

**CERAMIC DISC CAPACITOR SAFETY RECOGNIZED,
AC SERIES**

Ver : 19

PRODUCT SPECIFICATION

**PRODUCT: CERAMIC DISC CAPACITOR
SAFETY RECOGNIZED**

TYPE: AC SERIES

CUSTOMER:

DOC. NO.: POE-D11-02-E-19

APPROVED BY CUSTOMER



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1. Part number for SAP system

(Ex.) YV 0 AC 472 M 10 0 L 20 C 7 H
 (1) (2)-1 (2)-2 (3) (4) (5) (6) (7) (8) (9) (10) (11)

(1)Temperature characteristic (identified code)

CODE	CH(NP0)	SL	YP (Y5P)	YV(Y5V)	YU (Y5U)
Cap. Change	0±60PPM/°C	-1000~+350PPM/°C (+20°C~+85°C)	±10%	-80% ~ +30%	-55% to +20%

(2)-1 Rated voltage(identified by 1-figure code) : 0 = X1:400Vac/Y2:250Vac; 1 = X1:440Vac/Y2:300Vac (Only Approval by VDE/ENEC/UL/CSA/CQC, marking VDE/ENEC)

(2)-2 Type(identified by 2-figure code): AC

(3)Capacitance (identified by 3-figure code) : EX.221=220pF

(4)Capacitance tolerance (identified by code) : C:±0.25pF,D:±0.5pF,J:±5%,K:±10%,M:±20%

(5)Nominal body diameter dimension (identified by 2-figure code) : 06--Dmax7.0mm, 07--Dmax8.0mm...

(6)Internal code: 0--Normal, other code--Special control

(7)Lead Style : Refer to “2. Mechanical”.

(8)Packing mode and lead length (identified by 2-figure code)

Taping Code	Description
AF	Ammo box and product pitch : 15.0 mm
AM	Ammo box and product pitch : 25.4 mm

Bulk Code	Description
3E	Lead length : 3.5mm
04	Lead length : 4.0mm
4E	Lead length : 4.5mm
20	Lead length : 20.0mm

(9) Tolerance of lead length

Code	Description
A	±0.5 mm (only for kink lead type)
B	±1.0 mm
C	Min.
D	Taping special purpose

(10)Lead space

Code	Description
7	7.5±1.0 mm
M	7.5±0.5 mm
0	10±1.0 mm
A	10±0.5 mm

(11)Epoxy resin code

Code	Description
B	Pb free, Epoxy Resin
H	Halogen and Pb free , epoxy resin.

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2. Mechanical

Encapsulation : Epoxy resin, flammability UL94 V-0

Available lead code(unit: mm)

Lead type	SAP P/N (13-17)digits	Lead space (F)	Lead Length (L)	Packing	Lead Configuration
Lead style : L Type L Straight long lead	L20C7	7.5 ± 1.0	20 min.	Bulk	
	L20C0	10 ± 1.0	20 min.		
Lead style : B Type B Straight long lead	BAFD7	Refer to "4. Taping format"		Tap. Ammo	
	BAMD7				
	BAMD0				
Lead style : L Type L Straight short lead	L03B7	7.5 ± 1.0	3.0 ± 1.0	Bulk	
	L4EB7	7.5 ± 1.0	4.5 ± 1.0		
	L05B7	7.5 ± 1.0	5.0 ± 1.0		
	L03B0	10 ± 1.0	3.0 ± 1.0		
	L4EB0	10 ± 1.0	4.5 ± 1.0		
	L05B0	10 ± 1.0	5.0 ± 1.0		
Lead style : D Type D Vertical kink lead	D3EA7	7.5 ± 1.0	3.5 ± 0.5	Bulk	
	D04A7	7.5 ± 1.0	4.0 ± 0.5		
	D3EA0	10 ± 1.0	3.5 ± 0.5		
	D04A0	10 ± 1.0	4.0 ± 0.5		
	DAFD7	Refer to "4. Taping format"		Tap. Ammo	
	DAMD7				
	DAMD0				
Lead style : X Type X Outside kink lead	X3EA7	7.5 ± 1.0	3.5 ± 0.5	Bulk	
	X04A7	7.5 ± 1.0	4.0 ± 0.5		
	X05B7	7.5 ± 1.0	5.0 ± 1.0		
	X3EA0	10 ± 1.0	3.5 ± 0.5		
	X04A0	10 ± 1.0	4.0 ± 0.5		
	X05B0	10 ± 1.0	5.0 ± 1.0		
	XAFD7	Refer to "4. Taping format"		Tap. Ammo	
	XAMD7				
XAMD0					

* Lead diameter Φd: 0.55±/0.05mm

* e (Coating extension on leads): 3.0mmMax for straight lead style; Not exceed the kink for kink lead.

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3. Part numbering/T.C/Capacitance/ Tolerance/Diameter :
3.1 Normal parts:

SAP Part. No.	T.C.	Capacitance	Tolerance	Dimensions (unit : mm)				
				D (max)	T (max)	F		φd
						Bulk type	Taping type	
CH*AC***C060*	CH (NP0)	2, 3,4, 5(pF)	±0.25pF	7.0	5.0	7.5±1, 10±1	7.5±1 (AFD7)	0.55+/-0.05
SL*AC***J060*	SL	10,12,15,18,20,22,24,27,30,33,36,39,47,50,51(pF)	±5%	7.0				
SL*AC***J070*		56,62, 68,75(pF)	±5%	8.0				
SL*AC820J080*		82pF	±5%	9.0				
SL*AC101J090*		100pF	±5%	10.0				
YP*AC101K060*		Y5P	100 pF	±10%				
YP*AC151K060*	150 pF		±10%	7.0				
YP*AC221K060*	220 pF		±10%	7.0				
YP*AC331K060*	330 pF		±10%	7.0				
YP*AC471K060*	470 pF		±10%	7.0				
YP*AC561K070*	560pF		±10%	8.0				
YP*AC681K070*	680 pF		±10%	8.0				
YP*AC821K080*	820 pF		±10%	9.0				
YP*AC102K080*	1000 pF		±10%	9.0				
YU*AC102M060*	Y5U		1000 pF	±20%				
YU*AC152M080*		1500 pF	±20%	9.0				
YU*AC222M080*		2200 pF	±20%	9.0				
YU*AC332M100*		3300 pF	±20%	11.0				
YU*AC392M120*		3900 pF	±20%	13.0				
YU*AC472M120*		4700 pF	±20%	13.0				
YV*AC102M060*	Y5V	1000 pF	±20%	7.0				
YV*AC152M060*		1500 pF	±20%	7.0				
YV*AC222M060*		2200 pF	±20%	7.0				
YV*AC332M080*		3300 pF	±20%	9.0				
YV*AC392M100*		3900 pF	±20%	11.0				
YV*AC472M100*		4700 pF	±20%	11.0				
YV*AC682M120*		6800 pF	±20%	13.0				
YV*AC103M140*		10000 pF	±20%	15.0				

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3.2 Special design parts:

SAP Part. No.	T.C.	Capacitance	Tolerance	Dimensions (unit : mm)				
				D (max)	T (max)	F		φd
						Bulk type	Taping type	
YP*AC101K06S*	Y5P	100 pF	±10%	7.0	5.0	7.5±1, 10±1	7.5±1 (AFD7) Or 10±1 (AMD0)	0.55+/-0.05
YP*AC151K06S*		150 pF	±10%	7.0				
YP*AC221K06S*		220 pF	±10%	7.0				
YP*AC331K06S*		330 pF	±10%	7.0				
YP*AC471K07S*		470 pF	±10%	8.0				
YP*AC561K08S*		560pF	±10%	9.0				
YP*AC681K09S*		680 pF	±10%	10.0				
YP*AC102K10S*		1000 pF	±10%	11.0				
YU*AC102M07S*	Y5U	1000 pF	±20%	8.0	5.0	7.5±1, 10±1	7.5±1 (AFD7)	0.55+/-0.05
YU*AC152M08S*		1500 pF	±20%	9.0				
YU*AC222M09S*		2200 pF	±20%	10.0				
YU*AC332M11S*		3300 pF	±20%	12.0				
YU*AC392M12S*		3900 pF	±20%	13.0				
YU*AC472M13S*		4700 pF	±20%	14.0				

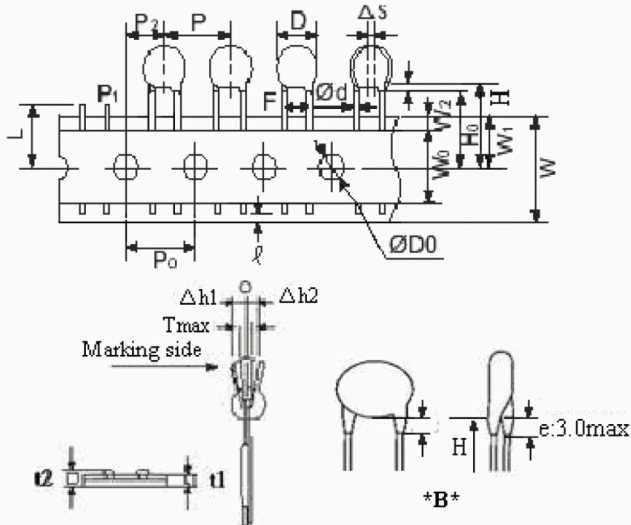
- The special parts only improve surge withstanding, but can't independently be used in protecting application against surge.

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4. Taping Format

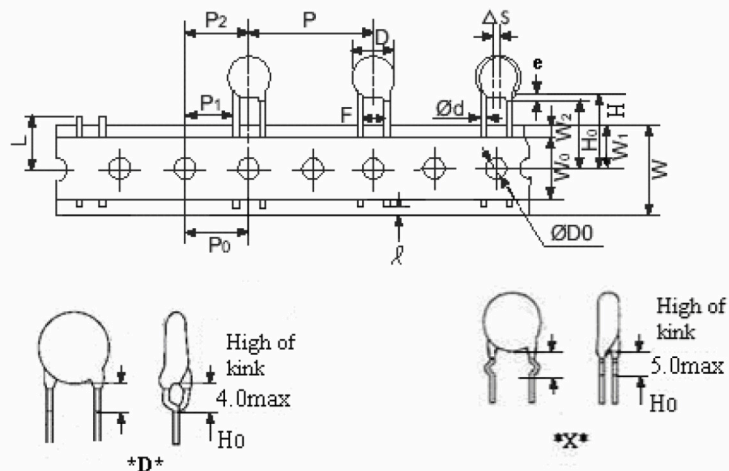
- 15mm pitch/lead spacing 7.5mm taping

 Lead Code: ***BAFD7 & *DAFD7 & *XAFD7**


- 25.4mm pitch/lead spacing 10.0mm taping

 Lead Code: ***DAMD0 & *XAMD0 & *BAMD0**

- 25.4mm pitch/lead spacing 7.5mm taping

 Lead code: ***DAMD7 & *XAMD7 & *BAMD7**


POE Part Number		*BAFD7	*DAFD7 *XAFD7	*BAMD7 *DAMD7 *XAMD7	*BAMD0 *DAMD0 *XAMD0
Item	Symbol	Dimensions (mm)	Dimensions (mm)	Dimensions (mm)	Dimensions (mm)
Pitch of component	P	15.0	15.0	25.4	25.4
Pitch of sprocket	P0	15.0±0.3	15.0±0.3	12.7±0.3	12.7±0.3
Lead spacing	F	7.5±1.0	7.5±1.0	7.5±1.0	10.0±1.0
Length from hole side center to component center	P2	7.5±1.5	7.5±1.5	12.7±1.5	12.7 ± 1.5
Length from hole center to lead	P1	3.75±1.0	3.75±1.0	8.95±1.0	7.7±1.5
Body diameter	D	See the “3. Part numbering/T.C/Capacitance/ Tolerance/Diameter”			
Deviation along tape, left or right	△S	0±2.0			
Carrier tape width	W	18.0 +1/-0.5			
Position of sprocket hole	W1	9.0±0.5			
Lead distance between the kink and center of sprocket hole	H0	---	18.0+2.0/-0	18.0+2.0/-0 (For: *DAMD7 / *XAMD7)	18.0+2.0/-0 (For: *DAMD0 / *XAMD0)
Lead distance between the bottom of body and the center of sprocket hole	H	20.0+1.5/-1.0	---	20.0+1.5/-1.0 (For: *BAMD7)	20.0+1.5/-1.0 (For: *BAMD0)
Length from the terminal of the lead wire to the edge of carrier tape	ℓ	2.0min (Or the end of lead wire may be inside the hole-down tape.)			
Diameter of sprocket hole	D0	4.0±0.2			
Lead diameter	φd	0.55±0.05			
Total tape thickness	t1	0.6±0.3			
Total thickness, tape and lead wire	t2	1.5 max.			
Deviation across tape	△h1/△h2	2.0 max.			
Portion to cut in case of defect	L	11.0 max.			
Hole-down tape width	W0	8.0 min			
Hole-down tape distortion	W2	1.5±1.5			
Coating extension on leads	e	3.0 max for straight lead style; Not exceed the kink leads for kink lead.			
Body thickness	T	See the “3. Part numbering/T.C/Capacitance/ Tolerance/Diameter”			

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5. Marking :

1. Type Designation	AC
2. Nominal Capacitance	Identified by 3-Figure Code. Ex. 47pF→"47" , 470pF→"471"
3. Capacitance Tolerance	C:±0.25pF,D:±0.5pF,J:±5%,K:±10%,M:±20%
4. Company Name Code(Trade mark)	UK
5. Products ID	Abbreviation ex.

6. Approved monogram:

6.1 VDE	or	6.3 CSA		6.5 NEMKO		6.7 FIMKO		6.9 CQC	
6.2 UL		6.4 SEMKO		6.6 DEMKO		6.8 SEV			

Marking Ex.:	Type	Two sides marking (for SAP part number 10-11 digits ≤ "07" products)		One side marking (for SAP part number 10-11 digits ≥ "08" products)
		0AC (X1:400Vac/ Y2:250Vac)		
	1AC (X1:440Vac/ Y2:300Vac)			

* The marking shall be easily legible.

* "C", Marked with code " _ " stand for Halogen and Pb free epoxy resin.

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6. Scope

THIS SPECIFICATION APPLIES TO CERAMIC INSULATED CAPACITORS DISK TYPE USED IN ELECTRONIC EQUIPMENT.

1. VDE/SEV/SEMKO/FIMKO/NEMKO/DEMKO/ UL/CSA recognized capacitor for Antenna coupling and AC line-by-pass.X1, Y2 Capacitor based on IEC 60384-14

“UL, CSA recognized for across-the-line, line-by-pass” and antenna-isolation.

2.Approval Standard and Recognized No.

Safety Standard	Standard No.	Subclass	w.v.	Recognized No.
UL	ANSI/UL 60384-14:2009	X1	400VAC or 440VAC	E146544
		Y2	250VAC or 300VAC	
CSA	CAN/CSA E60384-14:2009	X1	400VAC or 440VAC	2347969
		Y2	250VAC or 300VAC	
VDE (ENEC)	EN 60384-14:2013 IEC60384-14:2013	X1	400VAC or 440VAC	40001829
		Y2	250VAC or 300VAC	
SEV	IEC60384-14:2013	X1	400VAC	14.0554
		Y2	250VAC	
SEMKO	EN 60384-14:2013	X1	400VAC	1411212
		Y2	250VAC	
FIMKO	EN 60384-14:2013	X1	400VAC	NCS/FI 28679A1
		Y2	250VAC	
NEMKO	EN 60384-14:2013	X1	400VAC	P14219060
		Y2	250VAC	
DEMKO	EN 60384-14:2013	X1	400VAC	D-03994 A1
		Y2	250VAC	
CQC	GB/T 14472-1998	X1:400VAC /Y1:250VAC		CQC08001026519
	IEC60384-14 2005	X1: 440VAC /Y2:300VAC		CQC15001121984
KTL	K60384-14 2006	X1	400VAC or 440VAC	SU03065-14001
		Y2	250VAC	SU03065-14002
		Y2	300VAC	SU03065-14003A

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7. Specification and test method
7.1 Operating Temperature Range :

-40 to +125°C

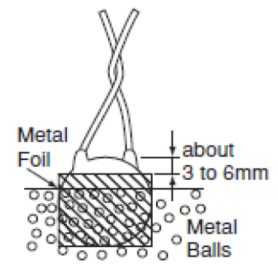
7.2 Test condition:

Test and measurement shall be made at the standard condition. (temperature 15~35°C, relative humidity 45~75% and atmospheric pressure 860~1060hpa). Unless otherwise specified herein.

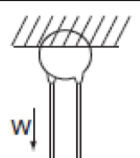
If doubt occurred on the value of measurement, and measurement was requested by customer capacitors shall be measured at the reference condition. (temperature 20±2°C or 25 ± 2°C, relative humidity 60~70% and atmospheric pressure 860~1060hpa.)

7.3 Performance:

Item		Specification	Testing Method	
1	Between lead wires	No failure.	The capacitors shall not be damage when AC2600V(rms.) are applied between the lead wires for 60 sec. (Charge/Discharge current □ 50mA.)	
	Body Insulation	No failure.	First the terminal of capacitor shall be connected together. Then a metal foil shall be closely wrapped around the body of the capacitor distance of about 3 to 4 mm from each terminal. Then the capacitor shall be inserted into a container filled with metal balls of about 1 mm diameter. Finally. AC2600V(rms.) is applied for 60 sec. between the capacitor lead wires and metal balls. (Charge/Discharge current □ 50mA.)	
2	Insulation Resistance(I.R.)	10000MΩ min.	The insulation resistance shall be measured with 500±50VDC with 60±5sec. of charging.	
3	Capacitance	Within specified tolerance		
4	Dissipation Factor(D.F.) or Q	Char. Specification	B&E&F: The capacitance shall be measured at 20±2°C with 1kHz±20% and 5V(rms.) or less. CH&SL: The capacitance shall be measured at 25°C with 1MHz±20% and 1.0±0.2Vrms	
		Y5P, Y5U		D.F ≤ 2.5%
		Y5V		D.F ≤ 5.0%
		CH,SL		Q: 30pF&above: ≥ 1000 Below 30PF: ≥ 400+20×C
5	Temperature Characteristic	Char. Capacitance Change	The capacitance measurement shall be made at each step specified in table 1. (Table 1)	
		Y5P		Within ± 10%
		Y5U		Within ± $\frac{2}{5}$ %
		Y5V		Within -80 ~ +30%
		CH		0±60ppm/°C
		SL		-1000~+350 ppm/°C (+20°C~+85°C)
6	Robustness of Termination	Tensile	Lead wire shall not cut off capacitor shall not be broken.	
		Bending	Lead wire shall not cut off capacitor shall not be broken.	
			As shown in the figure at right, fix the body of the capacitor and apply a tensile weight gradually to each lead wire in the radial direction of the capacitor up to 10N and keep it for 10±1 sec.	
			W Each lead wire should be subjected to 5N of weight and bent 90° at the point of egress, in one direction, then returned to its original position and bent 90° in the opposite direction at the rate of one bend in 2 to 3 sec.	



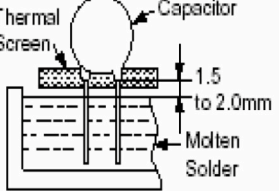
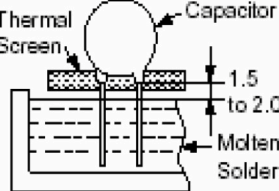
Step	Temperature
1	+20±2°C
2	-25±2°C
3	+20±2°C
4	+85±2°C
5	+20±2°C



※ "room condition" temperature : 15~35°C, humidity : 45~75%, atmospheric pressure : 86~106kPa

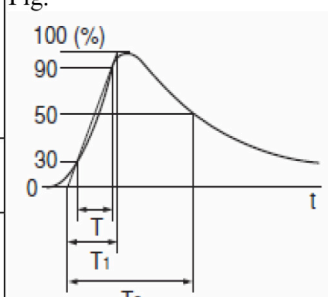
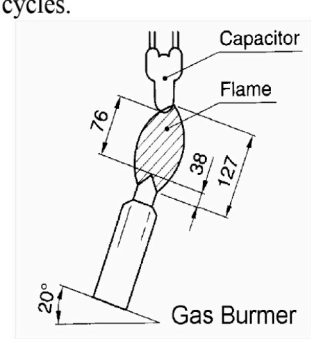
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Item	Specification	Testing Method
7	Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	The lead wire of capacitor should be dipped into molten solder for 5 ± 0.5 sec. The depth of immersion is up to about 1.5 to 2.0 mm from the root of lead wires. Temp. of solder : Lead free solder (Sn-3Ag -0.5Cu) 245 ± 5 °C
8	Appearance	No marked defect
	I.R.	1000MΩ min.
	Dielectric Strength	Per Item 1.
	Capacitance Y5P,Y5U,Y5V : Within $\pm 10\%$ SL,CH: Within $\pm 2.5\%$ or ± 0.25 pF, Whichever is large.	As shown in figure, the lead wires should be immersed in solder of 350 ± 10 °C or 260 ± 5 °C up to 1.5 to 2.0mm from the root of Terminal for 3.5 ± 0.5 sec (10 ± 1 sec for 260 ± 5 °C)  Pre-treatment: Capacitor shall be stored at 85 ± 2 °C for 1 hour, then placed at ^{*1} room condition for 24 ± 2 hours before initial measurements. Post-treatment: Capacitor shall be stored for 1 to 2 hours at ^{*1} room condition.
8	Appearance	No marked defect.
	I.R.	1000MΩ min.
	Dielectric Strength	Per Item 1.
	Capacitance Y5P,Y5U,Y5V : Within $\pm 10\%$ SL,CH: Within $\pm 2.5\%$ or ± 0.25 pF, Whichever is large.	First the capacitor should be stored at $120 + 0 / -5$ °C for $60 + 0 / -5$ sec. Then, as in figure , the lead wires should be immersed solder of $260 + / -5$ °C up to 1.5 to 2.0 mm from the root of terminal for $7.5 + 0 / -1$ sec.  Pre-treatment: Capacitor shall be stored at 85 ± 2 °C for 1 hour, then placed at ^{*1} room condition for 24 ± 2 hours before initial measurements. Post-treatment: Capacitor shall be stored for 1 to 2 hours at ^{*1} room condition.

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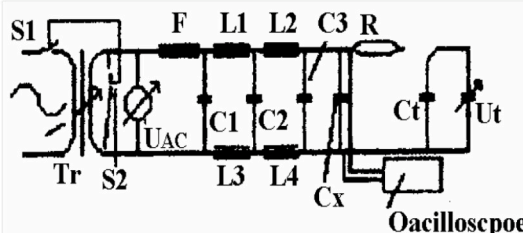
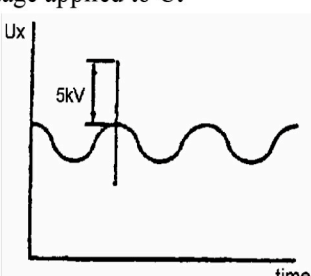
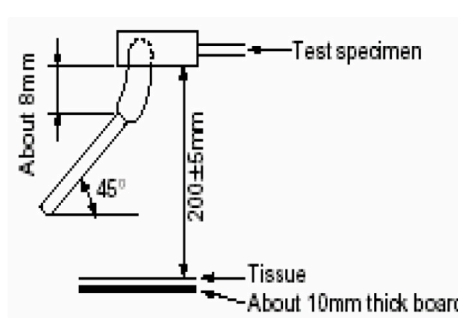
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Item		Specification	Testing Method						
9	Humidity (Under Steady State)	Appearance	Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% humidity. Then capacitor shall be stored for 1 to 2 hours at room condition.						
		Capacitance							
		D.F.							
10	Humidity Loading	Q	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to 95% humidity and set it for 1 to 2 hours at room condition.						
		I.R.							
		Capacitance							
11	Life	Appearance	Impulse Voltage: Each individual capacitor shall be subjected to a 5kv impulses for three times. After the capacitors are applied to life test. Fig.  Front time (T ₁) = 1.2µs = 1.67T Time to half-value (T ₂) = 50µs						
		Capacitance							
		I.R.							
		Dielectric Strength							
12	Flame Test	The capacitor flame discharge as follows. <table border="1" data-bbox="389 1659 763 1785"> <thead> <tr> <th>Cycle</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1~4</td> <td>30 sec, max.</td> </tr> <tr> <td>5</td> <td>60 sec, max.</td> </tr> </tbody> </table>	Cycle	Time	1~4	30 sec, max.	5	60 sec, max.	The capacitor shall subject to applied for 15 sec And then removed for 15 sec, until 5 cycles. Fig. 
		Cycle	Time						
1~4	30 sec, max.								
5	60 sec, max.								

(Unit: mm)

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	Item	Specification	Testing Method
13	Active Flammability	The cheesecloth shall not be on fire.	<p>The specimens shall be individually wrapped in at least one but more than two complete layers of cheesecloth. The specimens shall be subjected to 20 discharges. The interval between successive discharges shall be 5sec. The U_{ac} shall be maintained for 2 min. after the last discharge.</p> <p>Fig.</p>  <p> $C_{1,2} : 1Mf \pm 10\%$ $C_3 : 0.03Mf \pm 5\% \ 10KV$ $L_{1-4} : 1.5Mh \pm 20\% \ 16A \ \text{Rod core choke}$ $R : 100\Omega \pm 2\%$ $C_t : 3Mf \pm 5\% \ 10KV$ $U_{ac} : U_r \pm 5\%$ $U_r : \text{Rated working voltage}$ $C_x : \text{Capacitor}$ $F : \text{Fuse, Rated } 10A$ $U_t : \text{Voltage applied to } C_t$ </p> 
14	Passive Flammability	The burning time shall not be exceeded the time 30 sec. The tissue paper shall not ignite.	<p>The capacitor under test shall be held in the flame in the position, which best promotes burning. Each specimen shall only be exposed once to the flame.</p> <p>Time of exposure to flame : 30 sec Length of flame : $12 \pm 1 \text{ mm}$ Gas burner : Length 35 mm min. Inside Dia. : $0.5 \pm 0.1 \text{ mm}$ Outside Dia. : 0.9 mm max. Gas : Butane gas Purity 95% min.</p> <p>Fig.</p> 

**CERAMIC DISC CAPACITOR SAFETY RECOGNIZED,
AC SERIES**

Ver : 19

Item		Specification		Testing Method															
15	Temperature Cycle	Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles, <Temperature Cycle time: 5 cycles> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40+0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>125+3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>3</td> </tr> </tbody> </table>	Step	Temperature(°C)	Time(min)	1	-40+0/-3	30	2	Room temp.	3	3	125+3/-0	30	4	Room temp.	3
		Step	Temperature(°C)		Time(min)														
		1	-40+0/-3		30														
		2	Room temp.		3														
		3	125+3/-0		30														
		4	Room temp.		3														
		Char.	Cap. Change		DF / Q														
SL, CH	$\leq \pm 5\%$	$Q \geq 275 + 5/2C$ (C < 30pF) $Q \geq 350$ (C \geq 30pF)																	
Y5P	$\leq \pm 10\%$	DF $\leq 5.0\%$																	
Y5U, Y5V	$\leq \pm 20\%$	DF $\leq 7.5\%$																	
	I.R.	3000M Ω min.																	
	Dielectric strength	Per Item 1	Pre-treatment: Capacitor shall be stored at 85 \pm 2°C for 1hour.then placed at ^{*1} room condition for 24 \pm 2hours. Post-treatment: Capacitor shall be stored for 1 to 2hours at ^{*1} room condition.																

※ “room condition” temperature : 15~35°C, humidity : 45~75%, atmospheric pressure : 86~106kPa