

Specification for Approval

Date: 2019/1/10



Certificate
Green Partner

Customer : 天誠

TAI-TECH P/N: **HCB2012KF-121T50**

CUSTOMER P/N:

DESCRIPTION:

QUANTITY: pcs

| | | |
|----------------------------|--|--|
| REMARK: | | |
| Customer Approval Feedback | | |
| | | |

西北臺慶科技股份有限公司
TAI-TECH Advanced Electronics Co., Ltd

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| APPROVED | CHECKED | DRAWN |
|----------|---------|-------|
| 鄧福興 | 浦冬生 | 王俞琴 |

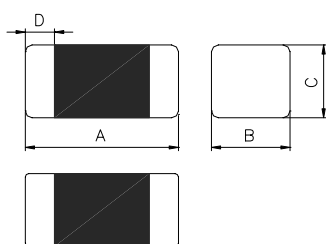
High Current Ferrite Chip Bead(Lead Free) HCB2012KF-121T50

1.Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. S.M.T. type.
4. Suitable for reflow soldering.
5. Shapes and dimensions follow E.I.A. spec.
6. Available in various sizes.
7. Excellent solderability and heat resistance.
8. High reliability.
9. 100% Lead(Pb) & Halogen-Free and RoHS compliant.



2.Dimensions



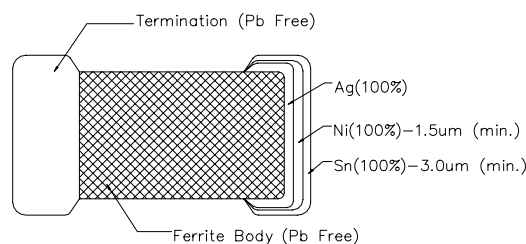
| Chip Size | |
|-----------|-----------|
| A | 2.00±0.20 |
| B | 1.25±0.20 |
| C | 0.85±0.20 |
| D | 0.50±0.30 |

Units: mm

3.Part Numbering



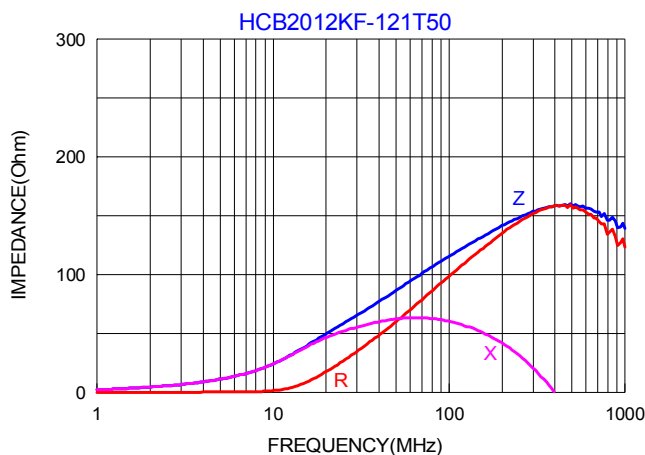
- A: Series
- B: Dimension L x W
- C: Material **Lead Free Material**
- D: Impedance **121=120**
- E: Packaging **T=Taping and Reel, B=Bulk(Bags)**
- F: Rated Current **50=5000mA**



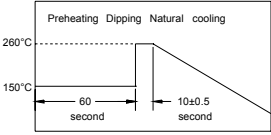
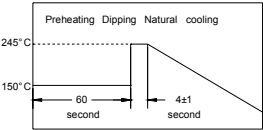
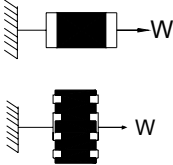
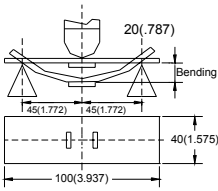
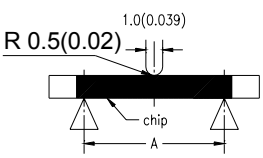
4.Specification

| Tai-Tech Part Number | Impedance () | Test Frequency (Hz) | DC Resistance () max. | Rated Current (mA) max. |
|----------------------|---------------|---------------------|------------------------|-------------------------|
| HCB2012KF-121T50 | 120±25% | 60mV/100M | 0.02 | 5000 |

■ Impedance-Frequency Characteristics



5. Reliability and Test Condition

| Item | Performance | | | | | | | | | | Test Condition | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|---|-------|-----|-----|-----|--|-----|-----|-----|-----|---|------|------------|-------|------|-------------|-----|------|-------------|-----|---------|-------------|-----|------|-------------|-----|------|-------------|-----|------|-------------|-----|------|-------------|-----|
| | FCB | FCM | HCB | GHB | FCA | FCI | FHI | FCH | HCI | MGI | | | | | | | | | | | | | | | | | | | | | | | | | |
| Series No. | | | | | | | | | | | -- | | | | | | | | | | | | | | | | | | | | | | | | |
| Operating Temperature | -40~+125 (Including self-temperature rise) | | | | | -40~+105 (Including self-temperature rise) | | | | | -- | | | | | | | | | | | | | | | | | | | | | | | | |
| Transportation Storage Temperature | -40~+125 | | | | | -40~+105 | | | | | For long storage conditions, please see the Application Notice | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance (Z) | Refer to standard electrical characteristics list | | | | | | | | | | Agilent4291 | | | | | | | | | | | | | | | | | | | | | | | | |
| Inductance (Ls) | | | | | | | | | | | Agilent E4991 | | | | | | | | | | | | | | | | | | | | | | | | |
| Q Factor | | | | | | | | | | | Agilent4287 | | | | | | | | | | | | | | | | | | | | | | | | |
| DC Resistance | | | | | | | | | | | Agilent16192 | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Current | | | | | | | | | | | Agilent 4338 | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature Rise Test | Rated Current < 1A ΔT 20 Max Rated Current 1A ΔT 40 Max | | | | | | | | | | 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer. | | | | | | | | | | | | | | | | | | | | | | | | |
| Solder heat Resistance | Appearance: No significant abnormality. Impedance change: Within ± 30%. Inductance change: : within±10% | | | | | No mechanical damage. Remaining terminal electrode:75% min. | | | | | Preheat: 150 ,60sec. Solder: Sn-Cu0.5 Solder temperature: 260±5 Flux for lead free: ROL0 Dip time: 10±0.5sec.  | | | | | | | | | | | | | | | | | | | | | | | | |
| Solderability | More than 95% of the terminal electrode should be covered with solder. | | | | |  | | | | | Preheat: 150 ,60sec. Solder: Sn-Cu0.5 Solder temperature: 245±5 Flux for lead free: ROL0 Dip time: 4±1sec. | | | | | | | | | | | | | | | | | | | | | | | | |
| Terminal strength | The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions. | | | | |  | | | | | For FCB FCM HCB GHB FCI FHI FCH HCI MGI: Size Force (Kgf) Time(sec) 1005 0.2 1608 0.5 2012 0.6 3216 1.0 >30 3225 1.0 4516 1.0 4532 1.5 For FCA: Size Force (Kgf) Time(sec) 3216 0.5 >30 | | | | | | | | | | | | | | | | | | | | | | | | |
| Flexture strength | The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions. | | | | |  | | | | | Solder a chip on a test substrate, bend the substrate by 2mm (0.079in)and return. The duration of the applied forces shall be 60 (+ 5) Sec. | | | | | | | | | | | | | | | | | | | | | | | | |
| Bending Strength | The ferrite should not be damaged by Forces applied on the right condition. | | | | |  | | | | | <table border="1"> <thead> <tr> <th>Size</th> <th>mm(inches)</th> <th>P-Kgf</th> </tr> </thead> <tbody> <tr> <td>1608</td> <td>0.80(0.033)</td> <td>0.3</td> </tr> <tr> <td>2012</td> <td>1.40(0.055)</td> <td>1.0</td> </tr> <tr> <td>FCA3216</td> <td>2.00(0.079)</td> <td>1.5</td> </tr> <tr> <td>3216</td> <td>2.00(0.079)</td> <td>2.5</td> </tr> <tr> <td>3225</td> <td>2.00(0.079)</td> <td>2.5</td> </tr> <tr> <td>4516</td> <td>2.70(0.106)</td> <td>2.5</td> </tr> <tr> <td>4532</td> <td>2.70(0.106)</td> <td>2.5</td> </tr> </tbody> </table> | Size | mm(inches) | P-Kgf | 1608 | 0.80(0.033) | 0.3 | 2012 | 1.40(0.055) | 1.0 | FCA3216 | 2.00(0.079) | 1.5 | 3216 | 2.00(0.079) | 2.5 | 3225 | 2.00(0.079) | 2.5 | 4516 | 2.70(0.106) | 2.5 | 4532 | 2.70(0.106) | 2.5 |
| Size | mm(inches) | P-Kgf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1608 | 0.80(0.033) | 0.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2012 | 1.40(0.055) | 1.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 3225 | 2.00(0.079) | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4516 | 2.70(0.106) | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4532 | 2.70(0.106) | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Random Vibration Test | Appearance: Cracking, chipping and any other defects harmful to the characteristics should not be allowed. Impedance: within±30% Inductance change: : within±10%. | | | | | | | | | | Frequency: 10-55-10Hz for 15 min. Amplitude: 1.52mm Directions and times: X, Y, Z directions for 15 min.. This cycle shall be performed 12 times in each of three mutually perpendicular directions (Total 9hours). | | | | | | | | | | | | | | | | | | | | | | | | |

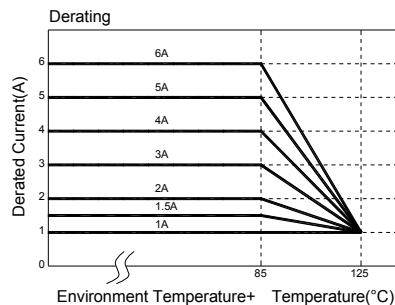
| Item | Performance | Test Condition |
|----------------------------------|---|--|
| Life testing at High Temperature | Appearance: no damage. | Temperature: 125±2 (bead), 85±2 (inductor) Applied current: rated current. Duration: 1000±12hrs. Measured at room temperature after placing for 2 to 3hrs. |
| Humidity | Impedance: within±30%of initial value. Inductance: within±10%of initial value. Q: within±30%of initial value. (FCI FHI FCH) Q: within±20%of initial value. (HCI MGI) | Humidity: 90~95%RH. Temperature: 40±2 . Temperature: 60±2 .(HCI MGI) Duration: 504±8hrs. Measured at room temperature after placing for 2 to 3hrs. |
| Thermal shock | Appearance: no damage. Impedance: within±30%of initial value. Inductance: within±10%of initial value. Q: within±30%of initial value. (FCI FHI FCH) Q: within±20%of initial value. (HCI MGI) | Condition for 1 cycle Step1: -40±2 30±5 min. Step2: +105±2 30±5min. Number of cycles: 500 Measured at room temperature after placing for 2 to 3 hrs. |
| Low temperature storage test | Q: within±20%of initial value. (HCI MGI) | Temperature: -40±2 . Duration: 500±8hrs. Measured at room temperature after placing for 2 to 3hrs. |
| Drop | No mechanical damage Impedance change: ±30% Inductance change: : within±10% | Drop 10 times on a concrete floor from a height of 75cm |

| Phase | Temperature() | Time(min.) |
|-------|----------------|------------|
| 1 | -40±2 | 30±5 |
| 2 | room temp. | 0.5 |
| 3 | +105±2 | 30±5 |

Measured: 500 times

****Derating Curve**

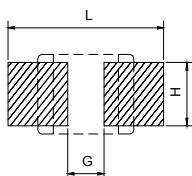
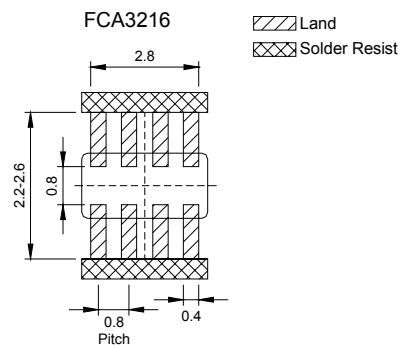
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85 , the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



6.Soldering and Mounting

6-1. Recommended PC Board Pattern

| Chip Size | | | | | Land Patterns For Reflow Soldering | | | |
|-----------|------|----------|-----------|-----------|------------------------------------|-------|-------|-------|
| Series | Type | A(mm) | B(mm) | C(mm) | D(mm) | L(mm) | G(mm) | H(mm) |
| FCB | 0603 | 0.6±0.03 | 0.30±0.03 | 0.30±0.03 | 0.15±0.05 | 0.80 | 0.30 | 0.30 |
| FCM | 1005 | 1.0±0.10 | 0.50±0.10 | 0.50±0.10 | 0.25±0.10 | 1.50 | 0.40 | 0.55 |
| HCB | 1608 | 1.6±0.15 | 0.80±0.15 | 0.80±0.15 | 0.30±0.20 | 2.60 | 0.60 | 0.80 |
| GHB | 2012 | 2.0±0.20 | 1.25±0.20 | 0.85±0.20 | 0.50±0.30 | 3.00 | 1.00 | 1.00 |
| | | 2.0±0.20 | 1.25±0.20 | 1.25±0.20 | 0.50±0.30 | | | |
| FHI | 3216 | 3.2±0.20 | 1.60±0.20 | 1.10±0.20 | 0.50±0.30 | 4.40 | 2.20 | 1.40 |
| FCH | 3225 | 3.2±0.20 | 2.50±0.20 | 1.30±0.20 | 0.50±0.30 | 4.40 | 2.20 | 3.40 |
| HCI | 4516 | 4.5±0.20 | 1.60±0.20 | 1.60±0.20 | 0.50±0.30 | 5.70 | 2.70 | 1.40 |
| MGI | 4532 | 4.5±0.20 | 3.20±0.20 | 1.50±0.20 | 0.50±0.30 | 5.90 | 2.57 | 4.22 |



PC board should be designed so that products can prevent damage from mechanical stress when warping the board. Products shall be positioned in the sideway direction against the mechanical stress to prevent failure.

6-2. Soldering

Mildly activated rosin fluxes are preferred. The terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

Note.

If wave soldering is used, there will be some risk.

Re-flow soldering temperatures below 240 degrees, there will be non-wetting risk

6-2.1 Lead Free Solder re-flow:

Recommended temperature profiles for lead free re-flow soldering in Figure 1.

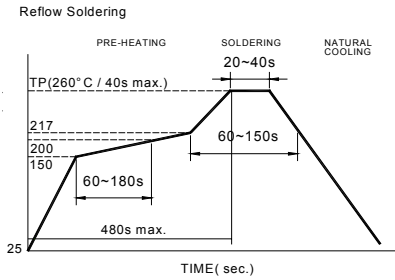
6-2.2 Soldering Iron:

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended. for Iron Soldering in Figure 2.

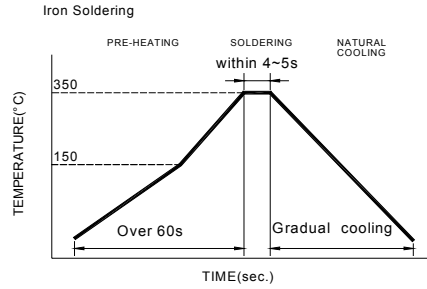
Preheat circuit and products to 150
350 tip temperature (max)

Never contact the ceramic with the iron tip
1.0mm tip diameter (max)

Use a 20 watt soldering iron with tip diameter of 1.0mm
Limit soldering time to 4-5sec.



Reflow times: 3 times max
Fig.1

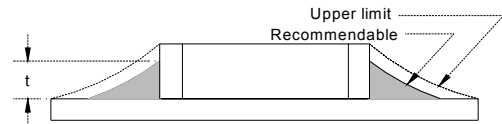


Iron Soldering times : 1 times max
Fig.2

6-2.3 Solder Volume:

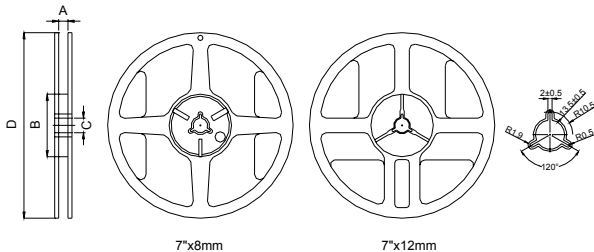
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



7.Packaging Information

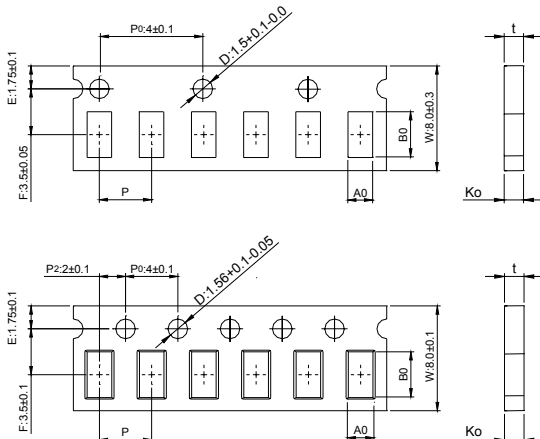
7-1. Reel Dimension



| Type | A(mm) | B(mm) | C(mm) | D(mm) |
|---------|----------|-------|----------|-------|
| 7"x8mm | 9.0±0.5 | 60±2 | 13.5±0.5 | 178±2 |
| 7"x12mm | 13.5±0.5 | 60±2 | 13.5±0.5 | 178±2 |

7-2.1 Tape Dimension / 8mm

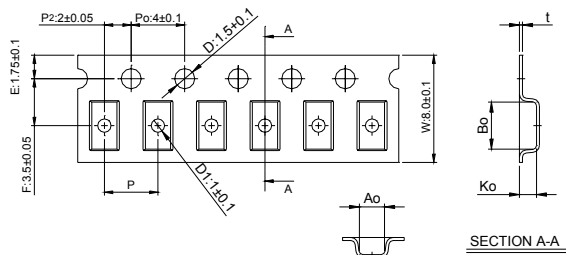
Material of taping is paper



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|--------|-----------|-----------|---------|----------|---------|--------|
| 060303 | 0.68±0.05 | 0.38±0.05 | 0.50max | 2.0±0.05 | 0.50max | none |

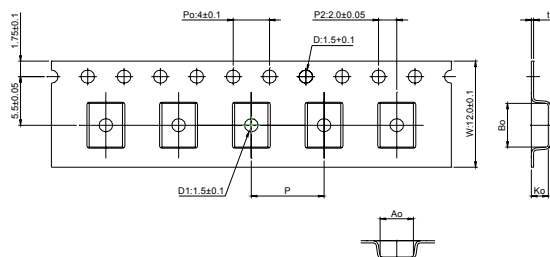
| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|--------|-----------|-----------|-----------|----------|-----------|--------|
| 100505 | 1.12±0.03 | 0.62±0.03 | 0.60±0.03 | 2.0±0.10 | 0.60±0.03 | none |
| 160808 | 1.85±0.05 | 1.05±0.05 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 | none |
| 201209 | 2.30±0.05 | 1.50±0.05 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 | none |

Material of taping is plastic



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|--------|-----------|-----------|-----------|----------|-----------|----------|
| 160808 | 1.95±0.10 | 1.05±0.10 | 1.05±0.10 | 4.0±0.10 | 0.23±0.05 | none |
| 201209 | 2.25±0.10 | 1.42±0.10 | 1.04±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 201212 | 2.35±0.10 | 1.50±0.10 | 1.45±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 321611 | 3.50±0.10 | 1.88±0.10 | 1.27±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 322513 | 3.42±0.10 | 2.77±0.10 | 1.55±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 321609 | 3.40±0.10 | 1.77±0.10 | 1.04±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |

7-2.2 Tape Dimension / 12mm

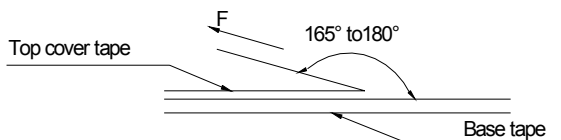


| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|--------|----------|----------|----------|---------|-----------|---------|
| 451616 | 4.95±0.1 | 1.93±0.1 | 1.93±0.1 | 4.0±0.1 | 0.24±0.05 | 1.5±0.1 |
| 453215 | 4.95±0.1 | 3.66±0.1 | 1.85±0.1 | 8.0±0.1 | 0.24±0.05 | 1.5±0.1 |

7-3. Packaging Quantity

| Chip Size | 453215 | 451616 | 322513 | 321611 | 321609 | 201212 | 201209 | 160808 | 100505 | 060303 |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Chip / Reel | 1000 | 2000 | 2500 | 3000 | 3000 | 2000 | 4000 | 4000 | 10000 | 15000 |
| Inner box | 4000 | 8000 | 12500 | 15000 | 15000 | 10000 | 20000 | 20000 | 50000 | 75000 |
| Middle box | 20000 | 40000 | 62500 | 75000 | 75000 | 50000 | 100000 | 100000 | 250000 | 375000 |
| Carton | 40000 | 80000 | 125000 | 150000 | 150000 | 100000 | 200000 | 200000 | 500000 | 750000 |
| Bulk (Bags) | 12000 | 20000 | 30000 | 50000 | 50000 | 100000 | 150000 | 200000 | 300000 | -- |

7-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

| Room Temp. () | Room Humidity (%) | Room atm (hPa) | Tearing Speed mm/min |
|----------------|-------------------|----------------|----------------------|
| 5-35 | 45-85 | 860-1060 | 300 |

Application Notice

Storage Conditions

To maintain the solder ability of terminal electrodes:

1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40 and 60% RH.
3. Recommended products should be used within 12 months from the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

Transportation

1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.