

**Features**

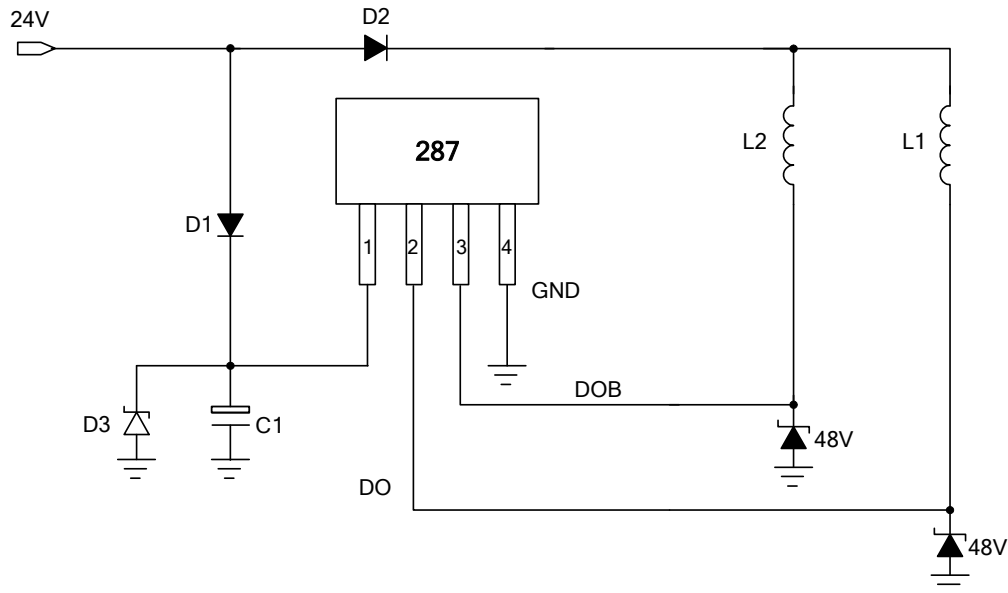
- On Chip Hall Sensor
- Rotor-Locked Shutdown
- Automatically Restart
- Built-in Zener Protection for Output Driver
- Operating Voltage: 3.8V~28V
- Output Current:  $I_{O(AVE)} = 400mA$
- Lead Free Packages: SIP-4L and SOT89-5L (Note 1)
- SIP-4L and SOT89-5L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 2)

**General Description**

AH287 is a monolithic fan motor controller with Hall sensor's capability. It contains two complementary open-drain drivers for motor's coil driving, automatic lock shutdown and restart function relatively.

Rotor-lock shutdown detection circuit turns off the output driver when the rotor is blocked to avoid coil overheat. Then, the automatic recovery circuit will restart the motor. These protected actions are repeated and periodic during the blocked period. Until the blocking is removed, the motor recovers and runs normally.

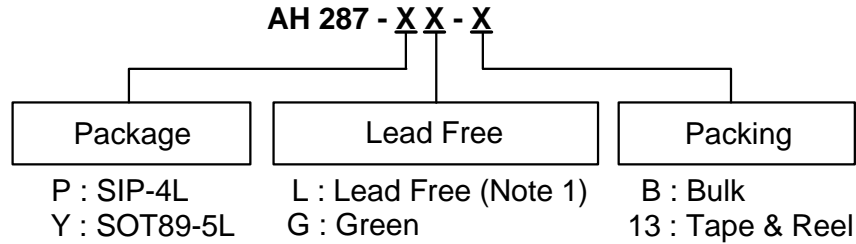
**Typical Application Circuit**



Note: The optional Capacitor C1 and Diode D3 are for power stabilization. C1 is recommended to be E-Cap.,  $\mu F/25V$ ; D3 is recommended to be Zener Diode,  $V_z = 27V$ . Which C1 and D3 value need to be fine tuned to optimize design for different coils and power suppliers.

**24V Brush-Less DC Fan**

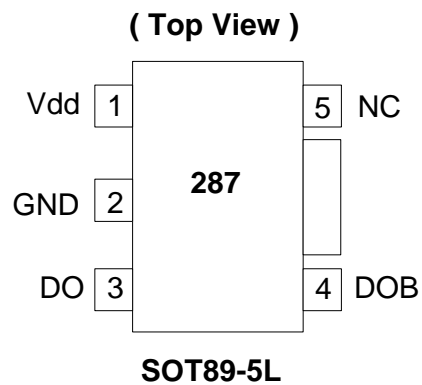
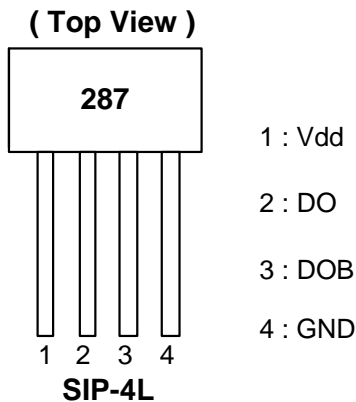
### Ordering Information



Device	Package Code	Packaging (Note 3)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH287-PL-B	P	SIP-4L	1000	-B	NA	NA
AH287-PG-B	P	SIP-4L	1000	-B	NA	NA
AH287-YL-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13
AH287-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

- Notes:
- AH287-YL-13 will be replaced by AH287-YG-13
  - 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).
  - 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>.
  - Reverse taping as shown on Diodes Inc. Surface Mount (SMD) Packaging document AP02007, which can be found on our website <http://www.diodes.com/datasheets/ap02007.pdf>.

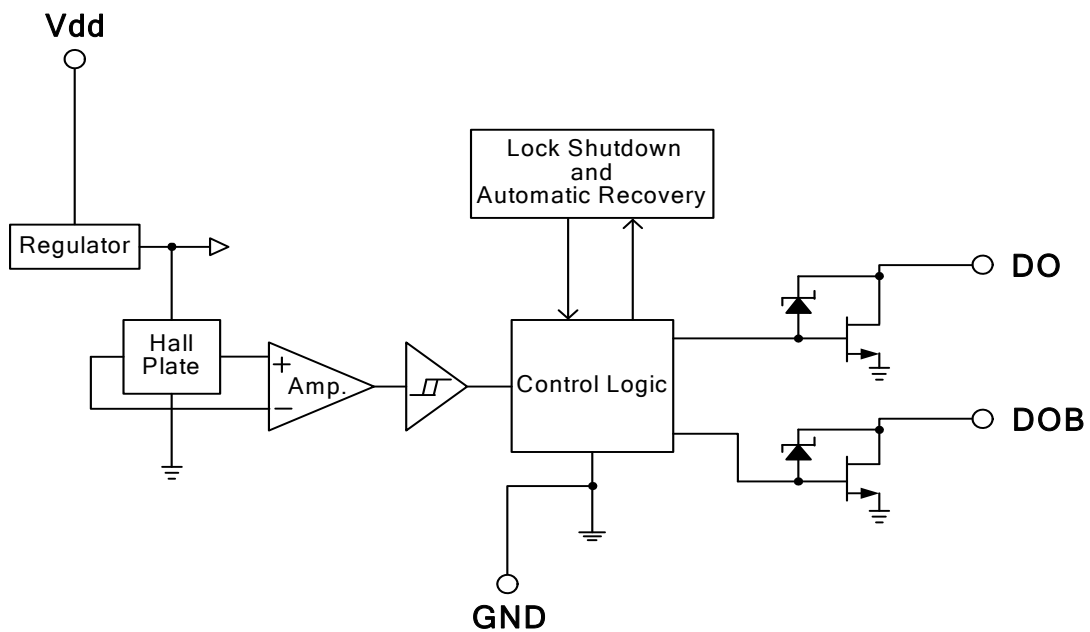
### Pin Assignment



**Pin Descriptions**

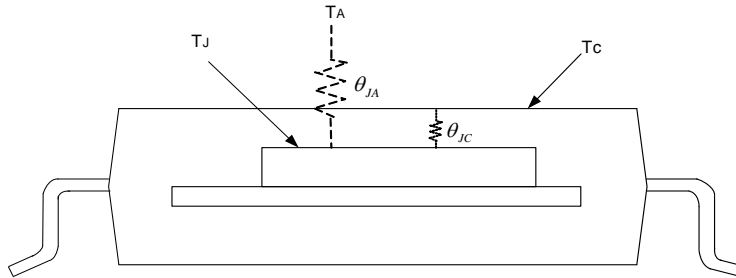
Pin Name	Description
Vdd	Input Power
DO	Output Pin
DOB	Output Pin
GND	Ground
NC	Not Connected

**Block Diagram**



**Absolute Maximum Ratings** ( $T_A = 25^{\circ}\text{C}$ )

Symbol	Characteristics		Rating	Unit	
V <sub>DD</sub>	Supply Voltage		30	V	
I <sub>O</sub>	Output Current	I <sub>O(AVE)</sub>	SIP-4L	400	mA
			SOT89-5L	400	mA
		I <sub>O(PEAK)</sub>		700	mA
P <sub>D</sub>	Power Dissipation	SIP-4L	550	mW	
		SOT89-5L	800	mW	
T <sub>ST</sub>	Storage Temperature		-55 ~ 150	°C	
T <sub>J</sub>	Maximum Junction Temperature		150	°C	
θ <sub>JA</sub>	Thermal Resistance Junction-to-Case (Note 5)	SIP-4L	227	°C/W	
		SOT89-5L	156	°C/W	



Notes: 5.  $\theta_{JA}$  should be confirmed with what heat sink thermal resistance. If no heat sink contacting,  $\theta_{JA}$  is almost the same as  $\theta_{JC}$ .

**Recommended Operating Conditions**

Symbol	Characteristic	Conditions	Min	Max	Unit
V <sub>DD</sub>	Supply Voltage (Note 6)	Operating	3.8	28	V
T <sub>A</sub>	Operating Ambient Temperature	Operating	-40	100	°C

Notes: 6. Please watch out the current limit issue when the operation voltage is over 26.4V, because of the different efficiency in the coil.

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

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
$I_{DD}$	Supply Current	Operating	-	2.0	4.0	mA
$I_{OFF}$	Output Leakage Current	$V_{OUT} = 24\text{V}$	-	< 0.1	10	$\mu\text{A}$
$T_{LRP-ON}$	Locked Protection On		0.4	0.46	0.6	Sec
$T_{LRP-OFF}$	Locked Protection Off		2.4	2.76	3.6	Sec
$V_{OUT(SAT)}$	Output Saturation Voltage	$I_O = 200\text{mA}$	-	450	700	mV
		$I_O = 300\text{mA}$	-	680	800	mV
$R_{DS(ON)}$	Output On Resistance	$I_O = 200\text{mA}$	-	2.25	3.5	ohm
$V_Z$	Output Zener-Breakdown Voltage		42	55	65	V

**Truth Table**

IN-	IN+	CT	OUT1	OUT2	Mode
H	L	L	H	L	Rotating
L	H	L	L	H	Rotating
-	-	H	off	off	Lockup protection activated

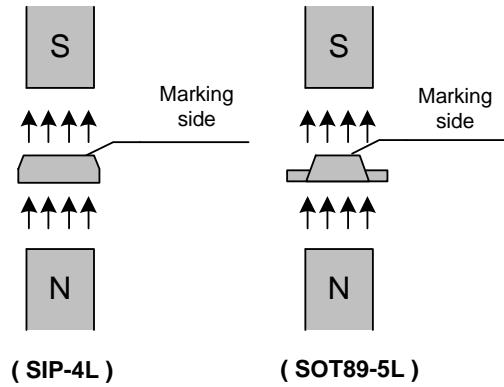
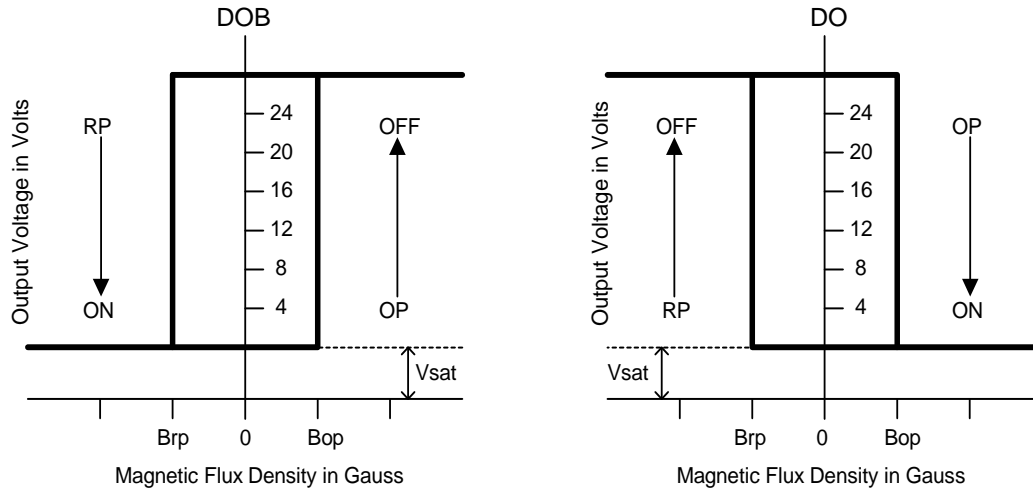
**Magnetic Characteristics** ( $T_A = 25\text{ }^\circ\text{C}$ ,  $V_{DD} = 24\text{V}$ , unless otherwise specified, Note 7)

(1mT=10 Gauss)

Symbol	Characteristics	Min	Typ.	Max	Unit
$B_{OP}$	Operate Point	10	30	60	Gauss
$B_{RP}$	Release Point	-60	-30	-10	Gauss
$B_{HY}$	Hysteresis	--	60	--	Gauss

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

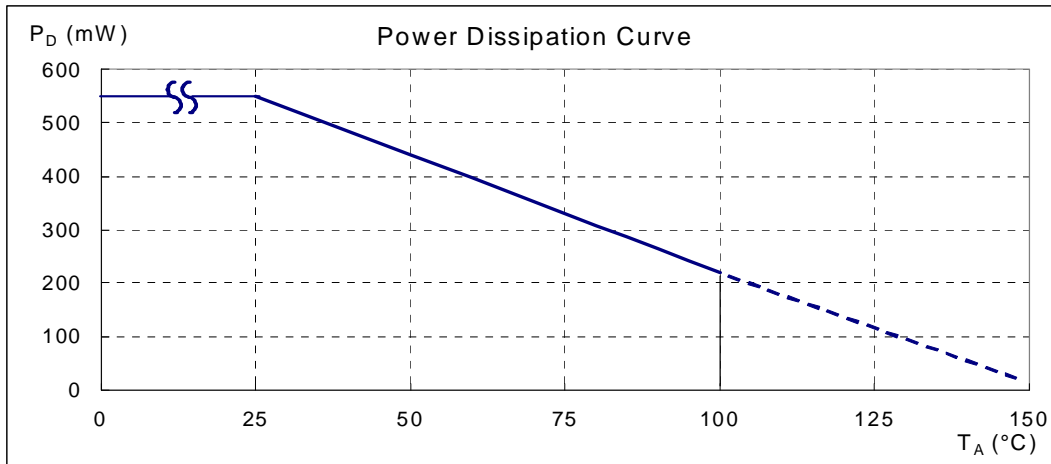
**Operating Characteristics**



**Performance Characteristics**

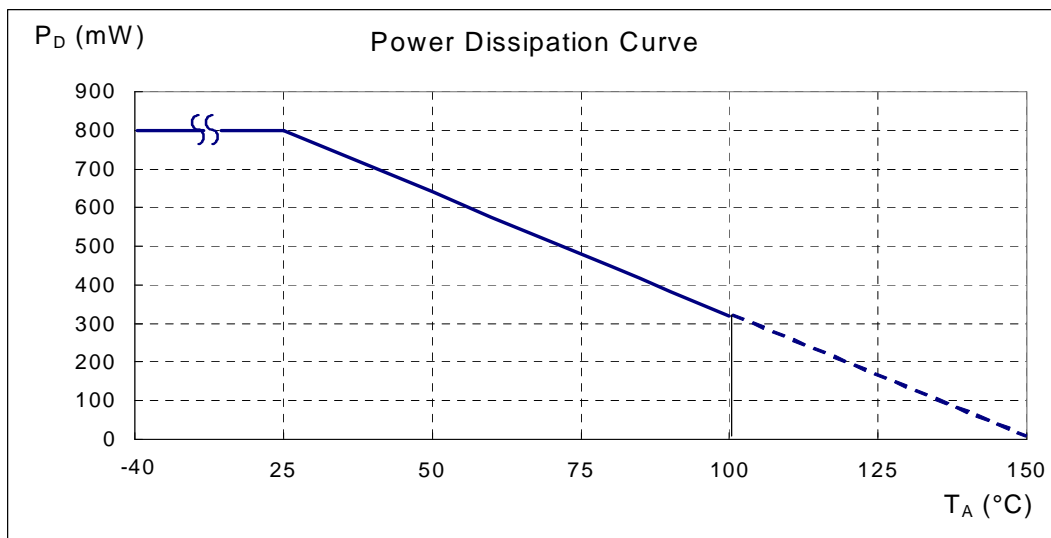
**(1) SIP-4L**

<b>T<sub>A</sub> (°C)</b>	<b>25</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>85</b>	<b>90</b>	<b>95</b>	<b>100</b>
P <sub>D</sub> (mW)	550	440	396	352	308	286	264	242	220
<b>T<sub>A</sub> (°C)</b>	<b>105</b>	<b>110</b>	<b>115</b>	<b>120</b>	<b>125</b>	<b>130</b>	<b>135</b>	<b>140</b>	<b>150</b>
P <sub>D</sub> (mW)	198	176	154	132	110	88	66	44	0



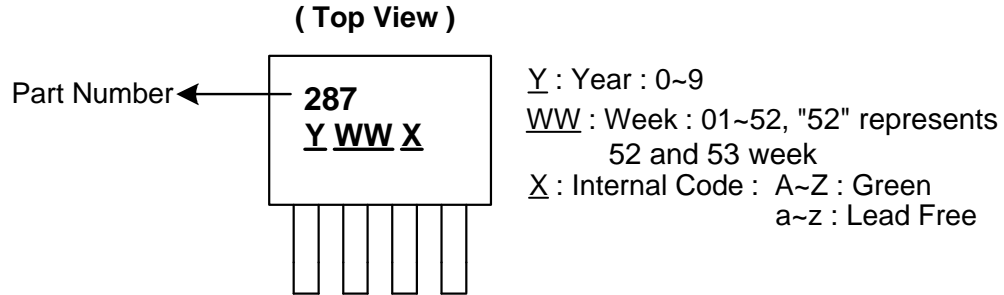
**(2) SOT89-5L**

<b>T<sub>A</sub> (°C)</b>	<b>25</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>75</b>	<b>80</b>	<b>85</b>	<b>90</b>	<b>95</b>	<b>100</b>
P <sub>D</sub> (mW)	800	640	576	512	480	448	416	384	352	320
<b>T<sub>A</sub> (°C)</b>	<b>105</b>	<b>110</b>	<b>115</b>	<b>120</b>	<b>125</b>	<b>130</b>	<b>135</b>	<b>140</b>	<b>145</b>	<b>150</b>
P <sub>D</sub> (mW)	288	256	224	192	160	128	96	64	32	0

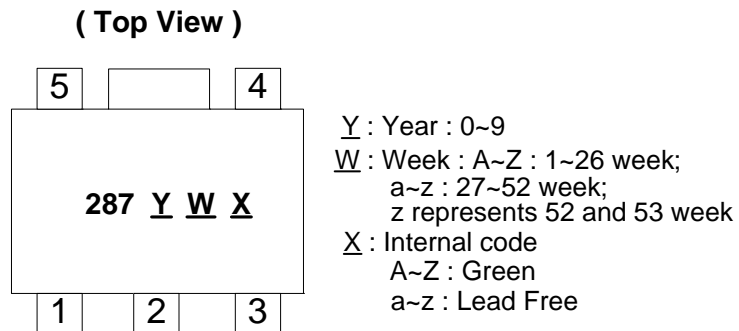


**Marking Information**

**(1) SIP-4L**



**(2) SOT89-5L**

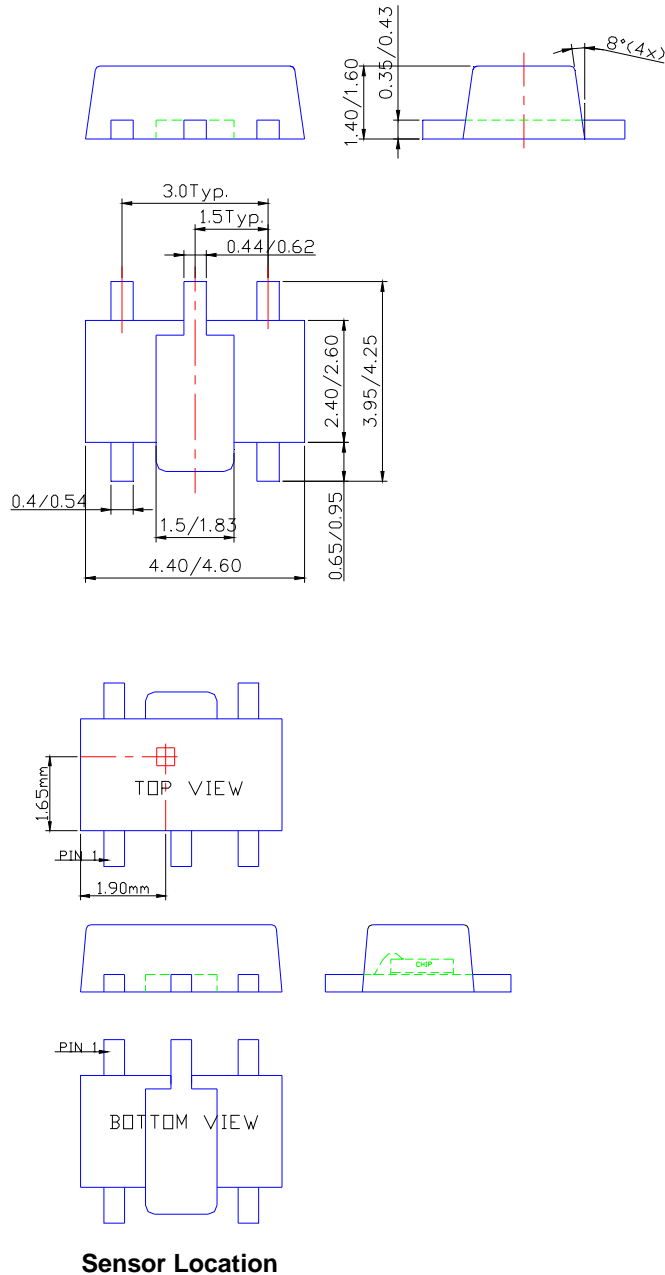






**Package Information (Continued)**

**(2) Package type: SOT89-5L**



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