

# SMD Multilayer Ceramic Capacitors **multicomp** PRO



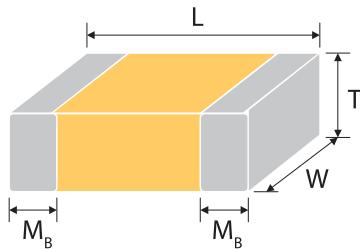
**RoHS  
Compliant**

## Description

This soft termination series MLCC is designed and with a polymer layer within end terminations of product, which can absorb mechanical stress caused by PCB handling in SMT line and reduce the mechanical impact for product. It will offer more robust and reliable performance in applications.

## Features

- MLCC's termination are with a soft & flexible polymer layer to withstand high bending stress in SMT line.



The outline of MLCC

## Applications

- Power supply and related industries.
- Lighting industry.
- The other mechanical stress concerned products.

## External Dimensions

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M <sub>B</sub> (mm)
0603 (1608)	1.6 ±0.2	0.8 ±0.1	0.8 ±0.07	S	0.4 ±0.15
	1.6 ±0.3	0.8 ±0.3	0.8 ±0.3	X	
0805 (2012)	2 ±0.2	1.25 ±0.1	0.6 ±0.1	A	0.5 ±0.2
			0.8 ±0.1	B	
			1.25 ±0.1	D	
	2 ±0.3	1.25 ±0.3	0.25 ±0.3	I	
1206 (3216)	3.2 +0.4/-0.1	1.6 ±0.15	0.8 ±0.1	B	0.6 ±0.2 (0.5 ±0.25)*
			0.95 ±0.1	C	
			1.15 ±0.15	J	
			1.25 ±0.1	D	
	3.2 +0.4/-0.1	1.6 ±0.2	1.6 ±0.2	G	#
	3.2 ±0.5	1.6 ±0.5	1.6 ±0.5	P	
1210 (3225)	3.2 ±0.4	2.5 ±0.2	0.95 ±0.1	C	0.75 ±0.25
			1.6 ±0.2	D	
	3.2 ±0.6	2.5 ±0.5	2 ±0.2	G	
			2.5 ±0.5	K	

# Reflow soldering only is recommended.

\* For 1206≥1000V, 1812\_200V~4000V products.

Newark.com/multicomp-pro

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## General Electrical Data:

Dielectric	X7R
Size	0603, 0805, 1206, 1210,
Capacitance range*	100pF to 47μF
Capacitance tolerance**	K ( $\pm 10\%$ ), M ( $\pm 20\%$ )
Rated voltage (WVDC)	6.3V to 4000V
Operating temperature	-55 to +125°C
Capacitance characteristic	$\pm 15\%$
Termination	Ni/Sn (lead-free termination)

\* Measured at the condition of 30~70% related humidity.

X7R: Apply  $1.0 \pm 0.2$  Vrms, 1kHz  $\pm 10\%$ , at 25°C ambient temperature.

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at  $150 \pm 10$  °C for 1 hour, then leave in ambient condition for  $24 \pm 2$  hours before measurement.

## X7R Dielectric 0603, 0805, 1206, 1210 Sizes

Dielectric	X7R					
SIZE	0603	0805			1206	1210
Rated Voltage (VDC)	16	16	50	1000	2000	25
100pF (101)	S	D	D	B	D	
120pF (121)	S	D	D	B	D	
150pF (151)	S	D	D	B	D	
180pF (181)	S	D	D	B	D	
220pF (221)	S	D	D	B	D	
270pF (271)	S	D	D	B	D	
330pF (331)	S	D	D	B	D	
390pF (391)	S	D	D	B	D	
470pF (471)	S	D	D	B	D	
560pF (561)	S	D	D	B	D	
680pF (681)	S	D	D	B	D	
820pF (821)	S	D	D	B	D	
1,000pF (102)	S	D	D	B	D	C
1,200pF (122)	S	D	D	B	G	C
1,500pF (152)	S	D	D	D	G	C
1,800pF (182)	S	D	D	D	G	C
2,200pF (222)	S	D	D	D	G	C
2,700pF (272)	S	D	D		G	C
3,300pF (332)	S	D	D			C
3,900pF (392)	S	D	D			C
4,700pF (472)	S	D	D			C

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Dielectric	X7R				
SIZE	0603	0805		1206	1210
<b>Rated Voltage (VDC)</b>	<b>16</b>	<b>16</b>	<b>50</b>	<b>1000</b>	<b>2000</b>
5,600pF (562)	S	D	D		C
6,800pF (682)	S	D	D		C
8,200pF (822)	S	D	D		C
0.010µF (103)	S	D	D		C
0.012µF (123)	S	D	D		C
0.015µF (153)	S	D	D		C
0.018µF (183)	S	D	D		C
0.022µF (223)	S	D	D		C
0.027µF (273)	S	D	D		C
0.033µF (333)	S	D	D		C
0.039µF (393)	S	D	D		C
0.047µF (473)	S	D	D		C
0.056µF (563)	S	D	D		C
0.068µF (683)	S	D	D		C
0.082µF (823)	S	D	D		C
0.10µF (104)	S	D	D		C
0.12µF (124)	S	D	D		C
0.15µF (154)	S	D	D		C
0.18µF (184)	S	D	D		C
0.22µF (224)	S	D	D		C
0.27µF (274)	X	I	I		C
0.33µF (334)	X	I	I		C
0.39µF (394)	X	I	I		C
0.47µF (474)	X	I	I		C
0.56µF (564)	X	I			D
0.68µF (684)	X	I			D
0.82µF (824)	X	I			D
1.0µF (105)	X	I	I		D
1.5µF (155)		I			G
2.2µF (225)		I			G
3.3µF (335)					G
4.7µF (475)		I			K
6.8µF (685)					
10µF (106)					M
22µF (226)					M

1. The letter in cell is expressed the symbol of product thickness.

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## Reliability Test Conditions And Requirements

No	Item	Test Condition	Requirements																																																																				
1	Visual and Mechanical	-	* No remarkable defect. * Dimensions to conform to individual specification sheet.																																																																				
2	Capacitance	*Test temp.: Room Temperature. *Class I: (NP0) ≤1000pF, 1 ±0.2Vrms, 1MHz±10% >1000pF, 1 ±0.2Vrms, 1KHz±10% Class II: (X7R) C≤10μF, 1 ±0.2Vrms, 1KHz±10% ** C>10μF, 0.5±0.2Vrms, 120Hz±20%	* Shall not exceed the limits given in the detailed spec.																																																																				
3	Q/ D.F. (Dissipation Factor)	** Test condition: 0.5±0.2Vrms, 1KHz±10% X7R: 0805=106(6.3V), 0603/475(6.3V) X5R: 0201≥224 (6.3V,10V,16V) <sup>#1</sup> , 0402≥475 (6.3V,16V), 0402≥225(10V), 0603=106 (6.3V) TT18X≥475(10V) , TT15X series X6S: 0201/474(4V),0201>104 (6.3V,10V), 0402≥225 (6.3V), 0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V)  #1 Excluding X5R/0201/105(6.3V);225(10V) , 0402X475M6R3 (1.0±0.2Vrms, 1KHz±10%) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	X7R: <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th>Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">≥ 100V</td> <td rowspan="4">≤2.5%</td> <td>≤3%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤3.5%</td> <td>1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤5%</td> <td>0603≥0.068μF; 0805&gt;0.1μF; 1206≥1μF; 1210≥2.2μF;</td> </tr> <tr> <td>≤10%</td> <td>0805&gt;0.22μF; 1210≥3.3μF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤2.5%</td> <td>≤3%</td> <td>0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td>≤3.5%</td> <td>1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤5%</td> <td>0201≥0.01μF; 1210≥3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.012μF;0603&gt;0.1μF; 0805/X7R&gt;0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">35V</td> <td rowspan="4">≤3.5%</td> <td>≤10%</td> <td>0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td>≤5%</td> <td>0201≥0.01μF;0805≥1μF;1210≥10μF</td> </tr> <tr> <td>≤7%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤3.5%</td> <td>≤12.5%</td> <td>0402≥0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.022μF;0402≥0.033μF; 0603≥0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td rowspan="4">16V</td> <td rowspan="4">≤3.5%</td> <td>≤10%</td> <td>0201/X7R≥0.022μF; 0402≥0.15μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF;0402≥1μF</td> </tr> <tr> <td rowspan="4">10V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201/X7R≥0.022μF; 0402≥0.15μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF;0402≥1μF</td> </tr> <tr> <td rowspan="4">6.3V</td> <td rowspan="4">≤10%</td> <td>≤15%</td> <td>0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥2.2μF</td> </tr> <tr> <td rowspan="2">4V</td> <td rowspan="2">≤15%</td> <td>---</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> </tbody> </table> <p>* I.R.: 10GΩ or RxC500Ω-F whichever is smaller. Class II (X7R)</p>	Rated vol.	D.F.≤	Exception of D.F.≤	≥ 100V	≤2.5%	≤3%	1206≥0.47μF	≤3.5%	1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5%	0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF;	≤10%	0805>0.22μF; 1210≥3.3μF	50V	≤2.5%	≤3%	0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF	≤3.5%	1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5%	0201≥0.01μF; 1210≥3.3μF	≤10%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF	35V	≤3.5%	≤10%	0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF	≤5%	0201≥0.01μF;0805≥1μF;1210≥10μF	≤7%	0603≥0.33μF	≤10%	0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF	25V	≤3.5%	≤12.5%	0402≥0.33μF	≤5%	0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF	≤10%	0201≥0.022μF;0402≥0.033μF; 0603≥0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF	16V	≤3.5%	≤10%	0201/X7R≥0.022μF; 0402≥0.15μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	≤15%	0201≥0.1μF;0402≥1μF	10V	≤5%	≤10%	0201/X7R≥0.022μF; 0402≥0.15μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	≤15%	0201≥0.1μF;0402≥1μF	6.3V	≤10%	≤15%	0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF	≤20%	0402≥2.2μF	4V	≤15%	---	---	---	---	* No evidence of damage or flash over during test.		
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4.	Dielectric Strength	*To apply voltage: ≤100V: 250% of rated voltage. 200V ~ 300V: 200% of rated voltage. 400V ~ 450V: 120% of rated voltage. 500V ~ 999V: 150% of rated voltage. 1000V ~ 3000V: 120% of rated voltage. 4000V: 110% of rated voltage. *Duration: 1 to 5 sec. *Charge & discharge current less than 50mA.																																																																					

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No	Item	Test Condition		Requirements													
5.	Insulation Resistance	*Test temp.: Room Temperature. *To apply rated voltage for MAX. 120sec.		10GΩ or $R_x C \geq 500\Omega \cdot F$ whichever is smaller. Class II (X7R)													
		<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="6" style="vertical-align: middle; text-align: center;"> <math>10G\Omega</math> or  <math>R_x C \geq 100 \Omega \cdot F</math>            whichever is smaller         </td> </tr> <tr> <td>50V: 0402≥0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> </tbody> </table>		Rated voltage	Insulation Resistance	100V: All X7R	$10G\Omega$ or $R_x C \geq 100 \Omega \cdot F$ whichever is smaller	50V: 0402≥0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	35V: 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF	16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF	10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF					
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		Rated voltage: 200~630V      To apply rated voltage (500V max.) for 60 sec.		$\geq 10G\Omega$ or $R_x C \geq 100 \Omega \cdot F$ whichever is smaller													
		Rated voltage: >630V      To apply 500V for 60 sec.															
6.	Temperature Coefficient	With no electrical load.		<table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> <td>X7R</td> <td>Within ±15%</td> </tr> </tbody> </table>		T.C.	Operating Temp	T.C.	Capacitance Change	X7R	-55~125°C at 25°C	X7R	Within ±15%				
T.C.	Operating Temp	T.C.	Capacitance Change														
X7R	-55~125°C at 25°C	X7R	Within ±15%														
		<table border="1"> <tr><td>0603</td></tr> <tr><td>Cap&lt;1μF: 1V</td></tr> <tr><td>1μF≤Cap≤4.7μF: 0.5V 0603X106-10V: 0.5V</td></tr> <tr><td>Cap&gt;4.7μF: 0.2V</td></tr> <tr><td>0805</td></tr> <tr><td>Cap&lt;10μF: 1V</td></tr> <tr><td>Cap=10μF: 0.5V 0805B475/6.3V~25V: 0.5V</td></tr> <tr><td>Cap&gt;10μF: 0.2V</td></tr> <tr><td>1206/1210</td></tr> <tr><td>Cap≤10μF: 1V</td></tr> <tr><td>10μF&lt;Cap≤100μF: 0.5V</td></tr> <tr><td>Cap&gt;100μF: 0.2V 1206X107-6.3V: 0.2V 1210S107-6.3V: 0.2V</td></tr> </table>		0603	Cap<1μF: 1V	1μF≤Cap≤4.7μF: 0.5V 0603X106-10V: 0.5V	Cap>4.7μF: 0.2V	0805	Cap<10μF: 1V	Cap=10μF: 0.5V 0805B475/6.3V~25V: 0.5V	Cap>10μF: 0.2V	1206/1210	Cap≤10μF: 1V	10μF<Cap≤100μF: 0.5V	Cap>100μF: 0.2V 1206X107-6.3V: 0.2V 1210S107-6.3V: 0.2V		
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7.	Adhesive Strength of Termination	* Pressurizing force: 2N (0201) and 5N (≤0603) and 10N (>0603) * Test time: 10±1 sec.		* No remarkable damage or removal of the terminations.													

# SMD Multilayer Ceramic Capacitors **multicomp** PRO

No	Item	Test Condition	Requirements															
8.	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 hrs each in three mutually perpendicular directions.)</li> <li>* Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. *Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change and Q/D.F.: To meet initial spec.</li> </ul>															
9.	Solderability	<ul style="list-style-type: none"> <li>* Solder temperature: 235±5°C</li> <li>* Dipping time: 2±0.5 sec.</li> </ul>	<ul style="list-style-type: none"> <li>* 75% min. coverage of all metallized area.</li> </ul>															
10.	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 5 mm and then the pressure shall be maintained for 5±1 sec.</li> <li>* Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * 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: X7R: within ±12.5%</li> <li>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</li> </ul>															
11	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>* Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder.</li> <li>* Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</li> <li>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change: X7R: within ±7.5%</li> <li>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</li> <li>* 25% max. leaching on each edge.</li> </ul>															
12	Temperature Cycle	<ul style="list-style-type: none"> <li>* Conduct the five cycles according to the temperatures and time.</li> </ul> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>15±3</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>15±3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td></td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td></td> </tr> </table> <p>*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</p>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	15±3	2	Room temp.	15±3	3	Max. operating temp. +3/-0		4	Room temp.		<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change: X7R: within ±7.5%</li> <li>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</li> </ul>
Step	Temp. (°C)	Time (min.)																
1	Min. operating temp. +0/-3	15±3																
2	Room temp.	15±3																
3	Max. operating temp. +3/-0																	
4	Room temp.																	

# SMD Multilayer Ceramic Capacitors **multicomp** PRO

No	Item	Test Condition	Requirements																																											
13	Humidity (Damp Heat) Steady State	*Test temp.: 40±2°C *Humidity: 90~95%RH *Test time: 500+24/-0hrs. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change: X7R: $\geq 10V^{**}$ , within ±12.5%; $\leq 6.3V$ within ±25%; TT series & C ≥ 1μF, within ±25% **10V: 0603≥4.7μF; 0402≥1μF; 0201≥0.1μF, within ±25%; * Q/D.F. value: NP0: More than 30pF Q≥350, 10pF≤C<30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R, X5R, X6S, X7S: <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th>Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">≥ 100V</td> <td rowspan="4">≤3%</td> <td>≤6%      1206≥0.47μF</td> </tr> <tr> <td>≤7%      1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤7.5%      0603≥0.068μF; 0805&gt;0.1μF; 1206≥1μF; 1210≥2.2μF;</td> </tr> <tr> <td>≤20%      0805&gt;0.22μF; 1210≥3.3μF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤3%</td> <td>≤6%      0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤7%      1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤10%      0201≥0.01μF; 1210≥3.3μF</td> </tr> <tr> <td>≤20%      0402≥0.012μF; 0603&gt;0.1μF; 0805/X7R&gt;0.47μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="4">35V</td> <td rowspan="4">≤5%</td> <td>≤20%      0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10%      0201≥0.01μF(0201/X5R=0.01μF); 0805≥1μF; 1210≥Z 10μF*</td> </tr> <tr> <td>≤14%      0603≥0.33μF</td> </tr> <tr> <td>≤15%      0201≥0.1μF(0201/X5R&gt;0.01μF); 0603≥0.47μF; TTseries 0402≥0.10μF(0402/X7R≥0.056μF); 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF(1210/X5R≥10μF)*;</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤20%      0402≥0.33μF</td> </tr> <tr> <td>≤10%      0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤15%      0201≥0.01μF(0201/X7R≥0.022μF); 0402≥0.033μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤15%      0201≥0.012μF; 0402≥0.22μF (0402/X7R≥0.15μF); 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤7.5%</td> <td>≤15%      0201≥0.1μF; 0402≥1μF; 0603/X5R≥10μF; 01R5/X5R</td> </tr> <tr> <td>≤20%      0201≥0.1μF; 0402≥1μF; 0603/X5R≥10μF; 01R5/X5R</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30%      0201≥0.1μF; 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F.≤	Exception of D.F.≤	≥ 100V	≤3%	≤6%      1206≥0.47μF	≤7%      1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤7.5%      0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF;	≤20%      0805>0.22μF; 1210≥3.3μF	50V	≤3%	≤6%      0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤7%      1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤10%      0201≥0.01μF; 1210≥3.3μF	≤20%      0402≥0.012μF; 0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF; 1210≥10μF	35V	≤5%	≤20%      0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	≤10%      0201≥0.01μF(0201/X5R=0.01μF); 0805≥1μF; 1210≥Z 10μF*	≤14%      0603≥0.33μF	≤15%      0201≥0.1μF(0201/X5R>0.01μF); 0603≥0.47μF; TTseries 0402≥0.10μF(0402/X7R≥0.056μF); 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF(1210/X5R≥10μF)*;	25V	≤5%	≤20%      0402≥0.33μF	≤10%      0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF	≤15%      0201≥0.01μF(0201/X7R≥0.022μF); 0402≥0.033μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	≤15%      0201≥0.012μF; 0402≥0.22μF (0402/X7R≥0.15μF); 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF	10V	≤7.5%	≤15%      0201≥0.1μF; 0402≥1μF; 0603/X5R≥10μF; 01R5/X5R	≤20%      0201≥0.1μF; 0402≥1μF; 0603/X5R≥10μF; 01R5/X5R	6.3V	≤15%	≤30%      0201≥0.1μF; 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF	4V	≤20%	---	---	---	---	*I.R.: $\geq 10V$ , $1G\Omega$ or $50 \Omega\text{-}F$ whichever is smaller. Class II (X7R, X5R, X6S, X7S)		
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# SMD Multilayer Ceramic Capacitors **multicomp PRO**

No	Item	Test Condition	Requirements																																																																														
14.	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: 500+24/-0 hrs.</li> <li>*To apply voltage: Rated voltage (MAX. 500V)</li> <li>*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</li> <li>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change: X7R: ≥10V**, within ±12.5%; ≤6.3V within ±25%; TT series &amp; C≥1μF, within ±25%</li> <li>**10V: 0603≥4.7μF; 0402≥1μF; 0201≥0.1μF, within ±25%;</li> <li>* Q/D.F. value: NP0: More than 30pF Q≥350, 10pF≤C&lt;30pF, Q≥275+2.5C Less than 10pF Q≥200+10C</li> <li>X7R, X5R, X6S, X7S:</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">≥ 100V</td> <td rowspan="4">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7%</td> <td>1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF; 0805&gt;0.1μF; 1206≥1μF; 1210≥2.2μF;</td> </tr> <tr> <td>≤20%</td> <td>0805&gt;0.22μF; 1210≥3.3μF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤3%</td> <td>≤6%</td> <td>0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤7%</td> <td>1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01μF; 1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF; 0603&gt;0.1μF; 0805/X7R&gt;0.47μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="4">35V</td> <td rowspan="4">≤5%</td> <td>≤20%</td> <td>0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01μF(0201/X5R=0.01μF); 0805≥1μF; 1210≥Z 10μF*</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF(0201/X5R&gt;0.01μF); 0603≥0.47μF; TTseries 0402≥0.10μF(0402/X7R≥0.056μF); 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF(1210/X5R≥10μF)*;</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.01μF(0201/X7R≥0.022μF); 0402≥0.033μF; 0603&gt;0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤15%</td> <td>0201≥0.012μF; 0402≥0.22μF (0402/X7R≥0.15μF); 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0201≥0.1μF; 0402≥1μF; 0603/X5R≥10μF; 01R5/X5R</td> </tr> <tr> <td>10V</td> <td>≤7.5%</td> <td>≤15%</td> <td>0201≥0.012μF; 0402≥0.22μF (0402/X7R≥0.15μF); 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30%</td> <td>0201≥0.1μF; 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	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Class II (X7R, X5R, X6S, X7S)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="7" style="vertical-align: middle;">500MΩ or RxC≥5 Ω-F whichever is smaller</td> </tr> <tr> <td>50V: 0402&gt;0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>25V: 0201≥0.1μF; 0402≥0.22μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V ; 4V ; TT series; Size≥1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	500MΩ or RxC≥5 Ω-F whichever is smaller	50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	35V: 0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V: 0201≥0.1μF; 0402≥0.22μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF	16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF	10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF	6.3V ; 4V ; TT series; Size≥1812				
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**multicomp PRO**

# SMD Multilayer Ceramic Capacitors **multicomp PRO**

No	Item	Test Condition				Requirements																																																																				
15.	High Temperature Load (Endurance)	* Test temp.: NP0, X7R/X7E/X7S: $125 \pm 3^\circ\text{C}$ X6S: $105 \pm 3^\circ\text{C}$ X5R: $85 \pm 3^\circ\text{C}$ *Test time: 1000+24/-0 hrs. *To apply voltage: (1) 100% of rated voltage for below range. <table border="1"> <thead> <tr> <th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr> </thead> <tbody> <tr> <td rowspan="2">0603</td><td rowspan="2">X7R</td><td>4V</td><td><math>C \geq 22\mu\text{F}</math></td></tr> <tr><td>6.3V,10V</td><td><math>C \geq 4.7\mu\text{F} \#1</math></td></tr> <tr> <td rowspan="5">0805</td><td rowspan="3">X5R/X7R/ X6S/X7S</td><td>35V</td><td><math>C \geq 1.0\mu\text{F}</math></td></tr> <tr><td>4V</td><td><math>C \geq 47\mu\text{F}</math></td></tr> <tr><td>63V</td><td><math>C \geq 68\mu\text{F}</math></td></tr> <tr><td rowspan="2">X7R</td><td>10V,50V</td><td><math>C \geq 10\mu\text{F}</math></td></tr> <tr><td>16V,25V</td><td><math>C \geq 10\mu\text{F}</math></td></tr> <tr> <td>1206</td><td>X7R</td><td><math>\leq 6.3\text{V}</math></td><td><math>C \geq 47\mu\text{F}</math></td></tr> <tr> <td rowspan="2">1210</td><td rowspan="2">X7R</td><td>16V</td><td><math>C \geq 47\mu\text{F}</math></td></tr> <tr><td>100V</td><td><math>C \geq 3.3\mu\text{F}</math></td></tr> </tbody> </table> **1WV items must follow de-rating conditions. #1. 0603X106(10V)&0603S106(4V&6.3V):150% of rated voltage (2) 150% of rated voltage for below range. <table border="1"> <thead> <tr> <th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr> </thead> <tbody> <tr> <td rowspan="2">0603</td><td rowspan="2">X7R</td><td>50V</td><td><math>C &gt; 0.1\mu\text{F}</math></td></tr> <tr><td>25V</td><td><math>C \geq 1.0\mu\text{F}</math></td></tr> <tr> <td rowspan="5">0805</td><td rowspan="4">X5R/X7R/ X6S/X7S</td><td>10V,16V</td><td><math>C \geq 1.0\mu\text{F}</math></td></tr> <tr><td>100V</td><td><math>C \geq 0.47\mu\text{F}</math></td></tr> <tr><td>50V</td><td><math>C \geq 0.68\mu\text{F}</math></td></tr> <tr><td>35V</td><td><math>C \geq 2.2\mu\text{F}</math></td></tr> <tr><td rowspan="2">X7R</td><td>10V,25V</td><td><math>C \geq 4.7\mu\text{F}</math></td></tr> <tr><td>16V,25V</td><td><math>C \geq 10\mu\text{F}</math></td></tr> <tr> <td>1206</td><td>X7R</td><td>100V</td><td><math>C \geq 1\mu\text{F}</math></td></tr> <tr> <td rowspan="2">1210</td><td rowspan="2">X7R</td><td>50V</td><td><math>C \geq 2.2\mu\text{F}</math></td></tr> <tr><td>50V~100V</td><td><math>C \geq 2.2\mu\text{F}</math></td></tr> </tbody> </table> (3) $\leq 6.3\text{V}$ or $C \geq 10\mu\text{F}$ : 150% of rated voltage. (4) 10V~250V: 200% of rated voltage. (5) 400V~450V: 120% of rated voltage. (6) 500V: 150% of rated voltage. (7) 630V~3000V:120% of rated voltage, Excluding 1210/X7R/103/2KV(110% of rated voltage) & 1812N472&1812N562(1KV): 100% of rated voltage. (8) 4000V: 110% of rated voltage * Before initial measurement (Class II only): To apply de-aging at $150^\circ\text{C}$ for 1hr then set for $24 \pm 2$ hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at $150^\circ\text{C}$ for 1hr then set for $24 \pm 2$ hrs at room temp. ** De-rating conditions:	Size	Dielectric	Rated voltage	Capacitance	0603	X7R	4V	$C \geq 22\mu\text{F}$	6.3V,10V	$C \geq 4.7\mu\text{F} \#1$	0805	X5R/X7R/ X6S/X7S	35V	$C \geq 1.0\mu\text{F}$	4V	$C \geq 47\mu\text{F}$	63V	$C \geq 68\mu\text{F}$	X7R	10V,50V	$C \geq 10\mu\text{F}$	16V,25V	$C \geq 10\mu\text{F}$	1206	X7R	$\leq 6.3\text{V}$	$C \geq 47\mu\text{F}$	1210	X7R	16V	$C \geq 47\mu\text{F}$	100V	$C \geq 3.3\mu\text{F}$	Size	Dielectric	Rated voltage	Capacitance	0603	X7R	50V	$C > 0.1\mu\text{F}$	25V	$C \geq 1.0\mu\text{F}$	0805	X5R/X7R/ X6S/X7S	10V,16V	$C \geq 1.0\mu\text{F}$	100V	$C \geq 0.47\mu\text{F}$	50V	$C \geq 0.68\mu\text{F}$	35V	$C \geq 2.2\mu\text{F}$	X7R	10V,25V	$C \geq 4.7\mu\text{F}$	16V,25V	$C \geq 10\mu\text{F}$	1206	X7R	100V	$C \geq 1\mu\text{F}$	1210	X7R	50V	$C \geq 2.2\mu\text{F}$	50V~100V	$C \geq 2.2\mu\text{F}$	* No remarkable damage. * Cap change: X7R: $\geq 10\text{V}^{**}$ , within $\pm 12.5\%$ ; $\leq 6.3\text{V}$ within $\pm 25\%$ ; TT series & $C \geq 1\mu\text{F}$ , within $\pm 25\%$ **10V: 0603 $\geq 4.7\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$ ; 0201 $\geq 0.1\mu\text{F}$ , within $\pm 25\%$ ; * Q/D.F. value: NP0: More than $30\text{pF}$ $Q \geq 350$ , $10\text{pF} \leq C < 30\text{pF}$ , $Q \geq 275 + 2.5\text{C}$ Less than $10\text{pF}$ $Q \geq 200 + 10\text{C}$ X7R, X5R, X6S, X7S			
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<math>0805 \geq 1\mu\text{F}</math>; <math>1210 \geq Z10\mu\text{F}^*</math></td></tr> <tr><td><math>\leq 14\%</math></td><td><math>0603 \geq 0.33\mu\text{F}</math></td></tr> <tr><td><math>\leq 15\%</math></td><td><math>0201 \geq 0.1\mu\text{F}</math> (<math>0201/X5R &gt; 0.01\mu\text{F}</math>); <math>0603 \geq 0.47\mu\text{F}</math>; TT series <math>0402 \geq 0.10\mu\text{F}</math>; <math>0402/X7R \geq 0.056\mu\text{F}</math>; <math>0805 \geq 2.2\mu\text{F}</math>; <math>1206 \geq 4.7\mu\text{F}</math>; <math>1210 \geq 22\mu\text{F}</math> (<math>1210/X5R \geq 10\mu\text{F}</math>)<math>*</math></td></tr> <tr> <td rowspan="4">25V</td><td rowspan="4"><math>\leq 5\%</math></td><td><math>\leq 20\%</math></td><td><math>0402 \geq 0.33\mu\text{F}</math></td></tr> <tr><td><math>\leq 10\%</math></td><td><math>0603 \geq 0.15\mu\text{F}</math>; <math>0805 \geq 0.68\mu\text{F}</math>; <math>1206 \geq 2.2\mu\text{F}</math>; <math>1210 \geq 4.7\mu\text{F}</math></td></tr> <tr><td><math>\leq 15\%</math></td><td><math>0201 \geq 0.01\mu\text{F}</math> (<math>0201/X7R \geq 0.022\mu\text{F}</math>); 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Class II (X7R, X5R, X6S, X7S)							
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# SMD Multilayer Ceramic Capacitors **multicomp** PRO

No	Item	Test Condition	Requirements
			<p>**De-rating conditions:</p> <p>The graph plots the ratio of operating voltage to rated voltage (%) against temperature in degrees Celsius. Three curves are shown: a solid line for 125°C, a dashed line for 105°C, and a dotted line for 85°C. All curves show a slight decrease in ratio as temperature increases, with the 125°C curve being the highest and the 85°C curve being the lowest.</p>

## APPENDIXES

### Tape & reel dimensions

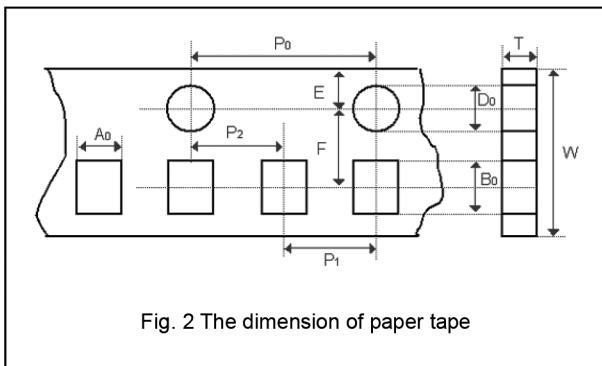


Fig. 2 The dimension of paper tape

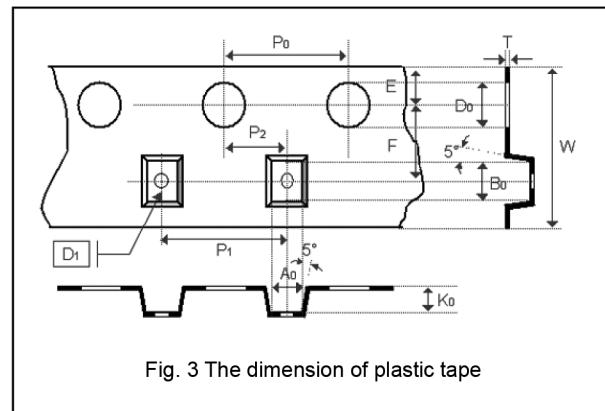
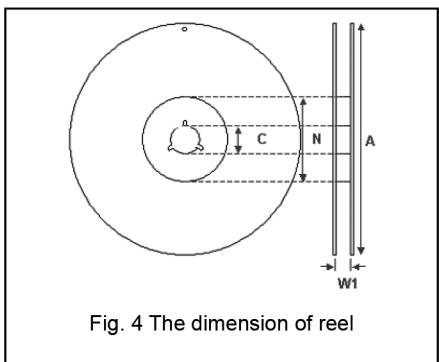


Fig. 3 The dimension of plastic tape

Size	0603	0805			1206			1210	
Thickness	S, X	A,H	B,T	D,I	B,T	C,J,D	G,P	C,D G,K	M
<b>A0</b>	1.05 +/-0.3	1.5 +/-0.2	1.5 +/-0.2	< 1.8	1.9 +/-0.5	< 2	<2.3	< 3.05	< 3.2
<b>B0</b>	1.8 +/-0.3	2.3 +/-0.2	2.3 +/-0.2	< 2.7	3.5 +/-0.5	< 3.7	< 4	< 3.8	<4
<b>T</b>	≤1.2	≤1.15	≤1.2	0.23 +/-0.1	≤1.2	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1
<b>K0</b>	-	-	-	< 2.5	-	< 2.5	< 2.5	< 2.5	< 3.2
<b>W</b>	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3
<b>P0</b>	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
<b>10xP0</b>	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2
<b>P1</b>	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
<b>P2</b>	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05
<b>D0</b>	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0
<b>D1</b>	-	-	-	1 +/-0.1	-	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1
<b>E</b>	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1
<b>F</b>	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05

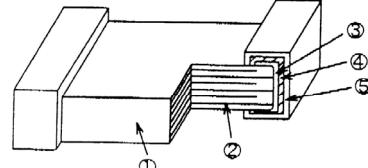
# SMD Multilayer Ceramic Capacitors **multicomp** PRO



Size	0603, 0805, 1206, 1210			1808 to 2225	
Reel size	7"	10"	13"	7"	13"
C	13 ±0.5	13 ±0.5	13 ±0.5	13 ±0.5	13 ±0.5
W <sub>1</sub>	10 ±1.5	10 ±1.5	10 ±1.5	12.4 +2/-0	12.4 +2/-0
A	178 ±2	250 ±2	330 ±2	178 ±2	330 ±2
N	60 +1/-0	50 min	50 min	60+1.0/-0	100 ±2

## Constructions

No.	Name	NP0	X7R
1	Ceramic material	CaZrO <sub>3</sub> based	BaTiO <sub>3</sub> based
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu + Ag Polymer
4		Middle layer	Ni
5		Outer layer	Sn



The construction of MLCC

## Application Notes

### Storage and handling conditions

- (1) To store products at 5°C to 40°C ambient temperature and 20% to 70% related humidity conditions; MSL Level 1.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

### Cautions:

- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition.  
To store products on the shelf and avoid exposure to moisture.

### Recommended soldering conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N<sub>2</sub> within oven are recommended.

# SMD Multilayer Ceramic Capacitors **multicomp** PRO

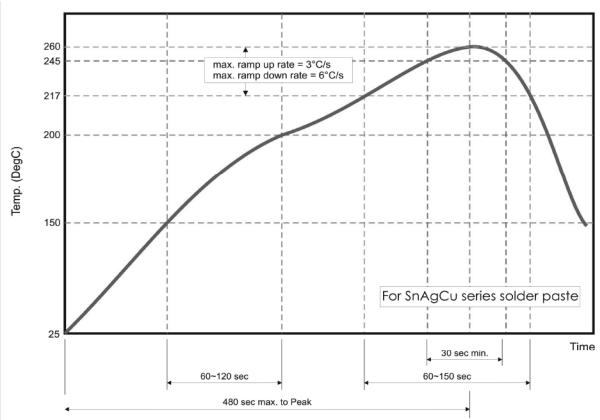


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

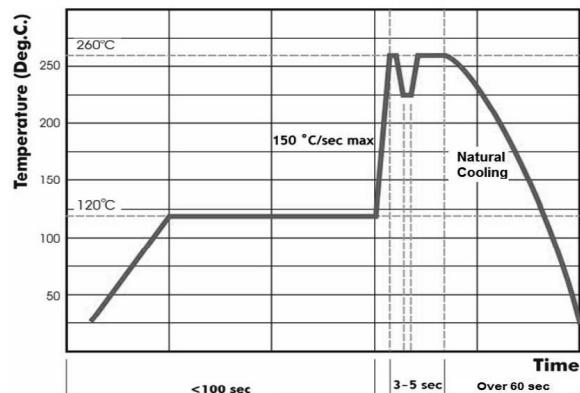


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

## Part Number Table

Description	Part Number
SMD Multilayer Ceramic Capacitors, Soft Termination, 0603, X7R, 1uF, 5%, 16V	MCSH18B105J160CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 0805, X7R, 1nF, 10%, 1KV	MCSH21B102K102CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 0805, X7R, 100nF, 5%, 50V	MCSH21B104J500CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 0805, X7R, 1uF, 10%, 16V	MCSH21B105K160CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 0805, X7R, 4.7uF, 10%, 16V	MCSH21B475K160CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 1206, X7R, 1nF, 10%, 2KV	MCSH31B102K202CT
SMD Multilayer Ceramic Capacitors, Soft Termination, 1210, X7R, 10uF, 10%, 25V	MCSH32B106K250CT

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