

# RADIAL LEADS MLCC

## Features

- Miniature size, large capacitance, ammo packaging suitable for auto-placement
- Epoxy resin coating creates excellent performance in humidity resistance, mechanical strength and heat resistance
- Standard size, various lead configuration
- RoHS Compliant

## How to Order

R	03	Y	104	M	500	T	F3
A	B	C	D	E	F	G	H

A		B		C		D		E		F	
Product Type		Size Code		Dielectric		Capacitance(pF)		Tolerance		Rated Voltage	
CODE	TYPE	Code	Size	N	COG(NPO)	1R2	1.2pF	B	±0.10pF	160	16V
R	Radial Leads	03	0603	B	X7R	100	10pF	C	±0.25pF	250	25V
		05	0805	Y	Y5V	101	100pF	D	±0.5pF	500	50V
		06	1206			102	1000pF	F	±1.0%	630	63V
		10	1210			103	10000pF	G	±2.0%	101	100V
		12	1812					J	±5.0%		
		25	2225					K	±10%		
		35	3035					M	±20%		

G		H	
Packaging Style		Lead Space (mm)	
T	TAPE(AMMO)	F1	2.54
B	BULK	F2	4.57
		F3	5.08
		F4	7.50

B, C, D for Cap<10pF  
 NPO: B,C,D,F,G,J,K,M  
 X7R: K,M,S,Z  
 Y5V: M,S,Z,P

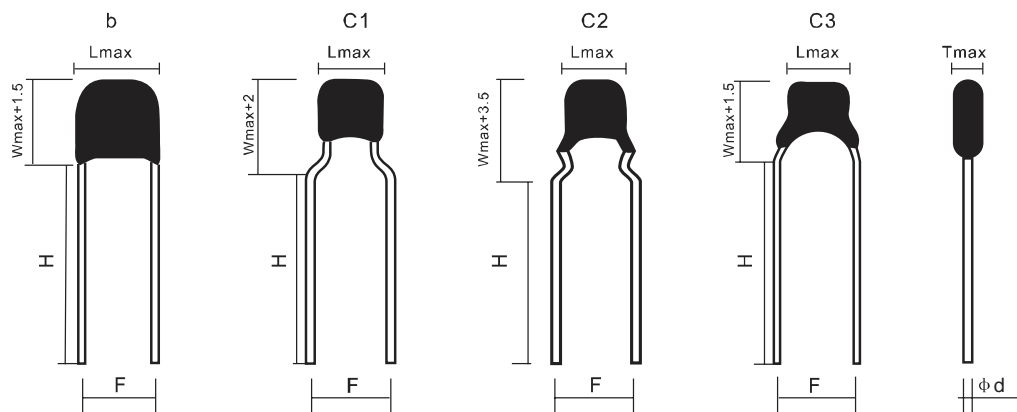


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## Size Code Capacitance and Voltage of Radial Leads MLCC

Size Code	Shape	Dimensions (mm)					Voltage	Capacitance Ranges (pF)		
		F( $\pm 0.5$ )	H( $\pm 1$ )	Lmax	Wmax	Tmax		COG (N)	X7R (B)	Y5V(Y)
0603	a	2.54	5.0				25V 50V 100V	0R5~102	101~224	102~224
	b	2.54	10.0							
	c1	5.08	5.0 10.0	3.8	3.8	3.0				
	c2	5.08	5.0							
	c3	5.08	5.0 10.0							
	c1	7.5	5.0							
0805	a	2.54	5.0				25V 50V 100V	0R5~272	101~105	102~125
	b	2.54	10.0							
	c1	5.08	5.0 10.0	4.2	3.8	3.8				
	c2	5.08	5.0							
	c3	5.08	5.0 10.0							
	c1	7.5	5.0							
1206	a	2.54					25V 50V 100V	0R5~562	101~225	102~125
	b	3.50	10.0	5.0	4.5	3.8				
	c1	5.08								
1210	b	3.50					25V 50V 100V	100~103	471~105	472~155
	c1	5.08	10.0	7.6	5.5	3.8				
1812	b	4.57					25V 50V 100V	100~153	471~335	103~335
			10.0	8.5	8.5	3.8				
2225	b	5.50					25V 50V 100V	100~473	102~475	103~475
			10.0	10.5	9.5	4.2				
3035	b	7.50					25V 50V 100V	102~104	103~225	105~106
			10.0	12.5	10.5	4.2				
								102~333	103~105	105~685

\*Other specifications available upon request, please contact us for more information



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## Ceramic Chip Capacitor Feature

Dielectric Material	(NPO/COG) (N/CG)	X7R(B)	Y5V(Y)
<b>Dielectric Type</b>	Stable Class I Dielectric	Stable Class II Dielectric	
<b>Electrical Properties</b>	With Negligible dependence of electrical properties on Temperature, Voltage, Frequency and Time	With predictable change of properties with Temperature, Voltage, Frequency and Time, this dielectric is FERRO-ELECTRIC and offers higher capacitance ranges than Class I	With high dielectric constant and greater variation of properties with temperature and test conditions, very high capacitance per unit volume
<b>Application</b>	Use in circuits requiring stable performance	Use as blocking, coupling, bypassing discriminating element	Suited for bypassing and coupling application such as store power and memory circuit
<b>Capacitance Range</b>	1pF – 10nF	100pF-1uF	1nF-4.7uF
<b>Operating Temperature</b>	0±30ppm/°C -55°C ~ +125°C	±15% -55°C ~ +125°C	+30% ~ -80% -55°C ~ +125°C

## Test Standard and Conditions

Item	Test Standard		
	NPO/COG (N/COG)	X7R (B)	Y5V (Y)
<b>Capacitance</b>	The capacitance is in the tolerance		
<b>Dissipation Factor</b>	≤ 0.15%	≤ 3.5%	≤ 7.5% (below 220nF) ≤ 10% (220nF ~ 470nF) ≤ 15% (470nF ~ 1uF)
<b>Insulation Resistance</b>	C≤10nF IR>10000MΩ C>10nF R.C>100s	C≤25nF IR>4000MΩ C>25nF R.C>100s	
<b>Voltage Test</b>	Test Voltage: 2.5 rated voltage The charging current may not exceed 50mA. Duration of test: 5 seconds		
<b>TEST CONDITION</b>			
<b>Frequency</b>	1 MHz (C>1nF, 1 KHz)	1 KHz	
<b>Test Voltage</b>	1±0.2VDC		0.5±0.2VDC
<b>Test Voltage of IR</b>	The measuring voltage is equal to the rated voltage. The charging current may not exceed 50mA		
<b>Standard atmospheres conditions</b>	Unless otherwise specified, the standard range of atmospheric conditions for measuring and testing is as follows:		
	<b>Ambient Temperature</b>	15°C ~ 35°C	
	<b>Relative Humidity</b>	45%~75%	
	<b>Air Pressure</b>	86Kpa~106Kpa (860-1060mbar)	
<b>Operating temperature range</b>	If there may be any doubt on the results, measurements shall be made within the following limits:		
	<b>Ambient Temperature</b>	25°C±1°C	
	<b>Relative Humidity</b>	45%~52%	
	<b>Air Pressure</b>	86Kpa~106Kpa (860-1060mbar)	
<b>Operating temperature range</b>	The operating temperature range is the range of ambient temperatures at which the capacitor can be operated continuously at rated voltage.		
	<b>Temperature compensation used:</b>		
	NPO	-55°C ~ +125°C	
	X7R	-55°C ~ +125°C	
Y5V	-25°C ~ +85°C		

## Requirement for Reliability Test

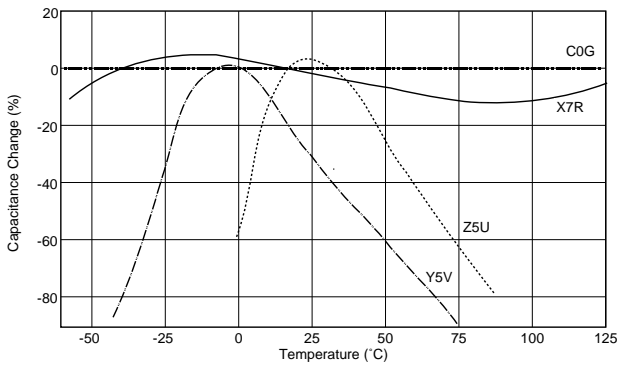
Item	Properties Requirement	Test Condition and Requirement
<b>Appearance</b>	No abnormality, sign in focus	Visual Inspection
<b>Capacitance</b>	In permissible tolerance	<b>Test condition</b>
		<b>Class I</b>
		Voltage 1±0.2V
		Frequency 1MHz±10% (C≤1nF) 1KHz±10% (C>1nF)
<b>Insulation Resistance</b>	In permissible tolerance	<b>Class II</b>
		Voltage 1±0.2V
		Frequency 1MHz±10%
		Voltage: rated voltage Duration: 60±5s Charge / discharge current is less than 50mA
<b>Withstanding Voltage</b>	Between terminals Between terminals and body	There shall be no evidence of damage or flash over during the test Voltage: 2.5 times rated voltage T=2s Charge / discharge current is less than 50mA

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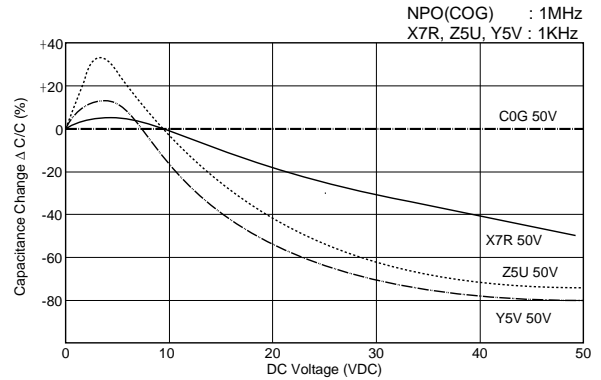
<b>Withstanding solder heat</b>	There shall be no visible defacing and sign in focus		Tin review: 260±5°C Duration: 10s Recovery time: 24±2h																																
	<b>Temp. Char.</b>	$\Delta C/C \leq$																																	
<b>Solder ability</b>	Leads shall be covered with a new coating		Tin review: 230±5°C Duration: 2s																																
	<b>Terminal Strength</b>	No abnormality such as cut lead or looseness	Bending force: 0.25Kg Duration: 5s Repeat 2 times Bent at an angle of 90° then returned to initial position, then bend in the opposite direction.																																
<b>Temperature Cycle</b>	No significant abnormality in appearance		<b>Class I:</b> Recovery time: 1h under standard condition after test																																
	Capacitance Range:	Class I: $\leq 5\%$ or $\pm 0.5pF$ Class II: B,E: $\leq \pm 12.5\%$ , Y: $\leq \pm 30\%$ Class I: Not more than twice of the initial value Class II: B,E: $\leq \pm 5.0\%$ , Y: $\leq 12.5\%$ ( $C_R \leq 0.1\mu F$ ) $\leq 15.0\%$ ( $1\mu F > C_R > 0.1\mu F$ ) $\leq 17.5\%$ ( $C_R \geq 1\mu F$ )	<b>Class II:</b> 1h of preconditioning at 150 +10°C Followed by 48±4h recovery time under standard condition																																
<b>High Temperature Loading Test</b>	No significant abnormality in appearance		Number of Cycles: 5																																
	Capacitance Range:	Class I: $\pm 3\%$ or $\pm 0.3pF$ whichever is larger Class II: B,E: $\leq \pm 12.5\%$ , Y: $\leq \pm 30\%$ Class I: Not more than twice of the initial value Class II: B,E: $\leq 5.0\%$ , Y: $\leq 12.5\%$ ( $C_R \leq 0.1\mu F$ ) $\leq 15.0\%$ ( $1\mu F > C_R > 0.1\mu F$ ) $\leq 17.5\%$ ( $C_R \geq 1\mu F$ )		<table border="1"> <thead> <tr> <th rowspan="2">Step</th> <th colspan="3">Temperature</th> <th rowspan="2">Time(Min.)</th> </tr> <tr> <th>NPO/X7R</th> <th>X5R</th> <th>Y5V</th> </tr> </thead> <tbody> <tr> <td>1</td> <td colspan="3">Room Temperature</td> <td>2-3</td> </tr> <tr> <td>2</td> <td>-55</td> <td>-25</td> <td>+10</td> <td>30</td> </tr> <tr> <td>3</td> <td colspan="3">Room Temperature</td> <td>2-3</td> </tr> <tr> <td>4</td> <td>+125</td> <td>+85</td> <td>+85</td> <td>30</td> </tr> <tr> <td>5</td> <td colspan="3">Room Temperature</td> <td>2-3</td> </tr> </tbody> </table>	Step	Temperature			Time(Min.)	NPO/X7R	X5R	Y5V	1	Room Temperature			2-3	2	-55	-25	+10	30	3	Room Temperature			2-3	4	+125	+85	+85	30	5	Room Temperature	
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3	Room Temperature			2-3																															
4	+125	+85	+85	30																															
5	Room Temperature			2-3																															
<b>Solvent Resistance</b>	Insulation Resistance $\geq 1000M\Omega$ or $50M\Omega \cdot \mu F$ Whichever is smaller		<table border="1"> <thead> <tr> <th colspan="3">Temperature</th> </tr> <tr> <th>NPO/X7R</th> <th>X5R</th> <th>Y5V</th> </tr> </thead> <tbody> <tr> <td>125°C</td> <td></td> <td>85°C</td> </tr> </tbody> </table> <p>Applied Voltage: 1.5 times rated voltage Charge/Discharge current: <math>&lt; 50mA</math> Duration: 1000h (+48 ~ 0h) Recovery time: Class I Dielectric: 24±2h Class II Dielectric: 48±4h Solvent Temperature: 23±5°C Put the sample in solvent for 1min, take out and brush sample's notation area 10 times with pledge, repeat 3 times</p>	Temperature			NPO/X7R	X5R	Y5V	125°C		85°C																							
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<b>Solvent Resistance</b>	Legible marking and no defects or abnormalities in appearance																																		

## Characteristics Data

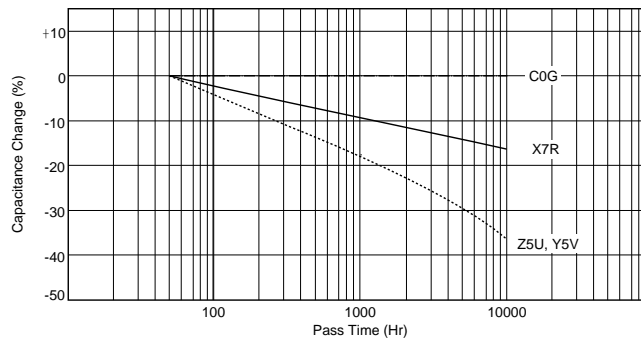
Temperature Characteristics



DC Voltage Characteristics

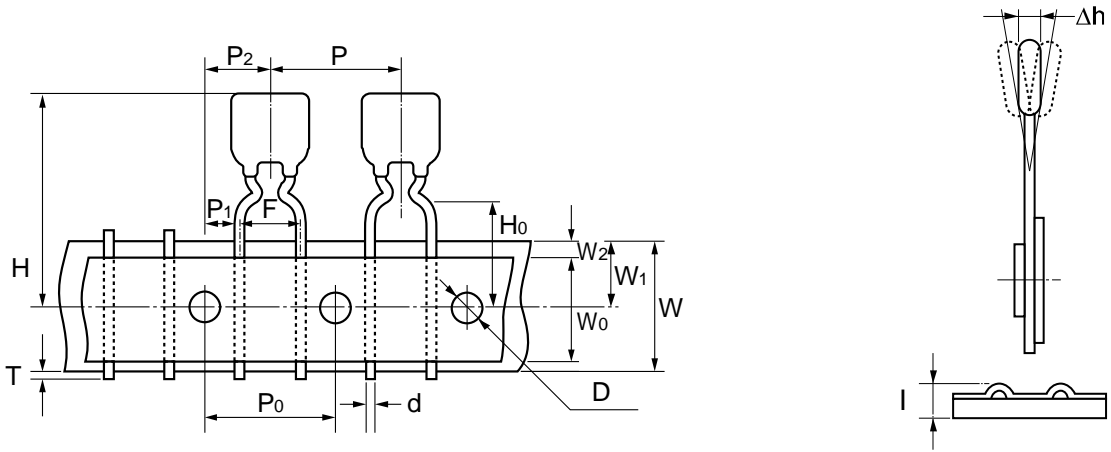


Capacitance Change - Aging

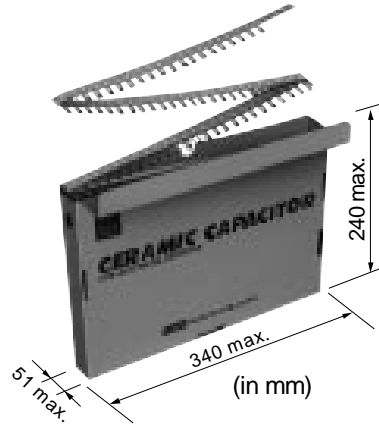


# RADIAL LEADS MLCC

## Packaging Style



Code	P	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	d	$\Delta h$	W	W <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>	H	H <sub>0</sub>	I	D	T
Measurements	12.7	12.7	3.85 5.1	6.35	0.5	0	18.5	13	9	3.0	32.25	15-20	1.42	4.0	0.7
Tolerance	±1	±0.8	±0.7	±1.3	±0.1	±1	±1	±1	±0.5	MAX	MAX	±0.5	MAX	MAX	MAX



## Packaging Quantity

Type	Quantity
Ammo Package	2500 pcs
Bulk Package	1000 pcs / 500 pcs

\*PACKAGING ACCORDING TO THE CUSTOMER REQUIREMENTS.

Notes: 2.54mm leads space  $P_1=5.1\pm 0.7$

5.08mm leads space  $P_1=3.75\pm 0.7$