AH2984

TWO PHASE HALL-EFFECT SMART FAN MOTOR CONTROLLER

NEW PRODUCT

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.

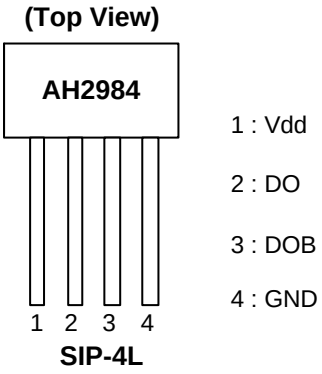
To help protect the motor coils, the AH2984 provides Rotor Lock Protection which shuts down output drives if rotor lock is detected. The device automatically re-starts when the rotor lock is removed. Over temperature shutdown provides thermal protection for the device.

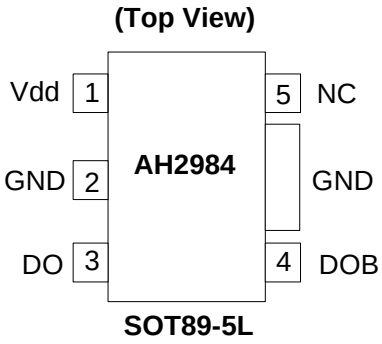
The AH2984 is available in SIP4 and SOT89-5L packages.

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





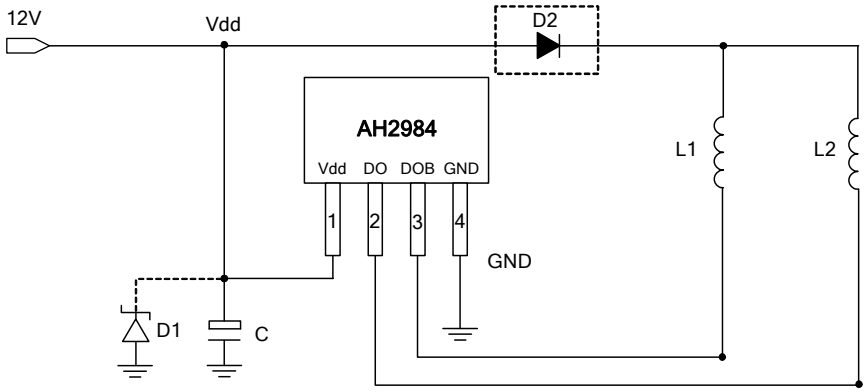
Applications

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

NEW PRODUCT

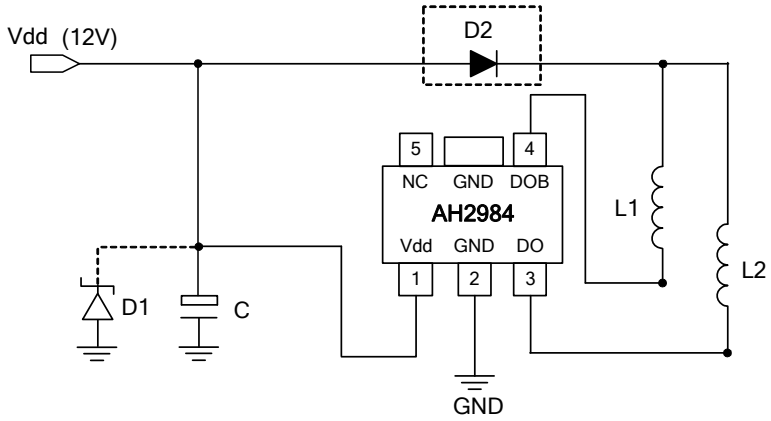
Typical Application Circuit (Note 1)

(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

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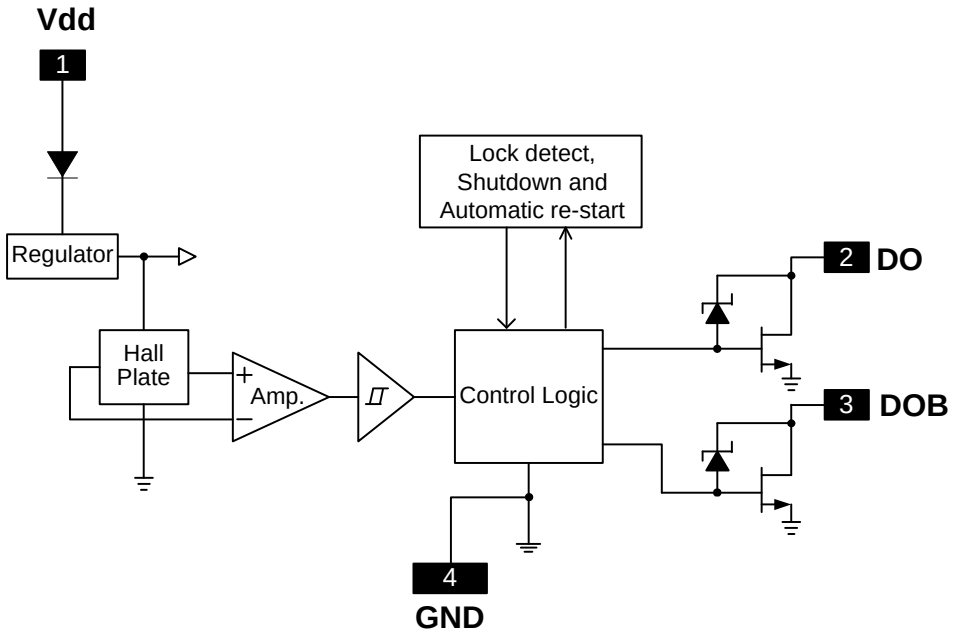
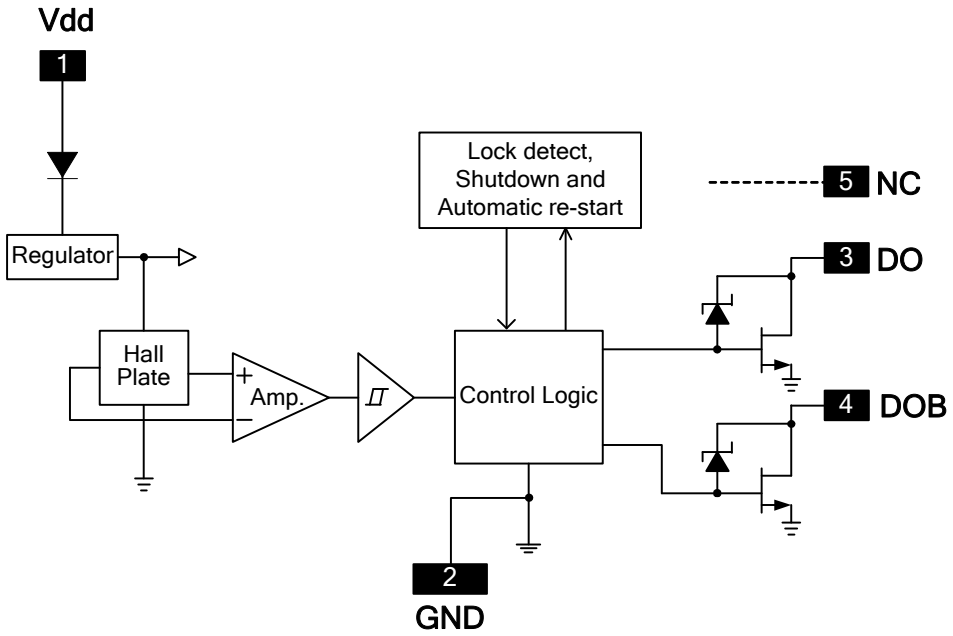
Functional Block Diagram

(1) For SIP-4L



(2) For SOT89-5L



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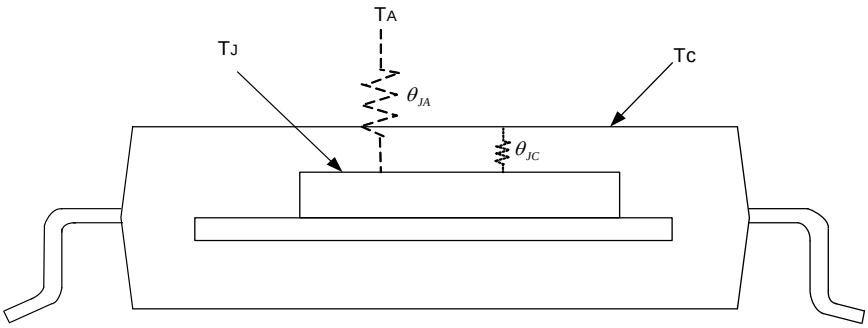
Absolute Maximum Ratings (T_A = 25°C)

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
$I_{O(peak\ as\ hold)}$			800	
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 (Note 3)	SIP-4L	227	°C/W
		SOT89-5L	156	°C/W



Notes: 2. Shall not exceed P_D and Safety Operation Area.
3. θ_{JA} should be confirmed with heat sink thermal resistance. If there is no heat sink contact, θ_{JA} will almost be the same as θ_{JC}.

Recommended Operating Conditions (T_A = 25°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	°C

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Electrical Characteristics (T_A = 25°C, Vdd = 12V; unless otherwise specified, Note 4)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
Idd	Supply Current	Operating, Vdd=12V	2.0	3.5	5.0	mA
Ton	Locked Protection On Time		-	0.25	-	Sec
Toff	Locked Protection Off Time		-	3.25	-	Sec
Rduty	Locked Protection Duty Ratio	Toff/Ton	-	13	-	-
Rds(on)	Output On Resistance	I_O= 300mA	-	1	1.67	ohm
		I_O= 500mA	-	1.25	1.8	
Vz	Output Zener-Breakdown Voltage	(Note 4)	24	33	42	V

Notes: 4. The Vz value is in D.C voltage measurement. The Vz may vary with coils in A.C. voltage measurements.

Magnetic Characteristics (T_A = 25°C, Vdd = 2.5V to 15V, Note 5)

(1mT=10 Gauss)

Symbol	Characteristics	Min	Typ.	Max	Unit
Bop	Operate Point	5	30	60	Gauss
Brp	Release Point	-60	-30	-5	Gauss
Bhy	Hysteresis	20	60	120	Gauss

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

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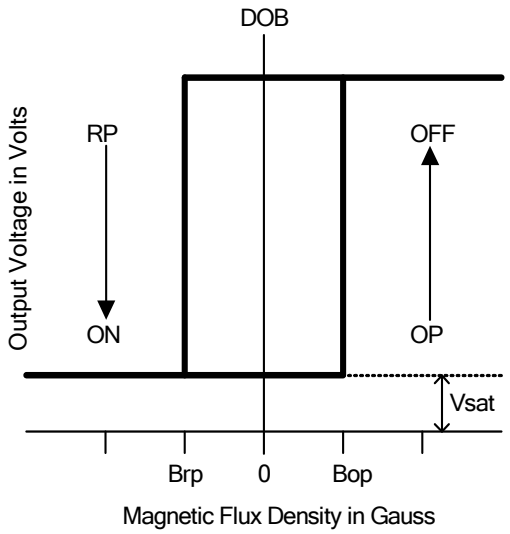
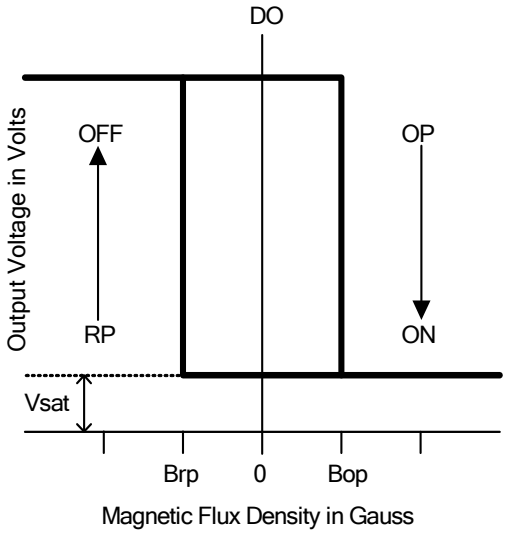
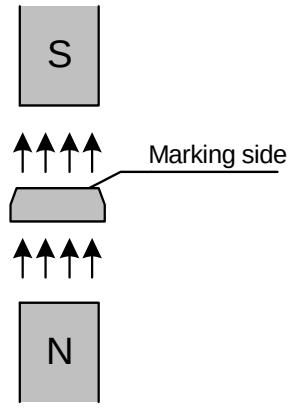
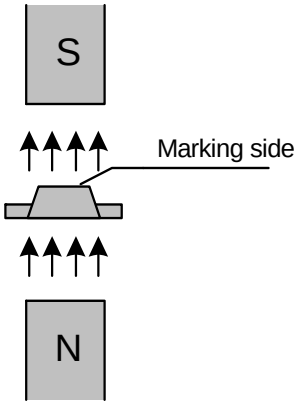
Operating Characteristics







(SIP-4L)



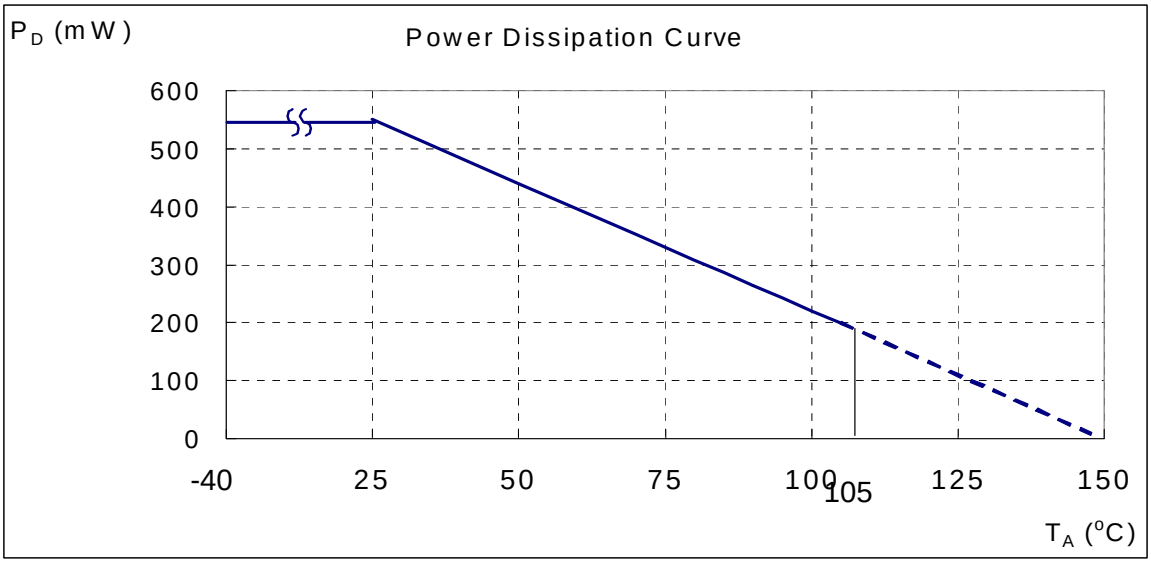
(SOT89-5L)

NEW PRODUCT

Performance Characteristics

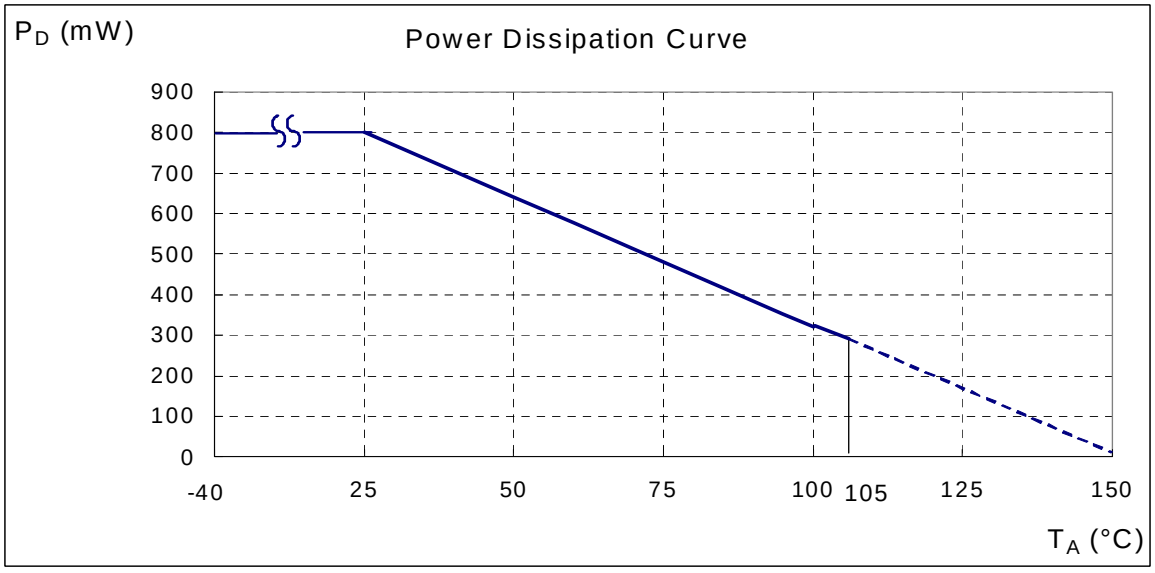
(1) SIP-4L

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



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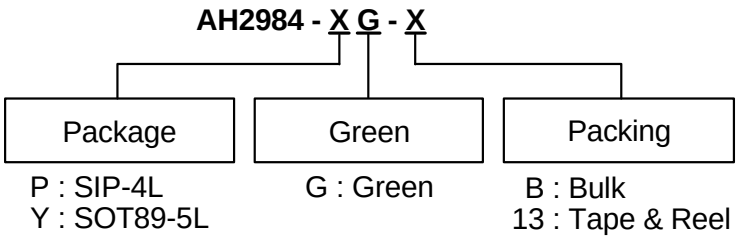
Ordering Information



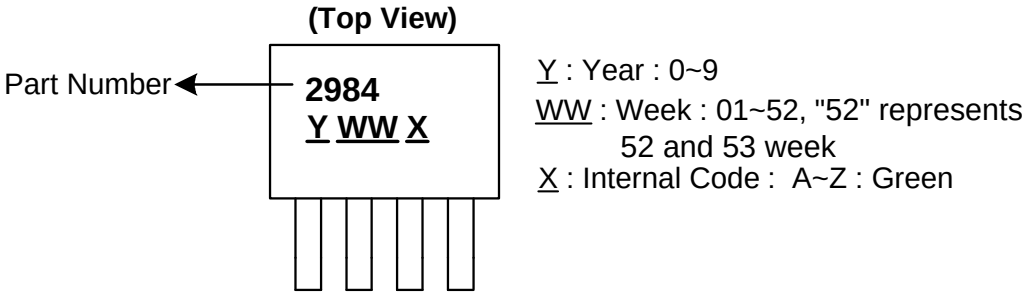
Device	Package Code	Packaging (Note 6 & 7)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH2984-PG-B	P	SIP-4L	1000	-B	NA	NA
AH2984-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

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.

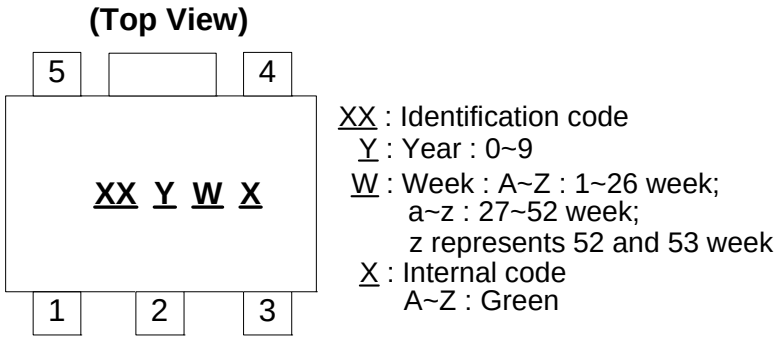
7. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

Marking Information

(1) SIP-4L



(2) SOT89-5L



Device	Package	Identification Code
AH2984	SOT89-5L	K1

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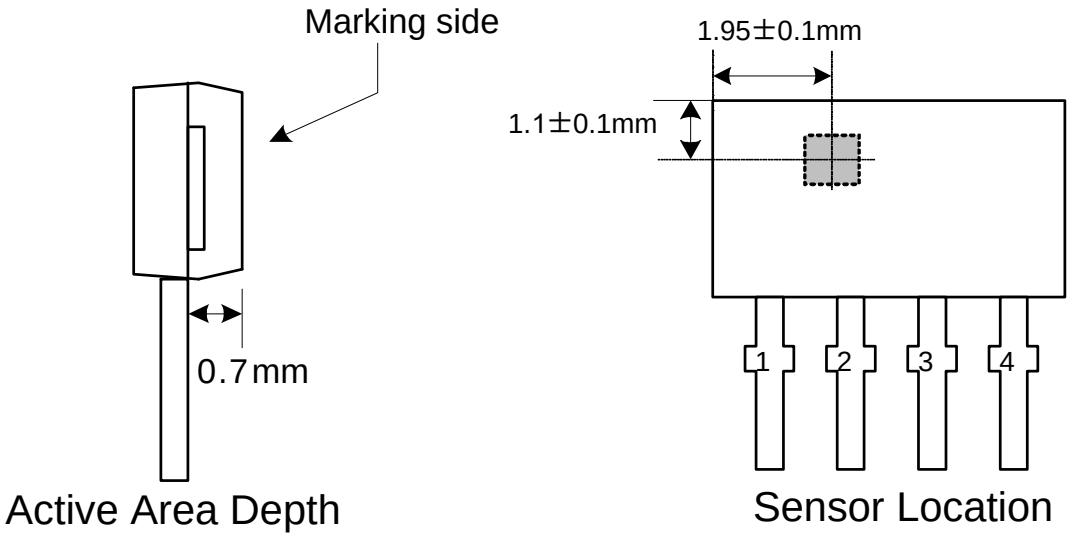
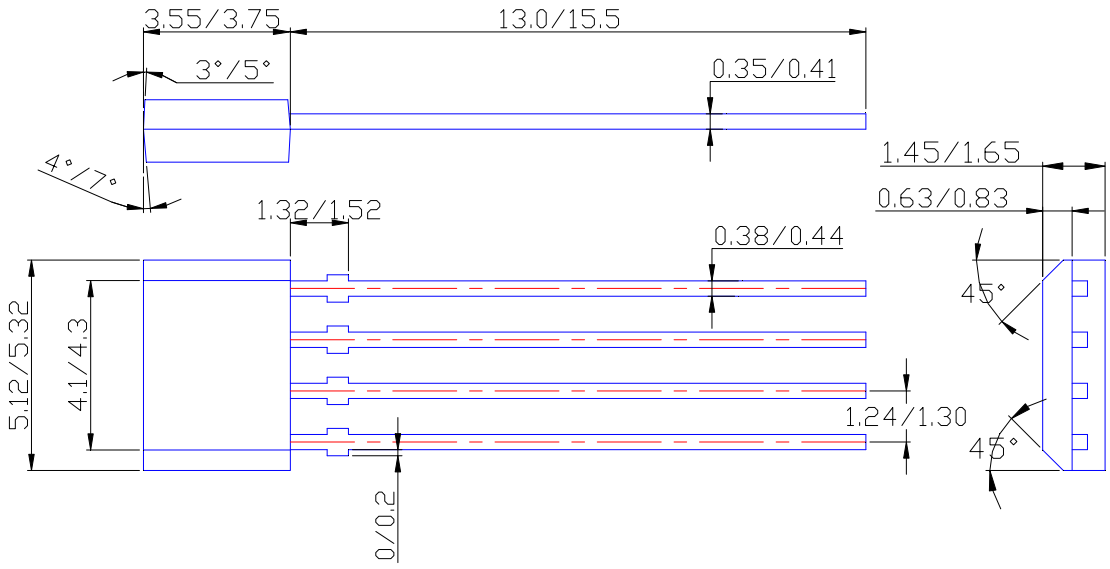
Package Outline Dimensions (All Dimensions in mm)

(1) Package type: SIP-4L



Package Dimension



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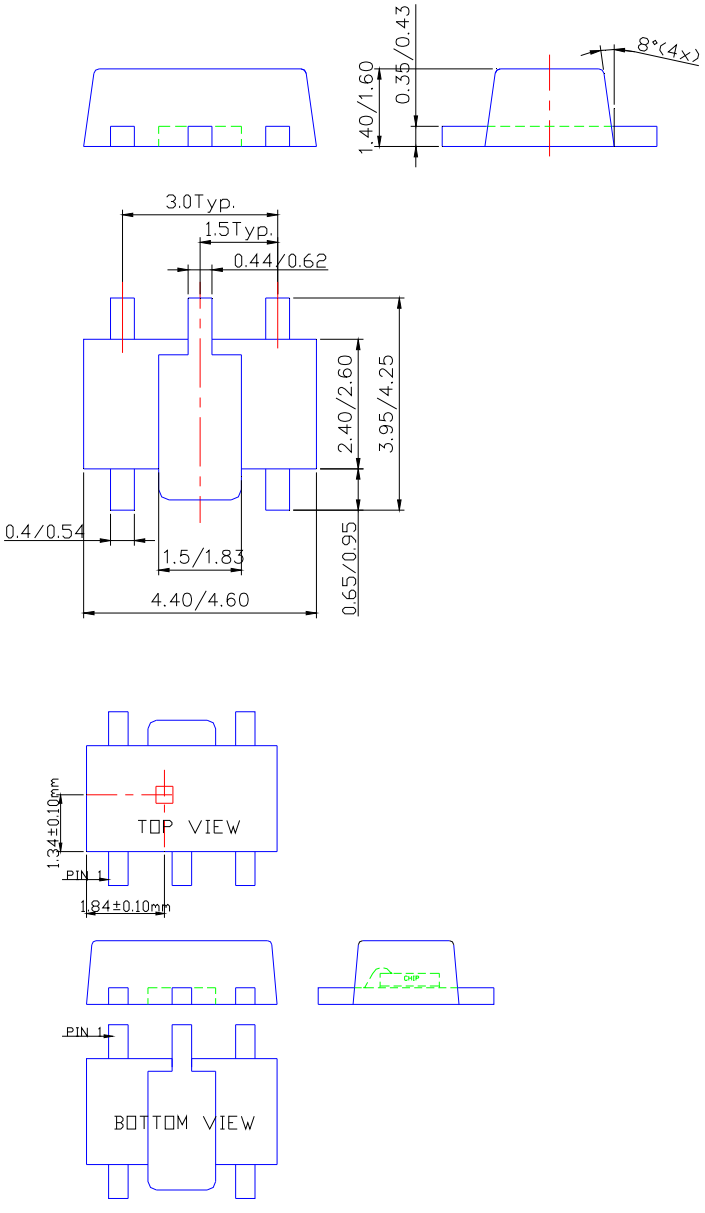
Package Outline Dimensions (Continued)

(2) Package type: SOT89-5L



Sensor location

NEW PRODUCT

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