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SPECIFICATION FOR CAPACITOR ARRAY

Series. : C Series ultra small size

Description : Size 0201 , COG(NPO) , X7R, X5R

16Vdc ~ 50Vdc

DRAWN BY	CHECKED BY	APPROVED BY
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1. INTRODUCTION

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.

0201 MLCC is performed by high precision technology achieve high capacitance in unit size and ensure the stability and reliability of products.

2. FEATURES

High capacitance in unit size.

High precision dimensional tolerances.

Suitable used in high-accuracy automatic mounting machine.

3. APPLICATIONS

Miniature microwave module.

Portable equipments (ex. Mobile phone, PDA).

High frequency circuits.

4. HOW TO ORDER

C	0201	N	100	J	500	N	V
Series	**Size**	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
C= series	**0201**	**N**=NP0 (C0G) **B**=X7R **X**=X5R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 100=10x10^0 =10pF	**J**=±5% **K**=±10% **M**=±20% **Z**=+80-20%	Two significant digits followed by no. of zeros. And R is in place of decimal point. **160**=16 VDC **250**=25 VDC **500**=50 VDC	**N**=Nickel barrier with 100% Tin	**V**=7" reeled

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		M_B (mm)
0201	0.60±0.03	0.30±0.03	0.30±0.03	T	0.15±0.05

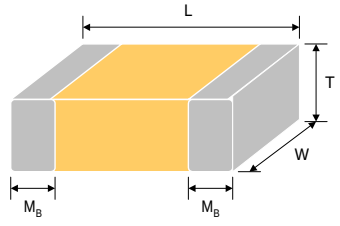

Fig. 1 The outline of Capacitor

6. GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R	X5R
Size	0201		
Capacitance*	0.3pF to 100pF	100pF to 10nF	100pF to 0.22μF
Capacitance tolerance	J(±5%), K(±10%)	K(±10%), M(±20%)	K(±10%), M(±20%)
Rated voltage (WVDC)	16V, 25V, 50V	6.3V, 10V, 16V, 25V, 50V	6.3V,10V, 16V,25V,50V
Q*/D.F.	Cap<30pF, Q ≥ 400+20C Cap ≥ 30pF, Q ≥ 1000	Ur=50V: ≤ 3.0% Ur=16V, 25V: ≤ 3.5% Ur=10V: ≤ 5.0% Ur=6.3V:≤ 10%	Ur=50V: ≤ 3.0% Ur=16V, 25V: ≤ 3.5% Ur=10V: ≤ 5.0% Ur=6.3V:≤ 10%
Insulation resistance at Ur	≥ 10G Ω	≥ 10G Ω or RxC ≥ 500 Ω xF whichever is less	
Operating temperature	-55 to +125℃		-55 to +85℃
Capacitance change	±30ppm	±15%	
Termination	Cu(or Ag)/Ni/Sn (lead-free termination)		

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

NP0: Apply 1.0 ± 0.2Vrms, 1.0MHz ± 10% at the condition of 25°C ambient temperature

X7R/X5R: Apply 1.0 ± 0.2Vrms, 1.0kHz ± 10% at the condition of 25°C ambient temperature

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

7. CAPACITANCE RANGE

SIZE		0201												
DIELECTRIC		X7R					X5R					C0G		
RATED VOLTAGE		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	16V	25V	50V
Capacitance	100pF (101)			T	T	T			T	T	T			
	150pF (151)			T	T	T			T	T	T			
	180pF (181)			T	T	T			T	T	T			
	220pF (221)			T	T	T			T	T	T			
	330pF (331)			T	T	T			T	T	T			
	470pF (471)			T	T	T			T	T	T			
	680pF (681)			T	T	T			T	T	T			
	1000pF (102)	T	T	T	T	T		T	T	T	T			
	1500pF (152)	T	T	T				T	T					
	2200pF (222)	T	T	T				T	T					
	3300pF (332)	T	T	T				T	T					
	4700pF (472)	T	T	T				T	T					
	6800pF (682)	T	T					T						
	10nF (103)	T	T				T	T						
	15nF (153)						T							
	22nF (223)						T							
	33nF (333)						T							
	47nF (473)						T							
	68nF (683)						T							
	100nF (104)						T	T						
	220Nf (224)						T							
	0.3 ~ 10pF												T	T
	12pF												T	T
	15pF												T	T
	18pF												T	T
	22pF												T	T
	33pF												T	T
	39pF												T	T
	47pF												T	T
	56pF											T	T	T
	68pF											T	T	T
	82pF											T	T	T
	100pF											T	T	T

8. PACKAGING DIMENSION AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape 7" reel
0201	0.30±0.03	T	15Kpcs

10. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Conditions</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>Class I: NP0
1.0 ± 0.2Vrms, 1MHz ± 10%
Class II: X7R, X5R:
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></td><td>* NP0: Cap ≥ 30pF, Q ≥ 1000; Cap<30pF, Q ≥ 400+20C
X7R, X5R:
<table><tr><td>Rated Voltage</td><td>D.F.</td><td>Rated Voltage</td><td>D.F.</td></tr><tr><td>≧50V</td><td>≦ 3%</td><td>10V</td><td>≦ 5.0%</td></tr><tr><td>25V</td><td>≦ 3.5%</td><td>6.3V</td><td>≦ 10%</td></tr><tr><td>16V</td><td>≦ 3.5%</td><td></td><td></td></tr></table></td></tr>
<tr><td>4.</td><td>Dielectric Strength</td><td>* To apply voltage: ≤50V, 250% of rated voltage.
* 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 : X7R, X5R, 6.3V ≥100Ω-F</td></tr>
<tr><td>6.</td><td>Temperature Coefficient</td><td>With no electrical load.
<table><tr><td>T.C.</td><td>Operating Temp.</td></tr><tr><td>NP0(C0G)</td><td>-55 ~ 125℃ at 25℃</td></tr><tr><td>X7R</td><td>-55 ~ 125℃ at 25℃</td></tr><tr><td>X5R</td><td>-55 ~ 85℃ at 25℃</td></tr></table></td><td>* Capacitance change:
NP0(C0G) : within ±30ppm/°C
X7R : within ± 15%
X5R : within ± 15%</td></tr>
<tr><td>7.</td><td>Adhesive Strength of Termination</td><td>* Pressurizing force：
5N≤0603: 10N＞0603
* Test time: 10±1 sec.</td><td>* 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>
<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:
NPO: within ±5.0% or ±0.5pF whichever is larger.
X7R: within ±12.5%
Y5V: within ±30%
(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before 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 1hr and then set for 48±4hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)</td><td>* No remarkable damage.
* Cap change:
NPO: within ±2.5% or ±0.25pF whichever is larger.
X7R: within ±7.5%
X5R: within ±7.5%
* 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.
*Before initial measurement (Class II) only): Perform 150 +0/-10°C for 1hr and then set for 48±4hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)</td><td>* No remarkable damage.
* Cap change：
NPO: within ±2.5% or ±0.25pF whichever is larger.
X7R: within ±7.5%
X5R: within ±7.5%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
</table>

10. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

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. * Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)	* No remarkable damage. * Cap change: NPO: within ±5.0% or ±0.5pF whichever is larger. X7R,X5R: ≧ 10V, within ±12.5%, 6.3V, within ±25% * Q/D.F. value: NPO: Cap≥30pF, Q≥350; 10pF≤Cap<30pF, Q≥275+2.5C Cap<10pF; Q≥200+10C X7R,X5R : Ur=50V, ≦ 6.0% Ur=16, 25V, ≦ 5.0% Ur=10V, ≦ 7.5% Ur=6.3V, ≦ 15% * I.R.: ≥10V. ≥1GΩ or RxC≥50Ω-F whichever is smaller 6.3V ≥10Ω-F
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 * Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)	* No remarkable damage. * Cap change: NPO: within ±5.0% or ±0.5pF whichever is larger. X7R,X5R: ≧ 10V, within ±12.5%, 6.3V, within ±25% * Q/D.F. value: NPO: Cap≥30pF, Q≥350; 10pF≤Cap<30pF, Q≥275+2.5C Cap<10pF; Q≥200+10C X7R,X5R : Ur=50V, ≦ 6.0% Ur=16, 25V, ≦ 5.0% Ur=10V, ≦ 7.5% Ur=6.3V, ≦ 15% * I.R.: ≥10V. ≥1GΩ or RxC≥25Ω-F whichever is smaller 6.3V ≥5Ω-F
15.	**High Temperature Load (Endurance)**	* Test temp.: NPO, X7R : 125±3°C, X5R: 85±3°C * To apply voltage: (1) 6.3V : 150% of rated voltage. (2) ＞6.3V: 200% of rated voltage * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)	* No remarkable damage. * Cap change: NPO: within ±5.0% or ±0.5pF whichever is larger. X7R,X5R: ≧ 10V, within ±12.5%, 6.3V, within ±25% * Q/D.F. value: NPO: Cap≥30pF, Q≥350; 10pF≤Cap<30pF, Q≥275+2.5C Cap<10pF; Q≥200+10C X7R,X5R : Ur=50V, ≦ 6.0% Ur=16, 25V, ≦ 5.0% Ur=10V, ≦ 7.5% Ur=6.3V, ≦ 15% * I.R.: ≥10V. ≥1GΩ or RxC≥25Ω-F whichever is smaller 6.3V ≥5Ω-F

11. APPENDIXES

◙ Tape & reel dimensions

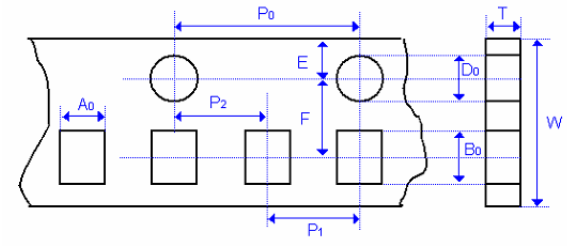

Fig. 5 The dimension of paper tape

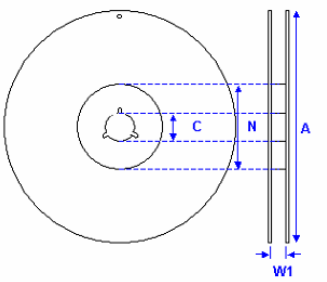

Fig. 6 The dimension of reel

Size	0201
Thickness	0.30±0..03
A_0	0.38±0.05
B_0	0.68±0.05
T	0.42±0.05
K_0	-
W	8.00±0.10
P_0	4.00±0.10
10xP_0	40.0±0.10
P_1	2.00±0.05
P_2	2.00±0.05
D_0	1.55±0.05
D_1	-
E	1.75±0.05
F	3.50±0.05

Size	0201	
Reel size	7”	13”
C	13.0+0.5/-0.2	13.0+0.5/-0.2
W_1	8.4+1.5/-0	8.4+1.5/-0
A	178.0±1.0	330.0±1.0
N	60.0+1.0/-0	100±1.0

◙ 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.

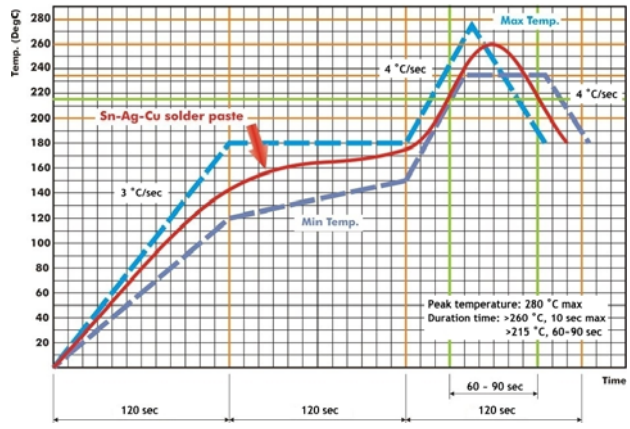

Fig. 8 Recommended IR reflow soldering profile for SMT process with SnAgCu series solder paste.

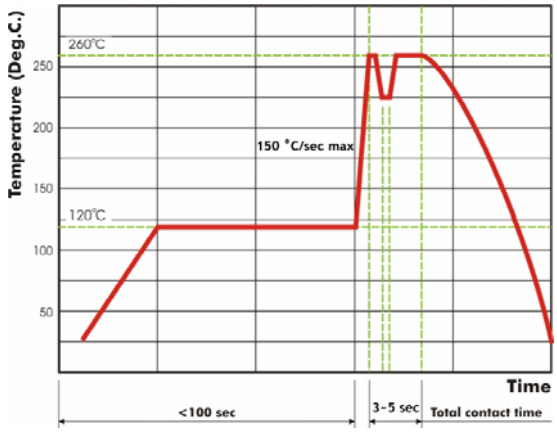

Fig. 9 Recommended wave soldering profile for SMT process with SnAgCu series solder.