LOW VOLTAGE HALL-EFFECT SMART FAN MOTOR CONTROLLER

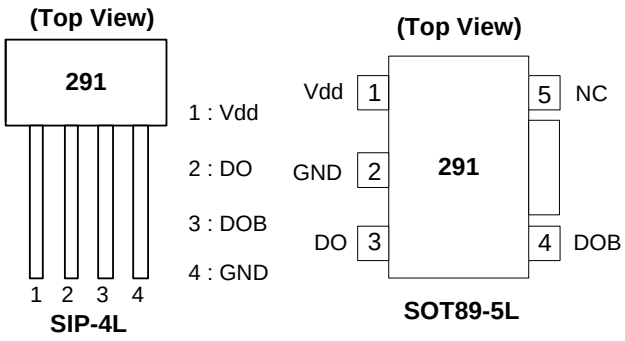
Description

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.

Pin Assignments



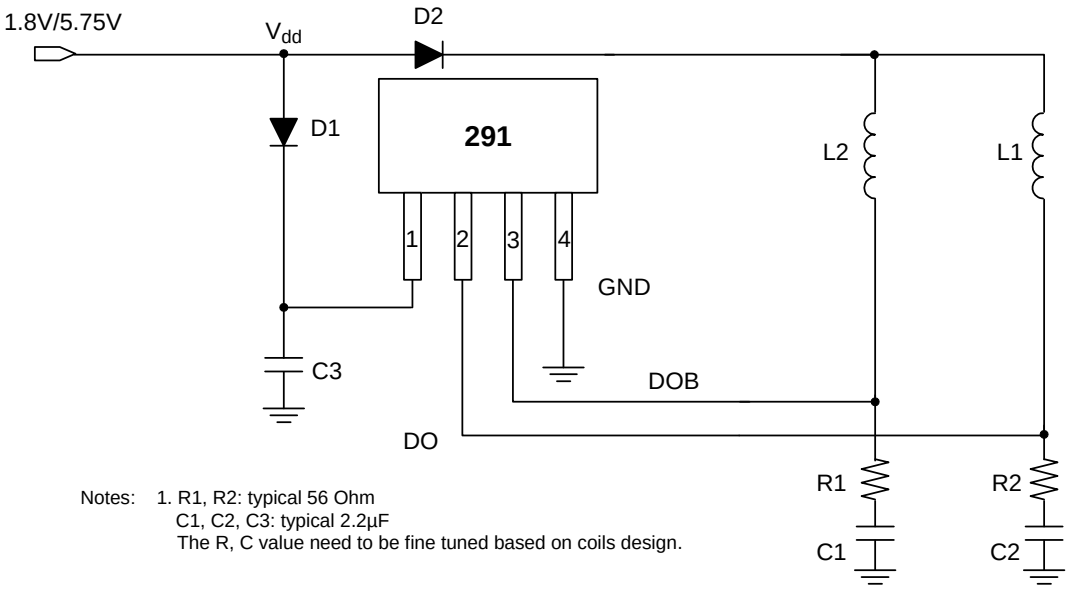
Features

- 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: $I_{O(AVE)}$= 400mA
- Packages: SIP-4L and SOT89-5L
- Green Molding Compound

Applications

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

Typical Application Circuit (Note 1)



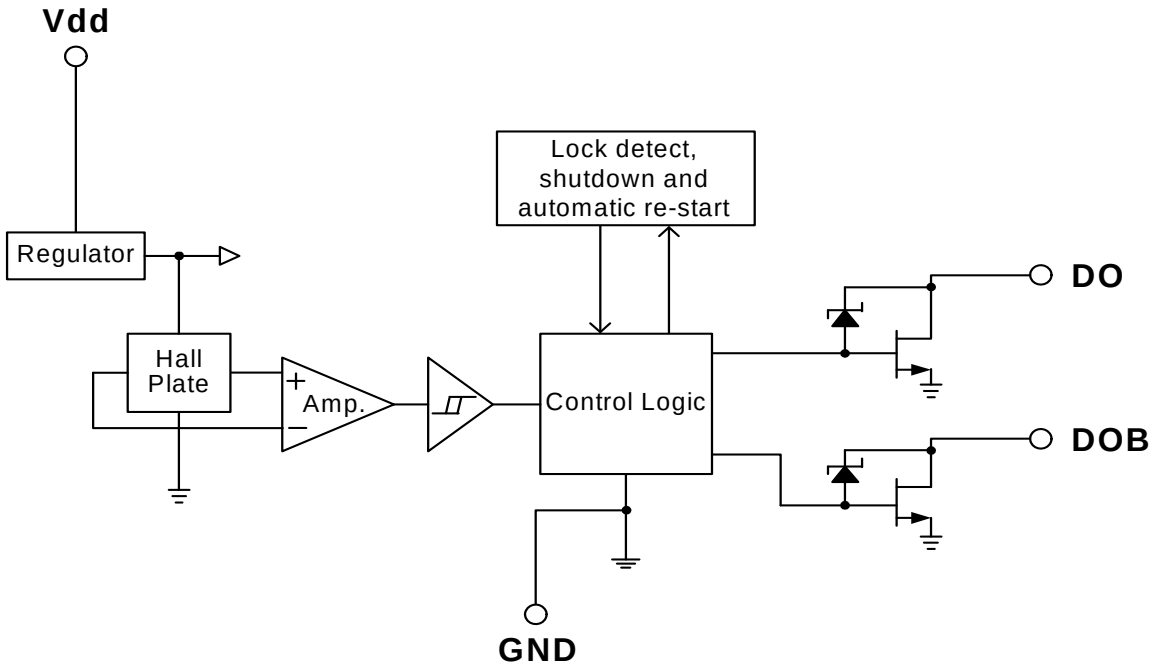
Notes: 1. R1, R2: typical 56 Ohm
C1, C2, C3: typical 2.2μF
The R, C value need to be fine tuned based on coils design.

1.8V/5.75V 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



Absolute Maximum Ratings (T_A = 25°C)

Symbol	Characteristics			Rating	Unit
Vdd	Operating Supply Voltage			8	V
I_O	Output Current	$I_{O(AVE)}$	SIP-4L	400	mA
			SOT89-5L	400	mA
		$I_{O(PEAK)}$		700	mA
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

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
Vz	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

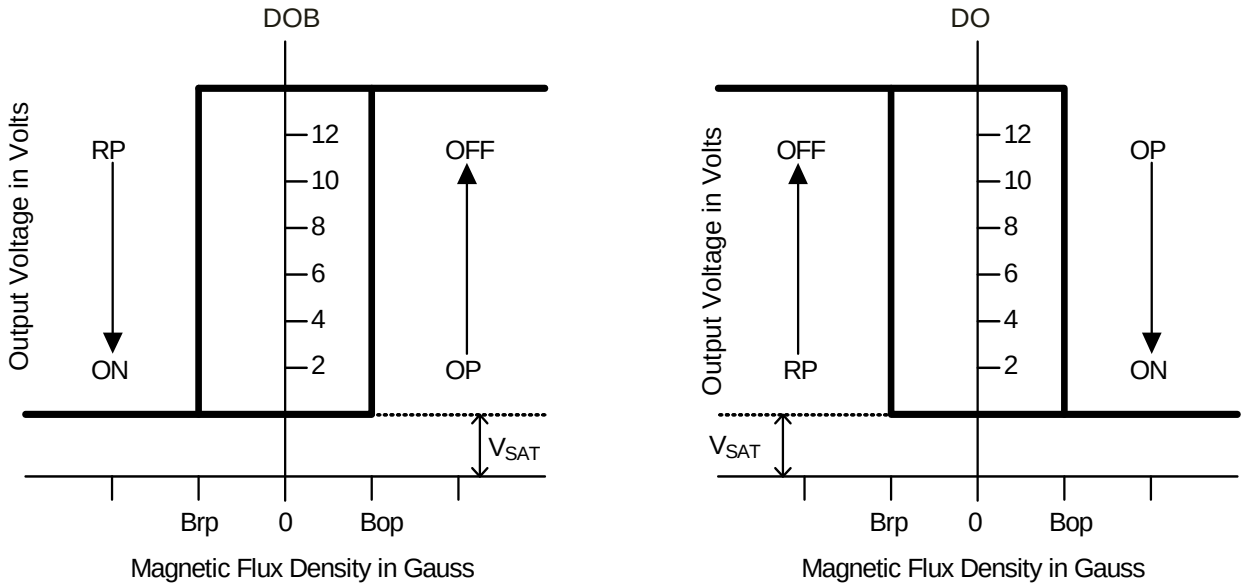
Magnetic Characteristics (T_A = 25 °C, Vcc = 24V, unless otherwise specified, Note 3)

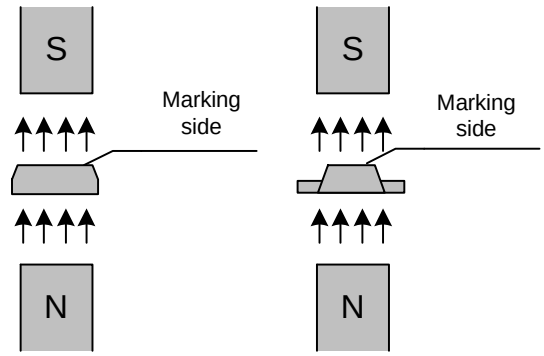
(1mT = 10 Gauss)

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



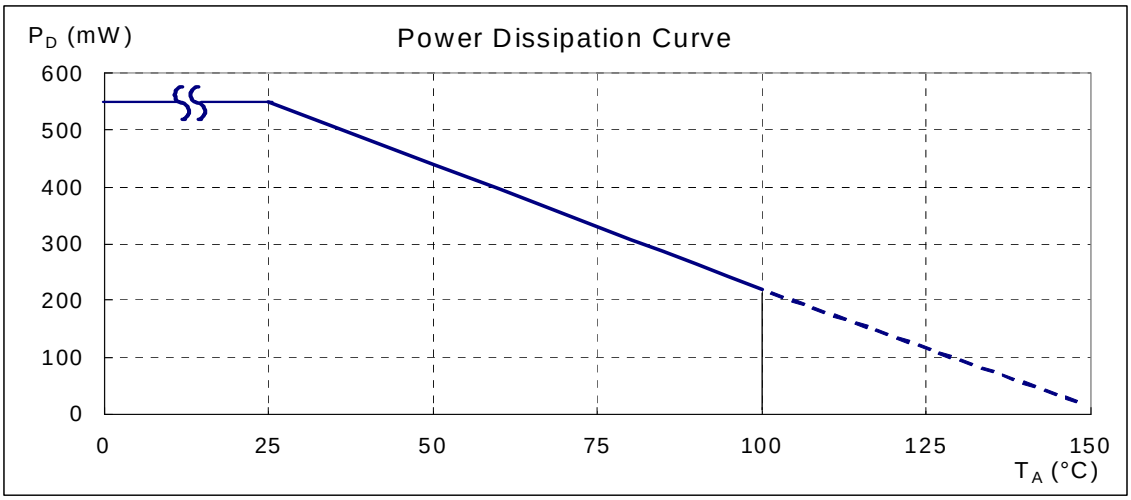


(SIP-4L) **(SOT89-5L)**

Performance Characteristics

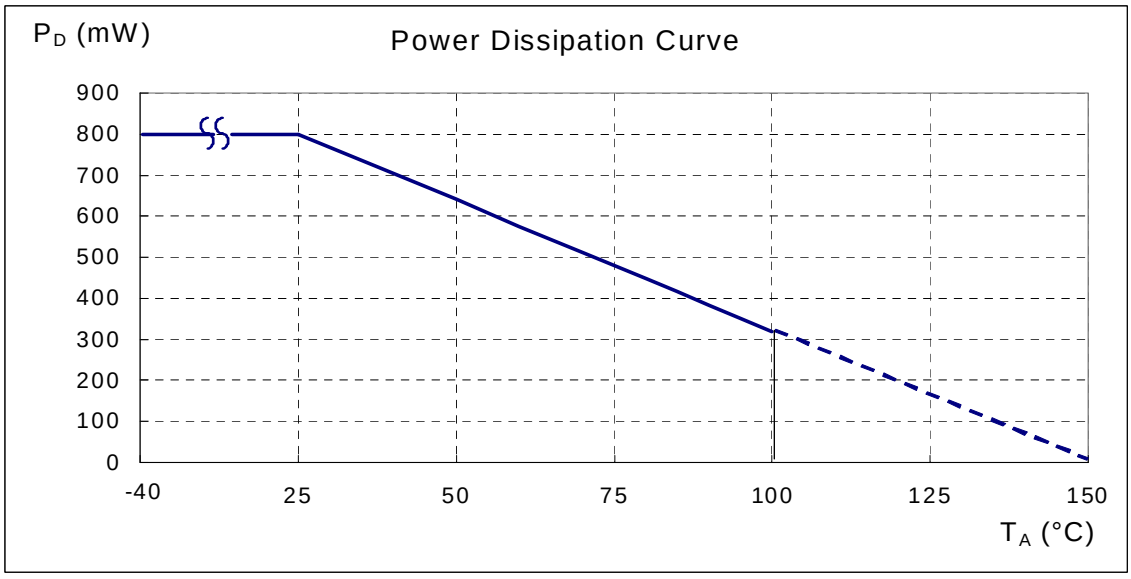
(1) SIP-4L

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

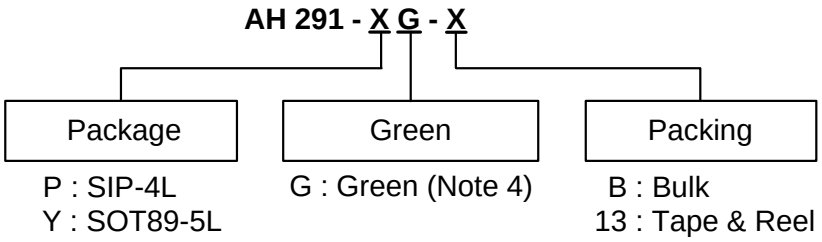


(2) SOT89-5L

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

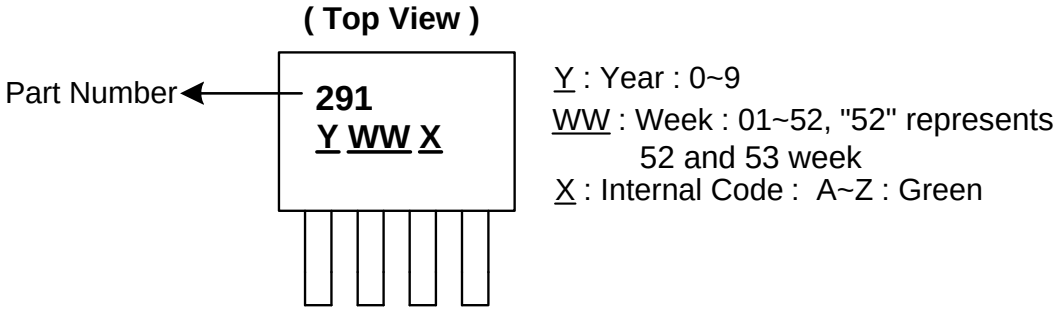


Device	Package Code	Packaging (Note 5, 6)	Bulk		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH291-YG-13	Y	SOT89-5L	NA	NA	2500/Tape & Reel	-13

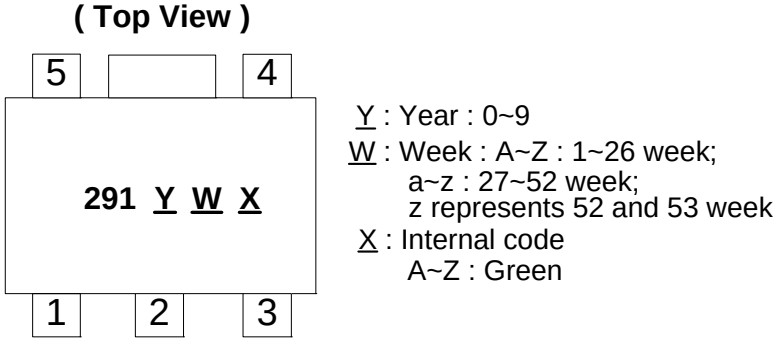
Notes: 4. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.
5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
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

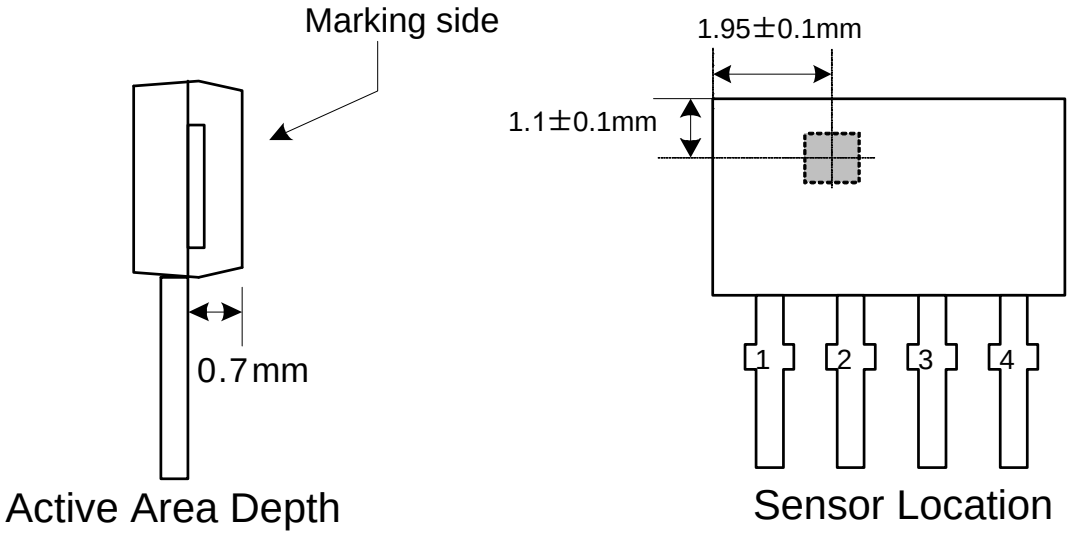


(2) SOT89-5L

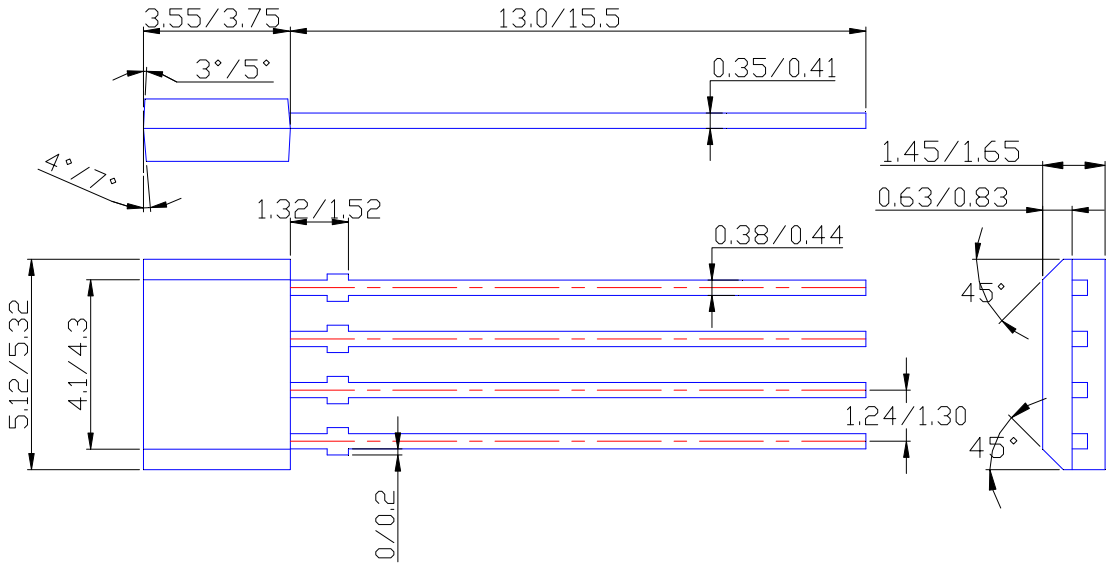


Package Outline Dimensions (All Dimensions in mm)

(1) Package type: SIP-4L

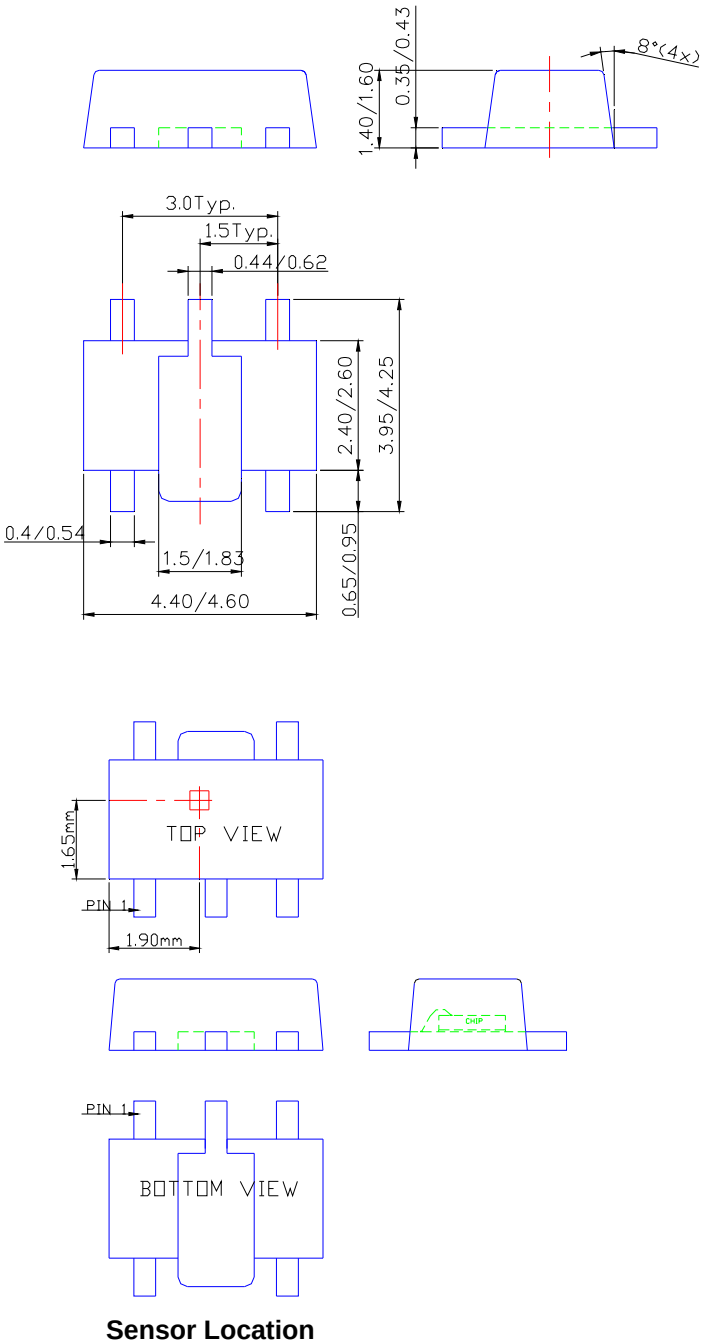


Package Dimension



Package Outline Dimensions (Continued)

(2) Package type: SOT89-5L



Sensor Location

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