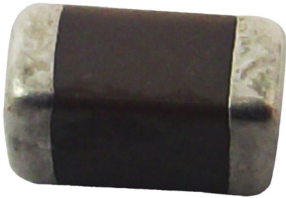


Low Profile Multilayer SMD Ceramic Capacitor
0402 to 1210 Sizes, X7R, X5R & Y5V Dielectrics (MCTT Series)



**RoHS
Compliant**



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 TT series MLCC is used in product having thickness concerned generally have high capacitance and thinner product thickness. The high dielectric constant material X7R, X5R and Y5V are used for this series product.

Features:

- Standard size with thin thickness.
- Small size with high capacitance.
- Capacitor with lead-free termination (pure Tin).

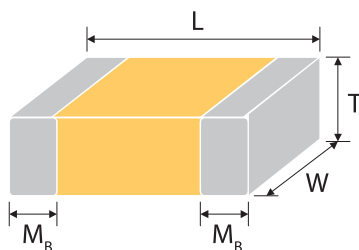
Applications:

- For LCD panels.
- For PCMCIA cards.
- For IC packaging and modules.
- Any thickness concerned products.

How To Order:

MCTT	31	X	225	K	100	C	T
Series	Size	Dielectric	Capacitance	Tolerance	Rated Voltage	Termination	Packaging style
Multicomp TT = Low profile	15=0402 (1005) 18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225)	B=X7R X=X5R F=Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point. Eg.: 225 = 22×10^5 =2,200,000pF =2.2μF	K=±10% M=±20% Z=-20/+80%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 6R3=6.3V DC 100=10V DC 160=16V DC 250=25V DC 500=50V DC	C=Cu/Ni/Sn	T=7" reel (paper tape) P=7" reel (plastic tape)

External Dimensions:



The outline of MLCC

Size Inch (mm)	L (mm)	W (mm)	T max (mm)/Symbol		M _B (mm)
0402 (1005)	1 ±0.05	0.5 ±0.05	0.33	L	0.25 ±0.1
0603 (1608)	1.6+0.15/-0.1	0.8+0.15/-0.1	0.6	H	0.4 ±0.15
0805 (2012)	2 ±0.2	1.25 ±0.2	0.95	T	0.5 ±0.2
1206 (3216)	3.2 ±0.2	1.6 ±0.2	0.95	T	0.6 ±0.2
			1.3	J	
1210 (3225)	3.2 ±0.3	2.5 ±0.2	0.95	T	0.75 ±0.25

Reflow soldering process only is recommended



General Electrical Data:

Dielectric	X7R	X5R	Y5V
Size	0402, 0603, 0805, 1206, 1210		
Capacitance range*	1 μ F to 10 μ F	0.22 μ F to 22 μ F	1 μ F to 10 μ F
Capacitance tolerance**	K (\pm 10%), M (\pm 20%)		Z (-20/+80%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V	6.3V, 10V, 16V, 25V	10V, 16V, 25V, 50V
Operating temperature	-55 to +125°C	-55 to +85°C	-25 to +85°C
Capacitance characteristic	\pm 15%		+30/-80%
Termination	Ni/Sn (lead-free termination)		

* Measured at 1.0 \pm 0.2Vrms, 1.0kHz \pm 10%, 30~70% related humidity, 25°C ambient temperature for X7R, X5R and at 20°C for Y5V.

** 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.

Packaging Dimension And Quantity:

Size	Thickness Max (mm)/Symbol		7" reel	
			Paper tape	Plastic tape
0402 (1005)	0.33	L	15k	-
0603 (1608)	0.60	H	4k	-
0805 (2012)	0.95	T	4k	-
1206 (3216)	0.95	T	4k	-
	1.30	J	-	3k
1210 (3225)	0.95	T	-	3k

Unit : pieces

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		Shall not exceed the limits given in the detailed spec.								
3	Q/ D.F. (Dissipation Factor)	Cap \leq 10 μ F, 1.0 \pm 0.2Vrms, 1kHz \pm 10% Cap $>$ 10 μ F, 0.5 \pm 0.2Vrms, 120Hz \pm 20%** ** Test condition: 0.5 \pm 0.2Vrms, 1KHz \pm 10% TT18X \geq 475(10V) , TT15X series	X7R/X5R:								
			<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.</th> </tr> </thead> <tbody> <tr> <td>50V, 25V, 16V, 10V</td> <td>\leq10%</td> </tr> <tr> <td>6.3V</td> <td>\leq15%</td> </tr> </tbody> </table>	Rated vol.	D.F.	50V, 25V, 16V, 10V	\leq 10%	6.3V	\leq 15%		
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Low Profile Multilayer SMD Ceramic Capacitor
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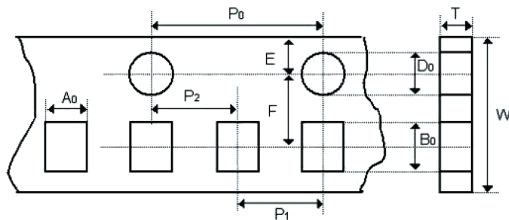
No	Item	Test Condition	Requirements																
4	Dielectric Strength	To apply voltage: 250% rated voltage. Duration: 1 to 5 sec. Charge and discharge current less than 50mA.	No evidence of damage or flash over during test.																
5	Insulation Resistance	To apply rated voltage for max. 120sec.	≥10GΩ or RxC≥100Ω-F whichever is smaller.																
6	Temperature Coefficient	With no electrical load. <table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NP0</td> <td>55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>55~125°C at 25°C</td> </tr> <tr> <td>Y5V</td> <td>25~85°C at 20°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	NP0	55~125°C at 25°C	X7R	55~125°C at 25°C	Y5V	25~85°C at 20°C	<table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <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> </tbody> </table>	T.C.	Capacitance Change	X7R	Within ±15%	X5R	Within ±15%	Y5V	Within +30%/-80%
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7.	Adhesive Strength of Termination	Pressurizing force: 5N (≤0603) and 10N (>0603) Test time: 10±1 sec.	No remarkable damage or removal of the terminations.																
8	Vibration Resistance	Vibration frequency: 10~55 Hz/min. Total amplitude: 1.5mm Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.) Measurement to be made after keeping at room temp. for 24±2 hrs.	No remarkable damage. Cap change and Q/D.F.: To meet initial spec.																
9	Solderability	Solder temperature: 235±5°C Dipping time: 2±0.5 sec.	95% min. coverage of all metalized area																
10	Bending Test	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1mm per second until the deflection becomes : 5mm and then the pressure shall be maintained for 5±1 sec. Measurement to be made after keeping at room temp. for 24±2 hrs.	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.)																
11	Resistance to Soldering Heat	Solder temperature: 260±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 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 24±2 hrs.	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.																

No	Item	Test Condition	Requirements																
12	Temperature Cycle	<p>Conduct the five cycles according to the temperatures and time.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	<p>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.</p>	
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3	Max. operating temp. +3/-0	30±3																	
4	Room temp.	2~3																	
13	Humidity (Damp Heat) Steady State	<p>Test temp.: 40±2°C Humidity: 90~95% RH Test time: 500+24/-0hrs. Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	<p>No remarkable damage. Cap change: X7R/X5R: within ±25% Y5V: within ±30%; 6.3V, within +30/-40% Q/D.F. value: X7R/X5R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.</th> </tr> </thead> <tbody> <tr> <td>25V, 16V</td> <td>≤15%</td> </tr> <tr> <td>10V</td> <td>≤20%</td> </tr> <tr> <td>50V, 6.3V</td> <td>≤30%</td> </tr> </tbody> </table> <p>Y5V:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.</th> </tr> </thead> <tbody> <tr> <td>50V</td> <td>≤10%</td> </tr> <tr> <td>25V</td> <td>≤15%</td> </tr> <tr> <td>16V, 10V</td> <td>≤20%</td> </tr> </tbody> </table> <p>I.R.: 1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</p>	Rated vol.	D.F.	25V, 16V	≤15%	10V	≤20%	50V, 6.3V	≤30%	Rated vol.	D.F.	50V	≤10%	25V	≤15%	16V, 10V	≤20%
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14	Humidity (Damp Heat) Load	<p>Test temp.: 40±2°C Humidity: 90~95%RH Test time: 500+24/-0 hrs. To apply voltage : rated voltage Before initial measurement (Class II only): To apply test voltage for 1hr at 40°C and then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	<p>No remarkable damage. Cap change: X7R/X5R: within ±25% Y5V: within ±30%; 6.3V, within +30/-40% Q/D.F. value: X7R/X5R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.</th> </tr> </thead> <tbody> <tr> <td>25V, 16V</td> <td>≤15%</td> </tr> <tr> <td>50V, 10V</td> <td>≤20%</td> </tr> <tr> <td>6.3V</td> <td>≤30%</td> </tr> </tbody> </table> <p>Y5V:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.</th> </tr> </thead> <tbody> <tr> <td>50V</td> <td>≤10%</td> </tr> <tr> <td>25V</td> <td>≤15%</td> </tr> <tr> <td>16V, 10V</td> <td>≤20%</td> </tr> </tbody> </table> <p>I.R.: 500MΩ or RxC ≥ 5 Ω-F whichever is smaller.</p>	Rated vol.	D.F.	25V, 16V	≤15%	50V, 10V	≤20%	6.3V	≤30%	Rated vol.	D.F.	50V	≤10%	25V	≤15%	16V, 10V	≤20%
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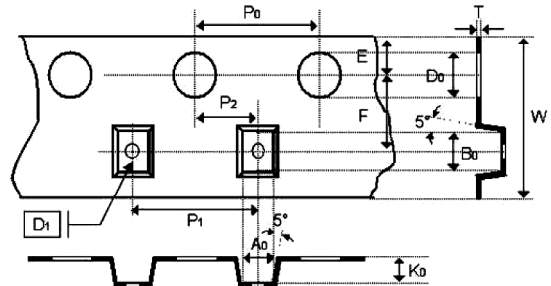
No	Item	Test Condition	Requirements																														
15	High Temperature Load (Endurance)	Test temp.: NP0, X7R/X7E: 125±3°C X5R, Y5V: 85±3°C Test time: 1000+24/-0 hrs. To apply voltage: 150% of rated voltage. 100% of rated voltage for below range.	No remarkable damage. Cap change: X7R/X5R: within ±25% Y5V: within ±30%; 6.3V, within +30/-40% Q/D.F. value: X7R/X5R:																														
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Appendixes

Tape & Reel Dimensions



The dimension of paper tape



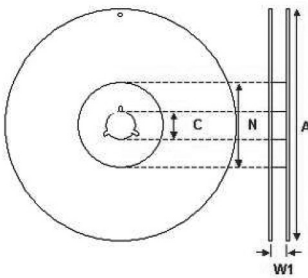
The dimension of plastic tape

Size	0402	0603	0805	1206		1210
Thickness	L	H	T	T	J	T
A ₀	0.62±0.05	1.1 ±0.1	1.5 ±0.10	2 ±0.1	<1.85	<2.97
B ₀	1.12±0.05	1.9 ±0.1	2.3 ±0.10	3.5 ±0.1	<3.46	<3.73
T	0.42±0.05	0.6 ±0.05	0.95 ±0.05	0.95 ±0.05	0.23±0.05	0.23±0.05
K ₀	-		-	-	<2.5	<2.50
W	8±0.1	8 ±0.1	8 ±0.10	8 ±0.1	8±0.1	8±0.1
P ₀	4 ±0.1	4 ±0.1	4 ±0.10	4 ±0.1	4±0.1	4±0.1
10xP ₀	40 ±0.1	40 ±0.1	40 ±0.10	40 ±0.1	40±0.1	40±0.1
P ₁	2 ±0.05	2 ±0.05	4 ±0.10	4±0.1	4±0.1	4±0.1
P ₂	2 ±0.05	2 ±0.05	2 ±0.05	2±0.05	2±0.05	2±0.05
D ₀	1.55 ±0.05	1.55 ±0.05	1.55 ±0.05	1.5±0.05	1.5±0.05	1.5±0.05

Low Profile Multilayer SMD Ceramic Capacitor
0402 to 1210 Sizes, X7R, X5R & Y5V Dielectrics (MCTT Series)



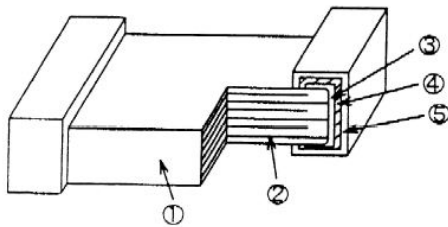
Size	0402	0603	0805	1206		1210
Thickness	L	H	T	T	J	T
D ₁	-		-	-	1±0.1	1±0.1
E	1.75 ±0.05	1.75 ±0.05	1.75 ±0.05	1.75±0.1	1.75±0.1	1.75±0.1
F	3.5 ±0.05	3.5 ±0.05	3.5 ±0.05	3.5±0.05	3.5±0.05	3.5±0.05



The dimension of reel

Size	0402, 0603, 0805, 1206, 1210		
Reel size	7"	10"	13"
C	13 +0.5/-0.2	13 +0.5/-0.2	13 +0.5/-0.2
W1	8.4 +1.5/-0	8.4+1.5/-0	8.4 +1.5/-0
A	178 ±0.10	250 ±1	330 ±1
N	60 +1/-0	100 ±1	100 ±1

Constructions:



No.	Name	NP0*	NPO, X7R, 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)

Storage and handling conditions

- (1) To store products at 5°C 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.

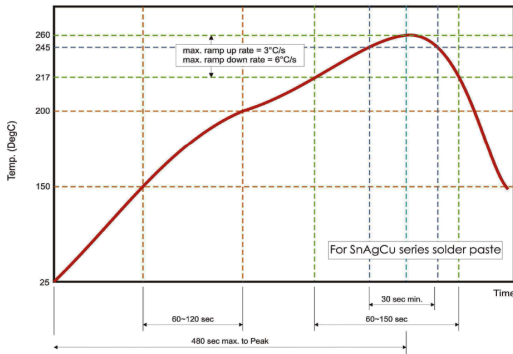
Cautions:

- a. 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.

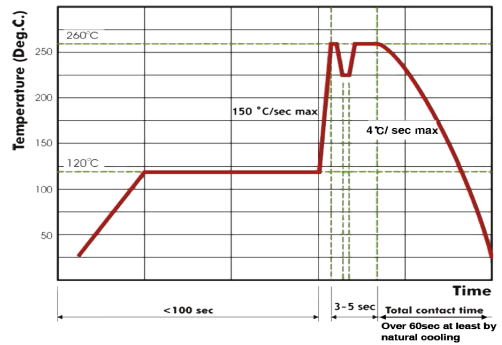


Recommended Soldering Conditions:

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 N₂ within oven are recommended.



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



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

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