



Description:

RoHS Compliant

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. MLCC is made by NP0, X7R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

Features:

- A wide selection of sizes is available (0402 to 1812)
- · High capacitance in given case size
- Capacitor with lead-free termination (pure Tin)

Applications:

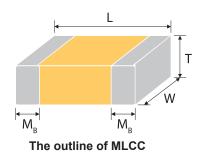
- · For general digital circuit
- · For power supply bypass capacitors
- · For consumer electronics
- · For telecommunication

How To Order:

МС	U	0805	С	102	J	С	Т
<u>MC</u>	Rated voltage	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Termination</u>	Packaging style
Multi- comp	Two significant digits followed by no. of zeros. And R is in place of decimal point. K=6.3V N=10V B=16V T=25V U=50V A=100V	Inch (mm) 0402 (1005) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225) 1812 (4532)	C=NP0 (C0G) R=X7R F=Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 102=10×10² =1,000pF	B = ±0.1pF C = ±0.25pF D = ±0.5pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20% Z = -20/+80%	C=Cu/Ni/Sn L=Ag/Ni/Sn (for partial NP0 items)	T =7" reeled G = 13" reeled

Partial NP0 items are with Ag/Ni/Sn terminations, please ref to below product range of NPO dielectric for detail.

External Dimensions:



Size Inch (mm)	L (mm)	W (mm)	T (mm)/Syml	ool	Remark	Мв (mm)	
0402 (1005)	1 ±0.05	0.5 ±0.05	0.5 ±0.05	N	#	0.25 +0.05/-0.1	
	1.6 ±0.1	0.8 ±0.1	0.8 ±0.07	S	-		
0603 (1608)	1.6 0.8 +0.15/-0.1 +0.15/-0.1		0.8 +0.15/-0.1	х	-	0.4 ±0.15	
			0.6 ±0.1	Α	-		
0805 (2012)	2 ±0.15	1.25 ±0.1	0.8 ±0.1	В	-	0.5 ±0.2	
0003 (2012)			1.25 ±0.1	D	#	0.5 ±0.2	
	2 ±0.2	1.25 ±0.2	1.25 ±0.2		#		





Size Inch (mm)	L (mm)	W (mm)	T (mm)/Syml	T (mm)/Symbol Remark		
			0.8 ±0.1	В	-	
			0.95 ±0.1	С	-	
	3.2 ±0.15	1.6 ±0.15	1.15 ±0.15	J	#	
1206 (3216)			1.25 ±0.1	D	#	0.6 ±0.2
			1.6 ±0.2	G	#	
	3.2 1.6 +0.3/-0.1 +0.3/0.1		1.6 +0.3/-0.1	Р	#	
	3.2 ±0.3	2.5 ±0.2	0.95 ±0.1	С	#	
	3.2 ±0.3	2.5 ±0.2	1.25 ±0.1	D	#	
1210 (3225)			1.6 ±0.2	G	#	0.75 ±0.25
	3.2 ±0.4	2.5 ±0.3	2 ±0.2	K	#	
			2.5 ±0.3	М	#	
1812 (4532)	4.5 ±0.4	3.2 ±0.3	1.25 ±0.1	25 ±0.1 D		0.75 ±0.25
1012 (4002)	4.5 ±0.4	3.2 ±0.3	2 ±0.2	K	#	0.75 ±0.25

[#] Reflow soldering only is recommended.

General Electrical Data:

Dielectric	NP0	X7R	Y5V			
Size	Size 0402, 0603, 0805, 1206, 1210, 1812					
Capacitance*	0.5pF to 0.1μF	100pF to 0.82μF	10nF to 0.68μF			
Capacitance tolerance**	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF <cap<10pf: (±0.25pf),="" (±0.5pf)="" (±1%),="" (±10%)<="" (±2%),="" (±5%),="" c="" cap≥10pf:="" d="" f="" g="" j="" k="" th=""><th>J (±5%), K (±10%), M (±20%)</th><th>M (±20%), Z (-20/+80%)</th></cap<10pf:>	J (±5%), K (±10%), M (±20%)	M (±20%), Z (-20/+80%)			
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16	V, 25V, 50V, 100V			
DF (Tan δ)*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1,000	Note 1				
Operating temperature	-55°C to +125°C		-25 to +85°C			
Capacitance change	±30ppm	±15%	+30/-80%			
Termination	Ni/Sn (lead-free termination)					

^{*} Measured at the condition of 30~70% related humidity.

NP0: Apply 1 ±0.2Vrms, 1MHz ±10% for Cap≤1,000pF and 1 ±0.2Vrms, 1kHz ±10% for Cap>1,000pF, 25°C at ambient temperature

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20°C ambient temperature.

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





Note 1:

X7R/X5R/X6S

Rated vol.	D.F.≦		Exception of D.F. ≦						
≥100V	≦2.5%	≦3%	1206≧0.47µF						
≥1000	≧2.5%	≦5%	805>0.1µF, 0603≧0.068µF						
		≦3%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF						
≧50V	≦2.5%	≦5%	I210≧4.7μF						
		≦10%	0402≧0.1μF; 0603≧1μF; 0805≧1μF;1206≧4.7μF; 1210≧10μF TT series						
35V	≦3.5%	≦10%	0603≧1μF; 0805≥2.2μF; 1210≧10μF						
		≦5%	0201≧0.01μF;0805≧1μF; 1210≧10μF						
25V	<2 F0/	<2 E0/	<2 E0/	<2 F0/	<2.50/	<2.50/	≦3.5%	≦7%	0603≧0.33μF; 1206≧4.7μF
250	≧3.5%	≦10%	0402≧0.10μF;0603≧0.47μF; 0805≧2.2μF; 1206≧6.8μF ; 1210≧22μF; TT series						
		≦12.5%	0402≧1µF						
16V	≤3.5%	≦5%	0201≧0.01μF; 0402≧0.033μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF						
100	≧3.5%	≦10%	0201≧0.1μF; 0402≧0.47μF; 0603≧0.68μF;0805≧2.2μF; 1206≧4.7μF; 1210≧22μF; TT series						
10V	≤5%	≦10%	0201≧0.012μF 0402≧0.33μF; 0603≧0.33μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧22μF; TT series						
100	≧5%	≦15%	0201≧0.1μF; 0402≧1μF						
6.3V	≦10%	≦15%	0201 \ge 0.1µF;0402 \ge 1µF;0603 \ge 10µF; 0805 \ge 4.7µF; 1206 \ge 47µF :1210 \ge 100µF; TT series						
0.57	≥10%	≦20%	0402≧2.2μF						
4V	≦15%	-	-						

Y5V

Rated vol.	D.F.≦		Exception of D.F. ≦
≧50V	5%	7%	0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF
35V	7%	-	-
25V	5%	7%	0402≥0.047μF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF; 1210≥4.7μF
250	3%	9%	0402≥0.068μF; 0603≥0.47μF; 1206≥4.7μF; 1210≥22μF
16V	7%	9%	0402≧0.068μF; 0603≧0.68μF
(C<1µF)	1 70	12.5%	0402≧0.22μF
16V (C≧1.0µF)	9%	12.5%	0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF; 1812≧47μF
10V	12.5%	20%	0402≧0.47μF
6.3V	20%	-	-

Page <3>





Packaging Dimension And Quantity:

0:	Thickness (mm)/Symbol -		Раре	er tape	Plastic tape		
Size			7" reel	13" reel	7" reel	13" reel	
0402 (1005)	0.5 ±0.05	N	10k	50k	-	-	
0603 (4608)	0.8 ±0.07	S	4k	15k	-	-	
0603 (1608)	0.8 +0.15/-0.1	Х	4k	15k	-	-	
	0.6 ±0.1	Α	4k	15k	-	-	
0905 (2012)	0.8 ±0.1	В	4k	15k	-	-	
0805 (2012)	1.25 ±0.1	D	-	-	3k	10k	
	1.25 ±0.2 l -		-	3k	10k		
	0.8 ±0.1	В	4k	15k	-	-	
	0.95 ±0.1	С	-	-	3k	10k	
4000 (0040)	1.15 ±0.15	J	-	-	3k	10k	
1206 (3216)	1.25 ±0.1	D	-	-	3k	10k	
	1.6 ±0.2	G	-	-	2k	10k	
	1.6 +0.3/-0.1	Р	-	-	2k	9k	
	0.95 ±0.1	С	-	-	3k	10k	
	1.25 ±0.1	D	-	-	3k	10k	
1210 (3225)	1.6 ±0.2	G	-	-	2k	-	
	2 ±0.2	К	-	-	1k	6k	
İ	2.5 ±0.3	М	-	-	1k	6k	
4040 (4500)	1.25 ±0.1	D	-	-	1k	5k	
1812 (4532)	2 ±0.2	К	-	-	1k	-	

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.		

Page <4>



No	Item	Test Condition				R	equirements	
2	Capacitance		*Shall not exceed the limits given in the detailed spec.					
			NP0: Cap≥30pF, Q≥1000; Cap<30pF,Q≥400+20C X7R,X5R,X6S:					
			Rated vol.	D.F.≦	≦		Exception of D.F. ≦	
			~ 400)/	-0.50	,	≦3%	1206≧0.47µF	
			≧100V	≦2.5%	% <u> </u>	≦5%	0805>0.1μF, 0603≧0.068μF	
						≦3%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF	
			 ≥50V	 ≦2.5%	_% [≦5%	1210≧4.7µF	
			=500	=2.07		≦10%	0402≥0.1μF; 0603≥1μF; 0805≥1μF;1206≥4.7μF; 1210≥10μF TT series	
			35V	≦3.5°	%	≦10%	0603≧1μF; 0805≥2.2μF; 1210≧10μF	
						≦5%	0201≧0.01μF;0805≧1μF; 1210≧10μF	
		Class I: NP0				≦7%	0603≧0.33μF; 1206≧4.7μF	
		Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10%	25V	≦3.5%		≦10%	0402≧0.10μF;0603≧0.47μF;0805≧2.2 μF; 1206≧6.8μF ; 1210≧22μF; TT series	
		Class II: X7R, X5R, X6S,Y5V Cap≤10µF, 1.0±0.2Vrms, 1kHz±10% ** Cap>10µF, 0.5±0.2Vrms, 120Hz±20%			≦	≦12.5%	0402≧1μF	
						≦5%	0201≧0.01μF; 0402≧0.033μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF	
	0/05	** Test condition: 0.5±0.2Vrms,	16V	≦3.5%		≦10%	0201≧0.1μF; 0402≧0.47μF; 0603≧0.68μF;0805≧2.2μF; 1206≧4.7μF; 1210≧22μF; TT series	
	Q/ D.F. (Dissipation Factor)	1KHz±10% X7R: 0603≧225(10V), 0805=106(6.3V&10V)	X7R: 0603≧225(10V),	10V	≦5%		≦10%	0201≥0.012μF 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF; TT series
		X5R: 01R5≧103, 0201≧224				≦15%	0201≧0.1μF; 0402≧1μF	
		(6.3V,10V), 0402≧475 (6.3V), 0402≧225(10V), 0603=106 (6.3V,10V),	6.3V	≦10%		≦15%	0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF; 1206≧47μF :1210≧100μF; TT series	
		TT18X ≧475(10V) , TT15X series			\perp	≦20%	0402≧2.2µF	
		X6S:0201≧224 (6.3V),0402≧225 (6.3V),	4V	≦15%	%	-	-	
		(6.6.7),	Y5V:					
			Rated vol.	D.	.F.≦		Exception of D.F. ≦	
			≧50V	' E	5%	7%	0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF	
			35V	7	7%	-	-	
			25V		5%	7%	0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF;1206≧1μF; 1210≧4.7μF	
					J 70	9%	0402≥0.068μF; 0603≥0.47μF; 1206≥4.7μF; 1210≥22μF	
			16V		7%	9%	0402≧0.068μF; 0603≧0.68μF	
			(C<1µF	-) '	, /0	12.5%	0402≧0.22μF	
			16V (C≧1.0µ	ıF)	9%	12.5%	0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF; 1812≧47μF	
			10V	12	2.5%	20%	0402≧0.47μF	
			6.3V	2	20%	-	-	

Page <5>





No	Item	Test Condition	Requirements				
4	Dielectric Strength	To apply voltage (≤100V) 250%. Duration: 1 to 5 sec. Charge and discharge current less than 50mA.	No evidence of damage or flash over during test.				
			10GΩ or RxC≧500Ω-F whichever is smaller. Class II (X7R, X5R, X6S, Y5V)				
			Rated voltage	Insulation Resistance			
			100V: X7R				
			50V:0603≥1µF;0805≥1µF;1206≥4.7µF; 1210≥4.7µF				
			35V:0805≥2.2μF;1210≧10μF	1,000			
5	Insulation	To apply rated voltage for max. 120	25V:0402≥1µF;0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF	10GΩ or RxC≧100ΩF whichever is			
	Resistance	sec.	16V:0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF	smaller.			
			10V:0201≥47nF;0402≥0.47µF;0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF;1210≥47µF				
			6.3V; 4V	-			
			50V: 0402≥0.1µF	10GΩ or			
			35V:0603≥1µF	RxC≥50 Ω-F			
			10V:0603≥10µF	whichever is			
			4V:0603≥22μF; 0805≥47μF	smaller.			
		With no electrical load.					
		T.C. Operating Temp	T.C. Capacitance Change				
		NPO -55~125°C at 25°C	NPO Within ±30ppm/°C				
6	Temperature	X7R -55~125°C at 25°C	X7R Within ±15%				
	Coefficient	X5R -55~ 85°C at 25°C	X5R Within ±15%				
		X6S -55~105°C at 25°C	X6S Within ±22%				
		Y5V -25~ 85°C at 20°C	Y5V Within +30%/-80%				
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.				

Page <6>



No	Item	Test Condition	Requirements
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 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec. Measurement be made after keeping at room ter for 24±2 hrs.	NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S: within ±12.5% Y5V: within ±30% (This capacitance change means the change of capacitance
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 athen set for 24±2 hrs at room temp. Measurement to be made after keep at room temp. for 24±2 hrs.	X7R, X5R, X6S: within ±7.5% Y5V: within ±20% Q/D.F., I.R. and dielectric strength: To meet initial requirements.
12	Temperature Cycle	Conduct the five cycles according to the temperatures and time. Step Temp. (°C) Time (minum) 1 Min. operating temp. +0/-3 30: 2 Room temp. 2- 3 Max. operating temp. +3/-0 30: 4 Room temp. 2- Before initial measurement (Class II only): Perform 150+0/-10°C for 1 has 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: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S: within ±7.5% Y5V: within ±20% Q/D.F., I.R. and dielectric strength: To meet initial requirements.



No	Item	Test Condition	Requirements						
				No remarkable damage. Cap change: NP0: within $\pm 5\%$ or 0.5pF whichever is larger X7R, X5R, X6S: $\geq 10V^{**}$, within $\pm 12.5\%$; $\leq 6.3V$ within $\pm 25\%$; TT series & C ≥ 1 uF, within $\pm 25\%$ **10V: $0603 \geq 4.7 \mu$ F; $0402 \geq 1 \mu$ F; $0201 \geq 0.1 \mu$ F, within $\pm 25\%$; Y5V: $\geq 10V$, within $\pm 30\%$; $\leq 6.3V$, within $\pm 30/-40\%$ Q/D.F. value: NP0: More than 30 pF Q ≥ 350 , 10 pF $\leq C\leq 30$ pF, Q $\geq 275+2.5C$ Less than 10 pF Q $\geq 200+10C$ X7R, X5R, X6S:					
			Rated vol.	D.F.≦		Exception of D.F. ≦			
					≦6%	1206≧0.47μF			
			≧100V	≦3%	≦7.5%	0805>0.1μF, 0603≧0.068μF			
				≦3%	≦6%	0201(50V); 0603≥0.047μF; 0805≥0.18μF;1206≥0.47μF			
			 ≥50V		≦10%	1210≧4.7µF			
13	Humidity (Damp Heat)				≦20%	0402≧0.1μF; 0603≧1μF; 0805≧1μF;1206≧4.7μF; 1210≧10μF TT series			
	Steady State		35V	≦5%	≦20%	0603≧1μF; 0805≥2.2μF; 1210≧10μF			
					≦10%	0201≧0.01μF;0805≧1μF; 1210≧10μF			
					≦14%	0603≧0.33μF; 1206≧4.7μF			
			25V	5V ≦5%	≦15%	0402≧0.10μF;0603≧0.47μF;0805≧2.2 μF; 1206≧6.8μF ; 1210≧22μF; TT series			
					≦20%	0402≧1µF			
					≦10%	0201≥0.01μF; 0402≥0.033μF; 0805≥0.68μF;1206≥2.2μF;1210≥4.7μF			
			16V	≦5%	≦15%	0201≥0.1μF; 0402≥0.47μF; 0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; TT series			
			10V	≦7.5%	≦15%	0201≥0.012μF 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF			
					≦20%	0201≧0.1μF; 0402≧1μF TT series			
			6.3V	≦15%	≦30%	0201≧0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF; 1206≥47μF :1210≥100μF; TT series			
			4V	≦20%	-	-			



No	Item	Test Condition	Requirements						
			Y5V:						
			Rated vol.	D.F.≦		Exception of D.F. ≦			
			≧50V	7.5%	10%	0603≧0.1µF; 080	05≧0.47μF; 1206≧4.7μF		
			35V	10%	-	-			
			25V	5)/	10%	0402≧0.047µF;0 0805≧0.33µF;12	603≧0.1μF; 06≧1μF; 1210≧4.7μF		
			250	7.5%	15%	0402≧0.068µF; 0 1206≧4.7µF; 121			
			16V	1 10%		0402≧0.068µF; 0603≧0.68µF			
			(C<1μF) 10% 20% 0402≧0.22μF						
					20%		05≧3.3μF; 1206≧10μF; 2≧47μF		
			10V	20%	30%	0402≧0.47µF			
			6.3V	30%	-	-			
13			*I.R.: ≥10V Class II (X			2-F whichever is smaller. 5, Y5V)			
			I Rated voltage				Insulation Resistance		
		100V: X7R							
			50V: 0402≥ 1206≥4.7µ			F;0805≥1µF;			
			35V: 0603≥1µF; 0805≥2.2	305≥2.2µ	uF;1210≧10μF				
			25V:0402≥ 1206≥10µF			F;0805≥2.2μF;	1GΩ or RxC≧10 Ω-F		
			16V:0402≥ 1206≥10µF			ıF;0805≥2.2μF;	whichever is smaller.		
			10V:0201≥ μF;0805≥2		102≥0.47	7μF;0603≥0.47			
			1206≥4.7µ	F;1210≥	:47μF				
			6.3V ; 4V						
14	Humidity (Damp Heat) Load	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	No remarkable damage. Cap change: NP0: $\pm 7.5\%$ or $0.75pF$ whichever is larger. X7R, X5R, X6S: $\geq 10V^{**}$,within $\pm 12.5\%$; $\leq 6.3V$ within $\pm 25\%$ TT series & C $\geq 1uF$,within $\pm 25\%$ **10V: $0603 \geq 4.7\mu F$; $0402 \geq 1\mu F$; $0201 \geq 0.1\mu F$, within $\pm 25\%$; Y5V: $\geq 10V$, within $\pm 30\%$; $\leq 6.3V$, within $\pm 30/-40\%$ Q/D.F. value: NP0: C $\geq 30pF$,Q ≥ 200 ;C $< 30pF$, Q $\geq 100+10/3$ C						





No	Item	Test Condition				R	Requirements				
			X7R, X5R, X6S:								
			Rated vol.	D.F	.≦		Exception of D.F. ≦				
						≦6%	1206≧0.47µF				
			≧100V	≦3		≦7.5%	0805>0.1μF, 0603≧0.068μF				
						≦6%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF				
			 ≧50V	 ≦3	3%	≦10%	1210≧4.7µF				
						≦20%	0402≥0.1μF; 0603≥1μF; 0805≥1μF;1206≥4.7μF; 1210≥10μF TT series				
			35V	≦5	5%	≦20%	0603≧1μF; 0805≥2.2μF; 1210≧10μF				
						≦10%	0201≧0.01μF;0805≧1μF; 1210≧10μF				
						≦14%	0603≧0.33μF; 1206≧4.7μF				
			25V	≦5		≦15%	0402≧0.10μF;0603≧0.47μF;0805≧2.2 μF; 1206≧6.8μF ; 1210≧22μF; TT series				
						≦20%	0402≧1µF				
						≦10%	0201≧0.01μF; 0402≧0.033μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF				
	l lumai alituu		16V	≦5	- 1	≦15%	0201≧0.1μF; 0402≧0.47μF; 0603≧0.68μF;0805≧2.2μF; 1206≧4.7μF; 1210≧22μF; TT series				
14	Humidity (Damp Heat) Load		10V	≦7.		≦15%	0201≧0.012μF 0402≧0.33μF; 0603≧0.33μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧22μF; TT series				
						≦20%	0201≧0.1μF; 0402≧1μF				
			6.3V	≦15	5%	≦30%	0201 \ge 0.1 μ F;0402 \ge 1 μ F;0603 \ge 10 μ F; 0805 \ge 4.7 μ F; 1206 \ge 47 μ F :1210 \ge 100 μ F; TT series				
			4V	≦20	0%	-	-				
			Y5V:	5V [.]							
			Rated vol.	·	D.F. ≦		Exception of D.F. ≦				
			≧50V		7.5%	10%	0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF				
			35V		10%	-	-				
			25V		7.5%	10%	0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF;1206≧1μF; 1210≧4.7μF				
			257	\perp	70	15%	0402≧0.068μF; 0603≧0.47μF; 1206≧4.7μF; 1210≧22μF				
			16V	T	10%	12.5%	0402≧0.068µF; 0603≧0.68µF				
			(C<1µF	-)	10 /0	20%	0402≧0.22μF				
			16V (C≧1.0µ	ıF)	12.5%	20%	0603≥2.2μF; 0805≥3.3μF; 1206≥10μF; 1210≥22μF; 1812≥47μF				
			10V		20%	30%	0402≧0.47μF				
			6.3V		30%	-	-				





No	Item	Test Condition	Requirements				
			*I.R.: ≥10V, 500MΩ or 25 Ω-F whicheve Class II (X7R, X5R, X6S, Y5V)	r is smaller.			
			Rated voltage	Insulation Resistance			
			100V: X7R				
			50V: 0402≥0.1μF;0603≥1μF;0805≥1μF; 1206≥4.7μF;1210≥4.7μF				
١.	Humidity		35V: 0603≥1µF; 0805≥2.2µF;1210≥10µF				
14	(Damp Heat) Load		25V:0402≥1µF;0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF	1GΩ or RxC≧10 Ω-F			
			16V:0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF	whichever is smaller.			
			10V:0201≥47nF;0402≥0.47µF;0603≥0.47 µF;0805≥2.2µF;				
			1206≥4.7μF;1210≥47μF				
			6.3V ; 4V				
15.	High Temperature Load (Endurance)	*Test temp.: NP0, X7R/X7E: 125±3°C X6S: 105±3°C X5R, Y5V: 85±3°C *Test time: 1000+24/-0 hrs. *To apply voltage: 1) ≦% of rated voltage. 2) 10V≦Ur<500V: 200% of rated voltage. 3) 500V: 150% of rated voltage. 4) Ur≧630V: 120% of rated voltage.	No remarkable damage. Cap change: NP0: $\pm 3.0\%$ or ± 0.3 pF whichever is larger X7R, X5R, X6S: $\geq 10V^{**}$,within $\pm 12.5\%$; $\leq 6.3V$ within $\pm 25\%$; TT series & C ≥ 1 uF,within $\pm 25\%$ **10V: $0603 \geq 4.7$ µF; $0402 \geq 1$ µF; $0201 \geq 0.1$ µF, within $\pm 25\%$; Y5V: $\geq 10V$, within $\pm 30\%$; $\leq 6.3V$, within $\pm 30/-40\%$ Q/D.F. value: NP0: More than 30pF, Q ≥ 350 10 pF \leq C ≤ 30 pF, Q $\geq 275+2.5$ C Less than 10 pF, Q $\geq 200+10$ C				



		5) 1009 rang Size 0201 0402	Dielectric X5R/X7R/ X6S X5R/X7R/ X6S X5R/X7R/	Rated voltage 6.3V,10V 6.3V,10V	Capacitance range C≧0.1μF C≥1.0μF		X7R, X5 Rated vol. ≧100V	R, X6S D.F. ≦ ≤3%	≦6% ≦7.5%	Exception of D.F. ≦ 1206≥0.47μF 0805>0.1μF, 0603≥0.068μF
		Size 0201 0402	Dielectric X5R/X7R/ X6S X5R/X7R/ X6S X5R/X7R/	Rated voltage 6.3V,10V 6.3V,10V	Capacitance range C≧0.1μF		vol.		-	
		Size 0201 0402	Dielectric X5R/X7R/ X6S X5R/X7R/ X6S X5R/X7R/	Rated voltage 6.3V,10V 6.3V,10V	Capacitance range C≧0.1μF		≧100V	≦3%	-	0805>0.1μF, 0603≧0.068μF
		0201	X5R/X7R/ X6S X5R/X7R/ X6S X5R/X7R/	voltage 6.3V,10V 6.3V,10V	tance range C≧0.1µF		≦100V	≧370	≦7.5%	1 /
		0201	X5R/X7R/ X6S X5R/X7R/ X6S X5R/X7R/	voltage 6.3V,10V 6.3V,10V	range C≧0.1μF					0204/50//): 0602 > 0.047::5:
		0402	X6S X5R/X7R/ X6S X5R/X7R/	6.3V,10V	<u> </u>	Ш			≦6%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF
			X5R/X7R/ X6S X5R/X7R/		C≧1.0µF	Ш	≧50V	≦3%	≦10%	1210≧4.7µF
		0603		///	'				≦20%	0402≥0.1μF; 0603≥1μF; 0805≥1μF;1206≥4.7μF; 1210≥10μF TT series
		0603		L 4 V	C≧22µF		35V	≦5%	≦20%	0603≧1μF; 0805≥2.2μF; 1210≧10μF
			l X6S	6.3V,10V	C≧4.7µF				≦10%	0201≧0.01μF;0805≧1μF; 1210≧10μF
				35V	C≧1.0µF				≦14%	0603≧0.33μF; 1206≧4.7μF
		0805	X5R/X7R/ X6S	4V 6.3V	C≧47µF		25V	≦5%	≦15%	0402≧0.10μF;0603≧0.47μF;0805≧2.2 μF; 1206≧6.8μF ; 1210≧22μF; TT series
			X5R/X7R/	6.3V	C≧22µF C≧47µF	Ш		Ī	≦20%	0402≧1µF
		1206	NP0	3,000V	C≧47μF C≧1.5pF				≦10%	0201≧0.01μF; 0402≧0.033μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF
	High	TT18	Y5V Y5V	6.3V,10 6.3V	C≧2.2μF C≧10μF		16V	≦5%	≦15%	0201≥0.1μF; 0402≥0.47μF; 0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; TT series
15	Temperature Load	. ,	(6) 150% of rated voltage for		C≧22μF or below		10V	≦7.5%	≦15%	0201≥0.012μF 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF; TT series
'	(Endurance)	ran	ge.						≦20%	0201≧0.1μF; 0402≧1μF
		Size	Dielectric	Rated voltage	Capaci- tance range		6.3V	≦15%	≦30%	0201≧0.1µF;0402≧1µF;0603≧10µF; 0805≧4.7µF; 1206≧47µF :1210≧100µF; TT series
		0201	X5R/X7R/ X6S	16V	C≧0.1µF		4V	≦20%	-	-
			X5R/X7R/	50V	C≧0.1µF		Y5V:			
		0402	X6S	10V~25V	C≧0.22µF		Rated vol.	D.F.≦		Exception of D.F. ≦
			Y5V	16V	C≧0.47µF		≧50V	7.5%	10%	0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF
		0603	X5R/X7R/ X6S	10V,50V	C≧1.0µF		35V	10%	-	-
			Y5V	16V	C≧2.2µF				10%	0402≥0.047μF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF; 1210≥4.7μF
			X5R/X7R/ X6S	10~50V	C≧4.7µF		25V	7.5%	15%	0402≧0.068µF; 0603≧0.47µF; 1206≧4.7µF; 1210≧22µF
		0805	X7R	50V	C≧2.2µF		16V		12.5%	0402≧0.068µF; 0603≧0.68µF
		[100V	C≧0.47µF		(C<1µF) 10%	20%	0402≧0.22µF
		2220	Y5V X7R	16V 100V	C≧4.7μF C≧6.8μF		16V (C≧1.0µl	12.5%	6 20%	0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF; 1812≧47μF
			<u> </u>	<u> </u>	- 1		10V	20%	30%	0402≧0.47μF
							6.3V	30%	+ -	

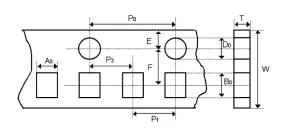




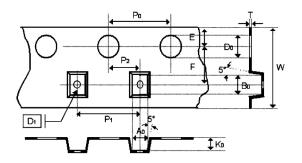
No	Item	Test Condition	Requirements				
			*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X5R, X6S, Y5V)				
	*Before initial measurement (Class II only): To apply test	Rated voltage	Insulation Resistance				
			100V: X7R				
		(Class II only): To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp. *Measurement to be made after keeping at room temp. for 24±2 hrs hrs 500: 0402≥0.1µF;0603≥1 1206≥4.7µF;1210≥4.7µF 35V: 0603≥1µF;0805≥2.2 25V:0402≥1µF;0603≥2.2 1206≥10µF;1210≥10µF 16V:0402≥0.22µF;0603≥1 1206≥10µF;1210≥47µF 1206≥10µF 1206≥10µF;1210≥47µF 1206≥10µF 1206≥10µ	(Class II only): To apply test	(Class II only): To apply test	(Class II only): To apply test	50V: 0402≥0.1μF;0603≥1μF;0805≥1μF; 1206≥4.7μF;1210≥4.7μF	
,_	Temperature		35V: 0603≥1µF; 0805≥2.2µF;1210≥10µF				
15	Load (Endurance		25V:0402≥1µF;0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF	1GΩ or RxC≧10 Ω-F			
			16V:0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF	whichever is smaller.			
			10V:0201≥47nF;0402≥0.47µF;0603≥0.47 µF;0805≥2.2µF;				
			1206≥4.7µF;1210≥47µF				
			6.3V ; 4V				

Appendixes

Tape & Reel Dimensions



The dimension of paper tape

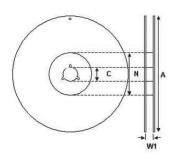


The dimension of plastic tape

Size	0402	0603		0805			1206		12	10	1812
Thickness	N	S, X	Α	В	C, D, I	В	C, J, D	G	C, D, G	М	D, K
A ₀	0.62±0.05	1.02 ±0.05	1.5 ±0.10	1.5 ±0.1	<1.57	2 ±0.1	<1.85	<1.95	<2.97	<2.97	<3.81
B ₀	1.12±0.05	1.80 ±0.05	2.3 ±0.10	2.3 ±0.1	<2.40	3.5 ±0.1	<3.46	<3.67	<3.73	<3.73	<5.3
Т	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	0.25±0.05
K ₀	-	-	-	-	<2.50	-	<2.5	<2.5	<2.5	<3	<2.5
W	8 ±0.1	8 ±0.1	8 ±0.1	8 ±0.10	8 ±0.1	8 ±0.1	8 ±0.1	8 ±0.1	8 ±0.1	8 ±0.1	12 ±0.2
P0	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.10	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1
10xP0	40 ±0.1	40 ±0.1	40 ±0.1	40 ±0.10	40 ±0.1	40 ±0.1	40 ±0.1	40 ±0.1	40 ±0.1	40 ±0.1	40 ±0.1
P1	2 ±0.05	4 ±0.1	4 ±0.1	4 ±0.10	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	4 ±0.1	8 ±0.1
P ₂	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	2 ±0.05	2 ±0.05
D ₀	1.55±0.05	1.55 ±0.05	1.55 ±0.05	1.55±0.05	1.5 ±0.05	1.5 ±0.05	1.5 ±0.05	1.5 ±0.05	1.5 ±0.05	1.5 ±0.05	1.5 ±0.05
D ₁	-	-	-	-	1 ±0.1	-	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.1	1.5 ±0.1
Е	1.75±0.05	1.75 ±0.05	1.75 ±0.05	1.75 ±0.05	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
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	3.5 ±0.05	3.5 ±0.05	3.5 ±0.05	3.5 ±0.05	5.5 ±0.05



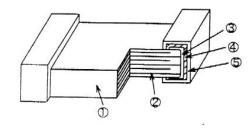




Size	0402,	1812		
Reel size	7"	10"	13"	7"
С	13 +0.5/-0.2	13 +0.5/-0.2	13 +0.5/-0.2	13 +0.5/-0.2
W ₁	8.4 +1.5/-0	8.4 +1.5/-0	8.4 +1.5/-0	12.4 +2.0/-0
Α	178 ±0.10	250 ±1	330 ±1	178 ±0.10
N	60 +1/-0	100 ±1	100 ±1	60 +1.0/-0

The dimension of reel

Constructions:



No.	Na	me	NP0* NPO, X7R, Y		
1	Ceramic	material	BaTiO₃ based		
2	Inner el	ectrode	AgPd alloy	Ni	
3		Inner layer	Ag	Cu	
4	Termination	Middle layer	Ni		
5		Outer layer	Sn		

^{*} Partial NPO items are with Ag/Ni/Sn terminations, please ref to product range of NPO dielectric for detail.

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:

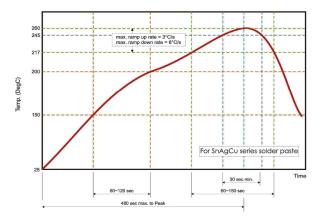
- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, 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.



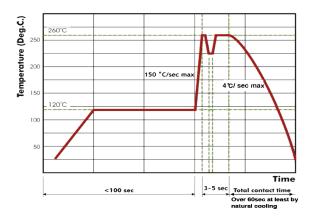


Recommended Soldering Conditions:

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.

Important Notice: This data sheet and its contents (the "Information") belong to the members of the Premier Farnell group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp is the registered trademark of the Group. © Premier Farnell plc 2012.



