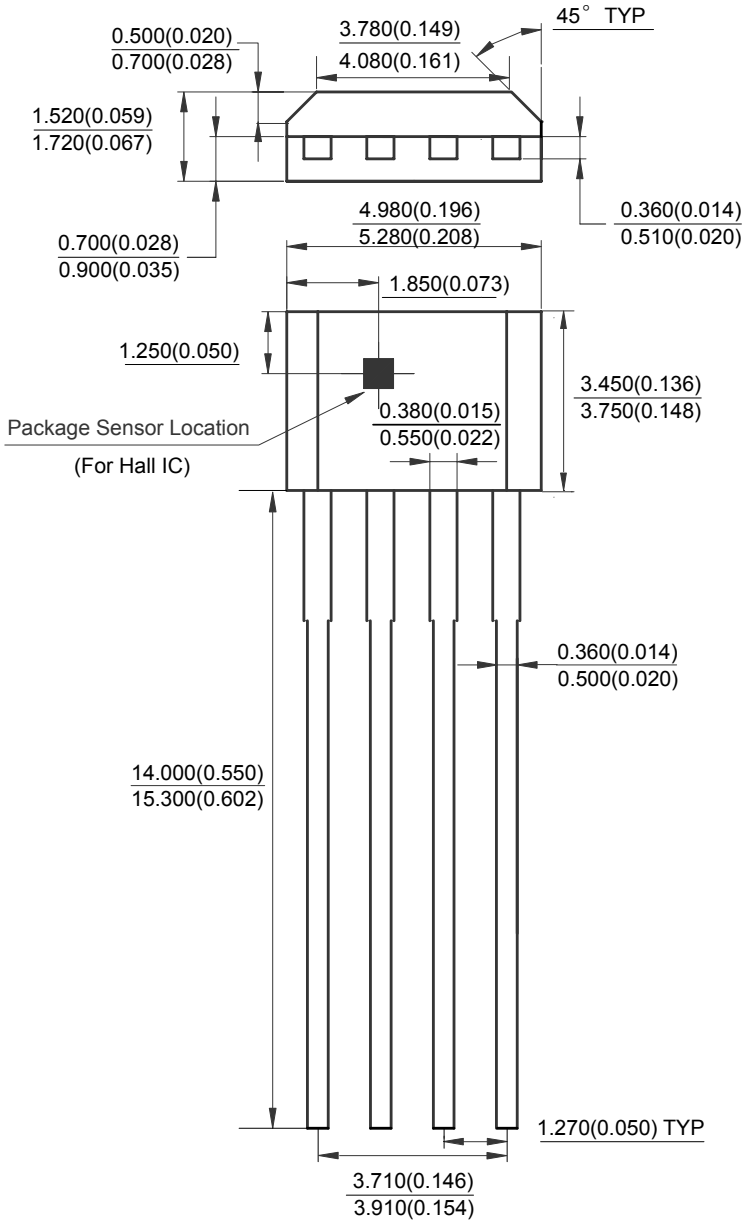


Figure 13. Typical Application Circuit with D1(Note 2)

Note 2: AH277A has Reversed Supply Voltage Protection. For DC fan application, sometimes need to test power reverse connection condition. The internal diode only protects chip-side but not for coil-side. It is recommended to add one external diode D1 in application to block the reverse current from coil-side as shown in Figure 13.

Mechanical Dimensions

TO-94 **Unit: mm(inch)**



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