

**Features**

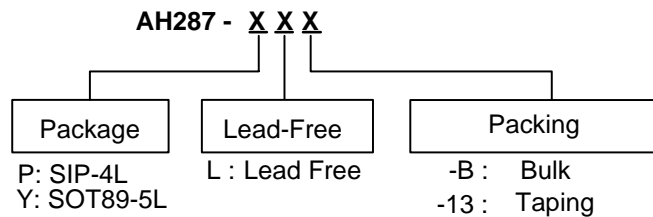
- On chip Hall sensor
- Rotor-locked shutdown
- Automatically restart
- Built-in Zener protection for output driver
- Operating voltage: 3.8V~28V
- Output current:  $I_{O(AVE)} = 400mA$
- Lead Free Finish/RoHS Compliant for Lead Free products (Note 1)
- Lead Free Packages: SIP-4L and SOT89-5L

**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.

**Ordering Information**



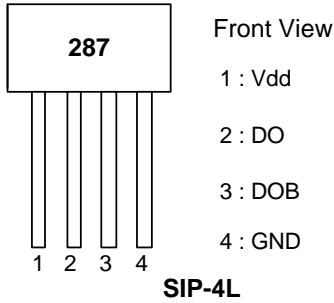
Note: 1. RoHS revision 13.2.2003. Glass and High Temperature Solder Exemptions Applied, see *EU Directive Annex Notes 5 and 7*.

Device	Package Code	Packaging (Note 2)	Tube/Bulk		7" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH287-P	P	SIP-4L	1000	-B	NA	NA
AH287-Y	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

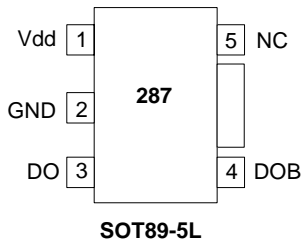
Note: 2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

**Pin Assignment**

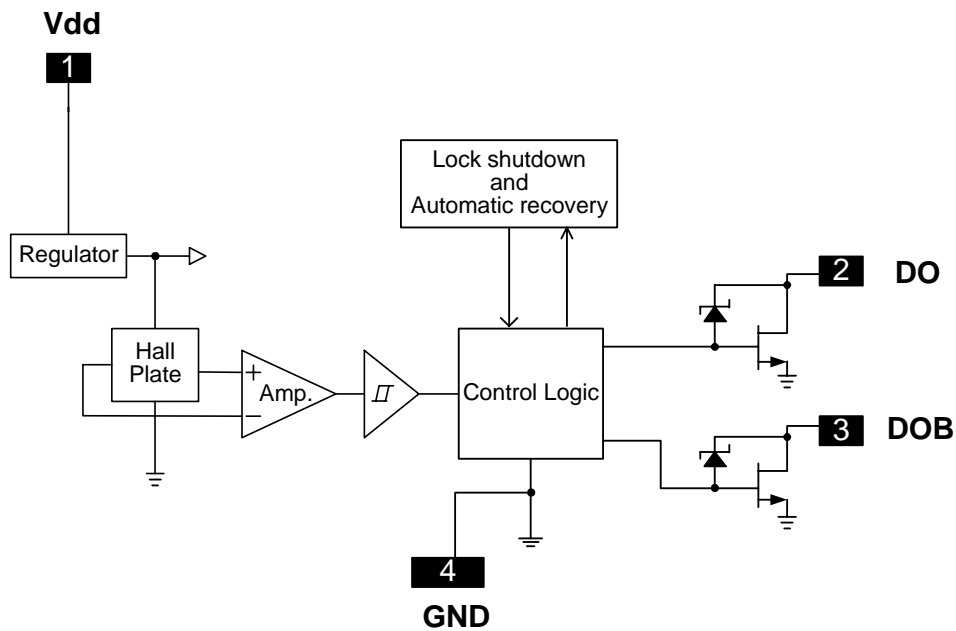
**Pin Descriptions**



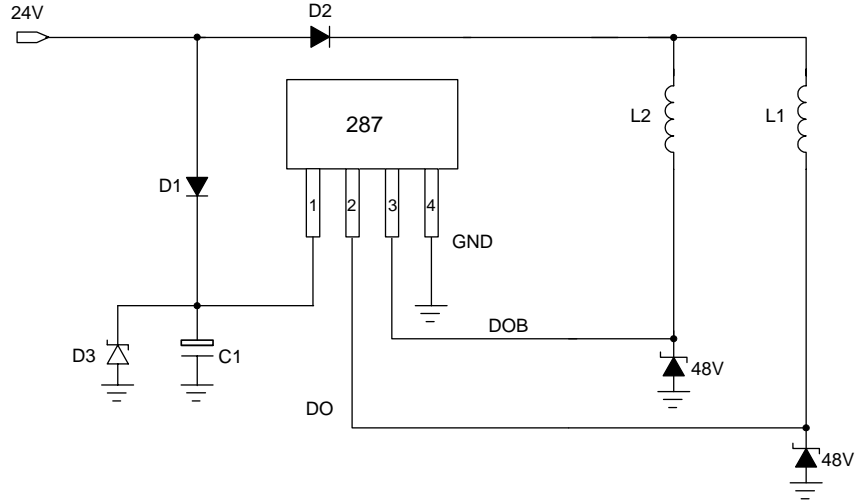
Name	Description
Vdd	Input power
DO	Output pin
DOB	Output pin
GND	Ground
NC	Not connected



**Block Diagram (SIP-4L)**



**Typical Application Circuit (SIP-4L)**

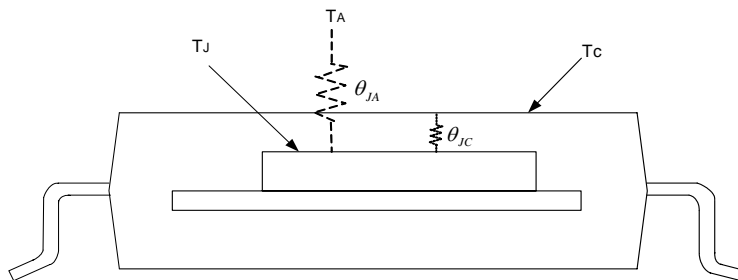


24V brush-less DC fan

Note: 3. The optional Capacitor C1 and Diode D3 are for power stabilization. C1 is recommended to be E-Cap., 1uF/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.

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

Characteristics	Symbol	Rating	Unit
Supply Voltage	Vdd	30	V
Output Current	$I_{O(AVE)}$	SIP-4L/SOT89-5L	400
	$I_{O(PEAK)}$		700
Power Dissipation	$P_D$	SIP-4L	550
		SOT89-5L	800
Operating Temperature	$T_{opr}$	-40 ~ 100	$^\circ C$
Storage Temperature	$T_{stg}$	-55 ~ 150	$^\circ C$
Maximum Junction Temp.	$T_j$	150	$^\circ C$
Thermal Resistance	$\theta_{JA}$	SIP-4L	227
		SOT89-5L	156



Note: 4.  $\theta_{JA}$  should be confirmed with what heat sink thermal resistance. If no heat sink contacting,  $\theta_{JA}$  is almost the same as  $\theta_{JC}$ .

### Electrical Characteristics (T<sub>A</sub> = 25 °C, V<sub>dd</sub> = 24V, unless otherwise specified)

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V <sub>dd</sub>	Operating	3.8	-	28*	V
Supply current	I <sub>cc</sub>	Operating	-	2.0	4.0	mA
Output Leakage Current	I <sub>off</sub>	V <sub>OUT</sub> =24V	-	< 0.1	10	μA
Locked Protection On	Tl <sub>rp-on</sub>		0.4	0.46	0.6	Sec
Locked Protection Off	Tl <sub>rp-off</sub>		2.4	2.76	3.6	Sec
Output saturation voltage	V <sub>OUT(sat)</sub>	I <sub>O</sub> =200mA	-	450	700	mV
		I <sub>O</sub> =300mA	-	680	800	
Output On resistance	R <sub>ds(on)</sub>	I <sub>O</sub> =200mA	-	2.25	3.5	ohm
Output Zener-breakdown Voltage	V <sub>z</sub>		42	55	65	V

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

#### Truth Table

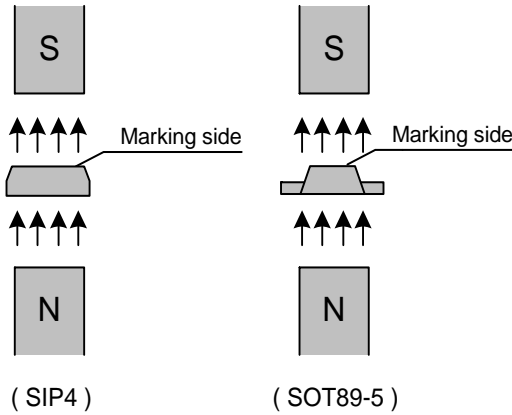
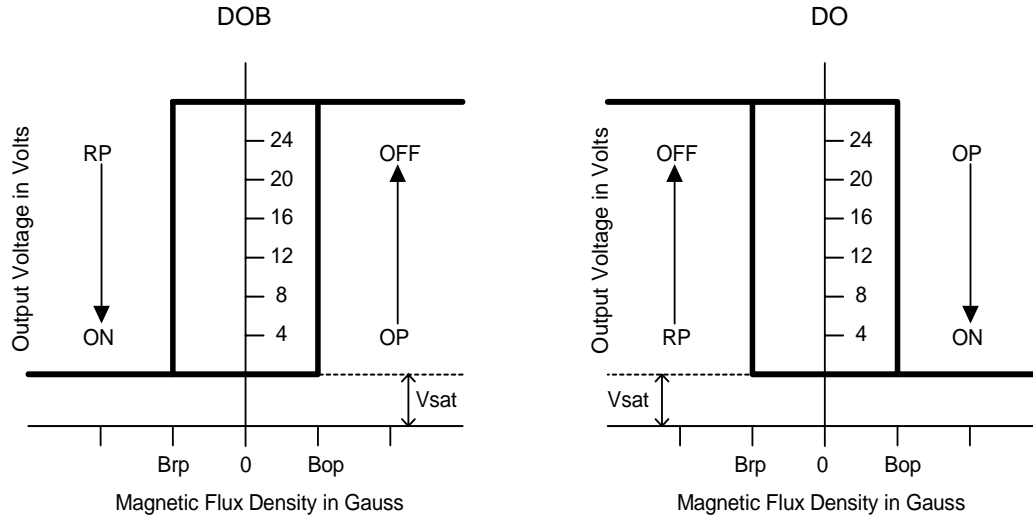
IN-	IN+	CT	OUT1	OUT2	Mode
H	L	L	H	L	Rotating
L	H	L	L	H	Rotating
-	-	H	off	off	Lockup protection activated

### Magnetic Characteristics (T<sub>A</sub> = 25 °C, V<sub>dd</sub> = 24V, unless otherwise specified)

(1mT=10 Gauss)

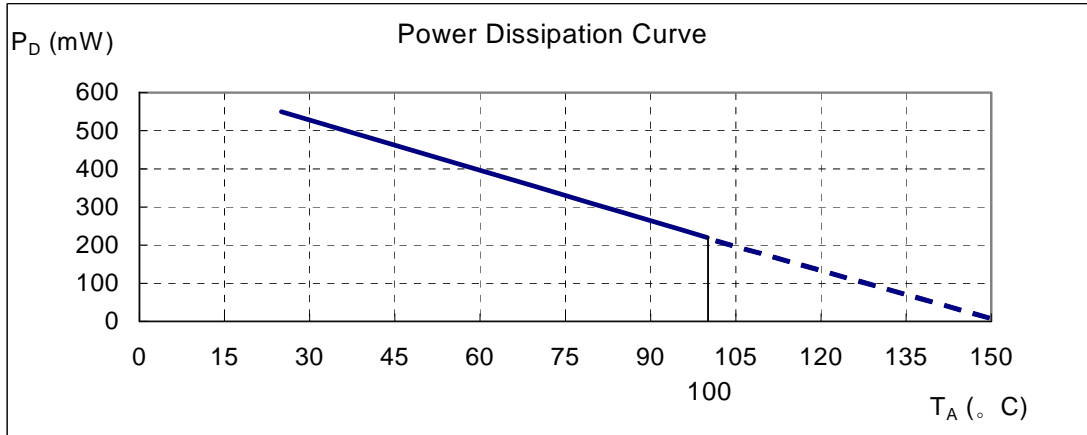
Characteristics	Symbol	Min.	Typ.	Max.	Unit
Operate Point	B <sub>op</sub>	10	30	60	Gauss
Release Point	B <sub>rp</sub>	-60	-30	-10	Gauss
Hysteresis	B <sub>hy</sub>	--	60	--	Gauss

**Operating Characteristics**



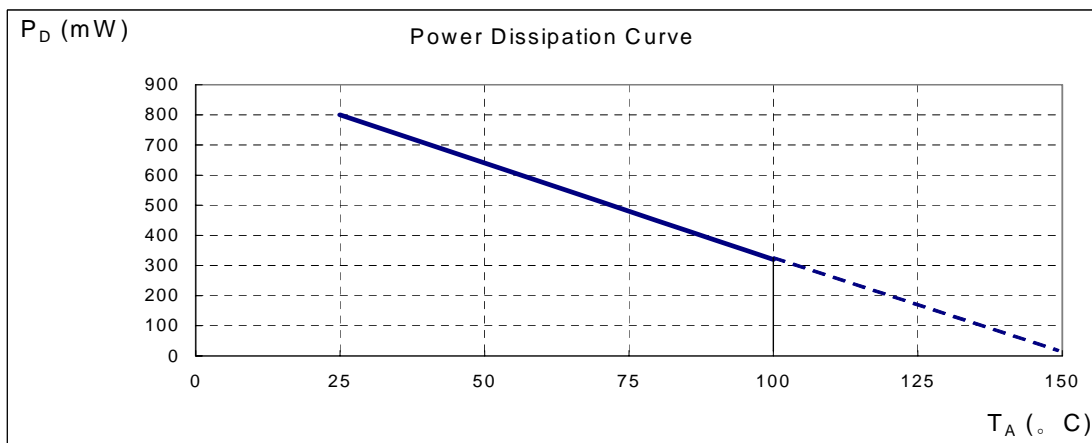
**Performance Characteristics (SIP-4L)**

$T_A$ (°C)	25	50	60	70	80	85	90	95	100
$P_D$ (mW)	550	440	396	352	308	286	264	242	220
$T_A$ (°C)	105	110	115	120	125	130	135	140	150
$P_D$ (mW)	198	176	154	132	110	88	66	44	0



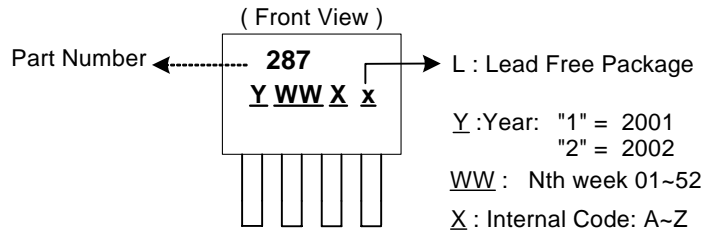
**Performance Characteristics (SOT89-5L)**

$T_A$ (°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

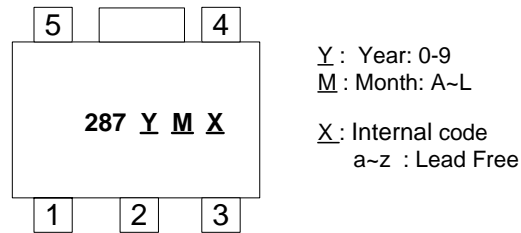


**Marking Information**

(1) SIP-4L



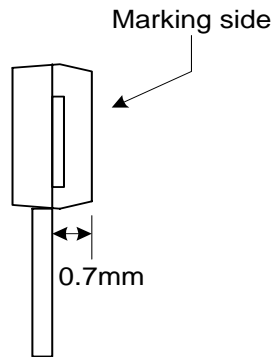
(2) SOT89-5L



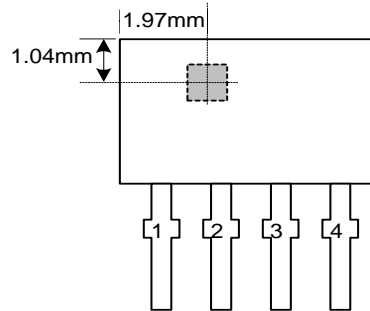
**Package Information** (unit: mm)

(1) SIP-4L

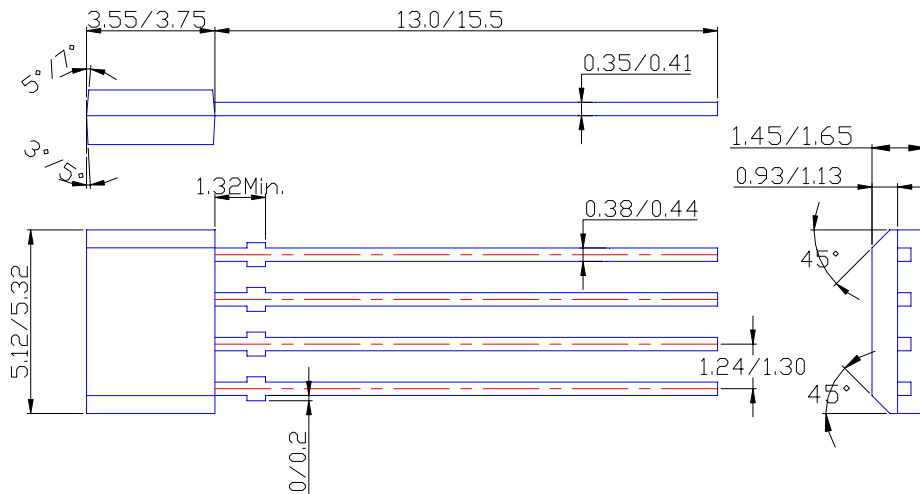
Active Area Depth



Package Sensor Location



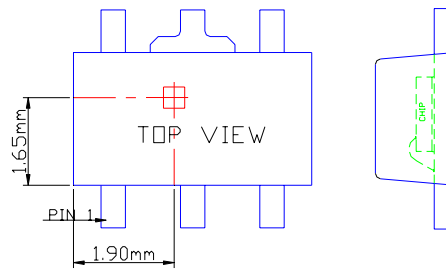
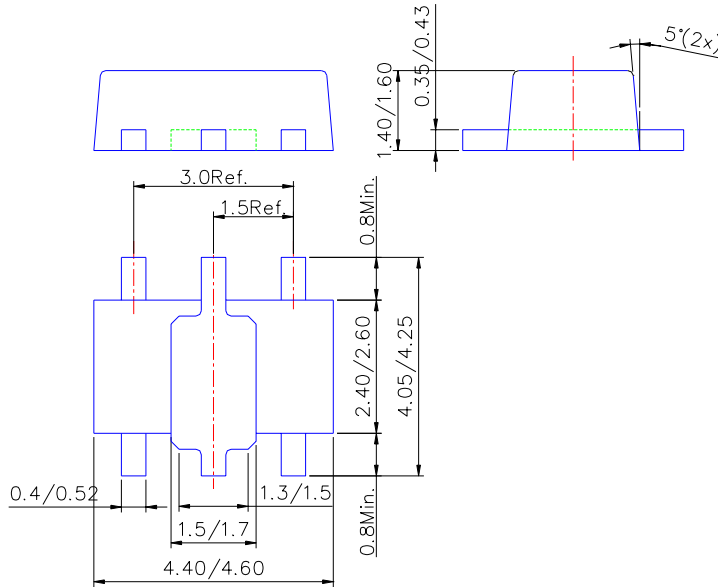
**Package Dimension**





**Package Information** (Continued)

(2) SOT89-5L



Sensor Location

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