

## Description

AH291 is a monolithic fan motor controller with Hall sensor's capability. It contains two complementary open-collector drivers for motor's coil driving, automatic lock shutdown and restart function relatively.

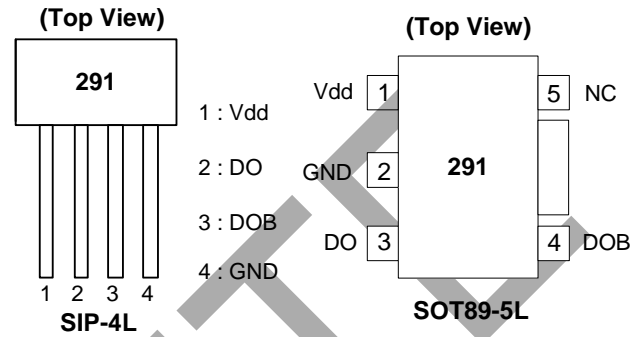
Rotor-lock shutdown detection circuit turns off the output driver when the rotor is blocked to avoid coil overheat. Then, the automatic recovery circuit will restart the motor. These protected actions are repeated and periodic during the blocked period. Until the blocking is removed, the motor recovers and runs normally.

The AH291 is available in SIP4 and SOT89-5L packages.

## Features

- On Chip Hall Sensor
- Rotor-Locked Shutdown
- Automatically Restart
- Built-in Zener Protection for Output Driver
- Operating Voltage: 1.8V to 5.75V
- Output Current:  $I_{O(AVE)} = 400\text{mA}$
- Packages: SIP-4L and SOT89-5L
- Green Molding Compound

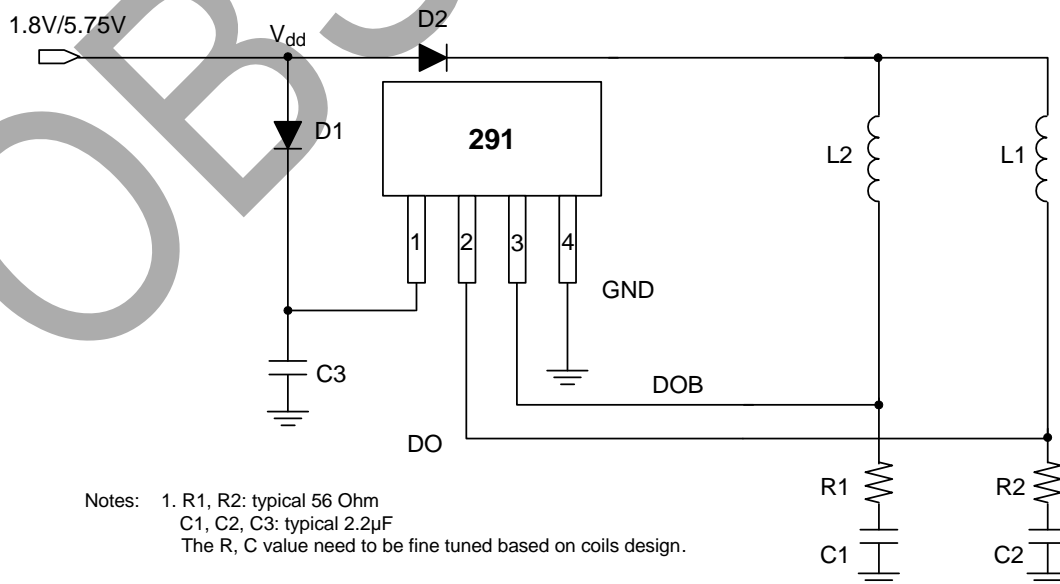
## Pin Assignments



## Applications

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

## Typical Application Circuit (Note 1)

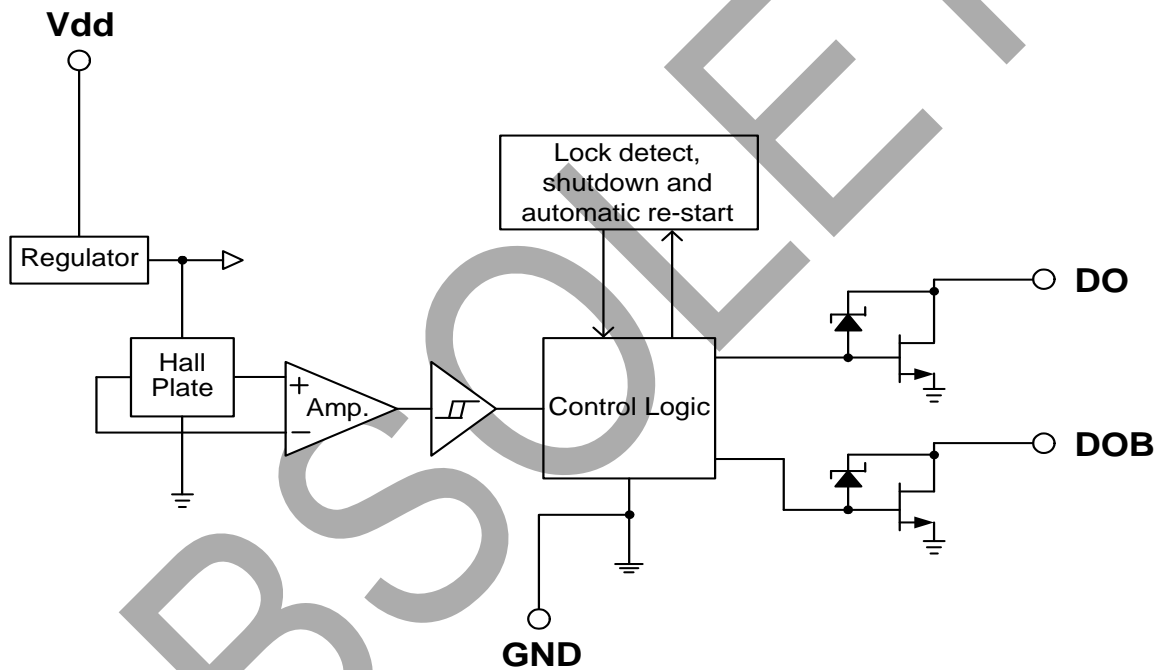


### 1.8V/5.75V Brush-Less DC Fan

### Pin Descriptions

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

### Functional Block Diagram



## LOW VOLTAGE HALL-EFFECT SMART FAN MOTOR CONTROLLER

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

Symbol	Characteristics		Rating	Unit	
V <sub>dd</sub>	Operating Supply Voltage		8	V	
I <sub>O</sub>	Output Current	I <sub>O(AVE)</sub>	SIP-4L	400	mA
			SOT89-5L	400	mA
		I <sub>O(PEAK)</sub>		700	mA
P <sub>D</sub>	Power Dissipation	SIP-4L	550	mW	
		SOT89-5L	800	mW	
T <sub>ST</sub>	Storage Temperature		-55 ~ 150	°C	
T <sub>J</sub>	Maximum Junction Temperature		150	°C	

### Recommended Operating Conditions

Symbol	Characteristic	Conditions	Min	Max	Unit
V <sub>dd</sub>	Supply Voltage (Note 2)	Operating	1.8	5.75	V
T <sub>A</sub>	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 ( $T_A = 25^\circ\text{C}$ , V<sub>dd</sub> = 5V, unless otherwise specified)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
I <sub>dd</sub>	Supply Current	Operating	-	2.6	4.0	mA
T <sub>RLP-ON</sub>	Rotor Lock Protection On Time		-	0.4	-	Sec
T <sub>RLP-OFF</sub>	Rotor Lock Protection Off Time		2.4	3	3.6	Sec
V <sub>OUT(SAT)</sub>	Output Saturation Voltage	I <sub>O</sub> = 180mA	-	300	-	mV
		I <sub>O</sub> = 350mA	-	600	-	mV
R <sub>DS(ON)</sub>	Output On Resistance		-	1.75	-	ohm
V <sub>Z</sub>	Output Zener-Breakdown Voltage		-	15	-	V

### Truth Table

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

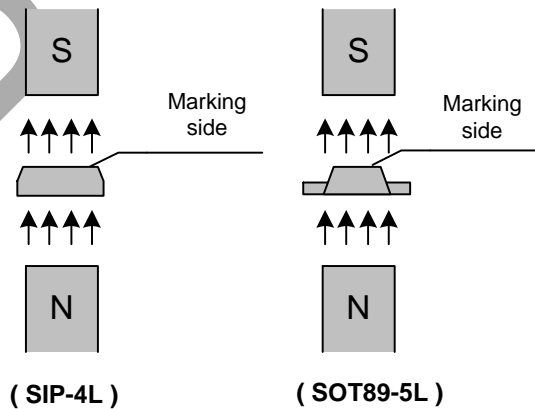
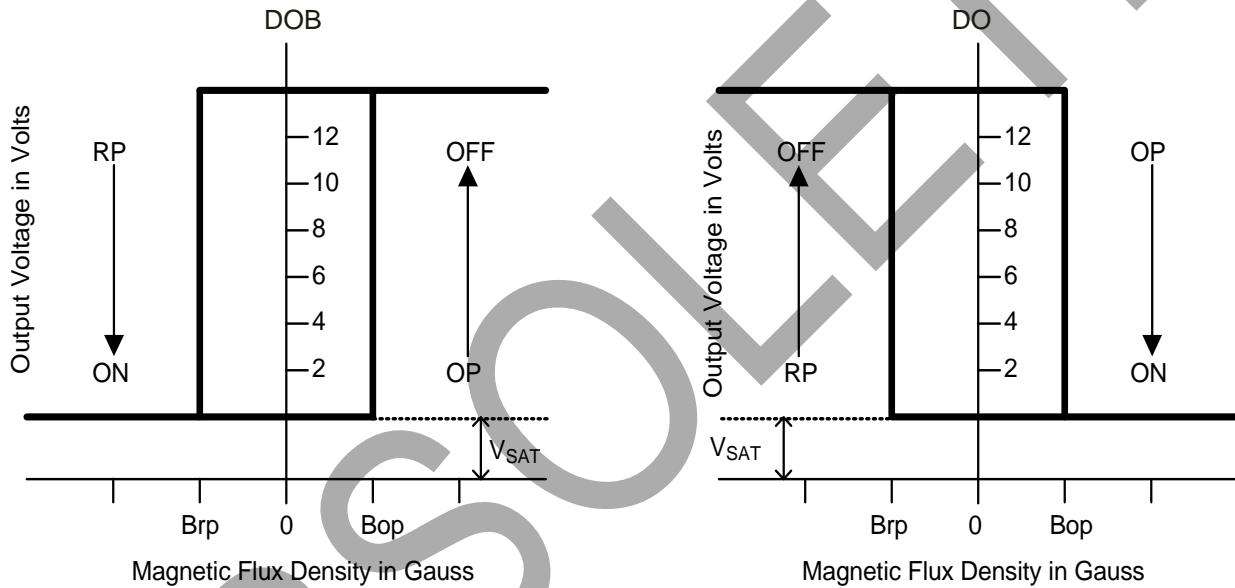
**Magnetic Characteristics** ( $T_A = 25\text{ }^\circ\text{C}$ ,  $V_{CC} = 24\text{V}$ , unless otherwise specified, Note 3)

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

**Operating Characteristics**

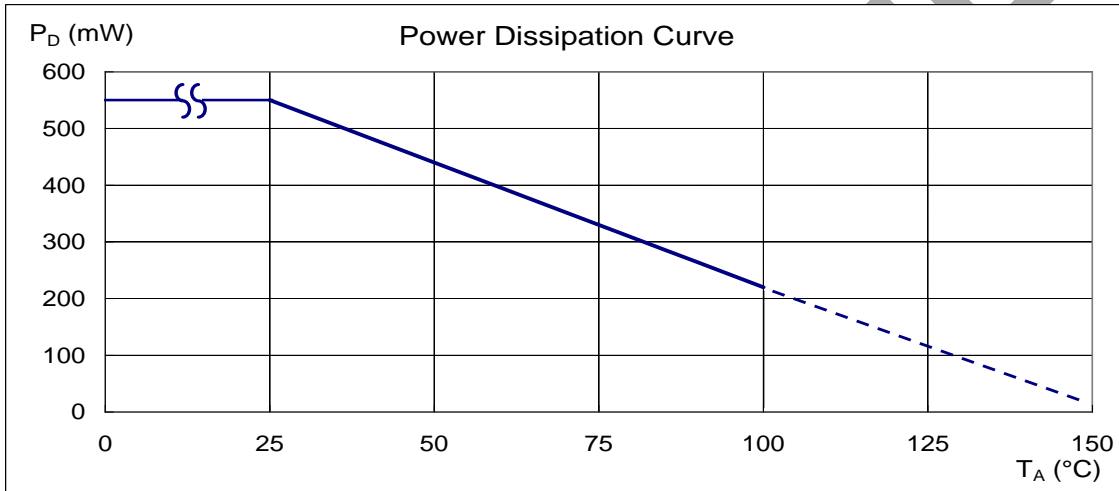


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### Performance Characteristics

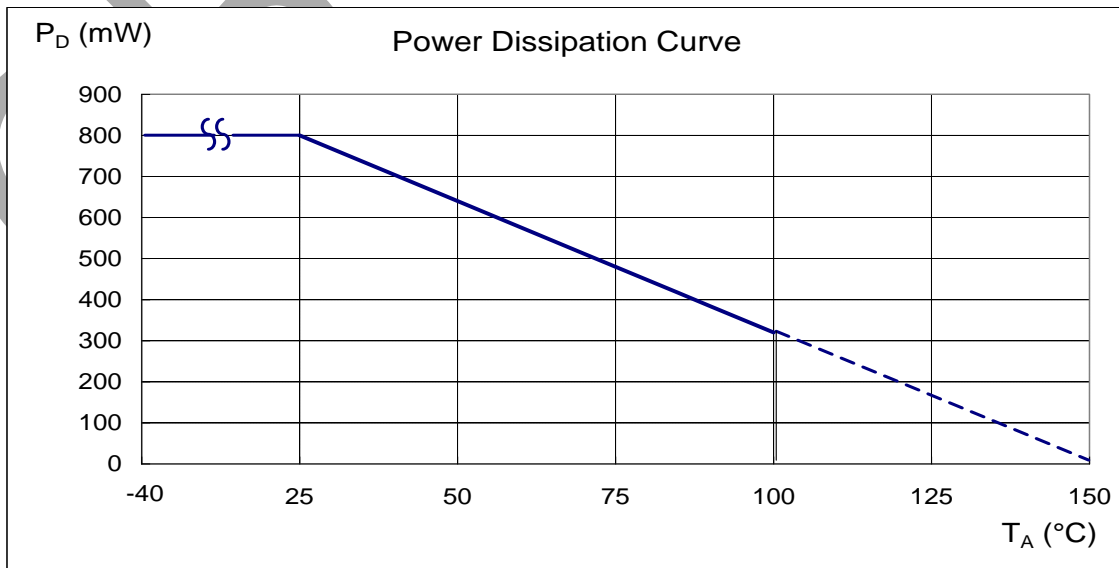
#### (1) SIP-4L

$T_A$ (°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

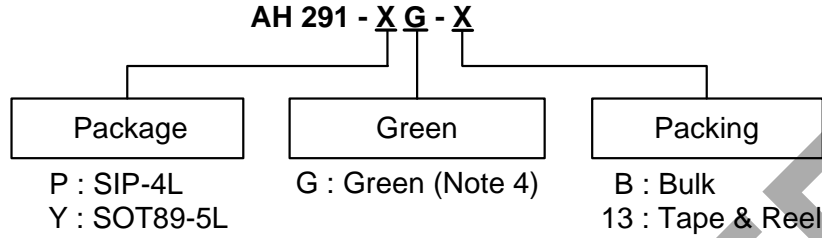


#### (2) SOT89-5L

$T_A$ (°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



**Ordering Information**

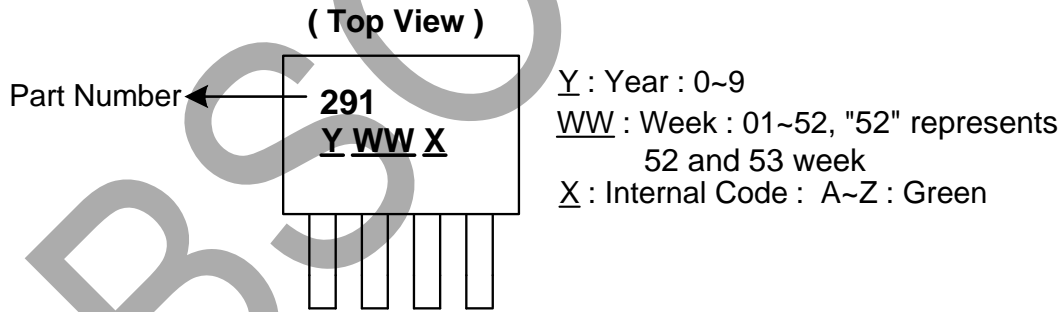


Device	Package Code	Packaging (Note 5, 6)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH291-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

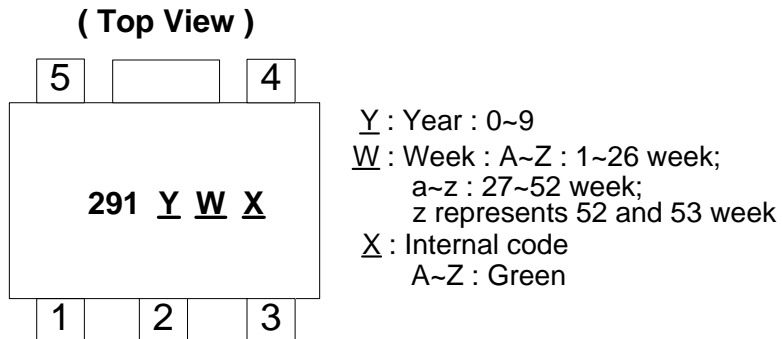
Notes: 4. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).  
 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be 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

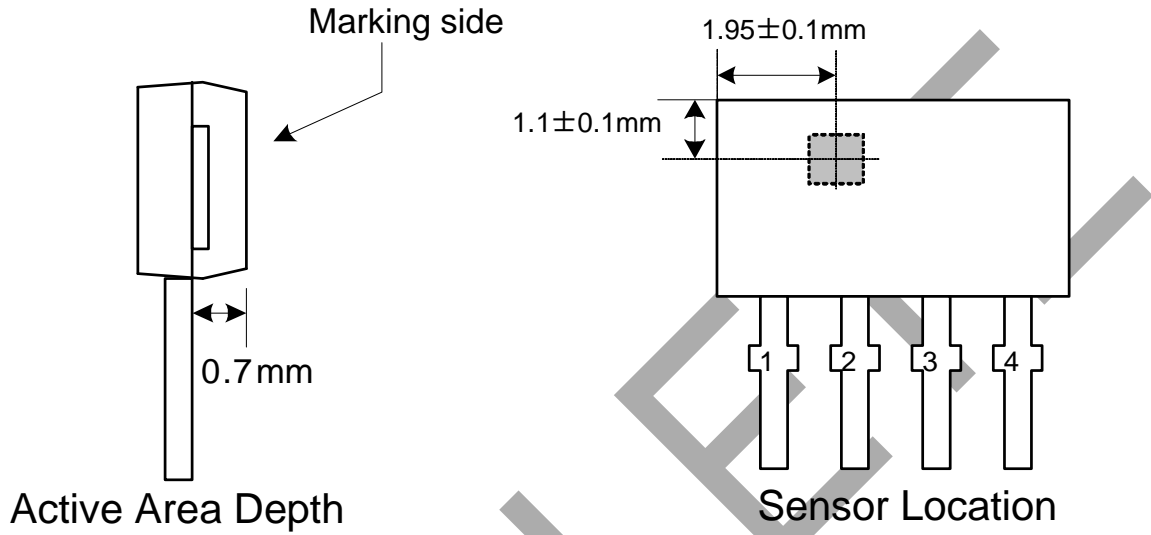


(2) SOT89-5L

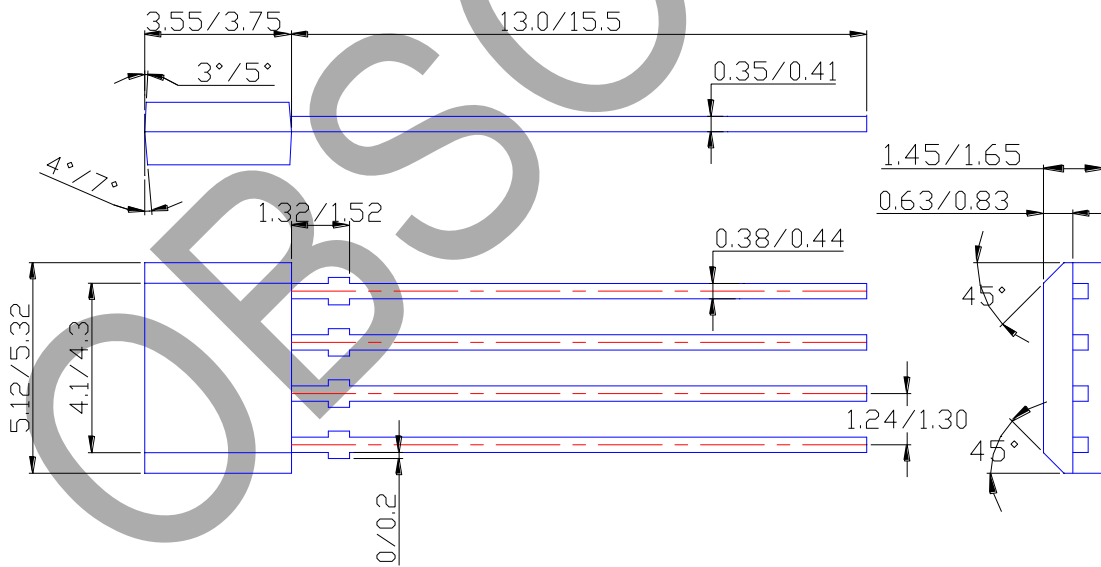


**Package Outline Dimensions (All Dimensions in mm)**

(1) Package type: SIP-4L



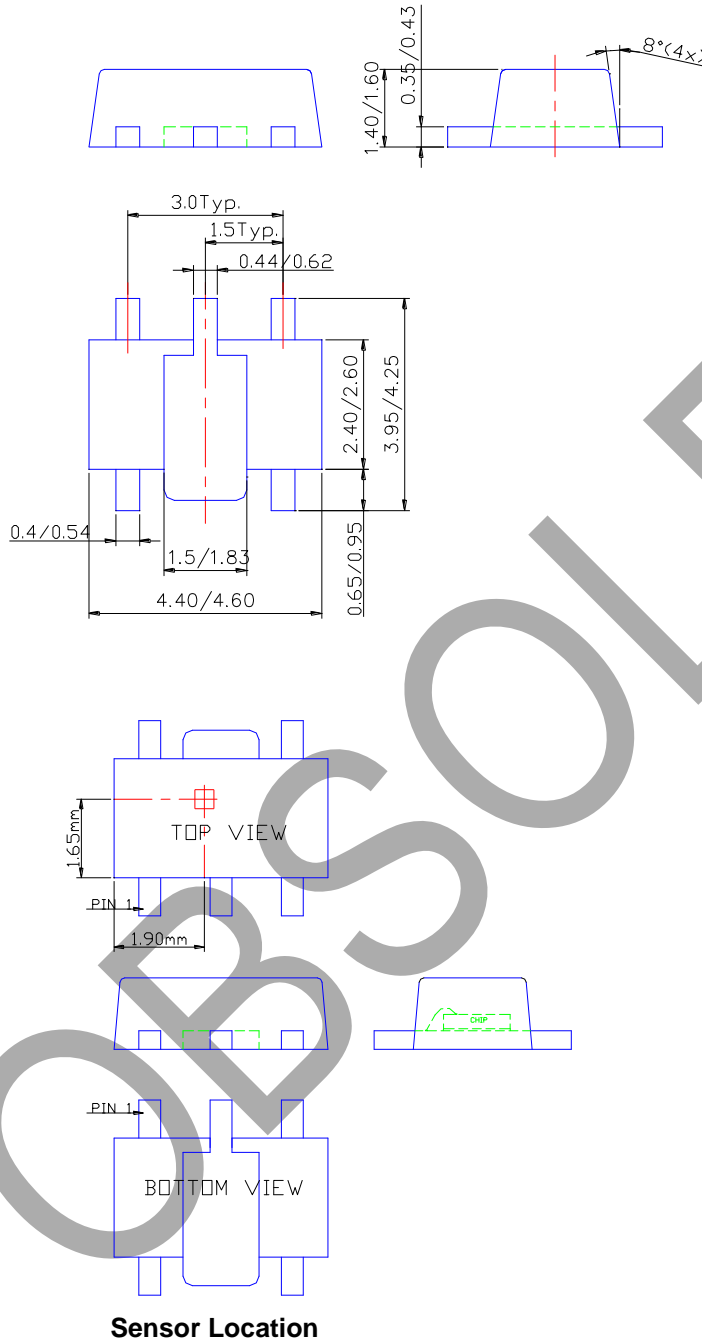
**Package Dimension**



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**Package Outline Dimensions (Continued)**

(2) Package type: SOT89-5L



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