

**HIGH VOLTAGE HALL EFFECT LATCH****AH278****General Description**

The AH278 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 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 and allows a wide operating supply voltage ranges.

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).

AH278 is available in TO-94 (SIP-4L) package.

Features

- On-Chip Hall Sensor
- 4V to 30V Supply Voltage
- 500mA (avg) Output Sink Current
- Build in Protection Diode for Reverse Power Connecting
- -20°C to 85°C Operating Temperature
- Low Profile TO-94 (SIP-4L) Package
- Build in Over Temperature Protection Function
- ESD Rating: 300V(Machine Model)

Applications

- 12V/24V Dual-Coil Brushless DC Motor/Fan
- Power Supply and Switchboard
- Communications Facilities
- Industrial Equipment

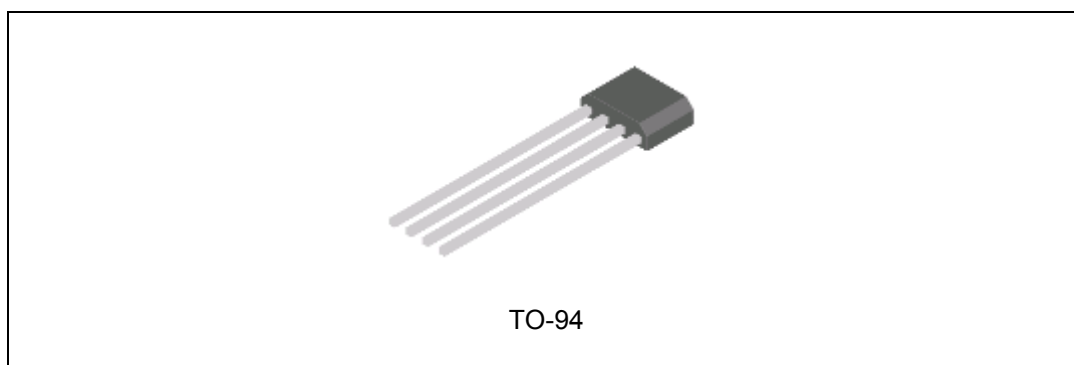


Figure 1. Package Type of AH278

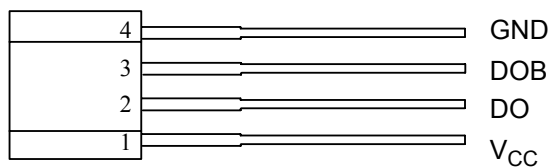
**HIGH VOLTAGE HALL EFFECT LATCH****AH278****Pin Configuration**Z4 Package
(TO-94)

Figure 2. Pin Configuration of AH278 (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

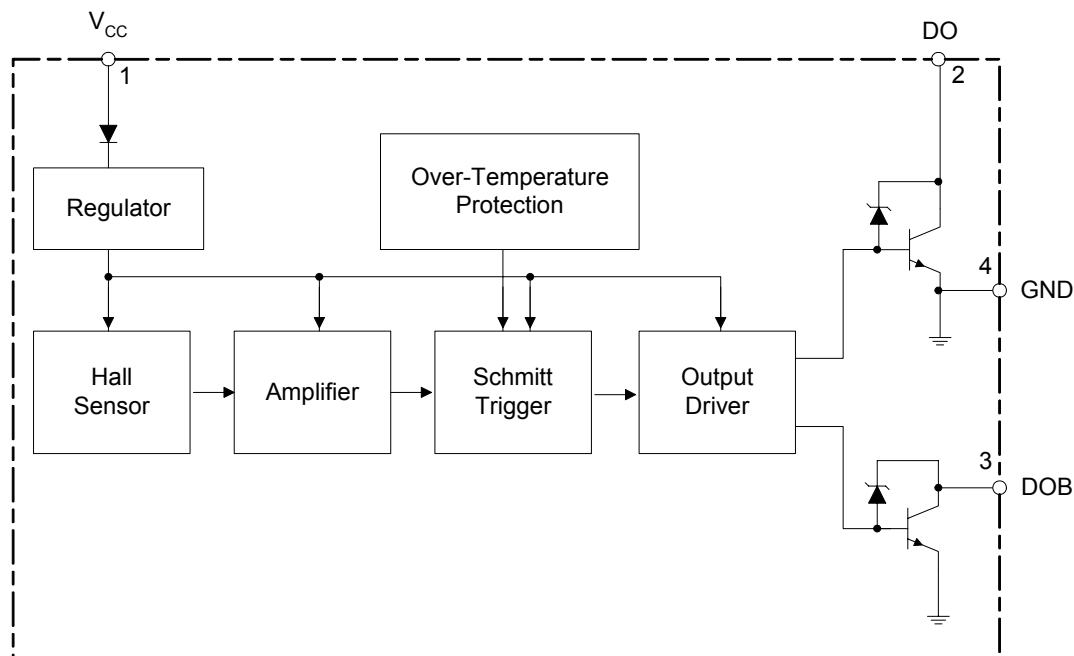
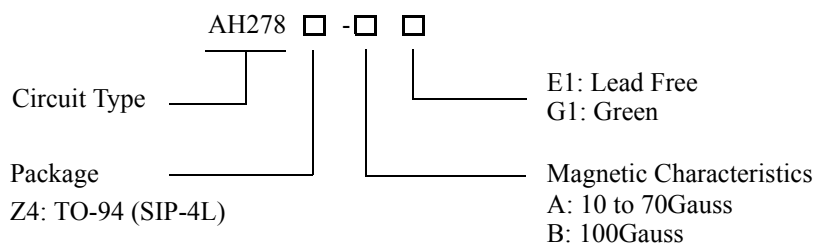
**HIGH VOLTAGE HALL EFFECT LATCH****AH278****Functional Block Diagram**

Figure 3. Functional Block Diagram of AH278

Ordering Information

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TO-94	-20 to 85 °C	AH278Z4-AE1	AH278Z4-AG1	AH278Z4-E1	AH278Z4-G1	Bulk
		AH278Z4-BE1	AH278Z4-BG1	AH278Z4-E1	AH278Z4-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.

**HIGH VOLTAGE HALL EFFECT LATCH****AH278****Absolute Maximum Ratings (Note 1)**(T_A=25°C)

Parameter		Symbol	Value	Unit
Supply Voltage		V _{CC}	30	V
Reverse Protection Voltage		V _{RCC}	-30	V
Magnetic Flux Density		B	Unlimited	Gauss
Output Current	Continuous	I _O	500 (Note 2)	mA
	Hold		600	mA
	Peak (start up)		800	mA
Power Dissipation		P _D	550	mW
Thermal Resistance	Die to atmosphere	θ _{JA}	227	°C/W
	Die to package case	θ _{JC}	49	°C/W
Storage Temperature		T _{STG}	-50 to 150	°C
ESD (Machine Model)			300	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.

Note 2: Continuous output current is 300mA at 85°C.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{CC}	4	28	V
Operating Ambient Temperature	T _A	-20	85	°C



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Electrical Characteristics

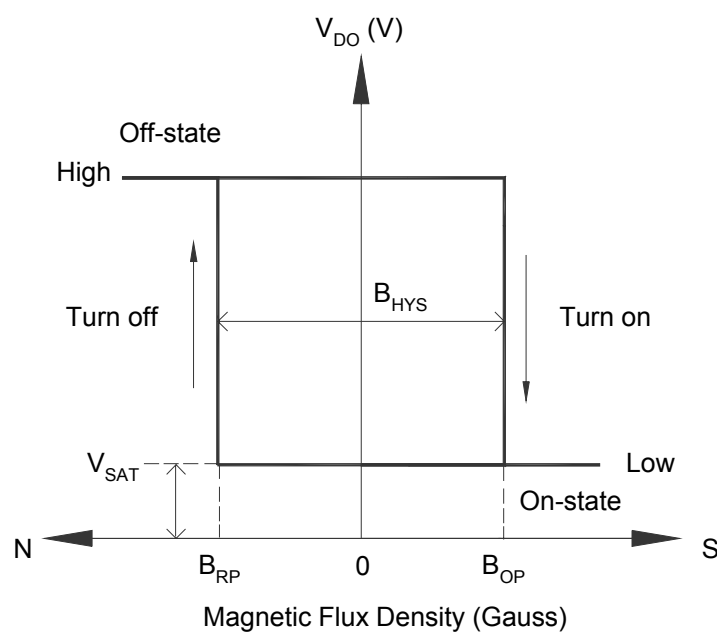
($T_A=25^{\circ}\text{C}$, $V_{CC}=24\text{V}$, unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Low Supply Voltage	V_{CE}	$V_{CC}=5\text{V}$, $I_O=100\text{mA}$		0.1	0.3	V
Output Saturation Voltage	V_{SAT1}	$I_O=500\text{mA}$		0.5	0.8	V
Output Saturation Voltage	V_{SAT2}	$I_O=300\text{mA}$		0.25	0.5	V
Output Leakage Current	I_{OL}	$V_{DO}, V_{DOB}=24\text{V}$		0.1	10	μA
Supply Current	I_{CC}	$V_{CC}=24\text{V}$, Output Open		12.5	16	mA
Output Rise Time	t_r	$R_L=820\Omega$, $C_L=20\text{pF}$		3.0	10	μs
Output Fall Time	t_f	$R_L=820\Omega$, $C_L=20\text{pF}$		0.3	1.5	μs
Switch Time Differential	Δt	$R_L=820\Omega$, $C_L=20\text{pF}$		3.0	10	μs
Output Zener Breakdown Voltage	V_{ZO}			60		V

Magnetic Characteristics

($T_A=25^{\circ}\text{C}$)

Parameter	Symbol	Grade	Min	Typ	Max	Unit
Operating Point	B_{OP}	A	10		70	Gauss
		B			100	Gauss
Releasing Point	B_{RP}	A	-70		-10	Gauss
		B	-100			Gauss
Hysteresis	B_{HYS}			80		Gauss



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Magnetic Characteristics (Continued)

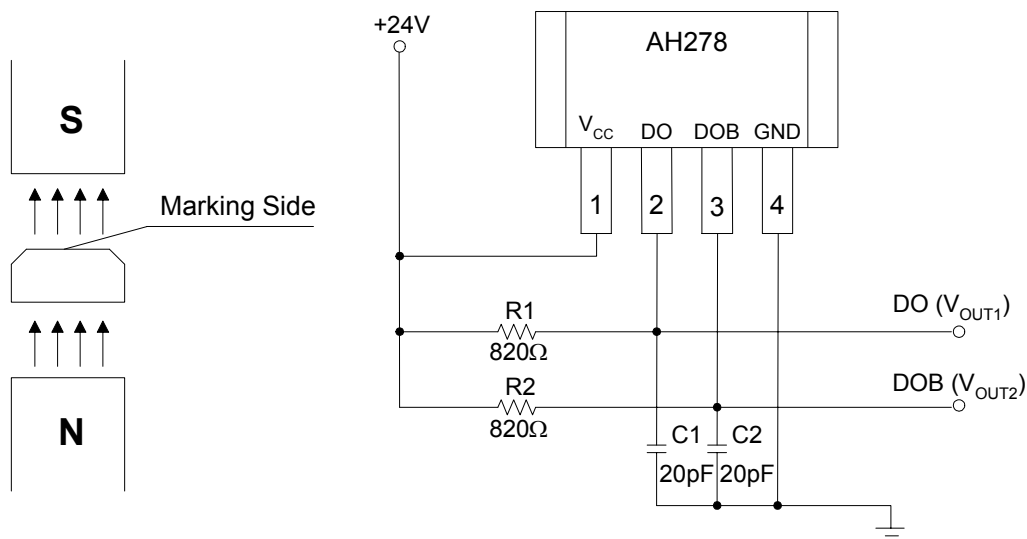
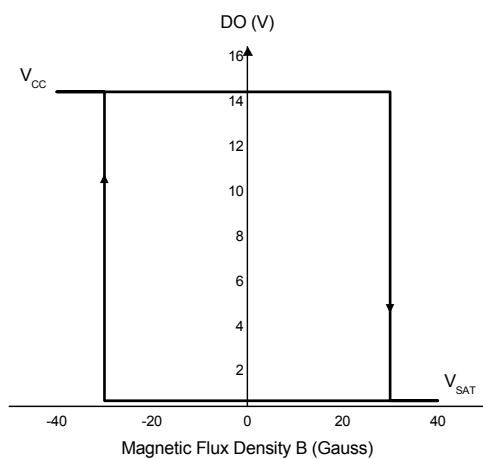
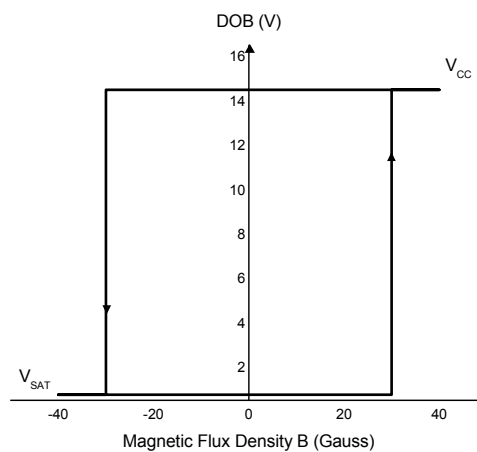
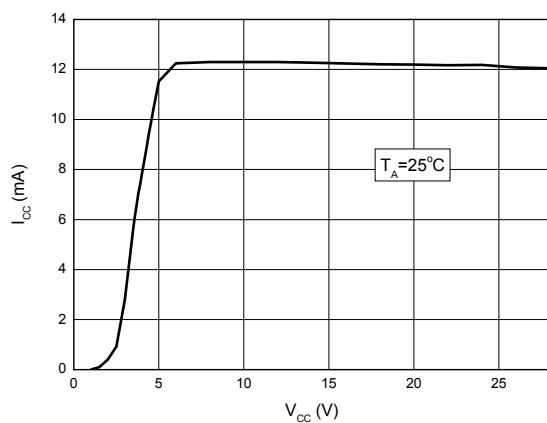
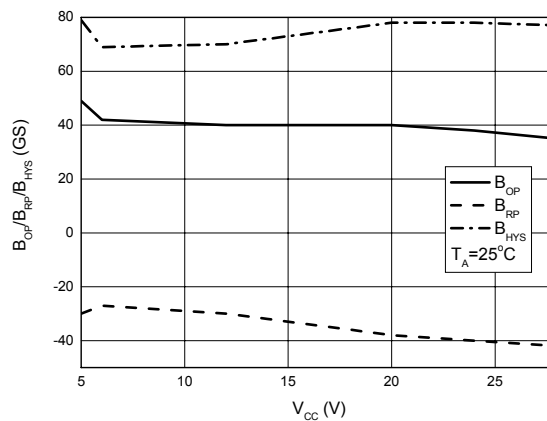
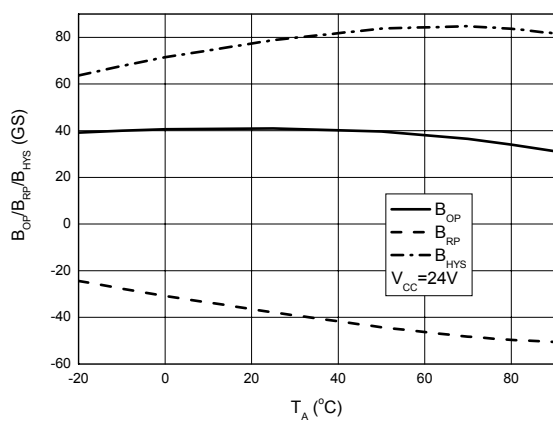
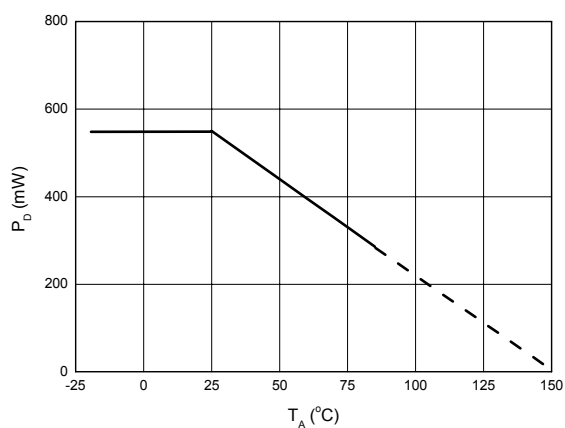
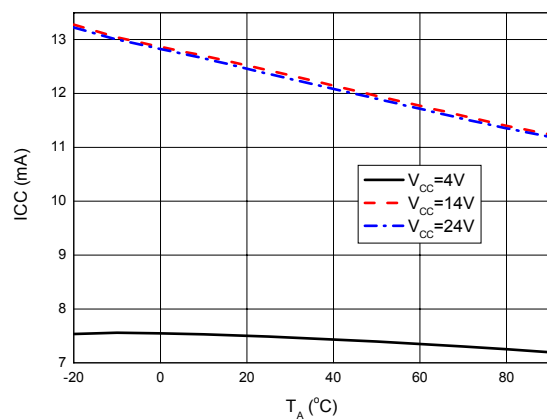
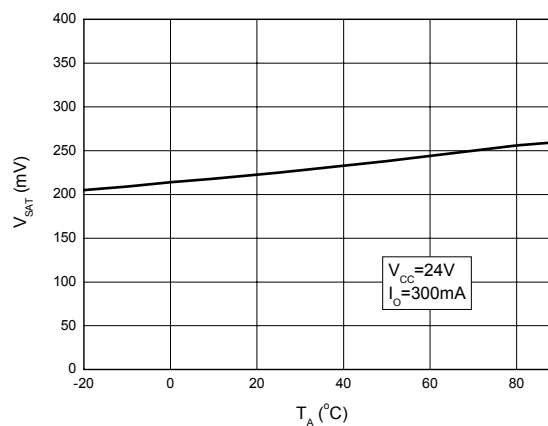
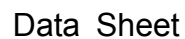


Figure 4. Basic Test Circuit


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

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

**HIGH VOLTAGE HALL EFFECT LATCH****AH278****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 TemperatureFigure 10. P_D vs. Ambient Temperature

**HIGH VOLTAGE HALL EFFECT LATCH****AH278****Typical Performance Characteristics (Continued)**Figure 11. I_{CC} vs. Ambient TemperatureFigure 12. V_{SAT} vs. Ambient Temperature



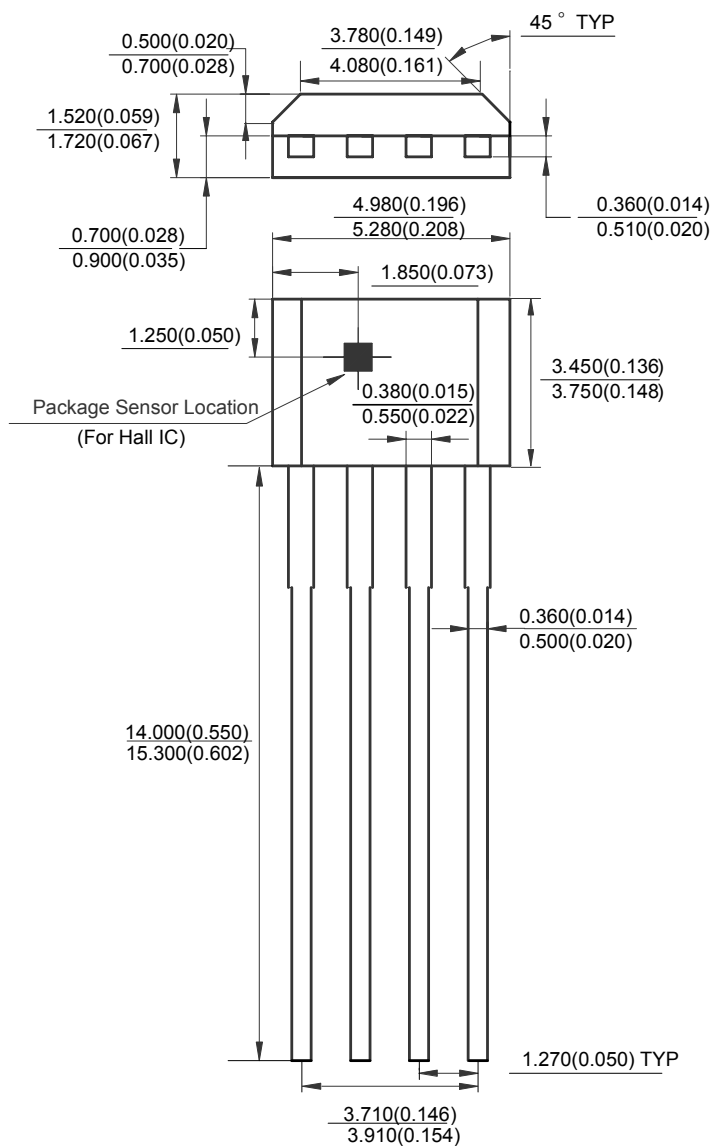
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The diagram shows the AH278 module with its four pins connected to a circuit. Pin 1 (VCC) is connected to a VCC source through a resistor R1. Pin 2 (DO) is connected to the DO output. Pin 3 (DOB) is connected to the DOB output. Pin 4 (GND) is connected to GND. The module is also connected to a diode D1, a coil COIL1, a coil COIL2, and two LEDs Z1 and Z2.

Z1, Z2: Zener diode, $2 \cdot V_{CC} \leq V_Z \leq 60V$

Note 3: Recommended R1 for different V_{CC}

V_{CC} (V)	7	8	9	10	11	12	13	14	15	16	17
R_I (Ω)	0	0	0	0	0	0	470	510	560	620	680
V_{CC} (V)	18	19	20	21	22	23	24	25	26	27	28
R_I (Ω)	750	820	820	910	1k	1k	1.1k	1.2k	1.2k	1.3k	1.3k

**HIGH VOLTAGE HALL EFFECT LATCH****AH278****Mechanical Dimensions****TO-94****Unit: mm(inch)**



BCD Semiconductor Manufacturing Limited

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