LOW VOLTAGE HALL-EFFECT SMART FAN MOTOR CONTROLLER

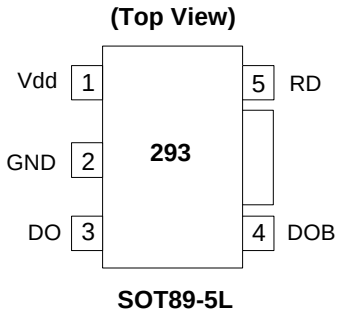
Description

AH293 is a monolithic fan motor controller with Hall sensor's capability. It contains two complementary open-collector transistors for Motor's coil driving, automatic lock current shutdown, and recovery protections. Also, rotor-state detection (RD) output is for speed 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.

The AH293 is available in SOT89-5L package.

Pin Assignments



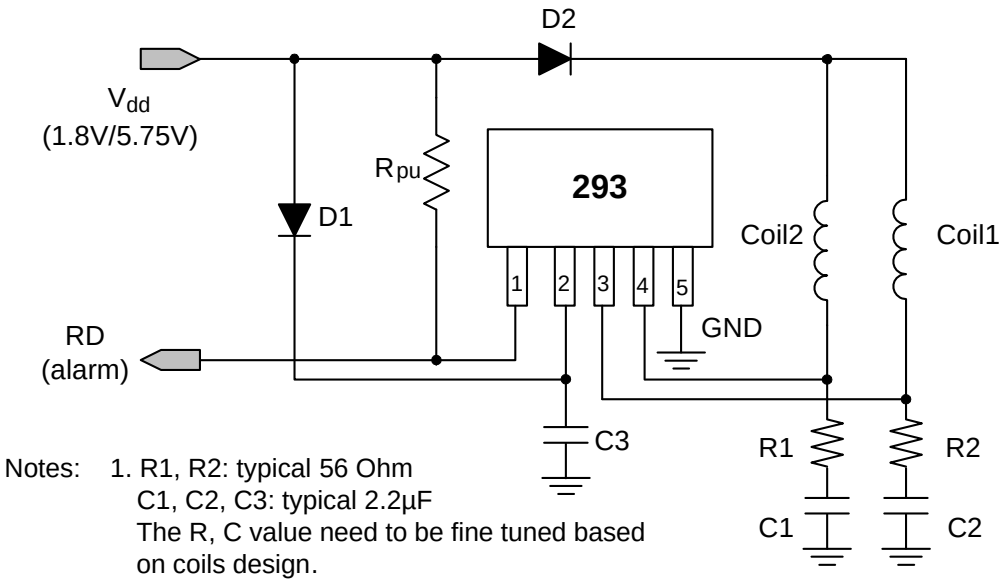
Features

- On Chip Hall Sensor
- Rotor-Locked Shutdown
- Automatically Restart
- Rotor-State Detection (RD) Output
- Built-in Zener Protection for Output Driver
- Operating Voltage: 1.8V~5.75 V
- Output Current: $I_{O(AVE)}$ = 400 mA
- Packaged in SOT89-5L
- Green Molding Compound

Applications

- Two-coil BLDC cooling fans
- Low to medium voltage, low power BLDC motors

Typical Application Circuit (Note 1)



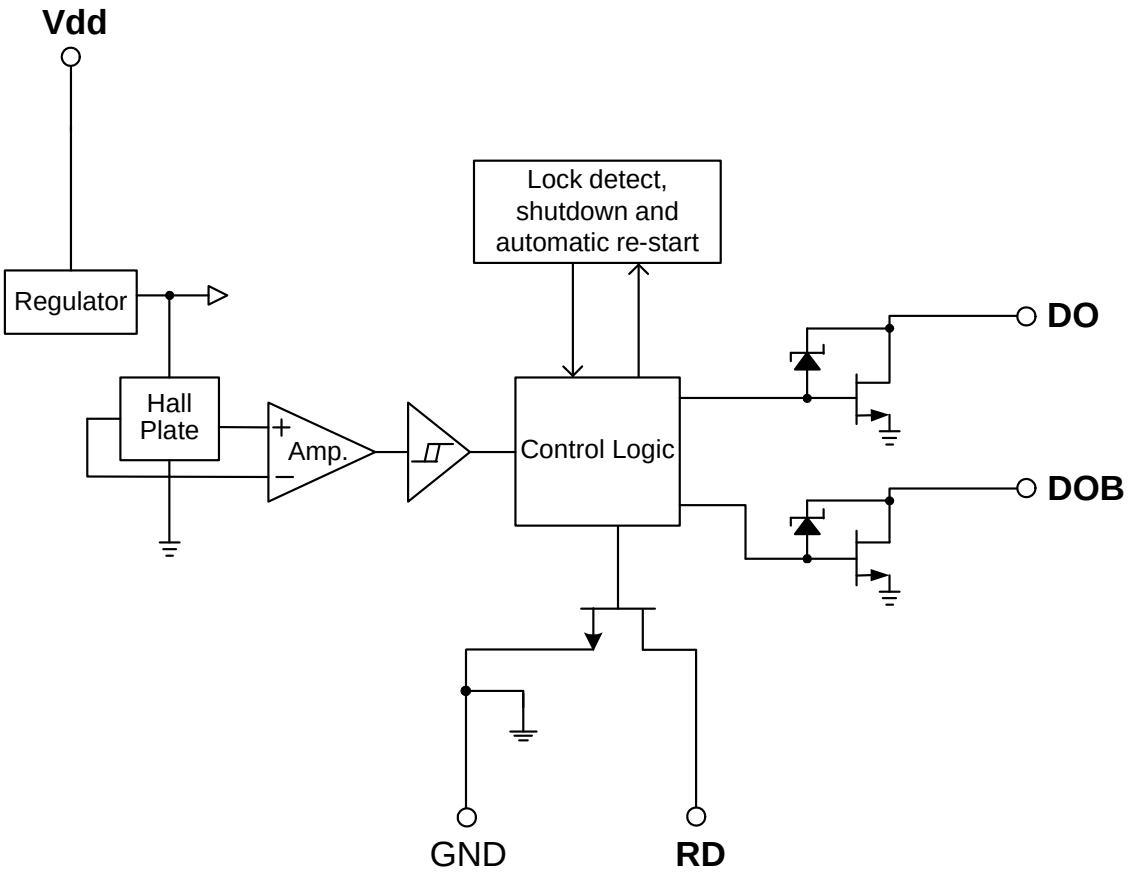
Notes: 1. R1, R2: typical 56 Ohm
C1, C2, C3: typical 2.2µF
The R, C value need to be fine tuned based on coils design.

1.8V/5.75V DC Brush-Less Fan with RD Output Function

Pin Descriptions

Pin Name	Description
RD	Rotor-State Detection
Vdd	Input Power
DO	Output Pin
DOB	Output Pin
GND	Ground

Functional Block Diagram



Absolute Maximum Ratings (T_A = 25°C)

Symbol	Characteristics	Rating	Unit
Vdd	Operating Supply Voltage	8	V
$I_{O(AVE)}$	Output Current	400	mA
$I_{O(PEAK)}$	Output Current	700	mA
P_D	Power Dissipation	800	mW
T_{ST}	Storage Temperature	-55 ~ 150	°C
T_J	Maximum Junction Temperature	150	°C

Recommended Operating Conditions

Symbol	Characteristic	Conditions	Min	Max	Unit
Vdd	Supply Voltage (Note 2)	Operating	1.8	5.75	V
T_A	Operating Ambient Temperature	Operating	-20	100	°C

Notes: 2. The output of IC will be switched after the supply voltage is over 1.8V, but the magnetic characteristics won't be normal until the supply is over 2.0V.

Electrical Characteristics (T_A = 25 °C, Vdd = 5V, unless otherwise specified)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
Idd	Supply current	Operating	-	2.6	4.0	mA
T_{RLP-ON}	Rotor Lock Protection On Time		-	0.4	-	Sec
$T_{RLP-OFF}$	Rotor Lock Protection Off Time		2.4	3	3.6	Sec
$V_{OUT(SAT)}$	Output Saturation Voltage	I_O = 180mA	-	300	-	mV
		I_O = 350mA	-	600	-	mV
$R_{DS(ON)}$	Output On Resistance		-	1.75	-	ohm
V_{OL}	RD Output Vds	I_O = 10mA	-	0.5	-	V
Vz	Output Zener-Breakdown Voltage		-	15	-	V

Truth Table (Note 3)

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

Notes: 3. Latch-type RD output is low during rotor rotation and high when the rotor is locked (not rotating)

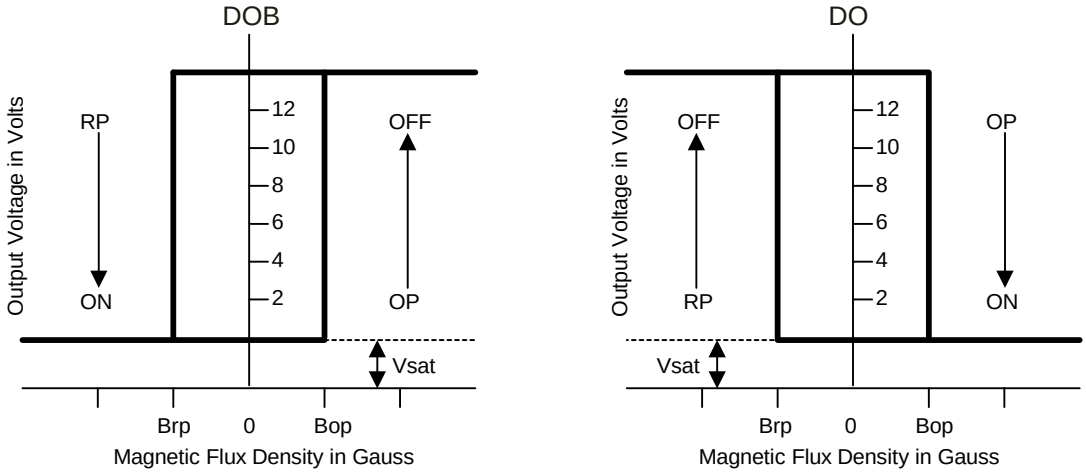
Magnetic Characteristics (T_A = 25 °C, Vdd = 5V, unless otherwise specified, Note 4)

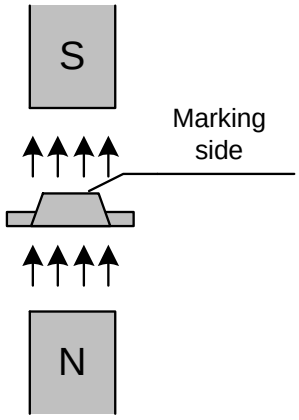
(1mT = 10 Gauss)

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

Notes: 4. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

Operating Characteristics

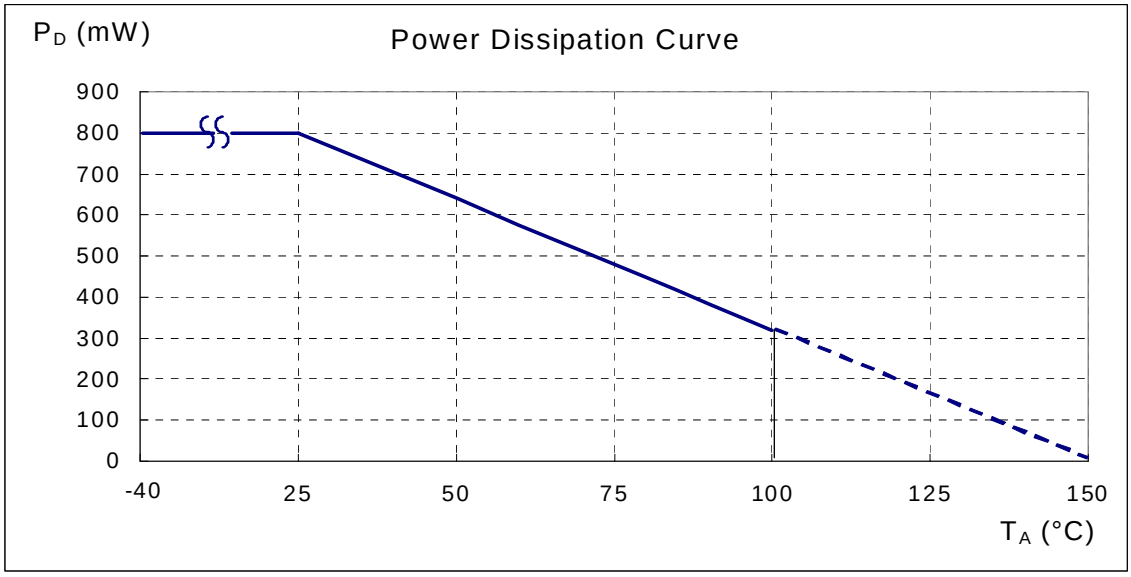




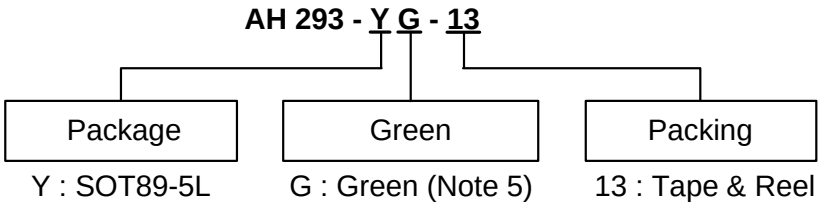
(SOT89-5L)

Performance Characteristics

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



Ordering Information



Device	Package Code	Packaging (Note 6, 7)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH293-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

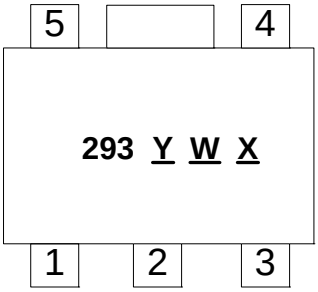
Notes: 5. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

6. 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.

7. 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.

Marking Information

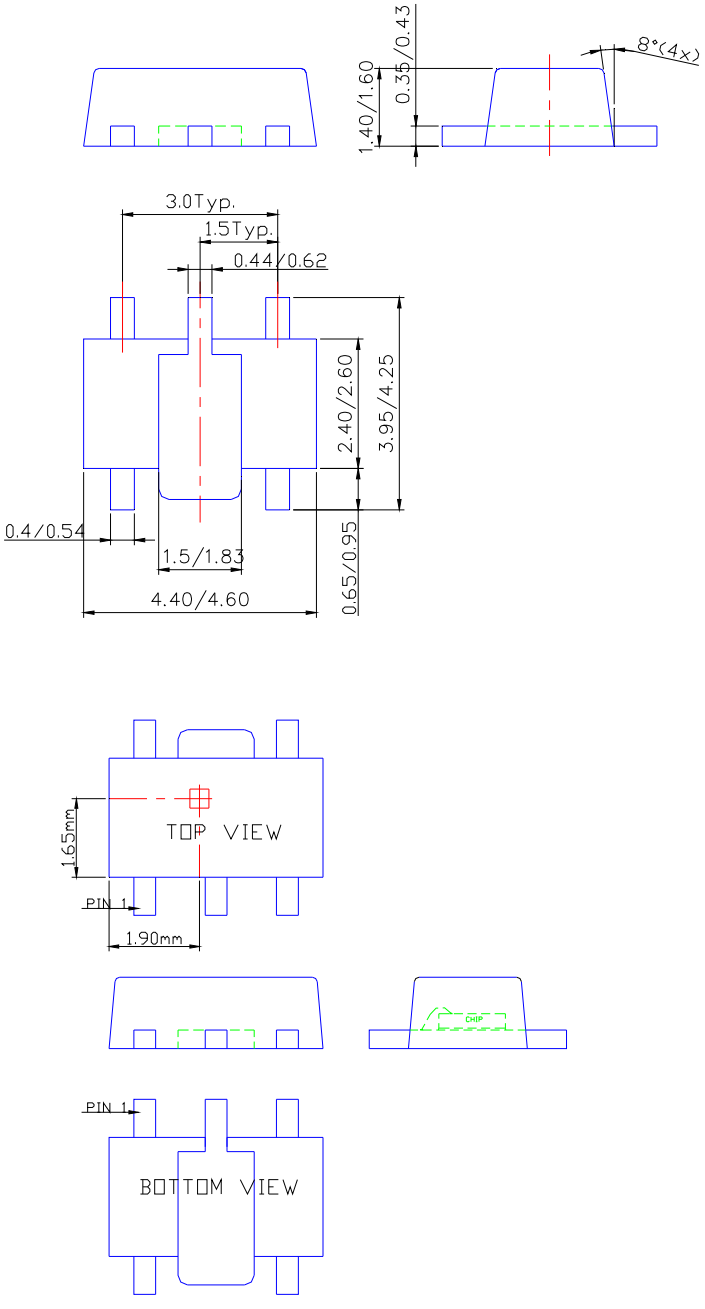
(Top View)



Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : Internal code
A~Z : Green

SOT89-5L

Package Outline Dimensions (All Dimensions in mm)



Sensor Location

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