

### **Description**

The AH284 is a single-chip solution for driving two-coil brushless direct current (BLDC) fans and motors. The device includes a Hall-effect sensor, dynamic offset correction and two complementary open-drain output drivers with internal Zener diode protection.

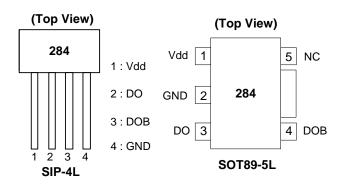
To help protect the motor coils, the AH284 provides Rotor Lock Protection which shuts down output drives if rotor lock is detected. The device automatically re-starts when the rotor lock is removed.

The AH284 is available in SIP4 and SOT89-5L packages.

#### **Features**

- Single-chip solution
- Operating Voltage: 3.8V to 20V
- · Built-in Hall sensor and input amplifier
- Rotor Lock Protection (Lock detection, output shutdown and automatic re-start)
- · Built-in Zener protection for output driver
- Average output current up to 500mA
- Packages: SIP-4L and SOT89-5L
- Green Molding Compound

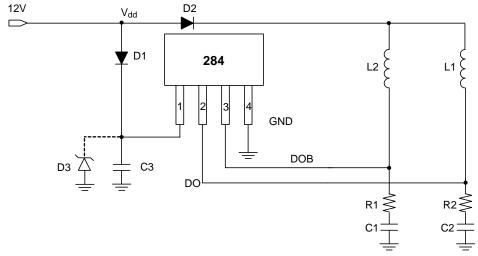
### **Pin Assignments**



### **Applications**

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

## **Typical Application Circuit (Note 1)**



Notes: 1. Typically it is recommended to us a 56 Ohm resistor for R1 and R2 and a 2.2µF E-Cap capacitor for C1, C2 and C3. These values may need to be optimized depending on the coils used.

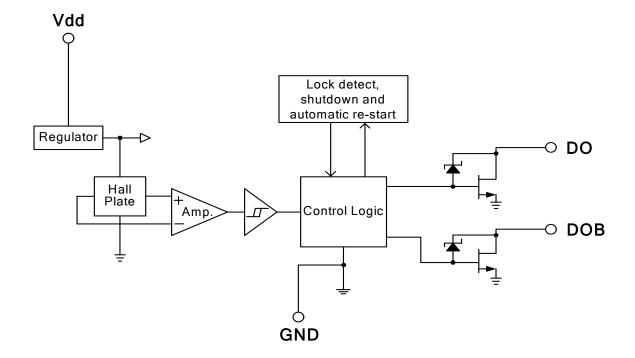
To help with IC protection it's advised to add a Zener diode between Vdd and ground. The Zener diode should be chosen to help prevent the supply voltage exceeding the maximum rating of the device.



# **Pin Descriptions**

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

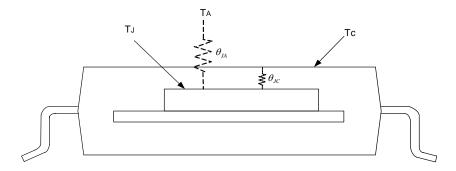
# **Functional Block Diagram**





# Absolute Maximum Ratings (T<sub>A</sub> = 25°C)

Symbol	Characteri		Rating	Unit	
Vdd	Supply Voltage			24	V
			SIP-4L	500	mA
Io	Output Current	I <sub>O</sub> (AVE)	SOT89-5L	500	mA
		I <sub>O (PEAK)</sub>		700	mA
$P_{D}$	Power Dissipation	SIP-4L		550	mW
ГБ	r ower Dissipation	SOT89-5L	•	800	mW
T <sub>ST</sub>	Storage Temperature			-55 ~ 150	°C
$T_J$	Maximum Junction Temperature	150	°C		
$\theta_{JA}$	Thermal Resistance Junction to	SIP-4L		227	°C/W
JA	Case (Note 2)	SOT89-5L		156	°C/W



Notes: 2.  $\theta_{JA}$  should be confirmed with heat sink thermal resistance. If there is no heat sink contact,  $\theta_{JA}$  will almost be the same as  $\theta_{JC}$ .

# **Recommended Operating Conditions**

Symbol	Characteristic	Conditions	Min	Max	Unit
Vdd	Supply Voltage	Operating	3.8	20	V
T <sub>A</sub>	Operating Ambient Temperature	Operating	-40	100	°C



# Electrical Characteristics (T<sub>A</sub> = 25 °C, Vdd = 12V, unless otherwise specified)

Symbol	Characteristics	Conditions	Min	Тур.	Max	Unit
ldd	Supply Current	Operating	ı	2.0	4.0	mA
I <sub>OFF</sub>	Output Leakage Current	V <sub>OUT</sub> = 24V	-	< 0.1	10	μA
T <sub>RLP-ON</sub>	Rotor Lock Protection On Time		0.4	0.5	0.6	Sec
$T_{RLP\text{-}OFF}$	Rotor Lock Protection Off Time		2.4	3	3.6	Sec
\/	Output Saturation Valtage	$I_0 = 300 \text{mA}$	-	375	500	\/
$V_{OUT(SAT)}$	Output Saturation Voltage	I <sub>O</sub> = 500mA	-	625	900	mV
R <sub>DS(ON)</sub>	Output On Resistance	I <sub>O</sub> = 300mA	-	1.25	1.67	ohm
Vz	Output Zener-Breakdown Voltage		35	42	60	V

#### **Truth Table**

IN-	IN+	СТ	OUT1	OUT2	Mode
Н	L	L	Н	L	Rotating
L	Н	L	L	Н	Rotating
-	-	Н	off	off	Lockup protection activated

# Magnetic Characteristics ( $T_A = 25$ °C, Vdd = 12V, unless otherwise specified, Note 3)

(1mT = 10 Gauss)

Symbol	Characteristics	Min	Тур.	Max	Unit
Вор	Operation Point	10	30	60	Gauss
Brp	Release Point	-60	-30	-10	Gauss
Bhy	Hysteresis	-	60	-	Gauss

Notes: 3. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

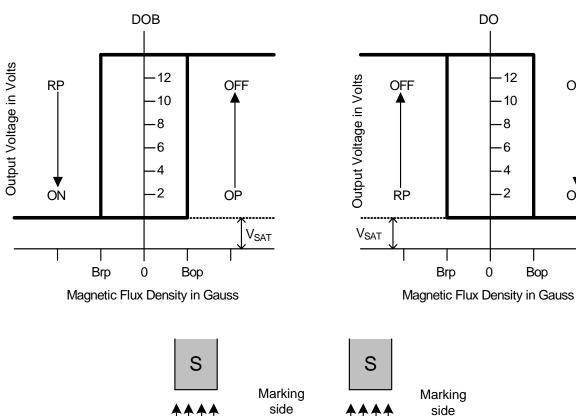
OP

ON



# HALL-EFFECT SMART FAN MOTOR CONTROLLER

# **Operating Characteristics**

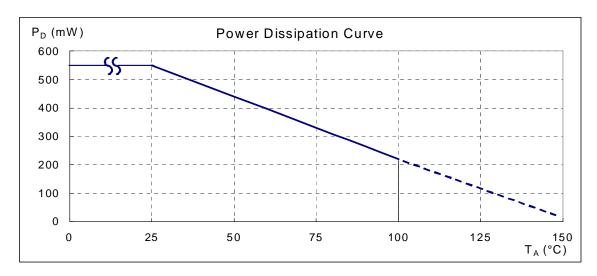




# **Performance Characteristics**

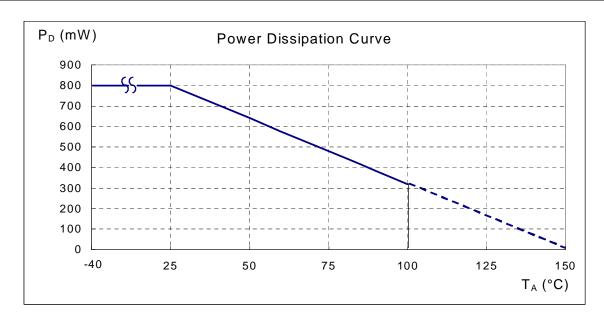
#### (1) SIP-4L

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



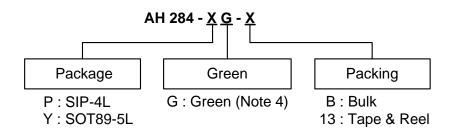
#### (2) SOT89-5L

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





### **Ordering Information**



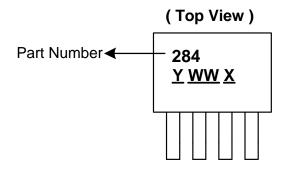
	Packag		Package Packaging		Bulk	13" Tape and Reel		
	Device	Code	Packaging (Note 5, 6) Quantity Part Number Suffix		Part Number Suffix	Quantity	Part Number Suffix	
<b>(P)</b>	AH284-PG-B	Р	SIP-4L	1000	-B	NA	NA	
<b>P</b>	AH284-YG-13	Υ	SOT89-5L	NA	NA	2500/Tape & Reel	-13	

Notes: 4. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead\_free.html.

- 5. 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.
- 6. 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**

#### (1) SIP-4L



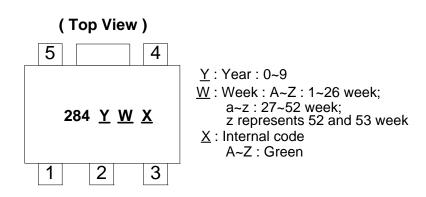
Y: Year: 0~9

WW: Week: 01~52, "52" represents

52 and 53 week

X: Internal Code: A~Z: Green

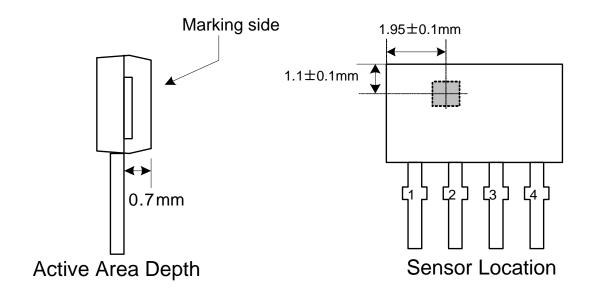
### (2) SOT89-5L



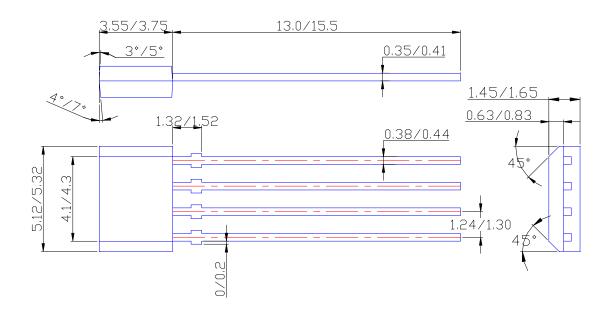


# Package Outline Dimensions (All Dimensions in mm)

#### (1) Package type: SIP-4L



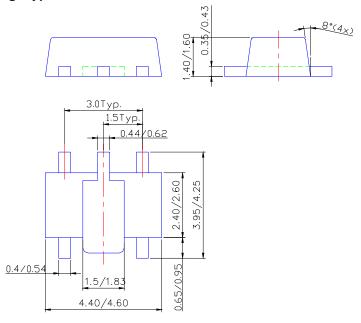
#### **Package Dimension**

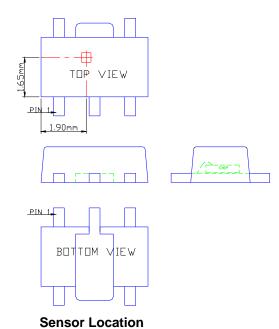




# **Package Outline Dimensions (Continued)**

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







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