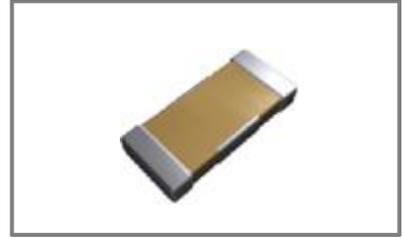


## ■ Three Terminations Chip Ceramic Filter Capacitor (EMI)



### Feature

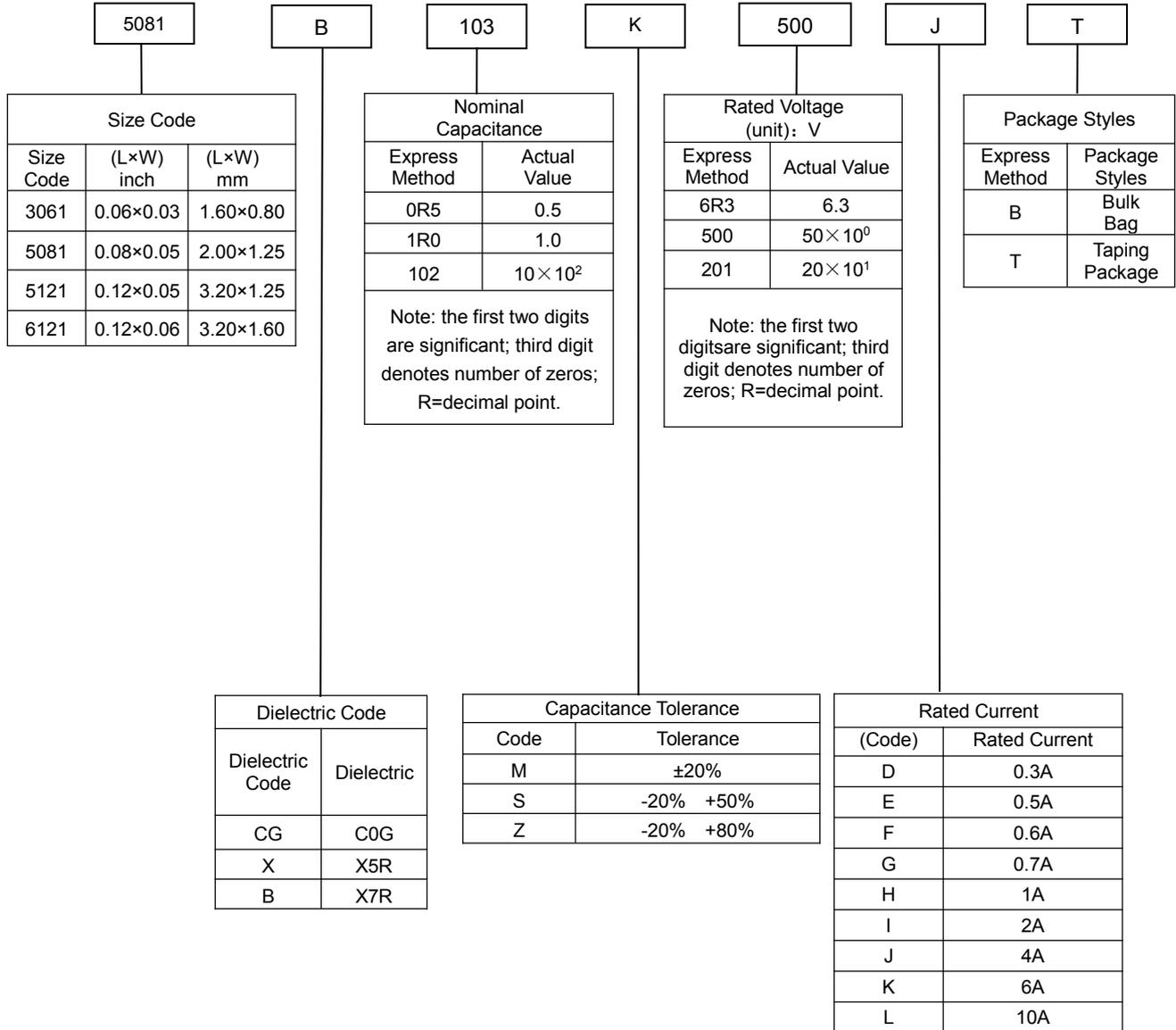
- \* There is high reliability on monolithic structure of laminated layers.
- \* Excellent performance in high current applications
- \* Non-polar, high-density surface mounting
- \* Superior filtering characteristics
- \* Super to absorb noise and restrain surge pulse
- \* Offers good solder-ability and leach-ability
- \* Executive Standard: GB/T 21041-2007 GB/T 21042-2007



### Application

- \* Cellular telephones and base stations
- \* Telecommunication equipment
- \* Industrial electronic interface of programmable controllers
- \* Electronic automotive equipment for car.
- \* Computer and peripheral equipment

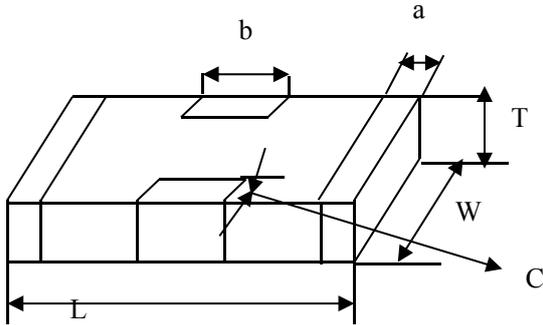
### How To Order



### Temperature Coefficient /Characteristics

| Dielectric | Reference Temperature Point | Temperature Coefficient | Operation Temperature Range |
|------------|-----------------------------|-------------------------|-----------------------------|
| C0G        | 20°C                        | 0±30 ppm/°C             | -55°C~125°C                 |
| X5R        | 20°C                        | ±15%                    | -55°C~85°C                  |
| X7R        | 20°C                        | ±15%                    | -55°C~125°C                 |

Note: Nominal temperature coefficient and allowed tolerance of class I are decided by the changing of the capacitance between 20°C and 85°C. Nominal temperature coefficient of class II are decided by the temperature of 20°C.

**◆ Product Structure And Dimensions**


| item size | (L)       | (W)       | (T)       | Termination Thickness (a) | Third Termination Width(b) | Third Termination Thickness(c) |
|-----------|-----------|-----------|-----------|---------------------------|----------------------------|--------------------------------|
| 3061      | 1.60±0.10 | 0.80±0.10 | 0.60±0.10 | 0.30±0.15                 | 0.4±0.10                   | 0.20±0.10                      |
| 5081      | 2.00±0.20 | 1.25±0.20 | 0.80±0.20 | 0.30±0.15                 | 0.6±0.10                   | 0.20±0.10                      |
| 5121      | 3.20±0.20 | 1.25±0.20 | 0.80±0.20 | 0.30±0.15                 | 1.10±0.10                  | 0.25±0.15                      |
| 6121      | 3.20±0.20 | 1.60±0.20 | 1.00±0.20 | 0.30±0.15                 | 1.10±0.10                  | 0.25±0.15                      |

**◆ Capacitance Range**

| Material | Product Specifications | Capacity range | Rated voltage | Error level      | Rated Current | DC resistance |
|----------|------------------------|----------------|---------------|------------------|---------------|---------------|
| X7R (B)  | 3061 (0603)            | 101~821        | 16V           | ±20% (M)         | 0.5A(E)       | ≤300mΩ        |
|          |                        | 102~822        | 16V           | ±20% (M)         | 0.7A(G)       | ≤300mΩ        |
|          |                        | 103~823        | 16V           | ±20% (M)         | 1.0A(H)       | ≤50mΩ         |
|          |                        | 104            | 16V           | ±20% (M)         | 2.0A(I)       | ≤30mΩ         |
|          |                        | 154~824        | 6.3V          | ±20% (M)         | 2.0A(I)       | ≤30mΩ         |
|          |                        | 105~225        | 6.3V          | ±20% (M)         | 4.0A(J)       | ≤10mΩ         |
|          | 5081 (0805)            | 221~821        | 50V           | ±20% (M)         | 1.0A(H)       | ≤50mΩ         |
|          |                        | 102~822        | 50V           | ±20% (M)         | 1.0A(H)       | ≤50mΩ         |
|          |                        | 103~823        | 50V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |
|          |                        | 104~824        | 16V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |
|          |                        | 105            | 16V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |
|          |                        | 105~225        | 6.3V          | ±20% (M)         | 4A(J)         | ≤10mΩ         |
| X7R (B)  | 5121 (1205)            | 221~821        | 50V           | ±20% (M)         | 0.7(G)        | ≤300mΩ        |
|          |                        | 221~821        | 50V           | +50%<br>-20% (S) | 0.7(G)        | ≤300mΩ        |
|          |                        | 102~822        | 50V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |
|          |                        | 102~822        | 50V           | +50%<br>-20% (S) | 2A(I)         | ≤30mΩ         |
|          |                        | 103~823        | 50V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |
|          |                        | 103~823        | 50V           | +50%<br>-20% (S) | 2A(I)         | ≤30mΩ         |
|          |                        | 104            | 50V           | ±20% (M)         | 2A(I)         | ≤30mΩ         |

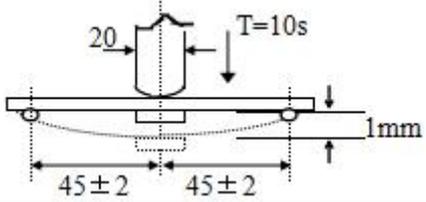
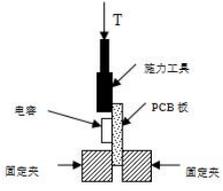
Note: We can design according to the customer requirements.

| Material    | Product Specifications | Capacity range | Rated voltage | Error level      | Rated Current | DC resistance |
|-------------|------------------------|----------------|---------------|------------------|---------------|---------------|
| X7R<br>(B)  | 6121<br>(1206)         | 102~822        | 50V           | ±20% (M)         | 6A(K)         | ≤5mΩ          |
|             |                        | 102~822        | 50V           | +50%<br>-20% (S) | 6A(K)         | ≤5mΩ          |
|             |                        | 104            | 50V           | ±20% (M)         | 10A(L)        | ≤2mΩ          |
|             |                        | 154~564        | 25V           | ±20% (M)         | 10A(L)        | ≤2mΩ          |
| X5R<br>(X)  | 3061<br>(0603)         | 474~225        | 6.3V          | ±20% (M)         | 4.0A(J)       | ≤10mΩ         |
|             | 5081<br>(0805)         | 225            | 6.3V          | ±20% (M)         | 4.0A(J)       | ≤10mΩ         |
|             | 6121<br>(1206)         | 152            | 25V           | +50%<br>-20% (S) | 6A(K)         | ≤5mΩ          |
| C0G<br>(CG) | 3061<br>(0603)         | 100~470        | 16V           | ±20% (M)         | 0.5A(E)       | ≤300mΩ        |
|             | 5081<br>(0805)         | 220~101        | 50V           | ±20% (M)         | 0.7A(G)       | ≤300mΩ        |
|             | 5121<br>(1205)         | 100~102        | 50V           | ±20% (M)         | 0.3(D)        | ≤300mΩ        |
|             |                        | 100~102        | 50V           | +50%<br>-20% (S) | 0.3(D)        | ≤300mΩ        |
|             | 6121<br>(1206)         | 100~102        | 50V           | ±20% (M)         | 0.3(D)        | ≤300mΩ        |
|             |                        | 100~102        | 50V           | +50%<br>-20% (S) | 0.3(D)        | ≤300mΩ        |

Note: We can design according to the customer requirements.

#### ◆ Reliability Test

| Item                             | Technical Specification  |  | Test Method and Remarks   |   |                   |      |       |       |       |       |   |   |  |  |
|----------------------------------|--|--|---|---|-------------------|------|-------|-------|-------|-------|---|---|--|--|
|                                  |  |  | Measuring Frequency   | Measuring Voltage                       |                   |      |       |       |       |       |   |   |  |  |
| Capacitance                      | Class I  | Should be within the specified tolerance.          | C > 1000pf: 1KHz±10%  | 1.0±0.2Vrms                             |                   |      |       |       |       |       |   |   |  |  |
|                                  | Class II   |  | C ≤ 1000pf: 1MHz±10%  |   |                   |      |       |       |       |       |   |   |  |  |
| Insulation Resistance            | Class I  | Ri ≥ 5000MΩ  | Measuring Voltage: Rated Voltage<br>Duration: 60±5s<br>Test Humidity: ≤75%<br>Test Temperature: 25℃±3℃<br>Test Current: ≤50mA |   |                   |      |       |       |       |       |   |   |  |  |
|                                  | Class II   | C ≤ 25 nF, Ri ≥ 10000MΩ<br>C > 25 nF, Ri·CR > 100S |   |   |                   |      |       |       |       |       |   |   |  |  |
| (DF, tanδ)<br>Dissipation Factor | Class I  | DF   | Capacitance   | Measuring frequency                     | Measuring Voltage |      |       |       |       |       |   |   |  |  |
|                                  |  | ≤1/ (400+20C)                                      | C < 30 pF   | 1MHz±10%                                | 1.0±0.2Vrms       |      |       |       |       |       |   |   |  |  |
|                                  | ≤0.1%  | C ≥ 30pF   |   |   |                   |      |       |       |       |       |   |   |  |  |
| Class II                         | <table border="1" style="width: 100%; text-align: center;"> <tr> <td>≥50V</td> <td>25V</td> <td>16V</td> <td>10V</td> <td>6.3V</td> </tr> <tr> <td>≤2.5%</td> <td>≤7.5%</td> <td>≤7.5%</td> <td>≤7.5%</td> <td>≥7.5% (C &lt; 1.0μF)<br/>≤10.0% (C ≥ 1.0μF)</td> </tr> </table> | ≥50V   | 25V   | 16V                                     | 10V               | 6.3V | ≤2.5% | ≤7.5% | ≤7.5% | ≤7.5% | ≥7.5% (C < 1.0μF)<br>≤10.0% (C ≥ 1.0μF) | Test Frequency: 1KHz±10%<br>Test Voltage: 1.0±0.2Vrms |  |  |
| ≥50V                             | 25V  | 16V  | 10V   | 6.3V                                    |                   |      |       |       |       |       |   |   |  |  |
| ≤2.5%                            | ≤7.5%  | ≤7.5%  | ≤7.5%   | ≥7.5% (C < 1.0μF)<br>≤10.0% (C ≥ 1.0μF) |                   |      |       |       |       |       |   |   |  |  |

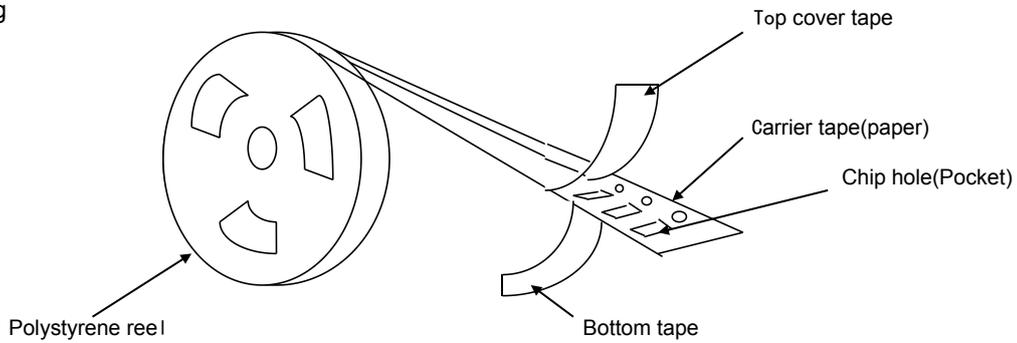
| Item  | Technical Specification  |   |          | Test Method and Remarks  |  |               |       |    |       |    |
|---|--|---|----------|--|--|---------------|-------|----|-------|----|
| Dielectric Withstanding Voltag  | No breakdown or damage.  |   |          | Measuring Voltage:<br>Ur<100V: Class I :300% Ur Class II :250% Ur<br>100V≤Ur<500V: 200%Ur<br>Duration:1~5s<br>Charge/ Discharge Current: 50mA max.   |  |               |       |    |       |    |
| Solderability   | At least 95% of the terminal electrode is covered by new solder.<br>Visual Appearance: No visible damage.    |   |          | Preheating conditions:80 to 120℃; 10~30s.  |  |               |       |    |       |    |
|   |  |   |          | Pb-Sn soldering<br>Solder Temperature:<br>235±5℃<br>Duration: 2±0.5s   | Lead-free soldering<br>Solder Temperature:<br>245±5℃<br>Duration: 2±0.5s |               |       |    |       |    |
| Resistance to Soldering Heat  | Item   | Class I                                 | Class II | Preheating conditions: 100 to 200℃; 60~120s.<br>Solder Temperature: 265±5℃<br>Duration: 10±1s<br>Clean the capacitor with solvent and examine it with a 10X(min.) microscope.<br>Recovery Time: 24±2h<br>Recovery condition: Room temperature  |  |               |       |    |       |    |
|   | ΔC/C   | ≤±2.5% or ±0.25pF , whichever is larger | ±15%     |  |  |               |       |    |       |    |
|   | DF   | Same to initial value.                  |          |  |  |               |       |    |       |    |
|   | IR   | Same to initial value.                  |          |  |  |               |       |    |       |    |
| Appearance : No visible damage.At least 95% of the terminal electrode is covered by new solder. |  |   |          |  |  |               |       |    |       |    |
| Resistance to Flexure of Substrate (Bending Strength)   | Appearance: No visible damage.<br>ΔC/C:<br>Class I : ≤±5% or ±0.5pF,whichever is larger.<br>Class II : ≤±10% |   |          | Test board: PCB Warp: 1mm<br>Speed: 1mm/sec. Unit: mm<br>The measurement should be made with the board in the bending position.    |  |               |       |    |       |    |
| Termination Adhesion  | No visible damage.   |   |          | As shown in the picture , Slowly apply a T force to the porcelain body on the side of the capacitor and hold for 60+1 seconds. <table border="1" data-bbox="893 1451 1129 1617"> <thead> <tr> <th>specification</th> <th>Apply force T</th> </tr> </thead> <tbody> <tr> <td>≤0402</td> <td>2N</td> </tr> <tr> <td>≥0603</td> <td>5N</td> </tr> </tbody> </table>  | specification  | Apply force T | ≤0402 | 2N | ≥0603 | 5N |
| specification   | Apply force T  |   |          |  |  |               |       |    |       |    |
| ≤0402   | 2N   |   |          |  |  |               |       |    |       |    |
| ≥0603   | 5N   |   |          |  |  |               |       |    |       |    |

| Item   | Technical Specification |   | Test Method and Remarks  |
|--|-------------------------|---|--|
| Life Test  | $\Delta C/C$            | Class I<br>$\leq \pm 3\%$ 或 $\pm 0.3pF$ , whichever is larger.                        | Applied Voltage:<br>※ Pretreatment (ClassII) :After preheating at $140^{\circ}C \sim 150^{\circ}C$ for $1h \pm 10min$ , place at room temperature for $24 \pm 2h$ .<br>$U_r < 100V$ : $2 \times$ Rated Voltage<br>$100V \leq U_r$ : $1.5 \times$ Rated Voltage<br>Duration: 1000h<br>Temperature: $85^{\circ}C$ (X5R) $125^{\circ}C$ (C0G, X7R)<br>Charge/ Discharge Current: 50mA max.<br>Recovery Conditions: Room Temperature<br>Recovery Time: $24 \pm 2h$ |
|  |                         | Class II<br>-20% ~ +20%   |  |
|  | DF                      | $\leq 2$ 倍初始标准<br>Not more than twice of initial value.                               |  |
|  | IR                      | Class I<br>$R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$<br>whichever is smaller. |  |
| Class II<br>$R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$<br>whichever is smaller. |                         |   |  |
| Appearance: No visible damage.   |                         |   |  |

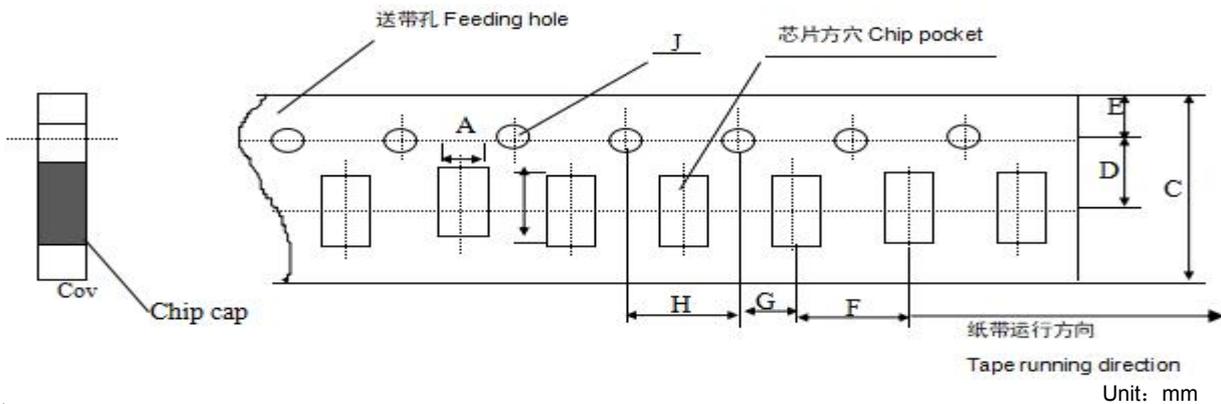
◆ Package

\*

Paper Taping



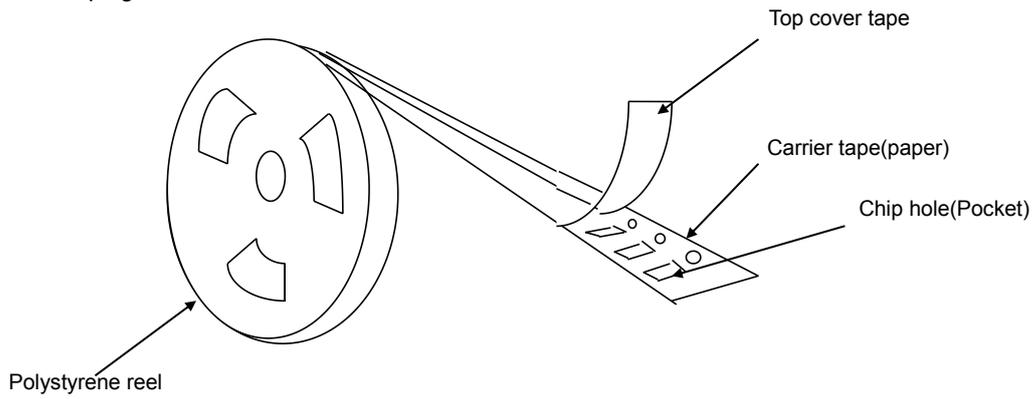
\*Dimensions of paper taping for 3061, 5081, 5121, 6121 types.



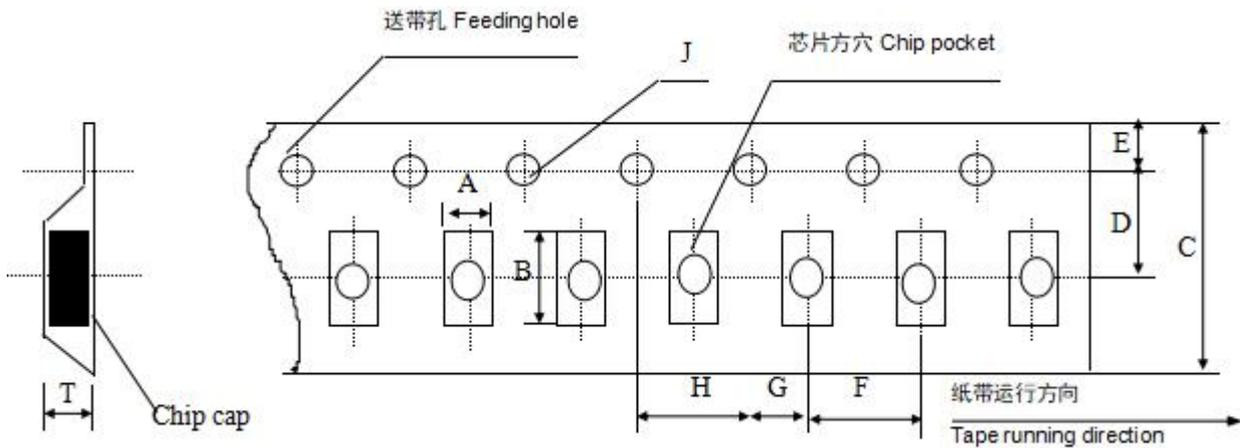
| Code<br>paper size | A                  | B                  | C                  | D*                 | E                  | F                  | G*                 | H                  | J                  | T           |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------|
| 3061               | 1.10<br>$\pm 0.10$ | 1.90<br>$\pm 0.10$ | 8.00<br>$\pm 0.10$ | 3.50<br>$\pm 0.05$ | 1.75<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 2.00<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 1.50<br>$-0/+0.10$ | 1.10<br>Max |
| 5081               | 1.45<br>$\pm 0.15$ | 2.30<br>$\pm 0.15$ | 8.0<br>$\pm 0.15$  | 3.50<br>$\pm 0.05$ | 1.75<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 2.00<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 1.50<br>$-0/+0.10$ | 1.10<br>Max |
| 5121/6121          | 1.80<br>$\pm 0.20$ | 3.40<br>$\pm 0.20$ | 8.00<br>$\pm 0.20$ | 3.50<br>$\pm 0.05$ | 1.75<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 2.00<br>$\pm 0.10$ | 4.00<br>$\pm 0.10$ | 1.50<br>$-0/+0.10$ | 1.10<br>Max |

Note: The place with "\*" means where needs exactly dimensions.

\* Embossed tapping



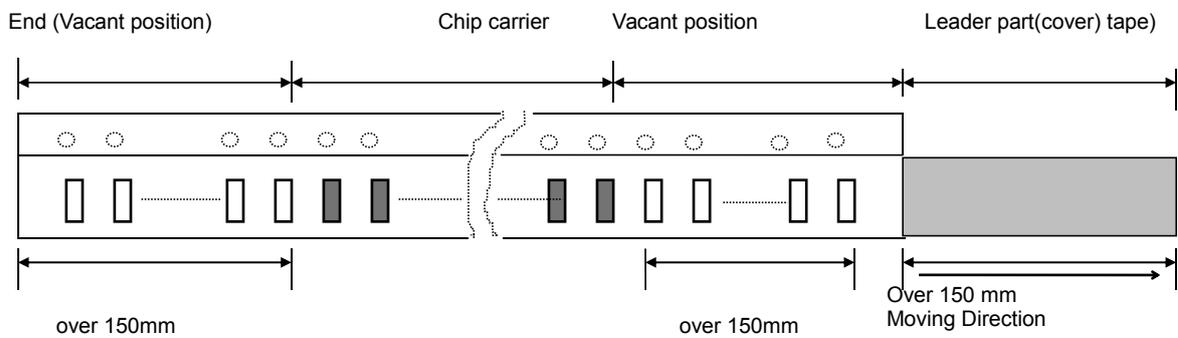
\* Dimensions of embossed tapping for 5081、5121、6121 type



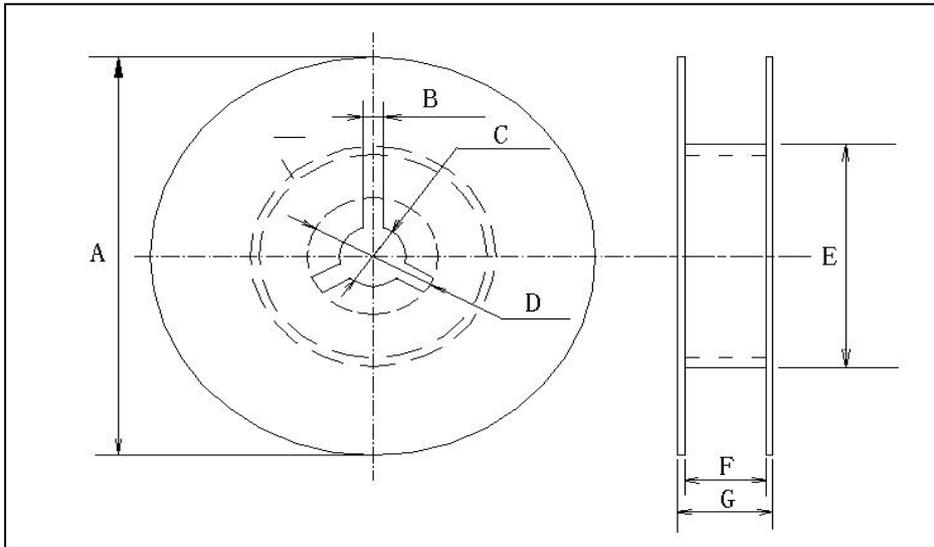
| Code<br>Tape size | A             | B             | C             | D*            | E             | F             | G*            | H             | J                | T           |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|-------------|
| 5081              | 1.55<br>±0.20 | 2.35<br>±0.20 | 8.00<br>±0.20 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10 | 2.00<br>±0.10 | 4.00<br>±0.10 | 1.50<br>-0/+0.10 | 1.50<br>Max |
| 5121/6121         | 1.95<br>±0.20 | 3.60<br>±0.20 | 8.00<br>±0.20 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10 | 2.00<br>±0.10 | 4.00<br>±0.1  | 1.50<br>-0/+0.10 | 1.85<br>Max |

Note: The place with "\*" means where needs exactly dimensions.

\* Structure of leader part and end part of the carrier paper



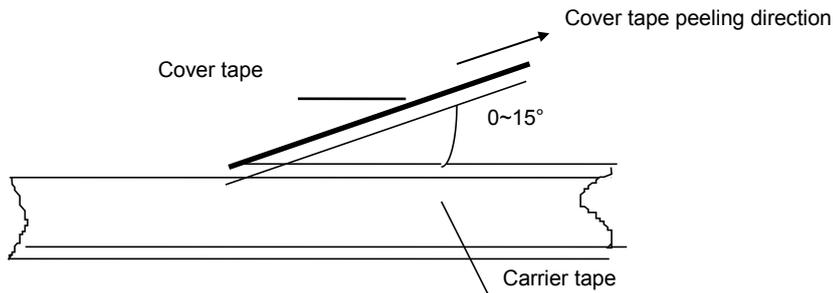
\* Reel dimensions (unit: mm)



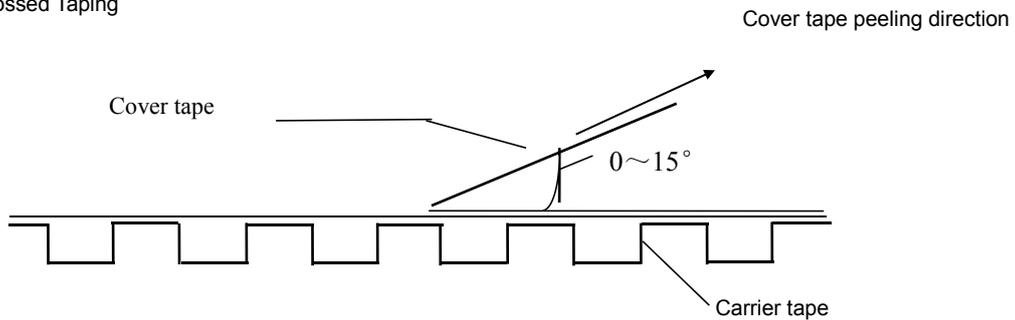
| Reel model | A                  | B   | C                 | D                 | E                 | F              | G     |
|------------|--------------------|-----|-------------------|-------------------|-------------------|----------------|-------|
| 7" REEL    | $\phi 178 \pm 2.0$ | 3.0 | $\phi 13 \pm 0.5$ | $\phi 21 \pm 0.8$ | $\phi 50$ or more | $10.0 \pm 1.5$ | 12max |

\* Taping specification: top tape peeling strength

\* Paper Taping



\* Embossed Taping



Standard:  $0.1N < \text{peeling strength} < 0.7N$

No paper dirty remains on the scotch when peeling, and sticks to top and bottom tape.

**\* Bulk Case Package**

(unit) :mm

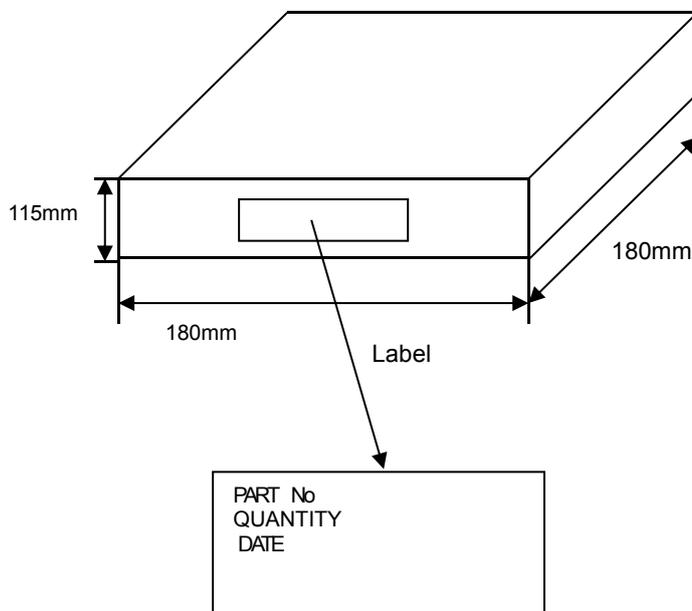
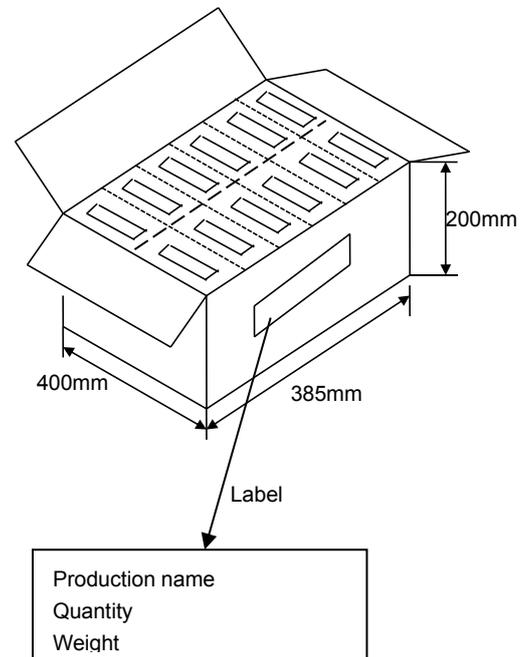
|           |               |               |            |               |              |           |
|-----------|---------------|---------------|------------|---------------|--------------|-----------|
| Symbol    | A             | B             | T          | C             | D            | E         |
| Dimension | 6.80±0.10     | 8.80±1.00     | 12.00±0.10 | 15.00+0.10/-0 | 2.00+0/-0.10 | 4.70±0.10 |
| Symbol    | F             | W             | G          | H             | L            | I         |
| Dimension | 31.50+0.20/-0 | 36.00+0/-0.20 | 19.00±0.35 | 7.00±0.35     | 110.00±0.70  | 5.00±0.35 |

**\* Packing Quantity**

| (SIZE)    | ( Package Style & Quantity) unit: pcs |      |                                |       |      |
|-----------|---------------------------------------|------|--------------------------------|-------|------|
|           | (EPT)                                 | (PT) | (ET)                           | (BC)  | (BP) |
| 3061      | -----                                 | 4000 | -----                          | 15000 | 5000 |
| 5081      | -----                                 | 4000 | 3000                           | 10000 | 5000 |
| 5121/6121 | -----                                 | 4000 | T≤1.35mm 3000<br>T>1.35mm 2000 | 5000  | 5000 |

Note: We can choose packing style and quantity can be according to the customer's requirement.

**\* Outer packing**

 The first package  
 Quantity: 10 reels

 The second package  
 Quantity: 6 cases


◆ **Storage Methods**

- \* The guaranteed period for solderability is 12 months (Under deliver package condition).
- \* Storage conditions:  
 Temperature 5~40℃                      Relative Humidity 20~70%

◆ **Precautions For Use**

The Multi-layer Ceramic Capacitors (MLCC) may fail in a short circuit mode in an open circuit mode when subjected to severe conditions of electrical environment and / or mechanical stress beyond the specified "rating" and specified "conditions" in the specification, which will result in burn out, flaming or glowing in the worst case. Following "precautions for "safety" and Application Notes shall be taken in your major consideration. If you have a question about the precautions for handling, please contact our engineering section or factory.

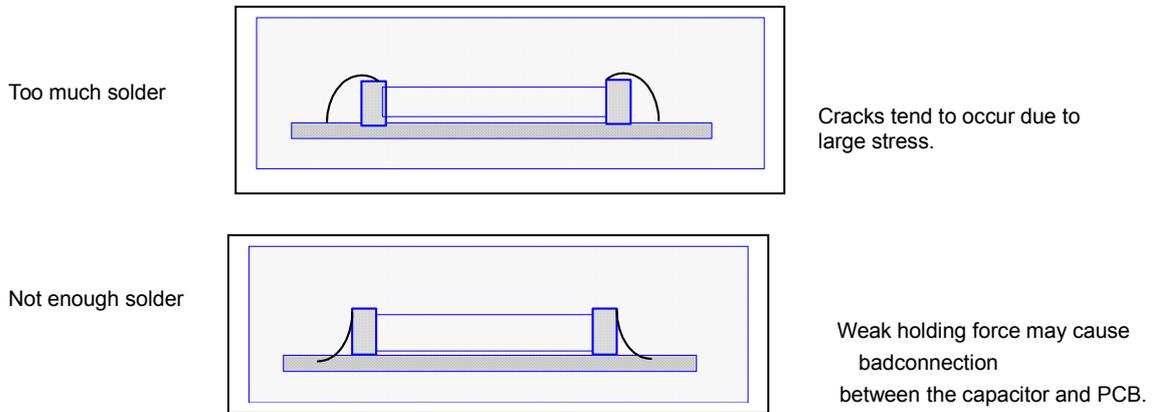
\* **Soldering Profile**

To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph (refer to the graph in the enclosure page).

\* **Manual Soldering**

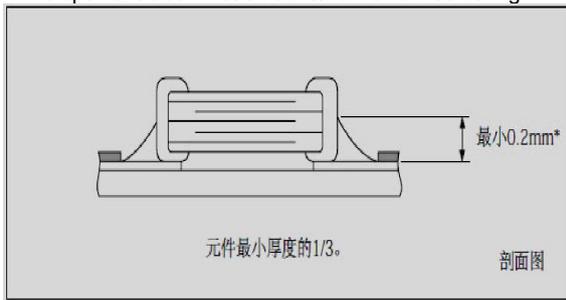
Manual soldering can pose a great risk of creating thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator's careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

\* **Optimum Solder Amount for Reflow Soldering**

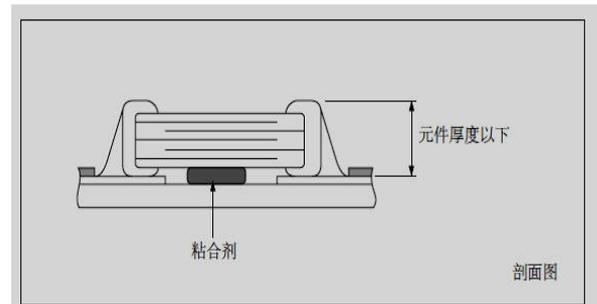


\* **Recommended Soldering amounts**

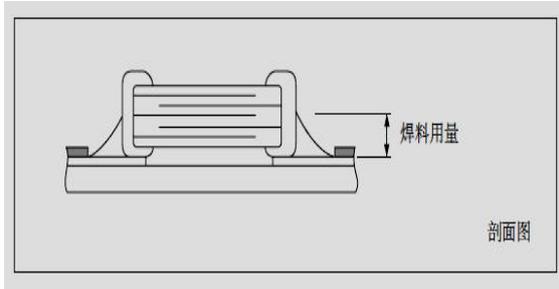
The optimal solder fillet amounts for re-flow soldering



The optimal solder fillet amounts for wave soldering



The optimal solder fillet amounts for reworking by using soldering iron



\* Recommended Soldering Method

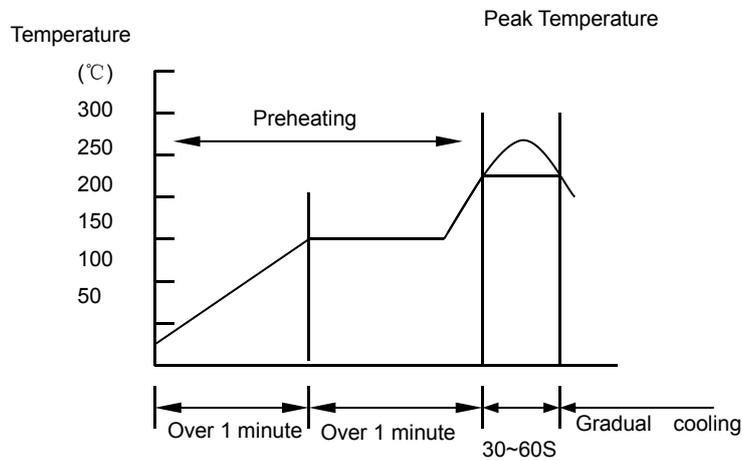
| Size | Temperature Characteristics | Rated Voltage | Capacitance | Soldering Method |
|------|-----------------------------|---------------|-------------|------------------|
| 3061 | C0G, X7R, X5R               | /             | /           | R                |
| 5081 | C0G, X7R, X5R               | /             | /           | R                |
| 5121 | C0G, X7R, X5R               | /             | /           | R                |
| 6121 | C0G, X7R, X5R               | /             | /           | R                |

Soldering method:

- R—Reflow Soldering
- W—Wave Soldering

◆ The temperature profile for soldering

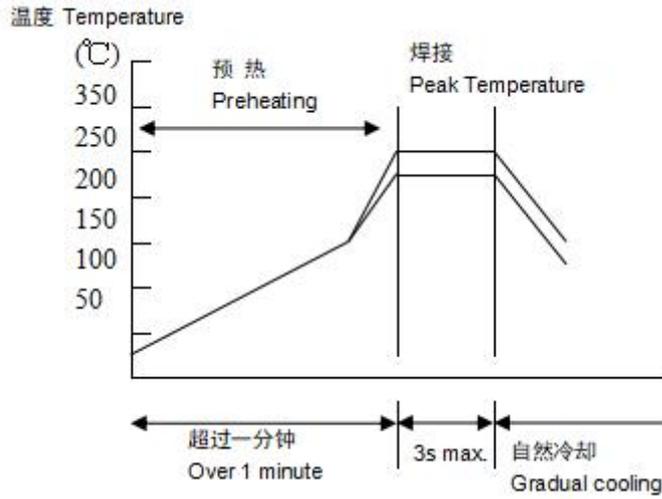
\* (Re-flow soldering)



|                  | Pb-Sn soldering | Lead-free soldering |
|------------------|-----------------|---------------------|
| Peak temperature | 230°C~250°C     | 240°C~260°C         |

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^\circ\text{C}$ .

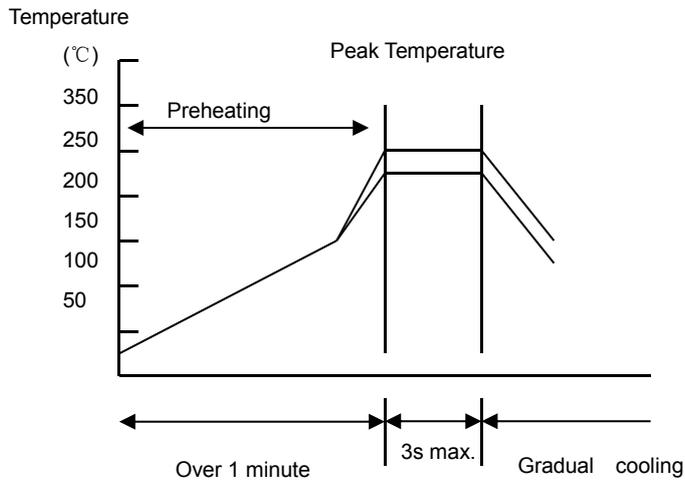
\* (Wave soldering)



|                  | Pb-Sn soldering | Lead-free soldering |
|------------------|-----------------|---------------------|
| Peak temperature | 230°C~260°C     | 240°C~270°C         |

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^\circ\text{C}$ .

\* Hand soldering



Conditions:

| Preheating                      | Temperature of soldering iron head       | Power of soldering iron | Diameter of soldering iron head | Soldering time    | Solder paste amount       | Restricted conditions  |
|---------------------------------|--|-------------------------|---------------------------------|-------------------|---------------------------|--|
| $\Delta \leq 130^\circ\text{C}$ | Highest temperature: $350^\circ\text{C}$ | 20W at the highest      | 1mm recommended                 | 3s at the longest | $\leq 1/2$ chip thickness | Please avoid the direct contact between soldering iron head and ceramic components |

\*The latest version of the content shall prevail