



# PRODUCT SPECIFICATION

**PRODUCT: CERAMIC DISC CAPACITOR**

**TYPE: 50V, 100V, 500V, 1KV, 2KV, TEMPERATURE COMPENSATING CAPACITOR**

**CUSTOMER:** \_\_\_\_\_

**DOC. NO.:** POE-D01-00-E-05

**Ver.:** 5

|                             |
|-----------------------------|
| <b>APPROVED BY CUSTOMER</b> |
|                             |

**VENDOR :**

**WALSIN TECHNOLOGY CORPORATION**

566-1, KAO SHI ROAD, YANG-MEI  
TAO-YUAN, TAIWAN

**PAN OVERSEAS (GUANGZHOU) ELECTRONIC CO.,LTD.**

NO.277,HONG MING ROAD,EASTERN SECTION,  
GUANG ZHOU ECONOMIC AND TECHNOLOGY  
DEVELOPMENT ZONE,CHINA

**MAKER : PAN OVERSEAS (GUANGZHOU) ELECTRONIC CO.,LTD.**

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**Record of change**

| Date          | Version       | Description  | page              |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
|---------------|---------------|--|-------------------|-----|--------|-----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|--|---------------|---------------|----------------------------------|
| 2008.6.3      | 1             | 1. D08-00-E-14 (before) → POE-D01-00-E-01 (1 <sup>st</sup> edition)  |                   |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| 2008.8.22     | 2             | <p>1.Revised diameter as below :</p> <table border="1"> <thead> <tr> <th>Before</th> <th>Now</th> <th>Before</th> <th>Now</th> </tr> </thead> <tbody> <tr> <td>CH5000R5X040*</td> <td>not available</td> <td>SL500181X060*</td> <td>SL500181X050*</td> </tr> <tr> <td>CH1010R5X040*</td> <td>not available</td> <td>SL500241X070*</td> <td>SL500241X060*</td> </tr> <tr> <td>CH501360X050*</td> <td>CH501360X060*</td> <td>SL500361X080*</td> <td>SL500361X070*</td> </tr> <tr> <td>CH501620X080*</td> <td>CH501620X060*</td> <td>SL500391X080*</td> <td>SL500391X070*</td> </tr> <tr> <td>CH501680X080*</td> <td>CH501680X060*</td> <td>SL101181X060*</td> <td>SL101181X050*</td> </tr> <tr> <td>CH501750X080*</td> <td>CH501750X060*</td> <td>SL101241X070*</td> <td>SL101241X060*</td> </tr> <tr> <td>CH501820X080*</td> <td>CH501820X070*</td> <td>SL101361X080*</td> <td>SL101361X070*</td> </tr> <tr> <td>CH501101X080*</td> <td>CH501101X070*</td> <td>SL101391X080*</td> <td>SL101391X070*</td> </tr> <tr> <td>CH102080X060*</td> <td>CH102080X050*</td> <td>SL102680X060*</td> <td>SL102680X050*</td> </tr> <tr> <td>CH102100X060*</td> <td>CH102100X050*</td> <td>SL102121X100*</td> <td>SL102121X060*</td> </tr> <tr> <td>CH102120X060*</td> <td>CH102120X050*</td> <td>SL102151X100*</td> <td>SL102151X070*</td> </tr> <tr> <td>CH102620X080*</td> <td>CH102620X070*</td> <td>SL102181X100*</td> <td>SL102181X070*</td> </tr> <tr> <td>CH102820X100*</td> <td>CH102820X080*</td> <td>SL102201X100*</td> <td>SL102201X080*</td> </tr> <tr> <td></td> <td></td> <td>SL102221X100*</td> <td>SL102221X080*</td> </tr> </tbody> </table> <p>2. Complete lead code</p> <p>3.Add last SAP code “ H” for halogen and Pb free , epoxy resin..</p> | Before            | Now | Before | Now | CH5000R5X040* | not available | SL500181X060* | SL500181X050* | CH1010R5X040* | not available | SL500241X070* | SL500241X060* | CH501360X050* | CH501360X060* | SL500361X080* | SL500361X070* | CH501620X080* | CH501620X060* | SL500391X080* | SL500391X070* | CH501680X080* | CH501680X060* | SL101181X060* | SL101181X050* | CH501750X080* | CH501750X060* | SL101241X070* | SL101241X060* | CH501820X080* | CH501820X070* | SL101361X080* | SL101361X070* | CH501101X080* | CH501101X070* | SL101391X080* | SL101391X070* | CH102080X060* | CH102080X050* | SL102680X060* | SL102680X050* | CH102100X060* | CH102100X050* | SL102121X100* | SL102121X060* | CH102120X060* | CH102120X050* | SL102151X100* | SL102151X070* | CH102620X080* | CH102620X070* | SL102181X100* | SL102181X070* | CH102820X100* | CH102820X080* | SL102201X100* | SL102201X080* |  |  | SL102221X100* | SL102221X080* | <p>6-7</p> <p>16-19</p> <p>8</p> |
| Before        | Now           | Before   | Now               |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH5000R5X040* | not available | SL500181X060*  | SL500181X050*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH1010R5X040* | not available | SL500241X070*  | SL500241X060*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501360X050* | CH501360X060* | SL500361X080*  | SL500361X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501620X080* | CH501620X060* | SL500391X080*  | SL500391X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501680X080* | CH501680X060* | SL101181X060*  | SL101181X050*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501750X080* | CH501750X060* | SL101241X070*  | SL101241X060*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501820X080* | CH501820X070* | SL101361X080*  | SL101361X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH501101X080* | CH501101X070* | SL101391X080*  | SL101391X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH102080X060* | CH102080X050* | SL102680X060*  | SL102680X050*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH102100X060* | CH102100X050* | SL102121X100*  | SL102121X060*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH102120X060* | CH102120X050* | SL102151X100*  | SL102151X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH102620X080* | CH102620X070* | SL102181X100*  | SL102181X070*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| CH102820X100* | CH102820X080* | SL102201X100*  | SL102201X080*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
|               |               | SL102221X100*  | SL102221X080*     |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| 2008.12.12    | 3             | <p>1. Complete the 13<sup>th</sup> to 17<sup>th</sup> codes of SAP P/N.</p> <p>2. Page layout adjustment.</p> <p>3. Added Marking when the coating resin is Halogen and PB free Epoxy.</p>   | 4-7               |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| 2009.8.19     | 4             | <p>1 Change PSA &amp; POE logo to Walsin &amp; POE logo.</p> <p>2.Operating temperature range change from -25℃ ~ +85℃ to -25℃ ~ +125℃.</p>   | 11                |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |
| 2010.8.24     | 5             | <p>1. Change the diameter dimension from 060 to 070 for P/N CH 500V<br/>62pF&amp;68pF&amp;75pF.</p> <p>2. Add 10pF~39pF(Code of diameter dimension is 050) for P/N SL 1KV.</p>   | <p>7</p> <p>8</p> |     |        |     |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |  |  |               |               |                                  |



**1. Part number for SAP system(total eighteen code ) :**

CH   500   470   J   050   B   20   C   5   B  
 ①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧   ⑨   ⑩

① Temperature characteristic : CH:0±60ppm/°C, SL:+350~-1000ppm/°C

② Rated voltage (Vdc) :

| Voltage | 50V | 100V | 500V | 1000V | 2000V |
|---------|-----|------|------|-------|-------|
| Code    | 500 | 101  | 501  | 102   | 202   |

③ Capacitance(pF) :

| Capacitors (pF) | 47  | 100 | 330 | 470 | 820 |
|-----------------|-----|-----|-----|-----|-----|
| Code            | 470 | 101 | 331 | 471 | 821 |

④ Capacitance tolerance : C: ±0.25pF (For below 5pF) · D: ±0.5pF (For6~10pF) · J: ±5% (For above 10pF)

⑤ Nominal body diameter dimension :

| Diameter size | 4mm | 5mm | 6mm | 7mm | 8mm | 9mm | 10mm | 11mm | 12mm |
|---------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Code          | 040 | 050 | 060 | 070 | 080 | 090 | 100  | 110  | 120  |

⑥ Code of lead type : Please refer to Item “2.Mechanical”.

⑦ Packing mode and lead's length (identified by 2-figure code)

| Taping Code | Description                       |
|-------------|-----------------------------------|
| AN          | Ammo / Pitch of component:12.7 mm |

| Bulk Code | Description             |
|-----------|-------------------------|
| 3E        | Lead's length L : 3.5mm |
| 04        | Lead's length L : 4mm   |
| 4E        | Lead's length L : 4.5mm |
| 20        | Lead's length L : 20mm  |

⑧ Length tolerance

| Code | Description                            |
|------|--|
| A    | ±0.5 mm(Only for short kink lead code) |
| B    | ±1.0 mm                                |
| C    | Min.                                   |
| D    | Taping special purpose                 |

⑨ Pitch

| Code | Description                  | Code | Description |
|------|------------------------------|------|-------------|
| 5    | 5.0±0.8mm (For Bulk)         | 7    | 7.5 ±1mm    |
| 5    | 5.0+0.8mm-0.2mm (For Taping) | 0    | 10.0 ±1mm   |
| 2    | 2.5 ±0.8 mm                  |      |             |

⑩ Coating code

| Code | Description   |
|------|---|
| P    | Phenolic resin -Pb free, voltage ≤ 1kV                  |
| A    | Halogen free and Pb free, phenolic resin, voltage ≤ 1kV |
| B    | Epoxy Resin , Pb free, voltage ≥ 2kV                    |
| H    | Halogen free and Pb free , epoxy resin, voltage ≥ 2kV   |

**2. Mechanical:**
**Available lead code: (unit: mm)**

| Lead type                                  | SAP P/N (13-17) digits | Old P/N Ref. to "2.1 Old P/N" | Pitch (F)                           | Lead length (L)              | Available rated voltage        | Packing   | Lead configuration             |
|--|------------------------|-------------------------------|-------------------------------------|------------------------------|--------------------------------|-----------|--------------------------------|
| Lead style : B<br>Straight long lead       | B20C2                  | 5                             | 2.5 ± 0.8                           | 20 MIN.                      | 50V&100V                       | Bulk      |                                |
|  | B20C5                  | 6                             | 5.0 ± 0.8                           | 20 MIN.                      | 50V&100V,<br>500V,<br>1KV,2KV  |           |                                |
|  | B20C6                  | 7                             | 6.4 ± 1.0                           | 20 MIN.                      |                                |           |                                |
|  | B20C0                  | C                             | 10 ± 1.0                            | 20 MIN.                      |                                |           |                                |
|  | B20C7                  | W4                            | 7.5 ± 1.0                           | 20 MIN.                      |                                |           |                                |
|  | BAND5                  | G                             | 5.0 <sup>+0.8</sup> <sub>-0.2</sub> | Taping Spec. (Ref.to page.9) | 50V&100V                       | Tap. Ammo |                                |
| BAND2                                      | F                      | 2.5 ± 0.8                     |                                     |                              |                                |           |                                |
| Lead style : L<br>Straight short lead      | L05B2                  | 1                             | 2.5 ± 0.8                           | 5.0 ± 1.0                    | 50V&100V                       | Bulk      |                                |
|  | L05B5                  | 2                             | 5.0 ± 0.8                           | 5.0 ± 1.0                    | 50V&100V,<br>500V, 1KV,<br>2KV |           |                                |
|  | L05B0                  | A                             | 10 ± 1.0                            | 5.0 ± 1.0                    |                                |           |                                |
|  | L05B6                  | P14                           | 6.4 ± 1.0                           | 5.0 ± 1.0                    |                                |           |                                |
|  | L05B7                  | P16                           | 7.5 ± 1.0                           | 5.0 ± 1.0                    |                                |           |                                |
|  | L4EB5                  | A5                            | 5.0 ± 0.8                           | 4.5 ± 1.0                    |                                |           |                                |
|  | L4EB7                  | A7                            | 7.5 ± 1.0                           | 4.5 ± 1.0                    |                                |           |                                |
| L4EB0                                      | A0                     | 10 ± 1.0                      | 4.5 ± 1.0                           |                              |                                |           |                                |
| Lead style : H<br>Inside kink lead         | H05B5                  | 8                             | 5.0 ± 0.8                           | 5.0 ± 1.0                    | 50V&100V,<br>500V, 1KV,<br>2KV | Bulk      |                                |
|  | H05B7                  | T3                            | 7.5 ± 1.0                           | 5.0 ± 1.0                    |                                |           |                                |
|  | H05B0                  | B                             | 10 ± 1.0                            | 5.0 ± 1.0                    |                                |           |                                |
|  | H20C0                  | T4                            | 10 ± 1.0                            | 20 MIN.                      |                                |           |                                |
|  | H20C5                  | 9                             | 5.0 ± 0.8                           | 20 MIN.                      |                                |           |                                |
|  | H04A5                  | B5                            | 5.0 ± 0.8                           | 4.0 ± 0.5                    |                                |           |                                |
|  | H04A7                  | B7                            | 7.5 ± 1.0                           | 4.0 ± 0.5                    |                                |           |                                |
|  | H04A0                  | B0                            | 10 ± 1.0                            | 4.0 ± 0.5                    |                                |           |                                |
|  | H3EA5                  | H1                            | 5.0 ± 0.8                           | 3.5 ± 0.5                    |                                |           |                                |
|  | H3EA7                  | H2                            | 7.5 ± 1.0                           | 3.5 ± 0.5                    |                                |           |                                |
|  | H3EA0                  | H3                            | 10 ± 1.0                            | 3.5 ± 0.5                    |                                |           |                                |
|  | H4EB5                  | H5                            | 5.0 ± 0.8                           | 4.5 ± 1.0                    |                                |           |                                |
|  | H4EB7                  | H7                            | 7.5 ± 1.0                           | 4.5 ± 1.0                    |                                |           |                                |
|  | H4EB0                  | H0                            | 10 ± 1.0                            | 4.5 ± 1.0                    |                                |           |                                |
|  | HAND5                  | H                             | 5.0 <sup>+0.8</sup> <sub>-0.2</sub> | Taping SPEC. (Ref.to page.9) |                                |           | 50V&100V,<br>500V, 1KV,<br>2KV |
| Lead style : X<br>Outside kink lead        | X3EA5                  | Q1                            | 5.0±0.8                             | 3.5 ± 0.5                    | 50V&100V,<br>500V, 1KV,<br>2KV | Bulk      |                                |
|  | X3EA7                  | Q2                            | 7.5±1.0                             |                              |                                |           |                                |
|  | X3EA0                  | Q3                            | 10±1.0                              |                              |                                |           |                                |
|  | X04A5                  | X5                            | 5.0±0.8                             | 4.0 ± 0.5                    |                                |           |                                |
|  | X04A7                  | X7                            | 7.5±1.0                             |                              |                                |           |                                |
|  | X04A0                  | X0                            | 10±1.0                              |                              |                                |           |                                |
|  | X05B5                  | X1                            | 5.0±0.8                             | 5.0 ± 1.0                    |                                |           |                                |
|  | X05B7                  | X2                            | 7.5±1.0                             |                              |                                |           |                                |
| X05B0                                      | X3                     | 10±1.0                        |                                     |                              |                                |           |                                |
| Lead style : D<br>Vertical kink short lead | D04A5                  | D5                            | 5.0±1.0                             | 4.0 ± 0.5                    | 50V&100V,<br>500V, 1KV,<br>2KV | Bulk      |                                |
|  | D04A7                  | D7                            | 7.5±1.0                             |                              |                                |           |                                |
|  | D04A0                  | D0                            | 10±1.0                              |                              |                                |           |                                |
|  | D3EA5                  | D1                            | 5.0±0.8                             | 3.5 ± 0.5                    |                                |           |                                |
|  | D3EA7                  | D2                            | 7.5±1.0                             |                              |                                |           |                                |
|  | D3EA0                  | D3                            | 10±1.0                              |                              |                                |           |                                |
|  | DAND5                  | D                             | 5.0 <sup>+0.8</sup> <sub>-0.2</sub> | Taping SPEC. (Ref.to page.9) |                                |           | Tap. Ammo                      |

| Lead type                                  | SAP P/N (13-17) digits | Old P/N<br>Refer to "2.1 Old P/N" | Pitch (F) | Lead length (L) | Available rated voltage        | Packing | Lead configuration |
|--|------------------------|-----------------------------------|-----------|-----------------|--------------------------------|---------|--------------------|
| Lead style : M<br>Double outside kink lead | M05B5                  | M6                                | 5.0 ± 0.8 | 5.0 ± 1.0       | 50V&100V,<br>500V, 1KV,<br>2KV | Bulk    |                    |
|  | M05B7                  | M4                                | 7.5 ± 1.0 |                 |                                |         |                    |
|  | M05B0                  | M5                                | 10 ± 1.0  | 4.0 ± 1.0       |                                |         |                    |
|  | M04B5                  | M6                                | 5.0 ± 0.8 |                 |                                |         |                    |
|  | M04B7                  | M4                                | 7.5 ± 1.0 |                 |                                |         |                    |
| M04B0                                      | M5                     | 10 ± 1.0                          |           |                 |                                |         |                    |

※ Lead diameter  $\phi = 0.6 \pm 0.06$  mm

※ Phenolic resin coating for 50V/500V/1KV product; Epoxy resin coating for 2KV product.

※ **e** (Coating **extension** on leads):

For straight lead style: 1.5mmMax when the rated voltage is 50Vdc & 100Vdc;  
 2.0mmMax when the rated voltage is 500Vdc and 1KVdc;  
 3.0mmMax when the rated voltage is 2KVdc.

For kink lead style: not exceed the kink.

※ When  $D\phi \geq 11$ mm, only for bulk, but  $D\phi \leq 10$ mm can do Bulk or Taping.

## 2.1 Old P/N :

(Ex.) **CH** **U** **5** **470** **J** **L** **7** **F**  
 (1) (2) (3) (4) (5) (6) (7) (8)

(1)Temperature characteristic (identified code) : CH: $0 \pm 60$ ppm/ $^{\circ}$ C , SL: $+350 \sim -1000$ ppm/ $^{\circ}$ C

(2)Rated voltage (identified by code)

(3)Nominal body diameter dimension

(4)Capacitance (identified by 3-figure code)

(5)Capacitance tolerance (identified by code)

(6)Lead style (configuration) (identified by code):

L: straight long lead; S: straight short lead; D: vertical kink lead; X: outside kink lead; H: inside kink lead

(7)Lead Space:

5= $5 \pm 0.8$  (Bulk), 5= $+0.8-0.2$ mm (Taping), 7= $7.5 \pm 1.0$  mm, 0= $10 \pm 1.0$  mm

(8)Taping type or other code:

| Code    | Pitch component |
|---------|-----------------|
| H       | 12.7mm          |
| No code | BULK            |



| T.C          | SL (CLASS I, Temperature:+20°C~+85°C, T.C.C.: +350 ~ -1000ppm°C) |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
|--------------|--|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|
|              | 50V/100V   |     |     |     |     |     |      | 500V |     |     |     |      | 1KV |     |     |     | 2KV |     |     |      |      |     |
| Rate voltage | Dφ   | 040 | 050 | 060 | 070 | 080 | 090  | 100  | 050 | 060 | 070 | 080  | 100 | 050 | 060 | 070 | 080 | 060 | 070 | 080  | 100  | 120 |
| D max. (mm)  | 4.5  | 5.5 | 6.5 | 7.5 | 8.5 | 9.5 | 10.5 | 5.5  | 6.5 | 7.5 | 9.0 | 10.5 | 6.0 | 7.0 | 8.0 | 9.0 | 7.5 | 8.5 | 9.5 | 11.5 | 13.5 |     |
| T max. (mm)  | 3.5  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5  | 4.0  | 4.0 | 4.0 | 4.0 | 4.0  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5  | 4.5  |     |
| 2            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 3            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 4            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 5            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 6            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 7            |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 8            |  | 080 |     |     |     |     |      |      | 080 |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 10           |  | 100 |     |     |     |     |      |      | 100 |     |     |      |     | 100 |     |     |     |     |     |      |      |     |
| 12           |  | 120 |     |     |     |     |      |      | 120 |     |     |      |     | 120 |     |     |     |     |     |      |      |     |
| 15           |  | 150 |     |     |     |     |      |      | 150 |     |     |      |     | 150 |     |     |     | 150 |     |      |      |     |
| 18           |  | 180 |     |     |     |     |      |      | 180 |     |     |      |     | 180 |     |     |     | 180 |     |      |      |     |
| 20           |  | 200 |     |     |     |     |      |      | 200 |     |     |      |     | 200 |     |     |     | 200 |     |      |      |     |
| 22           |  | 220 |     |     |     |     |      |      | 220 |     |     |      |     | 220 |     |     |     | 220 |     |      |      |     |
| 24           |  | 240 |     |     |     |     |      |      | 240 |     |     |      |     | 240 |     |     |     | 240 |     |      |      |     |
| 27           |  | 270 |     |     |     |     |      |      | 270 |     |     |      |     | 270 |     |     |     | 270 |     |      |      |     |
| 30           |  | 300 |     |     |     |     |      |      | 300 |     |     |      |     | 300 |     |     |     | 300 |     |      |      |     |
| 33           |  | 330 |     |     |     |     |      |      | 330 |     |     |      |     | 330 |     |     |     | 330 |     |      |      |     |
| 36           |  | 360 |     |     |     |     |      |      | 360 |     |     |      |     | 360 |     |     |     | 360 |     |      |      |     |
| 39           |  | 390 |     |     |     |     |      |      | 390 |     |     |      |     | 390 |     |     |     | 390 |     |      |      |     |
| 47           |  | 470 |     |     |     |     |      |      | 470 |     |     |      |     | 470 |     |     |     | 470 |     |      |      |     |
| 51           |  | 510 |     |     |     |     |      |      | 510 |     |     |      |     | 510 |     |     |     | 510 |     |      |      |     |
| 56           |  | 560 |     |     |     |     |      |      | 560 |     |     |      |     | 560 |     |     |     | 560 |     |      |      |     |
| 68           |  | 680 |     |     |     |     |      |      | 680 |     |     |      |     | 680 |     |     |     | 680 |     |      |      |     |
| 75           |  | 750 |     |     |     |     |      |      | 750 |     |     |      |     |     | 750 |     |     | 750 |     |      |      |     |
| 82           |  | 820 |     |     |     |     |      |      | 820 |     |     |      |     |     | 820 |     |     | 820 |     |      |      |     |
| 100          |  | 101 |     |     |     |     |      |      | 101 |     |     |      |     |     | 101 |     |     |     | 101 |      |      |     |
| 120          |  |     | 121 |     |     |     |      |      |     | 121 |     |      |     |     | 121 |     |     |     |     | 121  |      |     |
| 150          |  |     | 151 |     |     |     |      |      |     | 151 |     |      |     |     |     | 151 |     |     |     | 151  |      |     |
| 180          |  |     | 181 |     |     |     |      |      |     |     | 181 |      |     |     |     | 181 |     |     |     |      | 181  |     |
| 200          |  |     |     | 201 |     |     |      |      |     |     | 201 |      |     |     |     |     | 201 |     |     |      | 201  |     |
| 220          |  |     |     | 221 |     |     |      |      |     |     | 221 |      |     |     |     |     | 221 |     |     |      | 221  |     |
| 240          |  |     |     | 241 |     |     |      |      |     |     |     | 241  |     |     |     |     |     | 241 |     |      | 241  |     |
| 270          |  |     |     |     | 271 |     |      |      |     |     |     | 271  |     |     |     |     |     |     |     | 271  |      |     |
| 300          |  |     |     |     | 301 |     |      |      |     |     |     | 301  |     |     |     |     |     |     |     |      | 301  |     |
| 330          |  |     |     |     | 331 |     |      |      |     |     |     | 331  |     |     |     |     |     |     |     |      | 331  |     |
| 360          |  |     |     |     | 361 |     |      |      |     |     |     |      | 361 |     |     |     |     |     |     |      |      | 361 |
| 390          |  |     |     |     | 391 |     |      |      |     |     |     |      | 391 |     |     |     |     |     |     |      |      | 391 |
| 470          |  |     |     |     |     | 471 |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 500          |  |     |     |     |     |     | 501  |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 510          |  |     |     |     |     |     | 510  |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 560          |  |     |     |     |     |     | 561  |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 680          |  |     |     |     |     |     |      | 681  |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 750          |  |     |     |     |     |     |      | 751  |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 820          |  |     |     |     |     |     |      | 821  |     |     |     |      |     |     |     |     |     |     |     |      |      |     |
| 1000         |  |     |     |     |     |     |      |      |     |     |     |      |     |     |     |     |     |     |     |      |      |     |

#### 4. Marking:

| Remarks                            | CH  |   | SL |  |
|------------------------------------|---|---|----|--|
|                                    | Marking   |   |    |  |
| (1). Temp. char.                   | CH(Phenolic resin) : No marking, but recognized by black color presented on the top of product.<br>CH(Epoxy resin) : Shall be marked "CH"<br>SL : No marking. |   |    |  |
| (2). Rated capacitance             | Identified by 3-Figure Code. Ex. 47pF→"47" , 470pF→"471"  |   |    |  |
| (3). Rated voltage                 | 50V&100V  | Marked with code "-" under the rated capacitance. |    |  |
|                                    | 500V  | No any marking under the rated capacitance.       |    |  |
|                                    | 1000V&2000V   | Marked with code: 1000V→"1KV" , 2000V→"2KV"       |    |  |
| (4). Capacitance tolerance         | C: ±0.25pF (For below 5pF) · D: ±0.5pF (For 6~10pF) · J: ±5% (For above 10pF)   |   |    |  |
| (5). Manufacturer's identification | Shall be marked as "UK", but Dφ≤6.0 mm shall be omitted.  |   |    |  |
| (6). Halogen and Pb free           | There is a "-" marking under the code "V" when the coating resin is Halogen and Pb free Epoxy.  |   |    |  |

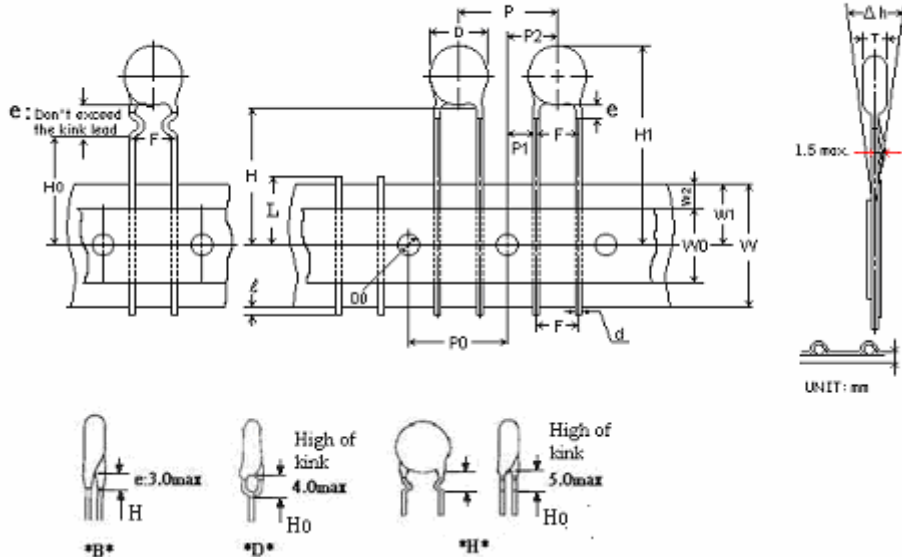


### 5. Taping specifications:

\* Lead spacing:  $F=5.0^{+0.8}_{-0.2}$  (mm)

• 12.7mm pitch/lead spacing 5.0mm taping

Lead code: \*BAND5 & \*DAND5 & \*HAND5



| Item                                 | Symbol                 | Specification   |            | Remarks  |  |
|--------------------------------------|------------------------|---|------------|--|--|
|                                      |                        | Value   | Tolerance  |  |  |
| Body diameter                        | D                      | *   | max.       | See Section "3. Capacitance value vs. rated voltage, product diameter".      |  |
| Body thickness                       | T                      | *   | max.       |  |  |
| Lead-wire diameter                   | d                      | 0.6   | +/-0.06    |  |  |
| Pitch of component                   | P                      | 12.7  | ±1.0       |  |  |
| Feed hole pitch                      | P0                     | 12.7  | ±0.3       | Cumulative pitch error: 1.0mm/20 pitch<br>To be measured at bottom of clinch |  |
| Feed hole center to lead             | P1                     | 3.85  | ±0.7       |  |  |
| Hole center to component center      | P2                     | 6.35  | ±1.3       |  |  |
| Lead-to-lead distance                | F                      | 5.0   | +0.8,-0.2  |  |  |
| Component alignment, F-R             | $\Delta h$             | 0   | ±2.0       |  |  |
| Tape width                           | W                      | 18.0  | +1.0,-0.5  |  |  |
| Hole-down tape width                 | W0                     | 11.0  | min.       |  |  |
| Hole position                        | W1                     | 9.0   | +0.75,-0.5 |  |  |
| Hole-down tape position              | W2                     | 3.0   | max.       |  |  |
| Height of component form tape center | For straight lead type | H   | 20.0       | +1.0 -0.5  |  |
|                                      | For kinked lead type   | H0  | 16.0       | ±0.5   |  |
| Component height                     | H1                     | 32.25   | max.       |  |  |
| Lead-wire protrusion                 | l                      | 2.0   | max.       | Or the end of lead wire may be inside the tape.                              |  |
| Food hole diameter                   | D0                     | 4.0   | ±0.2       |  |  |
| Total tape thickness                 | t                      | 0.7   | ±0.2       | Ground paper: 0.5±0.1 mm   |  |
| Length of sniped lead                | L                      | 11.0  | max.       |  |  |
| Coating rundown on leads             | e                      | 3.0 max for straight lead style; Not exceed the kink leads for kink lead. |            |  |  |



## 6. Packaging:

### 6-1. Packaging Styles

Bulk : 1000pcs/bag

Taping : 2000pcs/box for Ammo

## 7. Specification and test method:

7.1 SCOPE: THIS SPECIFICATION APPLIES TO TEMPERATURE COMPENSATING CERAMIC DISC CAPACITOR.

7.2 TEST CONDITIONS :

UNLESS OTHERWISE SPECIFIED, ALL TESTS SHALL BE OPERATED AT THE STANDARD TEST CONDITIONS OF TEMPERATURE 5°C TO 35°C AND RELATIVE HUMIDITY 45% TO 85%. WHEN FAILS A TEST, RETEST BE OPERATED AT THE CONDITIONS OF TEMPERATURE 25°C ± 2°C, RELATIVE HUMIDITY OF 60% TO 70% AND BAROMETRIC PRESSURE 860 TO 1060 MBAR.

7.3 HANDLE PROCEDURE : TO AVOID UNEXPECT TESTING RESULTS FROM OCCURRING, THE TESTED CAPACITOR MUST BE KEPT AT ROOM TEMPERATURE FOR AT LEAST 30 MINUTES AND COMPLETELY DISCHARGED.

7.4 TEST ITEMS :

| ITEM                              | POST-TEST REQUIREMENTS                                     | TESTING PROCEDURE  |
|-----------------------------------|--|--|
| APPEARANCE<br>STRUCTURE<br>SIZE   | NO ABNORMALITIES   | AS SECTION 3.  |
| MARKING                           |  | AS STATED IN SECTION 4   |
| WITHSTAND<br>VOLTAGE              | BETWEEN TERMINALS:<br>NO ABNORMALITIES                     | A. BELOW 1KV: 300% RATED VOLTAGE WITH 50mA MAX.<br>CHARGING CURRENT FOR 1~5 SEC.<br>B. 1KV & ABOVE: 200% RATED VOLTAGE WITH 50mA MAX.<br>CHARGING CURRENT FOR 1~5 SEC.   |
|                                   | BETWEEN TERMINAL AND<br>ENCLOSURE :<br>NO ABNORMALITIES    | SMALL METALLIC BALLS WITH 1mm DIAMETERS SHALL BE<br>PUT ON A VESSEL AND THE TEST CAPACITOR SHALL BE<br>SUBMERGED EXCEPT 2mm FROM THE TOP OF ITS<br>COMPONENT BODY.<br>THE TEST VOLTAGE SHALL BE APPLIED BETWEEN THE<br>SHORT-CIRCUITED TERMINALS AND THE METALLIC BALLS.<br>(APPLY 1.3KV DC OF RATED VOLTAGE BETWEEN<br>TERMINALS AND ENCLOSURE FOR 1~5 SEC) |
| INSULATION<br>RESISTANCE          | 10000 MΩ MIN   | INSULATION RESISTANCE SHALL BE MEASURED AT 60±5<br>SECONDS AFTER APPLIED VOLTAGE (RATED)<br>RATED VOLTAGE:<br>50V=50V, 100V=100V, 500V & ABOVE=500V  |
| CAPACITANCE                       | TOLERANCE :<br>C : ±0.25PF D : ±0.50PF<br>J : ±5% K : ±10% | TESTING FREQUENCY : 1 MHZ ± 20%<br>TESTING VOLTAGE : 1.0 VRMS  |
| OPERATING<br>TEMPERATURE<br>RANGE | -25°C ~ +125°C   |  |
| Q FACTOR                          | 30 PF<br>& ABOVE   | Q ≥ 1000   |
|                                   | BELOW<br>30PF  | Q ≥ 400+20×C   |
|                                   |  | AS ABOVE STIPULATION OF CAPACITANCE  |

| ITEM                       | POST-TEST REQUIREMENTS  | TESTING PROCEDURE  |
|----------------------------|---|--|
| TEMPERATURE CHARACTERISTIC | TEMPERATURE COEFFICIENT :<br>CH : $0 \pm 60$ PPM/ $^{\circ}$ C<br>SL : $+350 \sim -1000$ PPM/ $^{\circ}$ C<br>FOR ( $+20^{\circ}$ C $\sim +85^{\circ}$ C) | ACCORDING TO STEP 1 TO 5 IN ORDER, MEASURED CAPACITANCE WHEN TEMPERATURE REACH BALANCE AND TEMPERATURE COEFFICIENT SHALL BE CALCULATED ON THE FOLLOWING FORMULA :<br>$PPM/^{\circ}C = (C2 - C1) \times 10E6 / C1 (T2 - T1)$<br>STEP 1,3,5 : $25^{\circ}$ C<br>STEP 2 : $-25^{\circ}$ C (SL : $20^{\circ}$ C)<br>STEP 4 : $85^{\circ}$ C<br>NOTE : C1 = CAPACITANCE AS STEP 3<br>C2 = CAPACITANCE AS STEP 2 OR 4<br>T1 = TEMPERATURE AS STEP 3<br>T2 = TEMPERATURE AS STEP 2 OR 4 |
|                            | CAPACITANCE TOLERANCE :<br>WITHIN $\pm 0.2\%$ OR $\pm 0.05PF$ ,<br>WHICHEVER IS LARGE   | ACCORDING TO ABOVE STEP 1,3 & 5, CAPACITANCE TOLERANCE SHALL BE CALCULATED ON THE FOLLOWING FORMULA :<br>$\Delta C\% = (G - S) / C1$<br>NOTE : G = GREATEST CAPACITANCE AS TESTING RESULT OF STEP 1,3 & 5<br>S = LEAST CAPACITANCE AS TESTING RESULT OF STEP 1,3 & 5<br>C1 = CAPACITANCE AS STEP 3   |
| TERMINAL STRENGTH          | TENSIBLE STRENGTH :<br>NO BREAKDOWN   | WIRE DIA.0.5 M/M. LOADING WEIGHT 0.5 KGS, FOR $10 \pm 1$ SECONDS.<br>WIRE DIA.0.6 M/M. LOADING WEIGHT 1.0 KGS, FOR $10 \pm 1$ SECONDS.   |
|                            | BENDING STRENGTH :<br>NO BREAKDOWN  | WIRE DIA.0.5 mm, LOADING WEIGHT 0.25 KGS.<br>WIRE DIA.0.6 mm, LOADING WEIGHT 0.5 KGS.<br>(BENDING BACK AND FORTH $90$ DEGREE TWICE)  |
| SOLDERING HEAT RESISTANCE  | APPEARANCE :<br>NO ABNORMALITIES  | LEAD WIRE OR TERMINALS SHALL BE IMMERSSED UP TO $2.0$ M/M FORM BODY.<br>(A) BODY DIA. $\leq 5.0$ mm: INTO THE MOLTEN SOLDER OF WHICH TEMPERATURE: $260(+5/-0)^{\circ}$ C FOR $3.0 \pm 0.5$ SECONDS.  |
|                            | CAP.CHANGE :<br>WITHIN $\pm 2.5\%$ OR $\pm 0.25PF$ ,<br>WHICHEVER IS LARGE.   | (B) BODY DIA. $> 5.0$ mm: INTO THE MOLTEN SOLDER OF WHICH TEMPERATURE $260(+5/-0)^{\circ}$ C FOR $5 \sim 10$ SECONDS.  |
|                            | WITHSTAND VOLTAGE :<br>(BETWEEN TERMINALS)<br>NO ABNORMALITIES  | THEN LEAVE AT STANDARD TEST CONDITIONS FOR $1 \sim 2$ HOURS, THEN MEASURED.<br>※WHEN SOLDERING CAPACITOR WITH A SOLDERING IRON, IT SHOULD BE PERFORMED IN FOLLOWING CONDITIONS.<br>TEMPERATURE OF IRON-TIP: $350 \sim 400$ $^{\circ}$ C<br>SOLDERING IRON WATTAGE : $50W$ MAX.<br>SOLDERING TIME : $3.5$ SEC. MAX.   |
| SOLDERABILITY              | LEAD WIRE SHALL BE SOLDERED OVER $75\%$ OF THE CIRCUMFERENTIAL DIRECTION.   | TO COMPLY WITH JIS-C-5102 8.4 SOLDER TEMPERATURE $255(+5/-0)^{\circ}$ C AND DIPPING TIME $2 \pm 0.5$ SECONDS FLUX : WEIGHT RATIO OF ROSIN $25\%$   |

| ITEM                     | POST-TEST REQUIREMENTS   | TESTING PROCEDURE  |
|--------------------------|--|--|
| HUMIDITY CHARACTERISTIC  | APPEARANCE :<br>NO ABNORMALITIES   | CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90 ~ 95% AT 40 ± 2°C FOR 500(+24/-0) HOURS, THEN DRIED FOR 1~2 HOURS AND MEASURED.   |
|                          | CAP. CHANGE :<br>CH & SL :<br>WITHIN ±5% OR ±0.5PF,<br>WHICHEVER IS LARGE  |  |
|                          | Q FACTOR :<br>CH & SL :<br>LESS THAN 10PF ==><br>$Q \geq 200 + 10 \times C$<br>MORE THAN 10PF AND LESS THAN 30PF =><br>$Q \geq 275 + 5 \times C / 2$<br>MORE THAN 30PF => $Q \geq 350$ |  |
|                          | INSULATION RESISTANCE :<br>1000MΩ MIN.   |  |
| HUMIDITY LOADING         | APPEARANCE :<br>NO ABNORMALITIES   | CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90 ~ 95% AT 40±2°C FOR 500(+24/-0) HOURS WITH RATED VOLTAGE APPLIED (LESS THAN 50mA), THAN DRIED FOR 1~2 HOURS AND MEASURED.   |
|                          | CAP.CHANGE :<br>CH & SL :<br>WITHIN ±7.5% OR ±0.75PF,<br>WHICHEVER IS LARGE  |  |
|                          | Q FACTOR :<br>CH & SL :<br>LESS THAN 30PF =><br>$Q \geq 100 + 10 \times C / 3$<br>MORE THAN 30PF => $Q \geq 200$   |  |
|                          | INSULATION RESISTANCE :<br>500MΩ MIN.  |  |
| HIGH TEMPERATURE LOADING | APPEARANCE :<br>NO ABNORMALITIES   | CAPACITORS SHALL BE SUBJECTED TO A TEST OF:<br>(A) BELOW 1KV: 200% RATED VOLTAGE WITH 50mA MAX.<br>(B) 1KV & ABOVE: 150% RATED VOLTAGE WITH 50mA MAX.<br>FOR 1000(+48/-0) HOURS AT 85°C ± 2°C (FOR CH & SL) AND THEN DRIED FOR 1~2 HOURS AND MEASURED. |
|                          | CAP. CHANGE :<br>CH & SL :<br>WITHIN ±3% OR ±0.3PF,<br>WHICHEVER IS LARGE  |  |
|                          | Q FACTOR :<br>CH & SL :<br>LESS THAN 10PF =><br>$Q \geq 200 + 10 \times C$<br>MORE THAN 10PF & LESS THAN 30PF =><br>$Q \geq 275 + 5 \times C / 2$<br>MORE THAN 30PF => $Q \geq 350$    |  |
|                          | INSULATION RESISTANCE :<br>1000MΩ MIN.   |  |

| ITEM                   | POST-TEST REQUIREMENTS   | TESTING PROCEDURE   |
|------------------------|--|---|
| TEMPERATURE<br>CYCLING | APPEARANCE :<br>NO ABNORMALITIES   | CAPACITORS SHALL BE SUBJECTED TO:<br>-25±3°C (30±3min) → 25°C (3min) → 85±3°C (30±3min) →<br>25°C (3min) FOR 5 CYCLE. |
|                        | CAP. CHANGE :<br>WITHIN ±5% OR ±0.5PF,<br>WHICHEVER IS LARGE                         |   |
|                        | D.F.<br>$C < 30\text{pF} : Q \geq 275 + (5/2)C$<br>$C \geq 30\text{pF} : Q \geq 350$ |   |
|                        | INSULATION RESISTANCE :<br>1000 MΩ MIN.  |   |

## 8. Cautions & notices:

### 8.1. Caution (Rating)

#### I. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the  $V_{p-p}$  value of the applied voltage or the  $V_{o-p}$  which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

| Voltage                | DC Voltage | DC+AC Voltage | AC Voltage | Pulse Voltage (1) | Pulse Voltage (2) |
|------------------------|------------|---------------|------------|-------------------|-------------------|
| Positional measurement |            |               |            |                   |                   |

#### II. Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The frequency of the applied sine wave voltage should be less than 300kHz. The applied voltage load (\*) should be such that the capacitor's self-generated heat is within 20°C at an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of  $\phi 0.1\text{mm}$  in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations.

Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

#### III. Fail-Safe

When capacitor is broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure would follow an electric shock, fire or fume.

### 8.2. Caution (Storage and operating condition)

#### I. Operating and storage environment

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade and 15 to 85 %.

Use capacitors within 6 months.

**FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.**

### 8.3. Caution (Soldering and Mounting)

#### I. Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

#### II. Soldering

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor.

Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element. When soldering capacitor with a soldering iron, it should be performed in following conditions.

Temperature of iron-tip: 400 degrees C. max.

Soldering iron wattage : 50W max.

Soldering time : 3.5 sec. max.

**FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.**

### 8.4. Caution (Handling)

#### Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

**FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRDUCT IS USED.**

### 8.5. Notice

#### 8.5.1. Notice (Soldering and Mounting)

##### Cleaning (ultrasonic cleaning)

To perform ultrasonic cleaning, observe the following conditions.

Rinse bath capacity : Output of 20 watts per liter or less.

Rinsing time : 5 min. maximum.

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.