HALL-EFFECT SMART FAN MOTOR CONTROLLER

Features

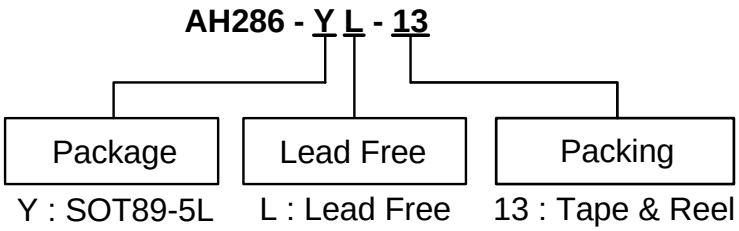
- On chip Hall sensor
- Rotor-locked shutdown
- Automatically restart
- Rotor-state detection (RD) output
- Built-in Zener protection for output driver
- Operating voltage: 3.8V~20 V
- Output current: $I_{O(AVE)}$ = 500mA for SOT89-5L
- Lead Free Package: SOT89-5L
- Lead Free Finish/RoHS Compliant (Note 1)

General Description

AH286 is a monolithic fan motor controller with Hall sensor's capability. It contains two complementary open-drain transistors for motor's coil driving, automatic lock current shutdown, and recovery protections. In addition, rotor-state detection (RD) output is for Rotor-state detection.

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.

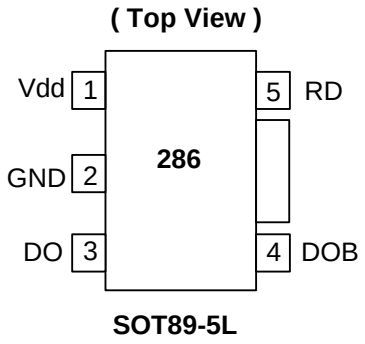
Ordering Information



Device	Package Code	Packaging (Note 2)	13" Tape and Reel	
			Quantity	Part Number Suffix
AH286-YL-13	Y	SOT89-5L	2500/Tape & Reel	-13

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied, see *EU Directive 2002/95/EC Annex Notes*.
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.

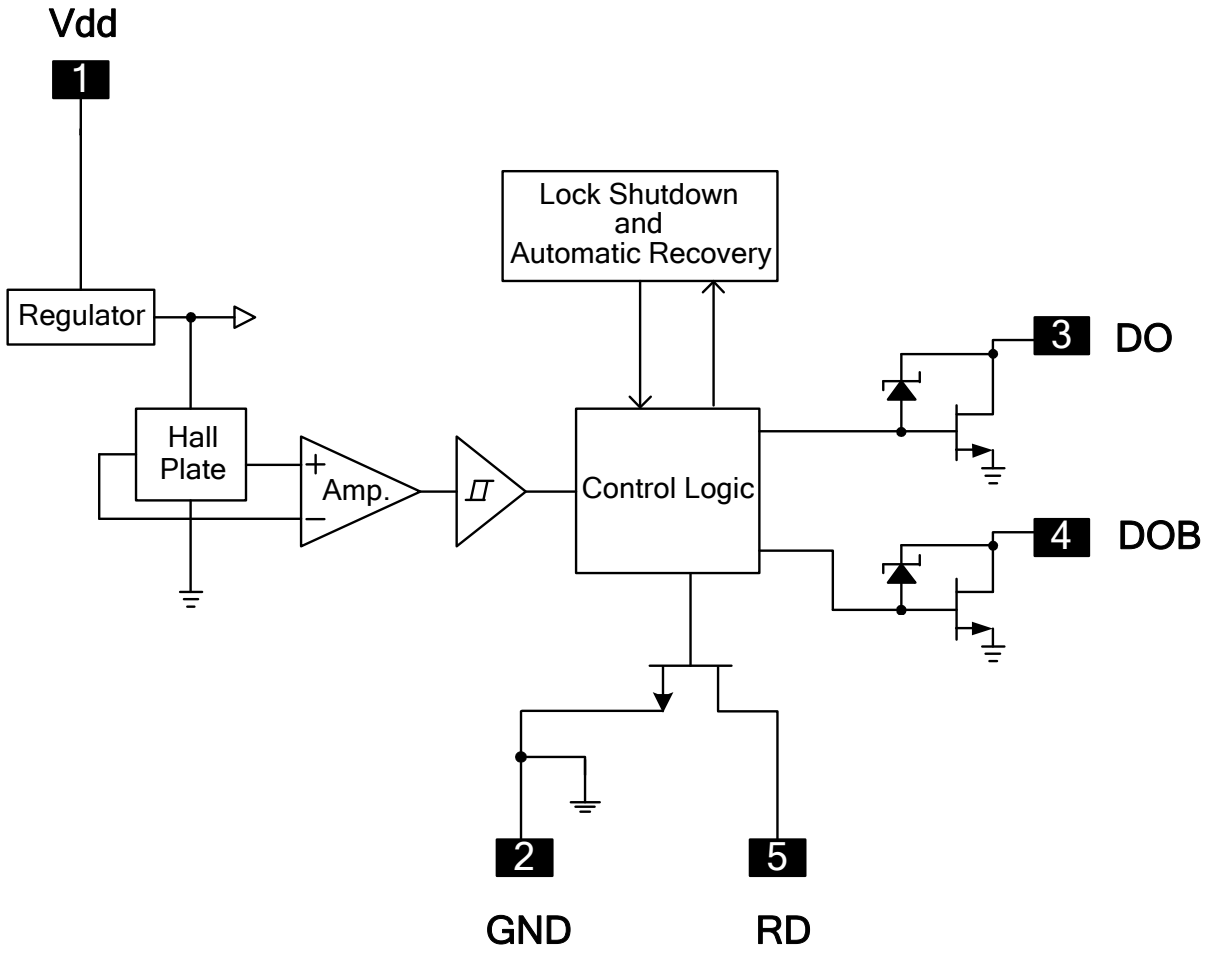
Pin Assignment



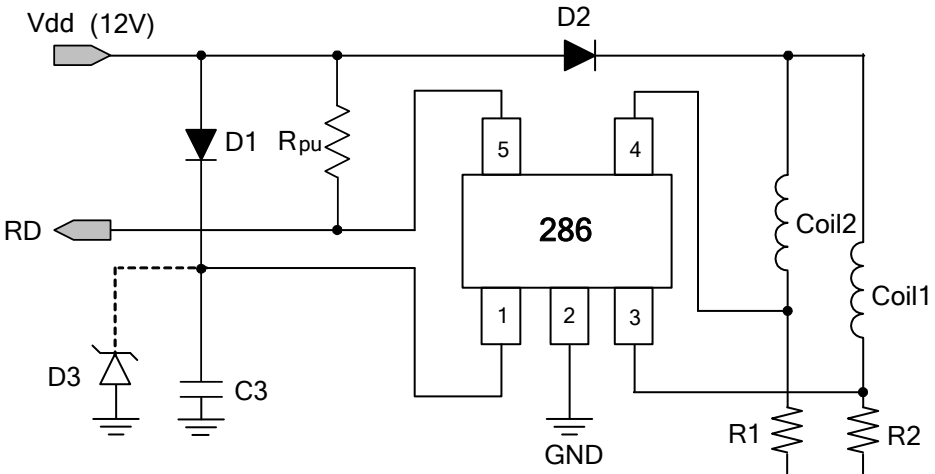
Pin Descriptions

Symbol	Description
RD	Rotor-state detection
Vdd	Input power
DO	Output pin
DOB	Output pin
GND	Ground

Block Diagram



Typical Application Circuit

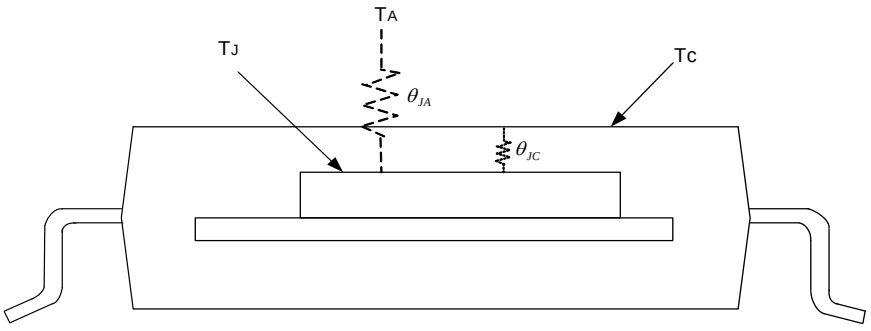


Notes: R1, R2: typical 56 Ohm.
C1, C2, C3: typical 2.2μF, E-Cap. is recommended.
The R, C value need to be fine tuned based on coils design.
D3 is a Zener diode, not to exceed the absolute maximum rating voltage.

12V DC Brush-Less Fan with RD Output Function

Absolute Maximum Ratings (T_A = 25°C)

Symbol	Characteristics		Rating	Unit
V_{dd}	Supply Voltage		24	V
$I_{O\ (AVE)}$ $I_{O\ (PEAK)}$	Output Current	SOT89-5L	500	mA
		$I_{O\ (PEAK)}$	700	
P_D	Power Dissipation	SOT89-5L	800	mW
T_{OP}	Operating Temperature		-40 ~ 100	°C
T_{ST}	Storage Temperature		-55 ~ 150	°C
T_J	Maximum Junction Temperature		150	°C
θ_{JA} (Note 3)	Thermal Resistance Junction-to-Case	SOT89-5L	156	°C/W



Notes: 3. 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}.

Electrical Characteristics (T_A = 25 °C, Vdd =12V, unless otherwise specified)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
Vdd	Supply Voltage	Operating	3.8	-	20	V
Idd	Supply current	Operating	-	2.0	4.0	mA
Ioff	Output Leakage Current	V_{OUT}=24V	-	< 0.1	10	μA
Tlrp-on	Locked Protection On		0.4	0.5	0.6	Sec
Tlrp-off	Locked Protection Off		2.4	3	3.6	Sec
$V_{OUT(sat)}$	Output saturation voltage	I_O=300mA	-	375	500	mV
		I_O=500mA	-	625	900	
Rds(on)	Output On resistance	I_O=300mA	-	1.25	1.67	ohm
Vol	RD output Vds	I_O=10mA	-	0.5	-	V
Vz	Output Zener-breakdown Voltage		35	42	60	V

Truth Table

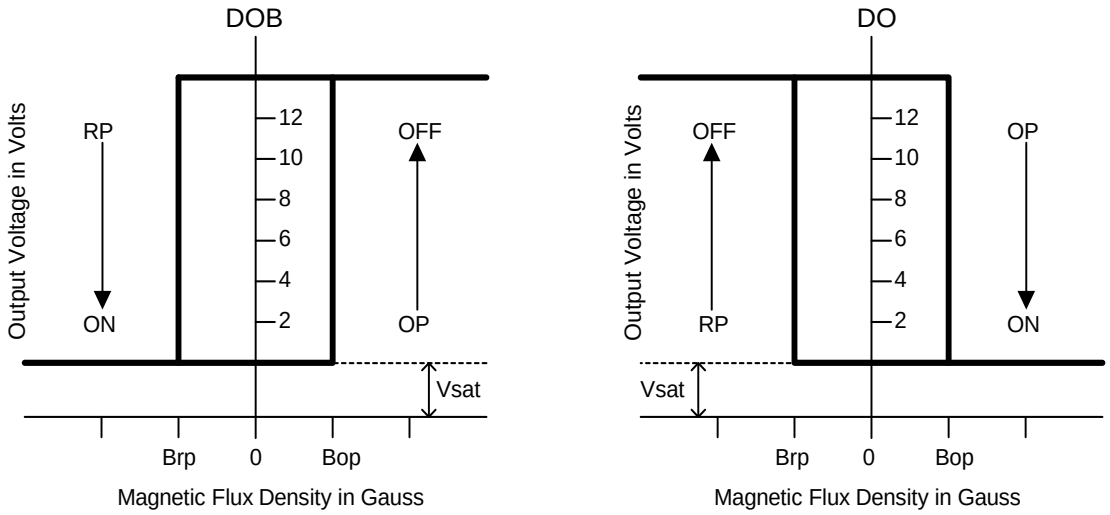
IN-	IN+	CT	OUT1	OUT2	RD	Mode
H	L	L	H	L	L	Rotating
L	H	L	L	H	L	Rotating
-	-	H	off	off	H	Lockup protection activated

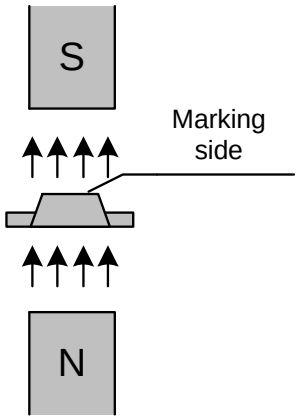
Magnetic Characteristics (T_A = 25 °C, V_{dd} = 12V, unless otherwise specified)

(1mT=10 Gauss)

Symbol	Characteristics	Min.	Typ.	Max.	Unit
Bop	Operate Point	10	30	60	Gauss
Brp	Release Point	-60	-30	-10	Gauss
Bhy	Hysteresis	--	60	--	Gauss

Operating Characteristics



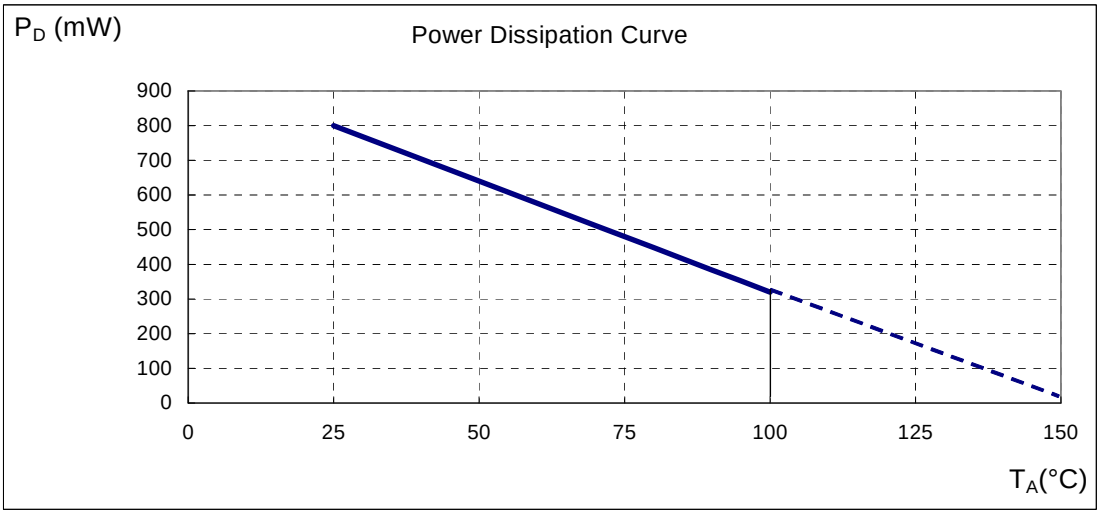


(SOT89-5L)

Performance Characteristics

(1) SOT89-5L

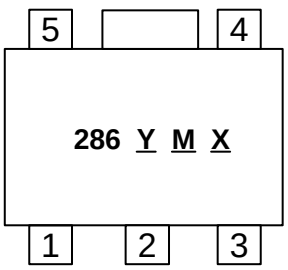
T_A (°C)	25	50	60	70	75	80	85	90	95	100
P_D (mW)	800	640	576	512	480	448	416	384	352	320
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**	**150**
P_D (mW)	288	256	224	192	160	128	96	64	32	0



Marking Information

(1) SOT89-5L

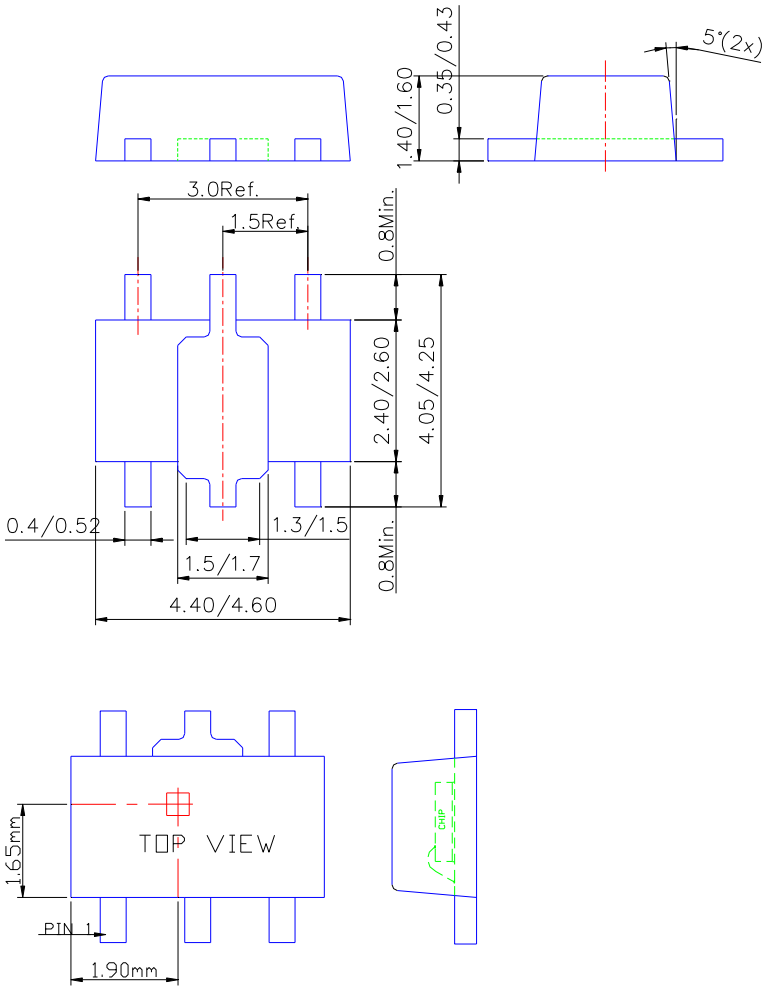
(Top View)



Y : Year : 0~9
M : Month: A~L
X : Internal code a~z : Lead Free

Package Information (All Dimensions in mm)

(1) SOT89-5L



Sensor Location