

# HAL-HW106A GaAs Hall Element

具有高线性度与优异温度特性的砷化镓霍尔元件

Linear GaAs Hall element with excellent thermal characteristics

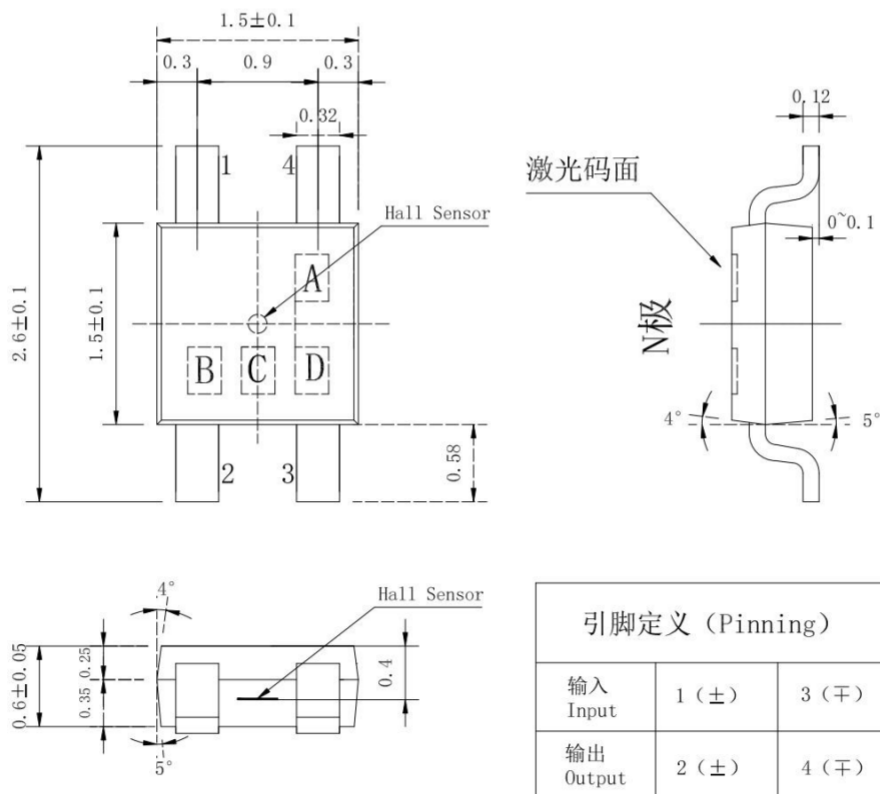
薄型 SSOT-4 封装

Thin-type SSOT-4 package

编带包装 ( 每卷 4,000 颗 )

Shipped in Packet-tape Reel (4000pcs devices per Reel)

## 外形尺寸图 Dimensional Drawing (Unit: mm)



## 绝对最大额定值 Absolute Maximum Ratings

项目 Item	符号 Symbol	条件 Conditions	范围 Limit	单位 Unit
最大输入电流 Maximum Input Current	$I_{Cmax}$	$T_a = 25^\circ\text{C}$	14	mA
工作温度 Operating Temperature Range	$T_{opr}$		-40 ~ +125	$^\circ\text{C}$
保存温度 Storage Temperature Range	$T_{STG}$		-40 ~ +150	$^\circ\text{C}$

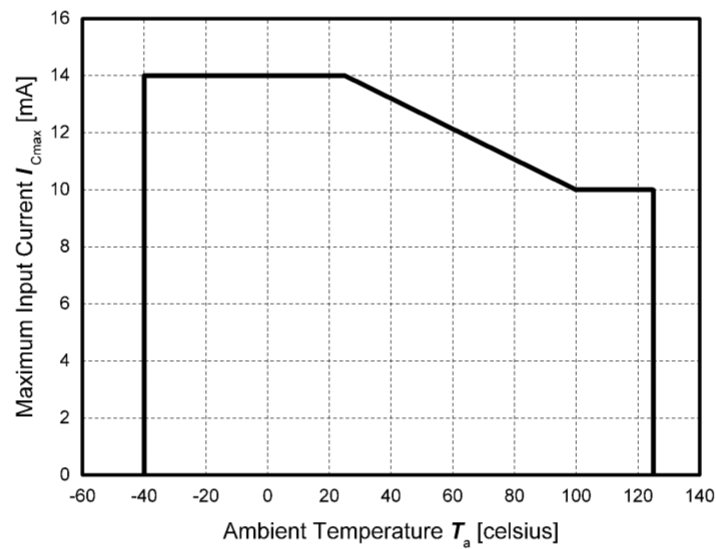


Figure 1. 最大输入电流-环境温度

Maximum input current  $I_{Cmax}$  as a function of ambient temperature  $T_a$

**电气特性 Electrical Characteristics ( RT=25°C )**

Table 1. HAL-HW106A 电气特性表 Electrical Characteristics of HAL-HW106A

项目 Item	符号 Symbol	测试环境 Test Condi.	最小 Min.	标准 Typ.	最大 Max.	标准 Unit
霍尔电压 Hall Voltage	$V_H$	$B = 50\text{mT}, I_C = 5\text{mA}$ $T_a = \text{RT}$	38		58	mV
输入电阻 Input Resist.	$R_{in}$	$B = 0\text{mT}, I_C = 0.1\text{mA}$ $T_a = \text{RT}$	450		750	$\Omega$
输出电阻 Output Resist.	$R_{out}$	$B = 0\text{mT}, I_C = 0.1\text{mA}$ $T_a = \text{RT}$	1000		2000	$\Omega$
非平衡电压 Offset Voltage	$V_{os}$	$B = 0\text{mT}, I_C = 5\text{mA}$ $T_a = \text{RT}$	-6		+6	mV
霍尔电压温度系数 Temp. Coeffi. of $V_H$	$ \alpha V_H $	$B = 50\text{mT}, I_C = 5\text{mA},$ $T_a = 25^\circ\text{C} \sim 125^\circ\text{C}$			0.06	%/°C
输入电阻温度系数 Temp. Coeffi. of $R_{in}$	$\alpha R_{in}$	$B = 0\text{mT}, I_C = 0.1\text{mA},$ $T_a = 25^\circ\text{C} \sim 125^\circ\text{C}$			0.3	%/°C
霍尔电压线性度 Linearity of $V_H$	$\Delta K$	$B = 0.1 - 0.5\text{T}, I_C = 5\text{mA}$ $T_a = \text{RT}$	-2		+2	%

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.

$$2. \quad \alpha V_H = \frac{1}{V_H(T_{a1})} \times \frac{V_H(T_{a2}) - V_H(T_{a1})}{T_{a2} - T_{a1}} \times 100 \quad T_{a1} = 25^\circ\text{C}, T_{a2} = 125^\circ\text{C}$$

$$3. \quad \alpha R_{in} = \frac{1}{R_{in}(T_{a1})} \times \frac{R_{in}(T_{a2}) - R_{in}(T_{a1})}{T_{a2} - T_{a1}} \times 100 \quad T_{a1} = 25^\circ\text{C}, T_{a2} = 125^\circ\text{C}$$

$$4. \quad \Delta K = \frac{K(B_1) - K(B_2)}{\frac{K(B_1) + K(B_2)}{2}} \times 100 \quad K = \frac{V_H}{I_C \times B} \quad B_1 = 0.5\text{T}, B_2 = 0.1\text{T}$$

特性曲线图 Characteristic Curves

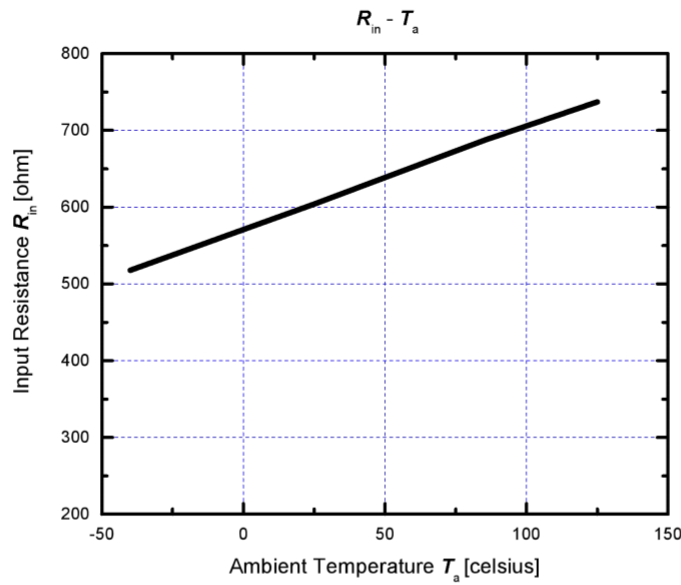


Figure 2. 输入电阻-环境温度  
Input resistance  $R_{in}$  as a function of ambient temperature  $T_a$

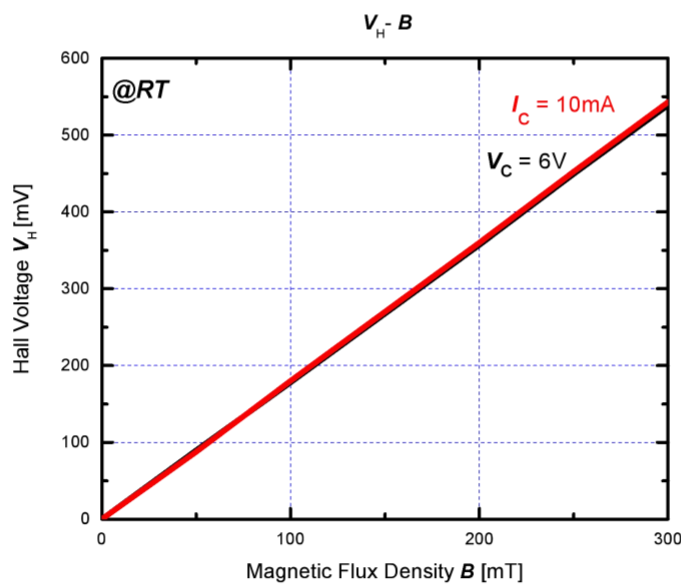


Figure 3. 霍尔电压-磁感应强度  
Hall voltage  $V_H$  as a function of magnetic flux density  $B$

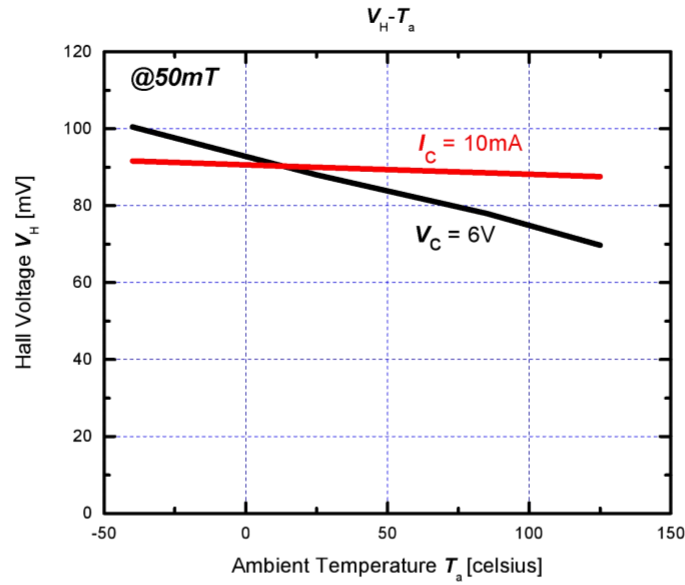


Figure 4. 霍尔电压-环境温度  
Hall voltage  $V_H$  as a function of ambient temperature  $T_a$

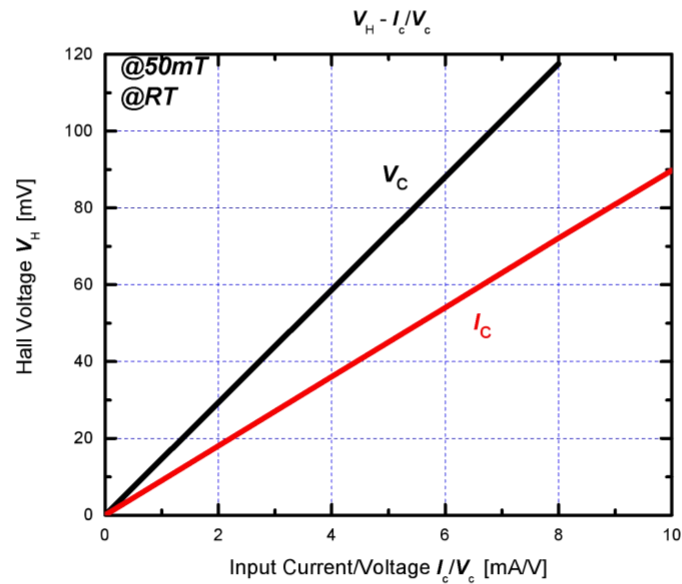


Figure 5. 霍尔电压-驱动电流/驱动电压  
Hall voltage  $V_H$  as a function of electrical stimuli  $I_c/V_c$

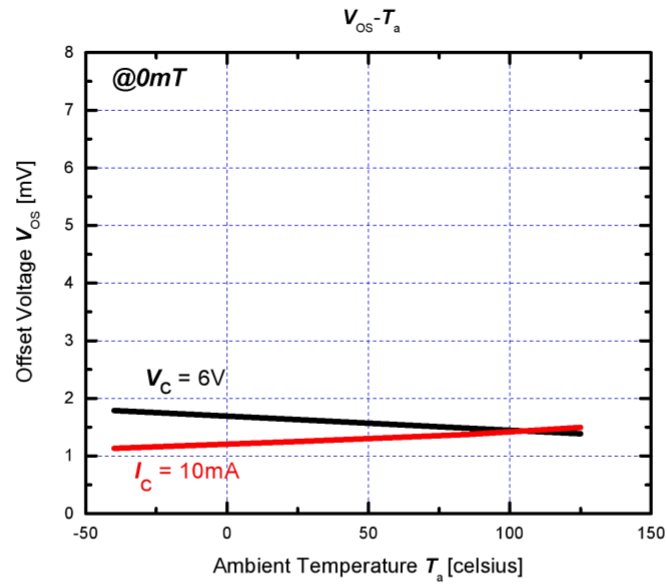


Figure 6. 非平衡电压-环境温度  
Offset voltage  $V_{OS}$  as a function of ambient temperature  $T_a$

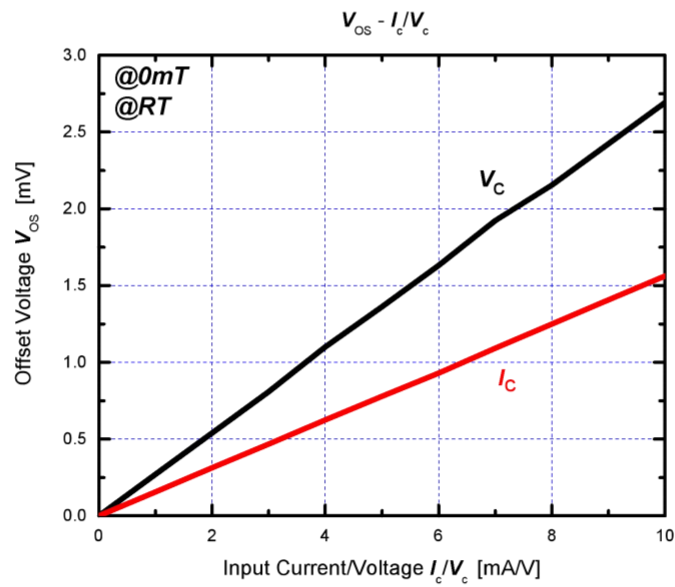


Figure 7. 非平衡电压-驱动电流/驱动电压  
Offset voltage  $V_{OS}$  as a function of electrical stimuli  $I_C/V_C$

## 可靠性测试项目 Reliability Test Terms

**Table 2. 可靠性测试项目,条件和持续时间 Reliability Test Terms, Conditions and Duration**

No.	项目 Terms	测试条件 Conditions	持续时间 Duration
1	高温存储试验 High Temperature Storage (HTS)	【JEITA EIAJ ED-4701】 $T_a=150 (0 \sim +10)^{\circ}\text{C}$	1000 hr
2	热循环试验 Heat Cycle (HC)	【JEITA EIAJ ED-4701】 $T_a=-55^{\circ}\text{C}\sim 150^{\circ}\text{C}$ high temp. - normal temp. - low temp. 30min - 5min - 30min	50 cycles
3	高温高湿存储试验 Temp. Humidity Storage (THS)	【JEITA EIAJ ED-4701】 $T_a=85\pm 3^{\circ}\text{C}$ , $RH=85\pm 5\%$	1000 hr
4	回流焊试验 Reflow Soldering (RS)	【JEITA EIAJ ED-4701】 $260\pm 5^{\circ}\text{C}$	10 sec
5	高温带电老化试验 High Temp. Operating (HTO)	$T_a=125^{\circ}\text{C}$ , $I_c=8\text{mA}$	1000 hr

判定基准:

- 霍尔电压 $V_H$ 和输入/输出电阻 $R_{in/out}$ 的数值变化幅度小于 $\pm 20\%$
- 非平衡电压 $V_{os}$ 的数值变化幅度小于 $\pm 8\text{mV}$
- 在表 1 中的其他参数仍然在表 1 的规定范围内

Criteria:

- Variation of Hall Voltage  $V_H$  and input/output resistances  $R_{in/out}$  are less than  $\pm 20\%$  of initial value.
- Variation of offset voltage  $V_{os}$  is within  $\pm 8\text{mV}$ .
- Other parameters in Table 1. are still within their ranges stated in Table 1.

## 焊接条件

### 助焊剂材料

- 使用树脂基助焊剂，避免使用有机或无机酸基及水溶性助焊剂。

### 助焊剂的清洗条件

- 使用乙醇或异丙醇作为清洗剂。
- 工艺温度 $\leq 50^{\circ}\text{C}$ 。
- 持续时间不超过 5 分钟。

### 焊接方法

焊接方法	焊接方法说明	焊接温度
回流法	在高温下进行焊接的方法	最高 $260^{\circ}\text{C}$ ，10 秒以内
波峰焊	在镀锡缸中完成焊接的方法	最高 $260^{\circ}\text{C}$ ，10 秒以内
烙铁法	使用烙铁修正引脚焊接部分的方法	最高 $350^{\circ}\text{C}$ ，3 秒以内

### 焊接温度范围

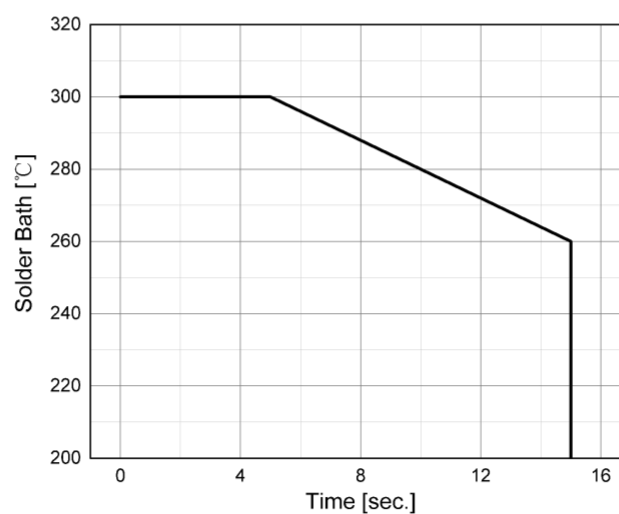


Figure 8. (参考) 浸入焊接条件

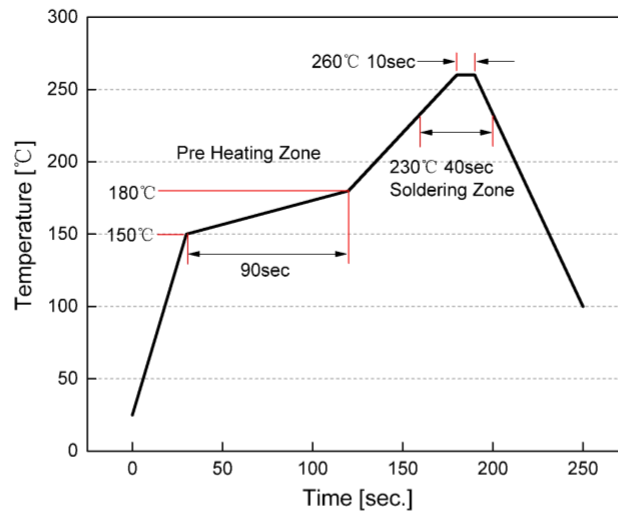


Figure 9. (参考) 回流焊条件

## ESD防护

本产品对 ESD (静电放电) 敏感, 接触带有 ESD-Caution 标记的霍尔元件时, 环境要求如下:

- 环境不太可能出现静电荷 (例如, 相对湿度超过 40%RH)。
- 接触产品时应该穿戴防静电服和腕带。
- 对直接接触产品的设备或容器实施防静电措施。

## 存储防护

- 产品应储存在适当的温度和湿度环境下 (5 至 35°C, 40%至 85%RH), 且使产品远离氯和腐蚀性气体。
- 即使在适当的条件下, 长期存放也可能导致产品的可焊接性和电气性能降低。针对长期存放的产品, 应该在使用前应检查其可焊性。
- 如果储存超过 2 年, 建议储存在氮气环境中。大气中的氧气会氧化产品的引线, 导致引线可焊接性变差。

## 安全防护

- 请勿通过燃烧，粉碎或化学处理等方式将本产品变成气体，粉末或液体。
- 丢弃本产品时，请遵守法律和公司规定。

## 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°C or less.
- Duration should be 5min or less.

### Hand-Soldering

- Solder the leads to PC board at the point(part from the body) at 260°C for 10 seconds or 350°C for less than 3 seconds.

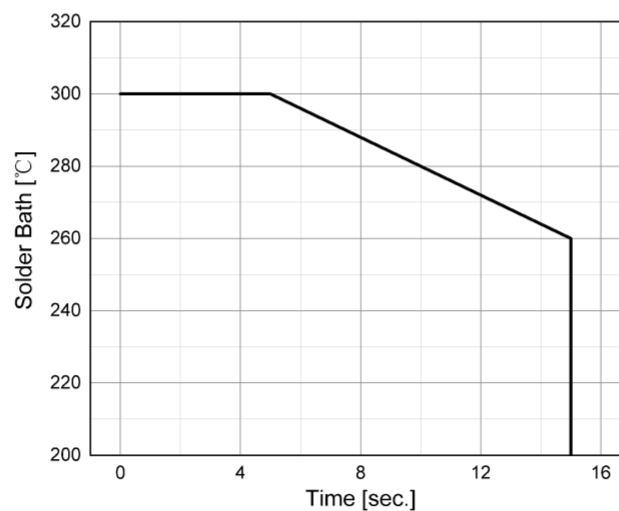


Figure 8. (Reference) Conditions of Dip Soldering

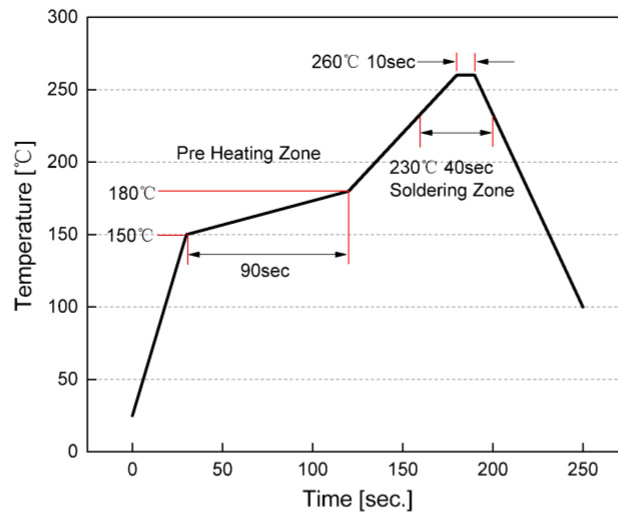


Figure 9. (Reference) Conditions of Reflow Profile

## 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 antistatic 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 to 35°C, 40 to 85%RH).

Keep products away from chlorine and corrosive gas.

- Long-term storage may result in poor lead solder ability and degraded electrical performance even under proper conditions. For those parts, which stored long-term shall be check solder ability before it

is used.

- For storage longer than 2 years, it is recommended to store in nitrogen atmosphere. Oxygen 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.