



# **SPECIFICATIONS of MULTILAYER CHIP CAPACITOR**

**NP0, X7R, Y5V  
10V ~ 3000V  
0402 (1005) ~ 1812 (4532)  
0.5pF ~ 22 $\mu$ F**

**Version 2002NOV**



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## MLCC PART NUMBER CODES HOW TO ORDER



For values below 10 pF, use "R" in place of decimal point, e.g., 4.7pF=4R7

## NPO SERIAL PRODUCTS SPECIFICATIONS

Above product satisfies the requirements as follow :

| NO. | Test Items                   | Test Condition                                                                                                                                                                                                                                                                                                                                         |                        | Requirements                                                                                                                                                                                                                                                                                   |
|-----|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Visual &Mechanical           |                                                                                                                                                                                                                                                                                                                                                        |                        | <ul style="list-style-type: none"><li>No remarkable defect.</li><li>Dimensions to conform to individual specification sheet.</li></ul>                                                                                                                                                         |
| 2.  | Capacitance                  | $\leq 1000\text{pF}$ $1.0\pm 0.2\text{Vrms}$ , $1\text{MHz}\pm 10\%$<br>$> 1000\text{pF}$ $1.0\pm 0.2\text{Vrms}$ , $1\text{KHz}\pm 10\%$                                                                                                                                                                                                              |                        | <ul style="list-style-type: none"><li>Shall not exceed the limits given in the detailed spec.</li></ul>                                                                                                                                                                                        |
| 3.  | Q Value                      | $\leq 1000\text{pF}$ $1.0\pm 0.2\text{Vrms}$ , $1\text{MHz}\pm 10\%$<br>$> 1000\text{pF}$ $1.0\pm 0.2\text{Vrms}$ , $1\text{KHz}\pm 10\%$                                                                                                                                                                                                              |                        | <ul style="list-style-type: none"><li>More than 30pF: <math>Q\geq 1000</math></li><li>Less than 30pF: <math>Q\geq 400+20C</math></li></ul>                                                                                                                                                     |
| 4.  | Dielectric strength          | <ul style="list-style-type: none"><li>To apply voltage(&lt;50V) : 250% of rated voltage for 1~5 sec.</li><li>Charge &amp; discharge current less than 50mA.</li></ul>                                                                                                                                                                                  |                        | No evidence of damage or flash over during test.                                                                                                                                                                                                                                               |
|     |                              | 100V                                                                                                                                                                                                                                                                                                                                                   | Cut-off, set at 10mA   | 100V $\geq 3$ times V DC                                                                                                                                                                                                                                                                       |
|     |                              | 200V ~ 300V                                                                                                                                                                                                                                                                                                                                            | TEST= 15               | 200V ~ 300V $\geq 2$ times V DC                                                                                                                                                                                                                                                                |
|     |                              | 500V ~ 999V                                                                                                                                                                                                                                                                                                                                            | RAMP=0                 | 500V ~ 999V $\geq 1.5$ times V DC                                                                                                                                                                                                                                                              |
|     |                              | 1000 ~ 3000V                                                                                                                                                                                                                                                                                                                                           |                        | 1000V ~ 3000V $\geq 1.2$ times V DC                                                                                                                                                                                                                                                            |
| 5.  | Insulation resistance        | To apply rated voltage for max. 120sec.                                                                                                                                                                                                                                                                                                                |                        | 10GΩ MIN. or 500Ω-F MIN. , whichever is smaller.                                                                                                                                                                                                                                               |
|     |                              | Rated Voltage:<br>100V ~ 500V                                                                                                                                                                                                                                                                                                                          | To apply rated voltage | > 10GΩ                                                                                                                                                                                                                                                                                         |
|     |                              | Rated Voltage:<br>>500V                                                                                                                                                                                                                                                                                                                                | To apply 500V*60sec    | > 10GΩ                                                                                                                                                                                                                                                                                         |
| 6.  | Temperature coefficient      | With no electrical load -55 ~ 125°C at 25°C                                                                                                                                                                                                                                                                                                            |                        | Within ±30ppm/°C                                                                                                                                                                                                                                                                               |
| 7.  | Bending test                 | <ul style="list-style-type: none"><li>The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 ±1 sec. (Appendix 1)</li><li>Measurement to be made after keeping at room temp. for 24±2 hours</li></ul> |                        | <ul style="list-style-type: none"><li>No remarkable damage.</li><li>Cap change : ±5.0% MAX. or ±0.5pF MAX. , whichever is larger.</li></ul> <p>This capacitance change means the change of Capacitance under specified flexure of substrate from the capacitance measured before the test.</p> |
| 8.  | Solderability                | <ul style="list-style-type: none"><li>Solder temperature :230±5°C</li><li>Dipping time : 2±0.5 sec</li><li>Solder : SN63A</li></ul>                                                                                                                                                                                                                    |                        | 90% MIN. coverage of all metalized area.                                                                                                                                                                                                                                                       |
| 9.  | Resistance to soldering heat | <ul style="list-style-type: none"><li>Solder temperature : 260±5°C</li><li>Dipping time : 10±1 sec</li><li>Solder : SN63A</li><li>Measurement to be made after keeping at room temp. for 24 ±2 hours.</li></ul>                                                                                                                                        |                        | <ul style="list-style-type: none"><li>No remarkable damage.</li><li>Cap change : ±2.5% MAX. or ±0.25pF MAX. , whichever is larger.</li><li>Q &amp; I.R. &amp; Dielectric strength : To meet initial requirements.</li><li>25% max. Leaching on each edge.</li></ul>                            |

| NO. | Test Items                        | Test Condition                                                                                                                                                                                                                                                                                                                                                          | Requirements                                                                                                                                                                                                                                                                                                    |
|-----|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10. | Temperature cycle                 | <ul style="list-style-type: none"> <li>Test temp. : -55°C ~ 125°C</li> <li>Test step : 1) -55°C -3/+0 °C 30±3 min.<br/>2) room temp. 2~3 min.<br/>3) 125°C +3/-0 °C 30±2min.<br/>4) room temp. 2~3 min.</li> <li>Conduct the five cycles according to the temperatures and time.</li> <li>Measurement to be made after keeping at room temp. for 24±2 hours.</li> </ul> | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : ±2.5% MAX. or ±0.25pF MAX. , whichever is larger.</li> <li>Q &amp; I.R. &amp; Dielectric strength : To meet initial requirements.</li> </ul>                                                                                 |
| 11  | Humidity (Damp Heat) steady state | <ul style="list-style-type: none"> <li>Test temp. : 40±2°C</li> <li>Humidity : 90~95%RH</li> <li>Test time : 1000+24/-0hrs.</li> <li>Measurement to be made after keeping at room temp. for 24 ±2 hrs.</li> </ul>                                                                                                                                                       | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : ±5.0% MAX. or ±0.5pF MAX. , whichever is larger.</li> <li>Q value : More than 30pF Q≥350<br/>10pF≤C&lt;30pF Q≥275+2.5C<br/>Less than 10pF Q≥200+10C</li> <li>I.R. : 1GΩ MIN. or 50Ω-F MIN., whichever is smaller.</li> </ul> |
| 12. | Humidity (Damp Heat) Load         | <ul style="list-style-type: none"> <li>Test temp. : 40±2°C</li> <li>Humidity : 90~95%RH</li> <li>Test time : 1000+24/-0hrs.</li> <li>To apply voltage :<br/>rated voltage (Max. 500V)</li> <li>Measurement to be made after keeping at room temp. for 24 ±2 hours.</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : ±7.5%MAX. or ±0.75pF MAX. , whichever is larger.</li> <li>Q value : More than 30pF Q≥200<br/>C&lt; 30pF Q≥100+10/3C</li> <li>I.R. : 500MΩ MIN. or 25Ω-F MIN. , whichever is smaller.</li> </ul>                              |
| 13. | Adhesive strength of termination  | <ul style="list-style-type: none"> <li>Pressurizing force : 1kg (10N)</li> <li>Test time : 10 ±1 sec (Appendix 2)</li> </ul>                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>No remarkable damage or removal of the terminations.</li> </ul>                                                                                                                                                                                                          |
| 14. | Vibration Resistance              | <ul style="list-style-type: none"> <li>Vibration frequency : 10~55 Hz/min.</li> <li>Total amplitude : 1.5mm</li> <li>Test time : 6 hrs.(Two hours each in three mutually perpendicular directions.)</li> </ul>                                                                                                                                                          | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change &amp; Q : To meet initial requirements.</li> </ul>                                                                                                                                                                             |
| 15. | High Temperature Load (Endurance) | <ul style="list-style-type: none"> <li>Test temp. : 125±3°C</li> <li>To apply voltage :<br/>V&lt;500V : 200% of rated voltage.<br/>V≥500V, &lt;1000V : 150% of rated voltage.<br/>V≥1000V : 120% of rated voltage.(Max.3600V)</li> <li>Test time : 1000+24/-0 hrs.</li> <li>Measurement to be made after keeping at room temp. for 24 ±2 hours.</li> </ul>              | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : ±3.0% MAX. or ±0.3pF MAX. , whichever is larger.</li> <li>Q value : More than 30pF Q≥350<br/>10pF≤C&lt;30pF Q≥275+2.5C<br/>Less than 10pF Q≥200+10C</li> <li>I.R. : 1GΩ MIN. or 50Ω-F MIN., whichever is smaller.</li> </ul> |

## X7R SERIAL PRODUCTS SPECIFICATIONS

Above product satisfies the requirements as follow

| NO. | Test Items                   | Test Condition                                                                                                                                                                                                                                                                                                                                        |                                           | Requirements                                                                                                                                                                                                                                              |
|-----|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Visual & Mechanical          |                                                                                                                                                                                                                                                                                                                                                       |                                           | <ul style="list-style-type: none"> <li>No remarkable defect.</li> <li>Dimensions to conform to individual specification sheet.</li> </ul>                                                                                                                 |
| 2.  | Capacitance                  | 1.0±0.2Vrms · 1KHz±10%                                                                                                                                                                                                                                                                                                                                |                                           | <ul style="list-style-type: none"> <li>Shall not exceed the limits given in the detailed spec.</li> </ul>                                                                                                                                                 |
| 3.  | Dissipation factor           | 1.0±0.2Vrms · 1KHz±10%                                                                                                                                                                                                                                                                                                                                |                                           | <ul style="list-style-type: none"> <li>≤2.5% Rated voltage : ≥50V</li> <li>≤3.5% Rated voltage : 25V, 16V</li> <li>≤5.0% Rated g voltage : 10V</li> </ul>                                                                                                 |
| 4.  | Dielectric strength          | <ul style="list-style-type: none"> <li>To apply voltage(&lt;50V) : 250% of rated voltage for 1~5 sec.</li> <li>Charge &amp; discharge current less than 50mA</li> </ul>                                                                                                                                                                               |                                           | No evidence of damage or flash over during test.                                                                                                                                                                                                          |
|     |                              | 100V<br>200V ~ 300V<br>500V ~ 999V<br>1000V ~ 3000V                                                                                                                                                                                                                                                                                                   | Cut off, set at 10mA<br>TEST=15<br>RAMP=0 | 100V ≥ 3 times V DC<br>200V ~ 300V ≥ 2 times V DC<br>500V ~ 999V ≥ 1.5 times V DC<br>1000V ~ 3000V ≥ 1.2 times V DC                                                                                                                                       |
| 5.  | Insulation resistance        | To apply rated voltage for max. 120sec.                                                                                                                                                                                                                                                                                                               |                                           | 10GΩ MIN. or 500Ω-F MIN. , whichever is smaller.                                                                                                                                                                                                          |
|     |                              | Rated Voltage:<br>100V ~ 500V                                                                                                                                                                                                                                                                                                                         | To apply rated voltage                    | > 10GΩ                                                                                                                                                                                                                                                    |
|     |                              | Rated Voltage:<br>> 500V                                                                                                                                                                                                                                                                                                                              | To apply 500V*60sec                       | >10GΩ                                                                                                                                                                                                                                                     |
| 6.  | Temperature coefficient      | With no electrical load -55 ~ 125°C at 25°C                                                                                                                                                                                                                                                                                                           |                                           | Within ±15%.                                                                                                                                                                                                                                              |
| 7.  | Bending test                 | <ul style="list-style-type: none"> <li>The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 sec. Appendix 1)</li> <li>Measurement to be made after keeping at room temp. for 24±2 hours</li> </ul> |                                           | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : ≤±12.5%.</li> </ul> This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.        |
| 8.  | Solderability                | <ul style="list-style-type: none"> <li>Solder temperature : 230±5°C</li> <li>Dipping time : 2±0.5 sec</li> <li>Solder : SN63A</li> </ul>                                                                                                                                                                                                              |                                           | 90% MIN. coverage of all metalized area.                                                                                                                                                                                                                  |
| 9.  | Resistance to soldering heat | <ul style="list-style-type: none"> <li>Solder temperature : 260±5°C</li> <li>Dipping time : 10±1 sec</li> <li>Solder : SN63A</li> <li>Measurement to be made after keeping at room temp. for 48±4 hours.</li> </ul>                                                                                                                                   |                                           | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : &lt; ±7.5%</li> <li>DF value &amp; I.R : To meet initial standard value.</li> <li>Dielectric Strength : no defect.</li> <li>25% max. Leaching on each edge.</li> </ul> |

| NO. | Test Items                        | Test Condition                                                                                                                                                                                                                                                                                                                                                                                                                                           | Requirements                                                                                                                                                                                                                                                                                                                                                       |
|-----|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10. | Temperature cycle                 | <ul style="list-style-type: none"> <li>Test temp. : -55°C ~ 125°C</li> <li>Test step :               <ol style="list-style-type: none"> <li>1) -55°C -3/+0 °C 30±3 min.</li> <li>2) room temp. 2~3 min.</li> <li>3) 125°C +3/-0 °C 30±2 min.</li> <li>4) room temp. 2~3min.</li> </ol> </li> <li>Conduct the five cycles according to the temperatures and time.</li> <li>Measurement to be made after keeping at room temp. for 48 ±4 hours.</li> </ul> | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : &lt;±7.5%</li> <li>D.F value &amp; I.R. : To meet initial standard value.</li> </ul>                                                                                                                                                                                            |
| 11  | Humidity (Damp Heat) steady state | <ul style="list-style-type: none"> <li>Test temp. : 40±2°C</li> <li>Humidity : 90~95% RH</li> <li>Test time : 1000+24/-0 hrs.</li> <li>Measurement to be made after keeping at room temp. for 48±4 hrs.</li> </ul>                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : &lt;±12.5%</li> <li>DF value :               <ul style="list-style-type: none"> <li>≤3.0% Rated voltage : 50V</li> <li>≤5.0% Rated voltage : 25V, 16V</li> <li>≤7.5% Rated voltage : 10V</li> </ul> </li> <li>I.R. : 1GΩ MIN. or 50Ω-F MIN., whichever is smaller.</li> </ul>   |
| 12. | Humidity (Damp Heat) Load         | <ul style="list-style-type: none"> <li>Test temp. : 40±2°C</li> <li>Humidity : 90~95% RH</li> <li>Test time : 1000+24/-0 hrs.</li> <li>To apply rated voltage (Max. 500V)</li> <li>Measurement to be made after keeping at room temp. for 48±2 hours.</li> </ul>                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : &lt;±12.5%</li> <li>DF value :               <ul style="list-style-type: none"> <li>≤3.0% Rated voltage : 50V</li> <li>≤5.0% Rated voltage : 25V, 16V</li> <li>≤7.5% Rated voltage : 10V</li> </ul> </li> <li>I.R. : 500MΩ MIN. or 25Ω-F MIN., whichever is smaller.</li> </ul> |
| 13. | Adhesive strength of termination  | Pressurizing force : 1kg (10N)<br>Test time : 10±1 sec (Appendix 2)                                                                                                                                                                                                                                                                                                                                                                                      | No remarkable damage or removal of the terminations.                                                                                                                                                                                                                                                                                                               |
| 14. | Vibration Resistance              | <ul style="list-style-type: none"> <li>Vibration frequency : 10~55 Hz/min.</li> <li>Total amplitude : 1.5mm</li> <li>Test time : 6 hrs.(Two hours each in three mutually perpendicular directions.)</li> </ul>                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change &amp; DF : To meet initial requirements.</li> </ul>                                                                                                                                                                                                                               |
| 15. | High Temperature Load (Endurance) | <ul style="list-style-type: none"> <li>Test temp. : 125±3°C</li> <li>To apply voltage :               <ul style="list-style-type: none"> <li>V&lt;500V : 200% of rated voltage.</li> <li>V≥500V, &lt;1000V : 150% of rated voltage.</li> <li>V≥1000V : 120% of rated voltage.(Max.3600V)</li> </ul> </li> <li>Test time : 1000+24/-0 hrs.</li> <li>Measurement to be made after keeping at room temp. for 48±4 hours.</li> </ul>                         | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : &lt;±12.5%</li> <li>DF value :               <ul style="list-style-type: none"> <li>≤3.0% Rated voltage : 50V</li> <li>≤5.0% Rated voltage : 25V, 16V</li> <li>≤7.5% Rated voltage : 10V</li> </ul> </li> <li>I.R. : 1GΩ MIN. or 50Ω-F MIN., whichever is smaller.</li> </ul>   |

## Y5V SERIAL PRODUCTS SPECIFICATIONS

Above product satisfies the requirements as follow :

| NO. | Test Items              | Test Condition                                                                                                                                                                                                                                                                                                                                     |                                           | Requirements                                                                                                                                                                                                                                                |
|-----|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Visual &Mechanical      |                                                                                                                                                                                                                                                                                                                                                    |                                           | <ul style="list-style-type: none"><li>No remarkable defect.</li><li>Dimensions to conform to individual specification sheet.</li></ul>                                                                                                                      |
| 2.  | Capacitance             | C≤22μF, 1.0±0.2Vrms, 1KHz±10%<br>C > 22μF, 0.5±0.1Vrms, 120Hz±10Hz, 25°C                                                                                                                                                                                                                                                                           |                                           | <ul style="list-style-type: none"><li>Shall not exceed the limits given in the detailed spec.</li></ul>                                                                                                                                                     |
| 3.  | Dissipation factor      | C≤22μF, 1.0±0.2Vrms, 1KHz±10%<br>C > 22μF, 0.5±0.1Vrms, 120Hz±10Hz, 25°C                                                                                                                                                                                                                                                                           |                                           | <ul style="list-style-type: none"><li>DF≤5.0% (≥50V)</li><li>DF≤5.0% (25V) [Except 0603≥0.1μF, 0805≥0.33μF, 1206≥1μF, DF≤7%]</li><li>DF≤7.0% (C&lt;1.0μF, 16V) [Except 0402≥0.068μF; DF≥9%]</li><li>DF≥9.0% (C≥1.0μF, 16V)</li><li>DF≥12.5% (10V)</li></ul> |
| 4.  | Dielectric strength     | <ul style="list-style-type: none"><li>To apply voltage(&lt;50V) : 250% of rated voltage for 1~5 sec.</li><li>Charge &amp; discharge current less than 50mA.</li></ul>                                                                                                                                                                              |                                           | No evidence of damage or flash over during test.                                                                                                                                                                                                            |
|     |                         | 100V<br>200V ~ 300V<br>500V ~ 999V<br>1000V ~ 3000V                                                                                                                                                                                                                                                                                                | Cut off, set at 10mA<br>TEST=15<br>RAMP=0 | 100V ≥ 3 times V DC<br>200V ~ 300V ≥2 times V DC<br>500V ~ 999V ≥1.5 times V DC<br>1000V ~ 3000V ≥1.2 times V DC                                                                                                                                            |
| 5.  | Insulation resistance   | To apply rated voltage for max. 120sec.                                                                                                                                                                                                                                                                                                            |                                           | 10GΩMIN. or 500Ω-F MIN , whichever is smaller.                                                                                                                                                                                                              |
|     |                         | Rated Voltage:<br>100V ~ 500V                                                                                                                                                                                                                                                                                                                      | To apply rated voltage                    | >10GΩ                                                                                                                                                                                                                                                       |
|     |                         | Rated Voltage:<br>>500V                                                                                                                                                                                                                                                                                                                            | To apply 500*60sec                        | >10GΩ                                                                                                                                                                                                                                                       |
| 6.  | Temperature coefficient | With no electrical load -25°C ~ 85°C at 20°C                                                                                                                                                                                                                                                                                                       |                                           | Within +30% / -80%                                                                                                                                                                                                                                          |
| 7.  | Bending test            | <ul style="list-style-type: none"><li>The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 sec. (Appendix 1)</li><li>Measurement to be made after keeping at room temp. for 48±4hours</li></ul> |                                           | <ul style="list-style-type: none"><li>No remarkable damage.</li><li>Cap change : ≤±30%</li></ul> <p>This capacitance change means the change of Capacitance under specified flexure of substrate from the capacitance measured before the test.</p>         |
| 8.  | Solderability           | <ul style="list-style-type: none"><li>Solder temperature : 230±5°C</li><li>Dipping time : 2±0.5 sec</li><li>Solder : SN63A</li></ul>                                                                                                                                                                                                               |                                           | 90%MIN. coverage of all metalized area.                                                                                                                                                                                                                     |

| NO. | Test Items                           | Test Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.  | Resistance to soldering heat         | <ul style="list-style-type: none"> <li>Solder temperature : <math>260\pm 5^{\circ}\text{C}</math></li> <li>Dipping time : <math>10\pm 1</math> sec</li> <li>Solder : SN63A</li> <li>Measurement to be made after keeping at room temp. for <math>48\pm 4</math> hours.</li> </ul>                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : <math>\leq \pm 20\%</math></li> <li>D.F value &amp; I.R. : To meet initial standard value.</li> <li>Dielectric strength : no defect.</li> <li>25% max. leaching on each edge.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 10. | Temperature cycle                    | <ul style="list-style-type: none"> <li>Test temp. : <math>-55^{\circ}\text{C} \sim 125^{\circ}\text{C}</math></li> <li>Test step :               <ol style="list-style-type: none"> <li><math>-55^{\circ}\text{C} -3/+0^{\circ}\text{C}</math> 30<math>\pm 3</math> min.</li> <li>room temp. 2~3 min.</li> <li><math>125^{\circ}\text{C} +3/-0^{\circ}\text{C}</math> 30<math>\pm 2</math> min.</li> <li>room temp. 2~3min.</li> </ol> </li> <li>Conduct the five cycles according to the temperatures and time.</li> <li>Measurement to be made after keeping at room temp. for <math>48 \pm 4</math> hours.</li> </ul> | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : <math>\leq \pm 20\%</math></li> <li>D.F value &amp; I.R. : To meet initial standard value.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 11  | Humidity (Damp Heat)<br>Steady State | <ul style="list-style-type: none"> <li>Test temp. : <math>40\pm 2^{\circ}\text{C}</math></li> <li>Humidity : 90~95% RH</li> <li>Test time : <math>1000+24/-0</math> hrs.</li> <li>Measurement to be made after keeping at room temp. for <math>48\pm 4</math> hrs.</li> </ul>                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : <math>\leq \pm 30\%</math></li> <li>DF value :               <ul style="list-style-type: none"> <li><math>\leq 7.5\%</math> Rated voltage: <math>\geq 50\text{V}</math></li> <li><math>\leq 7.5\%</math> Rated voltage: 25V [Except 0603<math>\geq 0.068\mu\text{F}</math>; 0805<math>\geq 0.33\mu\text{F}</math>, 1206<math>\geq 1\mu\text{F}</math>, DF<math>\leq 10\%</math>]</li> <li>DF<math>\leq 10.0\%</math> (C<math>&lt;1.0\mu\text{F}</math>, 16V) [Except 0402<math>\geq 0.1\mu\text{F}</math>, DF<math>\leq 12.5\%</math>]</li> <li>DF<math>\leq 12.5\%</math> (C<math>\geq 1.0\mu\text{F}</math>, 16V)</li> <li>DF<math>\leq 15\%</math> (10V)</li> </ul> </li> <li>I.R. : 1G<math>\Omega</math> MIN or 50<math>\Omega</math>-F MIN ,whichever is smaller</li> </ul>       |
| 12. | Humidity (Damp Heat)<br>Load         | <ul style="list-style-type: none"> <li>Test temp. : <math>40\pm 2^{\circ}\text{C}</math></li> <li>Humidity : 90~95% RH</li> <li>Test time : <math>1000+24/-0</math> hrs.</li> <li>To apply voltage : rated voltage (Max. 500V)</li> <li>Measurement to be made after keeping at room temp. for <math>48\pm 4</math> hrs.</li> </ul>                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : <math>\leq \pm 30\%</math></li> <li>DF value :               <ul style="list-style-type: none"> <li><math>\leq 7.5\%</math> Rated voltage: <math>\geq 50\text{V}</math></li> <li><math>\leq 7.5\%</math> Rated voltage: 25V [Except 0603<math>\geq 0.1\mu\text{F}</math>; 0805<math>\geq 0.33\mu\text{F}</math>, 1206<math>\geq 1\mu\text{F}</math>, DF<math>\leq 10\%</math>]</li> <li>DF<math>\leq 10.0\%</math> (C<math>&lt;1.0\mu\text{F}</math> · 16V) [Except 0402<math>\geq 0.068\mu\text{F}</math>, DF<math>\leq 12.5\%</math>]</li> <li>DF<math>\leq 12.5\%</math> (C<math>\geq 1.0\mu\text{F}</math> · 16V)</li> <li>DF<math>\leq 15\%</math> (10V)</li> </ul> </li> <li>I.R. : 500M<math>\Omega</math> MIN. or 25<math>\Omega</math>-F MIN.,whichever is smaller.</li> </ul> |
| 13. | Adhesive strength of termination     | <ul style="list-style-type: none"> <li>Pressurizing force : 1kg (10N)</li> <li>Test time: <math>10\pm 1</math>sec (Appendix2)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | No remarkable damage or removal of the terminations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

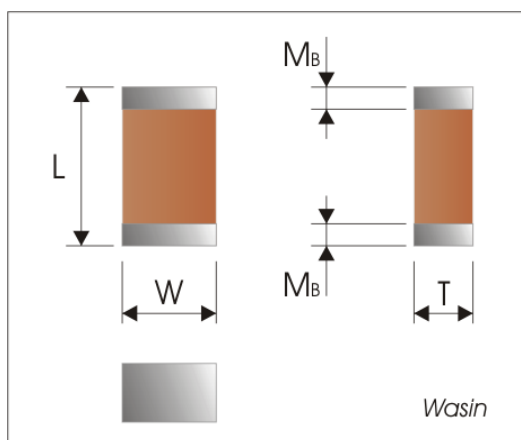
| NO. | Test Items                           | Test Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14  | Vibration Resistance                 | <ul style="list-style-type: none"> <li>Vibration frequency : 10~55 Hz/min.</li> <li>Total amplitude : 1.5mm</li> <li>Test time : 6 hrs.(Two hours each in three mutually perpendicular directions.)</li> </ul>                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change &amp; DF : To meet initial requirements</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 15. | High Temperature Load<br>(Endurance) | <ul style="list-style-type: none"> <li>Test temp. : <math>85\pm 3^{\circ}\text{C}</math></li> <li>To apply voltage :<br/> <math>V &lt; 500\text{V}</math> : 200% of rated voltage.<br/> <math>V \geq 500\text{V}, &lt; 1000\text{V}</math> : 150% of rated voltage.<br/> <math>V \geq 1000\text{V}</math> : 120% of rated voltage.(Max.3600V)</li> <li>Test time : 1000+24/-0 hrs.</li> <li>Measurement to be made after keeping at room temp. for 48<math>\pm</math>4 hours.</li> </ul> | <ul style="list-style-type: none"> <li>No remarkable damage.</li> <li>Cap change : <math>&lt; \pm 30\%</math></li> <li>DF value :<br/> <math>\leq 7.5\%</math> Rated voltage: <math>\geq 50\text{V}</math><br/> <math>\leq 7.5\%</math> Rated voltage:25V [Except 0603<math>\geq 0.1\mu\text{F}</math>;<br/> 0805<math>\geq 0.33\mu\text{F}</math>, 1206<math>\geq 1\mu\text{F}</math>, DF<math>\leq 10\%</math>]<br/> DF<math>\leq 10.0\%</math> (C<math>&lt; 1.0\mu\text{F}</math> · 16V) [Except 0402<math>\geq 0.068\mu\text{F}</math>,<br/> DF<math>\leq 12.5\%</math>]<br/> DF<math>\leq 12.5\%</math> (C<math>\geq 1.0\mu\text{F}</math>, 16V)<br/> DF<math>\leq 15\%</math> (10V)</li> <li>I.R. : 1G<math>\Omega</math> MIN. or 50<math>\Omega</math>-F MIN., whichever is smaller.</li> </ul> |

## TOLERANCE AND CAPACITANCE

| Capacitance & Tolerance                                                                                                                                                                                                                            | NPO                 | X7R     | Y5V     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------|---------|
| 1R0=1.0pF<br>100=10pF<br>101=100pF<br>102=1000pF=1nF<br>103=10000pF=10nF<br>104=100nF<br>105=1000nF=1 $\mu\text{F}$<br>106=10000nF=10 $\mu\text{F}$                                                                                                | 0R5—104             | 101—105 | 103—226 |
| B: $\pm 0.1\text{pF}$ (Cap $\leq 5\text{pF}$ )<br>C: $\pm 0.25\text{pF}$ (Cap $\leq 5\text{pF}$ )<br>D: $\pm 0.5\text{pF}$ (5pF < Cap < 10pF)<br>F: $\pm 1\%$<br>G: $\pm 2\%$<br>J: $\pm 5\%$<br>K: $\pm 10\%$<br>M: $\pm 20\%$<br>Z : -20% / +80% | B, C, D, F, G, J, K | J, K, M | M, Z    |

## LENGTH, WIDTH, AND MB

Unit: inch(mm)



| size          | 0402                                    | 0603                       | 0805                       | 1206                                                                | 1210                       | 1808                       | 1812                       |
|---------------|-----------------------------------------|----------------------------|----------------------------|---------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|
| <b>Length</b> | 0.040±0.0002<br>(1.00±0.05)             | 0.063±0.004<br>(1.60±0.10) | 0.080±0.006<br>(2.00±0.15) | 0.125±0.006<br>(3.20±0.15)                                          | 0.125±0.012<br>(3.20±0.30) | 0.180±0.015<br>(4.50±0.40) | 0.180±0.012<br>(4.50±0.30) |
| <b>Width</b>  | 0.020±0.002<br>(0.50±0.05)              | 0.030±0.003<br>(0.80±0.07) | 0.050±0.004<br>(1.25±0.1)  | 0.063±0.006<br>(1.60±0.15)<br>0.063±0.008<br>(1.60±0.2)<br><<Note>> | 0.100±0.008<br>(2.50±0.20) | 0.081±0.010<br>(2.03±0.25) | 0.125±0.012<br>(3.20±0.30) |
| <b>MB</b>     | 0.010+0.002/-0.004<br>(0.25+0.05/-0.10) | 0.015±0.006<br>(0.40±0.15) | 0.020±0.008<br>(0.50±0.20) | 0.025±0.008<br>(0.60±0.20)                                          | 0.030±0.010<br>(0.75±0.25) | 0.030±0.010<br>(0.75±0.25) | 0.030±0.010<br>(0.75±0.25) |

Note : Width 1.60±0.2mm is applied to thickness G(=1.6±0.2mm), and width 1.60±0.15mm is applied to the others.



## CAPACITANCE AND VOLTAGE (NPO)

| DIELECTRIC |         | NPO  |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
|------------|---------|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|
| SIZE       | EIA CAP | 0402 |     |     |     | 0603 |     |     |     | 0805 |     |     |     | 1206 |     |     |     | 1210 |     |     |     | 1812 |     |     |     |
| VDCW       | CODE    | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V |
| 0.5pF      | 0R5     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   |      |     |     |     |      |     |     |     |      |     |     |     |
| 1          | 1R0     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   |      |     |     |     |      |     |     |     |      |     |     |     |
| 1.2        | 1R2     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   |      |     |     |     |      |     |     |     |      |     |     |     |
| 1.5        | 1R5     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 1.8        | 1R8     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 2.2        | 2R2     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 2.7        | 2R7     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 3.3        | 3R3     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 3.9        | 3R9     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 4.7        | 4R7     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 5.6        | 5R6     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 6.8        | 6R8     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 8.2        | 8R2     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 10pF       | 100     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 12         | 120     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 15         | 150     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 18         | 180     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 22         | 220     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 27         | 270     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 33         | 330     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 39         | 390     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 47         | 470     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 56         | 560     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 68         | 680     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 82         | 820     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 100pF      | 101     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 120        | 121     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 150        | 151     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 180        | 181     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 220        | 221     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 270        | 271     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 330        | 331     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 390        | 391     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 470        | 471     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 560        | 561     |      |     |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 680        | 681     |      |     |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 820        | 821     |      |     |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   |      |     |     |     |
| 1000pF     | 102     |      |     |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 1200       | 122     |      |     |     |     | S    | S   |     |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 1500       | 152     |      |     |     |     | S    | S   |     |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 1800       | 182     |      |     |     |     | S    | S   |     |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 2200       | 222     |      |     |     |     | S    | S   |     |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 2700       | 272     |      |     |     |     | S    | S   |     |     | D    | D   | D   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 3300       | 332     |      |     |     |     | S    | S   |     |     | D    | D   | D   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 3900       | 392     |      |     |     |     |      |     |     |     | D    | D   | D   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 4700       | 472     |      |     |     |     |      |     |     |     | D    | D   | D   |     | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 5600       | 562     |      |     |     |     |      |     |     |     | D    | D   |     |     | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 6800       | 682     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 8200       | 822     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.01μF     | 103     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   | D   | D   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.012      | 123     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   |     |     | C    | C   | D   | D   | D    | D   | D   | D   |
| 0.015      | 153     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   | D   | D   | D    | D   | D   | D   |
| 0.018      | 183     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   |     |     | D    | D   | D   | D   |
| 0.022      | 223     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   |     |     | D    | D   | D   | D   |
| 0.027      | 273     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   |     |     | D    | D   | D   | D   |
| 0.033      | 333     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   |     |     | D    | D   | D   | D   |
| 0.039      | 393     |      |     |     |     |      |     |     |     | G    | G   |     |     |      |     |     |     | C    | C   |     |     | D    | D   |     |     |
| 0.047      | 473     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   |     |     |
| 0.056      | 563     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   |     |     |
| 0.068      | 683     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     | D   | D    | D   |     |     |
| 0.082      | 823     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     | D   | D    | D   |     |     |
| 0.1μF      | 104     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     | D    | D   |     |     |

(1) OTHER SIZE, CAPACITANCE, VOLTAGE, AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

TAPE AND REEL: Size Unit: inch(mm)

| SIZE          | 0402(1005)      | 0603(1608)     | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1808(4520)       | 1812(4532)       |
|---------------|-----------------|----------------|------------------|------------------|------------------|------------------|------------------|
| A=0.6±0.1mm   | —               | —              | PAPER 4Kp/REEL   | —                | —                | —                | —                |
| B=0.8±0.1mm   | —               | —              | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                | —                |
| C=0.95±0.1mm  | —               | —              | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                | —                |
| D=1.25±0.1mm  | —               | —              | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 2Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60±0.2mm  | —               | —              | —                | PLASTIC 2Kp/REEL | —                | —                | —                |
| S=0.8±0.07mm  | —               | PAPER 4Kp/REEL | —                | —                | —                | —                | —                |
| N=0.50±0.05mm | PAPER 10Kp/REEL | —              | —                | —                | —                | —                | —                |
| K=2.00±0.2mm  | —               | —              | —                | —                | —                | PLASTIC 1Kp/REEL | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm  | —               | —              | —                | —                | —                | —                | —                |

WALSIN TECHNOLOGY CORPORATION

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## CAPACITANCE AND VOLTAGE (Hi-Voltage NPO)

| DIELECTRIC |         | NPO  |      |     |     |     |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
|------------|---------|------|------|-----|-----|-----|------|-----|-----|-----|------|------|------|-----|-----|-----|------|------|------|------|------|------|-----|-----|-----|------|------|------|--|
| SIZE       | EIA CAP | 0603 | 0805 |     |     |     | 1206 |     |     |     |      |      | 1210 |     |     |     |      |      | 1808 |      |      | 1812 |     |     |     |      |      |      |  |
| VDCW       | CODE    | 100  | 100  | 200 | 250 | 500 | 100  | 200 | 250 | 500 | 1000 | 2000 | 100  | 200 | 250 | 500 | 1000 | 2000 | 1000 | 2000 | 3000 | 100  | 200 | 250 | 500 | 1000 | 2000 | 3000 |  |
| 0.5pF      | 0R5     | S    | A    | A   | A   | A   |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 1          | 1R0     | S    | A    | A   | A   | A   |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 1.2        | 1R2     | S    | A    | A   | A   | A   |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 1.5        | 1R5     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 1.8        | 1R8     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 2.2        | 2R2     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 2.7        | 2R7     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 3.3        | 3R3     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 3.9        | 3R9     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 4.7        | 4R7     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 5.6        | 5R6     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 6.8        | 6R8     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 8.2        | 8R2     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    |      |     |     |     |      |      |      |      |      |      |     |     |     |      |      |      |  |
| 10pF       | 100     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 12         | 120     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 15         | 150     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 18         | 180     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 22         | 220     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 27         | 270     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 33         | 330     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 39         | 390     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 47         | 470     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | C    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 56         | 560     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 68         | 680     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 82         | 820     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 100pF      | 101     | S    | A    | A   | A   | A   | B    | B   | B   | B   | B    | B    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 120        | 121     | S    | A    | A   | A   | D   | B    | B   | B   | B   | B    | D    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 150        | 151     | S    | A    | B   | B   | D   | B    | B   | B   | B   | C    | D    | C    | C   | C   | C   | C    | C    | D    | D    | D    | D    | D   | D   | D   | D    | D    | D    |  |
| 180        | 181     | S    | A    | B   | B   | D   | B    | B   | B   | B   | C    | G    | C    | C   | C   | C   | C    | C    | D    | D    | D    | K    | D   | D   | D   | D    | D    | D    |  |
| 220        | 221     | S    | A    | D   | D   | D   | B    | B   | B   | B   | D    | G    | C    | C   | C   | C   | C    | C    | D    | D    | D    | K    | D   | D   | D   | D    | D    | D    |  |
| 270        | 271     | S    | A    | D   | D   | D   | B    | B   | B   | C   | D    |      | C    | C   | C   | C   | C    | C    | D    | D    | D    | K    | D   | D   | D   | D    | D    | K    |  |
| 330        | 331     | S    | A    | D   | D   | D   | B    | B   | B   | C   |      |      | C    | C   | C   | C   | C    | D    | D    | D    |      | D    | D   | D   | D   | D    | D    | K    |  |
| 390        | 391     | S    | B    | D   | D   | D   | B    | B   | B   | C   |      |      | C    | C   | C   | C   | C    | D    | D    | K    |      | D    | D   | D   | D   | D    | D    | K    |  |
| 470        | 471     | S    | B    | D   |     |     | B    | C   | C   | C   |      |      | C    | C   | C   | C   | C    | D    | D    | K    |      | D    | D   | D   | D   | D    | D    | K    |  |
| 560        | 561     | S    | B    | D   |     |     | B    | C   | C   | C   |      |      | C    | C   | C   | C   |      |      | K    | K    |      | D    | D   | D   | D   | D    | D    |      |  |
| 680        | 681     |      | B    | D   |     |     | B    | C   | C   | C   |      |      | C    | C   | C   | C   |      |      | K    | K    |      | D    | D   | D   | D   | D    | K    |      |  |
| 820        | 821     |      | B    | D   |     |     | B    | C   | D   | D   |      |      | C    | C   | C   | C   |      |      | K    |      |      | D    | D   | D   | D   | D    | K    |      |  |
| 1000pF     | 102     |      | B    |     |     |     | B    | C   |     |     |      |      | C    | C   | C   | C   |      |      | K    |      |      | D    | D   | D   | D   | K    | K    |      |  |
| 1200       | 122     |      | B    |     |     |     | B    | C   |     |     |      |      | C    | D   | D   | D   |      |      |      |      |      | D    | D   | D   | D   | K    |      |      |  |
| 1500       | 152     |      | B    |     |     |     | B    | C   |     |     |      |      | C    | D   | D   | D   |      |      |      |      |      | D    | D   | D   | D   | K    |      |      |  |
| 1800       | 182     |      | B    |     |     |     | B    | D   |     |     |      |      | C    | D   | D   | D   |      |      |      |      |      | D    | D   | D   | D   |      |      |      |  |
| 2200       | 222     |      | B    |     |     |     | B    | D   |     |     |      |      | C    | D   | D   |     |      |      |      |      |      | D    | D   | D   | D   |      |      |      |  |
| 2700       | 272     |      | D    |     |     |     | B    |     |     |     |      |      | C    | D   | D   |     |      |      |      |      |      | D    | D   | D   | D   |      |      |      |  |
| 3300       | 332     |      | D    |     |     |     | B    |     |     |     |      |      | C    | D   |     |     |      |      |      |      |      | D    | D   | D   | D   |      |      |      |  |
| 3900       | 392     |      | D    |     |     |     | B    |     |     |     |      |      | C    | D   |     |     |      |      |      |      |      | D    | D   |     |     |      |      |      |  |
| 4700       | 472     |      |      |     |     |     | B    |     |     |     |      |      | C    |     |     |     |      |      |      |      |      | D    | D   |     |     |      |      |      |  |
| 5600       | 562     |      |      |     |     |     | B    |     |     |     |      |      | C    |     |     |     |      |      |      |      |      | D    | D   |     |     |      |      |      |  |
| 6800       | 682     |      |      |     |     |     | C    |     |     |     |      |      | C    |     |     |     |      |      |      |      |      | D    | D   |     |     |      |      |      |  |
| 8200       | 822     |      |      |     |     |     | C    |     |     |     |      |      | C    |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.01μF     | 103     |      |      |     |     |     |      |     |     |     |      |      | C    |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.012      | 123     |      |      |     |     |     |      |     |     |     |      |      | D    |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.015      | 153     |      |      |     |     |     |      |     |     |     |      |      | D    |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.018      | 183     |      |      |     |     |     |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.022      | 223     |      |      |     |     |     |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.027      | 273     |      |      |     |     |     |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |
| 0.033μF    | 333     |      |      |     |     |     |      |     |     |     |      |      |      |     |     |     |      |      |      |      |      | D    |     |     |     |      |      |      |  |

(1) OTHER SIZE, CAPACITANCE, VOLTAGE, AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

TAPE AND REEL: Size Unit : inch(mm)

| SIZE           | 0402(1005)      | 0603(1608)     | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1808(4520)       | 1812(4532)       |
|----------------|-----------------|----------------|------------------|------------------|------------------|------------------|------------------|
| A=0.6+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | —                | —                | —                | —                |
| B=0.8+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                | —                |
| C=0.95+/-0.1mm | —               | —              | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                | —                |
| D=1.25±0.1mm   | —               | —              | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 2Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60+/-0.2mm | —               | —              | —                | PLASTIC 2Kp/REEL | —                | —                | —                |
| S=0.8±0.07mm   | —               | PAPER 4Kp/REEL | —                | —                | —                | —                | —                |
| N=0.50±0.05mm  | PAPER 10Kp/REEL | —              | —                | —                | —                | —                | —                |
| K=2.00±0.2mm   | —               | —              | —                | —                | —                | PLASTIC 1Kp/REEL | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm   | —               | —              | —                | —                | —                | —                | —                |



## CAPACITANCE AND VOLTAGE (X7R BME)

| DIELECTRIC |         | X7R  |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
|------------|---------|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|
| SIZE       | EIA CAP | 0402 |     |     |     | 0603 |     |     |     | 0805 |     |     |     | 1206 |     |     |     | 1210 |     |     |     | 1812 |     |     |     |
| VDCW       | CODE    | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V |
| 100pF      | 101     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |      |     |     |     |
| 120        | 121     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |      |     |     |     |
| 150        | 151     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 180        | 181     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 220        | 221     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 270        | 271     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 330        | 331     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 390        | 391     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 470        | 471     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 560        | 561     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 680        | 681     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B^   | B^  | B^  | B^  |      |     |     |     |      |     |     |     |
| 820        | 821     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 1000pF     | 102     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 1200       | 122     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 1500       | 152     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 1800       | 182     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 2200       | 222     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 2700       | 272     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 3300       | 332     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 3900       | 392     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 4700       | 472     | N    | N   | N   | N   | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 5600       | 562     | N    | N   | N   |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 6800       | 682     | N    | N   | N   |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C^   | C^  | C^  | C^  | D^   | D^  | D^  | D^  |
| 8200       | 822     | N    | N   | N   |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.01μF     | 103     | N    | N   | N   |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.012      | 123     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.015      | 153     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.018      | 183     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.022      | 223     | N    | N   |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.027      | 273     | N    |     |     |     | S    | S   | S   | S   | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.033      | 333     | N    |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.039      | 393     | N    |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.047      | 473     | N    |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.056      | 563     |      |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.068      | 683     |      |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D^   | D^  | D^  | D^  |
| 0.082      | 823     |      |     |     |     | S    | S   |     |     | B    | B   | B   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.1μF      | 104     |      |     |     |     | S    | S   |     |     | B    | B   | B   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.12       | 124     |      |     |     |     | S    |     |     |     | B    | B   | B   | D   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.15       | 154     |      |     |     |     | S    |     |     |     | D    | D   | D   | D   | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.18       | 184     |      |     |     |     | S    |     |     |     | D    | D   | D   |     | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.22       | 224     |      |     |     |     | S    |     |     |     | D    | D   | D   |     | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.27       | 274     |      |     |     |     |      |     |     |     | D    | D   | D   |     | C    | C   | C   |     | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.33       | 334     |      |     |     |     |      |     |     |     | D    | D   | D   |     | C    | C   | C   |     | C    | C   | C   | D   | D    | D   | D   | D   |
| 0.39       | 394     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   |     |     | C    | C   | C   | D   | D    | D   | D   | D   |
| 0.47       | 474     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   |     |     | C    | C   | C   |     | D    | D   | D   | D   |
| 0.56       | 564     |      |     |     |     |      |     |     |     | D    | D   |     |     | D    | D   |     |     |      |     |     |     | D    | D   | D   | D   |
| 0.68       | 684     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   |     |     |      |     |     |     | D    | D   | D   | K   |
| 0.82       | 824     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   |     |     |      |     |     |     | D    | D   | D   | K   |
| 1μF        | 105     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   |     |     |      |     |     |     | D    | D   | D   | K   |

(1) OTHER SIZE, CAPACITANCE, VOLTAGE, AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

(2) [^]: the said items are made by NME(Noble Metal Electrode).

TAPE AND REEL: Size Unit: inch(mm)

| SIZE           | 0402(1005)      | 0603(1608)     | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1808(4520)       | 1812(4532)       |
|----------------|-----------------|----------------|------------------|------------------|------------------|------------------|------------------|
| A=0.6+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | —                | —                | —                | —                |
| B=0.8+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                | —                |
| C=0.95+/-0.1mm | —               | —              | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                | —                |
| D=1.25±0.1mm   | —               | —              | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 2Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60+/-0.2mm | —               | —              | —                | PLASTIC 2Kp/REEL | —                | —                | —                |
| S=0.8±0.07mm   | —               | PAPER 4Kp/REEL | —                | —                | —                | —                | —                |
| N=0.50±0.05mm  | PAPER 10Kp/REEL | —              | —                | —                | —                | —                | —                |
| K=2.00±0.2mm   | —               | —              | —                | —                | —                | PLASTIC 1Kp/REEL | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm   | —               | —              | —                | —                | —                | —                | —                |

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## CAPACITANCE AND VOLTAGE (Hi-Voltage X7R BME)

| DIELECTRIC |         | X7R  |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|------------|---------|------|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| SIZE       | EIA CAP | 0603 | 0805 |                |                |                | 1206           |                |                |                |                |                |                | 1210           |                |                |                |                | 1808           |                |                | 1812           |                |                |                |                |                |
| VDCW       | CODE    | 100  | 100  | 200            | 250            | 500            | 100            | 200            | 250            | 500            | 1000           | 1500           | 2000           | 100            | 200            | 250            | 500            | 1000           | 1000           | 1500           | 2000           | 100            | 200            | 250            | 500            | 1000           | 2000           |
| 100pF      | 101     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 120        | 121     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 150        | 151     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                |                |                |
| 180        | 181     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                |                |                |
| 220        | 221     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                |                |                |
| 270        | 271     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 330        | 331     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 390        | 391     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 470        | 471     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 560        | 561     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 680        | 681     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 820        | 821     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> | G <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> |
| 1000pF     | 102     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 1200       | 122     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 1500       | 152     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> | G <sup>A</sup> |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 1800       | 182     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> | G <sup>A</sup> |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 2200       | 222     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | D <sup>A</sup> | G <sup>A</sup> |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 2700       | 272     | S    | B    | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |
| 3300       | 332     | S    | B    | B <sup>A</sup> | B <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |
| 3900       | 392     | S    | B    | B <sup>A</sup> | B <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> | G <sup>A</sup> |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |
| 4700       | 472     | S    | B    | B <sup>A</sup> | B <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |
| 5600       | 562     | S    | B    | D <sup>A</sup> | D <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | K <sup>A</sup> |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |
| 6800       | 682     | S    | B    | D <sup>A</sup> | D <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | B <sup>A</sup> |                |                |                | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | K <sup>A</sup> |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |
| 8200       | 822     | S    | B    | D <sup>A</sup> | D <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | K <sup>A</sup> |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |
| 0.01μF     | 103     | S    | B    | D <sup>A</sup> | D <sup>A</sup> |                | B              | B <sup>A</sup> | B <sup>A</sup> | C <sup>A</sup> |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> | K <sup>A</sup> |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |
| 0.012      | 123     |      | B    |                |                |                | B              | B <sup>A</sup> | B <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |
| 0.015      | 153     |      | B    |                |                |                | B              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |
| 0.018      | 183     |      | B    |                |                |                | B              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.022      | 223     |      | B    |                |                |                | B              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> | D <sup>A</sup> |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.027      | 273     |      | D    |                |                |                | B              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.033      | 333     |      | D    |                |                |                | B              | G <sup>A</sup> | G <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.039      | 393     |      |      |                |                |                | B              | G <sup>A</sup> | G <sup>A</sup> |                |                |                |                | C              | C <sup>A</sup> | C <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.047      | 473     |      |      |                |                |                | B              | G <sup>A</sup> | G <sup>A</sup> |                |                |                |                | C              | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> |                |                |
| 0.056      | 563     |      |      |                |                |                | B              |                |                |                |                |                |                | C              | D <sup>A</sup> | D <sup>A</sup> |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |                |
| 0.068      | 683     |      |      |                |                |                | B              |                |                |                |                |                |                | C              |                |                |                |                |                |                |                | D <sup>A</sup> | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |                |
| 0.082      | 823     |      |      |                |                |                | D              |                |                |                |                |                |                | C              |                |                |                |                |                |                |                | D              | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |                |
| 0.1μF      | 104     |      |      |                |                |                | D              |                |                |                |                |                |                | C              |                |                |                |                |                |                |                | D              | D <sup>A</sup> | D <sup>A</sup> | K <sup>A</sup> |                |                |
| 0.12       | 124     |      |      |                |                |                |                |                |                |                |                |                |                | C              |                |                | D <sup>A</sup> |                |                |                |                | D              | D <sup>A</sup> | D <sup>A</sup> |                |                |                |
| 0.15       | 154     |      |      |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |                |                | D              | K <sup>A</sup> | K <sup>A</sup> |                |                |                |
| 0.18       | 184     |      |      |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |                |                | D              | K <sup>A</sup> | K <sup>A</sup> |                |                |                |
| 0.22       | 224     |      |      |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |                |                | D              | K <sup>A</sup> | K <sup>A</sup> |                |                |                |
| 0.27       | 274     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |
| 0.33       | 334     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |
| 0.39       | 394     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | D              |                |                |                |                |                |
| 0.47       | 474     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | K              |                |                |                |                |                |
| 0.56       | 564     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | K              |                |                |                |                |                |
| 0.68       | 684     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | K              |                |                |                |                |                |
| 0.82       | 824     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 1μF        | 105     |      |      |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |

(1) OTHER SIZE , CAPACITANCE , VOLTAGE , AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

(2) [°] : the said items are made by NME(Noble Metal Electrode).

TAPE AND REEL: Size Unit : inch(mm)

| SIZE           | 0402(1005)      | 0603(1608)     | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1808(4520)       | 1812(4532)       |
|----------------|-----------------|----------------|------------------|------------------|------------------|------------------|------------------|
| A=0.6+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | —                | —                | —                | —                |
| B=0.8+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                | —                |
| C=0.95+/-0.1mm | —               | —              | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                | —                |
| D=1.25±0.1mm   | —               | —              | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 2Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60+/-0.2mm | —               | —              | —                | PLASTIC 2Kp/REEL | —                | —                | —                |
| S=0.8±0.07mm   | —               | PAPER 4Kp/REEL | —                | —                | —                | —                | —                |
| N=0.50±0.05mm  | PAPER 10Kp/REEL | —              | —                | —                | —                | —                | —                |
| K=2.00±0.2mm   | —               | —              | —                | —                | —                | PLASTIC 1Kp/REEL | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm   | —               | —              | —                | —                | —                | —                | —                |

WALSIN TECHNOLOGY CORPORATION

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## CAPACITANCE AND VOLTAGE (Y5V BME)

| DIELECTRIC |         |      |     |     |     | Y5V  |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
|------------|---------|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|
| SIZE       | EIA CAP | 0402 |     |     |     | 0603 |     |     |     | 0805 |     |     |     | 1206 |     |     |     | 1210 |     |     |     | 1812 |     |     |     |
| VDCW       | CODE    | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V | 10V  | 16V | 25V | 50V |
| 1000pF     | 102     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 1200       | 122     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 1500       | 152     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 1800       | 182     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 2200       | 222     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 2700       | 272     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 3300       | 332     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 3900       | 392     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 4700       | 472     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 5600       | 562     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 6800       | 682     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 8200       | 822     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     |
| 0.01μF     | 103     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.012      | 123     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.015      | 153     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.018      | 183     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.022      | 223     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.027      | 273     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.033      | 333     | N    | N   | N   | N   | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.039      | 393     | N    | N   | N   |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.047      | 473     | N    | N   | N   |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.056      | 563     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.068      | 683     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.082      | 823     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   |      |     |     |     |      |     |     |     |
| 0.1μF      | 104     | N    | N   |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.15       | 154     | N    |     |     |     | S    | S   | S   | S   | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.22       | 224     | N    |     |     |     | S    | S   | S   |     | A    | A   | A   | A   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.33       | 334     |      |     |     |     | S    | S   | S   |     | B    | B   | B   | B   | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.47       | 474     |      |     |     |     | S    | S   |     |     | B    | B   | B   |     | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 0.68       | 684     |      |     |     |     | S    |     |     |     | B    | B   | D   |     | B    | B   | B   | B   | C    | C   | C   | C   | D    | D   | D   | D   |
| 1μF        | 105     |      |     |     |     | S    |     |     |     | B    | B   | D   |     | C    | C   | C   | C   | C    | C   | C   | C   | D    | D   | D   | D   |
| 1.5        | 155     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   | C   |     | C    | C   | C   |     | D    | D   | D   | D   |
| 2.2        | 225     |      |     |     |     |      |     |     |     | D    | D   |     |     | C    | C   | C   |     | C    | C   | C   |     | D    | D   | D   | D   |
| 3.3        | 335     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   | D   |     | C    | C   | C   |     | D    | D   | D   | D   |
| 4.7        | 475     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   |     |     | C    | C   | D   |     | D    | D   | D   | D   |
| 6.8        | 685     |      |     |     |     |      |     |     |     |      |     |     |     | D    |     |     |     | C    | C   |     |     | D    | D   | D   | D   |
| 10μF       | 106     |      |     |     |     |      |     |     |     |      |     |     |     | D    |     |     |     | D    | D   |     |     | D    | D   |     |     |
| 22μF       | 226     |      |     |     |     |      |     |     |     |      |     |     |     |      |     |     |     | D    |     |     |     |      |     |     |     |

(1) OTHER SIZE, CAPACITANCE, VOLTAGE, AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

TAPE AND REEL: Size Unit: inch(mm)

| SIZE           | 0402(1005)      | 0603(1608)     | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1808(4520)       | 1812(4532)       |
|----------------|-----------------|----------------|------------------|------------------|------------------|------------------|------------------|
| A=0.6+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | —                | —                | —                | —                |
| B=0.8+/-0.1mm  | —               | —              | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                | —                |
| C=0.95+/-0.1mm | —               | —              | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                | —                |
| D=1.25±0.1mm   | —               | —              | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 2Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60+/-0.2mm | —               | —              | —                | PLASTIC 2Kp/REEL | —                | —                | —                |
| S=0.8±0.07mm   | —               | PAPER 4Kp/REEL | —                | —                | —                | —                | —                |
| N=0.50±0.05mm  | PAPER 10Kp/REEL | —              | —                | —                | —                | —                | —                |
| K=2.00±0.2mm   | —               | —              | —                | —                | —                | PLASTIC 1Kp/REEL | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm   | —               | —              | —                | —                | —                | —                | —                |

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## CAPACITANCE AND VOLTAGE (Hi-Voltage Y5V BME)

| DIELECTRIC   |         | Y5V  |     |     |      |     |     |      |     |     |      |     |     |
|--------------|---------|------|-----|-----|------|-----|-----|------|-----|-----|------|-----|-----|
| SIZE         | EIA CAP | 0805 |     |     | 1206 |     |     | 1210 |     |     | 1812 |     |     |
| VDCW         | CODE    | 100  | 200 | 250 | 100  | 200 | 250 | 100  | 200 | 250 | 100  | 200 | 250 |
| 0.01 $\mu$ F | 103     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.015        | 153     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.022        | 223     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.033        | 333     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.047        | 473     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.068        | 683     | B    | B   | B   | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.1 $\mu$ F  | 104     | B    |     |     | B    | B   | B   | C    | C   | C   | D    | D   | D   |
| 0.15         | 154     |      |     |     | C    | C   | C   | C    | C   | C   | D    | D   | D   |
| 0.22         | 224     |      |     |     | C    |     |     | C    |     |     | D    | D   | D   |
| 0.33         | 334     |      |     |     |      |     |     | C    |     |     | D    | D   | D   |
| 0.47         | 474     |      |     |     |      |     |     |      |     |     | D    | D   | D   |
| 0.68         | 684     |      |     |     |      |     |     |      |     |     | D    | D   | D   |
| 1 $\mu$ F    | 105     |      |     |     |      |     |     |      |     |     | D    |     |     |

(1) OTHER SIZE, CAPACITANCE, VOLTAGE, AND 13" REEL ARE AVAILABLE UPON CUSTOMER'S REQUEST.

TAPE AND REEL: Size Unit : inch(mm)

| SIZE           | 0805(2012)       | 1206(3216)       | 1210(3225)       | 1812(4532)       |
|----------------|------------------|------------------|------------------|------------------|
| A=0.6+/-0.1mm  | PAPER 4Kp/REEL   | —                | —                | —                |
| B=0.8+/-0.1mm  | PAPER 4Kp/REEL   | PAPER 4Kp/REEL   | —                | —                |
| C=0.95+/-0.1mm | —                | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | —                |
| D=1.25±0.1mm   | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 3Kp/REEL | PLASTIC 1Kp/REEL |
| G=1.60+/-0.2mm | —                | PLASTIC 2Kp/REEL | —                | —                |
| S=0.8±0.07mm   | —                | —                | —                | —                |
| N=0.50±0.05mm  | —                | —                | —                | —                |
| K=2.00±0.2mm   | —                | —                | —                | PLASTIC 1Kp/REEL |
| M=2.5±0.30mm   | —                | —                | —                | —                |

### \*\*\* NEW PRODUCTS PROMOTION \*\*\*

#### (1). X5R Series,

X5R 0402 56nF- 100nF /10V

#### (2). Multi-layer C-array Series,

NPO 0603\*4(8P4C) 10pF- 470pF /50V

X7R 0603\*4(8P4C) 100pF- 100nF /16V

X7R 0603\*4(8P4C) 100pF- 10nF /50V,25V

Y5V 0603\*4(8P4C) 10nF- 100nF /50V,25V

#### (3). Low Inductance Capacitor (LIC) Series,

X5R 0306 100nF- 220nF /10V

X7R 0612 10nF- 100nF /50V

## PACKING ON TAPE AND REEL

Unit per reel

Unit : mm

| chip size | Paper tape  |           |           | Plastic tape |           |           | * chip thickness :                                                                                                                 |
|-----------|-------------|-----------|-----------|--------------|-----------|-----------|------------------------------------------------------------------------------------------------------------------------------------|
|           | width(reel) | thickness | unit/reel | width(reel)  | thickness | unit/reel |                                                                                                                                    |
| 0402      | 8 mm (7")   | N         | 10Kp/Reel |              |           |           | N=0.50±0.05<br>A=0.60±0.10<br>B=0.80±0.10<br>C=0.95±0.10<br>D=1.25±0.10<br>S=0.80±0.07<br>G=1.60±0.20<br>K=2.00±0.20<br>M=2.5±0.30 |
|           | 8mm(13")    | N         | 50Kp/Reel |              |           |           |                                                                                                                                    |
| 0603      | 8 mm (7")   | S         | 4Kp/Reel  |              |           |           |                                                                                                                                    |
|           | 8mm(10")    | S         | 10Kp/Reel |              |           |           |                                                                                                                                    |
|           | 8mm(13")    | S         | 15Kp/Reel |              |           |           |                                                                                                                                    |
| 0805      | 8 mm (7")   | A \ B     | 4Kp/Reel  | 8 mm (7")    | C \ D     | 3Kp/Reel  |                                                                                                                                    |
|           | 8mm(10")    | A \ B     | 10Kp/Reel | 8mm(10")     | C \ D     | 5Kp/Reel  |                                                                                                                                    |
|           | 8mm(13")    | A \ B     | 15Kp/Reel | 8mm(13")     | C \ D     | 10Kp/Reel |                                                                                                                                    |
|           | 8 mm (7")   | A \ B     | 4Kp/Reel  | 8 mm (7")    | C \ D     | 3Kp/Reel  |                                                                                                                                    |
| 1206      | 8mm(10")    | A \ B     | 10Kp/Reel | 8mm(10")     | C \ D     | 5Kp/Reel  |                                                                                                                                    |
|           | 8mm(13")    | A \ B     | 15Kp/Reel | 8mm(13")     | C \ D     | 10Kp/Reel |                                                                                                                                    |
|           |             |           |           | 8 mm (7")    | F \ G     | 2Kp/Reel  |                                                                                                                                    |
|           |             |           |           | 8 mm (7")    | K         | 1Kp/Reel  |                                                                                                                                    |
| 1210      |             |           |           | 8 mm (7")    | C \ D     | 3Kp/Reel  |                                                                                                                                    |
|           |             |           |           | 8 mm (7")    | F         | 1Kp/Reel  |                                                                                                                                    |
| 1808      |             |           |           | 12mm (7")    | C \ G     | 2Kp/Reel  |                                                                                                                                    |
|           |             |           |           | 12mm (7")    | K         | 1Kp/Reel  |                                                                                                                                    |
| 1812      |             |           |           | 12mm (7")    | D         | 1Kp/Reel  |                                                                                                                                    |

| Reels size | chip size          |                    |                    |                    |                   |                   |                   |
|------------|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|
| label      | 0402               | 0603               | 0805               | 1206               | 1210              | 1808              | 1812              |
| A          | 13.0±1.0           | 13.0±1.0           | 13.0±1.0           | 13.0±1.0           | 13.0±1.0          | 13.0±1.0          | 13.0±1.0          |
| B          | 9.0±1.0            | 9.0±1.0            | 9.0±1.0            | 9.0±1.0            | 9.0±1.0           | 13.5±1.0          | 13.5±1.0          |
| C          | 178.0±1.0<br>(7")  | 178.0±1.0<br>(7")  | 178.0±1.0<br>(7")  | 178.0±1.0<br>(7")  | 178.0±1.0<br>(7") | 178.0±1.0<br>(7") | 178.0±1.0<br>(7") |
|            |                    | 250.0±1.0<br>(10") | 250.0±1.0<br>(10") | 250.0±1.0<br>(10") |                   |                   |                   |
|            | 330.0±1.0<br>(13") | 330.0±1.0<br>(13") | 330.0±1.0<br>(13") | 330.0±1.0<br>(13") |                   |                   |                   |
| D          | 60.5±1.0<br>(7")   | 60.5±1.0<br>(7")   | 60.5±1.0<br>(7")   | 60.5±1.0<br>(7")   | 60.5±1.0<br>(7")  | 80.0±1.0<br>(7")  | 80.0±1.0<br>(7")  |
|            |                    | 62.5±1.0<br>(10")  | 62.5±1.0<br>(10")  | 62.5±1.0<br>(10")  |                   |                   |                   |
|            | 100.0±1.0<br>(13") | 100.0±1.0<br>(13") | 100.0±1.0<br>(13") | 100.0±1.0<br>(13") |                   |                   |                   |



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## PACKING ON TAPE AND REEL

### Tape Size Contrastive Table

#### A. Plastic tape size specification



| Item    | Specification | Tol. (+/-) |
|---------|---------------|------------|
| W       | 8.00          | ±0.20      |
| E       | 1.75          | ±0.10      |
| F       | 3.50          | ±0.05      |
| D0      | 1.50          | +0.10, -0  |
| D1      | 1.00          | ±0.10      |
| P0      | 4.00          | ±0.05      |
| P1      | 4.00          | ±0.10      |
| P2      | 2.00          | ±0.05      |
| P0 x 10 | 40.00         | ±0.20      |

#### B. Plastic tape size specification

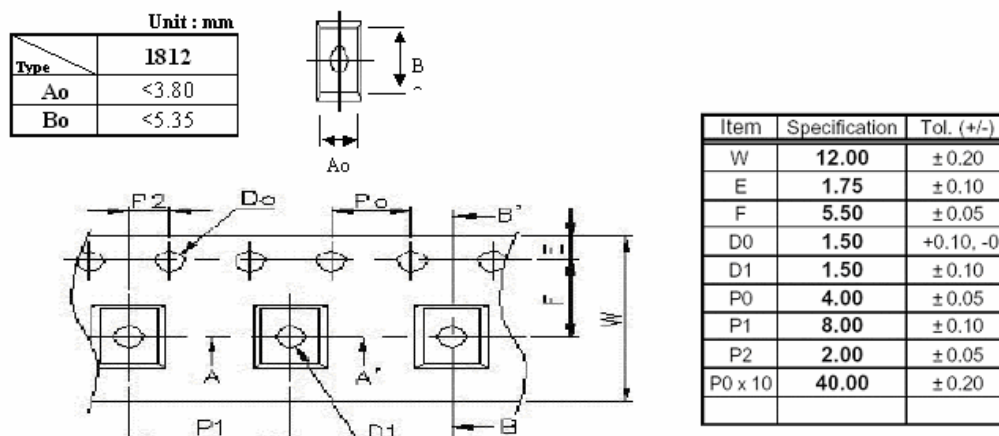


| Item    | Specification | Tol. (+/-) |
|---------|---------------|------------|
| W       | 12.00         | ±0.20      |
| E       | 1.75          | ±0.10      |
| F       | 5.50          | ±0.05      |
| D0      | 1.50          | +0.10, -0  |
| D1      | 1.50          | ±0.10      |
| P0      | 4.00          | ±0.05      |
| P1      | 4.00          | ±0.10      |
| P2      | 2.00          | ±0.05      |
| P0 x 10 | 40.00         | ±0.20      |

## PACKING ON TAPE AND REEL

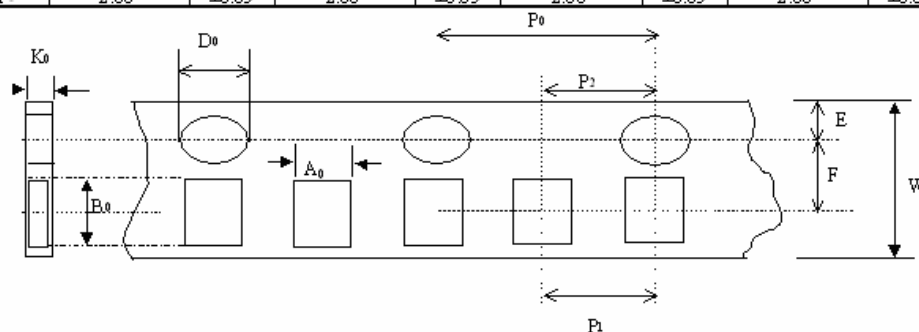
### Tape Size Contrastive Table

#### C. Plastic tape size specification



#### D. Paper tape size specification

| SYMBOL | PRODUCT SIZE CODE |       |      |       |           |       |      |       | UNIT |
|--------|-------------------|-------|------|-------|-----------|-------|------|-------|------|
|        | 0402              |       | 0603 |       | 0805      |       | 1206 |       |      |
|        | SIZE              | TOL   | SIZE | TOL   | SIZE      | TOL   | SIZE | TOL   |      |
| A      | 0.62              | ±0.05 | 1.02 | ±0.05 | 1.50      | ±0.10 | 2.00 | ±0.15 | mm   |
| B      | 1.12              | ±0.05 | 1.82 | ±0.05 | 2.30      | ±0.10 | 3.50 | ±0.15 | mm   |
| K      | 0.60              | ±0.05 | 0.95 | ±0.05 | 0.95/0.75 | ±0.05 | 0.95 | ±0.05 | mm   |
| W      | 8.00              | ±0.10 | 8.00 | ±0.10 | 8.00      | ±0.10 | 8.00 | ±0.10 | mm   |
| D      | 1.55              | ±0.05 | 1.55 | ±0.05 | 1.55      | ±0.05 | 1.55 | ±0.05 | mm   |
| E      | 1.75              | ±0.10 | 1.75 | ±0.10 | 1.75      | ±0.10 | 1.75 | ±0.10 | mm   |
| F      | 3.50              | ±0.05 | 3.50 | ±0.05 | 3.50      | ±0.05 | 3.50 | ±0.05 | mm   |
| P      | 4.00              | ±0.10 | 4.00 | ±0.10 | 4.00      | ±0.10 | 4.00 | ±0.10 | mm   |
| P      | 2.00              | ±0.05 | 4.00 | ±0.10 | 4.00      | ±0.10 | 4.00 | ±0.10 | mm   |
| P      | 2.00              | ±0.05 | 2.00 | ±0.05 | 2.00      | ±0.05 | 2.00 | ±0.05 | mm   |



## DESCRIPTION OF THE STANDARD SHIPPING LABEL



- |                                               |                                                           |
|-----------------------------------------------|-----------------------------------------------------------|
| a. Customer name                              | g. Quantity and WALSIN P/N or customer P/N in bar code    |
| b. WALSIN order serial number and item number | h. Material serial number of WALSIN                       |
| c. Customer P/O                               | i. Shipping date                                          |
| d. Customer P/N                               | j. Order bar code including serial number and item number |
| e. Description of specifications              | Serial number of the label                                |
| f. Quantity                                   |                                                           |

Information of caution/precaution handling of chip : 1. No bumping & pressurizing when carry. 2. Keep out of water.

## Walsin Standard Label (MLCC) :



- 1<sup>st</sup> Column : 0603 NPO 7.0pF +-0.50pF50V** <<Content: product description>>
  - (1). 0603: Size (2). NPO : Dielectric (3). 7.0pF : Capacitance (4) +/-0.50pF: Tolerance
- 2<sup>nd</sup> Column : 0603N7R0D500NT 1001000010 4000** <<Content: Part number + batch number of taping +quantity per reel(pcs)>>
  - (1). 0603N7R0D500NT: Part number
  - (2). 1001000010: Batch number of taping (2.1) 000010: random number
  - (3). 4000: quantity per reel (unit: pieces)
- 3<sup>rd</sup> Column: Bar code** <<Content:The reading is same as 2nd column>>
 

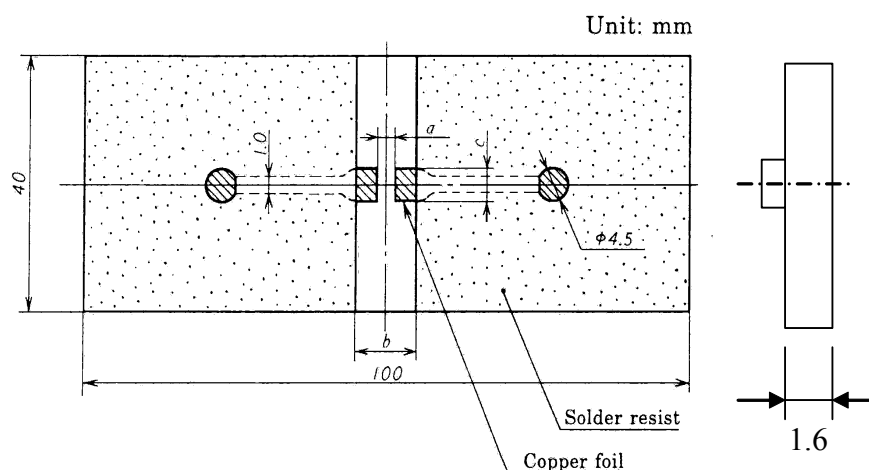
0603N7R0D500NT 1001000010 4 (Quantity unit: Kpcs)
- 4<sup>th</sup> Column: -11980293-083001181402- 16 0100002974 002**
  - (1). - : Tap
  - (2). 11980293 : Employee number
  - (3). 083001 : Mouth , Date, Year (The date of printing)
  - (4). 181402 : Hour, minute, second (Printing Time)
  - (5). 16 : Copies of label(with same batch number)
  - (6). 0100002974 : Batch number of bulk
  - (7). 002 : Series of copies

## Appendix 1 Bending test

### 1. Testing Substrate:

The testing substrate shall be the testing substrate A given in Fig.1, the substrate shall be that of class GE4 specified in JIS C6484 or at least the equivalent, the thickness shall be 1.6mm and thickness of copper foil be 0.035mm.

Fig. 1. Testing printed wiring board A  
(for use in test for resistance of board to bending)



| External Size of Capacitor |          | Dimensions of Pattern (Unit : mm) |     |      |     |
|----------------------------|----------|-----------------------------------|-----|------|-----|
| Symbol                     | W*L      | a                                 | b   | c    | d   |
| 0402                       | 0.5*1.0  | 0.4                               | 1.5 | 0.5  | 1.0 |
| 0603                       | 0.8*1.6  | 1.0                               | 3.0 | 1.2  | 1.0 |
| 0805                       | 1.25*2.0 | 1.2                               | 4.0 | 1.65 | 1.0 |
| 1206                       | 1.6*3.2  | 2.2                               | 5.0 | 2.0  | 1.0 |
| 1210                       | 2.5*3.2  | 2.2                               | 5.0 | 2.9  | 1.0 |
| 1812                       | 3.2*4.5  | 3.5                               | 7.0 | 3.7  | 1.0 |

### 2. Testing Method:

2.1 The capacitor shall be soldered to testing substrate A.

2.2 The substrate shall be so placed with its surface on which capacitor is mounted downwards that the center of capacitor coincides with the center of supports as illustrated in Fig2.

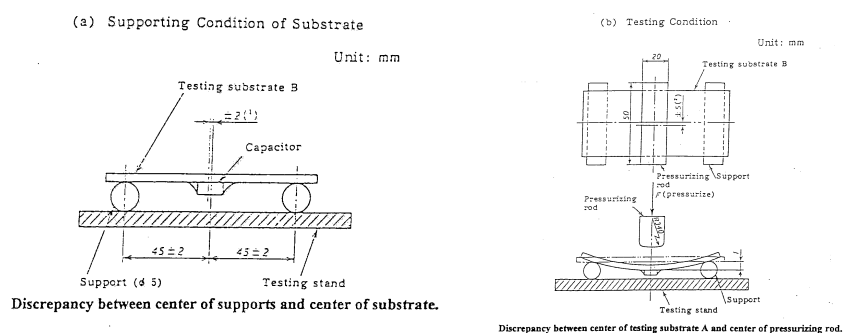


Fig.2 Flexural test of substrate

## Appendix 2 Adhesive strength of termination

### 1. Testing Substrate:

The testing substrate shall be the testing substrate A illustrated in Fig.1.



Fig.1 Testing substrate A

| External Size of Capacitor |          | Dimensions of Pattern Unit : mm |     |      |
|----------------------------|----------|---------------------------------|-----|------|
| Symbol                     | W*L      | a                               | b   | c    |
| 0402                       | 0.5*1.0  | 0.4                             | 1.5 | 0.5  |
| 0603                       | 0.8*1.6  | 1.0                             | 3.0 | 1.2  |
| 0805                       | 1.25*2.0 | 1.2                             | 4.0 | 1.65 |
| 1206                       | 1.6*3.2  | 2.2                             | 5.0 | 2.0  |
| 1210                       | 2.5*3.2  | 2.2                             | 5.0 | 2.9  |
| 1812                       | 3.2*4.5  | 3.5                             | 7.0 | 3.7  |

Remark : Material of substrate shall be alumina or glass fabric base epoxy resin.

Alumina : purity 95% or more, thickness 0.6mm or more.

Glass fabric base epoxy resin : Class GE4 specified in JIS C6484 or the equivalent.

Thickness 1.6mm and copper foil thickness 0.035mm.

### 2. Testing Method:

The pressurizing force shall be gradually applied to the center side surface of capacitor in the capacitor in the direction horizontal and parallel to the testing substrate as shown in Fig.2.

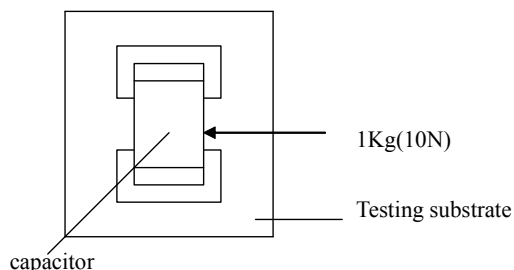


Fig.2 Direction of Pressurizing