



**THE DATASHEET OF
AH287-PL-B**



Features

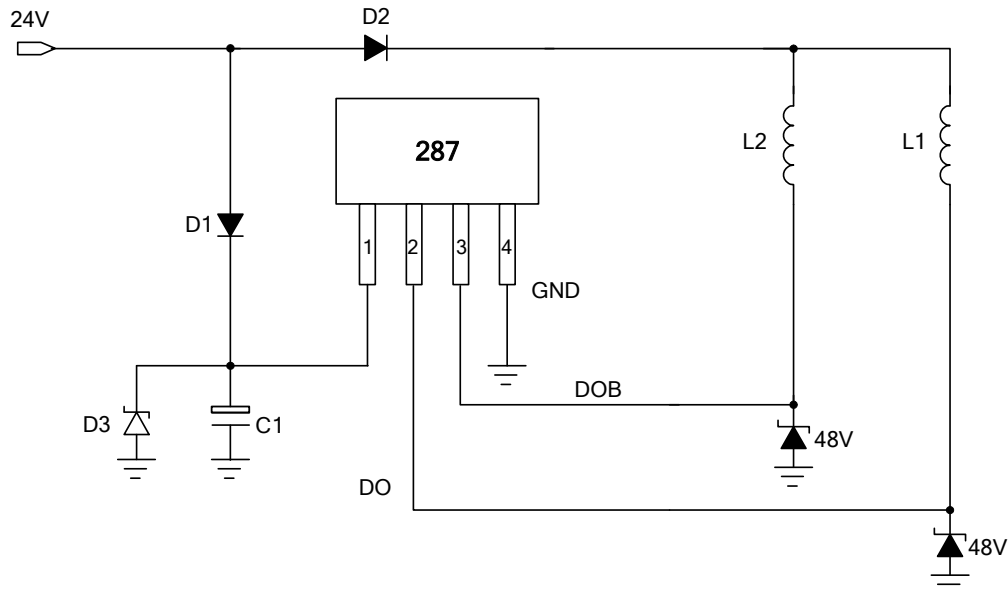
- On Chip Hall Sensor
- Rotor-Locked Shutdown
- Automatically Restart
- Built-in Zener Protection for Output Driver
- Operating Voltage: 3.8V~28V
- Output Current: $I_{O(AVE)} = 400mA$
- Lead Free Packages: SIP-4L and SOT89-5L (Note 1)
- SIP-4L and SOT89-5L: Available in "Green" Molding Compound (No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

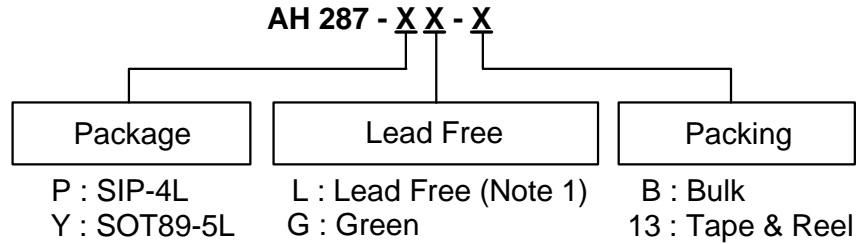
Typical Application Circuit



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

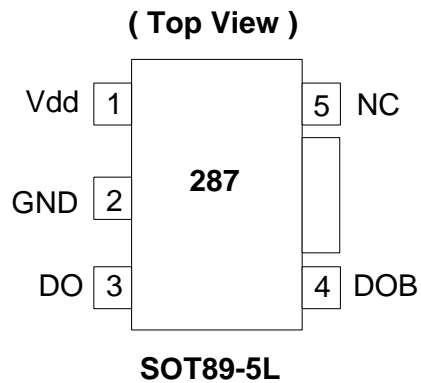
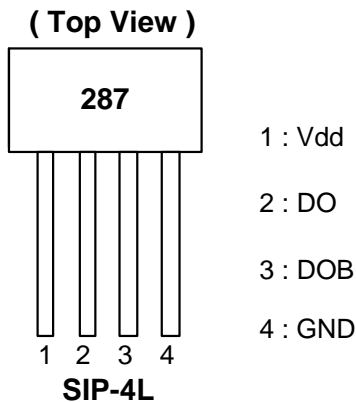
Ordering Information



| 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.
 - 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>.

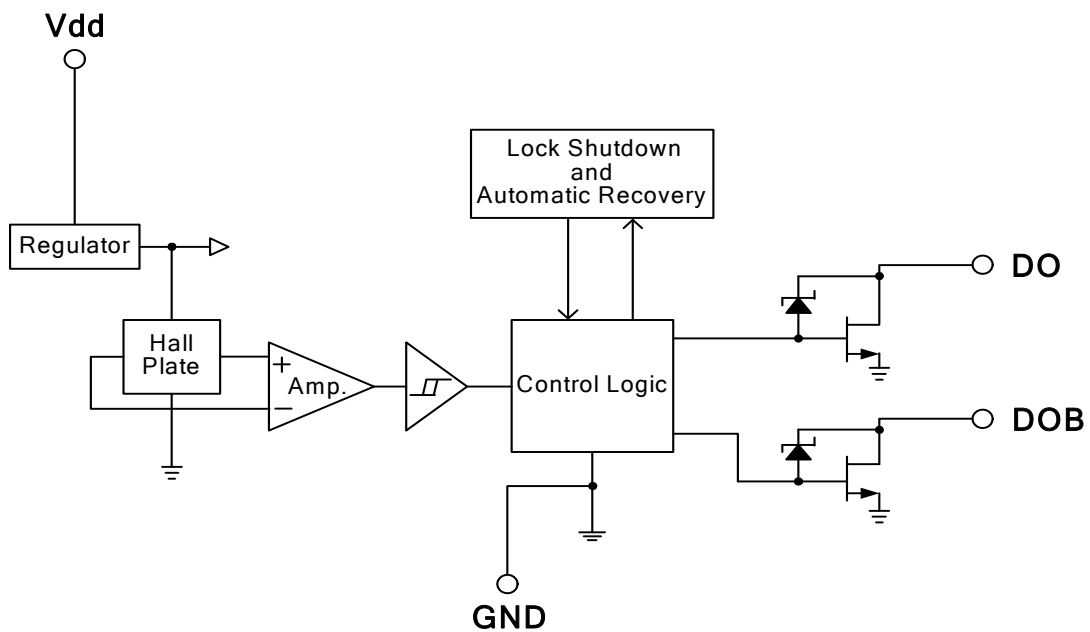
Pin Assignment



Pin Descriptions

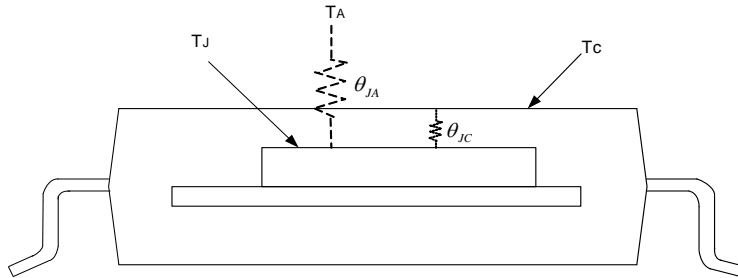
| Pin Name | Description |
|----------|---------------|
| Vdd | Input Power |
| DO | Output Pin |
| DOB | Output Pin |
| GND | Ground |
| NC | Not Connected |

Block Diagram



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

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



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

Recommended Operating Conditions

| Symbol | Characteristic | Conditions | Min | Max | Unit |
|-----------------|-------------------------------|------------|-----|-----|------|
| V _{DD} | Supply Voltage (Note 6) | Operating | 3.8 | 28 | V |
| T _A | 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 | μA |
| 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 |

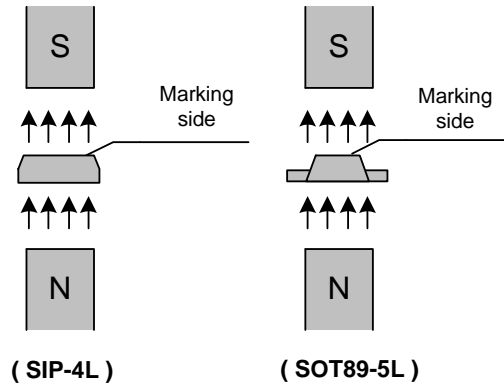
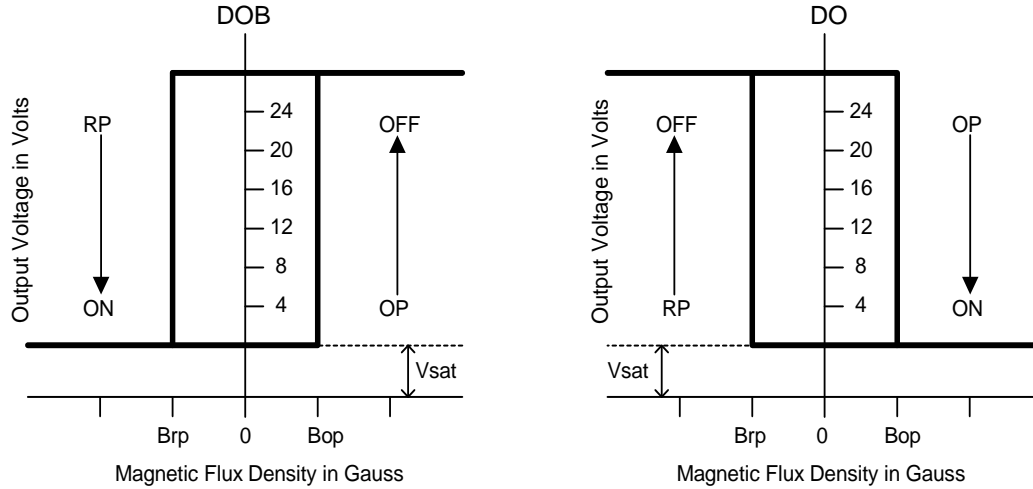
Magnetic Characteristics ($T_A = 25\text{ }^\circ\text{C}$, $V_{DD} = 24\text{V}$, unless otherwise specified, Note 7)

(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.

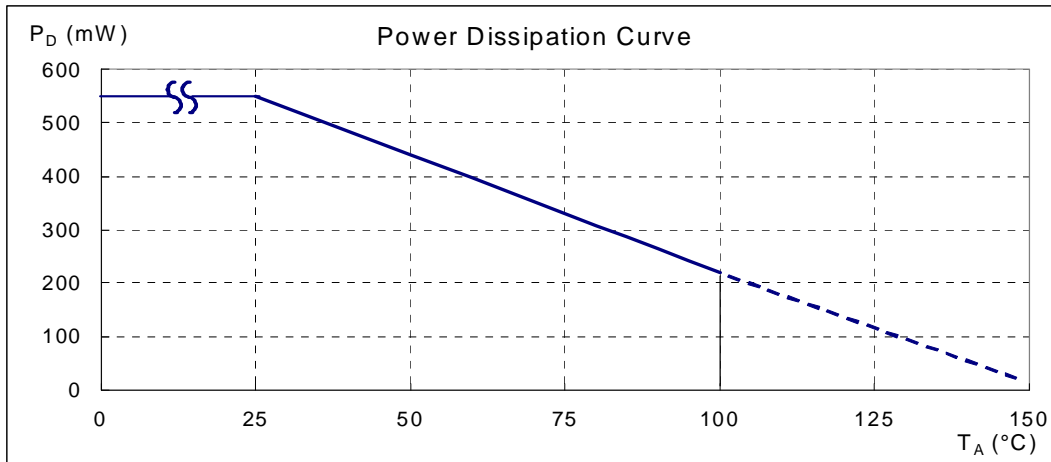
Operating Characteristics



Performance Characteristics

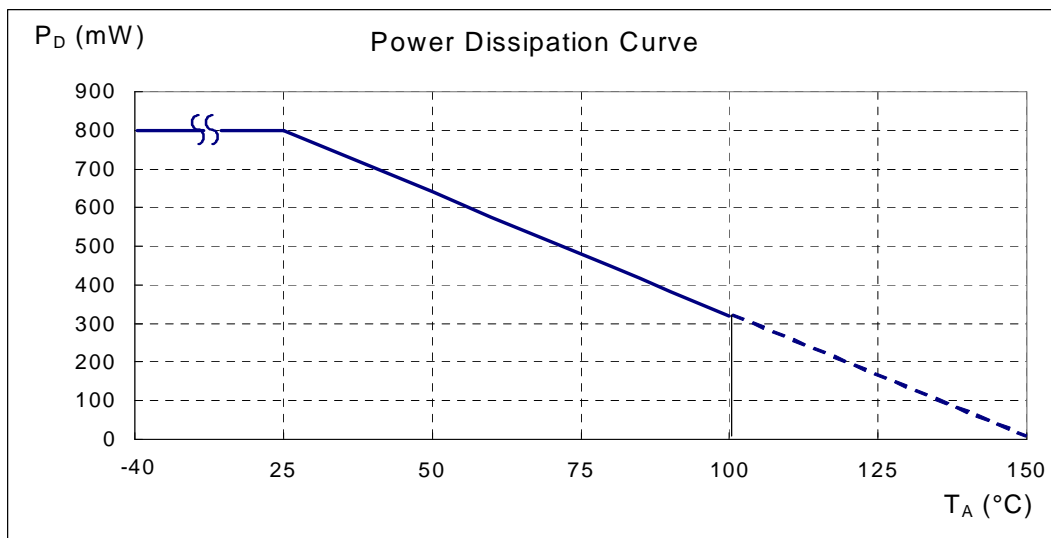
(1) SIP-4L

| | | | | | | | | | |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 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 |



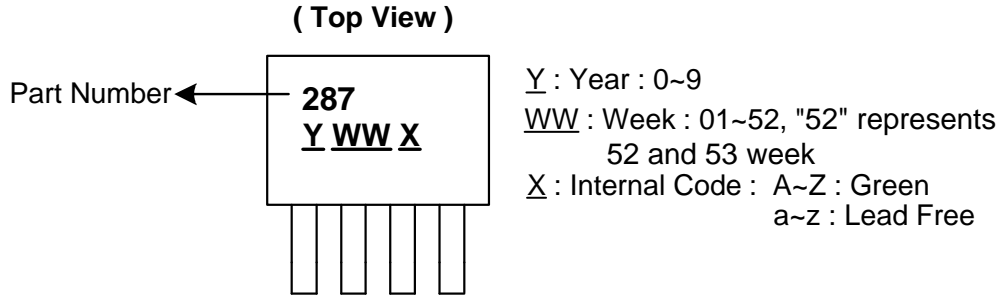
(2) SOT89-5L

| | | | | | | | | | | |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 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 |

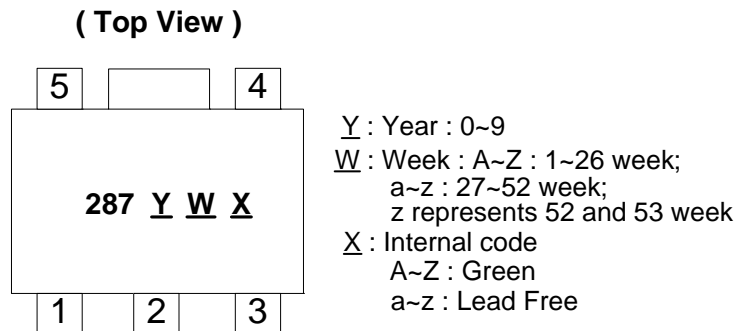


Marking Information

(1) SIP-4L

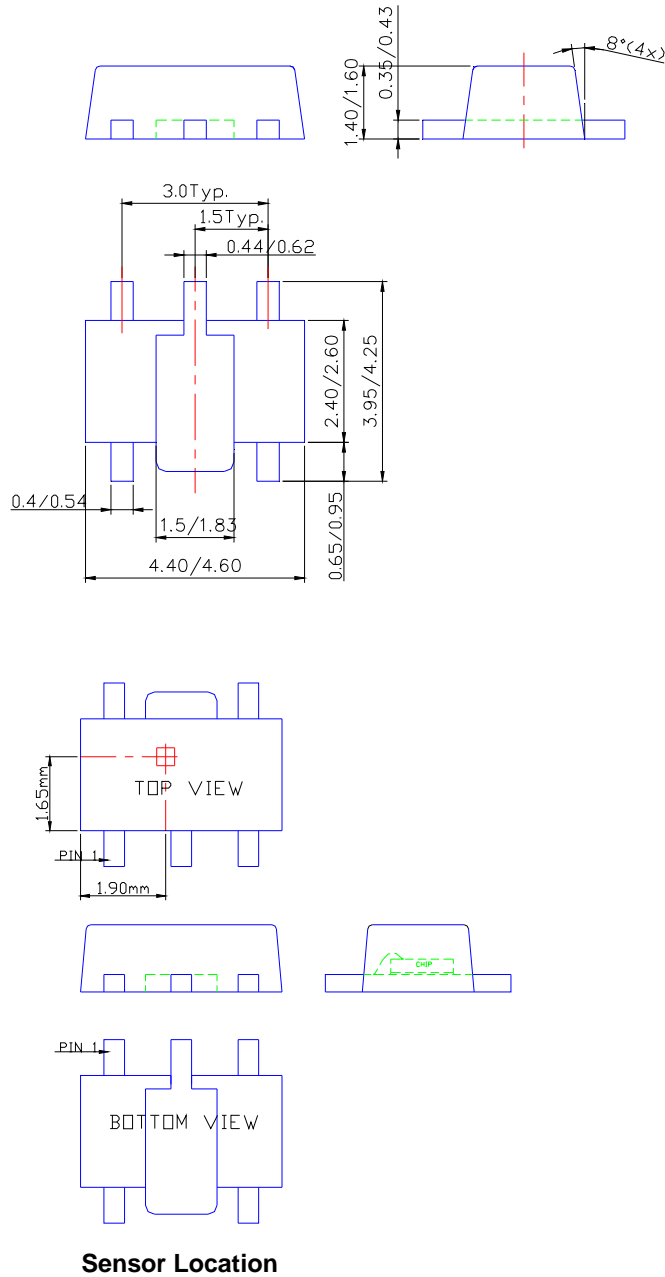


(2) SOT89-5L



Package Information (Continued)

(2) Package type: SOT89-5L



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