

## 1. Scope

This specification applies to the HPSM series of SMD power inductor.

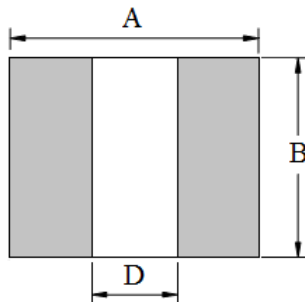
## 2. Product Identification

HPSM      201610    BE      1R0    M    26    - LF  
①              ②              ③              ④              ⑤              ⑥              ⑦

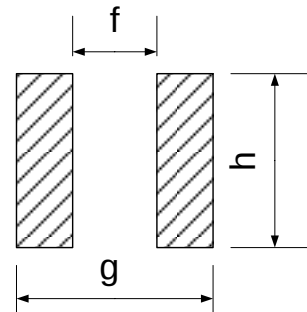
- ① Product Symbol
- ② Product dimensions
- ③ Special process code
- ④ Inductance Value (R47:0.47 uH; 1R0: 1.0uH; 100:10uH )
- ⑤ Inductance Tolerance (M: ±20% )
- ⑥ Process code
- ⑦ Lead free product.



## 3. Appearance and Dimensions



Note: Gray area is electrode



Recommended Land Pattern

| Series     | Dimensions (mm) |         |          |          |          |          |          |
|------------|-----------------|---------|----------|----------|----------|----------|----------|
|            | A               | B       | C (Max.) | D (Typ.) | f (Typ.) | g (Typ.) | h (Typ.) |
| HPSM141206 | 1.4±0.2         | 1.2±0.2 | 0.65     | 0.60     | 0.50     | 1.60     | 1.40     |
| HPSM141208 | 1.4±0.2         | 1.2±0.2 | 0.80     | 0.60     | 0.50     | 1.60     | 1.40     |
| HPSM160808 | 1.6±0.2         | 0.8±0.2 | 0.80     | 0.50     | 0.40     | 1.70     | 0.90     |
| HPSM201208 | 2.0±0.2         | 1.2±0.2 | 0.80     | 0.60     | 0.50     | 2.20     | 1.40     |
| HPSM201608 | 2.0±0.2         | 1.6±0.2 | 0.80     | 0.60     | 0.50     | 2.20     | 1.80     |
| HPSM201610 | 2.0±0.2         | 1.6±0.2 | 1.00     | 0.60     | 0.50     | 2.20     | 1.80     |
| HPSM252010 | 2.5±0.2         | 2.0±0.2 | 1.00     | 0.70     | 0.60     | 2.70     | 2.20     |
| HPSM322512 | 3.2±0.2         | 2.5±0.2 | 1.20     | 0.90     | 0.80     | 3.50     | 2.90     |



#### 4. Testing Conditions

Unless otherwise specified, the standard conditions for measurement/test as:

Ambient Temperature : 5 to 35°C

Relative Humidity: 25 to 85% RH

Atmospheric Pressure: 86 to 106 kPa

If any doubt on the results, measurements/tests should be made within the following limits:

Ambient Temperature : 25±1°C

Relative Humidity: 60 to 70% RH

Atmospheric Pressure: 86 to 106 kPa

#### 5. Electrical Characteristics And Test Instruments

##### HPSM141206 Series

| HONGDA Part No.       | Inductance<br>(uH) | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|--------------------|----------|------|----------|------|----------|------|
|                       |                    | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM141206BER33M20-LF | 0.33±20%           | 40       | 35   | 5.0      | 5.5  | 2.8      | 3.0  |
| HPSM141206BER47M20-LF | 0.47±20%           | 50       | 42   | 3.0      | 3.3  | 2.4      | 2.6  |

##### HPSM141208 Series

| HONGDA Part No.       | Inductance<br>(uH) | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|--------------------|----------|------|----------|------|----------|------|
|                       |                    | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM141208BER33M20-LF | 0.33±20%           | 27       | 22   | 4.4      | 4.8  | 3.4      | 3.7  |
| HPSM141208BER47M20-LF | 0.47±20%           | 38       | 33   | 3.7      | 4.2  | 2.8      | 3.0  |

##### HPSM160808 Series

| HONGDA Part No.       | Inductance<br>(uH) | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|--------------------|----------|------|----------|------|----------|------|
|                       |                    | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM160808BER56M20-LF | 0.56±20%           | 60       | 52   | 2.7      | 3.1  | 2.2      | 2.5  |
| HPSM160808BE1R0M20-LF | 1.0±20%            | 144      | 120  | 2.0      | 2.2  | 1.6      | 1.8  |
| HPSM160808BE2R2M20-LF | 2.2±20%            | 290      | 241  | 1.2      | 1.3  | 1.0      | 1.1  |

##### HPSM201208 Series

| HONGDA Part No.       | Inductance<br>(uH) | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|--------------------|----------|------|----------|------|----------|------|
|                       |                    | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM201208BER24M21-LF | 0.24±20%           | 20       | 16   | 5.6      | 6.1  | 5.1      | 5.4  |
| HPSM201208BER33M20-LF | 0.33±20%           | 27       | 23   | 5.0      | 5.6  | 4.2      | 4.5  |
| HPSM201208BER47M21-LF | 0.47±20%           | 27       | 24   | 4.8      | 5.2  | 4.0      | 4.2  |
| HPSM201208BER56M22-LF | 0.56±20%           | 47       | 40   | 3.3      | 3.7  | 3.2      | 3.5  |
| HPSM201208BE1R0M20-LF | 1.0±20%            | 60       | 50   | 3.2      | 3.4  | 2.8      | 3.1  |
| HPSM201208BE2R2M-LF   | 2.2±20%            | 161      | 148  | 1.8      | 2.2  | 1.6      | 1.8  |

**HPSM201608 Series**

| HONGDA Part No.       | Inductance | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|------------|----------|------|----------|------|----------|------|
|                       | (uH)       | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM201608BER47M20-LF | 0.47±20%   | 26       | 22   | 4.8      | 5.2  | 4.5      | 4.9  |
| HPSM201608BE1R0M20-LF | 1.0±20%    | 52       | 38   | 4.1      | 4.5  | 3.6      | 3.8  |
| HPSM201608BE2R2M20-LF | 2.2±20%    | 90       | 83   | 2.7      | 2.9  | 2.3      | 2.5  |

**HPSM201610 Series**

| HONGDA Part No.       | Inductance | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|------------|----------|------|----------|------|----------|------|
|                       | (uH)       | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM201610BER24M20-LF | 0.24±20%   | 19       | 155  | 7.2      | 7.9  | 5.4      | 5.8  |
| HPSM201610BER47M20-LF | 0.47±20%   | 26       | 20   | 5.5      | 6.0  | 4.5      | 5.0  |
| HPSM201610BE1R0M26-LF | 1.0±20%    | 45       | 40   | 4.2      | 4.5  | 4.1      | 4.3  |
| HPSM201610BE2R2M20-LF | 2.2±20%    | 102      | 84   | 2.4      | 2.7  | 2.1      | 2.3  |

**HPSM252010 Series**

| HONGDA Part No.       | Inductance | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|------------|----------|------|----------|------|----------|------|
|                       | (uH)       | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM252010BER47M-LF   | 0.47±20%   | 22       | 18   | 6.5      | 7.2  | 5.7      | 6.0  |
| HPSM252010BE1R0M25-LF | 1.0±20%    | 30       | 25   | 5.0      | 5.5  | 4.5      | 4.8  |
| HPSM252010BE2R2M-LF   | 2.2±20%    | 85       | 78   | 3.6      | 4.1  | 2.7      | 2.9  |
| HPSM252010BE4R7M-LF   | 4.7±20%    | 180      | 150  | 2.0      | 2.4  | 1.8      | 2.0  |

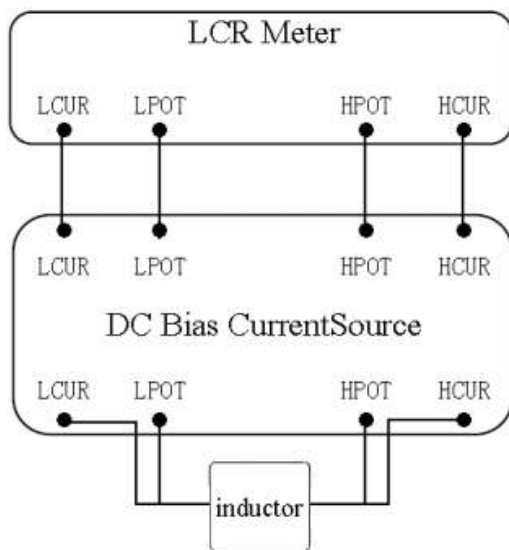
**HPSM322512 Series**

| HONGDA Part No.       | Inductance | DCR (mΩ) |      | Isat (A) |      | Irms (A) |      |
|-----------------------|------------|----------|------|----------|------|----------|------|
|                       | (uH)       | Max.     | Typ. | Max.     | Typ. | Max.     | Typ. |
| HPSM322512BER47M20-LF | 0.47±20%   | 18       | 14.5 | 8.0      | 9.0  | 6.0      | 6.6  |
| HPSM322512BER68M20-LF | 0.68±20%   | 22       | 18   | 5.0      | 5.5  | 4.8      | 5.3  |
| HPSM322512BE1R0M-LF   | 1.0±20%    | 36       | 31   | 7.0      | 8.0  | 4.0      | 4.4  |

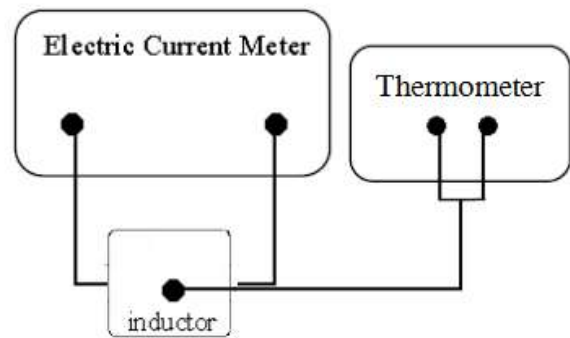


### Test instruments and remarks

- \* L test by CHROMA 3302 meter or equivalent
- \* DCR test by Tonghui TH2516B meter or equivalent
- \* CHROMA 3302 and 1320 meter for IDC;
- \* Isat: DC current (A) that will cause L0 to drop approximately 30%.
- \* Irms: DC current (A) that will cause an approximate  $\Delta T$  of 40°C.
- \* All test data is referenced to
- \* Operating temperature: -55°C to +125°C. (Including self\_heating).
- \* The part temperature (ambient + temp rise) should not exceed 125 under worse case operating conditions. Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provision all affect the part temperature. Part temperature should be verified in the end application.



Isat test schematic diagram



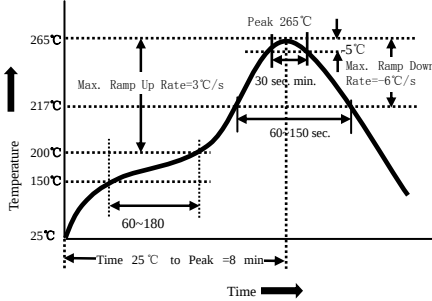
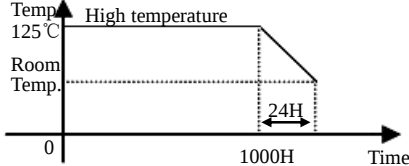
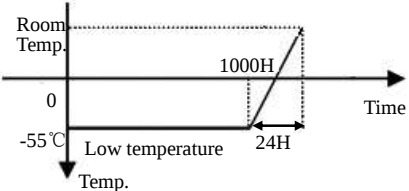
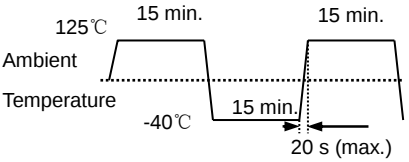
Irms test schematic diagram

## 6. Condition of work

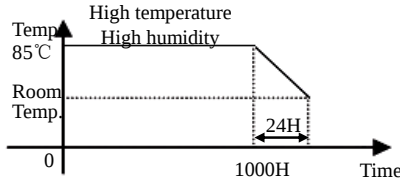
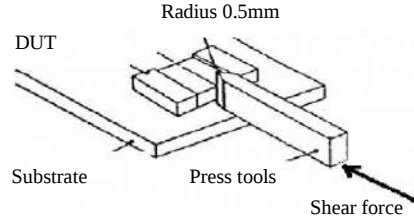
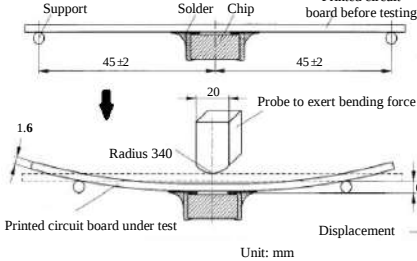
Operating temperature range: -55°C ~ +125°C (Including self-heating) .



## 7. Reliability

| No. | Item                         | Requirements                                                                     | Test Methods and Remarks                                                                                                                                                                                                                                                                                 | Reference                         | Sample Size |
|-----|------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------|
| 1   | Solderability                | (1) No physical damage.<br>(2) Terminal area must have 95% min. solder coverage. | ①Temperature: $245 \pm 5^\circ\text{C}$ , flux 5-10 s.<br>②Sample immersion tin furnace $5 \pm 0.5\text{s}$ .<br>③Immersed and in and out of speed: $25 \pm 6\text{mm/s}$ .                                                                                                                              | AEC-Q200 (J-STD-002)              | 15          |
| 2   | Resistance to Soldering Heat | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$                      | ①The peak temperature: $260 + 5/-0^\circ\text{C}$ .<br>②Reflow: 3 times.<br>③Temperature curve is as below:<br>                                                                                                        | AEC-Q200 (MIL-STD-202 Method 210) | 30          |
| 3   | High Temperature Storage     |                                                                                  | ①Temperature: $125 \pm 2^\circ\text{C}$ .<br>②Time : 1000 hours.<br>③Measurement at $24 \pm 4$ hours after test conclusion.<br>                                                                                      | AEC-Q200 (MIL-STD-202 Method 108) | 77          |
| 4   | Low Temperature Storage      |                                                                                  | ①Temperature: $-55 \pm 2^\circ\text{C}$ .<br>②Time : 1000 hours.<br>③Measurement at $24 \pm 4$ hours after test conclusion.<br>                                                                                      | JESD22-A119                       | 77          |
| 5   | Thermal shock                |                                                                                  | ①First $-40^\circ\text{C}$ for 15 minutes, last $125^\circ\text{C}$ 15 minutes as 1 cycle. Go through 300 cycles.<br>②Max transfer time is 20 second.<br>③Measurement at $24 \pm 4$ hours after test conclusion.<br> | MIL-STD-202 Method 107            | 30          |



| No. | Item                | Requirements                                                | Test Methods and Remarks                                                                                                                                                                                                                                                                                               | Reference                         | Sample Size |
|-----|---------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------|
| 6   | Humidity Resistance | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ①1000 hours, 85 °C/85%RH.<br>②Unpowered.<br>③Measurement at 24 ±4 hours after test conclusion.<br>                                                                                                                                   | AEC-Q200 (MIL-STD-202 Method 103) | 77          |
| 7   | Terminal Strength   | No physical damage.                                         | ①The test samples shall be soldered to the board.<br>②17.64N, 60s.<br>                                                                                                                                                               | AEC-Q200 (AEC-Q200-006)           | 30          |
| 8   | Board Flex          | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ①Part mounted on a 100mm*40mm FR4 PCB board, which is $1.6 \pm 0.2$ mm thick and as a Layer-thickness $35 \mu\text{m} \pm 10 \mu\text{m}$ .<br>②Bending speed is 1mm/s.<br>③Keeping the P.C Board 2 mm minimum for 60 seconds.<br> | AEC-Q200 (AEC-Q200-005)           | 30          |
| 9   | Drop                |                                                             | ①Height: 1 m, Free fall, 10times.<br>②Direction: 1 Angle, 1side, 2surface.                                                                                                                                                                                                                                             | JESD22-B111                       | 30          |
| 10  | Vibration           |                                                             | ①Frequency range : 10~2000Hz.<br>②Amplitude: 1.5mm, 5g.<br>③Sweep time and duration: 10~2000~10Hz for 20 minutes.<br>④Each four hours in X,Y,Z direction, 12 hours in total.                                                                                                                                           | AEC-Q200 (MIL-STD-202 Method 204) | 30          |



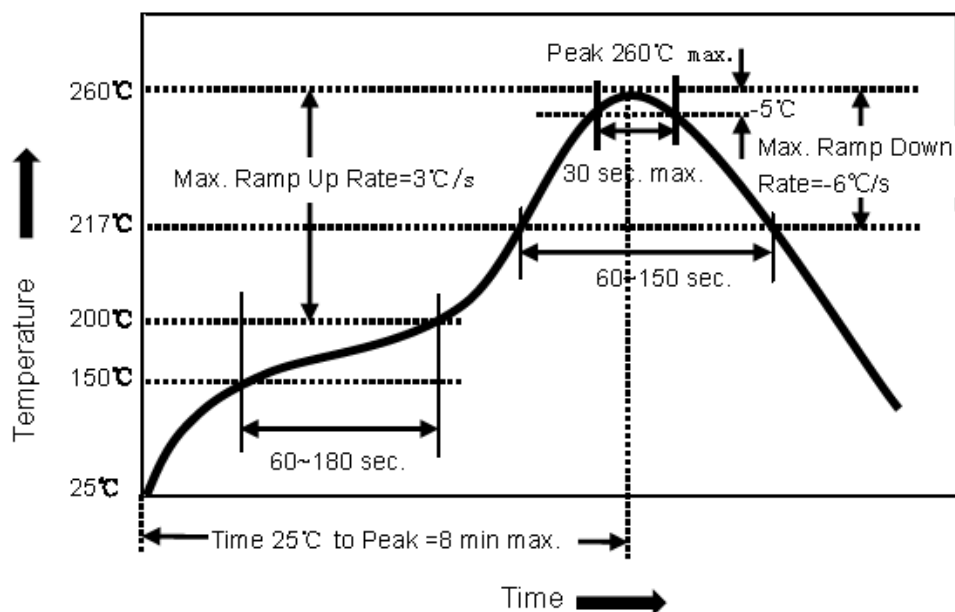
| No. | Item                        | Requirements                                                | Test Methods and Remarks                                                                                                                                        | Reference                | Sample Size |
|-----|-----------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------|
| 11  | Loading at High Temperature | (1) No physical damage.<br>(2) $ \Delta L_0/L_0  \leq 10\%$ | ①Temperature: $85 \pm 2^\circ\text{C}$ .<br>②Time : 1000 hours.<br>③Applied Current : Rated current.<br>④Measurement at $24 \pm 4$ hours after test conclusion. | AEC-Q200<br>(MIL-PRF-27) | 77          |

\*All above experiments items need 3 Lot., sample size is as specified in the table above.

\*Sample size standard is from AEC-Q200 : qualification sample size requirements.

## 8. Recommended Soldering Conditions

### (1) Reflow soldering conditions



\*Above reflow soldering curve is from J-STD-020D.

### (2) Iron soldering

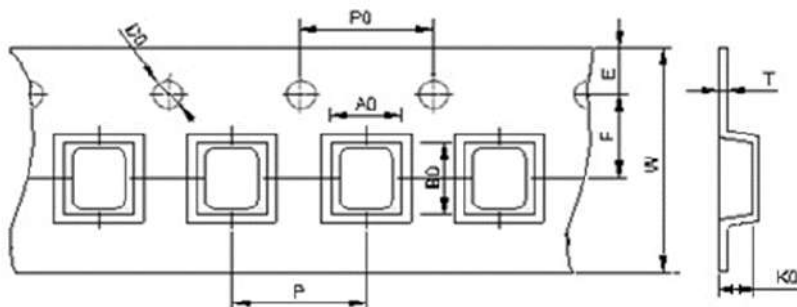
The following conditions must be strictly followed when using a soldering iron.

|                       |                |
|-----------------------|----------------|
| Pre-heating           | 150°C 1 minute |
| Tip temperature       | 350°C max      |
| Soldering iron output | 30w max        |
| End of soldering iron | Φ 1mm max      |
| Soldering time        | 3 seconds max  |



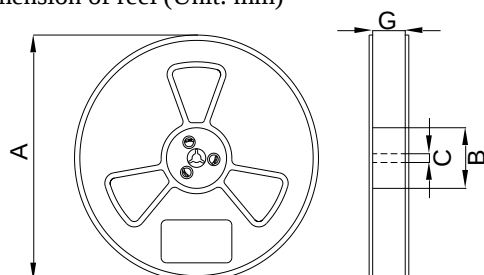
## 9. Package Information

### (1) Dimension of tape (Unit: mm)



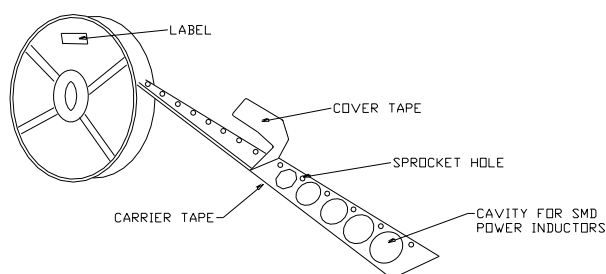
| W       | A0        | B0        | K0       | E        | F       | P       | P0      | D0           | T         |
|---------|-----------|-----------|----------|----------|---------|---------|---------|--------------|-----------|
| 8.0±0.1 | 2.00±0.10 | 2.35±0.10 | 1.10±0.1 | 1.75±0.1 | 3.5±0.1 | 4.0±0.1 | 4.0±0.1 | 1.5+0.1/-0.0 | 0.18±0.02 |

### (2) Dimension of reel (Unit: mm)



| Symbol | Dimension |
|--------|-----------|
| A      | 178±2     |
| B      | 58±2      |
| C      | 13.5±0.2  |
| G      | 9.0±1.5   |

### (3) Taping figure and drawing direction

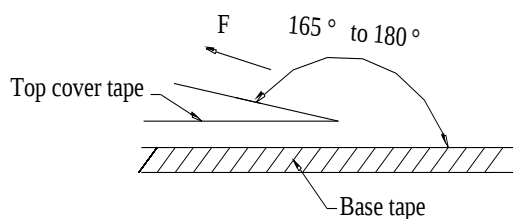


### (4) Packaging quantities: 2000PCS/Reel.

### (5) Peeling strength of cover tape:

The peel force of top cover tape shall be between 0.10N to 1.0N

\*the peel force standard is from EIA-481-D



| Room Temp.<br>(°C) | Room Humidity<br>(%) | Room aim<br>(hpa) | Peel Speed<br>mm/min |
|--------------------|----------------------|-------------------|----------------------|
| 5-35               | 45-85                | 860-1060          | 300                  |



## 10. Products Storage

### (1) Storage period

Products which inspected in HONGDA over 12 months ago should be examined and used, which can be confirmed with inspection No. marked on the container. Solderability should be checked if this period is exceeded.

### (2) Storage conditions

Products should be storage in the warehouse on the following conditions:

Temperature: -10 ~+ 35℃

Humidity: Less than 70% relative and humidity

No rapid change on temperature and humidity.

### (3) Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solderability.

### (4) Products should be storage on the palette for the prevention of the influence from humidity, dust and so on.

### (5) Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.

### (6) Products should be storage under the airtight packaged condition.