EYANG

Multilayer Ceramic Chip Capacitors for Automotive Powertrain & Safety

E0201X7R122K250NTA (0201,X7R,1.2 nF,DC 25V)

1. Scope

This specification applies to Automotive-grade Power Safety-Critical Multilayer Ceramic Capacitors (MLCCs). Specifically intended for:

Powertrain safety-critical applications including: Triple-electric systems; Body Control Modules (BCM); Electromechanical Braking Systems.

Application Scope: Wide-bandgap power devices (e.g. SiC); Triple-electric platforms: On-board chargers (OBC), DC-DC converters, Inverters, E-drive systems, DC-Link capacitors

Core systems: Propulsion systems, Safety-critical systems, Mission-critical sensors

2. Part Number System

E	0201	X7R	122	K	250	N	T	A
① Series Code	② Size Code	③ Temperature Characteristics	④ Nominal Capacitance	⑤ Capacitance Tolerance	⑥ Rated Voltage	⑦ Termination Type	Ⓑ Packaging Code	⑨ Thickness Code

① **Series Code** E-Multilayer Ceramic Chip Capacitors for Automotive Powertrain & Safety

② **Size Code** (Unit: mm)

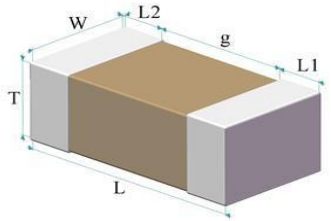


Fig.1 Structure & Dimension

Size Code	L	W	L1,L2	g	T	⑨ Thickness Code
0201	0.60 ± 0.03	0.30 ± 0.03	0.10-0.20	0.20 min	0.30 ± 0.03	**A**

③ **Temperature Characteristics**

Temperature Characteristics	Operating Temp. Range	Temperature Characteristics		
		Temp. coeff. or Cap. Change	Temp. Range	Ref. Temp.
X7R	-55 °C-125 °C	±15%	-55 °C-125 °C	25 °C

④ **Nominal Capacitance**

Code	Nominal Capacitance
122	1.2 nF

⑤ **Capacitance Tolerance**

Code	Capacitance Tolerance
K	±10%

⑥ **Rated Voltage**

Code	Voltage Values
250	DC 25 V

⑦ **Termination Type**

Code	Terminal Electrodes	Plating Material
N	Cu	Ni/Sn

Ⓑ **Packaging Code**

Code	Square Hole Spacing	Disc Size	Carrier Tape	QTY (Kpcs)
T	2 mm	7〃	Paper	15

3. Technical Specifications and Test Methods

1. Operating Environment

Temp. Characteristics	Temp. Range	Relative Humidity	Atmospheric Pressure
X7R	-55 ℃-125 ℃	≤95% (25 ℃)	86 Kpa-106 KPa

3.2 Reliablility Test Specifications and Methods

Table 1: Specifications and Test Methods

No.	Item AEC-Q200 Test Item		Specification Class 2 (High dielectric constant type)	Test Method	
1	Pre-and Post-Stress Electrical Test				
2	High Temperature Exposure (Storage)	Appearance	No defects or abnormalities.	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		Cap. Change	See Table 1-3	Subjected to 3 cycles of lead-free	reflow at 260 ℃ (standard profile) for thermal shock testing, with ~30 minutes between cycles.
		IR (Room Temp.)	See Table 1-3	Test temperature	(150 ± 3) ℃
		DF	See Table 1-3	Test time	(1000 ± 12) h
				Post-treatment	Let sit for (24 ± 2) h at room temperature, then measure.
3	Temperature Cycling	Appearance	No defects or abnormalities.	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		Cap. Change	See Table 1-3	Subjected to 3 cycles of lead-free	reflow at 260 ℃ (standard profile) for thermal shock testing, with ~30 minutes between cycles.
		IR (Room Temp.)	See Table 1-3	Mounting method	Solder the capacitor to the test substrate
		DF	See Table 1-3	The number of cycles	1000 cycles
				Temperature Step	
				Post-treatment	Let sit for (24 ± 2) h at room temperature, then measure.

Step	Temp.(℃)	Time (min)
1	-55	30 ± 3
2	Room Temp.	1
3	125	30 ± 3
4	Room Temp.	1

4	Destructive Physical Analysis (DPA)		No defects or abnormalities.	EIA-469	
5	Biased Humidity (8585)	Appearance	No defects or abnormalities.	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		Cap. Change	See Table 1-3	Subjected to 3 cycles of lead-free	reflow at 260 ℃ (standard profile) for thermal shock testing, with ~30 minutes between cycles.
		IR (Room Temp.)	See Table 1-3	Mounting method	Solder the capacitor to the test substrate
		DF	See Table 1-3	Test temperature	(85 ± 3) ℃
				Test humidity	(85 ± 3)% RH
				Test time	(1000 ± 12) h
				Test voltage	Rated voltage ($U_R \leq 1000$ V) and 1.3 V-1.5 Vdc (Add 100 kfi resister) 1000 ± 50 V ($U_R > 1000$ V) and 1.3 V-1.5 Vdc (Add 100 kfi resister) Note: For silver-containing ceramics (e.g., palladium-silver electrodes), low-voltage partial testing must be carried out simultaneously.
				The charge/discharge current	≤50 mA
				Post-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.

Table 1: Specifications and Test Methods

No.	Item AEC-Q200 Test Item		Specification Class 2 (High dielectric constant type)	Test Method	
6	Operational Life	Appearance	No defects or abnormalities.	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		Cap. Change	See Table 1-3	Subjected to 3 cycles of lead-free reflow at 260 °C (standard profile) for thermal shock testing, with ~30 minutes between cycles.	
		IR (Room Temp.)	See Table 1-3	Mounting method	Solder the capacitor to the test substrate
		DF	See Table 1-3	Test temperature	125 °C ± 3 °C
				Test time	(1000 ± 12) h
				Test voltage	See Table 1-3
				The charge/discharge current	≤ 50 mA
				Post-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
7	Appearance		No defects or abnormalities.	Visual inspection under 10x microscope	
8	Physical Dimension		See Fig.1	Measuring by gages which precision is not less than 0.01 mm.	
9	Mechanical Shock	Appearance	No defects or abnormalities.	Subjected to 3 cycles of lead-free reflow at 260 °C (standard profile) for thermal shock testing, with ~30 minutes between cycles.	
		Cap. Change	Within the specified initial value	Mounting method	Solder the capacitor to the test substrate
		IR (Room Temp.)	Within the specified initial value	Holding Time	0.5 ms
		DF	Within the specified initial value	Peak value	1500 g
				Velocity change	4.7 m/s
				Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks).	
10	Vibration	Appearance	No defects or abnormalities.	Subjected to 3 cycles of lead-free reflow at 260 °C (standard profile) for thermal shock testing, with ~30 minutes between cycles.	
		Cap. Change	Within the specified initial value	Mounting method	Solder the capacitor to the test substrate
		IR (Room Temp.)	Within the specified initial value	Frequency	10 Hz to 2000 Hz and return to 10 Hz
		DF	Within the specified initial value	Amplitude	1.5 mm
				Vibration Time	20 min
				This motion should be applied for 12 cycles in each 3 mutually perpendicular directions (total of 36 times).	
11	Resistance to Soldering Heat	Appearance	No defects or abnormalities.	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		Cap. Change	Within the specified initial value	Pre-heating	120 °C-150 °C,Time: 60 s
		IR (Room Temp.)	Within the specified initial value	Test Method	Solder bath
		DF	Within the specified initial value	Solder alloy	Sn-Ag-Cu (Lead Free Solder)
				Solder temp.	(260 ± 5) °C
				Duration of immersion	(10 ± 1) s
				Depth of immersion	(10 ± 1) mm
				Post-treatment	Let sit for (24 ± 2) h at room temperature, then measure.
12	ESD	Appearance	No defects or abnormalities.	Per AEC-Q200-002	
		Cap. Change	Within the specified initial value	Pre-treatment	Perform heat treatment at (150 +0/－10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure.
		IR (Room Temp.)	Within the specified initial value		
		DF	Within the specified initial value		

Table 1: Specifications and Test Methods

No.	Item AEC-Q200 Test Item		Specification Class 2 (High dielectric constant type)	Test Method		
13	Solderability	Appearance	95% of the terminations is to be soldered evenly and continuously	Pre-heating Test Method Flux Solder alloy Temperature Duration of immersion Depth of immersion	Temp.: 155 °C/Time: 4 h Solder bath Solution of rosin ethanol Sn-Ag-Cu (Lead Free Solder) (245 ± 5) °C (5.0 ± 0.5) s (10 ± 1) mm	
14	Electrical Characterization	Capacitance	Within the specified tolerance	Measurement Temperature Relative Humidity Measurement Frequency Measurement Voltage	18 °C-28 °C ≤80% RH C ≤ 10 μF,f = 1.0 ± 0.1 KHz; C > 10 μF, f = 120 ± 24 Hz C ≤ 10 μF,U = 1.0 ± 0.2 Vrms; C > 10 μF,U = 0.5 ± 0.1 Vrms	 See Table 1-2 See Table 1-2
15		DF	See Table 1-2			
16		IR (Room Temp.)	See Table 1-2	Measurement Temperature Measurement Voltage Charging Time The charge/discharge current	25 °C U_R < 500 V: U_R U_R ≥ 500 V: 500 V ± 50 V 1 min ≤ 50 mA	
17		IR (High Temp.)	See Table 1-2	Measurement Temperature Measurement Voltage Charging Time The charge/discharge current	125 °C U_R < 500 V: U_R U_R ≥ 500 V: 500 V ± 50 V 1 min ≤ 50 mA	
18		Voltage proof	No defects or abnormalities.	Test Voltage Applied Time The charge/discharge current	≥2.5 × U_R t = 1–5 s ≤ 50 mA	
19	Board Flex	Appearance Cap. Change IR (Room Temp.) DF	No defects or abnormalities. Within the specified initial value See Table 1-3 Within the specified initial value	Mounting method Pressurization Method Speed Flexure Holding Time then measure the capacitance	Solder the capacitor to the test substrate as shown in Fig 2 Shown in Fig 3 1 mm/s 2 mm t = (60 ± 1) s	

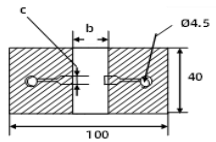


Fig. 2

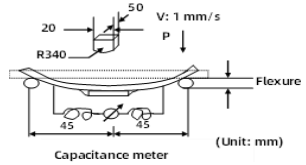


Fig. 3

Table 1: Specifications and Test Methods

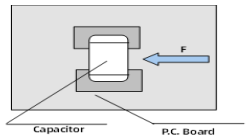
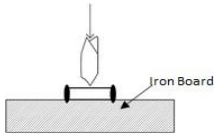
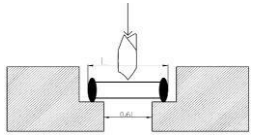
No.	Item AEC-Q200 Test Item		Specification Class 2 (High dielectric constant type)	Test Method
20	Terminal Strength	Appearance Cap. Change IR (Room Temp.) DF	No defects or abnormalities. Within the specified initial value See Table 1-3 Within the specified initial value	Subjected to 3 cycles of lead-free reflow at 260 °C (standard profile) for thermal shock testing, with ~30 minutes between cycles. Mounting method: Solder the capacitor to the test substrate as shown in Fig 4 Holding Time: t = (60 ± 1) s Pushing force: 0201: F = 2 N  Fig. 4
21	Beam Load Test	Destruction value	Should be exceed following one Size Code: Destruction value 0201: ≥5 N	Mounting method: Place the capacitor in the beam load fixture as Fig 5/6 Speed supplied the Stress Load: 0402 min: 0.5 mm/s, 0201: 0.1 mm/s <Size Code: 0805 max >  Fig. 5 <Size Code: 1206 min>  Fig. 6
22	Temperature Characteristics of Capacitance		X7R: ΔC/C ≤ ±15%	Pre-treatment: Perform heat treatment at (150 +0/−10) ℃ for 1 h, then soak at room temperature for (24 ± 2) h, then measure. Measure the capacitance separately in 25 °C,θ1,25 °C,θ2,25 °C, should satisfied relatived Temperature Coefficient of Capacitance . X7R: θ1 = -55 °C, θ2 = 125 °C T.C. Measurement Voltage: ≤ 1.0 ± 0.2 Vrms ※ [※ Please contact our technical support staff for more information.]

Table 1-2: Electrical tests

Series	Size	Temp. Chara.	U_R (DC)	Thickness Code	Cap.	Electrical Characterization				
						DF [max]	IR (Room Temp.) [min]	IR (High Temp.) [min]	Measurement Voltage [Vrms]	Measurement Frequency
E	0201	X7R	25 V	A	1.2 nF	0.025	10000Mfi	1000Mfi	1.0±0.2	1.0±0.1KHz

Table 1-3: Cap.¥ D.F¥ IR changes after test

Series	Size	Temp. Chara.	U_R (DC)	Thickness Code	Cap.	High Temperature Exposure (Storage)			Temperature Cycling			Biased Humidity (8585)			Operational Life				Board Flex	Terminal Strength
						Cap.Change [ΔC/C≤±%]	IR (Room Temp.) [min]	DF [max]	Cap.Change [ΔC/C≤±%]	IR (Room Temp.)[min]	DF [max]	Cap. Change [ΔC/C≤±%]	IR (Room Temp.)[min]	DF [max]	Cap.Change [ΔC/C≤±%]	IR (Room Temp.)[min]	DF [max]	Test voltage [Vrms]	IR (Room Temp.) [min]	IR (Room Temp.) [min]
E	0201	X7R	25 V	A	1.2 nF	10	10000Mfi	0.03	10	10000Mfi	0.03	12.5	1000Mfi	0.05	12.5	1000Mfi	0.05	2.0 × U_R	10000Mfi	10000Mfi

4. Packaging,Shipment and storage

4.1 Packaging

4.1.1 packaging type

Reel Packaging (standard carrier tape disc packaging), single disc smallest package see Ⓑ Packaging Code

First packaging: Each multi-disc material is packed into a box.

The second packaging: the first packaged packaging box is loaded into the paper packaging box,and the remaining space in the box is filled with light auxiliary materials.

The above packaging forms can also be packaged according to user needs.

4.1.2 Carrier Tape size

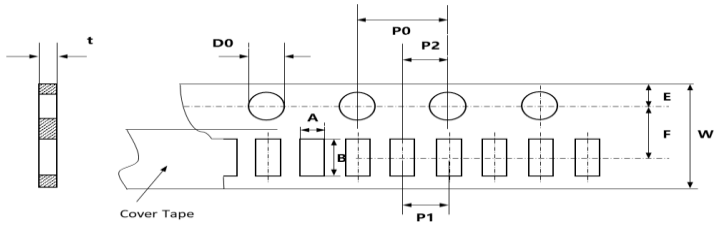


Fig. 7-1 0402 (Paper tape/ 2 mm pitch)

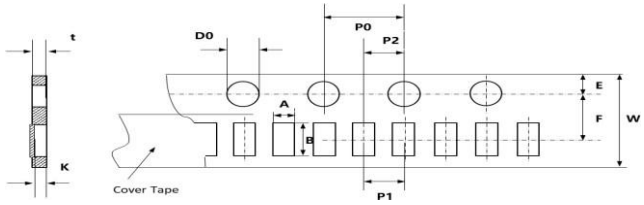


Fig. 7-2 0201 (Paper tape/ 2 mm pitch)

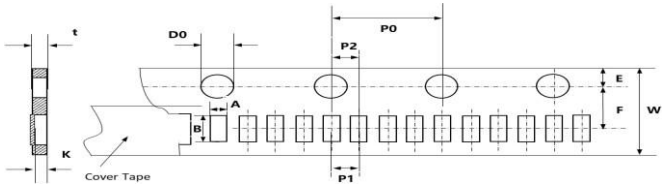


Fig. 7-3 0201 (Paper tape/ 1 mm pitch)

Table 2-1: Carrier size (Size Code: 0201,0402) (Unit:mm)

Size Code	Thickness code	Carrier Tape Type	Packaging Code	A	B	F	P1	E	D0	P2	K	W	P0	t
0201	A	Paper	T	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	J	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	H	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	D	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	1.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	1.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	L	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	1.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	1.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	F	Paper	T	0.44 ± 0.06	0.74 ± 0.06	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.40 ± 0.05	8.00 ± 0.10	4.00 ± 0.10	0.6 max
0402	B	Paper	T	0.63 ± 0.05	1.13 ± 0.05	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	B	Paper	J	0.63 ± 0.05	1.13 ± 0.05	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	N	Paper	T	0.70 ± 0.10	1.20 ± 0.10	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	N	Paper	J	0.70 ± 0.10	1.20 ± 0.10	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	C	Paper	T	0.75 ± 0.10	1.30 ± 0.10	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	C	Paper	J	0.75 ± 0.10	1.30 ± 0.10	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max

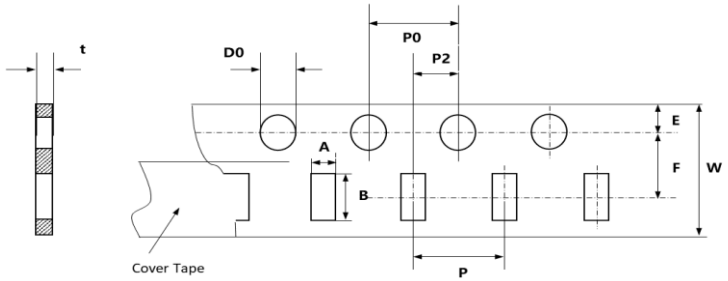


Fig. 7-4 0603, 0805, 1206, 1210,2220 (Paper tape)

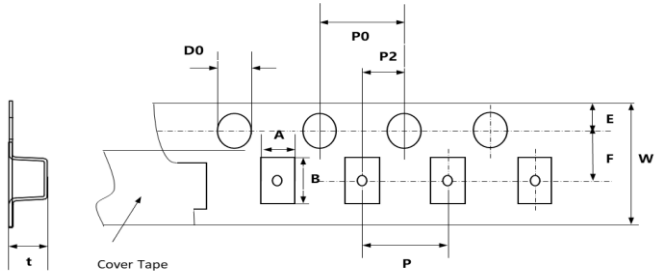


Fig. 7-5 0603,0805,1206,1210 ,2220 (Plastic tape)

Table 2-2: Carrier size (Size Code:0603, 0805, 1206, 1210,2220) (Unit:mm)

Size Code	Thickness code	Carrier Tape Type	Packaging Code	A	B	F	P	E	D0	P2	K	W	P0	t
0603	D	Paper	T	1.00 ± 0.10	1.80 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	D	Paper	A	1.00 ± 0.10	1.80 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	D	Plastic	O	1.00 ± 0.10	1.80 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	D	Paper	W	1.00 ± 0.10	1.80 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Paper	T	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Paper	A	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Plastic	O	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Paper	W	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Plastic	Q	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0603	K	Plastic	R	1.10 ± 0.10	1.90 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	C	Paper	T	1.45 ± 0.10	2.20 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	0.9 max
0805	C	Plastic	R	1.45 ± 0.10	2.20 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	0.9 max
0805	K	Paper	T	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	K	Plastic	R	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	K	Plastic	E	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	Y	Paper	T	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	Y	Plastic	E	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	Y	Plastic	P	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	Y	Plastic	R	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
0805	G	Plastic	R	1.45 ± 0.10	2.20 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.75 max
0805	G	Plastic	P	1.45 ± 0.10	2.20 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.75 max
0805	G	Plastic	O	1.45 ± 0.10	2.20 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.75 max
0805	H	Plastic	R	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.00 max
0805	H	Plastic	P	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.00 max
0805	H	Plastic	O	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.00 max
1206	E	Plastic	R	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
1206	E	Plastic	P	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max
1206	O	Plastic	R	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.45 max
1206	O	Plastic	P	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.45 max
1206	H	Plastic	R	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.00 max
1206	H	Plastic	P	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.00 max

Table 2-2: Carrier size (Size Code:0603, 0805, 1206, 1210,2220) (Unit:mm)

Size Code	Thickness code	Carrier Tape Type	Packaging Code	A	B	F	P	E	D0	P2	K	W	P0	t
1206	L	Plastic	P	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1206	L	Plastic	R	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1206	L	Plastic	E	1.80 ± 0.20	3.40 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1206	P	Plastic	P	1.90 ± 0.20	3.50 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1210	Q	Plastic	F	2.70 ± 0.20	3.50 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1210	Q	Plastic	S	2.70 ± 0.20	3.50 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1210	Q	Plastic	Z	2.70 ± 0.20	3.50 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	2.50 max
1210	R	Plastic	Z	2.70 ± 0.20	3.50 ± 0.30	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	3.00 max
1210	R	Plastic	S	2.70 ± 0.20	3.50 ± 0.30	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	3.00 max
2220	R	Plastic	S	5.50 ± 0.20	6.20 ± 0.20	7.50 ± 0.10	8.00 ± 0.10	1.75 ± 0.10	1.50 ± 0.10	2.00 ± 0.10	/	16.00 ± 0.30	4.00 ± 0.10	3.50 max
2220	I	Plastic	A	5.50 ± 0.20	6.20 ± 0.20	7.50 ± 0.10	8.00 ± 0.10	1.75 ± 0.10	1.50 ± 0.10	2.00 ± 0.10	/	16.00 ± 0.30	4.00 ± 0.10	4.00 max

4.1.3 Disc size

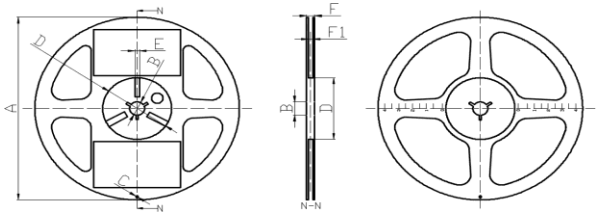


Fig. 8-1 Disc (Width of carrier-8 mm)

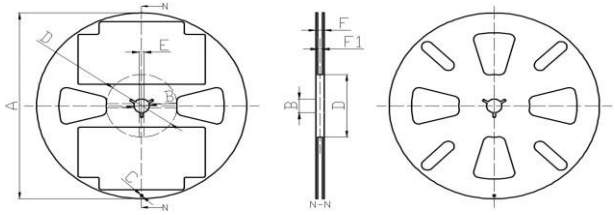


Fig. 8-2 Disc (Width of carrier-16 mm)

Table 3: Disc size (Unit:mm)

Disc size	Width of carrier	A	B	C	D	E	F	F1	Size Code
7″	8.00 ± 0.10	Φ178 ± 2.0	Φ13 ± 1.0	Φ4.0 ± 0.5	Φ60 ± 2.0	4.0 ± 1.0	11.5 ± 1.0	10.0 ± 2.0	All
13″	8.00 ± 0.10	Φ330 ± 2.0	Φ13 ± 1.0	Φ4.0 ± 0.5	Φ108 ± 2.0	4.0 ± 1.0	13.5 ± 2.0	10.0 ± 2.0	All
13″	16.00 ± 0.30	Φ330 ± 2.0	Φ13 ± 1.0	/	Φ100 ± 2.0	5.0 ± 1.0	16.0 ± 2.0	19.0 ± 2.0	2220

4.1.4 Carrier Tape specifications

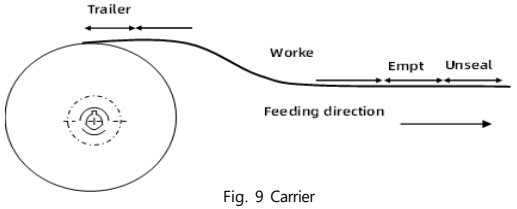


Fig. 9 Carrier

Packaging	The minimum length of the reserved spaces		
Carrier	Trailer	Empty	Unseal
	60 mm	200 mm	160 mm

4.1.5 Performance of Carrier Taping

4.1.5.1 Strength of Carrier Tape and Top Cover Tape

a. Carrier Tape

When a tensile force 1.02 kgf is applied in the direction to unreel the tape, the tape shall withstand this force.

b. Top cover Tape

When a tensile force 1.02 kgf is applied to the tape, the tape shall withstand this force.

4.1.5.2 Peeling Strength of Top Cover Tape

Unless otherwise specified, the peeling strength of top cover tape shall be within 10.2 gf to 71.4 gf when the top cover tape is pulled at a speed of 300 mm/min with the angle of 0° to 15° (see Fig. 10).

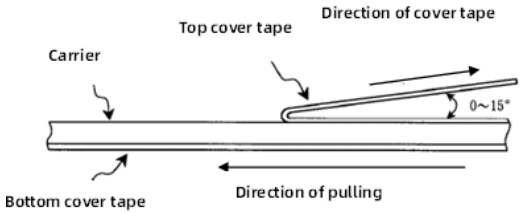


Fig. 10 Cover tape peel-off force

2. Shipment

Transport packaging products to adapt to the modern means of transport, but the product in the process of transport to prevent rain and acid and alkali corrosion, shall not be whipped extrusion casting and gravity.

3. Storage

1. Storage conditions:

   The recommended temperature is less than 30 ℃.

   A temperature is 5 ℃ to 40 ℃ and a relative humidity is 20% to 70% as a standard condition.(MSL Level 1)

   MLCC may be affected by the storage conditions. Please use them promptly after delivery.

   High temperature and humidity conditions and/or prolonged storage may cause deterioration of the packaging materials.

   If more than one year has elapsed since delivery, also check the solderability before use.

2. Corrosive gas can react with the termination (external) electrodes or lead wires of capacitors, and result in poor solderability.

   Do not store the capacitors in an atmosphere consisting of corrosive gas (e.g.,hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)

5. MLCC Application of Technical Requirements

5.1 Circuit Design

5.1.1 Operating Temperature

a. Do not use capacitor above the maximum allowable operating temperature.

b. Surface temperature including self-heating should be below maximum operating temperature.

5.1.2 Operating Voltage

The operating voltage for capacitors must always be lower than their rated voltage.

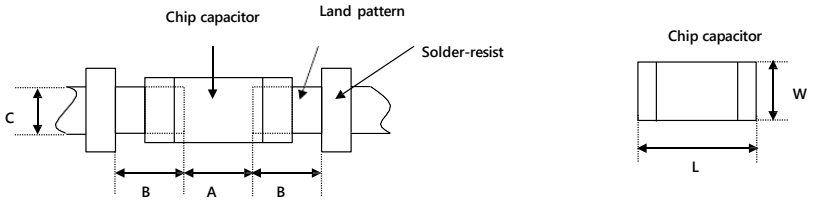
5.2 PCB Design

5.2.1 Design of Land-patterns

When the capacitors are mounted on a PCB, the amount of solder at the terminations has a direct effect on the performance of the capacitors.

The greater the amount of solder, the higher the stress on the capacitor. Therefore, when designing land-patterns, it is necessary to consider the appropriate size and configuration of the solder pads.

Size and recommended land dimensions are shown in the following figure and table.

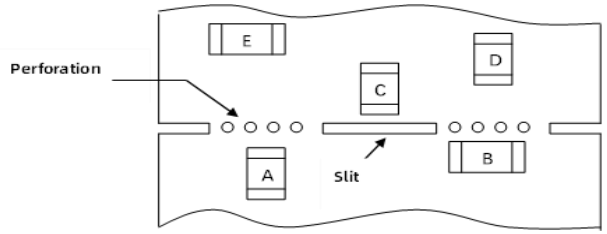


Recommended land dimensions for reflow-soldering (unit: mm)

Size Code	Length	Width	Tolerance	A	B	C
0201	0.6	0.3	± 0.03	0.20 - 0.25	0.20 - 0.30	0.20 - 0.35
0201	0.6	0.3	± 0.05	0.20 - 0.25	0.25 - 0.35	0.30 - 0.40
0201	0.6	0.3	± 0.09,± 0.1	0.23 - 0.30	0.25 - 0.35	0.30 - 0.40
0402	1.0	0.5	± 0.05	0.30 - 0.50	0.35 - 0.45	0.40 - 0.60
0402	1.0	0.5	± 0.15, ± 0.20	0.40 - 0.60	0.40 - 0.50	0.50 - 0.70
0402	1.0	0.5	± 0.30	0.40 - 0.60	0.40 - 0.50	0.50 - 0.80
0603	1.6	0.8	± 0.10	0.60 - 0.80	0.60 - 0.70	0.60 - 0.80
0603	1.6	0.8	± 0.20	0.70 -0.90	0.70 - 0.80	0.80 - 1.00
0603	1.6	0.8	± 0.25, ± 0.30	0.70 -0.90	0.70 - 0.90	0.80 - 1.10
0805	2.0	1.25	± 0.10,± 0.15, ± 0.20	1.00 - 1.40	0.60 - 0.80	1.20 - 1.40
0805	2.0	1.25	± 0.25	1.00 - 1.40	0.70 - 0.90	1.35 - 1.55
1206	3.2	1.6	± 0.15, ± 0.20	1.80 - 2.00	0.90 - 1.20	1.50 - 1.70
1206	3.2	1.6	± 0.30	1.90 - 2.10	1.00 - 1.30	1.60 - 1.90
1210	3.2	2.5	± 0.20	2.00 - 2.40	1.00 - 1.20	2.50 - 2.70
1210	3.2	2.5	± 0.30	2.00 - 2.40	1.10 - 1.30	2.50 - 2.80
2220	5.7	2.5	± 0.20	4.10 - 4.80	1.20 - 1.40	2.50 - 2.70
2220	5.7	5.0	± 0.40	4.10 - 4.80	1.20 - 1.40	4.00 - 5.00

5.2.2 Capacitor Layout on PC Board

Mechanical stress varies according to the location of capacitors on PC board. The recommendation for better design is as follows



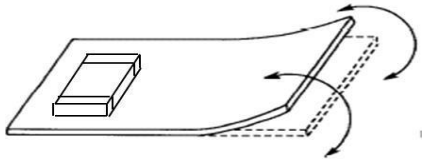
The stress in capacitors is in the following order: A > B = C > D > E

Pay attention not to bend or distort the PC board otherwise the capacitor may crack.

Please refer to the following examples of good and bad capacitors layout.

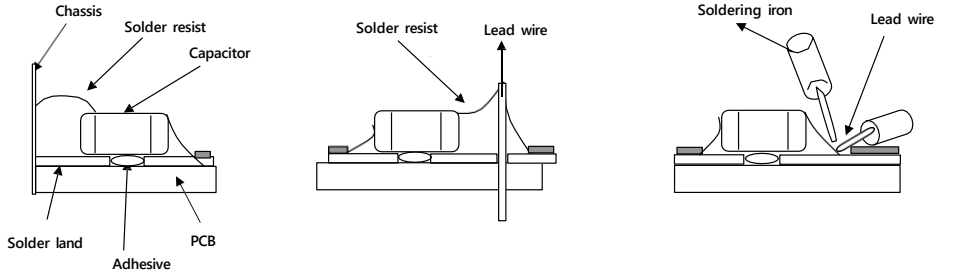
a. Not recommended

b.Recommended

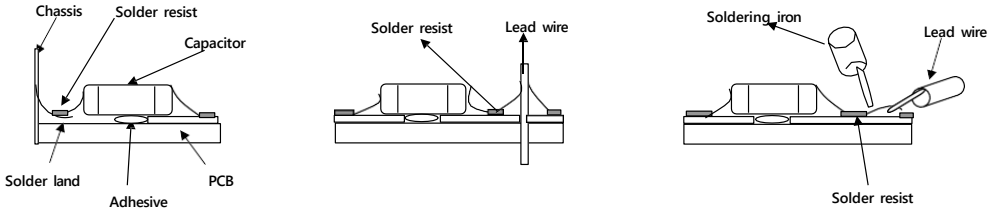


5.2.3 Solder Buildup and Soldering

a. Examples of soldering method not recommended



b. Examples of soldering method recommended



5.3 Consideration for Automatic Placement

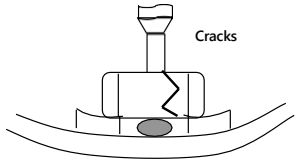
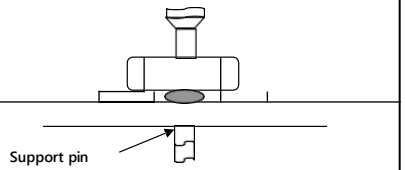
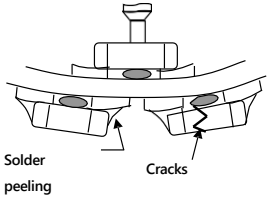
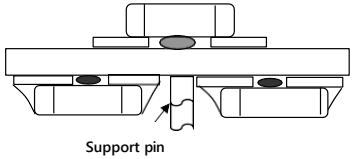
If the mounting head is adjusted too low, it may induce excessive stress in the chip capacitor to result in cracking. Please take following precautions

a. Adjust the bottom dead center of the mounting head to reach on the PC board surface and not press it；

b. Adjust the mounting head pressure to be 1N to 3N of static weight；

c. To minimize the impact energy from mounting head, it is important to provide support from the bottom side of the PC board.

Please refer to the following samples

Mounting	Not recommended	Recommended
Singel-sided Mounting		
Double-sided Mounting		

4. Soldering

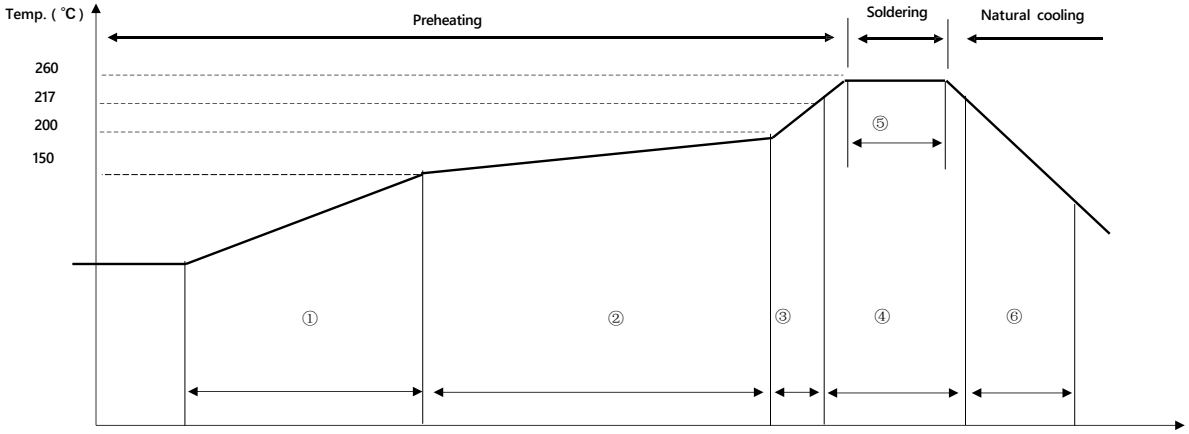
1. Flux Selection

a. It is recommended to use a mildly activated rosin flux (less than 0.1wt% chlorine). Strong flux is not recommended.

b. Please provide proper amount of flux. Excessive flux must be avoided.

c. When water-soluble flux is used, enough washing is necessary.

5.4.2 Recommended Soldering Profile



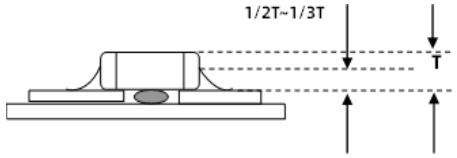
5.4.2.1 Reflow Soldering Condition

NO.	Reflow Soldering zone	Reflow Soldering Condition
①	Preheating 1	≤3 ℃/s, ≥60 s
②	Constant temperature	150℃- 200℃, 60 s-120 s, ≤1 ℃/s
③	Preheating 1	1-5 ℃/s
④	Soldering 1	Above 217 ℃, 60-150 s
⑤	Soldering 1	Above 260 ℃,over 10 s
⑥	Natural cooling	≤6 ℃/s

Caution

a.Excessive solder will induce higher tensile force in chip capacitor when temperature changes and result in cracking. Insufficient solder may detach the capacitor from the PC board.

The ideal condition is to have solder mass controlled to 1/2 to 1/3 of the thickness of the capacitors.



b.Soldering duration should be kept as close to recommended times as possible, because excessive duration can detrimentally affect solderability.

c.The peak temperature of reflow soldering is 245 ℃ ± 15 ℃.

6. All products in this specification comply with the EU RoHS directive

The EU RoHS Directive refers to the "Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment" stipulated by the European Union.

ORIGINAL MFG PART No.: **E0201X7R122K250NTA**

Image shown is a representation only.
Exact specifications should be obtained from the product dimension

PRODUCT NAME:	MLCC For Automotive Powertrain & Safety E Series SMD 0201 X7R 1.2nF ±10% 25V
REVISION:	A3
NEXTGEN ORDER PART CODE*:	E0201B122K250A
CROSS REF. PART NO.:	
ORIGINAL MFG PART NO.:	E0201X7R122K250NTA
ORIGINAL MANUFACTURER:	EYang Technology/Eyang MLCC

**: Please Indicate this Part Code For RFQ/Order Support*

AUTHORIZED DISTRIBUTOR

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US Warehouse Location: 9 Orchard Road, Suit 106, Lake Forest, CA 92630, USA

RFQ/Order Support: sales@NextGenComponent.com

ORIGINAL MFG PART No.: **E0201X7R122K250NTA**

HOW TO ORDER

Please Follow Up Part Code Guide And Indicate NextGen Part Code E0201B122K250A For RFQ and new Order.

RFQ
Request For Quotation

CODE	NAME	KEY SPECIFICATION OPTION
E	Series Code	E: Multilayer Ceramic Chip Capacitors For Automotive Powertrain & Safety
0201	Case Size	0105 : L0.40*W0.20mm; 0201 : L0.60*W0.30mm; 0402 : L1.00*W0.50mm; 0603 : L1.60*W0.80mm 0805 : L2.00*W1.25mm; 1206 : L3.20*W1.60mm; 1210 : L3.20*W2.50mm
B	Temperature Characteristics	N: NP0 (C0G); B: X7R; W: X5R; S: X6S; Y: Y5V; T: X7S; R: X7T
122	Capacitance	Two significant digits followed by number of Zero, The 3rd digit signifies the multiplying factor, and letter R is decimal point. 0R3: 0.3pF; 180: 18pF; 101: 100pF; 680: 68pF; 471: 470pF; 122: 1.2nF
K	Capacitance Tolerance	A: ±0.05pF; B: ±0.1pF; C: ±0.25pF; D: ±0.5pF; F: ±1%; G: ±2%; J: ±5%; K: ±10% L: ±15%; M: ±20%; N: ±30%; P: ±0.02pF; X: ±40%; S: 50%/-20%; Y: 150%/-20% Z: 80%/-20%
250	Rated Voltage	Two significant digits followed by No. of zeros. “R” is in place of decimal point. 6R3: 6.3VDC; 160: 16 VDC; 250: 25 VDC; 100: 10 VDC; 500: 50 VDC; 101: 100VDC
A	Case Thickness	A: 0.5mm Max, See Page 6 (T’s Symbol) for Different part code
XX	Internal Control Code	Blank: N/A; XX: Letter A~Z, a~z or digits (0~9) for Special/Custom Parameters

IMPORTANT NOTES AND DISCLAIMER

1. ROHS COMPLIANCE: The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained can be obtained at Download Center.
2. REACH COMPLIANCE: REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained can be obtained at Download Center.
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