

Data Sheet

Customer: _____

Product: Multilayer Chip Ceramic Capacitors – Untra Small Size

Size : 0201

Issued Date: 23-May.-2018

Edition: Ver. 1

Record of change

Date	Ver.	Description	Page

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23-May-2018	23-May-2018	23-May-2018	
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Application

- ◇ Miniature microwave module.
- ◇ Portable equipments (ex. Mobile phone, PDA).
- ◇ High frequency circuits.

General Specification

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°C		-55 to +85°C
Capacitance change	±30ppm	±15%	
Termination	Cu(or Ag)/Ni/Sn (lead-free termination)		

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

NPO: Apply $1.0 \pm 0.2V_{rms}$, $1.0MHz \pm 10\%$ at the condition of 25°C ambient temperature

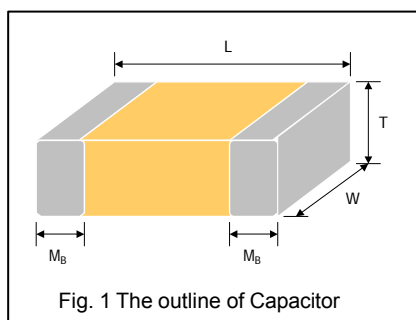
X7R/X5R: Apply $1.0 \pm 0.2V_{rms}$, $1.0kHz \pm 10\%$ at the condition of 25°C ambient temperature

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

How to order:

<u>C</u>	<u>0201</u>	<u>N</u>	<u>100</u>	<u>J</u>	<u>500</u>	<u>N</u>	<u>V</u>
Series	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
C= series	0201	N=NPO (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

Dimension:



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

Packaging Q'TY:

Size	Thickness (mm) Symbol (T)	7 inch Paper Tape
0201	0.30±0.03	15,000pcs

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			
	150pF (151)			T	T	T								
	180pF (181)			T	T	T								
	220pF (221)			T	T	T					T			
	330pF (331)			T	T	T								
	470pF (471)			T	T	T					T			
	560pF (561)			T	T	T								
	680pF (681)			T	T	T								
	1000pF (102)	T	T	T	T	T					T			
	1500pF (152)	T	T	T	T									
	2200pF (222)	T	T	T	T									
	3300pF (332)	T	T	T	T									
	4700pF (472)	T	T	T	T									
	5600pF (562)	T	T	T	T									
	6800pF (682)	T	T	T										
	8200pF (822)	T	T	T										
	10nF (103)	T	T	T	T		T	T	T	T	T			
	15nF (153)						T	T						
	22nF (223)	T	T	T			T	T						
	33nF (333)						T	T						
	47nF (473)						T	T						
	56nF (563)						T	T						
	68nF (683)						T	T						
	100nF (104)						T	T	T	T				
	220nF (224)						T	T	T*					
	330nF (334)						T*	T*						
	470nF (474)						T*	T*						
	1.0uF (105)						T*	T*	T*					
	2.2uF (225)						T*	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	
120pF											T	T	T	
150pF											T	T	T	
270pF											T	T		
330pF											T	T		
390pF											T	T		
470pF											T	T		
560pF											T	T		

Reliability Test Condition and Requirements:

No.	Item	Test Conditions	Requirements																
1.	Visual and Mechanical	---	* No remarkable defect. * Dimensions to conform to individual specification sheet.																
2.	Capacitance	Class I: NP0	Shall not exceed the limits given in the detailed spec.																
3.	Q/ D.F. (Dissipation Factor)	1.0 ± 0.2Vrms, 1MHz ± 10%	NP0: Cap ≥ 30pF, Q ≥ 1000; Cap<30pF, Q ≥ 400+20C X7R, X5R: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rated Voltage</th> <th>D.F.</th> <th>Rated Voltage</th> <th>D.F.</th> </tr> </thead> <tbody> <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> </tbody> </table>	Rated Voltage	D.F.	Rated Voltage	D.F.	≥50V	≤ 3%	10V	≤ 5.0%	25V	≤ 3.5%	6.3V	≤ 10%	16V	≤ 3.5%		
		Rated Voltage		D.F.	Rated Voltage	D.F.													
		≥50V		≤ 3%	10V	≤ 5.0%													
		25V		≤ 3.5%	6.3V	≤ 10%													
16V	≤ 3.5%																		
Class II: X7R, X5R: 1.0 ± 0.2Vrms, 1kHz ± 10%																			
4.	Dielectric Strength	* To apply voltage: ≤50V, 250% of 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. 120 sec.	≥10GΩ or RxC≥500Ω-F whichever is smaller Class II : X7R, X5R, 6.3V ≥100Ω-F																
6.	Temperature Coefficient	With no electrical load.	* Capacitance change: NP0(C0G) : within ±30ppm/°C X7R : within ± 15% X5R : within ± 15%																
		T.C.		Operating Temp.															
		NP0(C0G)		-55 ~ 125°C at 25°C															
		X7R		-55 ~ 125°C at 25°C															
		X5R		-55 ~ 85°C at 25°C															
7.	Adhesive Strength of Termination	* Pressurizing force : 5N≤0603: 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.)	* 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 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.	* No remarkable damage. * Cap change: NP0: 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.)																
		* Measurement to be made after keeping at room temp. for 24±2 hrs.																	
11.	Resistance to Soldering Heat	* 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.	* No remarkable damage. * Cap change: NP0: 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.																
		*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)																	
12.	Temperature Cycle	* 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.	* No remarkable damage. * Cap change : NP0: 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.																
		* Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4hrs.(Class II)																	

Reliability Test Condition 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: $\geq 10V$, within ±12.5%, 6.3V, within ±25% Q/D.F. value: NPO: Cap \geq 30pF, Q \geq 350; 10pF \leq Cap $<$ 30pF, Q \geq 275+2.5C Cap $<$ 10pF; Q \geq 200+10C X7R,X5R: Ur=50V, $\leq 6.0\%$ Ur=16, 25V, $\leq 5.0\%$ Ur=10V, $\leq 7.5\%$ Ur=6.3V, $\leq 15\%$ I.R.: $\geq 10V$. $\geq 1G\Omega$ or Rx $C \geq 50\Omega$ -F whichever is smaller 6.3V $\geq 10\Omega$ -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: $\geq 10V$, within ±12.5%, 6.3V, within ±25% Q/D.F. value: NPO: Cap \geq 30pF, Q \geq 350; 10pF \leq Cap $<$ 30pF, Q \geq 275+2.5C Cap $<$ 10pF; Q \geq 200+10C X7R,X5R: Ur=50V, $\leq 6.0\%$ Ur=16, 25V, $\leq 5.0\%$ Ur=10V, $\leq 7.5\%$ Ur=6.3V, $\leq 15\%$ I.R.: $\geq 10V$. $\geq 1G\Omega$ or Rx $C \geq 25\Omega$ -F whichever is smaller 6.3V $\geq 5\Omega$ -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: $\geq 10V$, within ±12.5%, 6.3V, within ±25% Q/D.F. value: NPO: Cap \geq 30pF, Q \geq 350; 10pF \leq Cap $<$ 30pF, Q \geq 275+2.5C Cap $<$ 10pF; Q \geq 200+10C X7R,X5R: Ur=50V, $\leq 6.0\%$ Ur=16, 25V, $\leq 5.0\%$ Ur=10V, $\leq 7.5\%$ Ur=6.3V, $\leq 15\%$ I.R.: $\geq 10V$. $\geq 1G\Omega$ or Rx $C \geq 25\Omega$ -F whichever is smaller 6.3V $\geq 5\Omega$ -F

APPENDIXES

Tape & reel dimensions

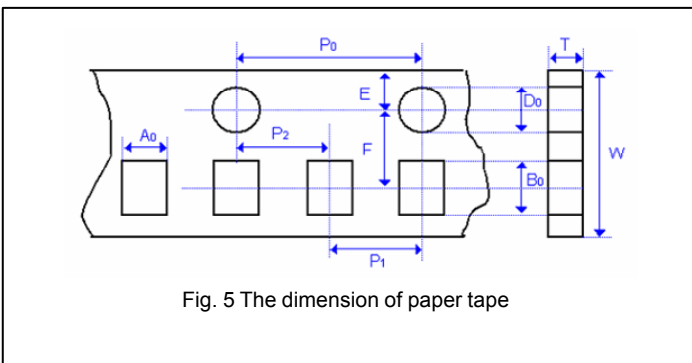


Fig. 5 The dimension of paper tape

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	
	7"	13"
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

Fig. 6 The dimension of reel

Storage and handling conditions

- (1) To store products at 5 to 40 °C ambient temperature and 20 to 70% relative 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 N₂ within oven are recommended.

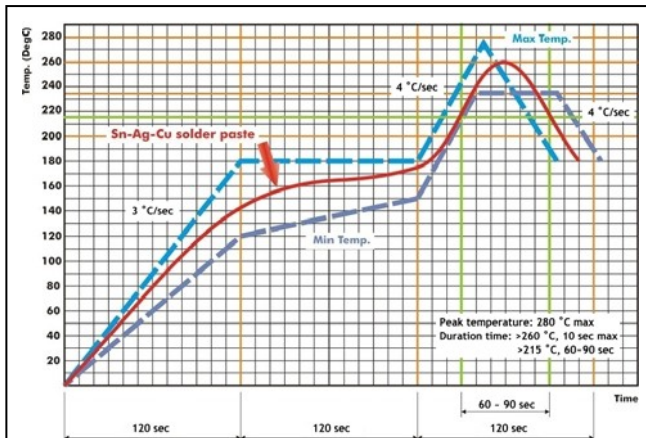


Fig. 8 Recommended IR reflow soldering profile for SMT process with SnAgCu series solder paste.

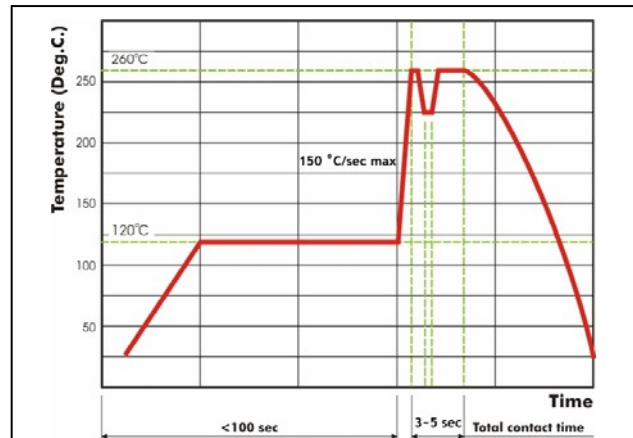


Fig. 9 Recommended wave soldering profile for SMT process with SnAgCu series solder.