

### Description

The AH5792 is a single chip solution for driving single-coil brush-less DC fans and motors. The AH5792 employs a bidirectional full bridge driver output stage for single coil fan motor applications. The device includes features such as Rotor Lock Protection with rotor lock detection and automatic self-restart to avoid damage to the coil when the rotor is blocked.

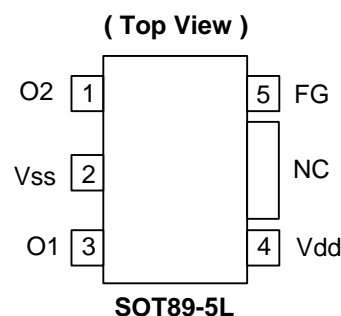
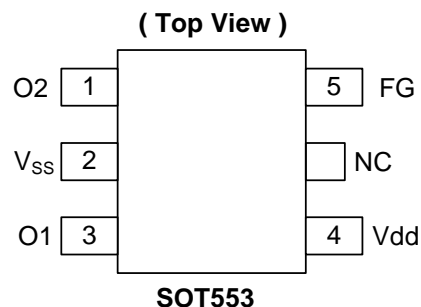
The AH5792 also offers an externally controlled Tachometer (Frequency Generator Pin) open -drain output which makes it easier to connect with external interface such as hardware monitoring. The FG is half (1/2) the magnetic change frequency.

The devices are packaged in SOT553 and SOT89-5L small outline packages for applications such as small motors like vibration motors or ultra thin cooling fans.

### Features

- Support single-phase full wave min fan driver
- Built-in Hall sensor input amplifier
- Low voltage startup ( V<sub>dd</sub>=1.8V )
- Lock detection and automatic self-restart
- Without external timing capacitor, Reduces the numbers of external component required
- FG output
- Low profile package : SOT553 and SOT89-5L
- “Green” Molding Compound

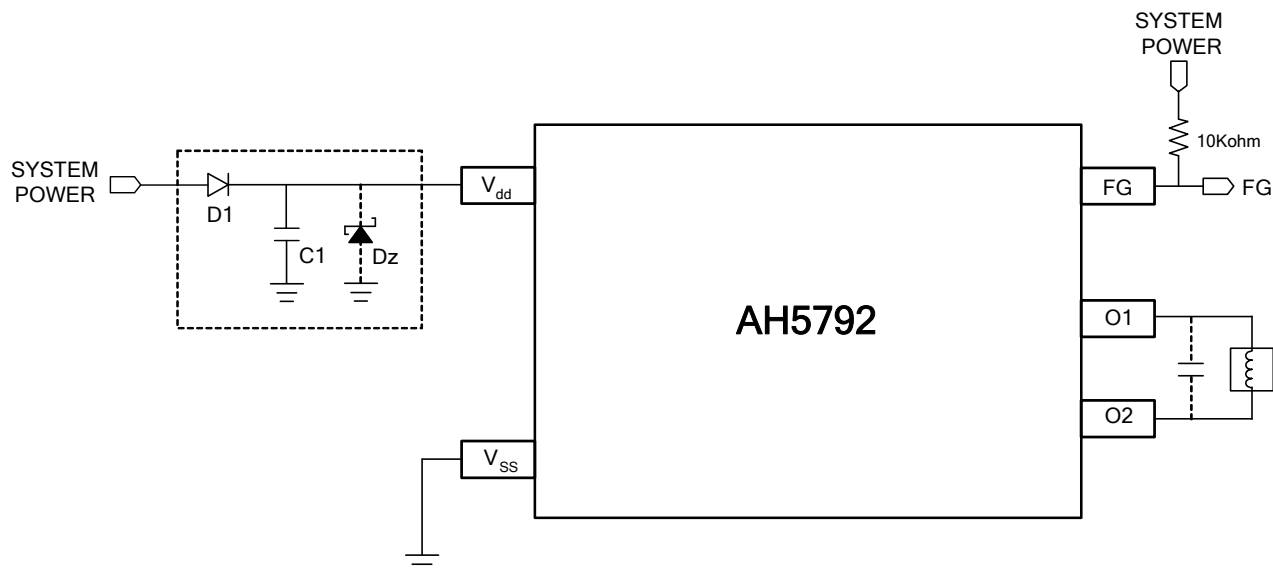
### Pin Assignments



### Applications

- 3.3V / 5V Min. DC Fans (Eight Pole)
- Low Voltage / BLDC Motors
- Micro-Vibration Motors

**Typical Application Circuit (Note 1)**



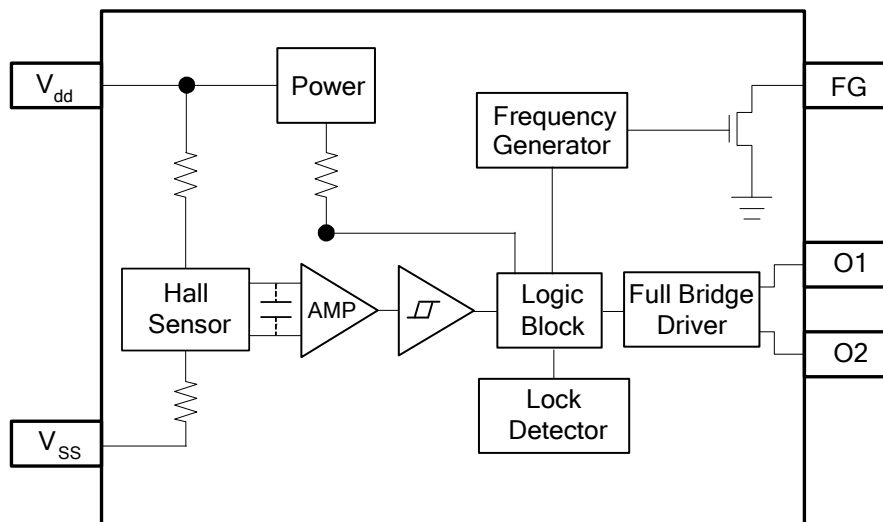
- Notes: 1. Reverse connection of power supply may break the device. A countermeasure is needed such as using reverse power protection diode D1 between power supply and Vdd terminal. In such case of using reverse power protection diode D1 because of there is no way to return current to power supply, please take necessary measures like below.
- Connect Dz (Zener diode) between Vdd and Vss terminal, not to exceed the absolute maximum rating voltage.
  - Connect a capacitor C1 between Vdd and Vss terminal, to make the path of return current to power supply.
- The AH5792 has an open-drain tachometer FG output that follows the half (1/2) the magnetic change frequency. A pull-up resistor (10Kohm, typically for System Power = 5V) connected to a supply voltage.

**Pin Descriptions (Note 2)**

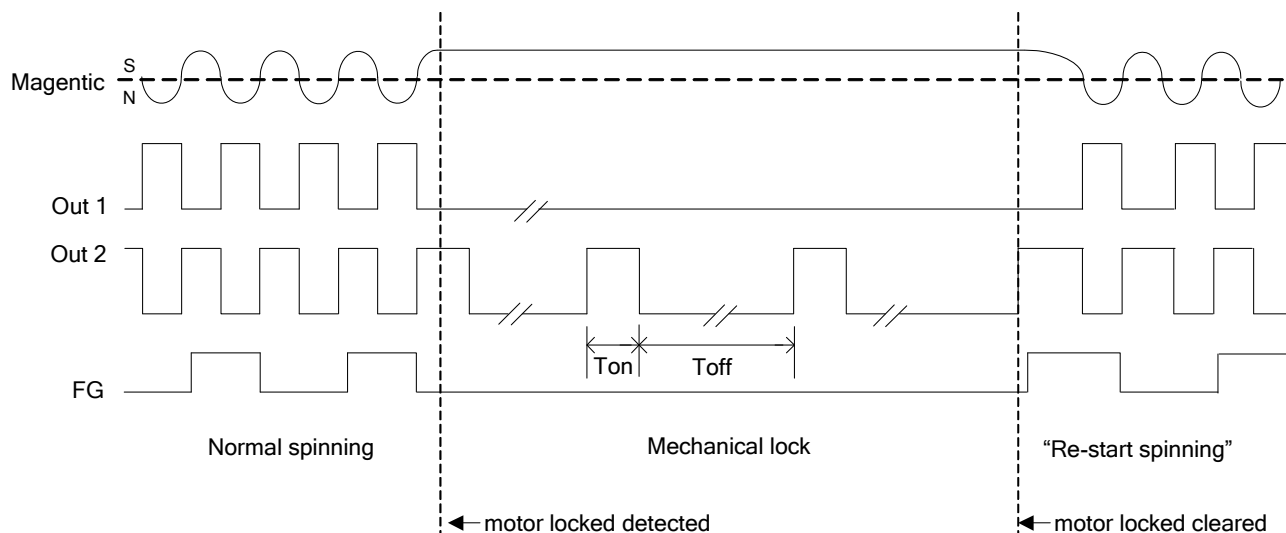
| Pin Name | Description                    |
|----------|--------------------------------|
| O1       | Output driving & sinking pin 1 |
| Vdd      | Power supply pin               |
| Vss      | Ground pin                     |
| FG       | Frequency Generator (Note 2)   |
| O2       | Output driving & sinking Pin 2 |
| NC       | No Connection                  |

- Notes: 2. The FG is half (1/2) the magnetic change frequency.

**Functional Block Diagram**



**Operating (Note 3, 4, 5)**



- Notes:
- In "Normal spinning, the FG shall change its state at each rising edge of OUT2. In "Mechanical lock", the FG state is kept as the same as the moment of motor locked detected.
  - When magnetic is locked as "S" pole, then out1 is kept on "L", out2 is a clock with  $T_{on}/T_{off}$  ratio. When magnetic is locked at "N" pole, then out 2 is kept on "L", out 1 is a clock with  $T_{on}/T_{off}$  ratio.
  - When "Re-start spinning" occurs, the motor shall ramp up to the "Normal Spinning" speed from zero. It depends on the motor characteristics.

## SINGLE PHASE HALL EFFECT LATCH SMART FAN MOTOR CONTROLLER

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

| Symbol               | Characteristics               | Values    | Unit   |
|----------------------|-------------------------------|-----------|--------|
| V <sub>DD</sub>      | Supply voltage                | 6         | V      |
| I <sub>O(PEAK)</sub> | Maximum Output Current (Peak) | SOT553    | 400 mA |
|                      |                               | SOT89-5L  | 500 mA |
| P <sub>D</sub>       | Power Dissipation             | SOT553    | 230 mW |
|                      |                               | SOT89-5L  | 800 mW |
| T <sub>ST</sub>      | Storage Temperature Range     | -65 ~ 150 | °C     |

### Recommended Operating Conditions ( $T_A = 25^\circ\text{C}$ )

| Symbol          | Parameter                   | Conditions | Rating      | Unit |
|-----------------|-----------------------------|------------|-------------|------|
| V <sub>DD</sub> | Supply Voltage              | Operating  | 1.8 to 5.0  | V    |
| T <sub>A</sub>  | Operating Temperature Range | Operating  | -40 to +100 | °C   |

### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ , V<sub>DD</sub> = 5.0V)

| Symbol            | Characteristic            | Conditions                                 | Min | Typ. | Max | Unit |
|-------------------|---------------------------|--|-----|------|-----|------|
| I <sub>DD</sub>   | Supply Current            | No Load                                    | -   | 3.5  | 5   | mA   |
| V <sub>OH</sub>   | Output Voltage High       | I <sub>OUT</sub> = 200mA<br>(For SOT553)   | 4.4 | -    | -   | V    |
|                   |                           | I <sub>OUT</sub> = 300mA<br>(For SOT89-5L) |     |      |     |      |
| V <sub>OL</sub>   | Output Voltage Low        | I <sub>OUT</sub> = 200mA<br>(For SOT553)   | -   | -    | 0.6 | V    |
|                   |                           | I <sub>OUT</sub> = 300mA<br>(For SOT89-5L) |     |      |     |      |
| I <sub>OUT</sub>  | Output Current            | R <sub>L</sub> = 30Ω                       | -   | 148  | -   | mA   |
| I <sub>Leak</sub> | FG Output Leakage Current |  | -   | -    | 5   | μA   |
| I <sub>FG</sub>   | FG Output Current         | V <sub>FGOL</sub> = 0.4V                   | 5   | -    | -   | mA   |
| V <sub>FGOL</sub> | FG Output Voltage Low     | I <sub>FG</sub> = 5mA                      | -   | -    | 0.4 | V    |
| T <sub>ON</sub>   | On Time                   |  | -   | 215  | -   | ms   |
| R <sub>DR</sub>   | Duty Ratio                | T <sub>OFF</sub> / T <sub>ON</sub>         | -   | 10   | -   |      |

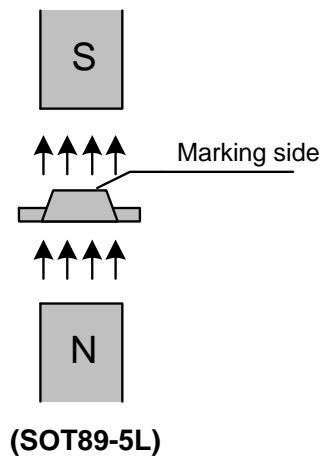
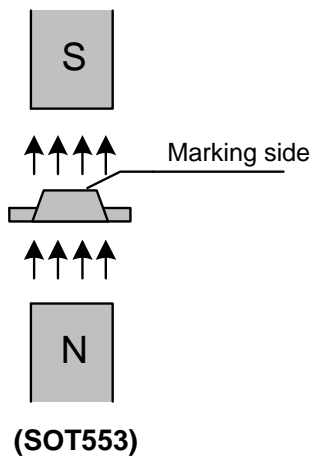
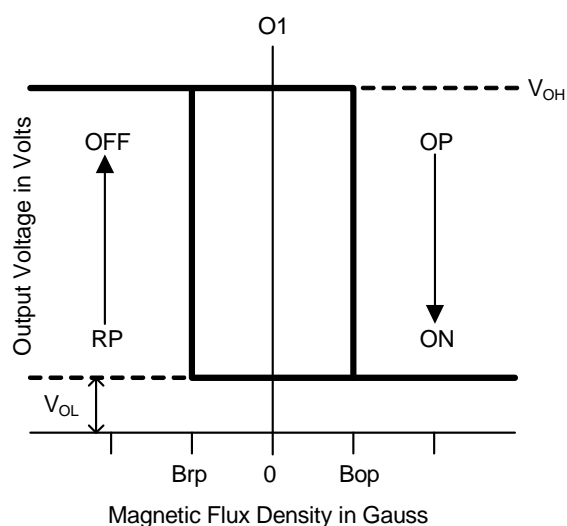
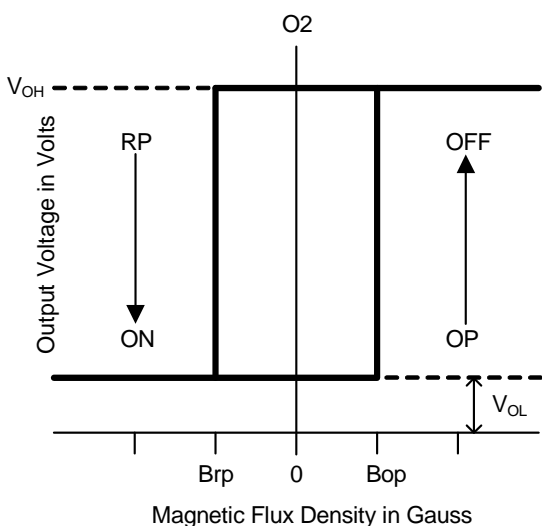
**Magnetic Characteristics** ( $T_A = 25^\circ\text{C}$ ,  $V_{dd} = 1.8\text{V}\sim 5.0\text{V}$ , Note 6)

(1mT = 10 G)

| Symbol   | Parameter     | Min | Typ. | Max | Unit |
|----------|---------------|-----|------|-----|------|
| $B_{op}$ | Operate Point | 10  | 30   | 50  | G    |
| $B_{rp}$ | Release Point | -50 | -30  | -10 | G    |
| $B_{hy}$ | Hysteresis    | -   | 60   | -   | G    |

Notes: 6. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

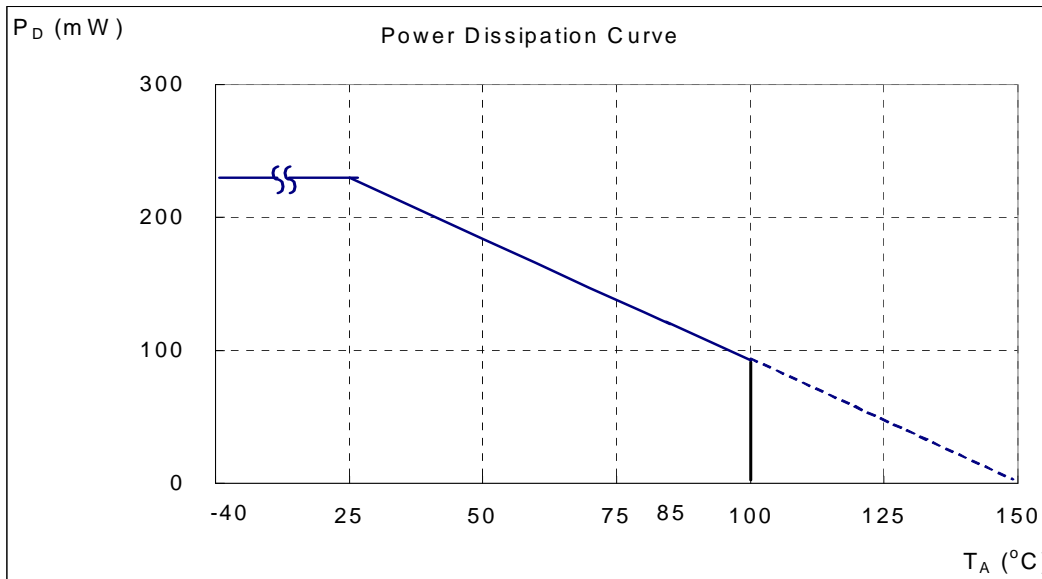
**Operating Characteristics**



**Performance Characteristics**

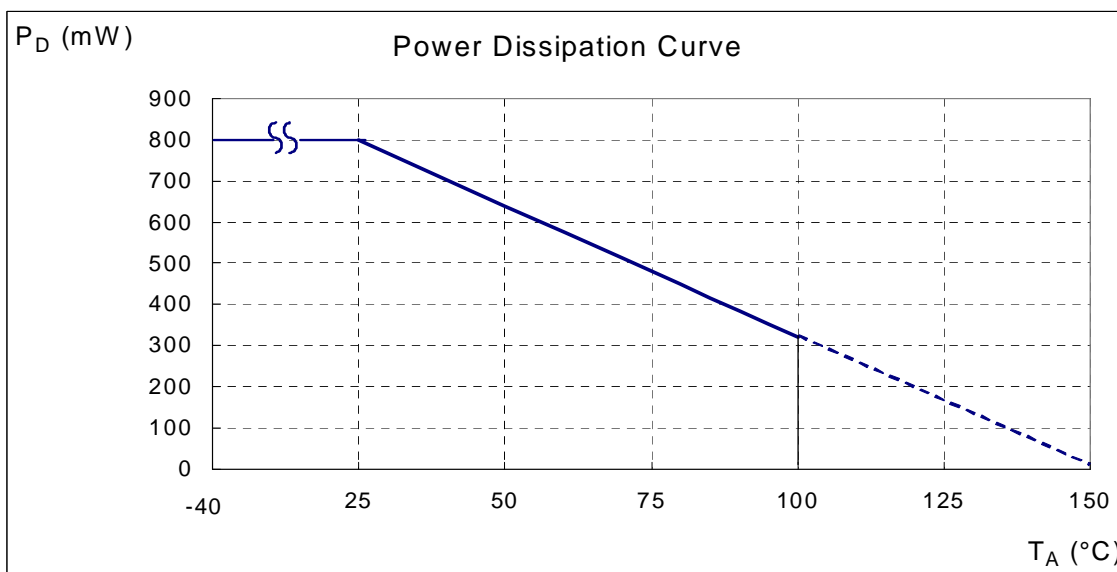
**(1) SOT553**

| T <sub>A</sub> (°C) | 25  | 50  | 60  | 70  | 80  | 85  | 90  | 100 | 110 | 120 | 130 | 140 | 150 |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| P <sub>D</sub> (mW) | 230 | 184 | 166 | 147 | 129 | 120 | 110 | 92  | 74  | 55  | 37  | 18  | 0   |

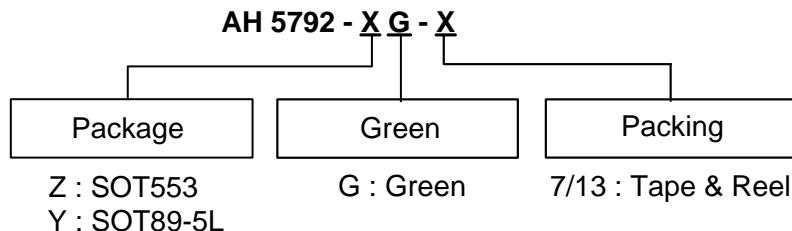


**(2) SOT89-5L**

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



**Ordering Information**

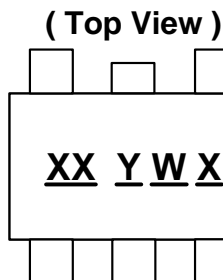


| Device       | Package Code | Packaging (Note 7 & 8) | 7"/13" Tape and Reel |                    |
|--------------|--------------|------------------------|----------------------|--------------------|
|              |              |                        | Quantity             | Part Number Suffix |
| AH5792-ZG-7  | Z            | SOT553                 | 3000/Tape & Reel     | -7                 |
| AH5792-YG-13 | Y            | SOT89-5L               | 2500/Tape & Reel     | -13                |

Notes: 7. 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>  
 8. 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**

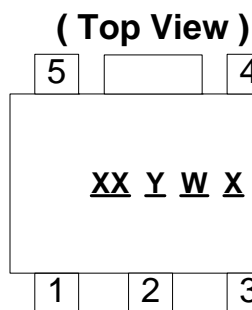
**(1) SOT553**



XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week;  
 z represents 52 and 53 week  
X : A~Z : Green

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH5792      | SOT553  | KE                  |

**(2) SOT89-5L**

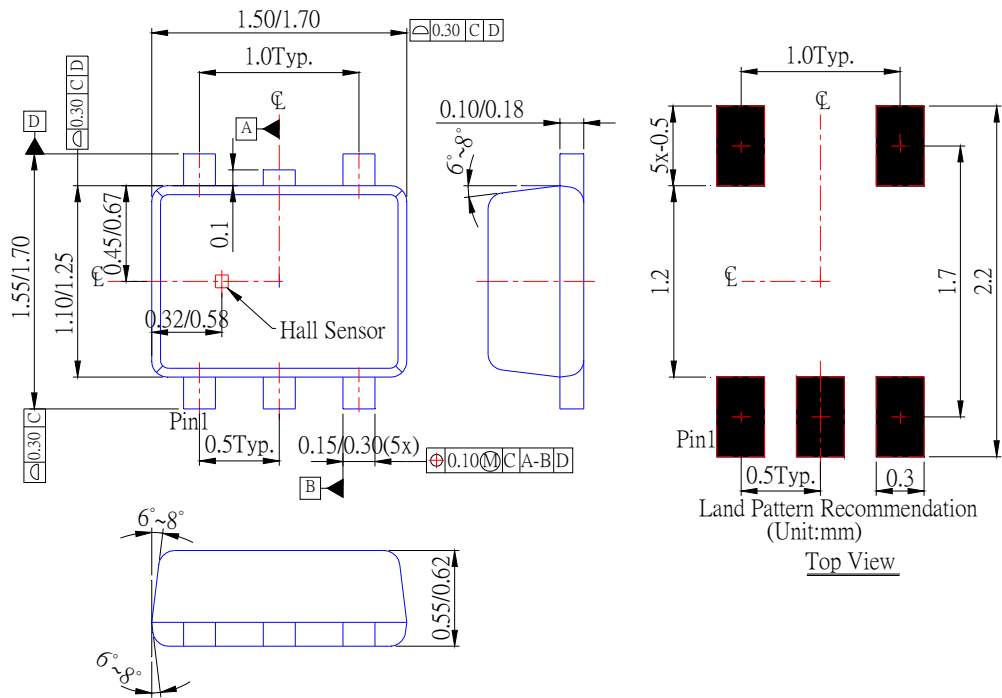


XX : Identification code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week;  
 z represents 52 and 53 week  
X : Internal code  
 A~Z : Green

| Part Number | Package  | Identification Code |
|-------------|----------|---------------------|
| AH5792      | SOT89-5L | KF                  |

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

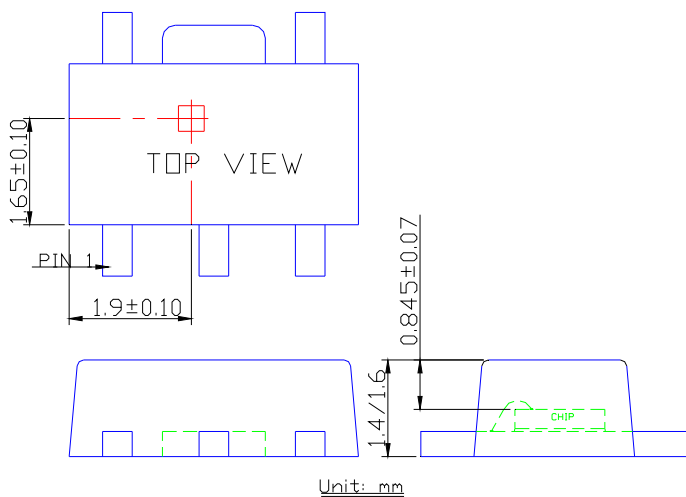
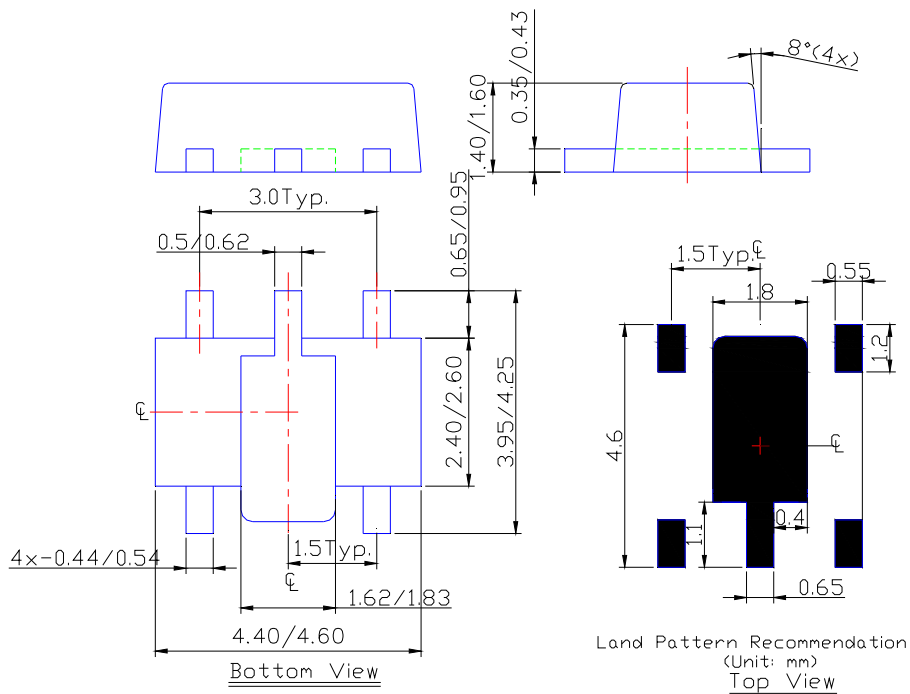
**(1) Package Type: SOT553**





**Package Outline Dimensions (Continued)**

(2) Package type: SOT89-5L



**Sensor Location**

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