

SAFETY STANDARDS REGULATED, REINFORCED INSULATION TYPE, AH SERIES

Ver: 15

PRODUCT SPECIFICATION

PRODUCT: CERAMIC DISC CAPACITOR SAFETY RECOGNIZED

TYPE: AH SERIES

CUSTOMER:

DOC. NO.: POE-D10-00-E-15

APPROVED BY CUSTOMER



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1. Part number for SAP system:

(Ex.)
$$\underline{YU}$$
 $\underline{0}$ \underline{AH} $\underline{472}$ \underline{M} $\underline{13}$ $\underline{0}$ \underline{L} $\underline{20}$ \underline{C} $\underline{0}$ \underline{H} $\underline{(1)}$ $\underline{(2)-1}$ $\underline{(3)}$ $\underline{(4)}$ $\underline{(5)}$ $\underline{(6)}$ $\underline{(7)}$ $\underline{(8)}$ $\underline{(9)}$ $\underline{(10)}$ $\underline{(11)}$

(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) : $0=X1:400V\sim/Y1:250V\sim$, $1=X1:400V\sim/Y1:400V\sim$
- (2)-1 Type(identified by 2-figure code): AH
- (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
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 : 20mm

(9)Length tolerance

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

(10)Pitch

Code	Description
0	10±1 mm
A	10±0.5 mm

(11)Epoxy Resin Code

Code	Description
В	Pb free, Epoxy Resin
Н	Halogen and Pb free, epoxy resin.

2. Mechanical:

Encapsulation: Epoxy resin, flammability UL94 V-0

Available lead code (unit: mm):

Lead type	SAP P/N (13-17)digits	Pitch (F)	Lead Length (L)	Packing	Lead Configuration	
Lead style : L Type L Straight long lead	L20C0	10 ± 1.0	20 min.	Bulk	Dmax. Tmax.	
Lead style : B Type B Straight long lead	BAMD0	10 ± 1.0	Refer to "4. Taping format"	Tap. Ammo	Dmax. Tmax.	
	L03B0	10 ± 1.0	3.0 ± 1.0		Dmax. Tmax.	
Lead style : L Type L Straight short lead	L4EB0	10 ± 1.0	4.5 ± 1.0	Bulk	e e	
	L05B0	10 ± 1.0	5.0 ± 1.0		ød L	
	D3EA0	10 ± 1.0	3.5 ± 0.5	D11-	Dmax. Tmax.	
Lead style : D Type D	D04A0	10 ± 1.0	4.0 ± 0.5	Bulk	4 max.	
Vertical kink lead	DAMD0	10 ± 1.0	Refer to "4. Taping format"	Tap. Ammo	Ød L L	
Lead style : X Type X	X3EA0	10 ± 1.0	3.5 ± 0.5		Dmax. Tmax.	
	X04A0	10 ± 1.0	4.0 ± 0.5	Bulk		
	X05B0	10 ± 1.0	5.0 ± 1.0		5.0max	
Outside kink lead	XAMD0	10 ± 1.0	Refer to "4. Taping format"	aping Tap. Ammo	Tap. Ammo	Ød L

^{*} Lead diameter Φd: 0.55 +/-0.05mm

^{*}e (Coating extension on leads): 3.0mm Max 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 P/N	T.C.	Capacitance(pF)	Tolerance		Dimens	sion (unit:n	nm)
SAI 1/IV	1.0.	Capacitance(pr)	Tolerance	D(max.)	T(max.)	F	Φd
CH*AH***C060*	CH(N P0)	2, 3,4, 5(pF)	±0.25pF	7.0			
SL*AH***J060*		10,12,15,18,20,22,24, 27,30,33, 36, 39(pF)		7.0			
SL*AH***J070*	SL*	47,50,51, 56,62(pF)	±5%	8.0			
SL*AH***J080*		68,75(pF)		9.0			
SL*AH***J090*		82,100(pF)		10.0			
YP*AH101K060*		100 pF		7.0	5.0	10±1	0.55+/-0.05
YP*AH151K060*		150 pF		7.0			
YP*AH221K060*		220 pF		7.0			
YP*AH331K060*	Y5P	330 pF	±10%	7.0			
YP*AH471K070*	131	470 pF		8.0			
YP*AH561K080*		560 pF		9.0			
YP*AH681K080*		680 pF		9.0			
YP*AH102K100*		1000 pF		11.0			
YU*AH681M060*		680 pF		7.0			
YU*AH102M070*		1000 pF		8.0			
YU*AH152M080*		1500 pF		9.0			
YU*AH222M090*	Y5U	2200 pF		10.0	5.0		
YU*AH332M110*		3300 pF		12.0			
YU*AH392M120*		3900 pF	±20%	13.0		10±1	0.55+/-0.05
YU*AH472M130*		4700 pF	±2070	14.0		10-1	0.55+/-0.05
YV*AH102M060*		1000pF		7.0			
YV*AH152M070*		1500pF		8.0			
YV*AH222M080*	Y5V	2200pF		9.0	5.5		
YV*AH332M100*		3300pF		11.0			
YV*AH472M110*		4700pF		12.0			

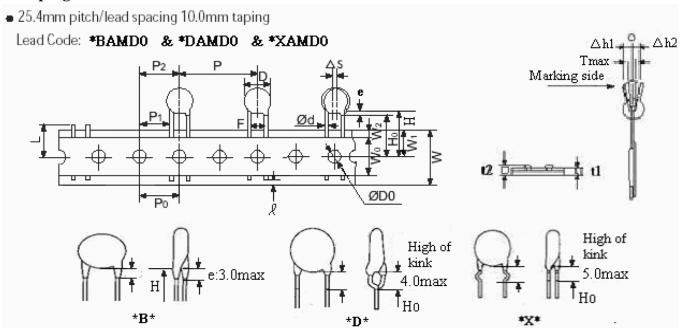
[•] The minimum thickness of coating (reinforced insulation) is 0.4mm.

3.2 Special design parts:

Part Number	Temp.	Cap.(pF) Tol.	Dimension (mm)				
Fart Number	Char.	Cap.(pF)	101.	D(max.)	T (max.)	F	Wire Dia. (φd)
YP *AH101K06S*		100		7.0			
YP *AH151K06S*		150		7.0			
YP *AH221K06S*		220		7.0			
YP *AH331K07S*	Y5P	330	±10%	8.0	6.0	10±1	0.55+/-0.05
YP *AH471K08S*		470		9.0			
YP *AH681K09S*		680		10.0			
YP *AH102K11S*		1000		12.0			
YU*AH681M07S*		680		8.0			
YU*AH102M07S*		1000		8.0			
YU*AH152M08S*		1500		9.0			
YU*AH222M09S*	Y5U	2200	±20%	10.0	6.0	10±1	0.55+/-0.05
YU*AH332M11S*		3300		12.0			
YU*AH392M12S*		3900		14.0			
YU*AH472M13S*		4700		14.0			

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

4. Taping Format:



POE Part Numb	oer	*BAMD0 / *DAMD0 / *XAMD0
Item	Symbol	Dimensions(mm)
Pitch of component	P	25.4 ± 2
Pitch of sprocket	P0	12.7 ± 0.3
Lead spacing	F	10.0 ± 1.0
Length from hole center to component center	P2	12.7 ± 1.5
Length from hole center to lead	P1	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
		18.0 +2.0/-0 (For: *DAMD0 & *XAMD0)
Lead distance between the bottom of body and the center of sprocket hole	Н	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 agrees tand	\triangle h1	2.0 max.
Deviation across tape	△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	3.0mm 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"

5. Marking:

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Mai Killg.					
1.Type Designation	AH				
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)	K				
5. Products ID	5:2015 6:2016 7:2017 ↓ : Manufa C:Pan c	year: ← 6 C 6 1234 - Epoxy resin co	ode: and Pb y resin est code	Last 4 digits of lot no. Manufacture month: 1:January 2:Feruary : 9:September 0:October N:November D:December	
6.Approved Monogram:					
(1) VDE approval mark	10 6 6 6	IEC 60384-14 Class Code: X1: 400V	√~ , Y1 :	250V~ or 400V~	
(2) UL approval mark	(6) DEMKO approval m		ark	D	
(3) CSA approval mark	(7) FIMKO approval ma		ırk (FI)		
(4) SEMKO approval mark	(\$)	(8) SEV approval mark		(\$	
(5) NEMKO approval mark	N	(9) CQC approval mark		@	
Normal	marking		YP*AH102K****		
Two sides	One side		(5	pecial marking)	
(for SAP part number 10-11 digits ≤ "07" products) OAH: (B) (F) (C) (S)		part number 10-11 : "08" products)	0АН	UK AH102K (10 PL) 250V~ (250V~ (11:250V~ (11:250V~	
1AH: X1:400V~ 6C61234 X1:400V~ 1:250V~ X1:400V~ X1:400V~ * Marking by the laser.	AH472M (VE) (D) (N) (F) (S) (Y1:250V~ (G) (P) (G) (G) (G) (G) (G)	AH472M (\$) (\$) (\$) (\$) (\$) X1:400V- (\$) (\$) (\$) Y1:400V- (\$) (\$)	1АН	UK AH102K (***) *********************************	
Warking by the laser.	1 C II 1	1 Dl. C			

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



6. Scope:

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

6.1Applicable safety standard

This specification applies to the VDE, SEV, SEMKO, FIMKO, NEMKO, DEMKO, KTL, UL, CSA approved ceramic capacitors disc type for antenna coupling, line-by-pass and across-the-line. X1, Y1 capacitor based on IEC384-14. "UL, CSA recognized capacitor for across-the-line, line-by-pass" and antenna-isolation.

6.2 Safety standards approval and recognized no.

Safety Standard	Standard No.	Subclass	w.v.	
UL	ANSI/UL 60384-14:2009	X1	400VAC	
	G L L L G G L	<u>Y1</u>	250VAC/400VAC	
CSA	CAN/CSA	X1	400VAC	
	E60384-14:2009	Y1	250VAC/400VAC	
VDE	EN 60384-14:2013	X1	400VAC	
(ENEC)	IEC60384-14:2013	Y1	250VAC/400VAC	
SEV	IEC60384-14:2013	X1	400VAC	
DL V	1200304-14.2013	Y1	250VAC/400VAC	
SEMKO	EN 60384-14:2013	X1	400VAC	
	EN 00304-14.2013	Y1	250VAC/400VAC	
FIMKO	EN 60384-14:2013	X1	400VAC	
		Y1	250VAC/400VAC	
NEMKO	EN 60384-14:2013	X1	400VAC	
NEWIKO	EN 00304-14.2013	Y1	250VAC/400VAC	
DEMKO	EN 60384-14:2013	X1	400VAC	
DEMIKO	EN 00384-14.2013	Y1	250VAC/400VAC	
CQC	GB/T 14472-1998	X1:400VAC /Y1:400VAC		
- CQC	OD/1 1 14 /2-1990	X1:400VAC /Y1:250VAC		
		X1	400VAC	
KTL	K60384-14:2006	Y1	250VAC	
		Y1	400VAC	



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 $15\sim35^{\circ}$ C, relative humidity $45\sim75\%$ and atmospheric pressure $860\sim1060$ hpa). 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 $20\pm2^{\circ}\text{C}$ or $25\pm2^{\circ}\text{C}$, relative humidity $60\sim70\%$ and atmospheric pressure $860\sim1060$ hpa.)

7.3 Performance:

No	Items		Performance	Testing method	
7.3.1	Appearance And dimension		The appearance and dimension shall be as given in section 3.		
7.3.2	Marking		The marking shall be easily legible. (As given section 5)		
		Between terminals	No failure.	The capacitors shall not be damage when AC4000V (rms.) are applied between the lead wires for 60sec. (Charge/Discharge current 50mA.)	
7.3.3	Dielectric Strength	Body Insulation	No failure.	First. The terminals of the capacitor shall be closely wrapped around the body of the capacitor distance of about 3 to 4mm from each terminal. Then, the capacitor shall be inserted into a container filled with metal balls of about 1mm diameter. Finally, AC4000V (rms.) is applied for 60sec between the capacitor lead wires and metal balls. (Charge/Discharge current 50mA.)	
7.3.4	Insulation Resistance	Between terminals	The insulation resistance shall be measured DC500±50V within 60±5sec of charging.		
7.3.5	Capa	apacitance Within specified tolerance.		Y5P&Y5U&Y5V: The capacitance shall be measured at 20±2°C with 1kHz±20% and 5V(rms.) or less.	
7.3.6	Dissipation Factor(tanδ) or Q		Y5P \ Y5U : D.F. \leq 2.5% Y5V : D.F. \leq 5.0% CH&SL : 30pF&above: \geq 1000 Below 30PF: \geq 400+20×C	CH&SL: The capacitance shall be measured at 25°C with 1MHz±20% and1.0±0.2Vrms	
7.3.7	Temperature Characteristic		Char. Capacitance Change Y5P Within $\pm 10\%$ Y5U Within $\pm \frac{20}{55}\%$ Y5V Within $-80 \sim +30\%$ CH 0 ± 60 ppm/°C $-1000 \sim +350$ SL ppm/°C $(+20$ °C $\sim +85$ °C)	The capacitance measurement shall be made at each step specified in Table 1.	
7.3.8	Solderability of Leads		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) $245\pm5^{\circ}$ C	





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	No	Items		Performance	Testing method
			Tensile	Lead wire shall not cut off. Capacitor shall not be broken.	With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; the tensile force of 10N shall be applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.
7.3.9	Robustness of Terminations	Bending	Lead wire shall not cut off. Capacitor shall not be broken.	With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; a mass applying a force of 5N is then suspended from the end of the termination. The body of the specimen is then inclined, within a period of 2 to 3sec, through an angle of approximately 90 in the vertical plane and then returned to its initial position over the same period of time; this operation constitutes one bend. One bend immediately followed by a second bend in the opposite direction.	
			Appearance	No marked defect.	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 2.0 mm from the root of terminal for 3.5 ± 0.5 sec (10 ± 1 sec. for 260 ± 1 °C).
			I.R.	1000 MΩ min.	
		Dielectric Strength	Per item7.3. 3	Thermal Capacitor	
	7.3.10	Soldering Effect (Non-Preheat)	Capacitance	Y5P,Y5U,Y5V: Within ±10 % SL,CH: Within±2.5% or ±0.25pF,Whichever is large.	Pre-treatment: Capacitor shall be stored at 85±2°C for 1hour then placed at *1 room condition for 24±2hours before initial measurements. Post-treatment: Capacitor shall be stored for 1 to 2hours at *1 room condition.
		Soldering Effect (On-Preheat)	Appearance	No marked defect.	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+0/-5 °C up to 1.5 to 2.0 mm from the root of terminal for 7.5+0/-1 sec. Thermal Capacitor Screen 1.5 Location 1.5 Location 2.0 mm
	7.3.11		I.R.	1000 MΩ min.	Molten Solder
	7.3.11		Dielectric Strength	Per item 7.3.3	Solder
			Capacitance	Y5P,Y5U,Y5V: Within ±10 % SL,CH: Within±2.5% or ±0.25pF,Whichever is large.	Pre-treatment: Capacitor shall be stored at 85±2°C for 1hour.then placed at **1room condition for 24±2hours before initial measurements. Post-treatment: Capacitor shall be stored for 1 to 2hours at **1room condition.



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No	Items		Performance	Testing method
		Appearance	No marked defect.	
7.3.12	Humidity (Under steady State) Humidity Loading	Capacitance	Y5P: Within ±10% Y5U: Within ±20% Y5V: Within ±30% SL&CH: Within±2.5% or ±0.25pF,Whichever is large.	1
		D.F.	Y5P,Y5U: 5.0% max. Y5V: 7.5% max.	condition.
		Q	SL&CH: Less than $30pF=>$ $Q \ge 100+10 \times C/3$ More than $30pF=>$ $Q \ge 200$	Apply the rated voltage for 500±12 hours at 40±2°C in
		I.R.	Y5P&Y5U&Y5V: 3000MΩ min. SL&CH: 1000MΩ min.	Apply the rated voltage for 500±12 hours at 40±2 € in 90 to 95% relative humidity and set it for 1 to 2 hours at *1 room condition.
		Dielectric Strength	Per Item 7.3.3	
		Appearance	No marked defect.	Impulse Voltage Each individual capacitor shall be subjected to 8kV
7.3.14	Life	Capacitance	Y5P&Y5U&Y5V: Within ±20% SL&CH: Within±3% or ±0.3pF,Whichever is large.	impulses for three times. After the capacitors are applied to life test. Fig. 2 VP UCR Cx tr td.
		I.R.	3000MΩ min. SL&CH: 1000MΩ min.	0.9Vp (vs) (vs) (vs) (vs) (vs) (vs) (vs) (vs)
		Dielectric Strength	Per Item 7.3 3	The specimen capacitors are placed in a circulating air oven for a period of 1000 hours. The air in the oven is maintained at a temperature of 125±3°C. Throughout the test, the capacitors are subjected to an AC425Vrms.(for 0AH type) or AC680Vrms.(for 1AH type) alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(rms.) for 0.1 sec.
7.3.15	Flame Test		The capacitor flame discontinues as follows. Cycle Time 1~4 30sec max. 5 60sec max.	The capacitor shall be subjected to applied for 15 sec and then removed for 15 sec until 5 cycles. Fig. 5 Capacitor Flame Gas Burmer (unit: mm)



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No		Items	Performance	Testing method
7.3.16	Active Flammability Passive Flammability		The cheesecloth shall not be on fire.	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 5 sec. The UAC shall be maintained for 2 min after the last discharge. Fig. 6 C1,2: 1µF±10% C1,2: 1µF±10% C3: 0.033µF±5% 10kV C4: 3µF±5% 10kV C5: C4 C6: C7 C7 C8 C8 C9 C9 C9 C9 C1,2: 1µF±10% C1,2: 1µF±10% C2 C3 C4 C4 C4 C4 C4 C4 C5 C4 C4 C4
7.3.17			The burning time shall not be exceeded the time 30 sec. The tissue paper shall not ignite.	The capacitor under test shall be held in the position which best promotes burning. Each specimen shall only be exposed once to flame. Time of exposure to flame: 30sec. Length of flame: 12±1mm Gas burner: Length 35mm min. Inside Dia.: 0.5±0.1mm Outside Dia.: 0.9mm max. Gas: Butane gas Purity 95% min. Fig. 7
7.3.18		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles,
		Char. Cap.	DF / Q	<temperature 5cycles="" cycle="" time:=""> Step Temperature(°C) Time(min)</temperature>
		Change SL, ≤±5% CH $Y5P$ ≤±10% $Y5U$ &±20% $X5V$	Q≥275+5/2C (C <30pF) Q≥350 (C≥30pF) DF≤5.0% DF≤7.5%	Pre-treatment: Capacitor shall be stored at 85±2°C for 1hour then placed at** 1
		I.R. 3000MΩ min.		Capacitor shall be stored for 1 to 2hours at *1room condition.
		Dielectric strength	Per Item 7.3.3	