

## SINGLE PHASE HALL EFFECT LATCH SMART FAN MOTOR CONTROLLER

### Features

- Support single-phase full wave DC fan driver
- Built-in Hall sensor input amplifier
- Low voltage startup (  $V_{dd}=1.8V$  )
- Lock detection and automatic self-restart
- Soft switching for low noise DC fans
- Without external timing capacitor, Reduces the numbers of external component required
- Thermal protection
- FG output
- Low profile package: SOT89-5L
- SOT89-5L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

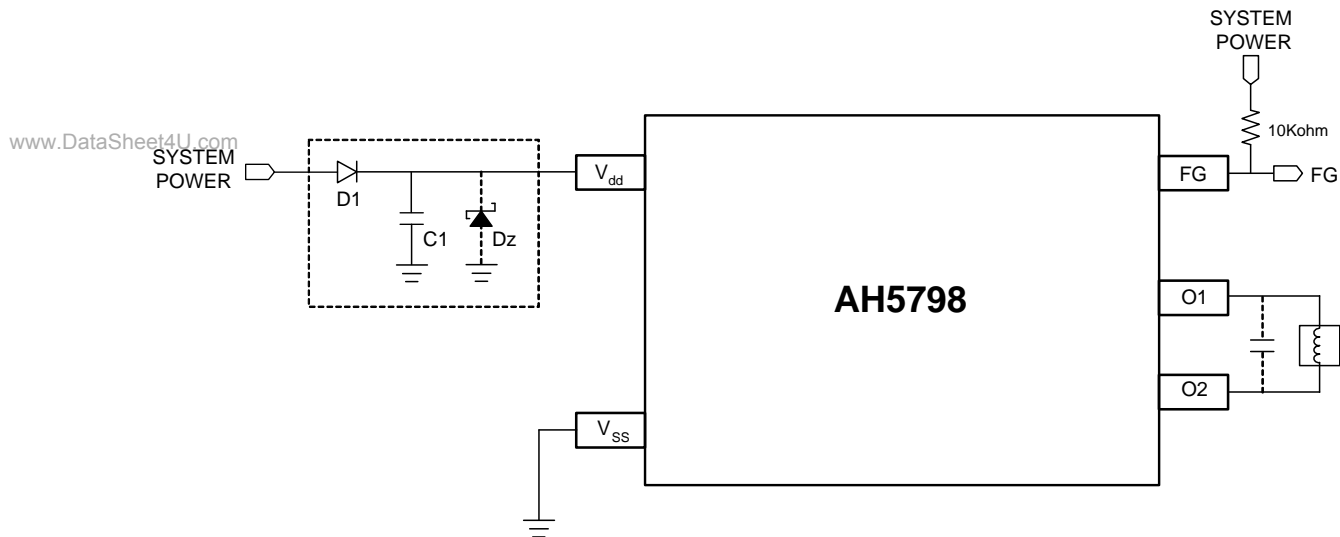
### General Description

The AH5798 is a single chip solution for driving single-coil brush-less DC fans and motors. The AH5798 employs a bidirectional full bridge driver output stage for single coil fan motor applications. The soft switching driver generates the low noise operating for DC fans. The device includes features such as Rotor Lock Protection with rotor lock detection and automatic self-restart to avoid damage to the coil when the rotor is blocked. The AH5798 also offers an externally controlled Tachometer (Frequency Generator Pin) open -drain output which makes it easier to connect with external interface such as hardware monitoring. The FG is the magnetic change frequency. The device is packaged in SOT89-5L for SMT applications in DC fans.

### Applications

- 3.3V / 5V Min. BLDC Cooling Fans
- Net-Book/ Note-Book DC fans
- Low Voltage/ Low Power BLDC Motors

### Typical Application Circuit

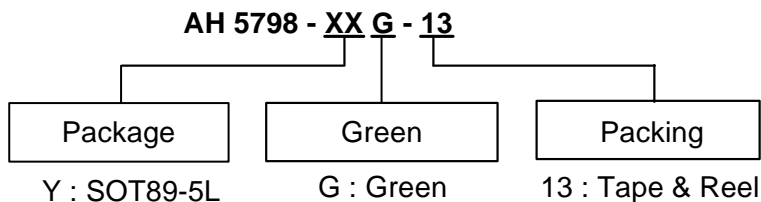


\* Reverse connection of power supply may break the device. A countermeasure is needed such as using reverse power protection diode D1 between power supply and V<sub>dd</sub> terminal. In such case of using reverse power protection diode D1 because of there is no way to return current to power supply, please take necessary measures like below.

- Connect Dz (Zener diode) between V<sub>dd</sub> and V<sub>ss</sub> terminal, not to exceed the absolute maximum rating voltage.
- Connect a capacitor C1 between V<sub>dd</sub> and V<sub>ss</sub> terminal, to make the path of return current to power supply.

The AH5798 has an open-drain tachometer FG output that follows the magnetic change frequency. A pull-up resistor (10Kohm, typically for System Power = 5V) connected to a supply voltage.

## Ordering Information



Device	Package Code	Packaging (Note 2)	13" Tape and Reel	
			Quantity	Part Number Suffix
AH5798-YG-13	Y	SOT89-5L	2500/Tape & Reel	-13

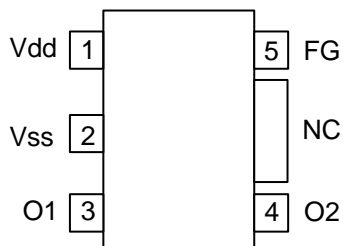


Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html)  
 2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

## Pin Assignments

### (1) SOT89-5L

#### ( Top View )



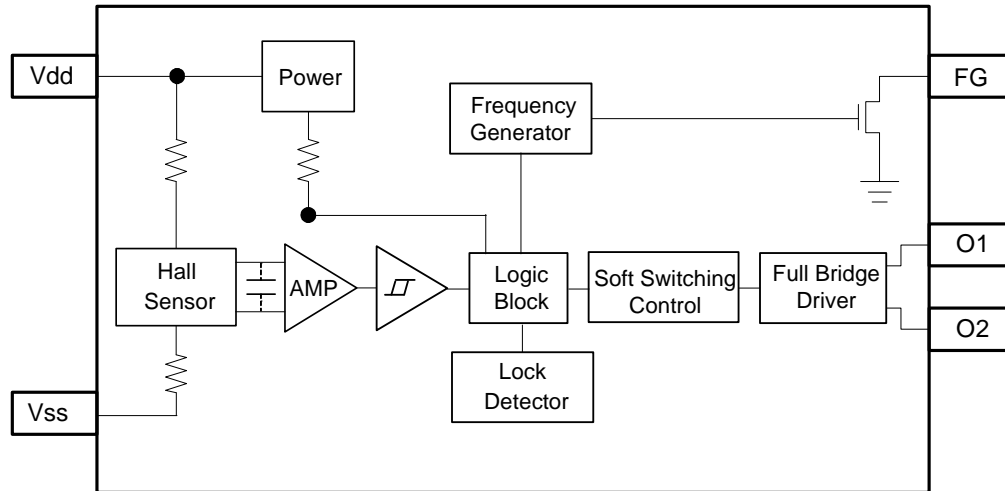
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## Pin Descriptions

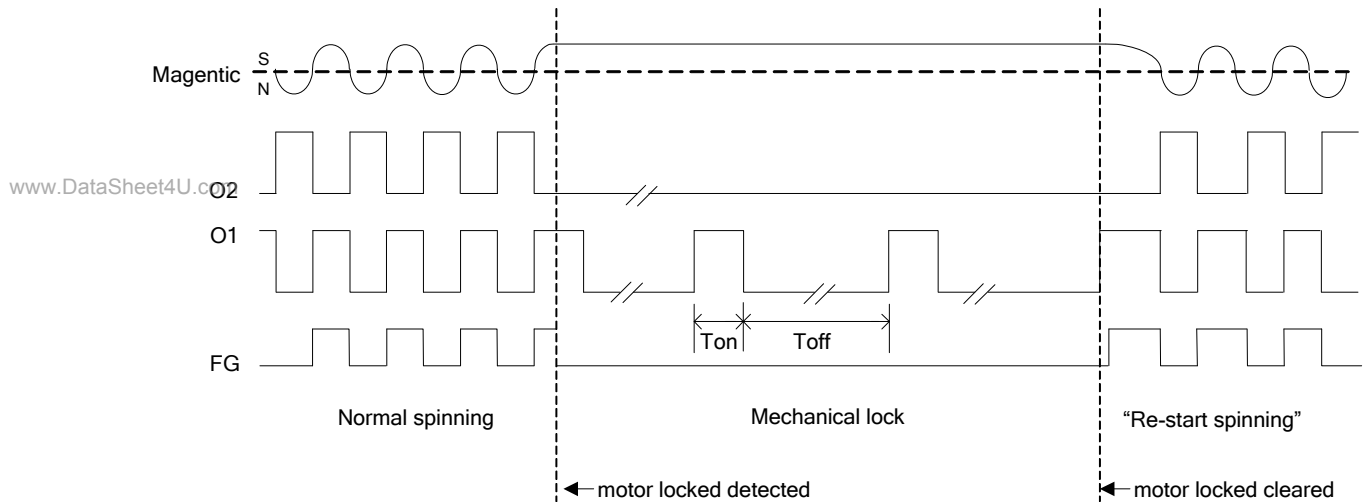
Pin Name	Description
Vdd	Power supply pin
Vss	Ground pin
O1	Output driving & sinking pin 1
O2	Output driving & sinking Pin 2
NC	No Connection
FG	Frequency Generator (Note 3)

Notes: 3. The FG is the same as the magnetic change frequency.

## Block Diagram



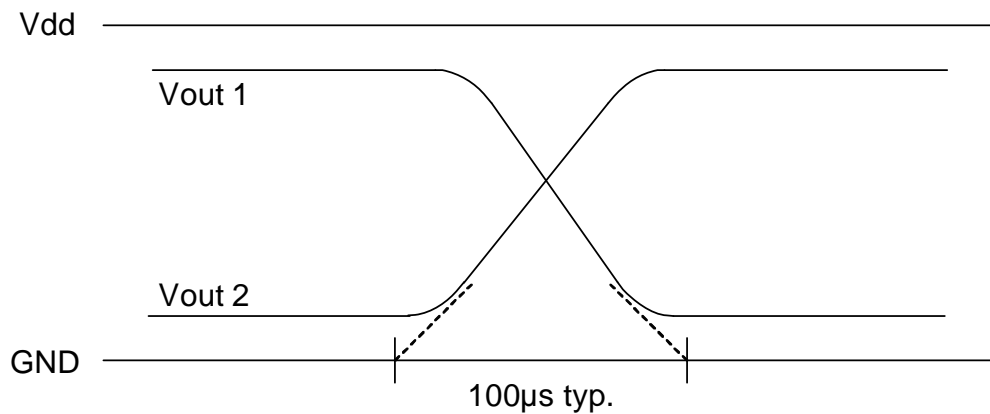
## Operating



- Notes:
4. In "Normal spinning", the FG shall change its state at each rising edge of O1.
  5. When magnetic is locked as "S" pole, then O2 is kept on "L", O1 is a clock with Ton/Toff ratio. When magnetic is locked at "N" pole, then O1 is kept on "L", O2 is a clock with Ton/Toff ratio.
  6. When "Re-start spinning" occurs, the motor shall ramp up to the "Normal Spinning" speed from zero. It depends on the motor characteristics.

## Soft Switching

AH5798 is with soft switching of the bidirectional current through the single motor coil is important for low noise applications.



## Absolute Maximum Ratings (Unless otherwise noted, at $T_A = 25^\circ\text{C}$ )

Symbol	Characteristics	Values	Unit
V <sub>DD</sub>	Supply voltage	6	V
I <sub>O(PEAK)</sub>	Maximum Output Current (Peak)	800	mA
P <sub>D</sub>	Power Dissipation	800	mW
T <sub>ST</sub>	Storage Temperature Range	-65 ~ 150	°C

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## Recommended Operating Conditions ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Conditions	Rating	Unit
T <sub>A</sub>	Operating Ambient Temperature Range	Operating	-40 ~ 105	°C
V <sub>DD</sub>	Supply Voltage	Operating	1.8~5.5	V



# AH5798

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### Electrical Characteristics (TA = 25°C, V<sub>dd</sub> = 5V)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
I <sub>dd</sub>	Supply Current	No Load	-	5	-	mA
V <sub>OH</sub>	Output Voltage High	I <sub>OUT</sub> = 300mA	4.4	4.65	-	V
V <sub>OL</sub>	Output Voltage Low	I <sub>OUT</sub> = 300mA	-	0.35	0.6	V
T <sub>SW</sub>	Output Switching Slope Duration	50Ω load on out1/out2	-	100	-	μs
I <sub>LEAK</sub>	FG Output Leakage Current		-	-	5	μA
V <sub>FGOL</sub>	FG Output Voltage Low	I <sub>FG</sub> = 5mA	-	-	0.4	V
T <sub>ON</sub>	On Time		350	500	650	ms
R <sub>DR</sub>	Duty Ratio	T <sub>OFF</sub> / T <sub>ON</sub>	-	10	-	

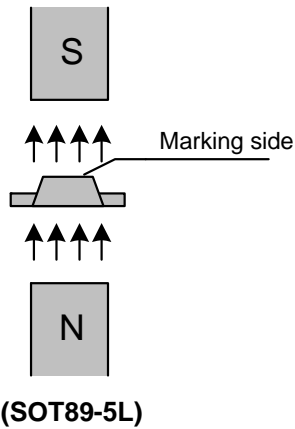
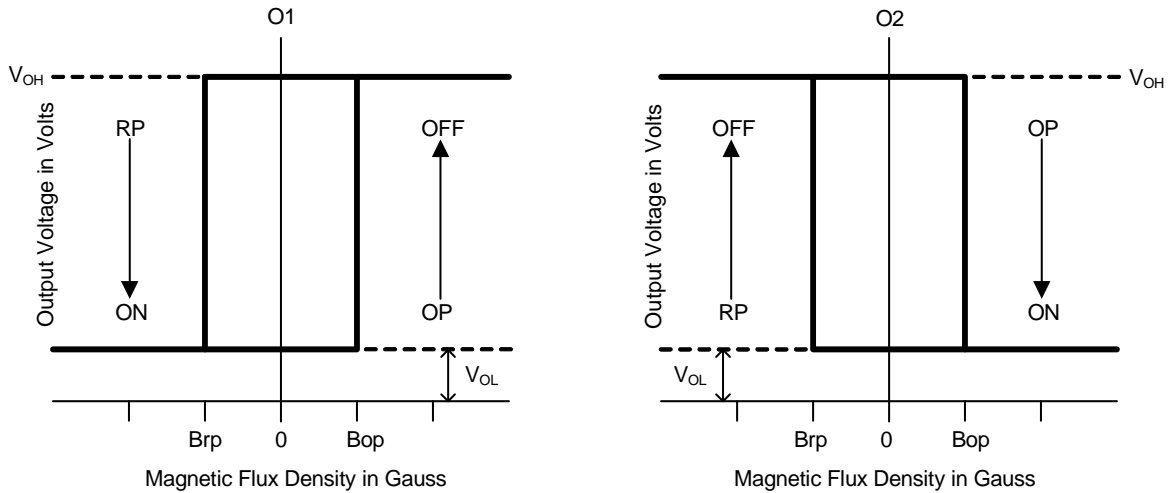
### Magnetic Characteristics (TA=25°C, V<sub>dd</sub>=1.8V~5V, Note 7)

(1mT = 10 G)

Symbol	Characteristic	Min	Typ.	Max	Unit
B <sub>op</sub>	Operate Point	10	25	50	G
B <sub>rp</sub>	Release Point	-50	-25	-10	G
B <sub>hy</sub>	Hysteresis	-	50	-	G

Notes: 7. Magnetic characteristics are for design information, which will vary with supply voltage, operating temperature and after soldering.

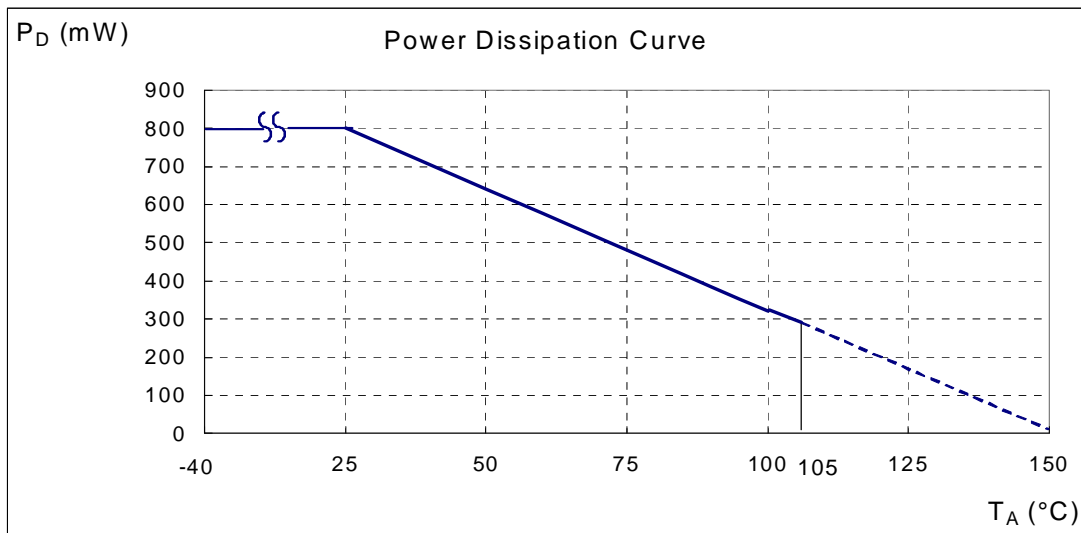
### Operating Characteristics



## Performance Characteristics

### (1) SOT89-5L

$T_A$ (°C)	25	50	60	70	75	80	85	90	95	100
$P_D$ (mW)	800	640	576	512	480	448	416	384	352	320
$T_A$ (°C)	105	110	115	120	125	130	135	140	145	150
$P_D$ (mW)	288	256	224	192	160	128	96	64	32	0

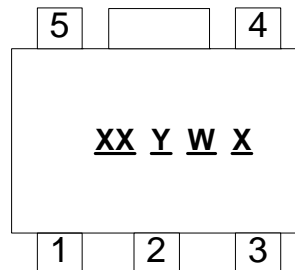


## Marking Information

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### (1) SOT89-5L

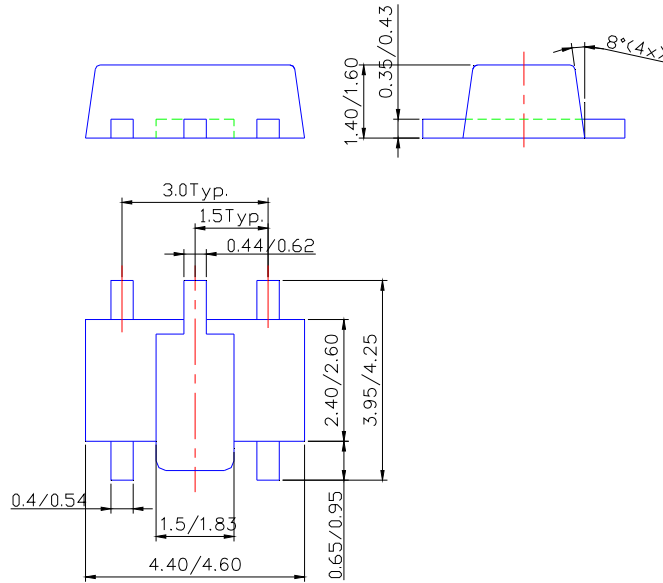
#### ( Top View )

XX : Identification codeY : Year : 0~9W : Week : A~Z : 1~26 week;  
a~z : 27~52 week;  
z represents 52 and 53 weekX : Internal code  
A~Z : Green

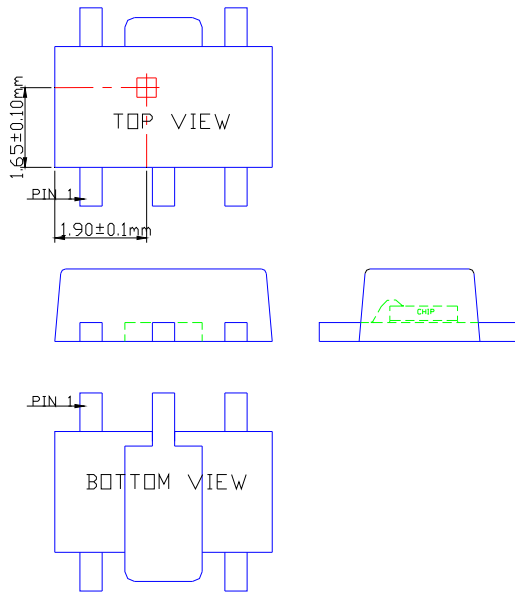
Device	Package	Identification Code
AH5798	SOT89-5L	K4

### Package Information (All Dimensions in mm)

(1) Package type: SOT89-5L



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### Sensor Location



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FAN MOTOR CONTROLLER****IMPORTANT NOTICE**

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