

# MULTILAYER CERAMIC CAPACITORS

## Ultra Small Series (0201)



### 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

- b. High capacitance in unit size.
- c. High precision dimensional tolerances.
- d. Suitable used in high-accuracy automatic mounting machine.

### 3. APPLICATIONS

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

### 4. HOW TO ORDER

<u>0201</u>	<u>N</u>	<u>100</u>	<u>J</u>	<u>250</u>	<u>L</u>	<u>I</u>
<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
Inch (mm) <b>0201</b> (0603)	<b>N</b> =NP0 (C0G) <b>B</b> =X7R <b>X</b> =X5R <b>F</b> =Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point.  eg.: R47=4.7pF 0R5=0.5pF 1R0=1.0pF 100=10x10 <sup>0</sup> =10pF	<b>B</b> =±0.1pF <b>C</b> =±0.25pF <b>D</b> =±0.5pF <b>G</b> =±2% <b>J</b> =±5% <b>K</b> =±10% <b>M</b> =±20% <b>Z</b> =-20/+80%	Two significant digits followed by no. of zeros. And R is in place of decimal point.  <b>4R0</b> =4 VDC <b>6R3</b> =6.3 VDC <b>100</b> =10 VDC <b>160</b> =16 VDC <b>250</b> =25 VDC	<b>L</b> =Ag/Ni/Sn (for NP0 dielectric) <b>C</b> =Cu/Ni/Sn (for X7R, X5R, Y5V dielectric)	<b>T</b> =7" reeled

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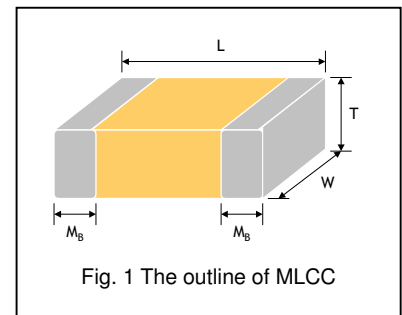
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### 5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	M <sub>B</sub> (mm)
0201 (0603)	0.60±0.03	0.30±0.03	0.30±0.03 L	0.15±0.05

\* Reflow soldering only.



### 6. GENERAL ELECTRICAL DATA

Size	0201			
	NP0	X7R	X5R	Y5V
<b>Dielectric</b>	NP0	X7R	X5R	Y5V
<b>Capacitance*</b>	0.5pF to 100pF	100pF to 4.7nF	100pF to 10nF	22nF to 100nF
<b>Capacitance tolerance</b>	Cap≤5pF: C (±0.25pF) 5pF<Cap<10pF: D (±0.5pF) Cap≥10pF: J (±5%)	K (±10%)	K (±10%), M (±20%)	Z (-20/+80%)
<b>Rated voltage (WVDC)</b>	16V, 25V	10V, 16V	10V, 16V	4V, 6.3V
<b>Tan δ / Q*</b>	Cap<30pF, Q≥400+20C Cap≥30pF, Q≥1000	≤3.5%	≤5.0%	6.3V: ≤16% 4V: ≤20%
<b>Insulation resistance at U<sub>r</sub></b>	≥10GΩ	≥10GΩ or R <sub>x</sub> C≥500ΩxF whichever is less		
<b>Operating temperature</b>	-55 to +125 °C		-55 to +85 °C	-25 to +85 °C
<b>Capacitance change</b>	±30ppm	±15%		+30/-80%
<b>Termination</b>	Ni/Sn (lead-free termination)			

\* Measured at 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.

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

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### 7. CAPACITANCE RANGE

	SIZE	0201	
	DIELECTRIC	NP0	
	RATED VOLTAGE (VDC)	16	25
Capacitance	0.5pF (0R5)		L
	1.0pF (1R0)		L
	1.2pF (1R2)		L
	1.5pF (1R5)		L
	1.8pF (1R8)		L
	2.2pF (2R2)		L
	2.7pF (2R7)		L
	3.3pF (3R3)		L
	3.9pF (3R9)		L
	4.7pF (4R7)		L
	5.6pF (5R6)		L
	6.8pF (6R8)		L
	8.2pF (8R2)		L
	10pF (100)		L
	12pF (120)		L
	15pF (150)		L
	18pF (180)		L
	22pF (220)		L
	27pF (270)		L
	33pF (330)		L
39pF (390)		L	
47pF (470)		L	
56pF (560)	L	L	
68pF (680)	L	L	
82pF (820)	L	L	
100pF (101)	L	L	

	SIZE	0201				
	DIELECTRIC	X7R	X5R		Y5V	
	RATED VOLTAGE (VDC)	16V	10V	16V	4V	6.3V
Capacitance	100pF (101)	L				
	120pF (121)	L				
	150pF (151)	L				
	180pF (181)	L				
	220pF (221)	L				
	270pF (271)	L				
	330pF (331)	L				
	390pF (391)	L				
	470pF (471)	L				
	560pF (561)	L				
	680pF (681)	L				
	820pF (821)	L				
	1,000pF (102)	L				
	1,500pF (152)	L			L	
	2,200pF (222)	L			L	
	3,300pF (332)	L			L	
	4,700pF (472)	L			L	
	6,800pF (682)			L		
	0.010μF (103)			L		
	0.015μF (153)					
	0.022μF (223)					L
	0.033μF (333)					
	0.047μF (473)					L
	0.068μF (683)					
	0.10μF (104)					L

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

### 8. PACKAGING DIMENSION AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape	
			7" reel	13" reel
0201 (0603)	0.30±0.03	L	15K	-

Unit: pieces

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### APPENDIXES

#### ▣ Constructions

No.	Name	NPO	
①	Ceramic material	BaTiO <sub>3</sub> based	
②	Inner electrode	AgPd alloy	
③	Termination	Inner layer	Ag
④		Middle layer	Ni
⑤		Outer layer	Sn

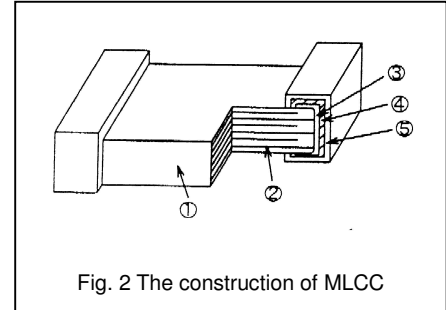


Fig. 2 The construction of MLCC

#### ▣ 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<sub>2</sub> within oven are recommended.

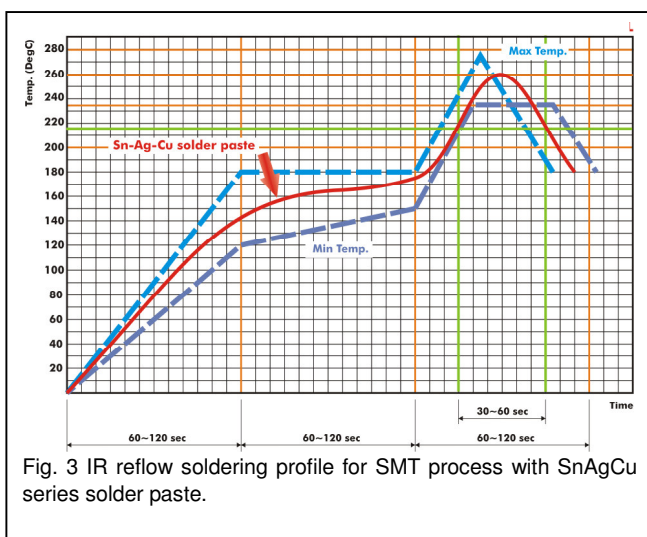


Fig. 3 IR reflow soldering profile for SMT process with SnAgCu series solder paste.

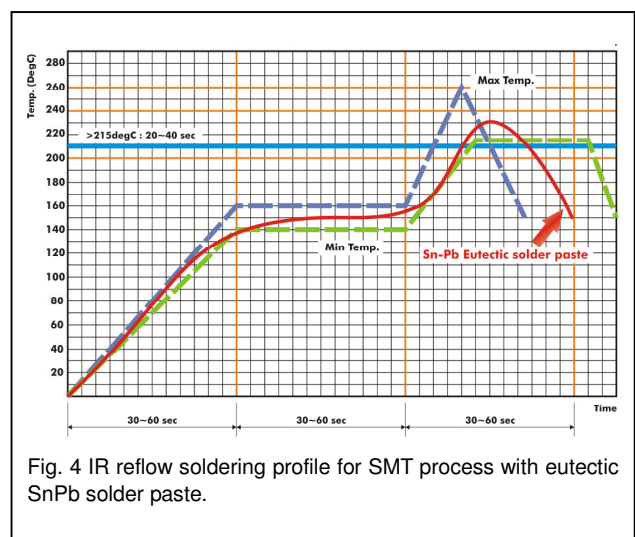


Fig. 4 IR reflow soldering profile for SMT process with eutectic SnPb solder paste.