



# PT3639

## Hi-sensitivity Unipolar Hall Switch

### Applications

- Automotive Brake Pedal Position detection
- Proximity detection
- Weak magnets application
- Solid state switches

### Features

- 2.8V to 24V wide operation voltage
- High accuracy unipolar switch
- Dynamic offset cancellation
- Open drain output
- Low thermal drift magnetic sensing

### Ordering information

- PT3639-PA-T  
Package(PA): UA or LH or LT  
Temperature(T): A or K

### Specifications

#### Absolute Maximum Ratings (Ta=25°C)

| Parameter                   | Symbol      | Conditions | Rating            | Unit |
|-----------------------------|-------------|------------|-------------------|------|
| Maximum supply voltage      | $V_{DDMAX}$ |            | 28                | V    |
| Allowable power dissipation | $P_D$       | TO-92(UA)  | 550 <sup>*1</sup> | mW   |
|                             |             | SOT-23(LH) | 300 <sup>*1</sup> | mW   |
|                             |             | SOT-89(LT) | 500 <sup>*1</sup> | mW   |
| Operating temperature range | $T_A$       | Suffix 'A' | -40~+150          | °C   |
|                             |             | Suffix 'K' | -40~+125          | °C   |
| Storage temperature range   | $T_S$       |            | -55~+150          | °C   |
| Max. output current         | $I_{OMAX}$  |            | 50                | mA   |

\*1: On 50mm x 50mm x 1.6mm glass epoxy board

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### Electrical Characteristics ( $T_A=+25^{\circ}\text{C}$ , $V_{DD}=12\text{V}$ )

| Characteristic         | Symbol   | Test Condition          | Min. | Typ. | Max. | Units         |
|------------------------|----------|-------------------------|------|------|------|---------------|
| Supply Voltage         | $V_{DD}$ |                         | 3.8  |      | 24   | V             |
| Output Sink Voltage    | $V_{OL}$ | @ $I_{OUT}=20\text{mA}$ |      | 130  | 280  | mV            |
| Output Leakage Current | $I_{OH}$ | Output switch off       |      |      | 0.1  | $\mu\text{A}$ |
| Output Clamp Voltage   | $V_{BV}$ |                         |      | 28   | 30   | V             |
| Supply Current         | $I_{DD}$ | Output open             |      | 4    | 6    | mA            |

### Magnetic Characteristics ( $T_A=+25^{\circ}\text{C}$ , $V_{DD}=12\text{V}$ )

|               |           |  |     |     |     |   |
|---------------|-----------|--|-----|-----|-----|---|
| Operate Point | $B_{OP}$  |  | -72 | -55 | -38 | G |
| Release Point | $B_{RP}$  |  | -50 | -35 | -20 | G |
| Hysteresis    | $B_{HYS}$ |  | 15  | 20  | 27  | G |

### Magnetic Characteristics ( $T_A=-40^{\circ}\text{C}\sim 150^{\circ}\text{C}$ , $V_{DD}=12\text{V}$ )

|               |           |  |     |  |     |   |
|---------------|-----------|--|-----|--|-----|---|
| Operate Point | $B_{OP}$  |  | -77 |  | -34 | G |
| Release Point | $B_{RP}$  |  | -54 |  | -18 | G |
| Hysteresis    | $B_{HYS}$ |  | 10  |  | 28  | G |

## General Specifications

The PT3639 is a high sensitive unipolar Hall switch sensor. The built-in dynamic offset cancellation and temperature compensation of pre-amplifier stage achieves accuracy magnetic sensing. The wide supply voltage range is from 3.8V to 24V and the maximum output current is 50mA.

This Hall-effect sensor IC integrated the Hall plate, pre-amplifier with dynamic offset cancellation, hysteresis comparator and protection circuit in single chip. The architecture block diagram is shown in Fig. 1.

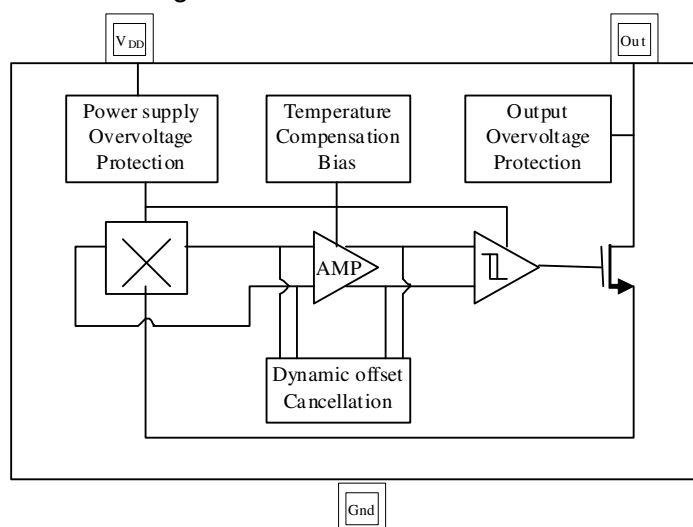
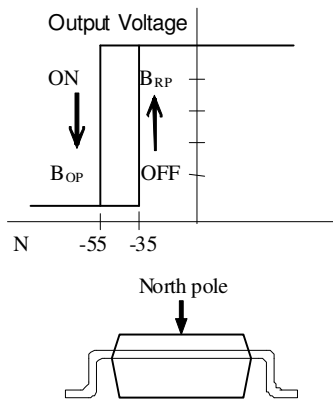
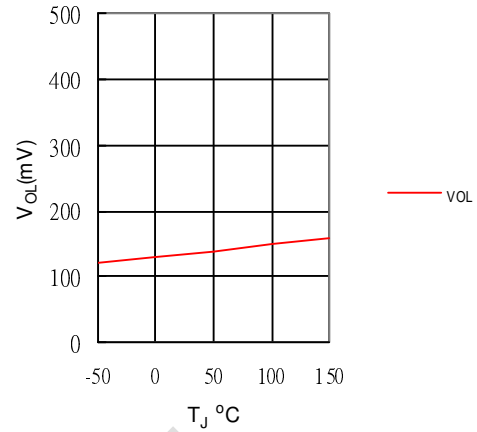


Fig. 1. Functional diagram

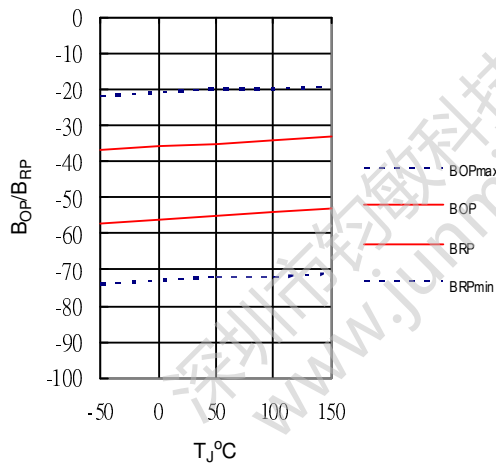
Magnetic Flux Density in G



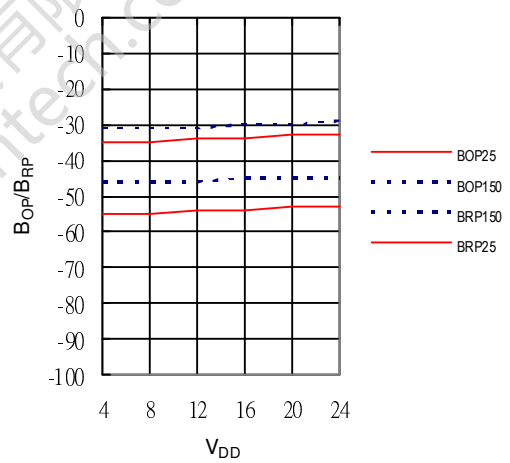
Output sink voltage versus temperature



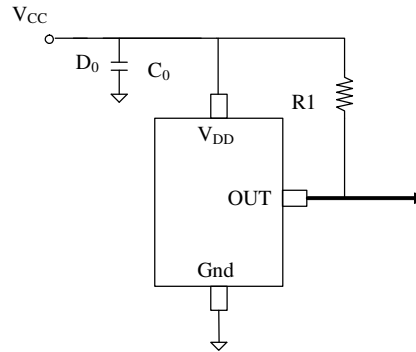
$B_{OP}$ ,  $B_{RP}$  versus temperature



$B_{OP}$ ,  $B_{RP}$  versus supply voltage



## Application circuits



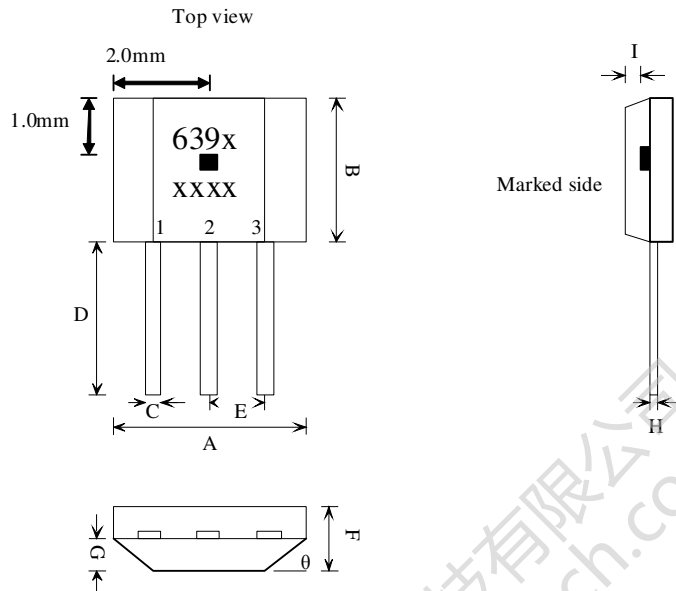
NOTE :

$C_0$ : decoupling capacitor 0.1 $\mu$ F(recommended)

$R1$ : 1K~10Kohm (recommended)

## Package Outline

### TO-92(UA)



Marking:

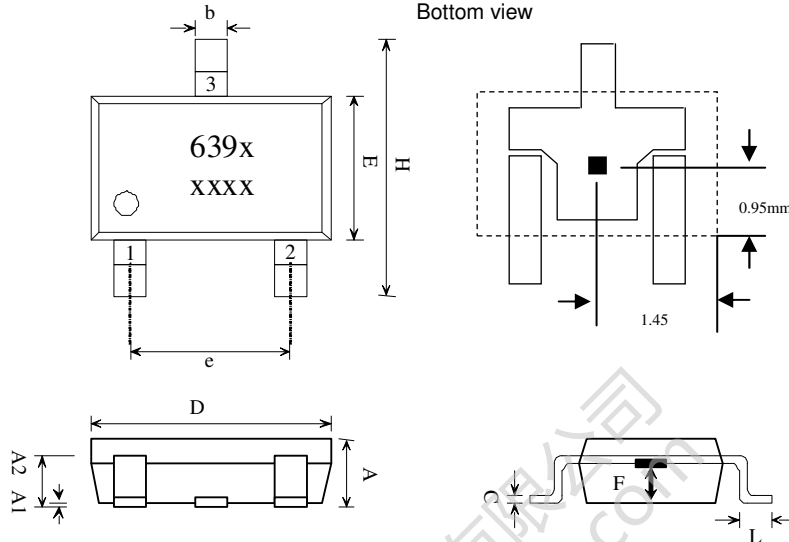
Part Number : 639 Temperature code : x  
 Date Code : xx(Year) xx(Week)

1. VDD/DC power supply
2. GND/DC ground
3. OUT/output pin

| SYMBOLS  | DIMENSIONS IN MILLIMETERS(mm) |       |       |
|----------|-------------------------------|-------|-------|
|          | MIN                           | NOM   | MAX   |
| A        | 3.80                          | 4.00  | 4.20  |
| B        | 2.90                          | 3.10  | 3.30  |
| C        | 0.38                          | 0.45  | 0.52  |
| D        | 15.10                         | 15.30 | 15.50 |
| E        | 1.24                          | 1.27  | 1.30  |
| F        | 1.45                          | 1.50  | 1.55  |
| G        | 0.68                          | 0.73  | 0.78  |
| H        | 0.36                          | 0.43  | 0.50  |
| I        | 0.41                          | 0.43  | 0.45  |
| $\theta$ |                               | 45°   |       |

## Package Outline SOT-23(LH)

## Sensor Location



### Marking:

Part Number : 639 Temperature code : x  
Date Code : xx(Year) xx(Week)

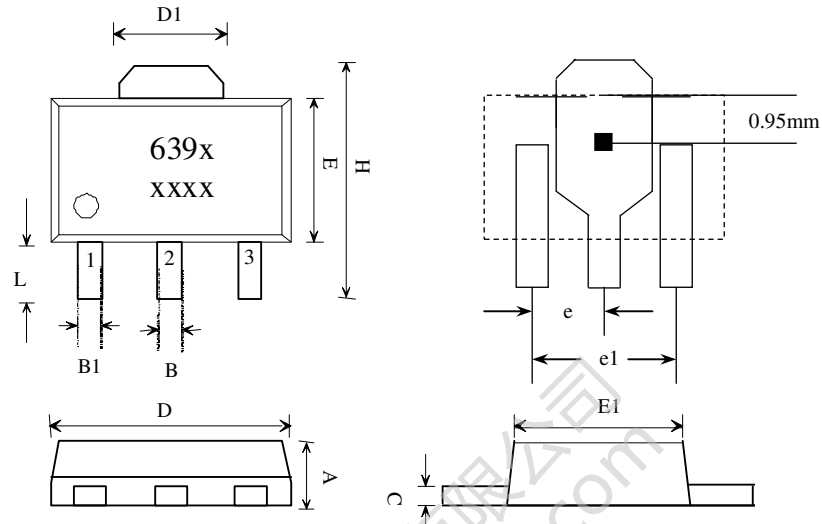
1. VDD/DC power supply
2. OUT/output pin
3. GND/DC ground

| SYMBOLS | DIMENSIONS IN MILLIMETERS(mm) |      |      |
|---------|-------------------------------|------|------|
|         | MIN                           | NOM  | MAX  |
| A       | 1.00                          | 1.10 | 1.30 |
| A1      | 0.00                          | -    | 0.10 |
| A2      | 0.70                          | 0.80 | 0.90 |
| b       | 0.35                          | 0.40 | 0.50 |
| C       | 0.10                          | 0.15 | 0.25 |
| D       | 2.70                          | 2.90 | 3.10 |
| E       | 1.40                          | 1.80 | 2.00 |
| F       | 0.35                          | 0.50 | 0.65 |
| H       | 2.60                          | 2.8  | 3.00 |
| e       | 1.7                           | 1.9  | 2.1  |
| L       | 0.20                          | -    | -    |

**Package Outline**  
**SOT-89(LT)**

**Sensor Location**

Bottom view



Marking:

Part Number : 639 Temperature code : x

Date Code : xx(Year) xx(Week)

1. VDD/DC power supply

2. GND/DC ground

3. OUT/output pin

| SYMBOLS | DIMENSIONS IN MILLIMETERS(mm) |      |      |
|---------|-------------------------------|------|------|
|         | MIN                           | NOM  | MAX  |
| A       | 1.40                          | 1.50 | 1.60 |
| B       | 0.44                          | 0.50 | 0.56 |
| B1      | 0.36                          | 0.42 | 0.48 |
| C       | 0.35                          | 0.40 | 0.44 |
| D       | 4.40                          | 4.50 | 4.60 |
| D1      | 1.52                          | 1.67 | 1.83 |
| E       | 2.30                          | 2.45 | 2.60 |
| E1      | 2.13                          | 2.21 | 2.29 |
| e       | -                             | 1.50 | -    |
| e1      | -                             | 3.00 | -    |
| H       | 3.94                          | 4.10 | 4.25 |
| L       | 0.89                          | 1.05 | 1.20 |