SINGLE PHASE HALL EFFECT LATCH AH477

General Description

The AH477 is an integrated Hall sensor with H-bridged output driver designed for brushless DC motor applications. The device includes an on-chip Hall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a comparator to provide switching hysteresis for noise rejection, a bi-directional drivers for sinking and driving large current load. It also includes an internal bandgap regulator to provide temperature compensated bias for internal circuits and allows a wide operating supply voltage range.

Placing the device in a variable magnetic field, if the magnetic flux density is larger than threshold B_{OP}, the DO is turned to sink and DOB is turned to drive. This output state is held until the magnetic flux density reverses and falls below $B_{RP,}$ then causes DO to be turned to drive and DOB turned to sink.

AH477 is available in TO-94 (SIP-4L) package.

Features

- On-Chip Hall Sensor
- Operating Voltage: 3.5V to 18V
- H-Bridge Output Drivers for Single Coil
- Internal Bandgap Regulator for Temperature Compensation
- Low Output Switching Current Noise
- -20°C to 85°C Operating Temperature
- Low Profile TO-94 (SIP-4L) Package
- ESD Rating: 3000V (Human Body Model)

Applications

- Single-Coil Brushless DC Motor
- Single-Coil Brushless DC Fan

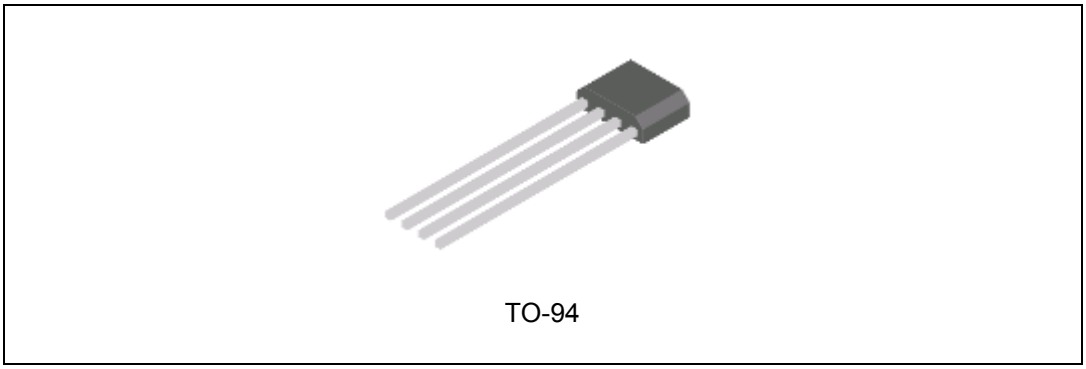


Figure 1. Package Type of AH477

Pin Configuration

Z4 Package
(TO-94)

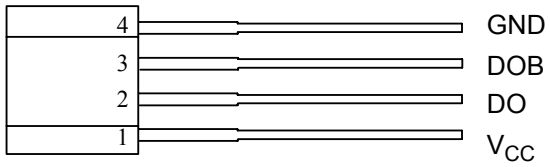


Figure 2. Pin Configuration of AH477 (Front View)

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

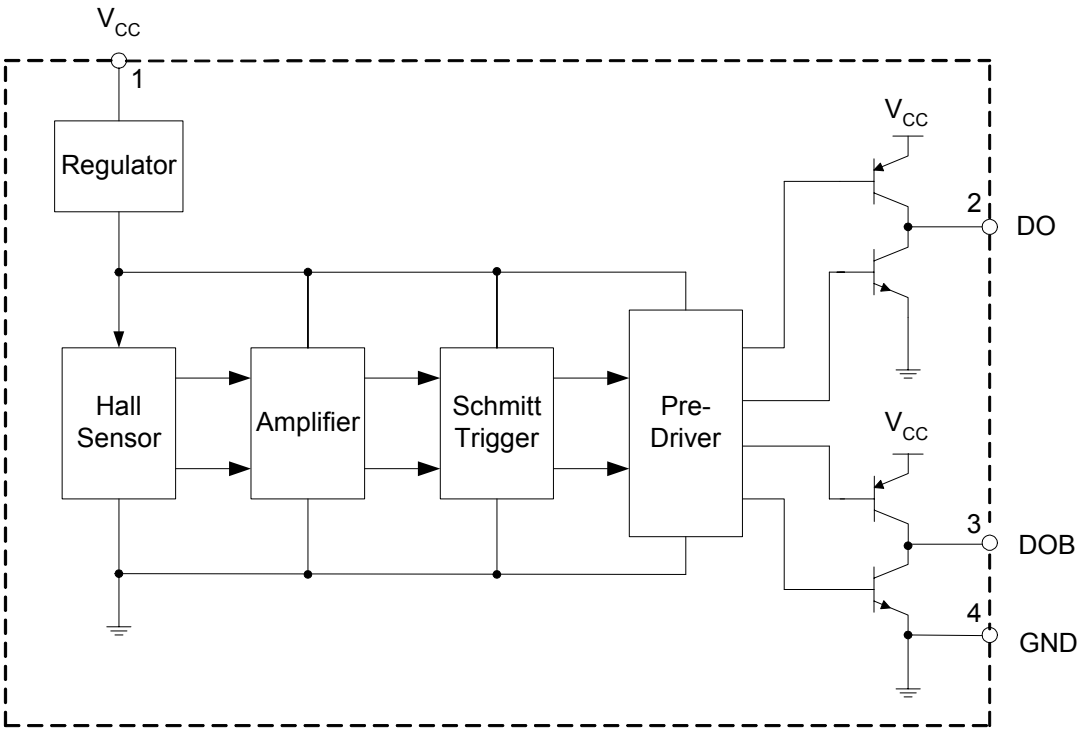
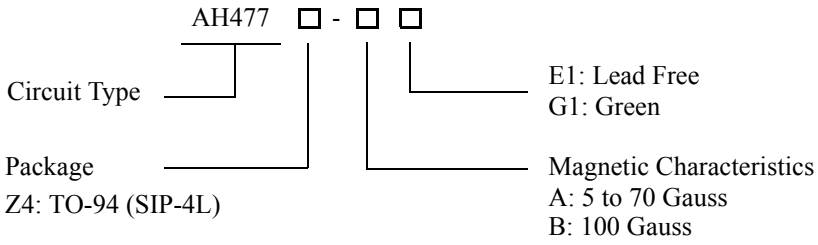


Figure 3. Functional Block Diagram of AH477

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TO-94	-20 to 85°C	AH477Z4-AE1	AH477Z4-AG1	AH477Z4-E1	AH477Z4-G1	Bulk
		AH477Z4-BE1	AH477Z4-BG1	AH477Z4-E1	AH477Z4-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
Magnetic Flux Density		B	Unlimited	Gauss
Output Current	Continuous	I_O	250	mA
	Hold		300	mA
	Peak (start up)		600	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)			3000	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	18	V
Ambient Temperature	T_A	-20	85	°C

Electrical Characteristics

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

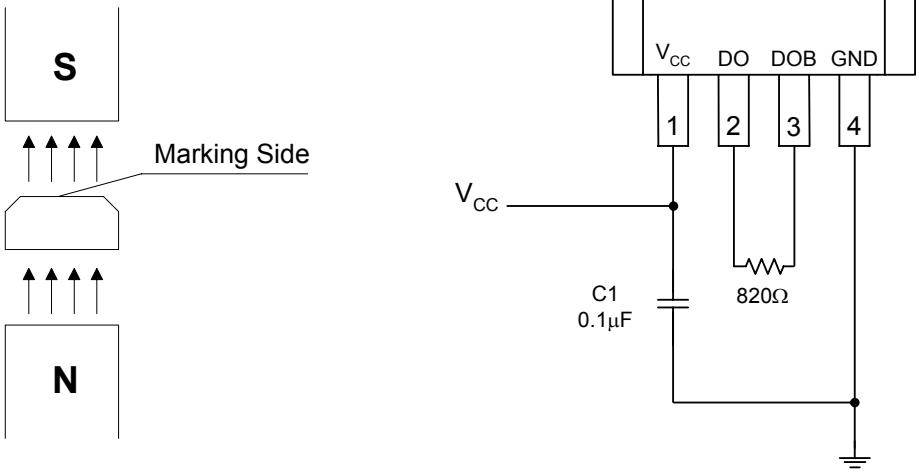
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output Saturation Voltage (Sink)	V_{SAT}	V_{CC}=14V, I_O=200mA		0.25	0.8	V
Output Saturation Voltage (Drive)		V_{CC}=14V, I_O=200mA	V_{CC}-1.5	V_{CC}-1.0	V_{CC}	V
Supply Current	I_{CC}	V_{CC}=20V, Output Open		14	25	mA
Output Rise Time	tr	R_L=820Ω, C_L=20pF		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

Magnetic Characteristics

(T_A=25°C)

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

Test Circuit



Magnetic Hysteresis Characteristics

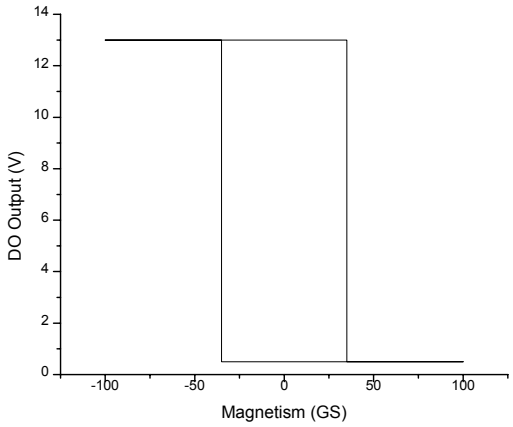


Figure 4. DO Output vs. Magnetism

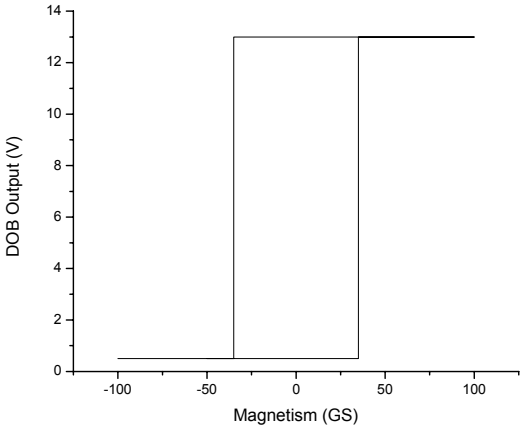


Figure 5. DOB Output vs. Magnetism

Typical Performance Characteristics

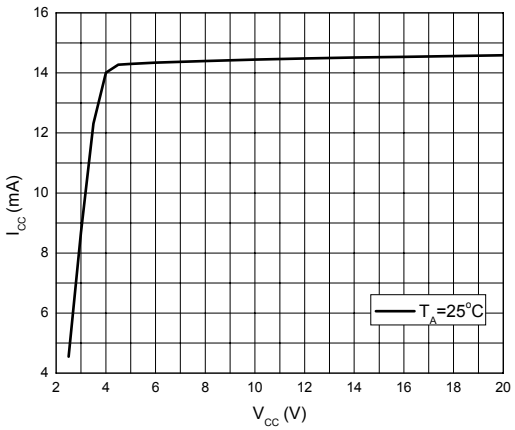


Figure 6. Supply Current vs. Supply Voltage

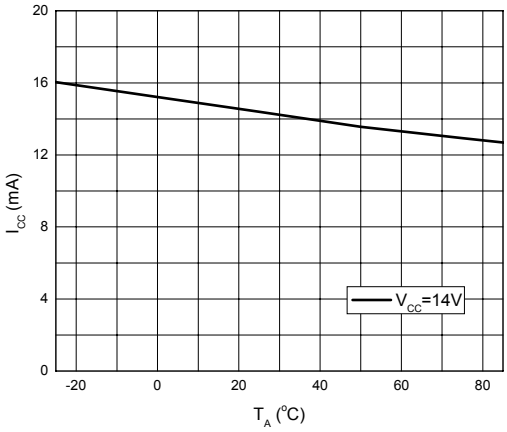


Figure 7. Supply Current vs. Ambient Temperature

Typical Performance Characteristics (Continued)

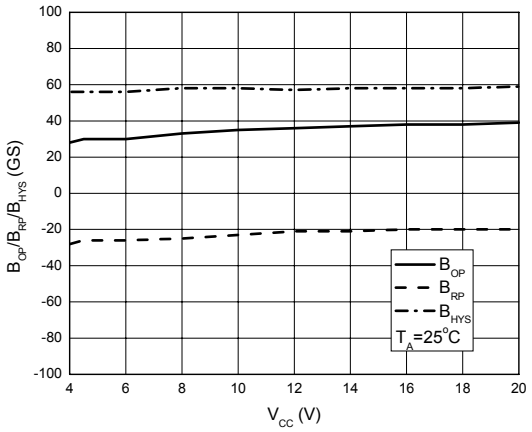


Figure 8. $B_{OP}/B_{RP}/B_{HYS}$ vs.Supply Voltage

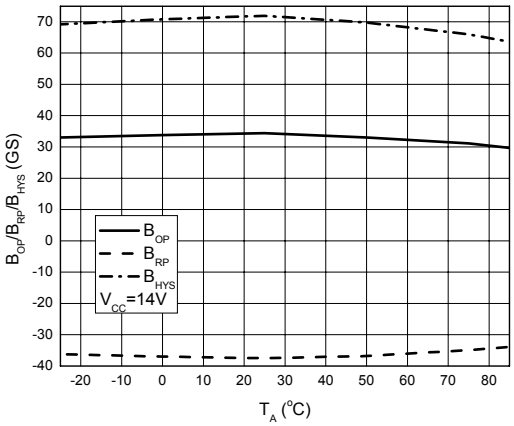


Figure 9. $B_{OP}/B_{RP}/B_{HYS}$ vs. Ambient Temperature

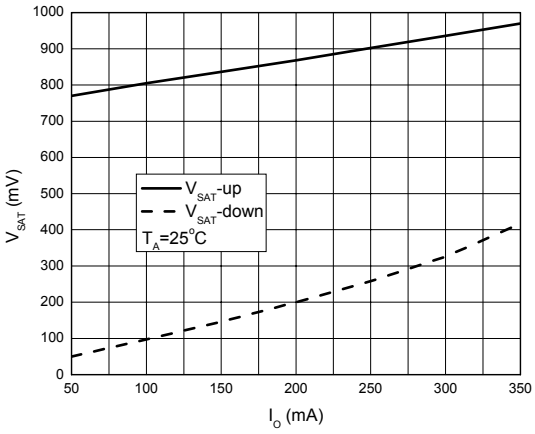


Figure 10. V_{SAT} vs. I_O

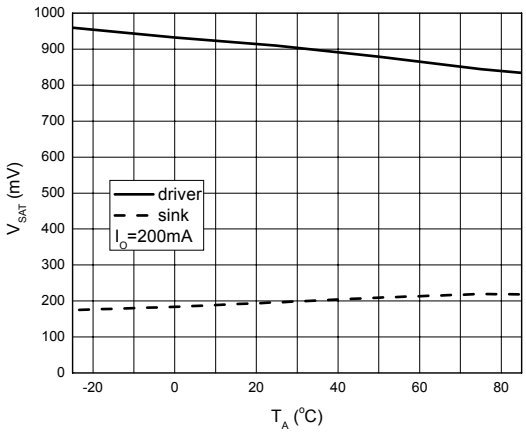


Figure 11. V_{SAT} vs. Ambient Temperature

Typical Performance Characteristics (Continued)

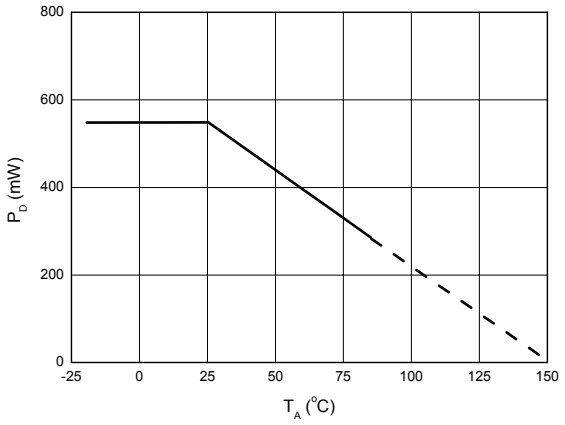


Figure 12. P_D vs. Ambient Temperature

Typical Application

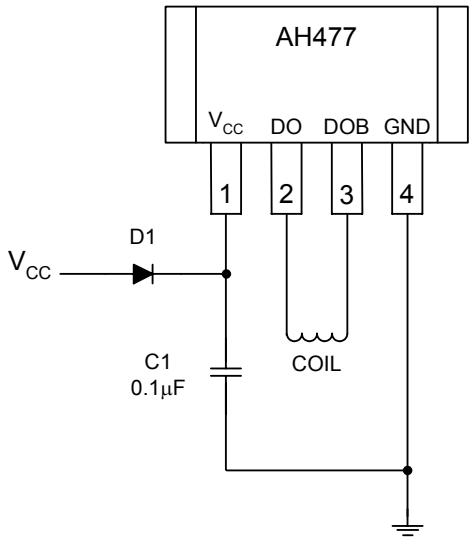
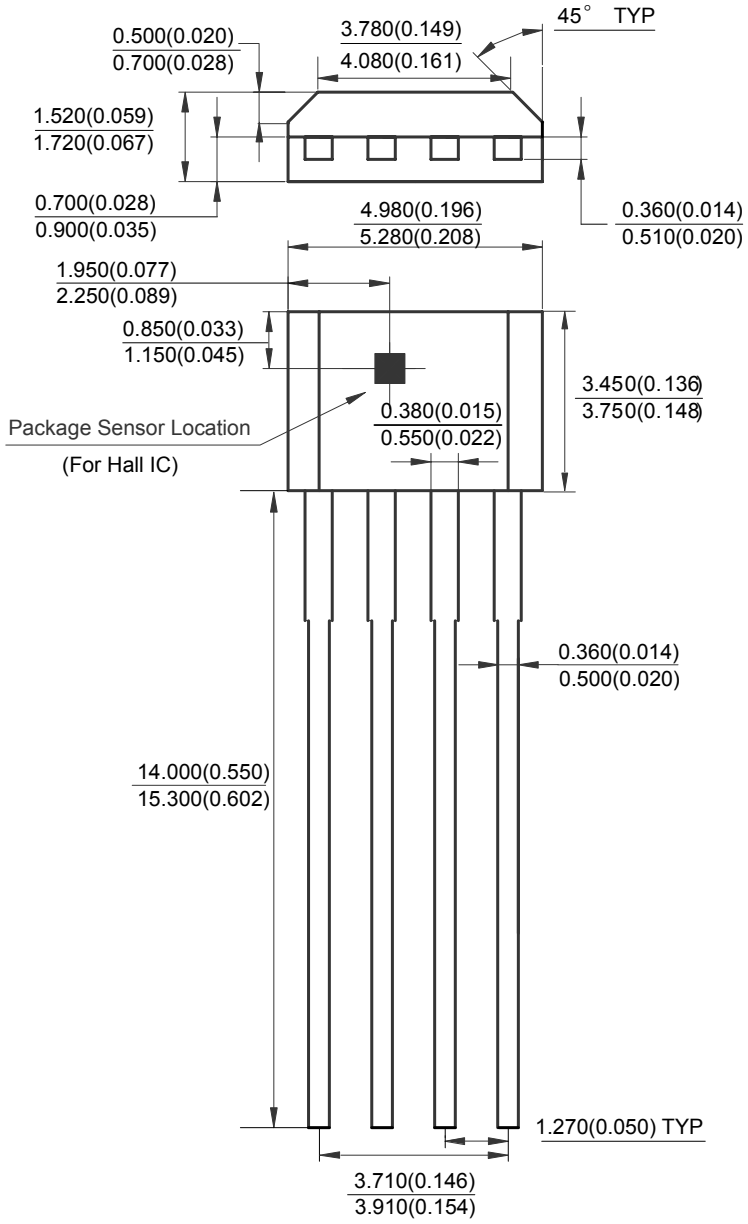


Figure 13. Typical Application Circuit

Mechanical Dimensions

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



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