APPROVAL SHEET

MULTILAYER CERAMIC CAPACITORS

High Capacitance Series

0402 to 1812 Sizes

X7R, X5R & Y5V Dielectrics

CUSTOMER: _____

APPROVAL NO.: _____

ISSUE DATE: _____

APPROVED BY: Hank Chiang

CUSTOMER APPROVAL:

1. DESCRIPTION

MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used.

WTC high capacitance MLCC offers low ESR and excellent frequency characteristics to be suited for coupling and decoupling applications in circuit. The high dielectric constant material X7R, X5R and Y5V are used for this series product.

2. FEATURES

a. Small size with high capacitance.
b. Capacitor with lead-free termination (pure Tin).

3. APPLICATIONS

a. Digital circuit coupling or decoupling applications.
b. For high frequency and high-density type power suppliers.
c. For bypassing.

4. HOW TO ORDER

1206	F	106	Z	100	C	T
Size	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
Inch (mm) **0402** (1005) **0603** (1608) **0805** (2012) **1206** (3216) **1210** (3225) **1812** (4532)	**B**=X7R **X**=X5R **F**=Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 106=10x10^6 =10μF	**K**=±10% **M**=±20% **Z**=-20/+80%	Two significant digits followed by no. of zeros. And R is in place of decimal point. **6R3**=6.3 VDC **100**=10 VDC **160**=16 VDC **250**=25 VDC **500**=50 VDC	**C**=Cu/Ni/Sn	**T**=7" reeled **G**=13" reeled

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Remark	M_B (mm)
0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N		0.25 +0.05/-0.10
0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	S		0.40±0.15
	1.60+0.15/-0.10	0.80+0.15/-0.10	0.80+0.15/-0.10	X		
0805 (2012)	2.00±0.15	1.25±0.10	0.80±0.10	B		0.50±0.20
			1.25±0.10	D	#	
	2.00±0.20	1.25±0.20	1.25±0.20	I	#	
1206 (3216)	3.20±0.15	1.60±0.15	0.95±0.10	C	#	0.60±0.20
			1.25±0.10	D	#	
	3.20±0.20	1.60±0.20	1.60±0.20	G	#	
			1.15±0.15	J	#	
	3.20+0.30/-0.10	1.60+0.30/-0.10	1.60+0.30/-0.10	P	#	
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C	#	0.75±0.25
			1.25±0.10	D	#	
	3.20±0.40	2.50±0.30	1.60±0.20	G	#	
			2.00±0.20	K	#	
			2.50±0.30	M	#	
1812 (4532)	4.50±0.40	3.20±0.30	1.25±0.10	D	#	0.75±0.25
			2.00±0.20	K	#	
			2.50±0.30	M	#	

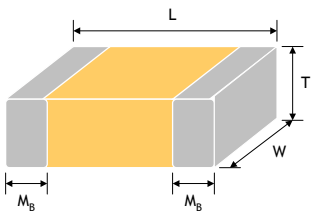

Fig. 1 The outline of MLCC

Reflow soldering only is recommended.

6. GENERAL ELECTRICAL DATA

Dielectric	X7R	X5R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1812		
Capacitance range*	100nF to 4.7μF	100nF to 22μF	150nF to100μF
Capacitance tolerance	K (±10%), M (±20%)		M (±20%), Z (-20/+80%)
Rated voltage (WVDC)	6.3V, 10V, 16V, 25V, 50V		
Tan δ*	Note 1		
Insulation resistance at Ur	RxC≥500ΩxF		
Operating temperature	-55 to +125°C	-55 to +85°C	-25 to +85°C
Capacitance characteristic	±15%		+30/-80%
Termination	Ni/Sn (lead-free termination)		

* Measured at 1.0±0.2Vrms, 1.0kHz±10% for C≤10μF; 0.5±0.2Vrms, 120Hz±20% for C>10μF, 30~70% related humidity, 25°C ambient temperature for X7R, X5R and at 20°C for Y5V.

* Note 1

Rated vol.	D.F.	Exception of D.F.	
≥50V	≤2.5%	≤3%	0603≥0.047μF; 0805≥0.18μF,1206≥0.47μF
25V	≤3.5%	≤5%	0805≥1μF; 1210≥10μF
		≤7%	0603≥0.33μF
		≤10%	0603≥0.68uF;0805≥4.7uF;1206≥6.8μF
16V	≤3.5%	≤5%	0402≥0.033μF; 0603≥0.15μF;0805≥0.68μF; 1206≥2.2μF;1210≥4.7uF
		≤10%	0603≥0.68uF;0805≥2.2uF;1206≥6.8uF; 1210≥22μF
10V	≤5.0%	≤10%	0603≥1μF; 0805≥2.2μF;1206≥6.8uF; 1210≥22μF
6.3V	≤10%	≤15.0%	0805≥10μF; 1210≥100μF

Y5V

Rated vol.	D.F.	Exception of D.F.	
≥50V	≤5.0%	≤7%	0603≥0.1uF
35V	≤7%	---	---
25V	≤5.0%	≤7%	0402≥0.047;0603≥0.1μF; 0805≥0.33μF; 1206≥1μF; 1210≥4.7μF
		≤9%	0402≥0.068μF;0603≥0.47μF ;1206≥4.7uF
16V (C<1.0μF)	≤7.0%	≤9%	0402≥0.068μF; 0603≥0.68μF
16V (C≥1.0μF)	≤9.0%	≤12.5%	0805≥4.7μF; 1206≥10μF; 1210≥22μF; 1812≥47μF
10V	≤12.5%	---	---
6.3V	≤20%	---	--

7. CAPACITANCE RANGE

7-1 X7R Dielectric

Dielectric		X7R																					
Size		0402		0603				0805			1206					1210				1812			
Rated Voltage (VDC)		6.3	10	10	16	25	50	10	16	25	6.3	10	16	25	50	10	16	25	50	10	16	25	50
	0.10μF (104)	N	N	S	S	S	X																
	0.15μF (154)			S	S																		
	0.22μF (224)			S	S																		
	0.33μF (334)			X																			
	0.47μF (474)			X																			
	0.68μF (684)			X																			
	1.0μF (105)			X				D	D	D		J	J	J	P	D	D	D	D	D	D	D	K
	1.5μF (155)										J	J	J										
	2.2μF (225)										J	J	J	P									
	3.3μF (335)											P											
	4.7μF (475)										P	P	P										
	6.8uF(685)																						
	10uF(106)																						

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

7-2 X5R Dielectric

Dielectric		X5R													
Size		0402			0603			0805			1206			1210	
Rated Voltage (VDC)		6.3	10	16	6.3	10	16	6.3	10	16	6.3	10	16	10	16
Capacitance	0.027μF (273)			N											
	0.033μF (333)			N											
	0.039μF (393)			N											
	0.047μF (473)			N											
	0.056μF (563)		N												
	0.068μF (683)		N												
	0.082μF (823)		N												
	0.10μF (104)		N	N											
	0.15μF (154)														
	0.22μF (224)	N													
	0.33μF (334)					X	X								
	0.47μF (474)					X	X								
	0.68μF (684)					X	X								
	1.0μF (105)				X	X	X								
	1.5μF (155)				X			I	I			J	J	K	K
	2.2μF (225)				X			I	I	I		J	J	K	K
	4.7μF (475)							I	I	I	P	P	P	K	K
	10μF (106)							I			P	P	P	K	K
	22uF(226)										P				

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

7-3 Y5V Dielectric

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

		Y5V																						
Size		0402		0603			0805				1206					1210						1812			
Rated Voltage (VDC)		6.3	10	6.3	10	16	10	16	25	50	10	16	25	35	50	6.3	10	16	25	35	50	10	16	25	50
Capacitance	0.15μF (154)		N																						
	0.22μF (224)	N	N																						
	0.33μF (334)	N	N																						
	0.47μF (474)	N	N																						
	0.68μF (684)	N																							
	1.0μF (105)	N			S	X	B	B	D	D	C	C	C		C		C	C	C		C	D	D	D	D
	1.5μF (155)				S		D	D			C	C	C				C	C	C			D	D	D	D
	2.2μF (225)				S		D	D			C	C	C				C	C	C			D	D	D	D
	3.3μF (335)			X			D	D			D	D	D				C	C	C			D	D	D	D
	4.7μF (475)			X			D	D			D	D	D	J			C	C	D			D	D	D	D
	6.8μF (685)						I				D	D					C	C	D			D	D	D	D
	10μF (106)						I				J	J					D	D	G	K		D	D	D	
	22μF (226)										P						K	K							
	47μF (476)																K						M		
	100μF (107)															M									

8. PACKAGING STYLE AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0402 (1005)	0.50±0.05	N	10k	50k	-	-
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80+0.15/-0.10	X	4k	15k	-	-
0805 (2012)	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1..25±0.20	I	-	-	3k	10k
1206 (3216)	0.95±0.10	C	-	-	3k	10k
	1.15±0.15	J	-	-	3K	10K
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	1.60+0.30/-0.10	P	-	-	2k	-
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.00±0.20	K	-	-	1k	-
	2.50±0.30	M	-	-	1k	-
1812 (4532)	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-
	2.50±0.30	M	-	-	0.5k	-

Unit: pieces

9. ELECTRICAL CHARACTERISTICS

◙ Typical Impedance/ESR vs. Frequency

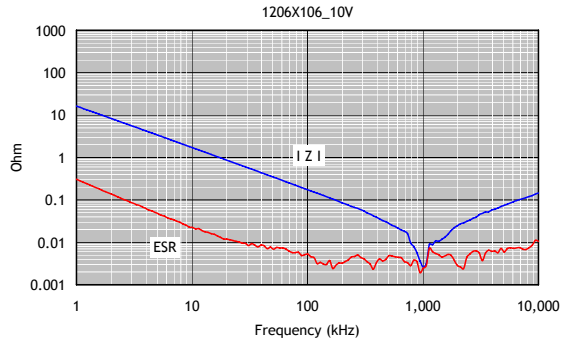

Fig. 2 ESR and IZI vs. frequency (1206X106_10V)

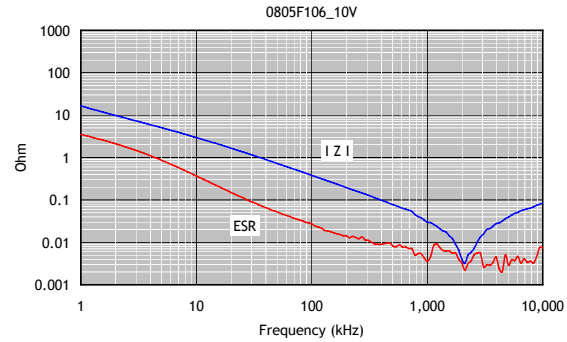

Fig. 3 ESR and IZI vs. frequency (0805F106_10V)

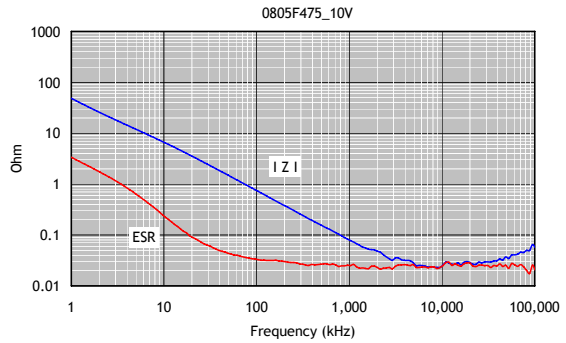

Fig. 4 ESR and IZI vs. frequency (0805F475_10V)

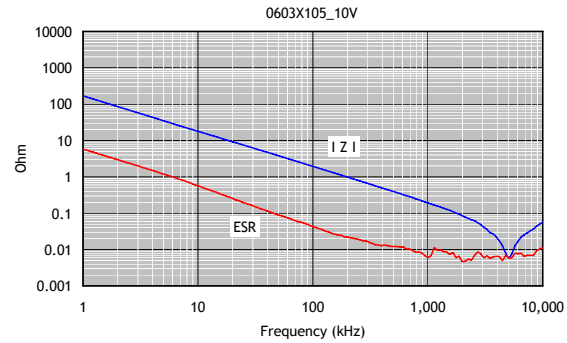

Fig. 5 ESR and IZI vs. frequency (0603X105_10V)

10. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Mechanical</td><td>---</td><td>* No remarkable defect.
* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td>Cap≤10μF, 1.0±0.2Vrms, 1kHz±10%</td><td>* Shall not exceed the limits given in the detailed spec.</td></tr>
<tr><td>3.</td><td>Q/ D.F. (Dissipation Factor)</td><td>Cap>10μF, 0.5±0.2Vrms, 120Hz±20%</td><td>X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
<tr><td>≥50V</td><td>≤2.5%</td><td>≤3%</td><td>0603≥0.047μF; 0805≥0.18μF, 1206≥0.47μF</td></tr>
<tr><td rowspan="3">25V</td><td rowspan="3">≤3.5%</td><td>≤5%</td><td>0805≥1μF; 1210≥10μF</td></tr>
<tr><td>≤7%</td><td>0603≥0.33μF</td></tr>
<tr><td>≤10%</td><td>0603≥0.68uF;0805≥4.7uF;1206≥6.8μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≤3.5%</td><td>≤5%</td><td>0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7uF</td></tr>
<tr><td>≤10%</td><td>0603≥0.68uF;0805≥2.2uF; 1206≥6.8uF;1210≥22μF</td></tr>
<tr><td>10V</td><td>≤5.0%</td><td>≤10%</td><td>0603≥1μF; 0805≥2.2μF; 1206≥6.8uF; 1210≥22μF</td></tr>
<tr><td>6.3V</td><td>≤10%</td><td>≤15.0%</td><td>0603≥10uF;0805≥10μF; 1210≥100μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
<tr><td>≥50V</td><td>≤5.0%</td><td>≤7%</td><td>0603≥0.1μF</td></tr>
<tr><td>35V</td><td>≤7%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≤5.0%</td><td>≤7%</td><td>0603≥0.1μF; 0805≥0.33μF; 1206≥1μF; 1210≥4.7μF</td></tr>
<tr><td>≤9%</td><td>0402≥0.068μF;0603≥0.47uF; 1206≥4.7μF</td></tr>
<tr><td>16V (C<1.0μF)</td><td>≤7.0%</td><td>≤9%</td><td>0402≥0.068μF;0603≥0.68μF</td></tr>
<tr><td>16V (C≥1.0μF)</td><td>≤9.0%</td><td>≤12.5%</td><td>0805≥4.7μF; 1206≥10μF;1210≥22μF; 1812≥47μF</td></tr>
<tr><td>10V</td><td>≤12.5%</td><td>---</td><td>---</td></tr>
<tr><td>6.3V</td><td>≤20%</td><td>---</td><td>--</td></tr>
</table></td></tr>
<tr><td>4.</td><td>Dielectric Strength</td><td>* To apply voltage (≤50V) 250%.
* Duration: 1 to 5 sec.
* Charge and discharge current less than 50mA.</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>To apply rated voltage for max. 120 sec.</td><td>≥10GΩ or RxC≥500Ω-F whichever is smaller.
Class II (X5R, X6S, X7R, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>10V:0603>0.47μF;0805>2.2μF;1206>4.7μF</td><td rowspan="2">≧ 100 Ω-F</td></tr>
<tr><td>6.3V</td></tr>
</table></td></tr>
<tr><td>6.
7.</td><td>Temperature Coefficient
Adhesive Strength of Termination</td><td>With no electrical load.
<table>
<tr><th>T.C.</th><th>Operating Temp</th></tr>
<tr><td>X7R</td><td>-55~125°C at 25°C</td></tr>
<tr><td>X5R</td><td>-55~85°C at 25°C</td></tr>
<tr><td>Y5V</td><td>-25~85°C at 20°C</td></tr>
</table>
* Pressurizing force：
5N (≤0603) and 10N (>0603)
* Test time: 10±1 sec.</td><td>
<table>
<tr><th>T.C.</th><th>Capacitance Change</th></tr>
<tr><td>X7R</td><td>Within ±15%</td></tr>
<tr><td>X5R</td><td>Within ±15%</td></tr>
<tr><td>Y5V</td><td>Within +30%/-80%</td></tr>
</table>
* No remarkable damage or removal of the terminations.</td></tr>
<tr><td>8.</td><td>Vibration Resistance</td><td>* Vibration frequency: 10~55 Hz/min.
* Total amplitude: 1.5mm
* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)</td><td>* No remarkable damage.
* Cap change and Q/D.F.: To meet initial spec.</td></tr>
<tr><td>9.</td><td>Solderability</td><td>* Solder temperature: 235±5°C
* Dipping time: 2±0.5 sec.</td><td>95% min. coverage of all metalized area.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>10.</td><td>Bending Test</td><td>* 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.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change：
X7R, X5R: within ±12.5%
Y5V: within ±30%
(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</td></tr>
<tr><td>11.</td><td>Resistance to Soldering Heat</td><td>* Solder temperature: 270±5°C
* Dipping time: 10±1 sec
* Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder.
* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change:
X7R, X5R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.
* 25% max. leaching on each edge.</td></tr>
<tr><td>12.</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<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>30±3</td></tr>
<tr><td>2</td><td>Room temp.</td><td>2~3</td></tr>
<tr><td>3</td><td>Max. operating temp. +3/-0</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temp.</td><td>2~3</td></tr>
</table>
* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change：
X7R, X5R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
<tr><td>13.</td><td>Humidity (Damp Heat) Steady State</td><td>* Test temp.: 40±2°C
* Humidity: 90~95% RH
* Test time: 500+24/-0hrs.
* Measurement to be made after keeping at room temp. for 48 ±4 hrs.</td><td>* No remarkable damage.
* Cap change:
X7R, X5R: ≥10V, within ±12.5%; 6.3V, within ±25%
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
* Q/D.F. value:
X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
<tr><td>≥50V</td><td>≤3.0%</td><td>≤6.0%</td><td>0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td></tr>
<tr><td>25V</td><td>≤5.0%</td><td>≤10.0%</td><td>0805≥1μF; 1210≥10μF;</td></tr>
<tr><td></td><td></td><td>≤14.0%</td><td>0603≥0.33uF;1206≥10μF</td></tr>
<tr><td>16V</td><td>≤5.0%</td><td>≤10.0%</td><td>0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td></tr>
<tr><td></td><td></td><td>≤15.0%</td><td>1210≥22μF</td></tr>
<tr><td>10V</td><td>≤7.5%</td><td>≤15.0%</td><td>0402≥0.056μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td></tr>
<tr><td>6.3V</td><td>≤15.0%</td><td>≤30.0%</td><td>0603≥10μ;0805≥10μF; 1210≥100μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
<tr><td>≥50V</td><td>≤7.5%</td><td>---</td><td>---</td></tr>
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<tr><td>25V</td><td>≤7.5%</td><td>≤10.0%</td><td>0402≥0.047uF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF; 1210≥4.7μF</td></tr>
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<tr><td>16V (C<1.0μF)</td><td>≤10.0%</td><td>≤12.5%</td><td>0402≥0.068μF; 0603≥0.68μF</td></tr>
<tr><td>16V (C≥1.0μF)</td><td>≤12.5%</td><td>≤20%</td><td>0805≥4.7μF; 1206≥10μF; 1210≥22μF; 1812≥47μF</td></tr>
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<tr><td>6.3V</td><td>≤30%</td><td>---</td><td>---</td></tr>
</table>
* I.R.: ≥10V, ≥1GΩ or RxC≥50Ω-F whichever is smaller.
6.3V, RxC≥10Ω-F</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>14.</td><td>Humidity
(Damp Heat)
Load</td><td>* Test temp.: 40±2°C
* Humidity: 90~95%RH
* Test time: 500+24/-0 hrs.
* To apply voltage : rated voltage.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change:
X7R, X5R: ≥10V, within ±12.5%; 6.3V, within ±25%
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
* Q/D.F. value:
X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
<tr><td>≥50V</td><td>≤3.0%</td><td>≤6.0%</td><td>0603≥0.047μF; 0805≥0.18μF;
1206≥0.47μF</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≤5.0%</td><td>≤10.0%</td><td>0805≥1μF; 1210≥10μF;</td></tr>
<tr><td>≤14.0%</td><td>0603≥0.33μF;1206≥10μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≤5.0%</td><td>≤10.0%</td><td>0402≥0.033μF; 0603≥0.15μF;
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<tr><td>≤15.0%</td><td>1210≥22uF</td></tr>
<tr><td>10V</td><td>≤7.5%</td><td>≤15.0%</td><td>0402≥0.056μF; 0603≥0.33μF;0805≥2.2μF;
1206≥2.2μF; 1210≥22μF</td></tr>
<tr><td>6.3V</td><td>≤15.0%</td><td>≤30.0%</td><td>0603≥10μF ;0805≥10μF;1210≥100μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
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<tr><td>6.3V</td><td>≤30%</td><td>---</td><td>---</td></tr>
</table>
* I.R.: ≥10V, ≥500MΩ or RxC≥25Ω-F whichever is smaller.
6.3V, RxC≥5Ω-F</td></tr>
<tr><td>15.</td><td>High
Temperature
Load
(Endurance)</td><td>* Test temp.:
X7R: 125±3°C
X5R, Y5V: 85±3°C
* To apply voltage: 200% of rated voltage.
* Test time: 1000+24/-0 hrs.
* Measurement to be made after keeping at room temp. for 48±4 hrs.</td><td>* No remarkable damage.
* Cap change:
X7R, X5R: ≥10V, within ±12.5%; 6.3V, within ±25%
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
* Q/D.F. value:
X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.</th><th colspan="2">Exception of D.F.</th></tr>
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</table>

APPENDIXES

◙ Tape & reel dimensions

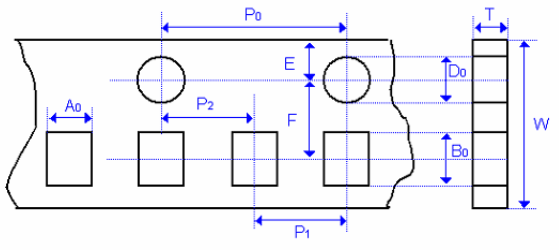


Fig. 6 The dimension of paper tape

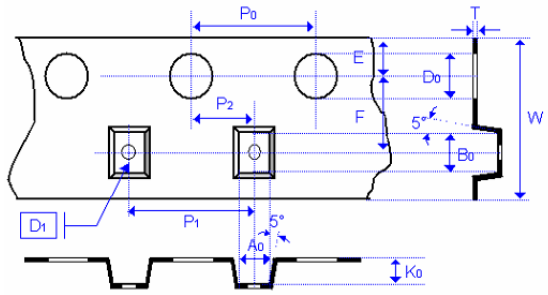


Fig. 7 The dimension of plastic tape

Size	0402	0603	0805			1206			1210			1812	
Thickness	N	S, X	A	B	C, D, I	B	C, J, D	G,P	C, D	G, K	M	D, K	M
A_0	0.62±0.05	1.02±0.05	1.50±0.10	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<2.97	<3.81	<3.81
B_0	1.12±0.05	1.82±0.05	2.30±0.10	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<3.73	<5.30	<5.30
T	0.60±0.05	0.95±0.05	0.75±0.05	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05	0.25±0.05
K_0	-	-	-	-	<2.50	-	<2.50	<2.50	<2.50	<2.50	<3.00	<2.50	<3.00
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.0±0.20	12.0±0.20
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10
P_1	2.00±0.05	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05
D_1	-	-	-	-	1.00±0.10	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.50±0.10	1.50±0.10
E	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05

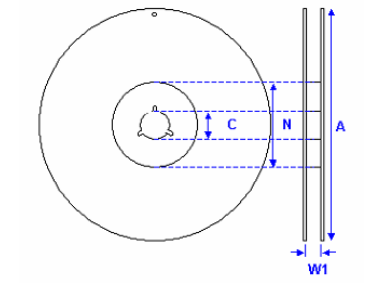
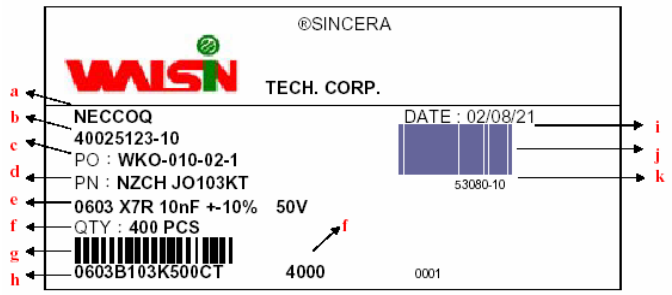


Fig. 8 The dimension of reel

Size	0402, 0603, 0805, 1206, 1210			1812
Reel size	7”	10”	13”	7”
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W_1	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
A	178.0±0.10	250.0±1.0	330.0±1.0	178.0±0.10
N	60.5±1.0	100.0±1.0	100±1.0	60.5±1.0

◙ Description of customer label



a. Customer name
b. WTC order series and item number
c. Customer P/O
d. Customer P/N
e. Description of product
f. Quantity
g. Bar code including quantity & WTC P/N or customer
h. WTC P/N
i. Shipping date
j. Order bar code including series and item numbers
k. Serial number of label

◙ Constructions

No.	Name		X7R, X5R, Y5V
①	Ceramic material		$BaTiO_3$ based
②	Inner electrode		Ni
③	Termination	Inner layer	Cu
④		Middle layer	Ni
⑤		Outer layer	Sn (Matt)

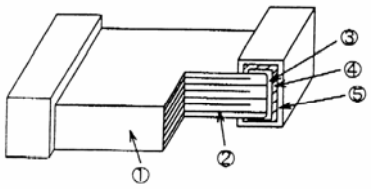


Fig. 9 The construction of MLCC

◙ Storage and handling conditions

(1) To store products at 5 to 40°C ambient temperature and 20 to 70%. related humidity conditions.
(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. Don't store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
b. To store products on the shelf and avoid exposure to moisture.
c. Don't expose products to excessive shock, vibration, direct sunlight and so on.

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_2 within oven are recommended.

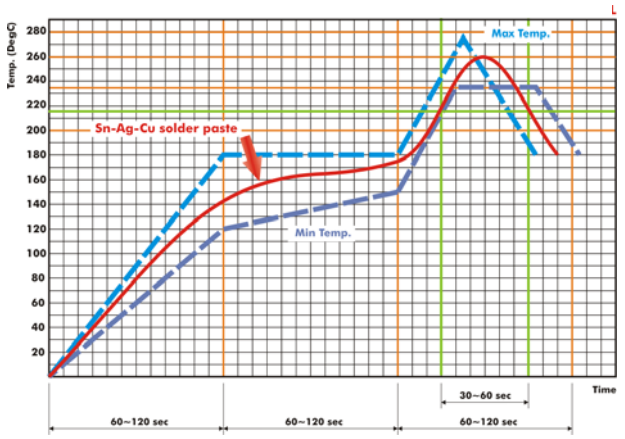


Fig. 10 IR reflow soldering profile for SMT process with SnAgCu series solder paste.

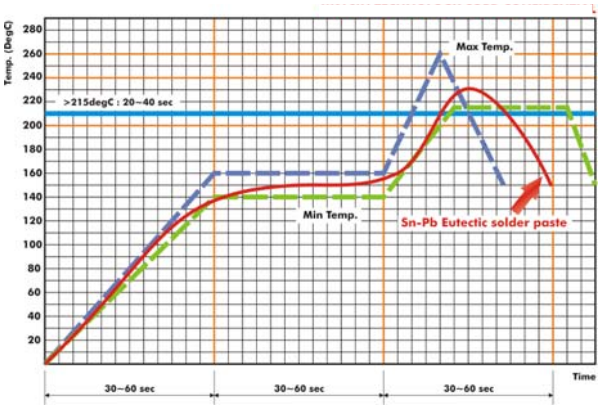


Fig. 11 IR reflow soldering profile for SMT process with eutectic SnPb solder paste.