

## NHE528 InSb Hall Element

- Ultra High-sensitivity InSb Hall Element
- Thin SOT Package
- Shipped in packet-tape reel (4,000pcs per reel)

### Absolute Maximum Rating

|                                  |               |
|----------------------------------|---------------|
| Operating Temperature Range      | -40°C ~ 125°C |
| Storage Temperature Range        | -55°C ~ 150°C |
| Maximum Input Current $I_{Cmax}$ | 20mA          |
| Maximum Input Voltage $V_{Cmax}$ | 2V            |

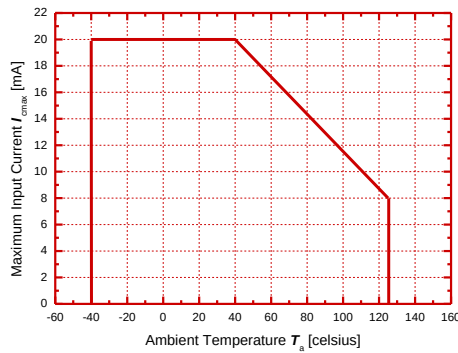


Figure 1.1 Maximum Input Current  $I_{Cmax}$

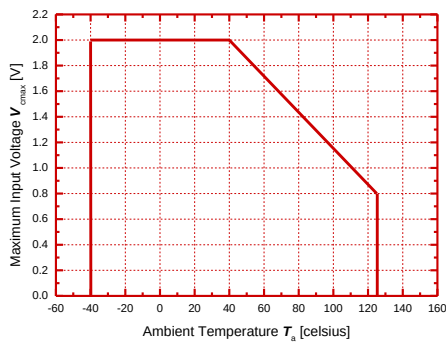
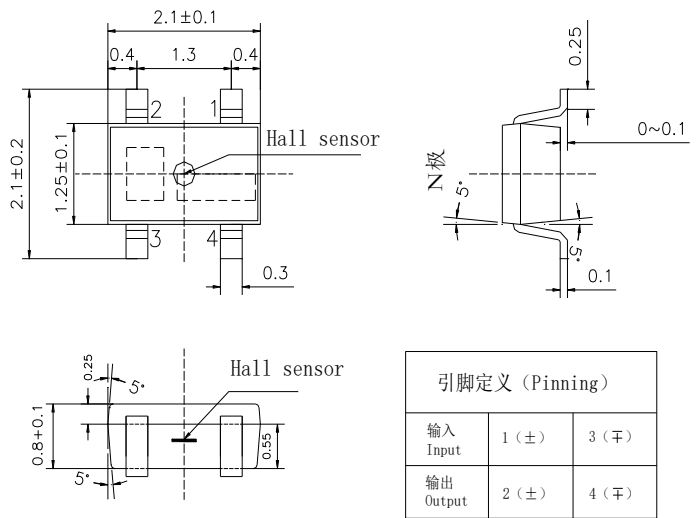


Figure 1.2 Maximum Input Voltage  $V_{Cmax}$

### Dimensional Drawing (Unit: mm)



### Electrical Characteristics (RT=25°C)

Table 1. Electrical Characteristics of NHE528

| Item                     | Symbol          | Test Condi.                                                 | Min. | Typ. | Max. | Unit     |
|--------------------------|-----------------|-------------------------------------------------------------|------|------|------|----------|
| Hall Voltage             | $V_H$           | $B = 50mT, V_C = 1V$<br>$T_a = RT$                          | 168  |      | 370  | mV       |
| Input Resistance         | $R_{in}$        | $B = 0mT, I_C = 0.1mA$<br>$T_a = RT$                        | 250  |      | 550  | $\Omega$ |
| Output Resistance        | $R_{out}$       | $B = 0mT, I_C = 0.1mA$<br>$T_a = RT$                        | 250  |      | 550  | $\Omega$ |
| Offset Voltage           | $V_{os}$        | $B = 0mT, V_C = 1V$<br>$T_a = RT$                           | -7   |      | +7   | mV       |
| Temp. Coeff. of $V_H$    | $\alpha V_H$    | $B = 50mT, I_C = 5mA$<br>$T_a = 0^\circ C \sim 40^\circ C$  |      | -1.8 |      | %/°C     |
| Temp. Coeff. of $R_{in}$ | $\alpha R_{in}$ | $B = 0mT, I_C = 0.1mA$<br>$T_a = 0^\circ C \sim 40^\circ C$ |      | -1.8 |      | %/°C     |

Note:

$$1. \quad V_H = V_{H-M} - V_{os}$$

In which  $V_{H-M}$  is the Output Hall Voltage,  $V_H$  is the Hall Voltage and  $V_{os}$  is the offset Voltage under the identical electrical stimuli.

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

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

$$T_1 = 20^\circ C, \quad T_2 = 0^\circ C, \quad T_3 = 40^\circ C$$

### 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  |                  |

### Characteristic Curves

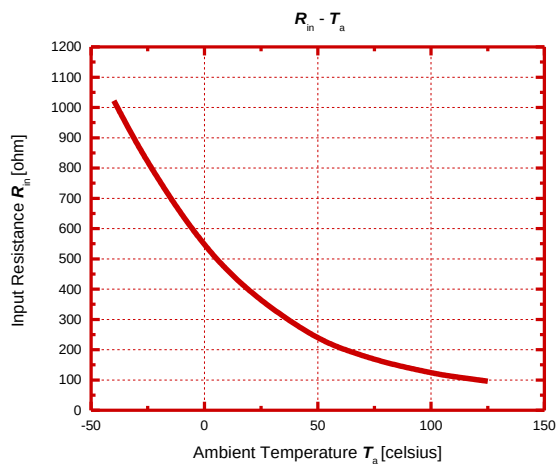


Figure 2. Input resistance  $R_{in}$  as a function of ambient temperature  $T_a$ .

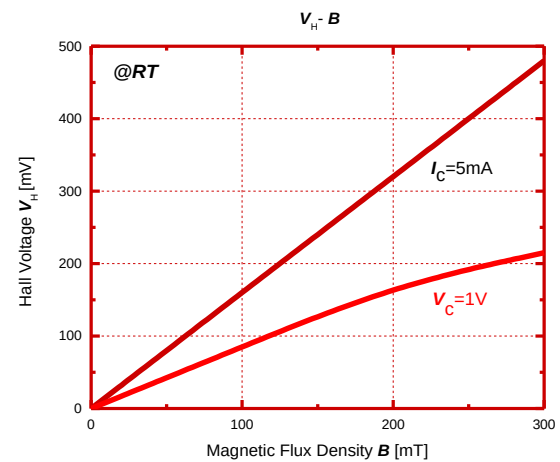


Figure 3. Hall voltage  $V_H$  as a function of magnetic flux density  $B$ .

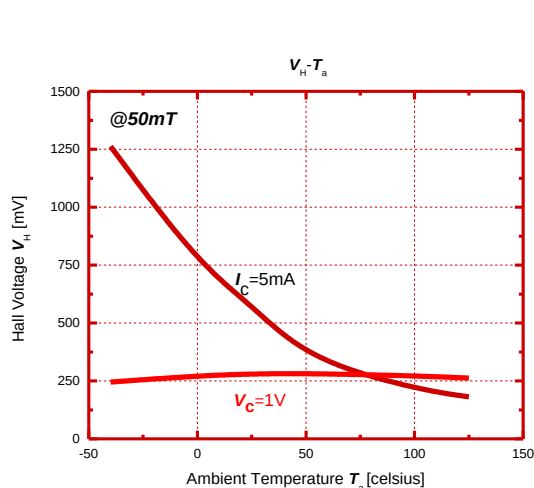


Figure 4. Hall voltage  $V_H$  as a function of ambient temperature  $T_a$ .

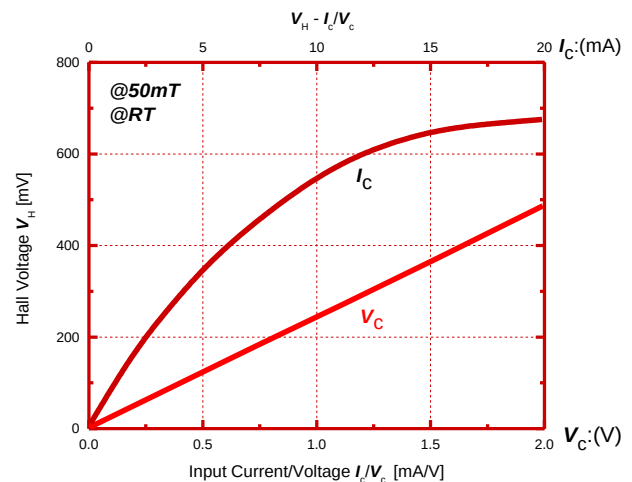


Figure 5. Hall voltage  $V_H$  as a function of electrical stimuli  $I_c/V_c$ .

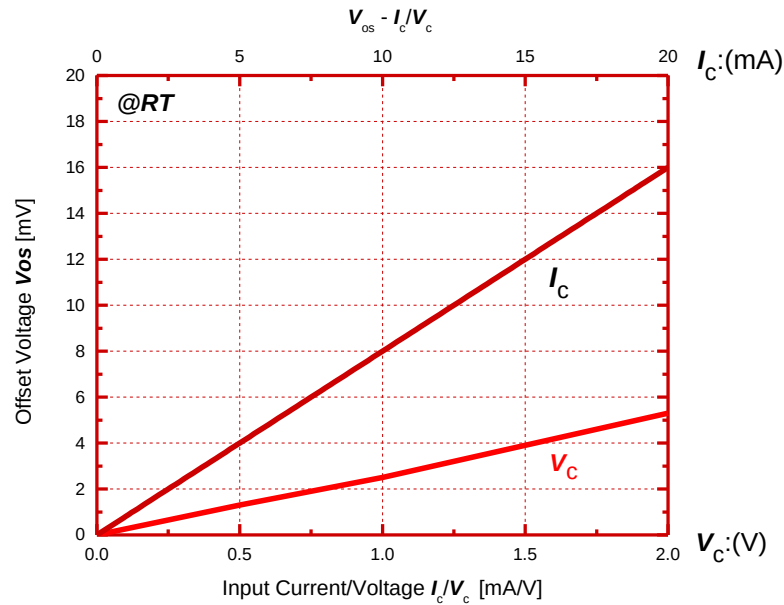


Figure 6. Offset voltage  $V_{os}$  as a function of electrical stimuli  $I_c$ /  $V_c$ .

## Reliability Test Terms

Table 2. Reliability Test Terms, Conditions and Duration.

| No. | Terms                             | Conditions                                                                                                                                       | Duration  |
|-----|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1   | High Temperature Storage<br>(HTS) | 【JEITA EIAJ ED-4701】<br>$T_a = 150$ ( 0 ~ +10 ) °C                                                                                               | 1000 hrs  |
| 2   | Heat Cycle<br>(HC)                | 【JEITA EIAJ ED-4701】<br>$T_a = -55^{\circ}\text{C} \sim 150^{\circ}\text{C}$<br>high temp. - normal temp. - low temp.<br>30 min - 5 min - 30 min | 30 cycles |
| 3   | Temp. Humidity Storage<br>(THS)   | 【JEITA EIAJ ED-4701】<br>$T_a = 85 \pm 3^{\circ}\text{C}$ , $R_H = 85 \pm 5\%$                                                                    | 1000 hrs  |
| 4   | Reflow Soldering<br>(RS)          | 【JEITA EIAJ ED-4701】<br>$260 \pm 5^{\circ}\text{C}$                                                                                              | 10 sec    |
| 5   | High Temp. Operating<br>(HTO)     | $T_a = 125^{\circ}\text{C}$ , $V_c = 1\text{V}$                                                                                                  | 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  $\pm 16\text{mV}$ .
- Other parameters in Table 1. are still within their ranges stated in Table 1.

## Soldering Conditions

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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

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

### Cleansing of solder flux conditions

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

### Hand soldering conditions

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

### Wave soldering conditions

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

## Precautions for ESD

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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

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- 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<sub>2</sub>O of atmosphere oxidizes leads of products and lead solder ability get worse.

## Precautions for Safety

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- 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.