

**Description**

The AH2984 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. It is optimized for low start-up voltage.

To help protect the motor coils, the AH2984 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. Over temperature shutdown provides thermal protection for the device.

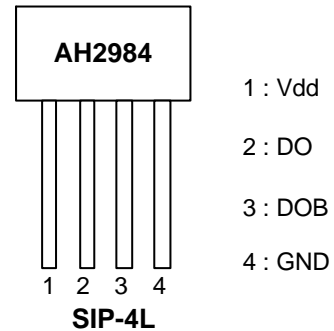
The AH2984 is available in SIP4 and SOT89-5L packages.

**Features**

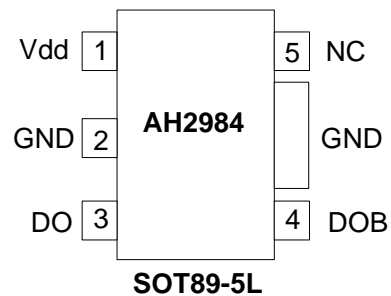
- Single-chip solution
- Operating Voltage: 2.5V to 15V
- Built-in Hall sensor and input amplifier
- Rotor Lock Protection (Lock detection, output shutdown and automatic re-start)
- Built-in reverse voltage protection diode
- Built-in Zener protection for output drivers
- Average output current up to 500mA
- Packages: SIP-4L and SOT89-5L
- “Green” Molding Compound

**Pin Assignments**

(Top View)



(Top View)

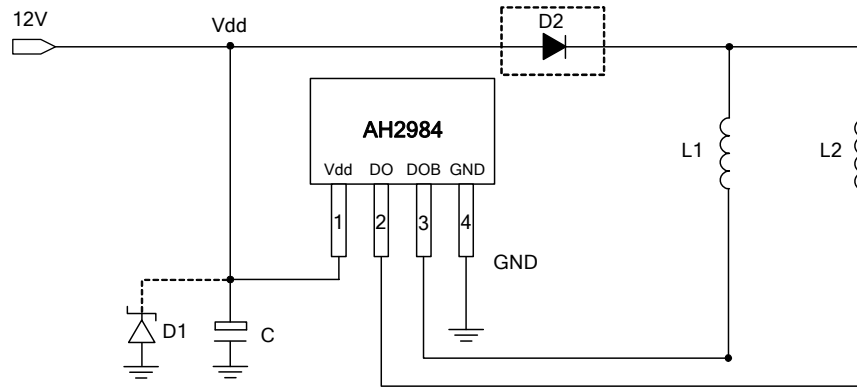


**Applications**

- Two-coil BLDC Cooling Fans
- Low Voltage/ Low Power BLDC Motors

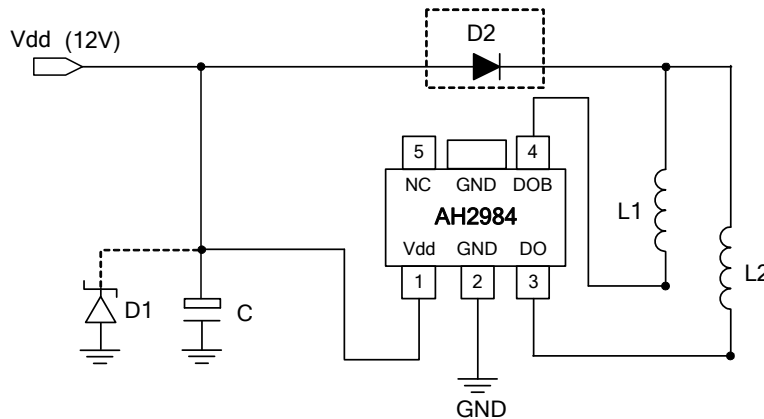
**Typical Application Circuit (Note 1)**

**(1) For SIP-4L**



**12V Brushless DC Fan**

**(2) For SOT89-5L**



**12V Brushless DC Fan**

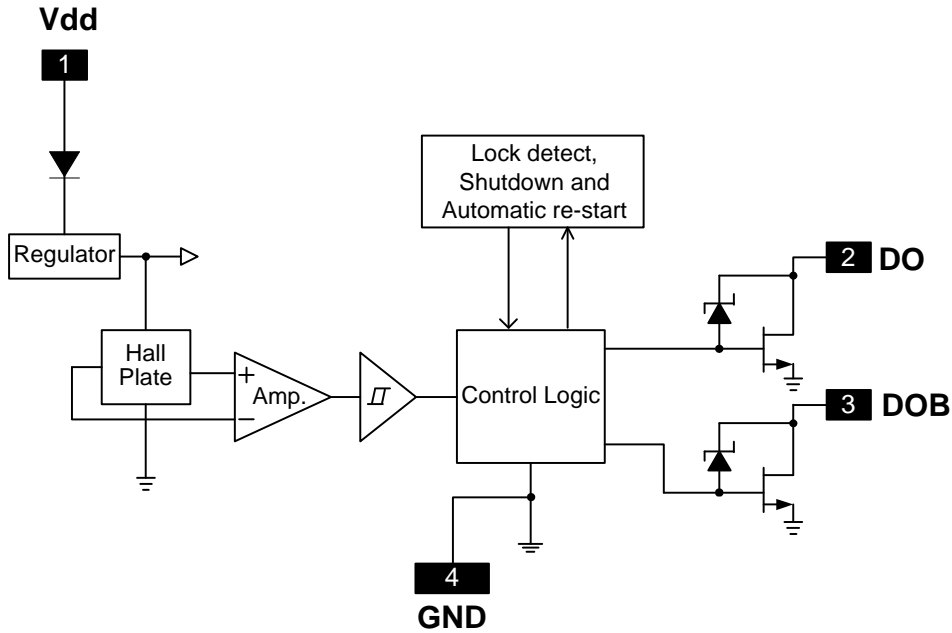
Notes: 1. D1 (Zener Diode) and Capacitor C are for power stabilization. Recommended value of C is 1uF/ 50V (E-Cap).  
Diode D2 is optional and helps to protect the device and fan coils from reverse power conditions. The AH2984 also includes an internal reverse blocking diode at Vdd pin.

**Pin Descriptions**

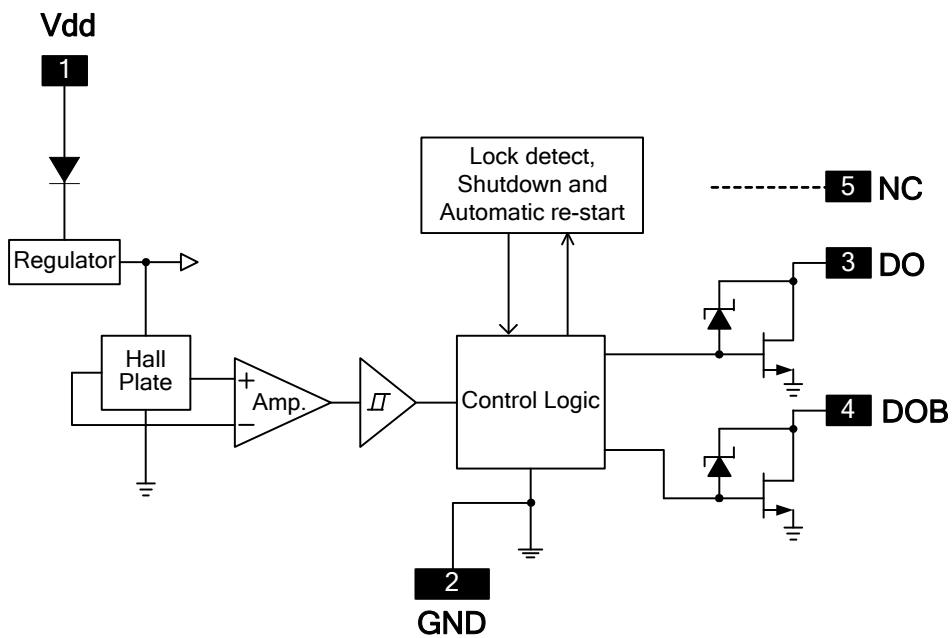
Pin Name	SIP-4L	SOT89-5L	Description
Vdd	1	1	Input Power
DO	2	3	Output Pin
DOB	3	4	Output Pin
GND	4	2	Ground
NC	-	5	No Connection

**Functional Block Diagram**

(1) For SIP-4L



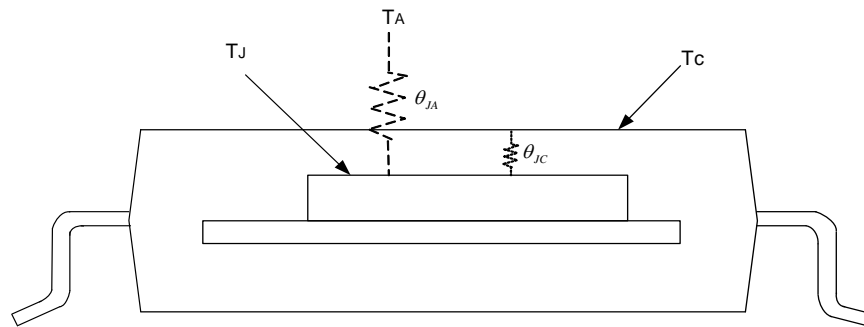
(2) For SOT89-5L



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

Symbol	Conditions	Rating	Unit
Vdd	Supply Voltage	18	V
Vrdd	Reverse Vdd Polarity Voltage	-15	V
$I_{O(AVE)}$	Output Current (Note 2)	500	mA
$I_{O(\text{peak as hold})}$		800	
$P_D$	Power Dissipation	SIP-4L	mW
		SOT89-5L	800
$T_{ST}$	Storage Temperature	-55 ~ 150	$^\circ\text{C}$
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$\theta_{JA}$	Thermal Resistance (Note 3)	SIP-4L	$^\circ\text{C/W}$
		SOT89-5L	156



- Notes: 2. Shall not exceed  $P_D$  and Safety Operation Area.  
3.  $\theta_{JA}$  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 ( $T_A = 25^\circ\text{C}$ )**

Symbol	Parameter	Conditions	Min	Max	Unit
Vdd	Supply Voltage	Operating	2.5	15	V
$T_A$	Operating Ambient Temperature (Note 2)	Operating	-40	105	$^\circ\text{C}$

## TWO PHASE HALL-EFFECT SMART FAN MOTOR CONTROLLER

### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ , $V_{dd} = 12\text{V}$ ; unless otherwise specified, Note 4)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
I <sub>dd</sub>	Supply Current	Operating, V <sub>dd</sub> =12V	2.0	3.5	5.0	mA
T <sub>on</sub>	Locked Protection On Time		-	0.25	-	Sec
T <sub>off</sub>	Locked Protection Off Time		-	3.25	-	Sec
R <sub>duty</sub>	Locked Protection Duty Ratio	T <sub>off</sub> /T <sub>on</sub>	-	13	-	-
R <sub>ds(on)</sub>	Output On Resistance	I <sub>O</sub> = 300mA	-	1	1.67	ohm
		I <sub>O</sub> = 500mA	-	1.25	1.8	
V <sub>z</sub>	Output Zener-Breakdown Voltage	(Note 4)	24	33	42	V

Notes: 4. The V<sub>z</sub> value is in D.C voltage measurement. The V<sub>z</sub> may vary with coils in A.C. voltage measurements.

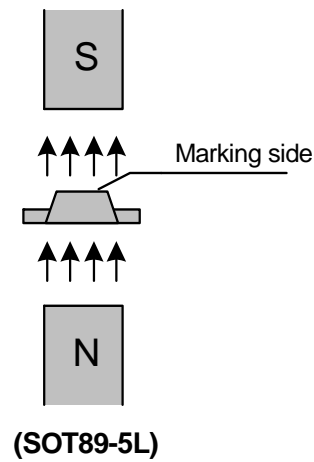
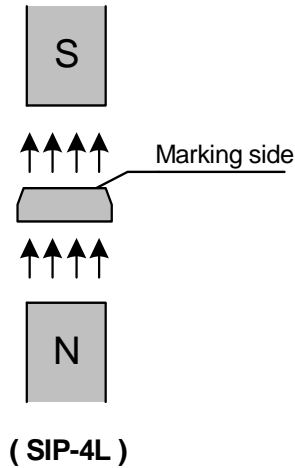
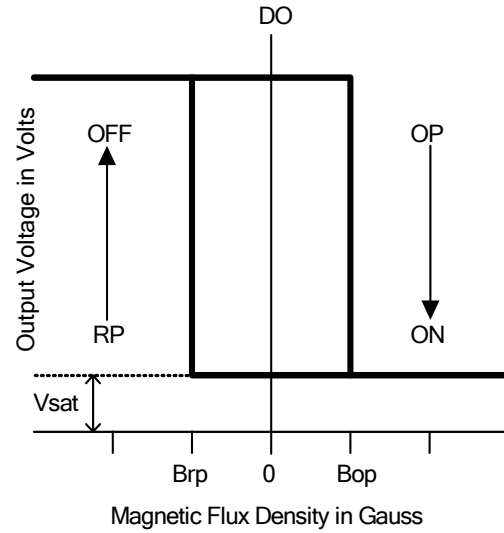
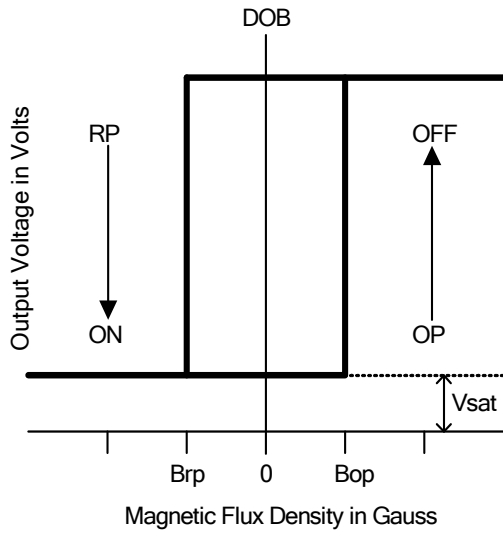
### Magnetic Characteristics ( $T_A = 25^\circ\text{C}$ , $V_{dd} = 2.5\text{V}$ to $15\text{V}$ , Note 5)

(1mT=10 Gauss)

Symbol	Characteristics	Min	Typ.	Max	Unit
B <sub>op</sub>	Operate Point	5	30	60	Gauss
B <sub>rp</sub>	Release Point	-60	-30	-5	Gauss
B <sub>hy</sub>	Hysteresis	20	60	120	Gauss

Notes: 5. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

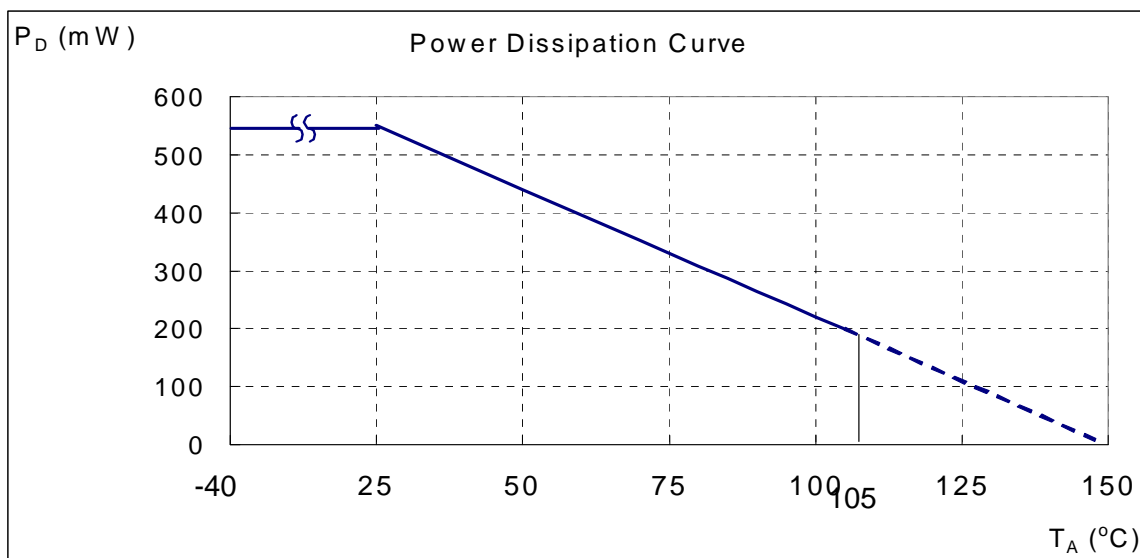
**Operating Characteristics**



**Performance Characteristics**

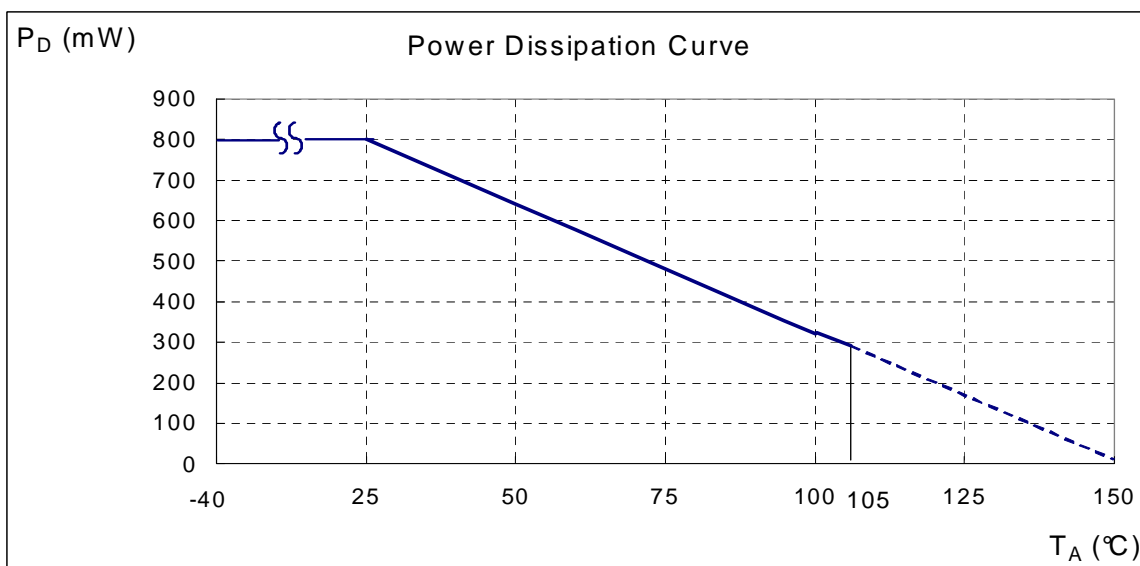
**(1) SIP-4L**

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

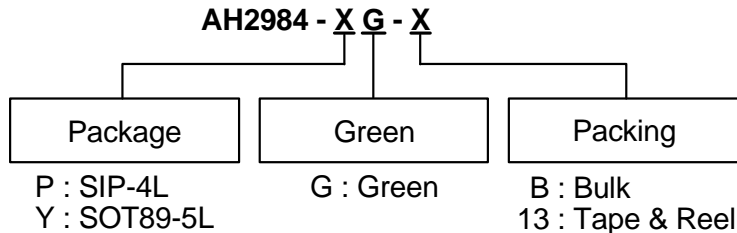


**(2) SOT89-5L**

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



**Ordering Information**



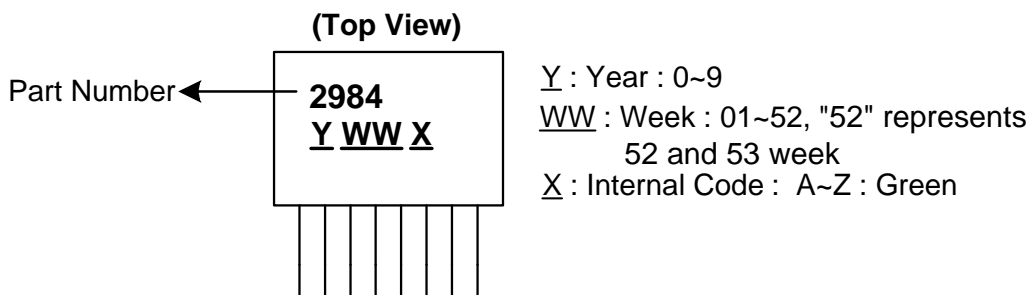
Device	Package Code	Packaging (Note 6 & 7)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH2984-PG-B	P	SIP-4L	1000	-B	NA	NA
AH2984-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

Notes: 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>.

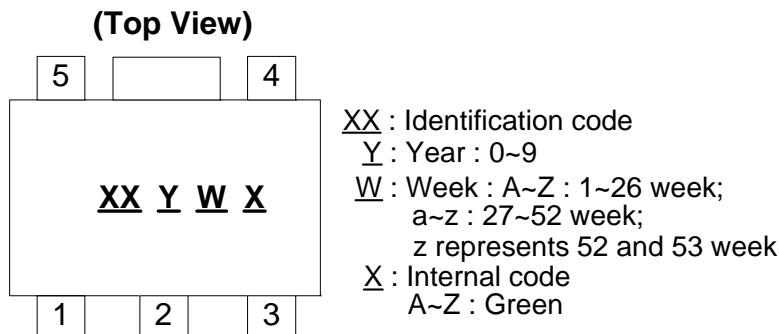
7. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).

**Marking Information**

**(1) SIP-4L**



**(2) SOT89-5L**

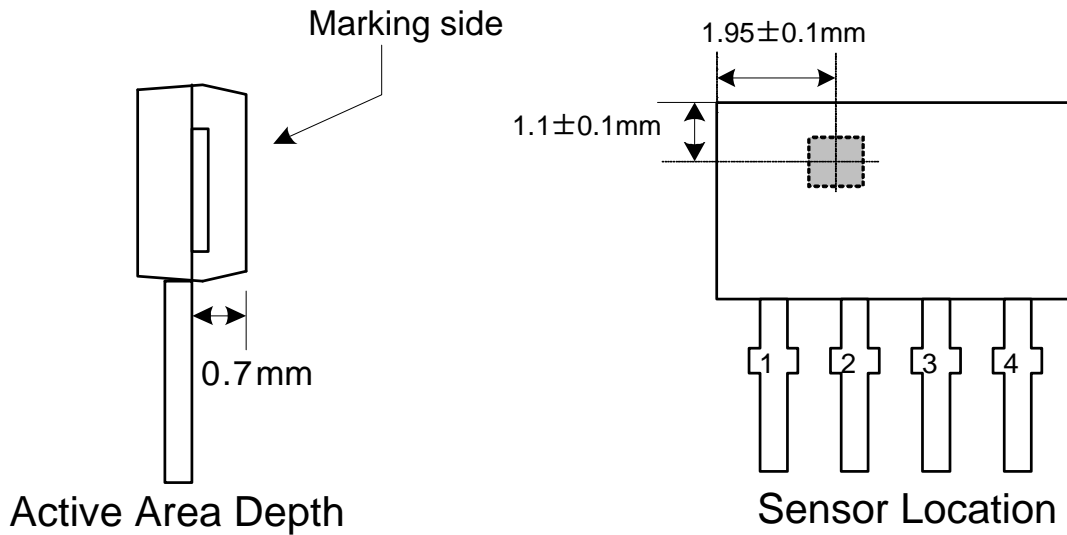


Device	Package	Identification Code
AH2984	SOT89-5L	K1

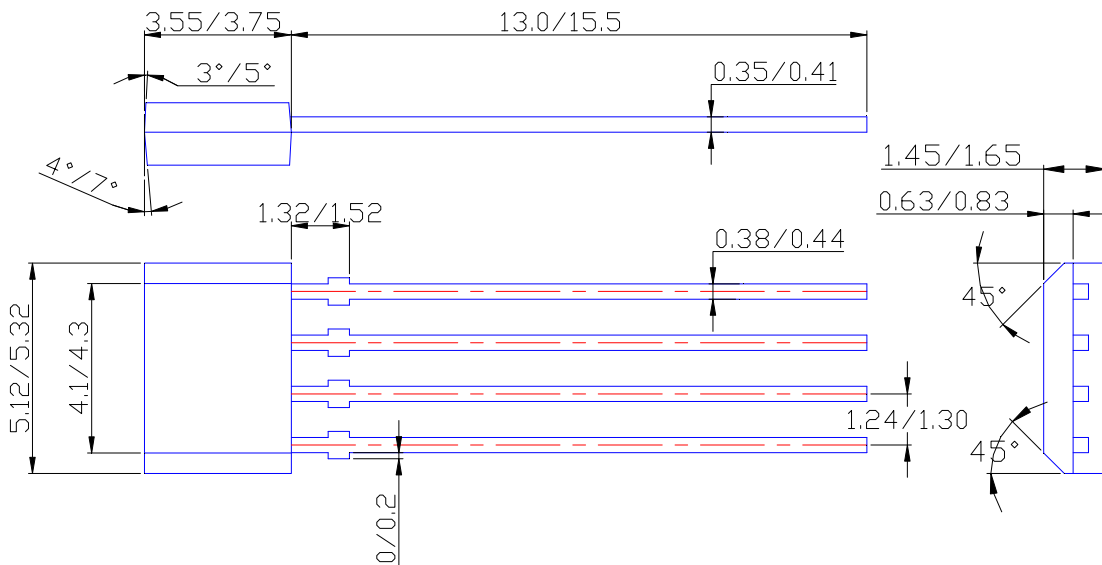
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**Package Outline Dimensions (All Dimensions in mm)**

(1) Package type: SIP-4L

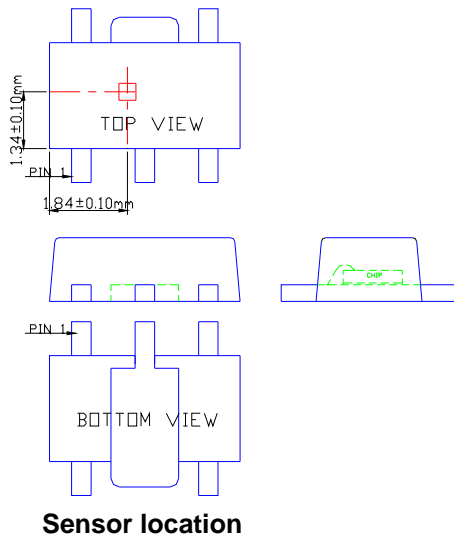
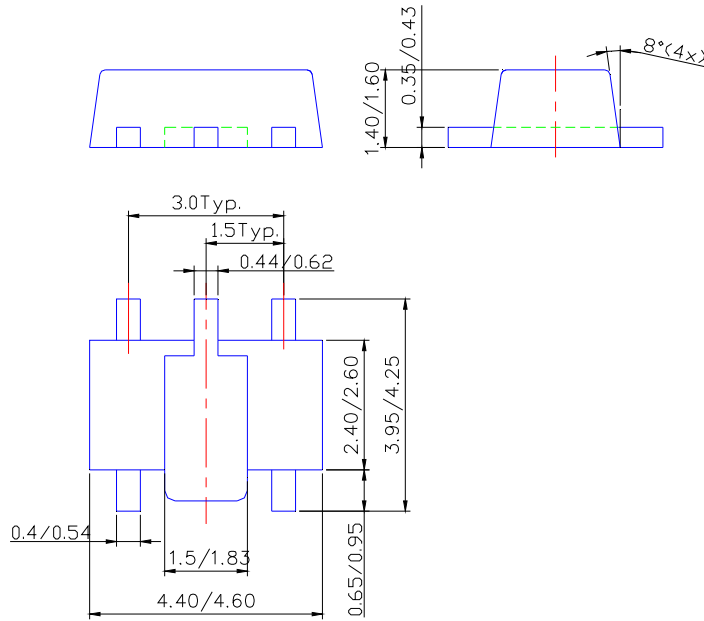


**Package Dimension**



**Package Outline Dimensions (Continued)**

(2) Package type: SOT89-5L



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