

■ Features

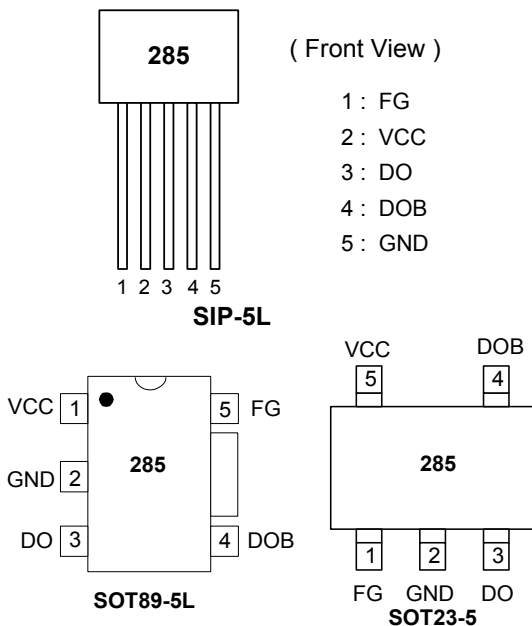
- On chip Hall sensor
- Rotor-locked shutdown
- Automatically restart
- Frequency generator (FG) output
- Built-in Zener protection for output driver
- Operating voltage: 3.5V~20V
- Output current: $I_{O(AVE)} = 500\text{mA}$ for SIP-5/SOT89-5
- Output current: $I_{O(AVE)} = 400\text{mA}$ for SOT23-5
- Package: SIP-5L, SOT23-5L, SOT89-5L

■ General Description

AH285 is a monolithic fan motor controller with Hall sensor's capability. It contains two complementary open-drain transistors as motor coil drivers, automatic lock current shutdown, and recovery protections. Additional, frequency generator (FG) output is for speed detection relatively.

To avoid coil burning, rotor-lock shutdown detection circuit shut down the output driver if the rotor is blocked and then the automatic recovery circuit will try to restart the motor. This function repeats while the rotor is blocked. Until the blocking is removed, the motor recovers running normally.

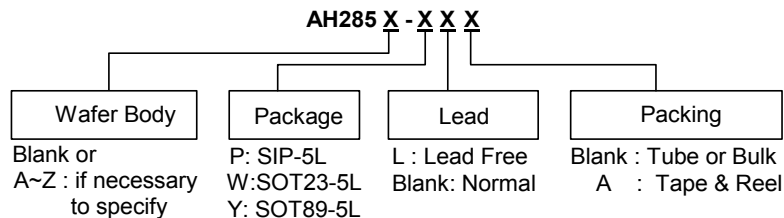
■ Pin Configuration



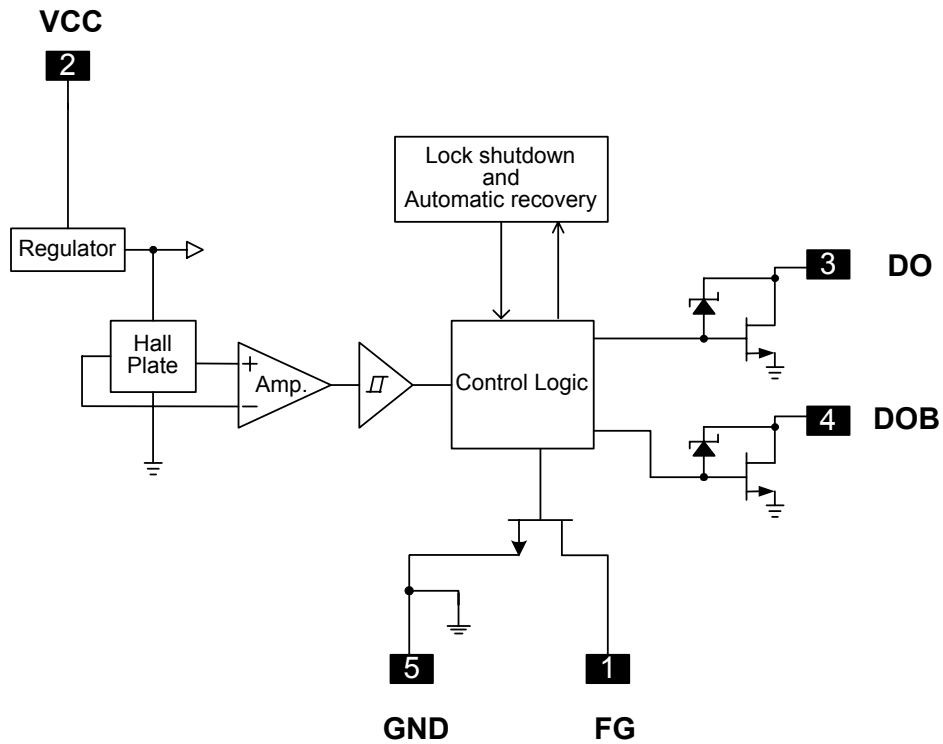
■ Pin Descriptions

| Symbol | Description |
|--------|----------------------|
| FG | Frequency generation |
| VCC | Input power |
| DO | Output pin |
| DOB | Output pin |
| GND | Ground |

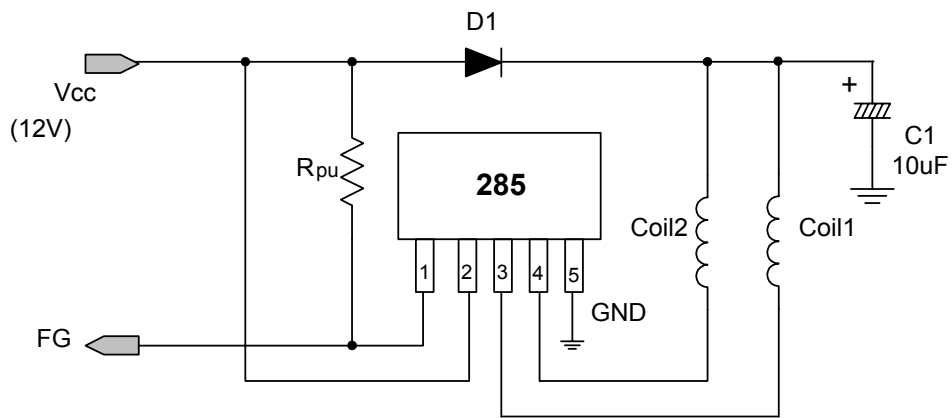
■ Ordering Information



■ Block Diagram (SIP5)



■ Typical Application Circuit (SIP5)



12V DC Brush-less Fan with FG output function

Hall-Effect Smart Fan Motor Controller
■ Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Rating | Unit |
|------------------------|---------------|--------------|------------------|
| Supply Voltage | V_{CC} | 24 | V |
| Output Current | $I_{O(AVE)}$ | SIP5/SOT89-5 | 500 |
| | | SOT23-5 | 400 |
| | $I_{O(PEAK)}$ | 700 | mA |
| Power Dissipation | P_D | SIP5 | 550 |
| | | SOT23-5 | 230 |
| | | SOT89-5 | 800 |
| Operating Temperature | T_{opr} | -40 ~ 100 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 ~ 150 | $^\circ\text{C}$ |
| Maximum Junction Temp. | T_j | 150 | $^\circ\text{C}$ |

■ Electrical Characteristics ($T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{V}$, unless otherwise notice)

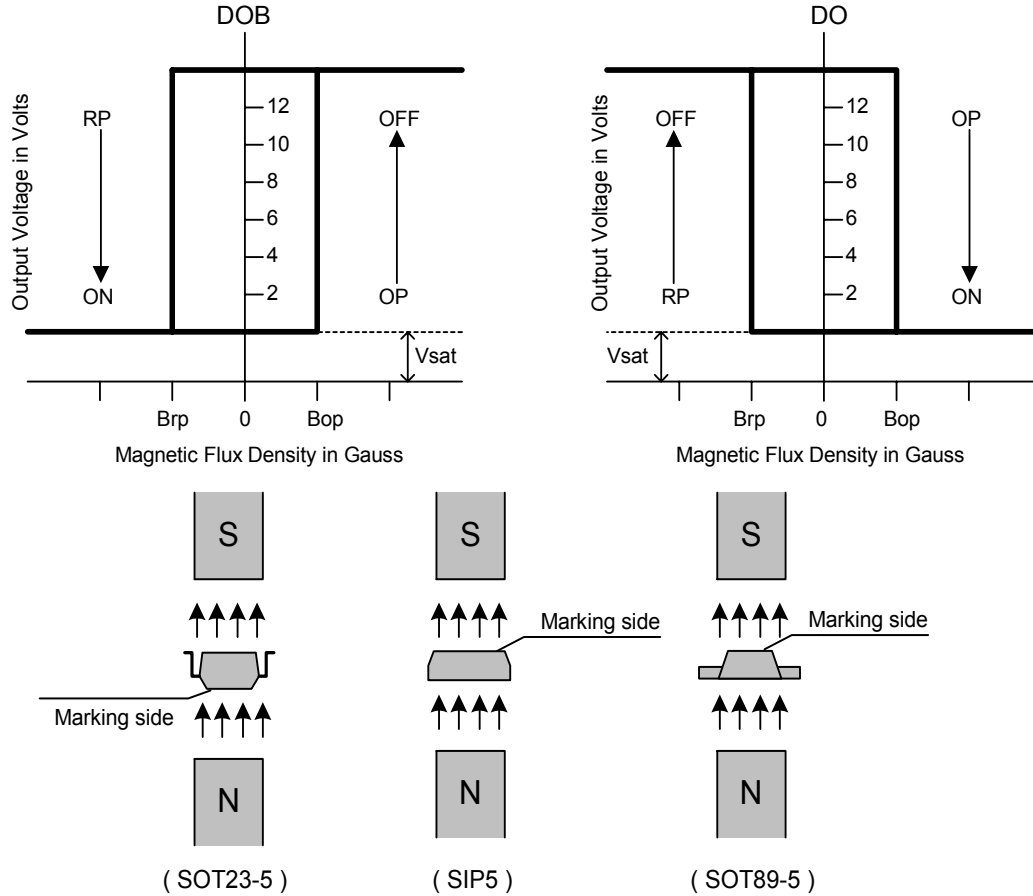
| Characteristics | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------|----------------|----------------------|------|-------|------|---------------|
| Supply Voltage | V_{CC} | Operating | 3.5 | - | 20 | V |
| Supply current | I_{CC} | Operating | - | 2 | 4 | mA |
| Output Leakage Current | I_{off} | $V_{OUT}=24\text{V}$ | - | < 0.1 | 10 | μA |
| Locked Protection On | T_{lrp-on} | | 0.4 | 0.5 | 0.6 | Sec |
| Locked Protection Off | $T_{lrp-off}$ | | - | 3 | - | Sec |
| Output saturation voltage | $V_{OUT(sat)}$ | $I_O=300\text{mA}$ | - | 375 | 500 | mV |
| | | $I_O=500\text{mA}$ | - | 625 | - | |
| Output On resistance | $R_{ds(on)}$ | $I_O=300\text{mA}$ | - | 1.25 | 1.67 | ohm |
| FG output Vds | V_{ol} | $I_O=10\text{mA}$ | - | 0.5 | - | V |
| Output Zener-breakdown Voltage | V_Z | | - | 42 | - | V |

■ Magnetic Characteristics ($T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{V}$, unless otherwise specified)

(1mT=10 Gauss)

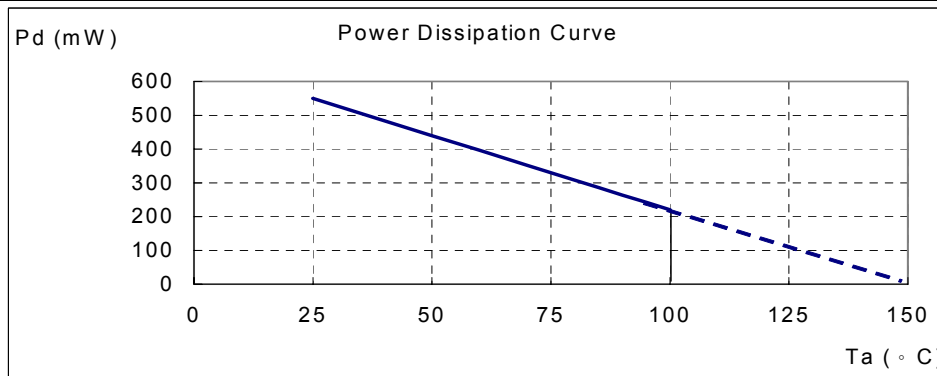
| Characteristics | Symbol | Min. | Typ. | Max. | Unit |
|-----------------|--------|------|------|------|-------|
| Operate Point | Bop | - | 30 | 60 | Gauss |
| Release Point | Brp | -60 | -30 | - | Gauss |
| Hysteresis | Bhy | - | 60 | - | Gauss |

■ Operating Characteristics



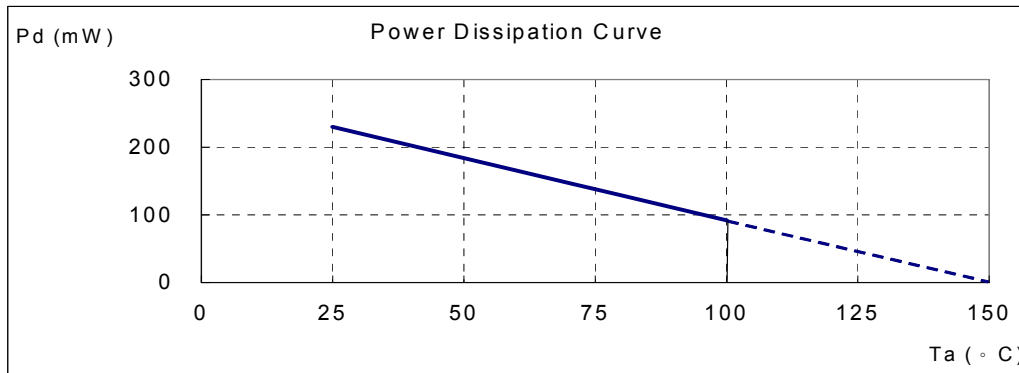
■ Performance Characteristics (SIP5)

| | | | | | | | | | |
|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Ta (°C) | 25 | 50 | 60 | 70 | 80 | 85 | 90 | 95 | 100 |
| Pd (mW) | 550 | 440 | 396 | 352 | 308 | 286 | 264 | 242 | 220 |
| Ta (°C) | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 150 |
| Pd (mW) | 198 | 176 | 154 | 132 | 110 | 88 | 66 | 44 | 0 |



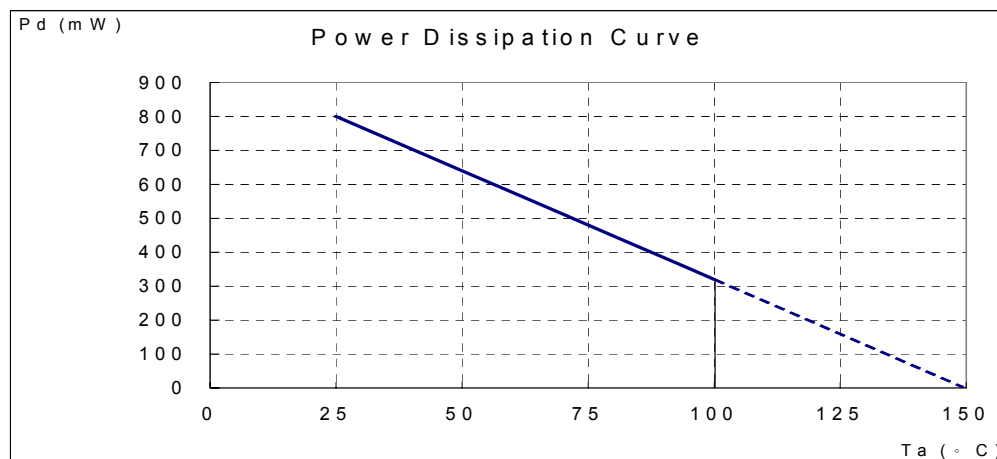
■ Performance Characteristics (SOT23-5)

| Ta (°C) | 25 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pd (mW) | 230 | 184 | 166 | 147 | 129 | 110 | 92 | 74 | 55 | 37 | 18 | 0 |



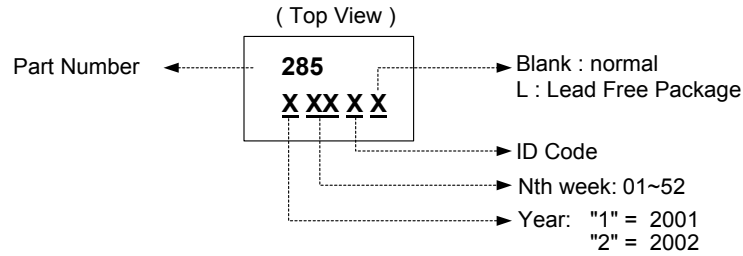
■ Performance Characteristics (SOT89-5)

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

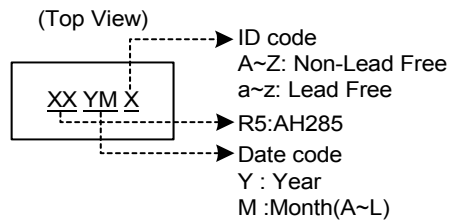


■ Marking Information

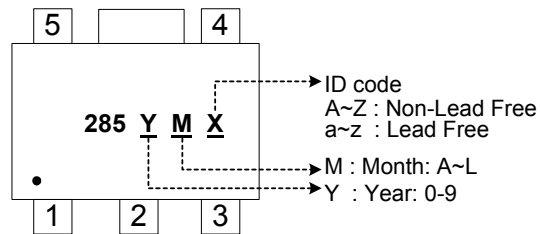
(1)SIP-5L



(2)SOT23-5L

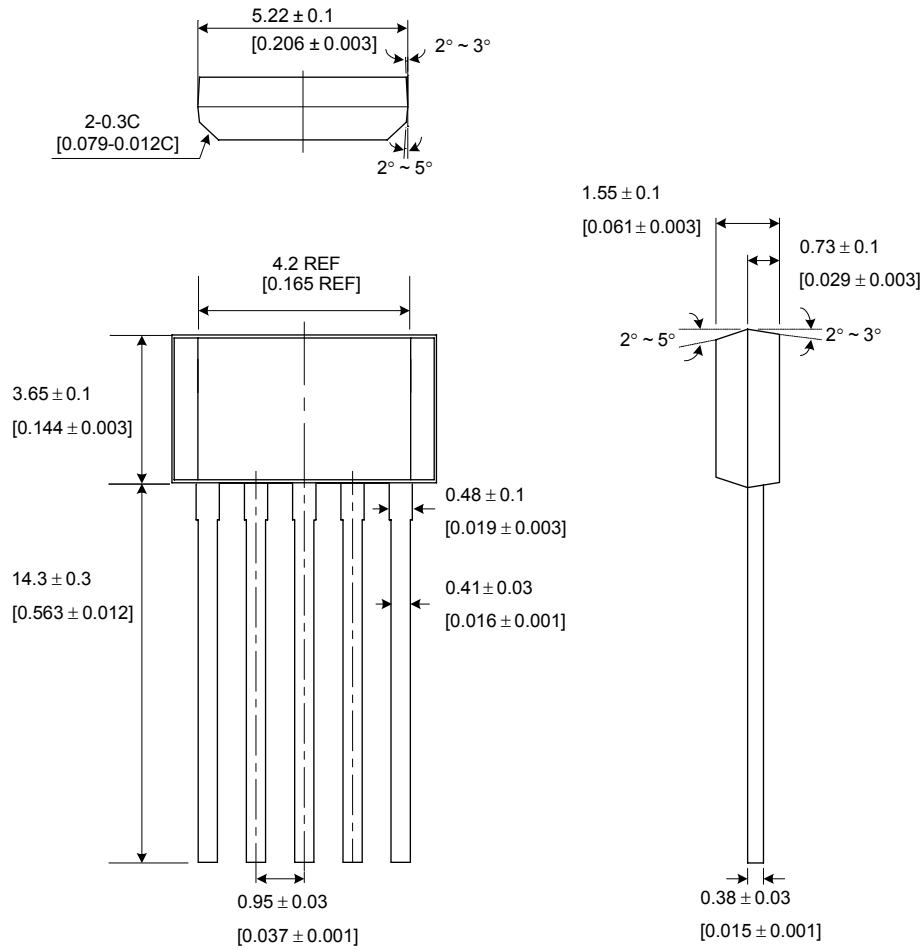


(3)SOT89-5L

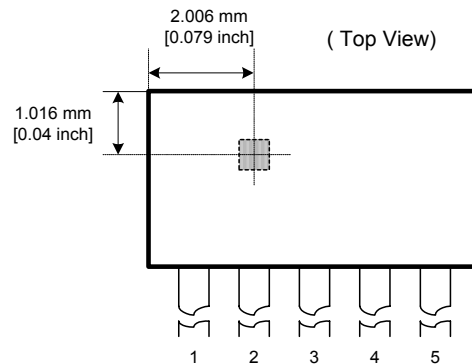


■ Package Information

(1) Package type: SIP-5L (unit: mm / [inch])

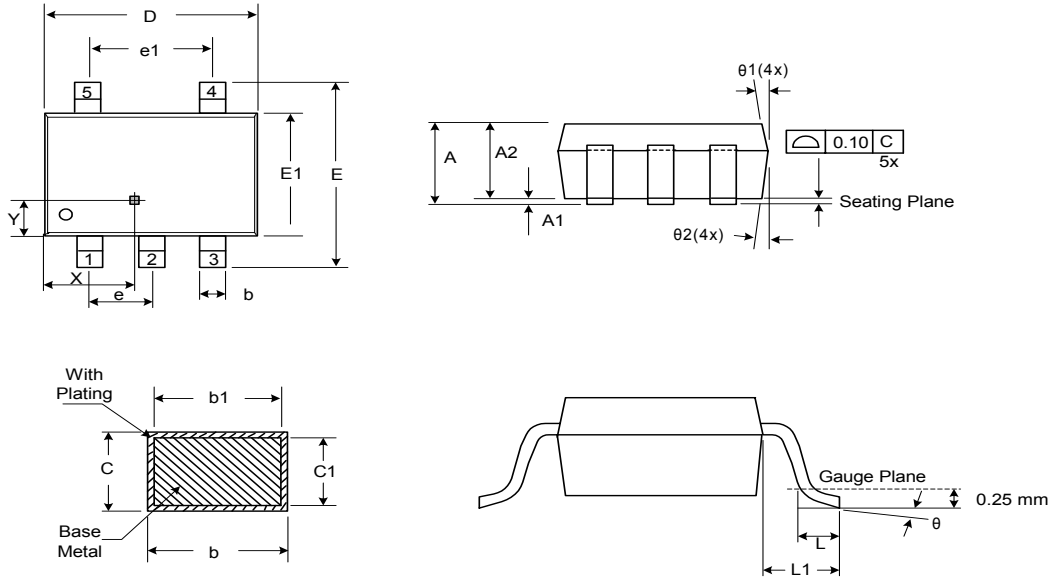


■ Location of Sensing Point



Hall-Effect Smart Fan Motor Controller

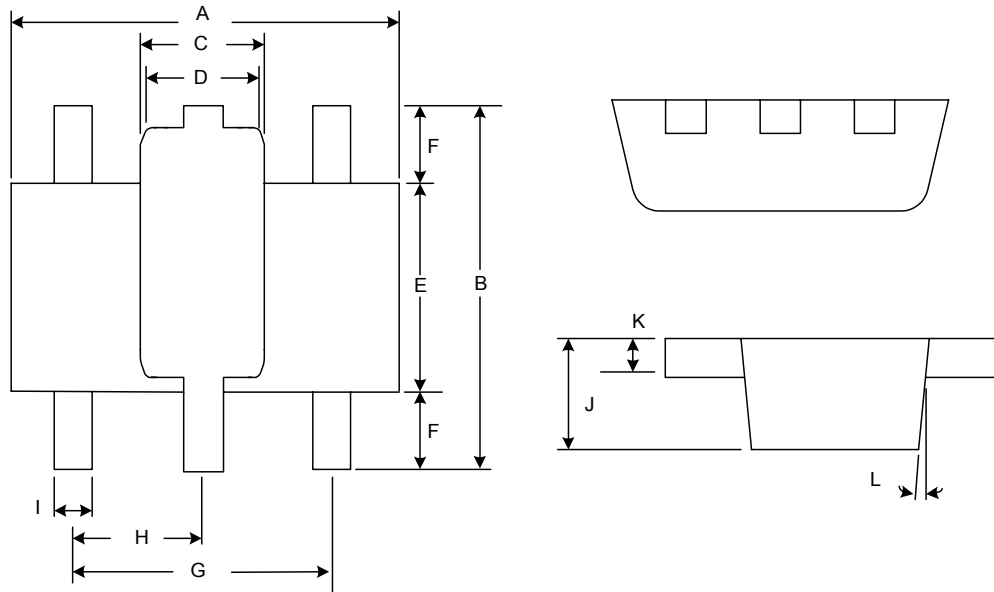
(2) SOT23-5L



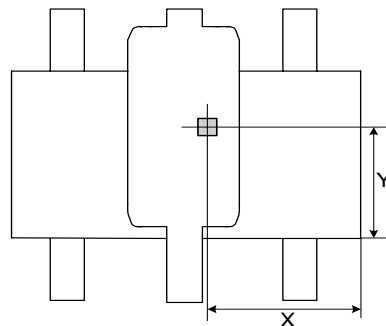
| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|------------|---------------------------|-------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 1.05 | 1.20 | 1.35 | 0.041 | 0.047 | 0.053 |
| A1 | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 1.00 | 1.10 | 1.20 | 0.039 | 0.043 | 0.047 |
| b | 0.25 | - | 0.55 | 0.010 | - | 0.022 |
| b1 | 0.25 | 0.40 | 0.45 | 0.010 | 0.016 | 0.018 |
| c | 0.08 | - | 0.20 | 0.003 | - | 0.008 |
| c1 | 0.08 | 0.11 | 0.15 | 0.003 | 0.004 | 0.006 |
| D | 2.70 | 2.85 | 3.00 | 0.106 | 0.112 | 0.118 |
| E | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| E1 | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| L | 0.35 | 0.45 | 0.55 | 0.014 | 0.018 | 0.022 |
| L1 | 0.60 Ref. | | | 0.024 Ref. | | |
| e | 0.95 Bsc. | | | 0.037 Bsc. | | |
| e1 | 1.90 Bsc. | | | 0.075 Bsc. | | |
| θ | 0° | 5° | 10° | 0° | 5° | 10° |
| $\theta 1$ | 3° | 5° | 7° | 3° | 5° | 7° |
| $\theta 2$ | 6° | 8° | 10° | 6° | 8° | 10° |
| X | - | 1.067 | - | - | 0.042 | - |
| Y | - | 0.432 | - | - | 0.017 | - |

Hall-Effect Smart Fan Motor Controller

(3) Package type: SOT89-5L



Package Sensor Location



| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|--------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 4.40 | 4.50 | 4.60 | 0.173 | 0.177 | 0.181 |
| B | 4.05 | 4.15 | 4.25 | 0.159 | 0.163 | 0.167 |
| C | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| D | 1.30 | 1.40 | 1.50 | 0.051 | 0.055 | 0.059 |
| E | 2.40 | 2.50 | 2.60 | 0.094 | 0.098 | 0.102 |
| F | 0.80 | - | - | 0.031 | - | - |
| G | 3.00 Ref. | | | 0.118 Ref. | | |
| H | 1.50 Ref. | | | 0.059 Ref. | | |
| I | 0.40 | 0.46 | 0.52 | 0.016 | 0.018 | 0.020 |
| J | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| K | 0.35 | 0.39 | 0.43 | 0.014 | 0.015 | 0.017 |
| L | 5° Typ. | | | 5° Typ. | | |
| X | - | 1.90 | - | - | 0.075 | - |
| Y | - | 1.65 | - | - | 0.065 | - |