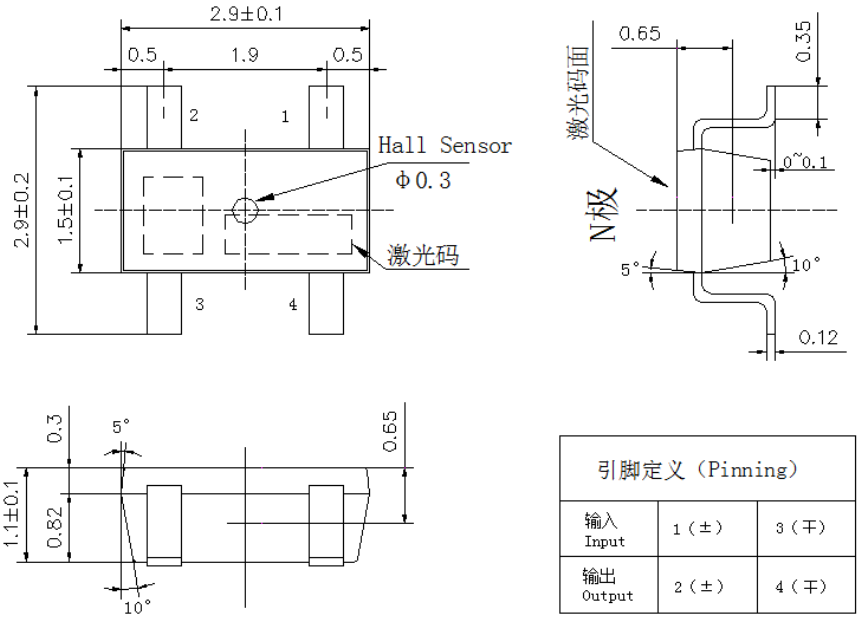
# MW601 InSb Hall Element

Ultra High-sensitivity InSb Hall element

Classic SOT Package

Shipped in packet-tape reel (3,000pcs per reel)

## Dimensional Drawing (Unit: mm)




| 引脚定义（Pinning） | | |
|---|---|---|
| 输入 Input | 1（±） | 3（干） |
| 输出 Output | 2（±） | 4（干） |

## Absolute Maximum Rating

| | |
|---|---|
| Operating Temperature Range | -40℃ ~ 125℃ |
| Storage Temperature Range | -55℃ ~ 150℃ |
| Maximum Input Voltage $I_{cmax}$ | 20mA |

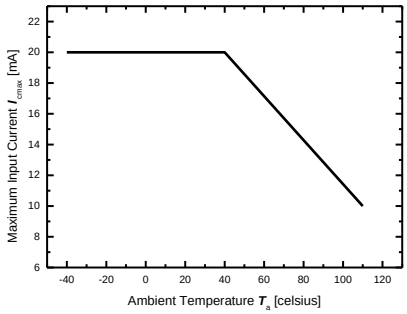



**Figure 1.** Maximum input current $I_{cmax}$

# Electrical Characteristics （RT=25℃）

**Table 1.** Electrical Characteristics of MW601.

| Item | Symbol | Test Condi. | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Hall Voltage | $V_H$ | $B$ = 50mT, $V_C$=1V<br>$T_a$ = RT | 168 | | 516 | mV |
| Input Resistance | $R_{in}$ | $B$ = 0mT, $I_C$ = 0.1mA<br>$T_a$ = RT | 240 | | 550 | Ω |
| Output Resistance | $R_{out}$ | $B$ = 0mT, $I_C$ = 0.1mA<br>$T_a$ = RT | 240 | | 550 | Ω |
| Offset Voltage | $V_{os}$ | $B$ = 0mT, $V_C$ = 1V<br>$T_a$ = RT | -5 | | +5 | mV |
| Temp. Coeffi. of $V_H$ | $\alpha V_H$ | $B$ = 50mT, $I_C$ =5mA,<br>$T_a$ = 0℃ ~ 40℃ | | -1.8 | | %/℃ |
| Temp. Coeffi. of $R_{in}$ | $\alpha R_{in}$ | $B$ = 0mT, $I_C$ =0.1mA,<br>$T_a$ = 0℃ ~ 40℃ | | -1.8 | | %/℃ |
| Dielectric strength | | 100V D.C | 1.0 | | | MΩ |

Note:

1. $\boldsymbol{V}_{\mathrm{H}} = \boldsymbol{V}_{\mathrm{H-M}} - \boldsymbol{V}_{\mathrm{os}}$

   In which $\boldsymbol{V}_{\mathrm{H\text{-}M}}$ is the Output Hall Voltage, $\boldsymbol{V}_{\mathrm{H}}$ is the Hall Voltage and $\boldsymbol{V}_{\mathrm{os}}$ is the offset Voltage under the identical electrical stimuli.

2. $\alpha V_H = \frac{1}{V_H(T_1)} \times \frac{V_H(T_3) - V_H(T_2)}{(T_3 - T_2)} \times 100$

3. $\alpha R_{in} = \frac{1}{R_{in}(T_1)} \times \frac{R_{in}(T_3) - R_{in}(T_2)}{(T_3 - T_2)} \times 100$

   $\boldsymbol{T}_1 = 20℃$, $\boldsymbol{T}_2 = 0℃$, $\boldsymbol{T}_3 = 40℃$

## Classification of Output Hall Voltage ( $V_H$ )

**Table 2.** Classification of Hall Voltage

| Rank | $V_H$ [mV] | Conditions |
|---|---|---|
| C | 168 ~ 204 | B=50mT, $V_C$=1V |
| D | 196 ~ 236 | |
| E | 228 ~ 274 | |
| F | 266 ~ 320 | |
| G | 310 ~ 370 | |
| H | 360 ~ 415 | |
| I | 405 ~ 465 | |
| J | 454 ~ 516 | |

## Characteristic Curves

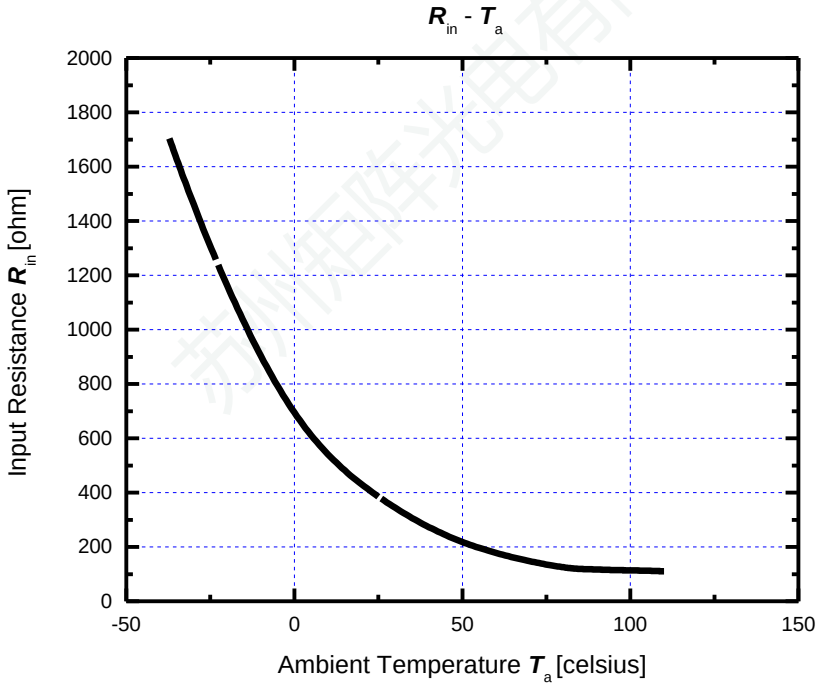



**Figure 2.** Input resistance $R_{in}$ as a function of ambient temperature $T_a$.

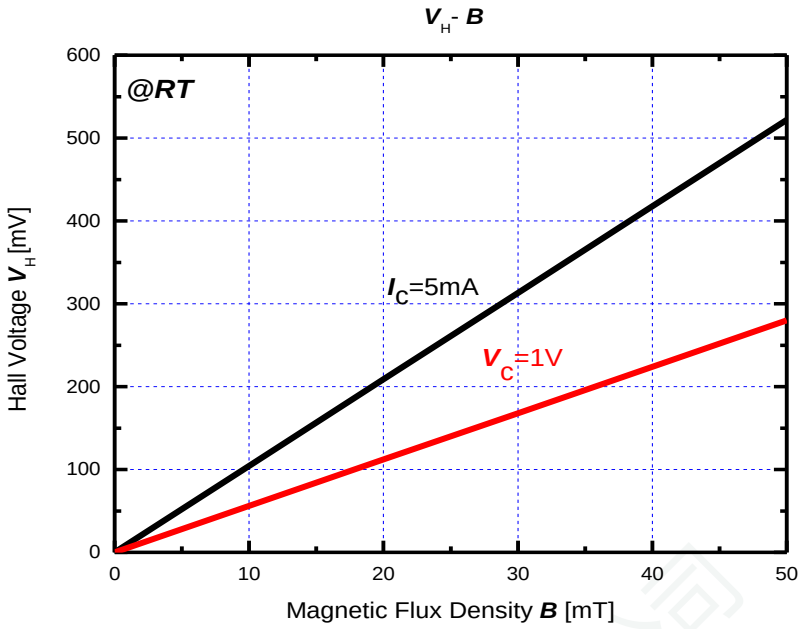



**Figure 3**. Hall voltage $V_H$ as a function of magnetic flux density $B$.

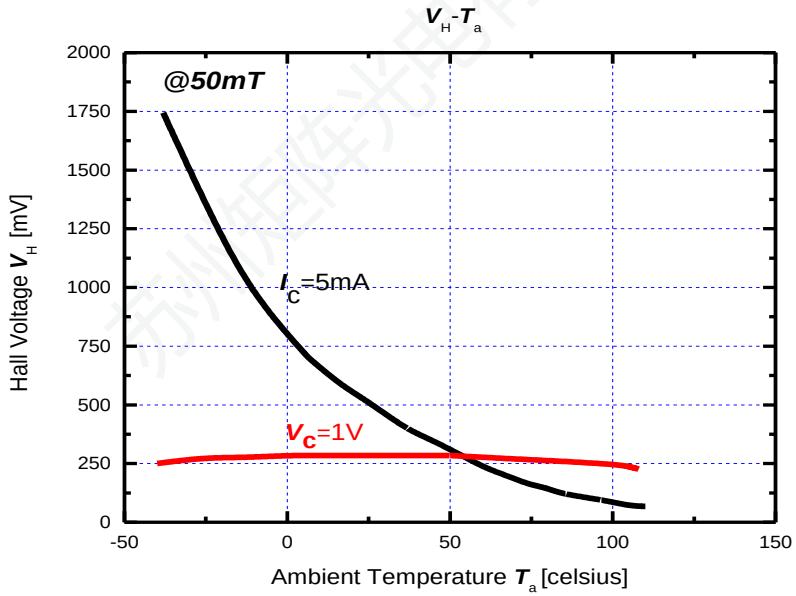



**Figure 4**. Hall voltage $V_H$ as a function of ambient temperature $T_a$.

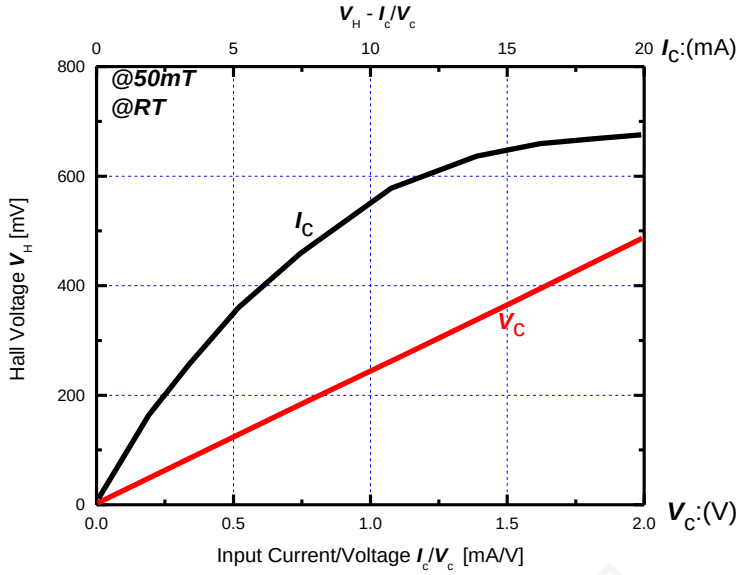



**Figure 5**. Hall voltage $V_H$ as a function of electrical stimuli $I_c/V_c$.

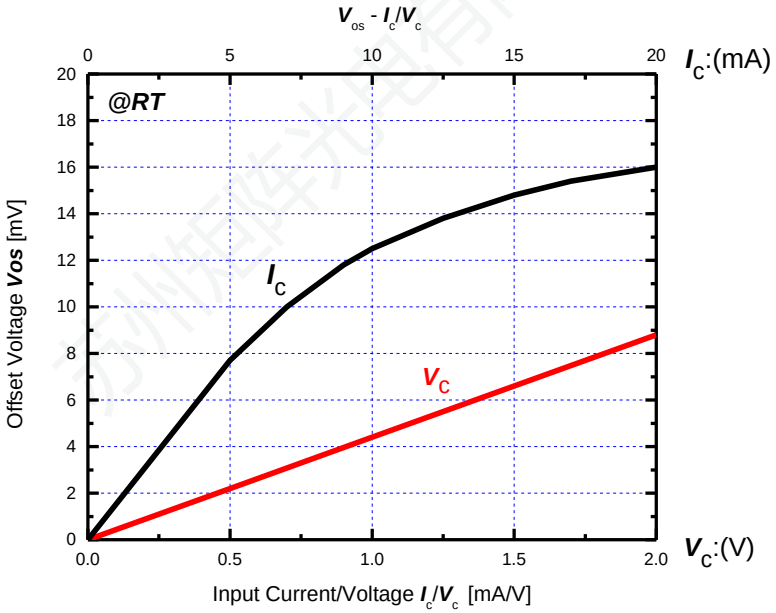



**Figure 6**. Offset voltage $V_{os}$ as a function of electrical stimuli $I_c$/ $V_c$.

# Reliability Test Terms

**Table 2.** Reliability Test Terms, Conditions and Duration.

| No. | Terms | Conditions | Duration |
|---|---|---|---|
| 1 | High Temperature Storage (HTS) | 【JEITA EIAJ ED-4701】 $T_a$ =150 ( 0 ~ +10 ) ℃ | 1000 hrs |
| 2 | Heat Cycle (HC) | 【JEITA EIAJ ED-4701】 $T_a$=-55℃~150 ℃ high temp. - normal temp. - low temp. 30 min - 5 min - 30 min | 30 cycles |
| 3 | Temp. Humidity Storage (THS) | 【JEITA EIAJ ED-4701】 $T_a$ =85±3 ℃ , $R_H$ =85±5 % | 1000 hrs |
| 4 | Reflow Soldering (RS) | 【JEITA EIAJ ED-4701】 260±5 ℃ | 10 sec |
| 5 | High Temp. Operating (HTO) | $T_a$ =125 ℃ , $V_c$ =1V | 1000 hrs |

Criteria:

- Variation of Hall Voltage $V_H$ and input/output resistances $R_{in/out}$ are less than 20%.

- Variation of offset voltage $V_{os}$ is less than ±16mV.

- Other parameters in **Table 1**. are still within their ranges stated in **Table 1**.

# Soldering Conditions

The following conditions should be preserved. Solder ability should be checked by yourself, because it is depend on solder paste material and other parameters.

## Material of solder flux

- Use the resin based flux and refrain from using organic or inorganic acid based and water-soluble one.

## Cleansing of solder flux conditions

- Use Ethanol or Isopropyl alcohol as cleansing material.
- Process temperature should be 50 ℃ or less.
- Duration should be 5 minutes or less.

## Hand soldering conditions

- Apart from the mold resin more than 1mm.
- Solder at temperature 300 ℃ for less than 5s.

## Wave soldering conditions

- Temperature in Pre-heating zone should be lower than 150℃.
- Temperature in Soldering zone should be lower than 270℃.

## Precautions for ESD

This product is the device that is sensitive to ESD (Electrostatic Discharge). Handling Hall Elements with the ESD-Caution mark under the environment in which

- Static electrical charge is unlikely to arise (Ex: Relative Humidity over 40%RH).
- Wearing the anti-static suit and wristband when handling the devices.
- Implementing measures against ESD as for containers that directly touch the devices.

## Precautions for Storage

- Products should be stored at an appropriate temperature and humidity (5°C to 35°C, 40%RH to 60%RH) after the unsealing of the MBB. Keeping products away from chlorine and corrosive gas.
- **For storage longer than 2 years**

  Products are sealed in MBB with a desiccant. It is recommended to store in nitrogen atmosphere with MBB sealed. Oxygen and $H_2O$ of atmosphere oxidizes leads of products and lead solder ability get worse.

## Precautions for Safety

- Do not alter the form of this product into a gas, powder or liquid through burning, crushing or chemical processing.
- Observe laws and company regulations when discarding this product.