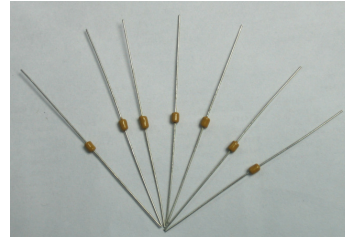


## Axial Coated Multilayer Ceramic Chip Capacitors [General Capacitor – NPO, X7R, X5R, Y5V]

### AXC Series



#### ◆ Features

- Special internal electrode design offers the highest voltage rating
- Surface mount suited for wave and reflow soldering
- High reliability
- RoHS compliant
- Halogen free available

#### ◆ Applications

- For EIA Class I can be used in stabilize frequency circuits
- For EIA Class II can be used in by pass circuits

#### ◆ Summary of Specification

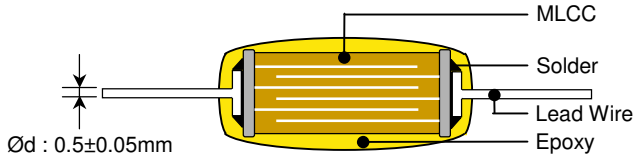
Operation Temperature	NPO, X7R : -55~+125 °C
	X5R : -55~+85 °C
	Y5V : -30~+85 °C
Rated Voltage	6.3Vdc to 50Vdc
Temperature Coefficient	NPO : $\leq \pm 30\text{ppm}/^\circ\text{C}$ , -55~+125 °C (EIA Class I )
	X7R : $\leq \pm 15\%$ , -55~+125 °C (EIA Class II )
	X5R : $\leq \pm 15\%$ , -55~+85 °C (EIA Class II )
	Y5V : $\leq \pm 22\sim 82\%$ , -30~+82 °C (EIA Class II )
Capacitance Range	NPO : 0.5pF to 33nF
	X7R : 150pF to 1.5uF
	X5R : 10nF to 22uF
	Y5V : 10nF to 22uF
Dissipation Factor :	NPO : $Q \geq 1000$ ;
	X7R, X5R, Y5V : Please see AXC specification data sheet
Insulation Resistance	10G $\Omega$ or 500/C $\Omega$ whichever is smaller
Aging	NPO:0% ; X7R, X5R: 2.5 % ; Y5V: 6% per decade of time
Dielectric Strength	250% Rated Voltage

#### ◆ How To Order

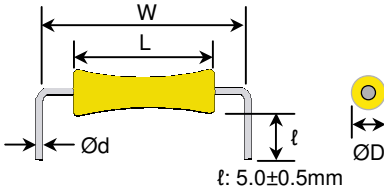
AXC	X	103	K	050	D	L	N
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Product Code	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Dimension (max.)	Lead Spacing & Packaging	Optional Suffix
AXC: Axial Leader Ceramic Capacitors	Ex.: N: NPO X: X7R B: X5R Y: Y5V	Ex.: 2R0:2.0pF 100:10 $\times$ 10 <sup>0</sup> 471:47 $\times$ 10 <sup>1</sup> 102:10 $\times$ 10 <sup>2</sup> 105:10 $\times$ 10 <sup>5</sup>	Ex.: C: +/-0.25pF D: +/-0.50pF J: +/- 5% K: +/-10% M: +/-20% Z: +80/-20%	Ex.: 007:6.3Vdc 016:16Vdc 025:25Vdc 050:50Vdc	EX: Size C:3.07x2.12mm D:3.81x2.54mm E:5.08x3.81mm	EX: 5: 5.00mm 6: 6.35mm 7: 7.50mm 8: 8.90mm L: 52mm Lead Tape & Reel (Standard) S: 26mm Lead Tape & Reel	Ex.: N :Halogen Free Indicator

## ◆ Dimension



### H,C,A. type (Bulk)

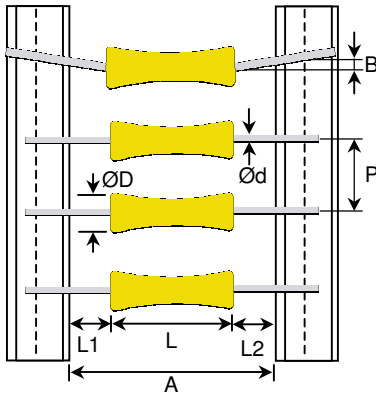


### Lead Spacing

Unit:mm [inches]

Type	Dimensions(mm)					
	ØD	L	W			
C	2.12max [.083max.]	3.07max [.121max.]	5.00±0.8 [.197±.0314]	6.35±0.8 [.250±.0314]	7.50±0.8 [.295±.0314]	8.90±0.8 [.350±.0314]
D	2.54max [.100max.]	3.81max [.150max.]	5.00±0.8 [.197±.0314]	6.35±0.8 [.250±.0314]	7.50±0.8 [.295±.0314]	8.90±0.8 [.350±.0314]
E	3.81max [.150max.]	5.08max [.200max.]	--	6.35±0.8 [.250±.0314]	7.50±0.8 [.295±.0314]	8.90±0.8 [.350±.0314]

### L,S. Type (Tapping)



### L(Lead Space 52mm) Packing

Unit:mm [inches]

Type	Dimension					
	ØD	L	A	B	L1-L2	P
C	2.12max [.083max.]	3.07max [.121max.]	52.0±0.5 [2.047±.0197]	1.2 max [.0472max.]	1.0 max [.0393max.]	5.0±0.5 [.197±.0197]
D	2.54max [.100max.]	3.81max [.150max.]				
E	3.81max [.150max.]	5.08max [.200max.]				

### S(Lead Space 26mm) Packing

Type	Dimension					
	ØD	L	A	B	L1-L2	P
C	2.12max [.083max.]	3.07max [.121max.]	26.0±0.5 [1.024±.0197]	0.8 max [.0315max.]	0.5 max [.0197max.]	5.0±0.5 [.197±.0197]
D	2.54max [.100max.]	3.81max [.150max.]				
E	3.81max [.150max.]	5.08max [.200max.]				

Unit:mm [inches]

## ◆ Capacitance Range

### NPO(N) Series

Type	C				D		E	
WVDC	16V	25V	50V	100V	50V	100V	50V	100V
Cap Min.	R50	R50	R50	5R0	5R0	100	100	100
Cap Max.	332	332	332	471	103	102	333	472

### X7R(X) Series

Type	C				D				E			
WVDC	16V	25V	50V	100V	16V	25V	50V	100V	16V	25V	50V	100V
Cap Min.	151	151	151	151	151	151	151	151	102	102	102	102
Cap Max.	105	224	104	183	105	224	334	104	156	475	155	474

### X5R(B) Series

Type	C				D				E				
WVDC	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V
Cap Min.	474	334	154	104	105	334	225	224	475	155	105	103	103
Cap Max.	106	475	225	105	226	106	475	475	476	226	226	106	105

### Y5V(Y) Series

Type	C				D				E				
WVDC	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V
Cap Min.	103	103	103	103	103	103	103	103	103	103	103	103	103
Cap Max.	475	475	225	105	226	106	475	225	105	226	226	106	105

■ Other dimensions, capacitance values and voltages rating are available. Please contact HEC.

## AXC Series Specification & Test Condition

Item	Specification		Test Condition
<b>Operation Temperature</b>	Char.	Operation Temp.	
	NPO(N)	-55°C ~ +125°C	
	X7R (X)	-55°C ~ +125°C	
	X5R (B)	-55°C ~ +85°C	
	Y5V (Y)	-30°C ~ +85°C	
<b>Visual</b>	No abnormal exterior appearance		Visual Inspection
<b>Capacitance</b>	Within The Specified Tolerance		Class      Frequency      Voltage
<b>Quality Factor</b>	Class I (NPO):		NPO
	More Than 30pF : Q ≥ 1000		C ≤ 100pF    1MHz±10%    1.0±0.2Vrms
	30pF & Below: Q ≥ 400+20C (C:Cap., pF)		C > 100pF    1KHz±10%
<b>Dissipation Factor</b>	Class II (X7R,X5R,Y5V):		X7R,X5R,Y5V
	Please see AXC specification data sheet		C ≤ 10uF    1KHz±10%    1.0±0.2Vrms C > 10uF    120Hz±20%    0.5±0.2Vrms
<b>Insulation Resistance</b>	10,000MΩ or 500/C Ω whichever is smaller for rated voltage > 10V and greater 100/C Ω for rated voltage ≤ 10V		Perform a heat treatment at 150±5°C for 30min. then place room temp. for 24±2hr. Applied Voltage: Rated Voltage Charge Time : 60±5 sec. Current is limited to less than 50mA
<b>Withstanding Voltage</b>	No dielectric breakdown or mechanical breakdown		V ≤ 50 : 250% Rated Voltage for 1~5 sec. Current is limited to less than 50mA.
<b>Temperature Capacitance Coefficient</b>	Char.	Temp. Range	Cap. Change
	NPO (N)	-55°C ~ +125°C	± 30ppm/°C
	X7R (X)	-55°C ~ +125°C	± 15%
	X5R (B)	-55°C ~ +85°C	± 15%
	Y5V (Y)	-30°C ~ +85°C	+22% ~ -82%
<b>Lead Strength</b>	Tensile Strength	No mechanical damage such as lead breakage and losing.	Class I : [C2-C1/C1(T2-T1)] × 100% Class II : (C2-C1)/C1 × 100% T1:Standard Temperature(25°C) T2:Test Temperature C1:Capacitance At Standard Temperature C2:Capacitance At Test Temperature
	Bending Strength	No mechanical damage such as lead breakage and losing.	With holding the parts, apply pulling force to lead drawing direction gradually. Pulling strength: 5N With holding the capacitors to keep the axis vertical, bend it 90 degrees with weighting and put it back to the original position. This operation shall be done for 2~3s. and repeat the following times. Bending forth: 5N(weight :0.51kg) / 2 times
<b>Solderability</b>	Leads shall be covered by new solder more than 75% of its surface		Completely soak both terminations in solder at 235± 5°C for 2±0.5s Solder : H63A Flux : Rosin Dipping : By 1.5~2.0mm form the root of lead
<b>Resistance to Soldering Heat</b>	Appearance	No mechanical damage shall occur	Completely soak both terminations in solder at 250± 5°C for 5±1s
	Capacitance	Class I (NPO): Within 2.5% or ±0.25pF whichever is larger of initial value Class II (X7R,X5R,Y5V) see AXC specification data sheet	Solder : H63A Flux : Rosin Dipping : By 1.5~2.0mm form the root of lead
	Q / Tanδ	To satisfy the specified initial value	
	Insulation Resistance	To satisfy the specified initial value	

**AXC Series Specification & Test Condition**

Item	Specification	Test Condition																
<b>Temperature Cycle</b>	Appearance	No mechanical damage shall occur																
	Capacitance	Class I (NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II (X7R,X5R,Y5V): Char.      Cap. change <u>X7R(X)</u> $\leq \pm 7.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 7.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 20\%$ of initial value	Class II capacitor shall be set for $48 \pm 4$ hours at room temperature after one hour heat treatment at $150 \pm 10^\circ\text{C}$ before initial measurement. Capacitor shall be subjected to five cycles of the temperature cycle as following: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temp.(<math>^\circ\text{C}</math>)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min Rated Temp.+0/-3 (-55)</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>3</td> </tr> <tr> <td>3</td> <td>Max Rated Temp.+3/-0 (125)</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>3</td> </tr> </tbody> </table>	Step	Temp.( $^\circ\text{C}$ )	Time(min)	1	Min Rated Temp.+0/-3 (-55)	30	2	25	3	3	Max Rated Temp.+3/-0 (125)	30	4	25	3
	Step	Temp.( $^\circ\text{C}$ )	Time(min)															
	1	Min Rated Temp.+0/-3 (-55)	30															
	2	25	3															
	3	Max Rated Temp.+3/-0 (125)	30															
4	25	3																
Q / Tan $\delta$	To satisfy the specified initial value	Measure at room temperature after cooling for Class I : $24 \pm 2$ Hours Class II : $48 \pm 4$ Hours																
Insulation Resistance	To satisfy the specified initial value																	
<b>Humidity</b>	Appearance	No mechanical damage shall occur																
	Capacitance	Class I (NPO): Within 5% or $\pm 0.5\text{pF}$ whichever is larger of initial value Class II (X7R,X5R,Y5V): Char.      Cap. change <u>X7R(X)</u> $\leq \pm 15\%$ of initial value <u>X5R(B)</u> $\leq \pm 15\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 30\%$ of initial value	Class II capacitor shall be set for $48 \pm 4$ hours at room temperature after one hour heat treatment at $150 \pm 10^\circ\text{C}$ before initial measurement. Temperature : $40 \pm 2^\circ\text{C}$ Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0 hr															
	Q / Tan $\delta$	see AXC specification data sheet	Measure at room temperature after cooling for Class I : $24 \pm 2$ Hours Class II : $48 \pm 4$ Hours															
	Insulation Resistance	see AXC specification data sheet																
	Appearance	No mechanical damage shall occur																
	<b>High Temperature Load (Life Test)</b>	Capacitance	Class I (NPO): Within 5% or $\pm 0.5\text{pF}$ whichever is larger of initial value Class II (X7R,X5R,Y5V): Char.      Cap. change <u>X7R(X)</u> $\leq \pm 15\%$ of initial value <u>X5R(B)</u> $\leq \pm 15\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 30\%$ of initial value	Class II capacitors applied DC testing voltage is applied for one hour at maximum operation temperature $\pm 3^\circ\text{C}$ then shall be set for $48 \pm 4$ hours at room temperature and the initial measurement shall be conducted. Applied Voltage: please see HEC specification data sheet. Temperature: max. operating temperature Test Time : 1000 +48/-0 Hr Current Applied : 50mA Max														
Q / Tan $\delta$		see AXC specification data sheet	Measure at room temperature after cooling for Class I : $24 \pm 2$ Hours Class II : $48 \pm 4$ Hours															
Insulation Resistance		see AXC specification data sheet																
Appearance		No mechanical damage shall occur																
<b>Vibration</b>		Appearance	No mechanical damage shall occur	Solder the capacitor on P.C. Board shown in Fig 2. before testing. Vibrate the capacitor with amplitude of 1.5mm P-P changing the frequencies from 10Hz to 55Hz and back to 10Hz in about 1 min. Repeat this for 2 hours each in 3perpendicular directions.														
		Capacitance	Within the specified tolerance															
	Q / Tan $\delta$	To satisfy the specified initial value																