

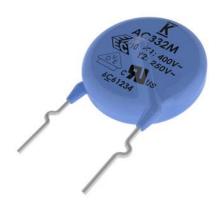
# Safety Standard Recognized, 900 Series, Encapsulated, AC Type, X1 400 VAC/Y2 250 VAC (Industrial Grade)

#### **Overview**

KEMET's 900 series encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution when needing to suppress line disturbances at the source.

Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to line (across-the-line) applications. In this application there is no danger of electric shock to humans should the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 400 VAC in line-to-line (Class X) and 250 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y2 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 5 KV (Y2) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V-0.



# **Ordering Information**

C9	8	1	U	103	M	Υ	V	D	Α	Α	7317
Ceramic Series	Body Diameter	Lead Spacing <sup>1,2,4</sup>	Spec.	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage	Dielectric/ Temp. Char.	Design	Lead Config. <sup>1,3,4</sup>	Failure Rate	Packaging (C-Spec)
C9 = Ceramic 900 Series	0 = 7.0 mm 1 = 8.0 mm 2 = 9.0 mm 3 = 10.0 mm 4 = 11.0 mm 6 = 13.0 mm 8 = 15.0 mm	5 = 5.0 mm 7 = 7.5 mm 1 = 10.0 mm	U = Safety	2 significant digits + number of zeroes	J = ±5% K = ±10% M = ±20%	Y = X1 400 VAC /Y2 250 VAC	S = SL Y = Y5P W = Y5U V = Y5V	D = Disc	A = Straight B = Vertical Kink C = Outside Kink D = Inside Kink	A = N/A	See "Packaging C-Spec Ordering Options Table" below

<sup>&</sup>lt;sup>1</sup> Due to a high risk of arcing, "Inside Kink" lead configuration cannot be combined with the 5 mm lead spacing option. The "Inside Kink" option is only available on capacitors with lead spacing of 7.5 mm or greater. A potential for arcing may exist when combining the "Inside Kink" lead configuration with a 7.5 mm lead spacing option, especially in high humidity environments and/or when exposure to voltages and transients may impact creepage and clearance requirements.

<sup>&</sup>lt;sup>2</sup> Capacitor body diameter will limit available lead spacing and packaging options. See "Dimensions" and "Product Ordering Codes and Ratings" sections of this document to determine availability.

<sup>&</sup>lt;sup>3</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.



# **Packaging C-Spec Ordering Options Table**

Packaging Type	Lead Length (mm) <sup>2,3</sup>	Packaging Ordering Code (C-Spec)
Ammo Pack	20.0 +1.5/-1.0 (straight leads) 18.0 +2.0/-0 (preformed leads¹)	7317
	3.0 ±1.0	WL30
	3.5 ±1.0	WL35
Bulk Bag	4.0 ±1.0	WL40
Bulk Bay	4.5 ±1.0	WL45
	5.0 ±1.0	WL50
	20.0 minimum⁴	WL20

<sup>&</sup>lt;sup>1</sup> Preformed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

# **Benefits**

- Safety Standard Recognized (IEC 60384-14)
- Reliable operation up to 125°C
- · Class X1/Y2
- 5.0 mm, 7.5 mm, and 10 mm lead spacing
- · Lead (Pb)-free and RoHS Compliant
- · Halogen Free
- Capacitance offerings ranging from 15 pF up to 4,700 pF
- Available capacitance tolerances of ±5%, ±10%, and ±20%
- · High reliability
- Preformed (crimped) or straight lead configurations
- · Non-polar device, minimizing installation concerns
- Encapsulation meets flammability standard UL 94V–0

# **Applications**

Typical applications include:

- · Line-to-line (Class X) filtering
- · Line-to-ground (Class Y) filtering
- Antenna coupling
- Primary and secondary coupling (switching power supplies)
- · Line disturbances suppression (motors and motor controls, relays, switching power supplies, and inverters)

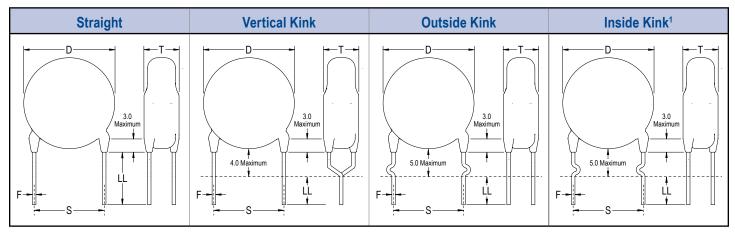
<sup>&</sup>lt;sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.



# **Lead Configurations**



<sup>&</sup>lt;sup>1</sup> Due to a high risk of arcing, the "Inside Kink" lead configuration option cannot me combined with 5 mm lead spacing ("F" dimension above). The "Inside Kink" option is only available on devices with lead spacing of 7.5 mm or 10 mm.

#### **Dimensions – Millimeters**

	Lead	F	Lead	D	Т	е	Ød
Lead Configuration	Configuration Ordering Code <sup>1</sup>	Lead Spacing <sup>2</sup>	Spacing Tolerance	Body Diameter <sup>2</sup>	Body Thickness	Lead Meniscus	Lead Diameter
		5.0	±0.8				
Straight	A	7.5	±1.0				
		10.0	±1.0				
		5.0	±0.8				
Vertical Kink (Preformed)	В	7.5	±1.0	See To	phla 1 -		
(1.1010111104)		10.0	±1.0	"Product Ord	rdering Codes	mavimim	0.55 ±0.1
		5.0	±0.8	and R	atings"	maximam	
Outside Kink (Preformed)	С	7.5	±1.0				
(1 10.0111104)		10.0	±1.0				
Inside Kink	D	7.5	±1.0				
(Preformed)	D	10.0	±1.0				

<sup>&</sup>lt;sup>1</sup>Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.



# **Approval Standard and Certification No.**

Safety Standard	Standard No.	Subclass	Working Voltage	Certificate No.
VDE	IEC 60384-14	X1	400 VAC	40036415
(ENEC)	IEC 00304-14	Y2	250 VAC	40030413

These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384-14.

# **Environmental Compliance**

These devices are Halogen Free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



# **General Specifications/Performance Characteristics**

Dielectric/Temperature Characteristic	SL	Y5P	Y5U	Y5V
Operating Temperature Range:	-40°C to +125°C			
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	-1,000 ~ +350 ppm/°C	±10%	+20%/-55%	~ +30%/-80%
Dielectric Withstanding Voltage (7.5 mm and 10 mm Lead Spacing) <sup>1</sup>	2,600 VAC (60 ±5 seconds at 25°C)			
Dielectric Withstanding Voltage (5 mm Lead Spacing) <sup>1</sup>	2,000 VAC (60 ±5 seconds at 25°C)			
Quality Factor (Q)	30 pF and above: ≥ 1,000 Below 30 pF: ≥ 400 +(20xC)*	See "Dissination Factor"		
Dissipation Factor (tanδ) at +25°C1	See "Quality Factor"         2.50%         2.50%			5.0%
Insulation Resistance (IR) Limit at +25°C	10,000 MΩ Minimum (500 VDC applied for 60 ±5 seconds @ 25°C)			

<sup>\*</sup>C = Nominal capacitance

SL: 1 MHz  $\pm$  100 kHz and 1.0  $\pm$ 0.2 Vrms

X5P, Y5U and Y5V: 1 kHz  $\pm$  50 Hz and 1.0  $\pm$ 0.2 Vrms

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

<sup>&</sup>lt;sup>1</sup> The distance between the adjacent leads of the component (also referred to as "lead spacing") governs Dielectric Withstanding Voltage (DWV) limit.

<sup>&</sup>lt;sup>2</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:



# **Table 1 – Product Ordering Codes and Ratings**

Dielectrie				Din	nensions (mn	1)	Lead S	pacing	
Dielectric/ Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Bulk Packaging	Ammo Packaging	
	C90(1)U100JYSD(2)A(3) C90(1)U120JYSD(2)A(3)	10 pF 12 pF							
	C90(1)U150JYSD(2)A(3)	15 pF							
İ	C90(1)U180JYSD(2)A(3)	18 pF	18 pF 20 pF						
	C90(1)U200JYSD(2)A(3)								
	C90(1)U220JYSD(2)A(3)	22 pF							
	C90(1)U240JYSD(2)A(3)	24 pF		7.0					
	C90(1)U270JYSD(2)A(3)	27 pF		7.0					
	C90(1)U300JYSD(2)A(3) C90(1)U330JYSD(2)A(3)	30 pF 33 pF					5 m	nm,	
SL	C90(1)U360JYSD(2)A(3)	36 pF	±5%		5.0	0.55 ±0.1	7.5 :		
02	C90(1)U390JYSD(2)A(3)	39 pF	10/0		0.0	0.00 ±0.1		r	
	C90(1)U470JYSD(2)A(3)	47 pF					10	mm	
	C90(1)U500JYSD(2)A(3)	50 pF							
	C90(1)U510JYSD(2)A(3)	51 pF	ĺ						
	C91(1)U560JYSD(2)A(3)	56 pF							
	C91(1)U620JYSD(2)A(3)	62 pF		8.0					
	C91(1)U680JYSD(2)A(3)	68 pF							
	C91(1)U750JYSD(2)A(3)	75 pF							
	C92(1)U820JYSD(2)A(3)	82 pF		9.0					
	C93(1)U101JYSD(2)A(3)	100 pF		10.0	<u> </u>				
	C90(1)U101KYYD(2)A(3)	100 pF							
	C90(1)U151KYYD(2)A(3)	150 pF							
	C90(1)U221KYYD(2)A(3)	220 pF	7.0	j j	r				
	C90(1)U331KYYD(2)A(3)	330 pF					5 m 7.5 i		
Y5P	C90(1)U471KYYD(2)A(3)	470 pF	±10%		5.0	0.55 ±0.1		or	
	C91(1)U561KYYD(2)A(3)	560 pF		8.0			10		
	C91(1)U681KYYD(2)A(3)	680 pF							
	C92(1)U821KYYD(2)A(3) C92(1)U102KYYD(2)A(3)	820 pF 1,000 pF		9.0					
	C32(1)O102R11D(2)A(3)	1,000 μι		L	<u> </u>	<u> </u>			
	C90(1)U102MYWD(2)A(3)	1,000 pF		7.0					
	C92(1)U152MYWD(2)A(3)	1,500 pF					5 mm, 7.5 m	m, or 10 mm	
Y5U	C92(1)U222MYWD(2)A(3)	2,200 pF	±20%	9.0	5.0	0.55 ±0.1			
130	C94(1)U332MYWD(2)A(3)	3,300 pF	±2U /0	11.0	3.0	0.55 ±0.1		7.5 mm or 10 mm	
	C96(1)U392MYWD(2)A(3)	3,900 pF		13.0			7.5 mm or 10 mm	10 mm only	
	C96(1)U472MYWD(2)A(3)	4,700 pF			L				
	C90(1)U102MYVD(2)A(3)	1,000 pF			<u> </u>				
	C90(1)U152MYVD(2)A(3)	1,500 pF		7.0					
	C90(1)U222MYVD(2)A(3)	2,200 pF				0.55 ±0.1	5 mm, 7.5 m	m, or 10 mm	
VEV	C92(1)U332MYVD(2)A(3)	3,300 pF	. 200/	9.0	E ^				
Y5V	C94(1)U392MYVD(2)A(3)	3,900 pF	±20%	11.0	5.0			7.5 mm or 10 mm	
	C94(1)U472MYVD(2)A(3)	4,700 pF					7.5 mm or 10 mm	MIII VI 10 IIIIII C.1	
	C96(1)U682MYVD(2)A(3)	6,800 pF		13.0			7.5 11111 01 10 111111	10 mm only	
	C98(1)U103MYVD(2)A(3)	10,000 pF		15.0					
			Camasitanas	Dady Diameter	Dady Thickers				
	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Lead S	pacing	
(1) To muon out to			I IOICIAIICE	(maxillulli)	<u> </u>	L			

<sup>(1)</sup> To properly complete ordering code, insert the one-digit numeric code to reflect required lead spacing: (Note that select capacitance values and packaging options may limit lead spacing availability. See table above to verify availability.) 5 = 5.0 mm 7 = 7.5 mm

 $<sup>1 = 10.0 \,</sup> mm$ 

<sup>(2)</sup> To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)

A = Straight

B = Vertical Kink

C = Outside Kink

D = Inside Kink (not available with 5 mm lead spacing option)

<sup>(3)</sup> To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.



Ite	em	Specif	ication	Test Method				
Operating Tem	perature Range			-40°C to +125°C				
	Between lead wires	No fa	ilures	The capacitor shall not be damaged when voltage is applied between the lead wires for 60 seconds.  2,000 VAC(rms) - 5.0 mm lead spacing  2,600 VAC(rms) - 7.5 mm and 10 mm lead spacing				
Dielectric Strength	Body Insulation	No failures		The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 2,600 VAC(rms) is applied for 60 seconds between the capacitor lead wires and metal balls.				
Insulation Re	esistance (IR)	10,000 MΩ	Ω minimum	The ir	sulation resi 30 ±5 second	stance shall be meas is of charging.	ured with 500 ±50 VDC applied	
Сарас	citance	Within specif	fied tolerance					
		Temperature Characteristics	Specification					
		Y5P, Y5U	DF ≤ 2.5%	Y5P, Y5U and Y5V: Capacitance is measured at 1 kHz ±20% and 5 Vrms or less. (20 ±2°C)				
Dissipation Fa	actor (DF) or Q	Y5V	DF ≤ 5.0%	Vrms of less. (20 ±2°C) SL: Capacitance is measured at 1 MHz ±20% and 1.0 ±0.2 Vrms (25°C)				
·		SL	≥ 30 pF: Q ≥ 1000 < 30 pF: Q ≥ 400 +(20 x C) C = Nominal capacitance					
				A cap	acitance mea	asurement is made at	each step specified:	
		Temperature	Capacitance Change	,	Step	Temperature		
		Characteristics			1	+20 ±2°C		
		Y5P	Within ±10%		2	-25 ±2°C		
Temperature (	Characteristics	Y5U	Within +20%/-55%		3	+20 ±2°C		
		Y5V	Within ~+30%/-80%		4	+85 ±2°C		
		SL	-1,000 ~+350 ppm°C		5	+20 ±2°C		
			(+20°C ~+85°C)	Pre-treatment: Capacitor is stored at 85 ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before measurement.				
	Tensile Lead wire or capa		r body shall not break.	body tensile	n such a ma e force of 10	nner that the axis of t N is applied to the ter	on, the specimen is held by its he termination is vertical; a mination in the direction of its the body of the specimen.	
Terminal Strength	Bending	Lead wire or capacito	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 force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed 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.					
Solde	rability	solder in the axial direct	e a uniform coating of ction and over 3/4 of its ference.	The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.  Solder Temperature: Lead free solder (Sn-3Ag = 0.5Cu) 245°C ±5°C.				

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specif	ication	Test N	Method	
	Appearance	No visua	al defect	As shown in the figure below, the le solder up to 1.5 mm (+5/-0 mm) from	ad wires are immersed in molten	
	IR	1,000	) ΜΩ	(root of lead wire). Duration/Solder Temperature: 3.5 ±	:0.5 seconds/350°C ±10°C or 10 ±1	
	Dielectric Strength	Per it	tem 1	seconds/260°C ±5°C  Thermal Capacitor		
Soldering Effect (Non-Preheat)	Capacitance	Y5P, Y5U and Y5V: Within ±10% SL: Within ±2.5% or ±0.25 pF, whichever is larger.		Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.		
	Appearance	No visua	al defect	Capacitor is stored at 120°C +0/-5°		
	IR	1,000	) ΜΩ	up to 1.5 mm (+5/-0mm) from the er	wires are immersed in molten solder and of the epoxy meniscus (root of	
	Dielectric Strength	Per it	tem 1	lead wire). Duration/Solder Temperature: 7.5 +0/-1 seconds/260°C ±5°C		
Soldering Effect (Preheat)	Capacitance		5V: Within ±10% £0.25 pF, whichever is ger.	Thermal Capacitor Screen  1.5  1.5  Molten Solder  Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.		
	Appearance	No visua	al defect	Steady State Humidity:	Load Humidity:	
		Temperature Characteristics	Capacitance Change			
		Y5P	Within ±10%			
	Capacitance	Y5U	Within ±20%			
		Y5V	Within ±30%			
Biased Humidity		SL	Within ±2.5% or ±0.25 pF, whichever is larger.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours. Post Treatment:	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.	
	DF	Y5P and Y5U: Y5V: 7.5%	5.0% maximum maximum	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .	Post Treatment: Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .	
	Q	SL: Less than 30 pF: Q ≥ 100 + 10 × C/3 More than 30 pF: Q ≥ 200 C = Nominal capacitance			nouis acrosm condition.	
	IR	Y5P, Y5V and Y5U:	$3,000~\text{M}\Omega$ minimum $1\Omega$ minimum			
	Dielectric Strength	No fa				

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specification	Test Method		
	Appearance Capacitance Change	No visual defect  Y5P, Y5V and Y5U: Within ±20%  SL: Within ±3 or ±0.3 pF,  whichever is larger.  3,000 MΩ minimum  SL: 1,000 MΩ minimum	Impulse Voltage: Each individual capacitor is subjected to three 5 kv impulses prior to life testing.    Cx tr td (uF) (uS) (uS) (uS) (uS) (uS) (uS) (uS) (uS		
High Temperature Life	Dielectric Strength	No failures	Capacitors are placed in a circulating air oven for a period of 1,000 hours. The air in the oven is maintained at a temperature of 125°C ±2 throughout the test. The capacitors are subjected to AC 425 Vrms. Each hour the voltage is increased to AC 1,000 Vrms for 0.1 seconds.		
Flame	The capacitor flame extinguishes as follows:    Cycle Time   1 ~ 4 30 seconds maximum   5 60 seconds maximum		The capacitor is exposed to a flame for 15 seconds and then removed for 15 seconds. This test is repeated for 5 cycles.  Capacitor Flame  Gas Burner  (Unit:mm)		
			The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.		
Active Flammability		The cheesecloth should not ignite.	$ \begin{array}{ c c c c c c c c } \hline C_{1,2} & 1 \ \mu F \pm 10\% & C_3 & 0.033 \ \mu F \pm 5\% \ 10 \ kV \\ \hline L_{1.4} & 1.5 \ Mh \pm 20\% \ 16A \ Rod \ core \ choke & Cx & Test \ capacitor \\ \hline R & 100 \pm 2\% & V_{_{AC}} & VR \pm 5\% \\ \hline Ct & 3 \ \mu F \pm 5\% \ 10 \ kV & V_{_{R}} & Rated \ Voltage \\ \hline F & Fuse, \ Rated \ 10A & Vt & Voltage \ applied \ to \ Ct \\ \hline \end{array} $		
			Vx SkV time		

 $<sup>^1</sup>$  "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	em	Specifi	ication		Test Me	thod		
Passive Flammability		The burning time should not exceed 30 seconds. The tissue paper should not ignite.		Time of exposure to flame:  Length of flame:  Gas burner length:  Inside diameter:  Outside diameter:  Outside diameter:  Gas butane gas purity:  95% minimum  10 a flame and in a position which best promotes time.  Test Specimen  Test Specimen  30 seconds  12 ±1 mm  Gas burner length:  0.5 ±0.1 mm  Outside diameter:  0.9 mm maximum  Gas butane gas purity:  95% minimum				
	Appearance	No visua	al defect					
	Capacitance	Temperature Characteristics	Capacitance Change	The capacitor is subjected to 5 temperature cycles.  Temperature Cycle				
		SL Y5P Y5U, Y5V	Within ±5% Within ±10% Within ±20%	Step	Temperature (°C)	Dwell Time (minutes)	Transition Time (minutes)	
Temperature		SL	≥ 30 pF: Q ≥ 350	1	-40 +0/-3	30	,	
Cycle			< 30 pF: Q ≥ 275	2	Room temperature	3		
			+5/2C C = Nominal	3	125 +3/-0	30	3	
	DF/Q		capacitance	4	Room temperature	3		
		Y5P Y5U, Y5V	DF ≤ 5% DF ≤ 7.5%	Pre-treatment: Capacitor shall be stored at 85 ±2 for 1 hour then		1 hour then		
		100, 100	DI = 1.570	placed at roop Post-treatm	om condition <sup>1</sup> for 24 ±2 honent: Capacitor is stored for	urs. or 1 to 2 hours at	room condition1.	
	IR	3,000 ΜΩ	minimum		•			
	Dielectric No failures Strength							

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



# **Soldering and Mounting Information**

#### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

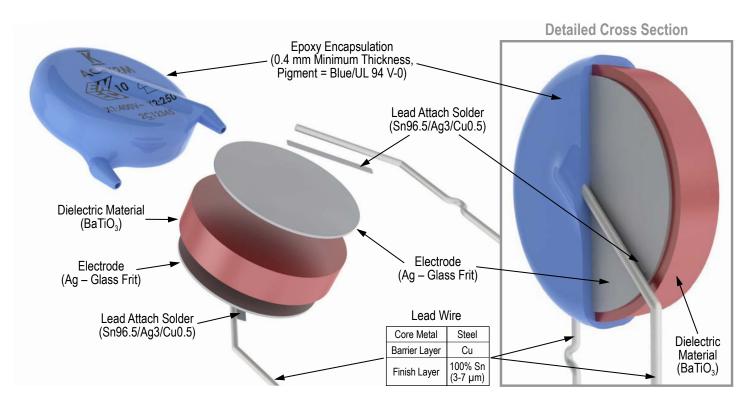
- Temperature of iron-tip: 400°C maximum
- · Soldering iron wattage: 50 W maximum
- · Soldering time: 3.5 seconds maximum

#### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- · Rinse bath capacity: Output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

#### Construction

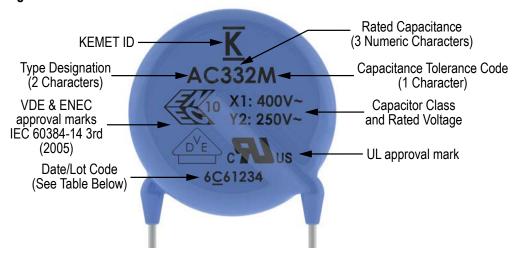




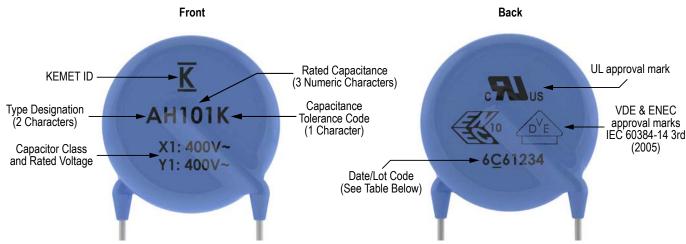
# Marking

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two sided marking is limited to capacitors with body diameters ≤ 8.0 mm.)

#### Single Sided



#### **Double Sided**



Date/Lot Code Explanation

6	<u>C</u>	6	1234
Last digit of year, e.g., 6 = 2016	Manufacturing Location Code	Manufacturing Month:  1-9 = Jan - Sept A = October N = November D = December	Last 4 digits of lot no.



# **Packaging Quantities**

Capacitor		Bulk Bag	Ammo Pack (Carrier Tap		oe)		
Body Diameter			Component pitch on carrier tape <sup>2</sup>				
(mm)	Code	(Loose)	12.7 mm				
7.0	0						
8.0	1						
9.0	2				1,000 pieces/box		
10.0	3						
11.0	4	500 pieces/bag	1,000 pi	eces/box			
12.0	5						
13.0	6						
14.0	7				500 pieces/box		
15.0	8						

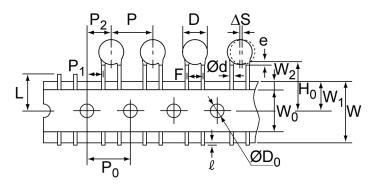
<sup>&</sup>lt;sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

<sup>&</sup>lt;sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.



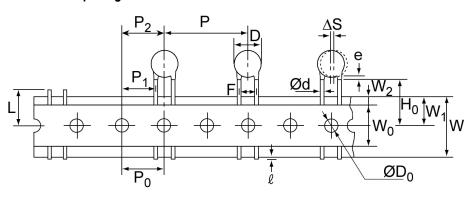
# Figure 1 - Ammo Pack Taping Format

# 5 mm and 7.5 mm Lead Spacing:



# 

#### 10 mm Lead Spacing:



**Table 3 – Ammo Pack Taping Specifications** 

Lead Spacing	Lead Spacing		5 mm 7.5 mi		mm	10 mm	
Lead Style		Straight	ight Preformed¹ Straight Preformed¹ Straight Preformed				Preformed <sup>1</sup>
Item	Symbol			Dimensi	ons (mm)		
Lead Spacing	F	5.0 +0	0.8/-0.2	7.5	±1.0	10.0	±1.0
Component Pitch	Р	12	2.7	15.0		25.4 ±2	
Sprocket Hole Pitch	P <sub>0</sub>	12.7 ±0.3		15.0 ±0.3		12.7 ±0.3	
Sprocket Hole Center to Component Center	P <sub>2</sub>	6.35	i ±1.5	7.5 ±1.5		12.7 ±1.5	
Sprocket Hole Center to Lead Center	P <sub>1</sub>	3.75	±1.0	3.75 ±1.0		7.7 ±1.5	
Body Diameter	D		See "Product Or	dering Codes and	Ratings" section of	of this document.	
Component Alignment (side/side)	ΔS	0 ±2.0					
Carrier Tape Width	W	18.0 +1.0/-0.5					
Sprocket Hole Position	W <sub>1</sub>			9.0	±0.5		

<sup>&</sup>lt;sup>1</sup>Prefromed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



# Table 3 - Ammo Pack Taping Specifications cont'd

Lead Spacing		5 r	nm	7.5 mm		10 mm	
Lead Style		Straight	Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>
Item	Symbol			Dimensi	ons (mm)		
Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> )	H <sub>o</sub>	N/A	18.0 +2.0/-0	N/A	18.0 +2.0/-0	N/A	18.0 +2.0/-0
Height to Seating Plane <sup>2</sup> (straight leads)	Н	20.0 +1.5/-1.0	N/A	20.0 +1.5/-1.0	N/A	20.0 +1.5/-1.0	N/A
Lead Protrusion	ł	2.0 maximum					
Diameter of Sprocket Hole	D <sub>0</sub>	4.0 ±0.2					
Lead Diameter	φd	0.55 ±0.1					
Carrier Tape Thickness	t <sub>1</sub>			0.6	±0.3		
Total Thickness (Carrier Tape, Hold-Down Tape and Lead)	t <sub>2</sub>			1.5 ma	aximum		
Component Alignment (front/back )	$\Delta h_1$ $\Delta h_2$			2.0 ma	aximum		
Cut Out Length	L			11.0 m	aximum		
Hold-Down Tape Width	W <sub>o</sub>	11.0 m	inimum		11.5 m	inimum	
Hold-Down Tape Position	W <sub>2</sub>	3.0 maximum 1.5 ±1.5					
Coating Extension on Leads (meniscus)	е	3.0 maximum for straight lead; not to exceed the bend for preformed lead configurations.					
Body Thickness	T		See "Product Or	dering Codes and	Ratings" section	of this document.	

<sup>&</sup>lt;sup>1</sup>Prefromed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

# **Application Notes:**

#### **Storage and Operating Conditions:**

The insulating coating of these devices does not form an air and moisture-tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt, or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees Centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

#### **Working Voltage:**

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

#### **Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

#### **Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.



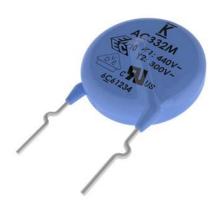
# Safety Standard Recognized, 900 Series, Encapsulated, AC Type, X1 440 VAC/Y2 300 VAC (Industrial Grade)

#### **Overview**

KEMET's 900 Series encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution in situations where there is a need to suppress line disturbances at the source.

Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to-line (across-the-line) applications. In this application there is no danger of electric shock to humans should the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 440 VAC in line-to-line (Class X) and 300 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y2 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 5 KV (Y2) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V–0.



# **Ordering Information**

C9	7	1	U	472	M	Z	W	D	Α	Α	7317
Ceramic Series	Body Diameter	Lead Spacing <sup>1,2,4</sup>	Spec.	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage	Dielectric/ Temp. Char.	Design	Lead Config. <sup>1,3,4</sup>	Failure Rate	Packaging (C-Spec)
C9 = Ceramic 900 Series	0 = 7.0 mm 1 = 8.0 mm 2 = 9.0 mm 3 = 10.0 mm 4 = 11.0 mm 6 = 13.0 mm 8 = 15.0 mm	7 = 7.5 mm 1 = 10.0 mm	U = Safety	2 significant digits + number of zeroes	J = ±5% K = ±10% M = ±20%	Z = X1 440 VAC /Y2 300 VAC	S = SL Y = Y5P W = Y5U V = Y5V	D = Disc	A = Straight B = Vertical Kink C = Outside Kink D = Inside Kink	A = N/A	See "Packaging C-Spec Ordering Options Table" below

<sup>&</sup>lt;sup>1</sup> Due to a high risk of arcing, "Inside Kink" lead configuration cannot be combined with the 5 mm lead spacing option. The "Inside Kink" option is only available on capacitors with lead spacing of 7.5 mm or greater. A potential for arcing may exist when combining the "Inside Kink" lead configuration with a 7.5mm lead spacing option, especially in high humidity environments and/or when exposure to voltages and transients may impact creepage and clearance requirements.

<sup>&</sup>lt;sup>2</sup> Capacitor body diameter will limit available lead spacing and packaging options. See "Dimensions" and "Product Ordering Codes and Ratings" sections of this document to determine availability.

<sup>&</sup>lt;sup>3</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.



# **Packaging C-Spec Ordering Options Table**

Packaging Type	Lead Length (mm) <sup>2,3</sup>	Packaging Ordering Code (C-Spec)
Ammo Pack	20.0 +1.5/-1.0 (straight leads) 18.0 +2.0/-0 (preformed leads¹)	7317
	3.0 ±1.0	WL30
	3.5 ±1.0	WL35
Pulk Pog	4.0 ±1.0	WL40
Bulk Bag	4.5 ±1.0	WL45
	5.0 ±1.0	WL50
	20.0 minimum⁴	WL20

<sup>&</sup>lt;sup>1</sup> Preformed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

# **Benefits**

- Safety Standard Recognized (IEC 60384-14)
- · Reliable operation up to 125°C
- · Class X1/Y2
- 7.5 mm and 10 mm lead spacing
- · Lead (Pb)-free and RoHS Compliant
- · Halogen Free
- Capacitance offerings ranging from 15 pF up to 4,700 pF
- Available capacitance tolerances of ±5%, ±10%, and ±20%
- · High reliability
- Preformed (crimped) or straight lead configurations
- · Non-polar device, minimizing installation concerns
- Encapsulation meets flammability standard UL 94V–0

# **Applications**

Typical applications include:

- Line-to-line (Class X) filtering
- · Line-to-ground (Class Y) filtering
- Antenna coupling
- Primary and secondary coupling (switching power supplies)
- Line disturbances suppression (motors and motor controls, relays, switching power supplies, and inverters)

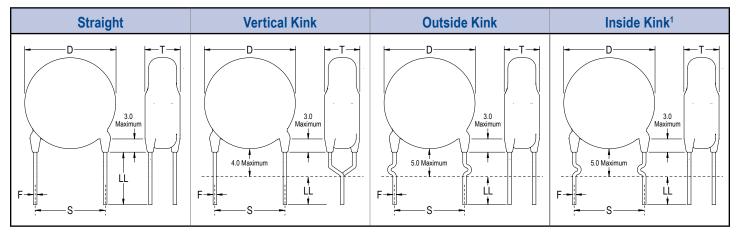
<sup>&</sup>lt;sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.



# **Lead Configurations**



<sup>&</sup>lt;sup>1</sup> Due to a high risk of arcing, the "Inside Kink" lead configuration option cannot be combined with 5 mm lead spacing ("F" dimension above). The "Inside Kink" option is only available on devices with lead spacing of 7.5 mm or 10 mm.

# **Dimensions - Millimeters**

Lead Configuration	Lead Configuration Ordering Code <sup>1</sup>	F Lead Spacing <sup>2</sup>	Lead Spacing Tolerance	D Body Diameter <sup>2</sup>	T Body Thickness	e Lead Meniscus	Ød Lead Diameter
Ctroight	A	7.5	±1.0				
Straight	A	10.0	±1.0				
Vertical Kink	В	7.5	±1.0			3.0 maximum	0.55 ±0.1
(Preformed)	В	10.0	±1.0		able 1 -		
Outside Kink	0	7.5	±1.0		dering Codes atings"		
(Preformed)	С	10.0	±1.0				
Inside Kink	D	7.5	±1.0				
(Preformed)	D	10.0	±1.0				

<sup>&</sup>lt;sup>1</sup>Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.



# **Approval Standard and Certification No.**

Safety Standard	Standard No.	Subclass	Working Voltage	Certificate No.
VDE	IEC 60394 14	X1	440 VAC	40036415
(ENEC)	(ENEC) IEC 60384-14		300 VAC	40030413

These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384-14.

# **Environmental Compliance**

These devices are Halogen Free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



# **General Specifications/Performance Characteristics**

Dielectric/Temperature Characteristic	SL	Y5P	Y5U	Y5V
Operating Temperature Range:		-40°C to	+125°C	
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	-1,000 ~ +350 ppm/°C	±10%	+20%/-55%	~ +30%/-80%
Dielectric Withstanding Voltage (7.5 mm and 10 mm Lead Spacing)	2,600 VAC (60 ±5 seconds at 25°C)			
Quality Factor (Q)	(Q) $ \begin{array}{c} 30 \text{ pF and above:} \\ \geq 1,000 \\ \text{Below } 30 \text{ pF:} \geq 400 \\ +(20\text{xC})^* \end{array} $ See "Dissipation Factor"			
Dissipation Factor (tanδ) at +25°C¹	See "Quality Factor"	2.50%	2.50%	5.0%
Insulation Resistance (IR) Limit at +25°C	10,000 MΩ Minimum (500 VDC applied for 60 ±5 seconds @ 25°C)			

<sup>\*</sup>C = Nominal capacitance

SL: 1 MHz  $\pm$  100 kHz and 1.0  $\pm$ 0.2 Vrms

X5P, Y5U and Y5V: 1 kHz  $\pm$  50 Hz and 1.0  $\pm$ 0.2 Vrms

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

<sup>&</sup>lt;sup>2</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:



# Table 1 – Product Ordering Codes and Ratings

Dielectric/				Din	nensions (mm	1)	Lead S	pacing
Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Bulk Packaging	Ammo Packaging
	C90(1)U100JZSD(2)A(3)	10 pF						
	C90(1)U120JZSD(2)A(3) C90(1)U150JZSD(2)A(3)	12 pF 15 pF						
	C90(1)U180JZSD(2)A(3)	18 pF						
	C90(1)U200JZSD(2)A(3)	20 pF						
	C90(1)U220JZSD(2)A(3)	22 pF						
	C90(1)U240JZSD(2)A(3)	24 pF						
	C90(1)U270JZSD(2)A(3)	27 pF		7.0				
	C90(1)U300JZSD(2)A(3)	30 pF	±5%					
	C90(1)U330JZSD(2)A(3)	33 pF					7.5	
SL	C90(1)U360JZSD(2)A(3)	36 pF			5.0	0.55 ±0.1		or
	C90(1)U390JZSD(2)A(3)	39 pF					10	mm
	C90(1)U470JZSD(2)A(3) C90(1)U500JZSD(2)A(3)	47 pF 50 pF						
	C90(1)U510JZSD(2)A(3)	50 pF						
	C91(1)U560JZSD(2)A(3)	56 pF	-					
	C91(1)U620JZSD(2)A(3)	62 pF						
	C91(1)U680JZSD(2)A(3)	68 pF		8.0				
	C91(1)U750JZSD(2)A(3)	75 pF						
	C92(1)U820JZSD(2)A(3)	82 pF		9.0				
	C93(1)U101JZSD(2)A(3)	100 pF		10.0				
	000(4)114041(7)(D(0) A(0)	400 5				ı		
	C90(1)U101KZYD(2)A(3) C90(1)U151KZYD(2)A(3)	100 pF 150 pF					7.5 mm or 10 mm	
	C90(1)U221KZYD(2)A(3)	220 pF		7.0				
	C90(1)U331KZYD(2)A(3)	330 pF		7.0		0.55 ±0.1		
Y5P	C90(1)U471KZYD(2)A(3)	470 pF	±10%		5.0			
	C91(1)U561KZYD(2)A(3)	560 pF	=		0.0			
	C91(1)U681KZYD(2)A(3)	680 pF		8.0				
	C92(1)U821KZYD(2)A(3)	820 pF		9.0				
	C92(1)U102KZYD(2)A(3)	1,000 pF		3.0				
	000/4)14004477470(0)4/0)	1000 5		7.0		1		
	C90(1)U102MZWD(2)A(3)	1,000 pF		7.0				
	C92(1)U152MZWD(2)A(3) C92(1)U222MZWD(2)A(3)	1,500 pF 2,200 pF		9.0				7.5 mm or 10 mm
Y5U	C94(1)U332MZWD(2)A(3)	3,300 pF	±20%	11.0	5.0	0.55 ±0.1	7.5 mm or 10 mm	
	C96(1)U392MZWD(2)A(3)	3,900 pF						
	C96(1)U472MZWD(2)A(3)	4,700 pF		13.0				10 mm only
	C90(1)U102MZVD(2)A(3)	1,000 pF						
	C90(1)U152MZVD(2)A(3)	1,500 pF		7.0				
	C90(1)U222MZVD(2)A(3)	2,200 pF	±20%	0.0				7.5 mm or 10 mm
Y5V	C92(1)U332MZVD(2)A(3) C94(1)U392MZVD(2)A(3)	3,300 pF 3,900 pF		9.0	5.0	0.55 ±0.1	7.5 mm or 10 mm	
	C94(1)U392MZVD(2)A(3)	4,700 pF		11.0				
	C96(1)U682MZVD(2)A(3)	6,800 pF		13.0				
	C98(1)U103MZVD(2)A(3)	10,000 pF		15.0				10 mm only
	(, (-)	,						
	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Lead S	pacing

 <sup>(1)</sup> To properly complete ordering code, insert the one-digit numeric code to reflect required lead spacing: (Note that select capacitance values and packaging options may limit lead spacing availability. See table above to verify availability.)
 7 = 7.5 mm
 1 = 10.0 mm
 (2) To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)
 A = Straight
 B = Vartical Kink

B = Vertical Kink

C = Outside Kink

D = Inside Kink

<sup>(3)</sup> To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.



Ite	em	Specif	ication		Test Meth	nod		
Operating Temp	perature Range			-40°C to +125°	C			
	Between lead wires	No fa	illures	The capacitor shall between the lead w	I not be damaged who vires for 60 seconds.	en 2,600 VAC(rms) is applied		
Dielectric Strength	Body Insulation	No failures		The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 2,600 VAC(rms) is applied for 60 seconds between the capacitor lead wires and metal balls.		intly or at a erminal. Intainer Metal m in 60		
Insulation Re			The insulation resignation from after 60 ±5 second		ured with 500 ±50 VDC applied			
Capac	itance	Within specif	fied tolerance		<u>, , , , , , , , , , , , , , , , , , , </u>			
		Temperature Characteristics	Specification					
	Dissipation Factor (DF) or Q		DF ≤ 2.5%	Y5P, Y5U and Y5V: Capacitance is measured at 1 kHz ±20% and 5				
Dissination Fa			DF ≤ 5.0%	Vrms or less. (20 ±2°C) SL: Capacitance is measured at 1 MHz ±20% and 1.0 ±0.2 Vrms				
Bioopation			≥ 30 pF: Q ≥ 1000 < 30 pF: Q ≥ 400 +(20 x C) C = Nominal capacitance	(25°C)				
				A capacitance measurement is made at each step specified:				
		Temperature Characteristics	-	Step 1	Temperature +20 ±2°C			
		Y5P	Within ±10%	2	-25 ±2°C			
Temperature (	Characteristics	Y5U	Within +20%/-55%	3	+20 ±2°C			
		Y5V	Within ~+30%/-80%	4	+85 ±2°C			
		SL	-1,000 ~+350 ppm°C	5	+20 ±2°C			
			(+20°C ~+85°C)	Pre-treatment: Capacitor is stored at 85 ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before measurement.				
	Tensile	Lead wire or capacitor body shall not break.		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 tensile force of 10 N is applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.				
Terminal Strength	Bending Lead wire or capacitor body shall not break.		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 force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed 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.					
Solder	Solderability		e a uniform coating of ction and over 3/4 of its ference.	The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.  Solder Temperature: Lead free solder (Sn-3Ag – 0.5Cu) 245°C ±5°C.				

<sup>1 &</sup>quot;Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specif	ication	Test N	Method		
	Appearance	No visua	al defect	As shown in the figure below, the le solder up to 1.5 mm (+5/-0 mm) fror	ad wires are immersed in molten		
	IR	1,000	) ΜΩ	(root of lead wire).  Duration/Solder Temperature: 3.5 ±0.5 seconds/350°C ±10°C or 10 ±1			
	Dielectric Strength	Per item 1		seconds/260°C ±5°C  Thermal Capacitor			
Soldering Effect (Non-Preheat)	Capacitance	SL: Within ±2.5% or ±	5V: Within ±10% £0.25 pF, whichever is ger.	Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements. Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.			
	Appearance	No visual defect		Capacitor is stored at 120°C +0/-5°	°C for 60 +0/-5 seconds. Then, as wires are immersed in molten solder		
	IR	1,000 ΜΩ		up to 1.5 mm (+5/-0mm) from the er	nd of the epoxy meniscus (root of		
	Dielectric Strength	Per item 1		lead wire). Duration/Solder Temperature: 7.5 +0/-1 seconds/260°C ±5°C			
Soldering Effect (Preheat)	Capacitance	SL: Within ±2.5% or ±	5V: Within ±10% £0.25 pF, whichever is ger.	Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.			
	Appearance	No visua	al defect	Steady State Humidity:	Load Humidity:		
		Temperature Characteristics	Capacitance Change				
		Y5P	Within ±10%				
	Capacitance	Y5U	Within ±20%				
		Y5V	Within ±30%		00 to 050/ houseidito at 4090		
Biased Humidity		SL	Within ±2.5% or ±0.25 pF, whichever is larger.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.		
	DF		5.0% maximum maximum	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .	Post Treatment: Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .		
	Q	SL: Less t Q ≥ 100 + More than 30 C = Nominal	han 30 pF: + 10 × C/3 ) pF: Q ≥ 200 capacitance		nours acroom condition.		
	IR	Y5P, Y5V and Y5U:	$3,000~\text{M}\Omega$ minimum $1\Omega$ minimum				
	Dielectric Strength		ilures				

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specification	Test Method		
	Appearance	No visual defect	Impulse Voltage: Each individual capacitor is subjected to three 5 kv impulses prior to life testing.		
	Capacitance Change	Y5P, Y5V and Y5U: Within ±20% SL: Within ±3 or ±0.3 pF, whichever is larger.	Cx tr td  (us) (us) (us)		
	IR	3,000 M $\Omega$ minimum SL: 1,000 M $\Omega$ minimum	0.5Vp		
High Temperature Life	Dielectric Strength	No failures	Capacitors are placed in a circulating air oven for a period of 1,000 hours. The air in the oven is maintained at a temperature of 125°C ±2 throughout the test. The capacitors are subjected to AC 510 Vrms. Each hour the voltage is increased to 1,000 Vrms for 0.1 seconds.  The capacitor is exposed to a flame for 15 seconds and then removed		
Flame Test		The capacitor flame extinguishes as follows:    Cycle Time   1 ~ 4 30 seconds maximum   5 60 seconds maximum	for 15 seconds. This test is repeated for 5 cycles.  Capacitor Flame  Gas Burner  (Unit:mm)		
			The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.		
			C <sub>1,2</sub> 1 μF ±10% C <sub>3</sub> 0.033 μF ±5% 10 kV		
Active Flan	mmability	The cheesecloth should not ignite.	L <sub>1.4</sub> 1.5 Mh ±20% 16A Rod core choke Cx Test capacitor		
			R 100 ±2% V <sub>AC</sub> VR ±5%		
			Ct 3 µF ±5% 10 kV V <sub>R</sub> Rated Voltage		
			F Fuse, Rated 10A Vt Voltage applied to Ct		

<sup>1 &</sup>quot;Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	em	Specifi	cation		Test Method			
Item  Passive Flammability		The burning time sh seco The tissue paper	nds.	The capacitor under test is held into a flame and in a position white best promotes burning. Each specimen is exposed to the flame of time.  Test Specimen  Time of exposure to flame:  Length of flame:  Gas burner length:  Inside diameter:  Outside diameter:  Gas butane gas purity:  95% minimum			he flame one	
	Appearance	No visua	ıl defect					
	Capacitance	Temperature Characteristics SL	Capacitance Change Within ±5%	The capacitor is subjected to 5 temperature cycles.  Temperature Cycle				
		Y5P Y5U, Y5V	Within ±10% Within ±20%	Step	Temperature (°C)	Dwell Time (minutes)	Transition Time (minutes)	
Temperature		SL	≥ 30 pF: Q ≥ 350	1	-40 +0/-3	30		
Cycle			< 30 pF: Q ≥ 275 +5/2C	2	Room temperature	3	3	
	DF/Q		C = Nominal	3	125 +3/-0	30	ا	
	וע		capacitance	4	Room temperature	3		
		Y5P Y5U, Y5V	DF ≤ 5% DF ≤ 7.5%	Pre-treatment: Capacitor shall be stored at 85 ±2 for 1 hour then placed at room condition for 24 ±2 hours.			1 hour then	
	IR	3,000 ΜΩ	minimum	Post-treatment: Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .				
	Dielectric Strength	No fa	lures					

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



# **Soldering and Mounting Information**

#### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

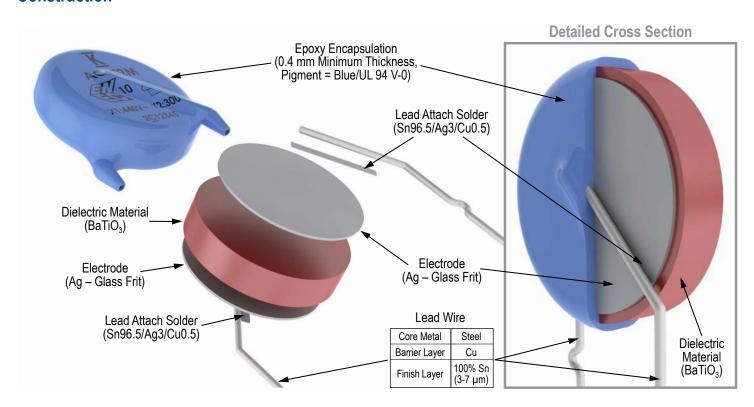
- Temperature of iron-tip: 400°C maximum
- · Soldering iron wattage: 50 W maximum
- · Soldering time: 3.5 seconds maximum

#### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- · Rinse bath capacity: Output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

#### Construction

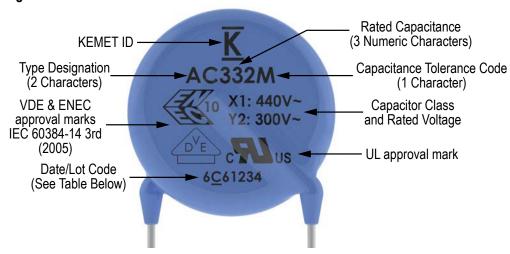




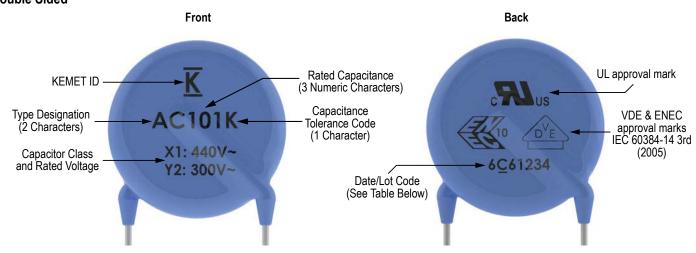
# Marking

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two sided marking is limited to capacitors with body diameters ≤ 8.0 mm.)

#### Single Sided



#### **Double Sided**



#### Date/Lot Code Explanation

6	<u>C</u>	6	1234
Last digit of year, e.g., 6 = 2016	Manufacturing Location Code	Manufacturing Month:  1-9 = Jan - Sept A = October N = November D = December	Last 4 digits of lot no.



# **Packaging Quantities**

Capacitor	Capacitor		Ammo Pack (Carrier Tape)					
Body Diameter	Body Diameter Code <sup>1</sup>	Bulk Bag (Loose)	Comp	Component pitch on carrier tape <sup>2</sup>				
(mm)	Code	(Loose)	12.7 mm	15 mm	25.4 mm			
7.0	0							
8.0	1		1,000 pieces/box					
9.0	2				1,000 pieces/box			
10.0	3							
11.0	4	500 pieces/bag						
12.0	5							
13.0	6							
14.0	7			500 pieces/box				
15.0	8							

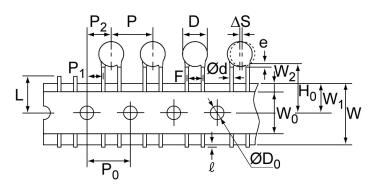
<sup>&</sup>lt;sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

<sup>&</sup>lt;sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.



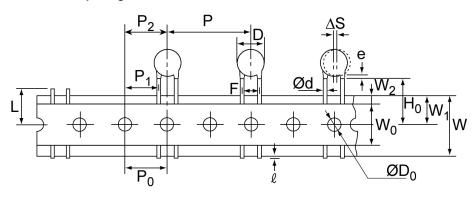
# Figure 1 - Ammo Pack Taping Format

# 5 mm and 7.5 mm Lead Spacing:



# $\begin{array}{c|c} \Delta h_1 & 0 & \Delta h_2 \\ T & \text{max.} \\ \text{Marking side} \\ \end{array}$

#### 10 mm Lead Spacing:



**Table 3 – Ammo Pack Taping Specifications** 

Lead Spacing		5 mm		7.5 mm		10 mm	
Lead Style		Straight	Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>
Item	Symbol		Dimensions (mm)				
Lead Spacing	F	5.0 +0	0.8/-0.2	7.5	±1.0	10.0	±1.0
Component Pitch	Р	12	2.7	15.0		25.4 ±2	
Sprocket Hole Pitch	P <sub>0</sub>	12.7 ±0.3		15.0 ±0.3		12.7 ±0.3	
Sprocket Hole Center to Component Center	P <sub>2</sub>	6.35 ±1.5		7.5 ±1.5		12.7 ±1.5	
Sprocket Hole Center to Lead Center	P <sub>1</sub>	3.75 ±1.0		3.75 ±1.0		7.7 ±1.5	
Body Diameter	D	See "Product Ordering Codes and Ratings" section of this document.					
Component Alignment (side/side)	ΔS	0 ±2.0					
Carrier Tape Width	W	18.0 +1.0/-0.5					
Sprocket Hole Position	W <sub>1</sub>			9.0	±0.5		

<sup>&</sup>lt;sup>1</sup>Prefromed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



# Table 3 - Ammo Pack Taping Specifications cont'd

Lead Spacing		5 mm		7.5 mm		10 mm	
Lead Style	Lead Style		Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>	Straight	Preformed <sup>1</sup>
Item	Symbol			Dimensio	ons (mm)		
Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> )	H <sub>o</sub>	N/A	18.0 +2.0/-0	N/A	18.0 +2.0/-0	N/A	18.0 +2.0/-0
Height to Seating Plane <sup>2</sup> (straight leads)	Н	20.0 +1.5/-1.0	N/A	20.0 +1.5/-1.0	N/A	20.0 +1.5/-1.0	N/A
Lead Protrusion	ł	2.0 maximum					
Diameter of Sprocket Hole	D <sub>0</sub>	4.0 ±0.2					
Lead Diameter	φd	0.55 ±0.1					
Carrier Tape Thickness	t <sub>1</sub>	0.6 ±0.3					
Total Thickness (Carrier Tape, Hold-Down Tape and Lead)	t <sub>2</sub>	1.5 maximum					
Component Alignment (front/back )	$\Delta h_1$ $\Delta h_2$	2.0 maximum					
Cut Out Length	L	11.0 maximum					
Hold-Down Tape Width	W <sub>o</sub>	11.0 minimum			11.5 m	inimum	
Hold-Down Tape Position	$W_2$	3.0 maximum 1.5			±1.5		

<sup>&</sup>lt;sup>1</sup>Prefromed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

# **Application Notes:**

#### **Storage and Operating Conditions:**

The insulating coating of these devices does not form an air and moisture-tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt, or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees Centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

#### Working Voltage:

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)	
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p	

#### **Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

#### **Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.



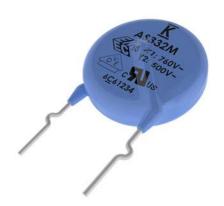
# Safety Standard Recognized, 900 Series, Encapsulated, AS Type, X1 760 VAC/Y1 500 VAC (Industrial Grade)

#### **Overview**

KEMET's 900 series encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution when needing to suppress line disturbances at the source.

Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to line (across-the-line) applications. In this application there is no danger of electric shock to humans should the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 760 VAC in line-to-line (Class X) and 500 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y1 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 8 KV (Y1) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V-0.



# **Ordering Information**

C9	6	1	U	222	M	W	W	D	Α	Α	7317
Ceramic Series	Body Diameter	Lead Spacing <sup>1</sup>	Spec.	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage	Dielectric/ Temp. Char.	Design	Lead Config.1	Failure Rate	Packaging (C-Spec)
C9 = Ceramic 900 Series	1 = 8.0 mm 2 = 9.0 mm 3 = 10.0 mm 5 = 12.0 mm 6 = 13.0 mm 7 = 14.0 mm 8 = 15.0 mm	1 = 10.0 mm	U = Safety	2 significant digits + number of zeroes	M = ±20%	W = X1 760 VAC /Y1 500 VAC	W = Y5U	D = Disc	A = Straight B = Vertical Kink C = Outside Kink	A = N/A	See "Packaging C-Spec Ordering Options Table" below

<sup>&</sup>lt;sup>1</sup> "Vertical Kink" and "Outside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors ordered with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.



# **Packaging C-Spec Ordering Options Table**

Packaging Type	Lead Length (mm) <sup>2,3</sup>	Packaging Ordering Code (C-Spec)
Ammo Pack	20.0 +1.5/-1.0 (straight leads) 18.0 +2.0/-0 (preformed leads¹)	7317
	3.0 ±1.0	WL30
	3.5 ±1.0	WL35
Bulk Bag	4.0 ±1.0	WL40
Bulk Bay	4.5 ±1.0	WL45
	5.0 ±1.0	WL50
	20.0 minimum⁴	WL20

<sup>&</sup>lt;sup>1</sup> Preformed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

# **Benefits**

- Safety Standard Recognized (IEC 60384–14)
- · Reliable operation up to 125°C
- · Class X1/Y1
- 10 mm lead spacing
- · Lead (Pb)-free and RoHS Compliant
- · Halogen Free
- Available capacitance tolerances of ±5%, ±10%, and ±20%
- High reliability
- · Preformed (crimped) or straight lead configurations
- Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated lead finish allowing for excellent solderability
- Encapsulation meets flammability standard UL 94V–0

# **Applications**

Typical applications include:

- Line-to-line (Class X) filtering
- · Line-to-ground (Class Y) filtering
- · Antenna coupling
- Primary and secondary coupling (switching power supplies)
- Line disturbances suppression (motors and motor controls, relays, switching power supplies, and inverters)

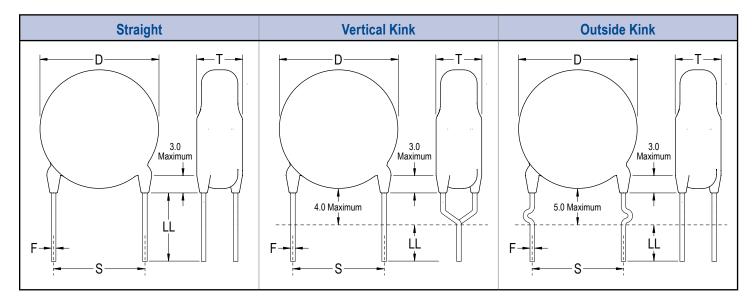
<sup>&</sup>lt;sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.



## **Lead Configurations**



## **Dimensions – Millimeters**

	Lead	F	Lead	D	Т	е	Ød
Lead Configuration	Configuration Ordering Code <sup>1</sup>	Lead Spacing <sup>2</sup>	Spacing Tolerance	Body Diameter <sup>2</sup>	Body Thickness	Lead Meniscus	Lead Diameter
Straight	А	10.0	±1.0	See Table 1 - "Product Ordering Codes and Ratings"			0.55 ±0.1
Vertical Kink (Preformed)	В	10.0	±1.0			3.0 maximum	
Outside Kink (Preformed)	С	10.0	±1.0				

<sup>&</sup>lt;sup>1</sup> Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.



## **Approval Standard and Certification No.**

Safety Standard	Standard No.	Subclass	Working Voltage	Certificate No.
VDE	IEC 60384-14	X1	760 VAC	40034867
(ENEC)	IEC 00304-14	Y1	500 VAC	40034007

These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384-14.

## **Environmental Compliance**

These devices are Halogen Free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



## **General Specifications/Performance Characteristics**

Dielectric/Temperature Characteristic	Y5P	Y5U	
Operating Temperature Range:	-40°C to	+125°C	
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	±10%	+20%/-55%	
Dielectric Withstanding Voltage	4,000 VAC (60 ±5 seconds at 25°C)		
Quality Factor (Q)	See "Dissipation Factor"		
Dissipation Factor (tanδ) at +25°C1	2.50%	2.50%	
Insulation Resistance (IR) Limit at +25°C	10,000 MΩ Minimum (500 VDC applied for 60 ±5 seconds @ 25°C)		

<sup>&</sup>lt;sup>1</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

<sup>1</sup> kHz ±50 Hz and 1.0 ±0.2 Vrms



## Table 1 – Product Ordering Codes and Ratings

Dialogateial	Distantial			Dimensions (mm)			Lead Spacing	
Dielectric/ Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Bulk Packaging	Ammo Packaging
	C911U101KWYD(1)A(2)	100 pF		8.0				
	C911U151KWYD(1)A(2)	150 pF		8.0		0.55 ±0.05	10 mm	
	C911U221KWYD(1)A(2)	220 pF	±10%	8.0	7.0			
Y5P	C911U331KWYD(1)A(2)	330 pF		8.0				
15P	C921U471KWYD(1)A(2)	470 pF		9.0				
	C931U561KWYD(1)A(2)	560 pF		10.0				
	C931U681KWYD(1)A(2)	680 pF		10.0				
	C951U102KWYD(1)A(2)	1,000 pF		12.0	7.0		101	11111
	C921U102MWWD(1)A(2)	1,000 pF		9.0				
	C931U152MWWD(1)A(2)	1,500 pF		10.0				
Y5U	C961U222MWWD(1)A(2)	2,200 pF	. 200/	13.0				
150	C961U332MWWD(1)A(2)	3,300 pF	±20%	13.0				
	C971U392MWWD(1)A(2)	3,900 pF		14.0				
	C981U472MWWD(1)A(2)	4,700 pF		15.0				

<sup>(1)</sup> To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)

A = Straight

B = Vertical Kink

C = Outside Kink

<sup>(2)</sup> To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code". See "Dimensions" section of this document, page 2, for available options.



Item		Specification		Test Method			
Operating Temperature Range				-40°C to +125°C			
Between lead wires		No fa	ilures	The capacitor shall not be damaged when 4,000 VAC(rms) is applied between the lead wires for 60 seconds.			
Dielectric Strength			The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 4,000 VAC(rms) is applied for 60 seconds between the capacitor lead wires and metal balls.				
Insulation Re	sistance (IR)	10,000 MC	2 minimum	The insulation resis	tance shall be meas s of charging.	sured with 500 ±50 VDC applied	
Capac	itance	Within specif	ied tolerance		<u> </u>	0/ 151/ 1 (00 000)	
Dissipation Fa	ctor (DF) or Q	DF ≤ 2.5%		Capacitance is measured at 1 kHz ±20% and 5 Vrms or less (20 ±2°C)			
				A capacitance measurement is made at each step specified:			
		Temperature Characteristics	Capacitance Change	Step	Temperature		
		Characteristics		1	+20 ±2°C		
		Y5U	Within +22% / -56%	2	-25 ±2°C		
Temperature (	Characteristics			3	+20 ±2°C		
				4	+85 ±2°C		
				5	+20 ±2°C		
				Pre-treatment: Capacitor is stored condition <sup>1</sup> for 24 ±2	at 85 ±2°C for 1 hou hours before measu	ur and then placed at room urement.	
	Tensile	Lead wire or capacitor body shall not break.		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 tensile force of 10 N is applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.			
Terminal Strength	Bending	Lead wire or capacitor body shall not break.		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 force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed 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.			
Solderability		solder in the axial direc	e a uniform coating of ction and over 3/4 of its rence.	The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.  Solder Temperature: Lead free solder (Sn-3Ag – 0.5Cu) 245°C ±5°C.			

 $<sup>^{1}</sup>$  "Room Condition" is defined as follows: Temperature:  $15 \sim 35$  °C/Humidity:  $45 \sim 75$  %/Atmospheric Pressure:  $86 \sim 106$  kPa.



Item		Specif	ication	Test Method			
Appearance		No visua	al defect	As shown in the figure below, the lead wires are immersed in molten solder up to 1.5 mm (+5/-0 mm) from the end of the epoxy meniscus			
	IR	1,000	) ΜΩ	(root of lead wire).  Duration/Solder Temperature: 3.5 ±0.5 seconds/350°C ±10°C or 10 ±1			
	Dielectric Strength	Per item 1		seconds/260°C ±5°C  Thermal Capacitor			
Soldering Effect (Non-Preheat)	Capacitance	Within ±10%		Pre-treatment: Capacitor is stored placed at room condition¹ for 24 ±2 Post-treatment: Capacitor is stored condition¹.	hours before initial measurements.		
	Appearance	No visua	al defect	Capacitor is stored at 120°C +0/-5°	C for 60 +0/-5 seconds. Then, as		
	IR	1,000	) ΜΩ	up to 1.5 mm (+5/-0mm) from the er	wires are immersed in molten solder nd of the epoxy meniscus (root of		
	Dielectric Strength	Per it	tem 1	lead wire). Duration/Solder Temperature: 7.5 +	0/-1 seconds/260°C ±5°C		
Soldering Effect (Preheat)	Capacitance	Within ±10%		Thermal Screen  1.5  1.5  Wolten Solder  Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.			
	Appearance	No visual defect		Steady State Humidity:	Load Humidity:		
Biased Humidity	Capacitance	Temperature Characteristics Y5U	Capacitance Change Within ±30%	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.		
	DF	5.0% m	aximum	Post Treatment: Capacitor is stored for 1 to 2	Post Treatment:		
	IR	3,000 MΩ	2 minimum	hours at room condition <sup>1</sup> .	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .		
	Dielectric Strength	No fa	ilures				
	Appearance	No visua	al defect	Impulse Voltage: Each individual ca impulses prior to life testing.	pacitor is subjected to three 8 kv		
	Capacitance Change	Within	±20%	Vp Upg	td		
	IR	3,000 ΜΩ	2 minimum	0.5Vp (0.5)	46		
High Temperature Life	Dielectric Strength	No failures		Capacitors are placed in a circulatir hours. The air in the oven is maintai ±2°C throughout the test. The capa Vrms. Each hour the voltage is increseconds.	ng air oven for a period of 1,000 ined at a temperature of 125°C acitors are subjected to AC 850		

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Item	Specification	Test Method
Flame Test	The capacitor flame extinguishes as follows:    Cycle Time   1 ~ 4 30 seconds maximum   5 60 seconds maximum	The capacitor is exposed to a flame for 15 seconds and then removed for 15 seconds. This test is repeated for 5 cycles.  Capacitor Flame  Gas Burner  (Unit:mm)
Active Flammability	The cheesecloth should not ignite.	The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.
		time

 $<sup>^{1}</sup>$  "Room Condition" is defined as follows: Temperature:  $15 \sim 35$  °C/Humidity:  $45 \sim 75$  %/Atmospheric Pressure:  $86 \sim 106$  kPa.



Ite	em	Specification			Test Met	hod	
Passive Flammability		The burning time should not exceed 30 seconds. The tissue paper should not ignite.		The capacitor under test is held into a flame and in a position which best promotes burning. Each specimen is exposed to the flame one time.  Test Specimen  Time of exposure to flame:  Length of flame:  Gas burner length:  Inside diameter:  Outside diameter:  0.9 mm maximum			
	Appearance	No visua	al defect	The capacitor is subjected to 5 temperature cycles.  Temperature Cycle			
	Capacitance	Temperature Characteristics	Capacitance Change Within ±20%	Step	Temperature (°C)	Dwell Time (minutes)	Transition Time (minutes)
Temperature		100	VVIIIIII ±2070	1	-40 +0/-3	30	,
Cycle	DE/O	55.	7.50/	2	Room temperature	3	
	DF/Q	DF≤	1.3%	3	125 +3/-0	30	3
	IR	3,000 MΩ minimum		4 Pre-treatm	Room temperature  ent: Capacitor shall be store	3	1 hour then
	Dielectric Strength	No failures		placed at ro	om condition <sup>1</sup> for 24 ±2 ho nent: Capacitor is stored fo	urs.	

 $<sup>^1</sup>$  "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



## **Soldering and Mounting Information**

#### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

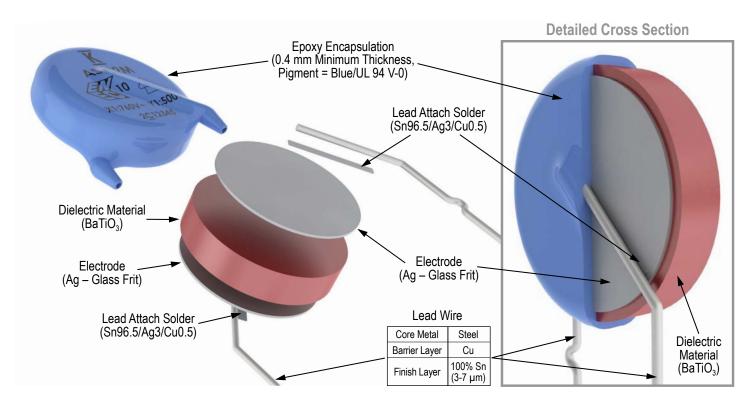
- Temperature of iron-tip: 400°C maximum
- · Soldering iron wattage: 50 W maximum
- · Soldering time: 3.5 seconds maximum

#### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- · Rinse bath capacity: Output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

#### Construction

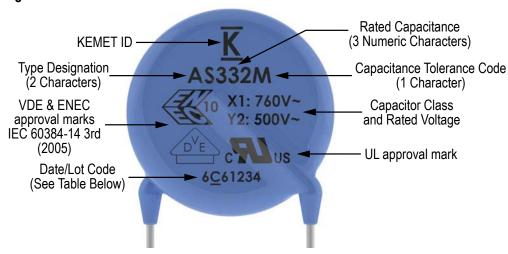




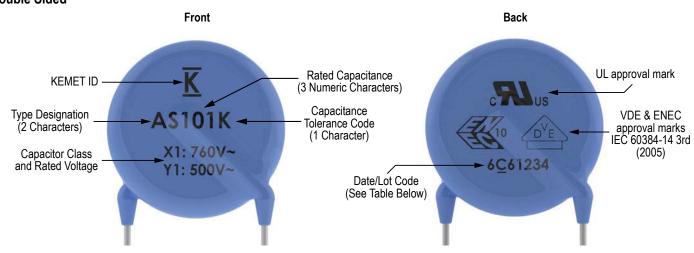
## **Marking**

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two sided marking is limited to capacitors with body diameters ≤ 8.0 mm.)

#### Single Sided



#### **Double Sided**



Date/Lot Code Explanation

6	<u>C</u>	6	1234
Last digit of year, e.g., 6 = 2016	Manufacturing Location Code	Manufacturing Month:  1-9 = Jan - Sept A = October N = November D = December	Last 4 digits of lot no.



## **Packaging Quantities**

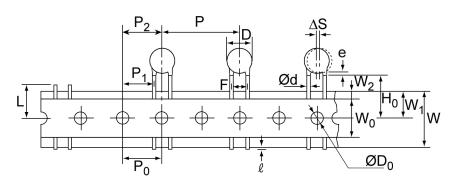
			Ammo Pack (Carrier Tape)		
Capacitor Body Diameter (mm)	Body Diameter Code <sup>1</sup>	Bulk Bag (Loose)	Component pitch on carrier tape <sup>2</sup>		
Body Diameter (IIIII)		(LOOSE)	25.4 mm		
7.0	0				
8.0	1				
9.0	2		1,000 pieces/box		
10.0	3	EOO niceas/bas			
11.0	4	500 pieces/bag			
13.0	6				
14.0	7		500 pieces/box		
15.0	15.0 8				

<sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

<sup>&</sup>lt;sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.



Figure 1 - Ammo Pack Taping Format (10 mm Lead Spacing)



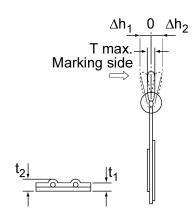


Table 3 – Ammo Pack Taping Specifications

Lead Spacing		10 mm		
Lead Style		Straight	Preformed <sup>1</sup>	
Item	Symbol	Dimension	ons (mm)	
Lead Spacing	F	10.0	±1.0	
Component Pitch	Р	25.4	±2	
Sprocket Hole Pitch	P <sub>0</sub>	12.7	±0.3	
Sprocket Hole Center to Component Center	P <sub>2</sub>	12.7	±1.5	
Sprocket Hole Center to Lead Center	P <sub>1</sub>	7.7 :	±1.5	
Body Diameter	D	See Table 1 - Product Ord	dering Codes and Ratings	
Component Alignment (side/side )	ΔS	0 ±	2.0	
Carrier Tape Width		18.0 +1.0/-0.5		
Sprocket Hole Position W		9.0 ±0.5		
Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> )	H <sub>0</sub>	N/A 18.0 +2.0/-0		
Height to Seating Plane <sup>2</sup> (straight leads)	Н	20.0 +1.5/-1.0	N/A	
Lead Protrusion	l	2.0 ma	ximum	
Diameter of Sprocket Hole	D <sub>0</sub>	4.0 =	±0.2	
Lead Diameter	φd	0.55	±0.1	
Carrier Tape Thickness	t <sub>1</sub>	0.6 ±0.3		
Total Thickness (Carrier Tape, Hold-Down Tape and Lead)	t <sub>2</sub>	1.5 maximum		
Component Alignment (front/back )	$\Delta h_{_{1}}$	2.0 ma	ximum	
Component Alignment (nontroack )	$\Delta h_2$	2.0 ma	ximum	
Cut Out Length	L	11.0 ma	aximum	
Hold-Down Tape Width	W <sub>0</sub>	11.0 mi	nimum	
Hold-Down Tape Position	W <sub>2</sub>	1.5 ±1.5		
Coating Extension on Leads (meniscus)	е	3.0 maximum for straight lead; not to exceed the bend for preformed¹ lead configurations.		
Body Thickness	Т	7.0 Maximum		

<sup>&</sup>lt;sup>1</sup>Preformed (crimped) lead configurations include vertical kink and outside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



## **Application Notes:**

#### **Storage and Operating Conditions:**

The insulating coating of these devices does not form an air and moisture-tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt, or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees Centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

#### **Working Voltage:**

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

#### **Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

#### **Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



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Note: KEMET reserves the right to modify minor details of internal and external construction at any time in the interest of product improvement. KEMET does not assume any responsibility for infringement that might result from the use of KEMET Capacitors in potential circuit designs. KEMET is a registered trademark of KEMET Electronics Corporation.



#### **Disclaimer**

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed.

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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.



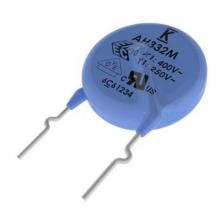
# Safety Standard Recognized, 900 Series, Encapsulated, AH Type, X1 400 VAC/Y1 250 VAC (Industrial Grade)

#### **Overview**

KEMET's 900 series encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution when needing to suppress line disturbances at the source.

Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to line (across-the-line) applications. In this application there is no danger of electric shock to humans should the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 400 VAC in line-to-line (Class X) and 250 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y1 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 8 KV (Y1) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V-0.



## **Ordering Information**

<b>C9</b>	1	1	U	620	J	U	S	D	Α	Α	7317
Ceramic Series	Body Diameter	Lead Spacing <sup>1</sup>	Spec.	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage	Dielectric/ Temp. Char.	Design	Lead Config. <sup>2</sup>	Failure Rate	Packaging (C-Spec)
C9 = Ceramic 900 Series	0 = 7.0 mm 1 = 8.0 mm 2 = 9.0 mm 3 = 10.0 mm 4 = 11.0 mm 5 = 12.0 mm 7 = 14.0 mm	1 = 10.0 mm	U = Safety	2 significant digits + number of zeroes	J = ±5% K = ±10% M = ±10%	U = X1 400 VAC /Y1 250 VAC	S = SL Y = Y5P W = Y5U V = Y5V	D = Disc	A = Straight B = Vertical Kink C = Outside Kink	A = N/A	See "Packaging C-Spec Ordering Options Table" below

<sup>&</sup>lt;sup>1</sup> "Vertical Kink" and "Outside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors ordered with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>2</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.



## **Packaging C-Spec Ordering Options Table**

Packaging Type	Lead Length (mm) <sup>2,3</sup>	Packaging Ordering Code (C-Spec)
Ammo Pack	20.0 +1.5/-1.0 (straight leads) 18.0 +2.0/-0 (preformed leads¹)	7317
	3.0 ±1.0	WL30
	3.5 ±1.0	WL35
Pulk Pog	4.0 ±1.0	WL40
Bulk Bag	4.5 ±1.0	WL45
	5.0 ±1.0	WL50
	20.0 minimum⁴	WL20

<sup>&</sup>lt;sup>1</sup> Preformed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

#### **Benefits**

- Safety Standard Recognized (IEC 60384-14)
- · Reliable operation up to 125°C
- Class X1/Y1
- 10 mm lead spacing
- · Lead (Pb)-free and RoHS Compliant
- · Halogen Free
- Capacitance offerings ranging from 10 pF up to 10 nF
- Available capacitance tolerances of ±5%, ±10%, and ±20%
- · High reliability
- · Preformed (crimped) or straight lead configurations
- · Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated lead finish allowing for excellent solderability
- Encapsulation meets flammability standard UL 94V–0

## **Applications**

Typical applications include:

- · Line-to-line (Class X) filtering
- · Line-to-ground (Class Y) filtering
- · Antenna coupling
- · Primary and secondary coupling (switching power supplies)
- Line disturbances suppression (motors and motor controls, relays, switching power supplies, and inverters)

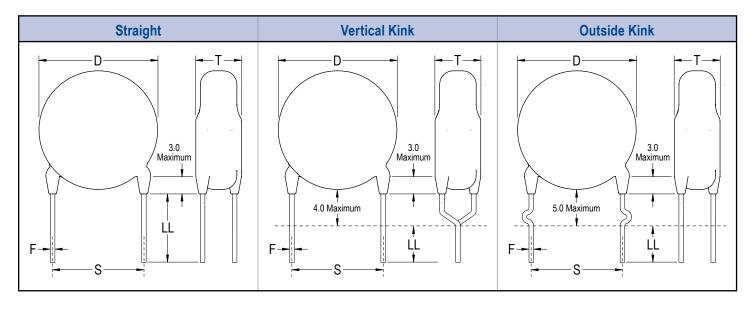
<sup>&</sup>lt;sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.



## **Lead Configurations**



## **Dimensions – Millimeters**

	Lead	F	Lead	D	Т	е	Ød
Lead Configuration	Configuration Ordering Code <sup>1</sup>	Lead Spacing <sup>2</sup>	Lead Spacing		Body Body Diameter <sup>2</sup> Thickness		Lead Diameter
Straight	А	10.0	±1.0	See Table 1 - "Product Ordering Codes and Ratings"			
Vertical Kink (Preformed)	В	10.0	±1.0			3.0 maximum	0.55 ±0.1
Outside Kink (Preformed)	С	10.0	±1.0				

<sup>&</sup>lt;sup>1</sup> Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.



## **Approval Standard and Certification No.**

Safety Standard	Standard No.	Subclass	Working Voltage	Certificate No.
VDE	IEC 60384-14	X1	400 VAC	40036417
(ENEC)	IEC 00304-14	Y1	250 VAC	40030417

These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384-14.

## **Environmental Compliance**

These devices are Halogen Free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



## **General Specifications/Performance Characteristics**

Dielectric/Temperature Characteristic	SL	Y5P	Y5U	Y5V		
Operating Temperature Range:		-40°C to	+125°C			
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	-1,000 ~ +350 ppm/°C	±10%	+20%/-55%	~ +30%/-80%		
Dielectric Withstanding Voltage		4,000 VAC (60 ±5 seconds at 25°C)				
Quality Factor (Q)	30 pF and above: ≥ 1,000 Below 30 pF: ≥ 400 +(20xC)*		See "Dissipation Factor"			
Dissipation Factor (tanδ) at +25°C1	See "Quality Factor"	2.50%	2.50%	5.0%		
Insulation Resistance (IR) Limit at +25°C			2 Minimum 0 ±5 seconds @ 25°C)			

<sup>\*</sup> C = Nominal capacitance

SL: 1 MHz ±100 kHz and 1.0 ±0.2 Vrms

X5P, Y5U and Y5V: 1 kHz  $\pm$ 50 Hz and 1.0  $\pm$ 0.2 Vrms

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

<sup>&</sup>lt;sup>1</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:



## Table 1 – Product Ordering Codes and Ratings

Dielectric/				Din	nensions (mn	1)	Lead S	pacing	
Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Bulk Packaging	Ammo Packaging	
	C901U150JUSD(1)A(2) C901U180JUSD(1)A(2)	15 pF 18 pF							
	C901U200JUSD(1)A(2)	20 pF							
	C901U220JUSD(1)A(2)	22 pF							
	C901U240JUSD(1)A(2)	24 pF		7.0					
	C901U270JUSD(1)A(2)	27 pF							
	C901U300JUSD(1)A(2)	30 pF							
	C901U330JUSD(1)A(2)	33 pF							
0.	C901U360JUSD(1)A(2)	36 pF	. 50/		5.0	0.55 .04	40		
SL	C901U390JUSD(1)A(2)	39 pF	±5%		5.0	0.55 ±0.1	10	mm	
	C911U470JUSD(1)A(2)	47 pF		8.0					
	C911U500JUSD(1)A(2)	50 pF							
	C911U510JUSD(1)A(2)	51 pF							
	C911U560JUSD(1)A(2) C911U620JUSD(1)A(2)	56 pF 62 pF							
	C921U680JUSD(1)A(2)	68 pF							
	C921U750JUSD(1)A(2)	75 pF		9.0					
	C921U820JUSD(1)A(2)	82 pF		5.0					
	C931U101JUSD(1)A(2)	100 pF		10.0					
	000101010002(1)11(2)	100 p.		10.0					
	C901U101KUYD(1)A(2)	100 pF				l			
	C901U151KUYD(1)A(2)	150 pF		7.0					
	C901U221KUYD(1)A(2)	220 pF		7.0	7.0				
Y5P	C901U331KUYD(1)A(2)	330 pF	. 100/		E 0	0.55 ±0.1	10 mm		
125	C911U471KUYD(1)A(2)	470 pF	±10%	8.0	5.0				
	C921U561KUYD(1)A(2)	560 pF		9.0					
	C921U681KUYD(1)A(2)	680 pF							
	C941U102KUYD(1)A(2)	1,000 pF		11.0					
	C911U102MUWD(1)A(2)	1,000 pF		8.0					
	C921U152MUWD(1)A(2)	1,500 pF		9.0					
Y5U	C931U222MUWD(1)A(2)	2,200 pF	±20%	10.0	5.0	0.55 ±0.1	10	mm	
	C951U332MUWD(1)A(2)	3,300 pF		12.0					
	C961U392MUWD(1)A(2) C971U472MUWD(1)A(2)	3,900 pF 4,700 pF		13.0 14.0					
	OST TO 4T ZIVIO VVD(T)A(Z)	4,700 pr		14.0					
	C901U102MUVD(1)A(2)	1,000 pF		7.0					
	C911U152MUVD(1)A(2)	1,500 pF		8.0					
Y5V	C921U222MUVD(1)A(2)	2,200 pF	±20%	9.0	5.5	0.55 ±0.1	10	mm	
	C941U332MUVD(1)A(2)	3,300 pF		11.0					
	C951U472MUVD(1)A(2)	4,700 pF	<u> </u>	12.0					
	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Lead S	pacing	

<sup>(1)</sup> To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)

- A = Straight
- B = Vertical Kink
- C = Outside Kink

<sup>(2)</sup> To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.



Ite	em	Specif	ication		Test Meth	nod	
Operating Tem	perature Range		-40°C to +125°C				
	Between lead wires	No fa	ilures	The capacitor shall not be damaged when 4,000 VAC(rms) is applied between the lead wires for 60 seconds.			
Dielectric Strength	Body Insulation	No failures		The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 4,000 VAC(rms) is applied for 60 seconds between the capacitor lead wires and metal balls.			
Insulation Re	esistance (IR)	10,000 MΩ	Ω minimum	The insulation resi		sured with 500 ±50 VDC applied	
Сарас	citance	Within specif	fied tolerance		<u> </u>		
		Temperature Characteristics	Specification				
		Y5P, Y5U	DF ≤ 2.5%	Y5P, Y5U and Y5\	: Capacitance is mea	asured at 1 kHz ±20% and 5	
	. (55)	Y5V	DF ≤ 5.0%	Vrms or less. (20 :	±2°C) s measured at 1 MHz	±20% and 1.0 ±0.2 Vrms	
Dissipation Fa	actor (DF) or Q	SL	≥ 30 pF: Q ≥ 1,000 < 30 pF: Q ≥ 400 +(20 x C) C = Nominal capacitance	(25°C)			
				A capacitance measurement is made at each step specified:			
		Temperature Characteristics	Capacitance Change	Step 1	Temperature +20 ±2°C		
		Y5P	Within ±10%	2	-25 ±2°C		
Temperature (	Characteristics	Y5U	Within +22%/-56%	3	+20 ±2°C		
		Y5V	Within ~+30%/-80%	4	+85 ±2°C		
		SL	-1,000 ~+350 ppm°C	5	+20 ±2°C		
			(+20°C ~+85°C)	Pre-treatment: Capacitor is stored at 85 ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before measurement.			
	Tensile Lead wire or capacitor body shall not break.		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 tensile force of 10 N is applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.				
Terminal Strength	Bending	Lead wire or capacitor body shall not break.		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 force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed to its initial position over the same period of time; this operation constitutes one bend. One bend immediately followed by			
Solde	rability	solder in the axial direct	e a uniform coating of ction and over 3/4 of its ference.	a second bend in the opposite direction.  The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.  Solder Temperature: Lead free solder (Sn-3Ag – 0.5Cu) 245°C ±5°C.			

<sup>1 &</sup>quot;Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specif	ication	Test N	Method		
	Appearance	No visu	al defect	As shown in the figure below, the le solder up to 1.5 mm (+5/-0 mm) fror			
	IR	1,000	Ο ΜΩ	(root of lead wire).  Duration/Solder Temperature: 3.5 ±0.5 seconds/350°C ±10°C or 10 ±1 seconds/260°C ±5°C  Thermal			
	Dielectric Strength	Peri	tem 1				
Soldering Effect (Non-Preheat)	Capacitance	Y5P, Y5U and Y5V: Within ±10% SL: Within ±2.5% or ±0.25 pF, whichever is larger.		Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.			
	Appearance	No visu	al defect	Capacitor is stored at 120°C +0/-5°	C for 60 +0/-5 seconds. Then, as		
	IR	1,000	Ο ΜΩ	up to 1.5 mm (+5/-0mm) from the er	wires are immersed in molten solder and of the epoxy meniscus (root of		
	Dielectric Strength	Peri	tem 1	lead wire). Duration/Solder Temperature: 7.5 +0/-1 seconds/260°C ±5°C			
Soldering Effect (Preheat)			±0.25 pF, whichever is	Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.			
	Appearance	No visu	al defect	Steady State Humidity:	Load Humidity:		
		Temperature Characteristics	Capacitance Change				
		Y5P	Within ±10%				
	Capacitance	Y5U	Within ±20%				
	·	Y5V	Within ±30%		00 to 050/ houseidito at 4090		
Biased Humidity		SL	Within ±2.5% or ±0.25 pF, whichever is larger.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours. Post Treatment:	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.		
-	DF		5.0% maximum maximum	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .	Post Treatment: Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .		
	Q	More than 30	F: Q ≥ 100+10×C/3 ) pF: Q ≥ 200 capacitance				
	IR	Y5P, Y5V and Y5U:	3,000 MΩ minimum IΩ minimum				
	Dielectric Strength	No fa	ilures				

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specification	Test Method			
	Appearance Capacitance Change	No visual defect Y5P, Y5V and Y5U: Within ±20% SL: Within ±3 or ±0.3 pF,	Impulse Voltage: Each individual capacitor is subjected to three 8 kv impulses prior to life testing.  Output			
	IR	whichever is larger. 3,000 M $\Omega$ minimum SL: 1,000 M $\Omega$ minimum	0.5Vp			
High Temperature Life	Dielectric Strength	No failures	Capacitors are placed in a circulating air oven for a period of 1,000 hours. The air in the oven is maintained at a temperature of 125°C ±2°C throughout the test. The capacitors are subjected to AC 425 Vrms. Each hour the voltage is increased to AC 1,000 Vrms for 0.1 seconds.			
Flame Test		The capacitor flame extinguishes as follows:    Cycle Time   1 ~ 4 30 seconds maximum   5 60 seconds maximum	The capacitor is exposed to a flame for 15 seconds and then removed for 15 seconds. This test is repeated for 5 cycles.  Capacitor Flame  (Unit:mm)			
Active Flammability			The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.			
		The cheesecloth should not ignite.	$\begin{array}{ c c c c c c } \hline L_{_{1.4}} & 1.5 \text{ Mh} \pm 20\% \text{ 16A Rod core choke} & \text{Cx} & \text{Test capacitor} \\ \hline R & 100 \pm 2\% & \text{V}_{_{AC}} & \text{VR} \pm 5\% \\ \hline \text{Ct} & 3  \mu\text{F} \pm 5\% \text{ 10 kV} & \text{V}_{_{R}} & \text{Rated Voltage} \\ \hline F & \text{Fuse, Rated 10A} & \text{Vt} & \text{Voltage applied to Ct} \\ \hline \end{array}$			
			Vx 5kV time			

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	em	Specifi	cation	Test Method			
Passive Flammability		The burning time should not exceed 30 seconds. The tissue paper should not ignite.		The capacitor under test is held into a flame and in a position which best promotes burning. Each specimen is exposed to the flame one time.  Test Specimen  Time of exposure to flame:  Length of flame:  Gas burner length:  Inside diameter:  Outside diameter:  Outside diameter:  Gas butane gas purity:  95% minimum			
	Appearance	No visual defect					
	Capacitance	Temperature Characteristics SL	Capacitance Change Within ±5%	The capacitor is subjected to 5 temperature cycles.  Temperature Cycle			
	Capacitanics	Y5P Y5U, Y5V	Within ±10% Within ±20%	Step	Temperature (°C)	Dwell Time (minutes)	Transition Time (minutes)
Temperature Cycle		SL	≥30 pF: Q ≥ 350 <30 pF: Q ≥ 275	1	-40 +0/-3	30	
Oycie			+5/2C	2	Room temperature	3	3
	DF/Q		C = Nominal capacitance	3	125 +3/-0	30	
		Y5P	DF ≤ 5%	4	Room temperature	3	
		Y5U, Y5V	DF ≤ 7.5%	Pre-treatme	ent: Capacitor shall be sto om condition for 24 ±2 ho	red at 85 ±2 for	1 hour then
	IR	3,000 MΩ SL: 1,000 M			nent: Capacitor is stored for		room condition <sup>1</sup> .
	Dielectric Strength  No failures						

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



## **Soldering and Mounting Information**

#### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

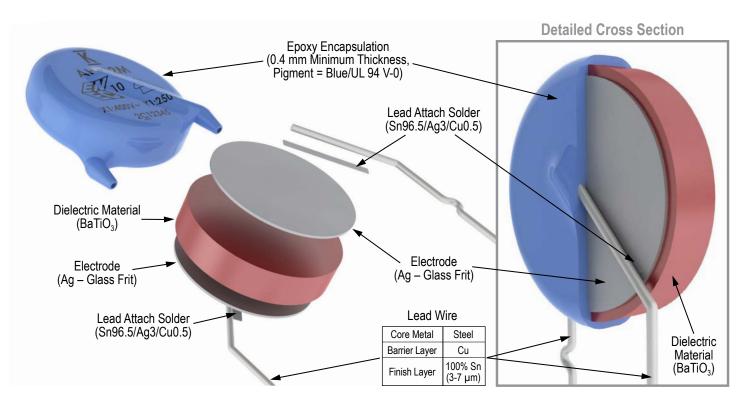
- Temperature of iron-tip: 400°C maximum
- · Soldering iron wattage: 50 W maximum
- · Soldering time: 3.5 seconds maximum

#### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- · Rinse bath capacity: Output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

#### Construction

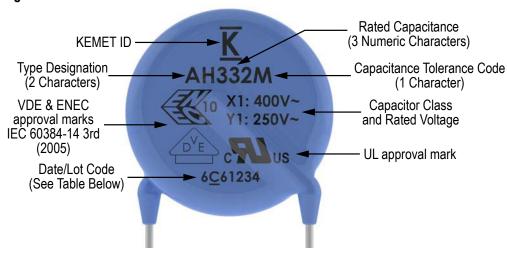




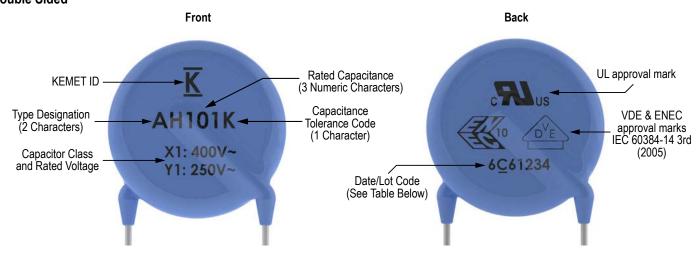
## Marking

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two sided marking is limited to capacitors with body diameters ≤ 8.0 mm.)

#### Single Sided



#### **Double Sided**



#### Date/Lot Code Explanation

6	<u>C</u>	6	1234
Last digit of year, e.g., 6 = 2016	Manufacturing Location Code	Manufacturing Month:  1-9 = Jan - Sept A = October N = November D = December	Last 4 digits of lot no.



## **Packaging Quantities**

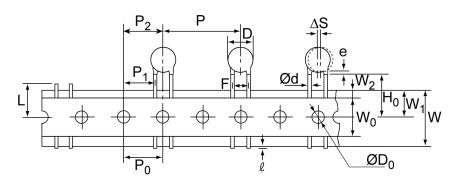
			Ammo Pack (Carrier Tape)		
Capacitor Body Diameter (mm)	Body Diameter Code <sup>1</sup>	Bulk Bag (Loose)	Component pitch on carrier tape <sup>2</sup>		
Body Diameter (IIIII)		(LOOSE)	25.4 mm		
7.0	0				
8.0	1				
9.0	2		1,000 pieces/box		
10.0	3	EOO niceas/bas			
11.0	4	500 pieces/bag			
13.0	6				
14.0	7		500 pieces/box		
15.0	8				

<sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

<sup>&</sup>lt;sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.



Figure 1 - Ammo Pack Taping Format (10 mm Lead Spacing)



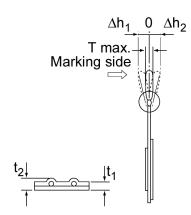


Table 3 – Ammo Pack Taping Specifications

Lead Spacing		10 ו	mm	
Lead Style		Straight	Preformed <sup>1</sup>	
Item	Symbol	Dimension	ons (mm)	
Lead Spacing	F	10.0	±1.0	
Component Pitch	Р	25.4	±2	
Sprocket Hole Pitch	P <sub>0</sub>	12.7	±0.3	
Sprocket Hole Center to Component Center	P <sub>2</sub>	12.7	±1.5	
Sprocket Hole Center to Lead Center	P <sub>1</sub>	7.7 :	±1.5	
Body Diameter	D	See "Product Ordering Codes and	Ratings" section of this document.	
Component Alignment (side/side )	ΔS	0 ±	2.0	
Carrier Tape Width	Carrier Tape Width W 18.0 +1.0/-0.5			
Sprocket Hole Position	W <sub>1</sub>	9.0 ±0.5		
Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> )	H <sub>0</sub>	N/A	18.0 +2.0/-0	
Height to Seating Plane <sup>2</sup> (straight leads)	Н	20.0 +1.5/-1.0	N/A	
Lead Protrusion	l	2.0 ma	ximum	
Diameter of Sprocket Hole	D <sub>0</sub>	4.0 =	±0.2	
Lead Diameter	φd	0.55	±0.1	
Carrier Tape Thickness	t <sub>1</sub>	0.6 :	±0.3	
Total Thickness (Carrier Tape, Hold-Down Tape and Lead)	t <sub>2</sub>	1.5 ma	ximum	
Component Alignment (front/back)	$\Delta h_{_{1}}$	2.0 ma	ximum	
Component Alignment (nontroack )	$\Delta h_2$	2.0 ma	ximum	
Cut Out Length	L	11.0 ma	aximum	
Hold-Down Tape Width	W <sub>0</sub>	11.0 mi	nimum	
Hold-Down Tape Position	W <sub>2</sub>	1.5 :		
Coating Extension on Leads (meniscus)	е	3.0 maximum for straight lead; not to configu		
Body Thickness	Т	See "Product Ordering Codes and	Ratings" section of this document.	

<sup>&</sup>lt;sup>1</sup>Preformed (crimped) lead configurations include vertical kink and outside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



## **Application Notes:**

#### **Storage and Operating Conditions:**

The insulating coating of these devices does not form an air and moisture-tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt, or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees Centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

#### **Working Voltage:**

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

#### **Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

#### **Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



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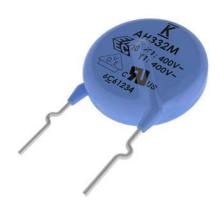
# Safety Standard Recognized, 900 Series, Encapsulated, AH Type, X1 400 VAC/Y1 400 VAC (Industrial Grade)

#### **Overview**

KEMET's 900 series encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution when needing to suppress line disturbances at the source.

Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to line (across-the-line) applications. In this application there is no danger of electric shock to humans should the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 400 VAC in line-to-line (Class X) and 400 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y1 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 8 KV (Y1) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V-0.



## **Ordering Information**

<b>C9</b>	3	1	U	101	J	V	S	D	Α	Α	7317
Ceramic Series	Body Diameter	Lead Spacing <sup>1</sup>	Spec.	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage	Dielectric/ Temp. Char.	Design	Lead Config. <sup>2</sup>	Failure Rate	Packaging (C-Spec)
C9 = Ceramic 900 Series	0 = 7.0 mm 1 = 8.0 mm 2 = 9.0 mm 3 = 10.0 mm 4 = 11.0 mm 5 = 12.0 mm 6 = 13.0 mm 7 = 14.0 mm	1 = 10.0 mm	U = Safety	2 significant digits + number of zeroes	J = ±5% K = ±10% M = ±20%	V = X1 400 VAC /Y1 400 VAC	S = SL Y = Y5P W = Y5U V = Y5V	D = Disc	A = Straight B = Vertical Kink C = Outside Kink	A = N/A	See "Packaging C-Spec Ordering Options Table" below

<sup>&</sup>lt;sup>1</sup> "Vertical Kink" and "Outside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors ordered with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>2</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.



## **Packaging C-Spec Ordering Options Table**

Packaging Type	Lead Length (mm) <sup>2,3</sup>	Packaging Ordering Code (C-Spec)
Ammo Pack	20.0 +1.5/-1.0 (straight leads) 18.0 +2.0/-0 (preformed leads¹)	7317
	3.0 ±1.0	WL30
	3.5 ±1.0	WL35
Pulk Pog	4.0 ±1.0	WL40
Bulk Bag	4.5 ±1.0	WL45
	5.0 ±1.0	WL50
	20.0 minimum⁴	WL20

<sup>1</sup> Preformed (crimped) lead configurations include vertical kink, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

#### **Benefits**

- Safety Standard Recognized (IEC 60384-14)
- · Reliable operation up to 125°C
- Class X1/Y1
- 10 mm lead spacing
- · Lead (Pb)-free and RoHS Compliant
- · Halogen Free
- Capacitance offerings ranging from 10 pF up to 10 nF
- Available capacitance tolerances of ±5%, ±10%, and ±20%
- · High reliability
- · Preformed (crimped) or straight lead configurations
- · Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated lead finish allowing for excellent solderability
- Encapsulation meets flammability standard UL 94V–0

## **Applications**

Typical applications include:

- · Line-to-line (Class X) filtering
- · Line-to-ground (Class Y) filtering
- · Antenna coupling
- · Primary and secondary coupling (switching power supplies)
- Line disturbances suppression (motors and motor controls, relays, switching power supplies, and inverters)

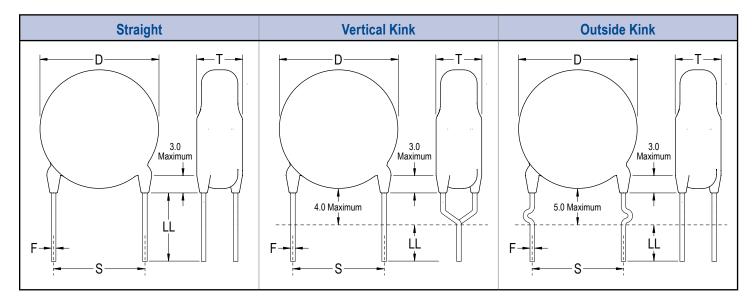
<sup>&</sup>lt;sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

<sup>&</sup>lt;sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.



## **Lead Configurations**



## **Dimensions – Millimeters**

	l ead	Lead F		D	D T		Ød
Lead Configuration	Configuration Ordering Code <sup>1</sup>	Lead Spacing <sup>2</sup>	Lead Spacing Tolerance	Body Diameter <sup>2</sup>	Body Thickness	Lead Meniscus	Lead Diameter
Straight	А	10.0	±1.0				0.55 ±0.1
Vertical Kink (Preformed)	В	10.0	±1.0	"Product Ord	able 1 - dering Codes atings"	3.0 maximum	
Outside Kink (Preformed)	С	10.0	±1.0		and Ratings"		

<sup>&</sup>lt;sup>1</sup> Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.



## **Approval Standard and Certification No.**

Safety Standard	Standard No.	Subclass	Working Voltage	Certificate No.
VDE	IEC 60384-14	X1	400 VAC	40036417
(ENEC)	IEC 00304-14	Y1	400 VAC	40030417

These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384-14.

## **Environmental Compliance**

These devices are Halogen Free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



## **General Specifications/Performance Characteristics**

Dielectric/Temperature Characteristic	SL	Y5P	Y5U	Y5V	
Operating Temperature Range:	-40°C to +125°C				
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	-1,000 ~ +350 ppm/°C	±10%	+20%/-55%	~ +30%/-80%	
Dielectric Withstanding Voltage			) VAC nds at 25°C)		
Quality Factor (Q)	30 pF and above: ≥ 1,000 Below 30 pF: ≥ 400 +(20xC)*		See "Dissipation Factor"		
Dissipation Factor (tanδ) at +25°C1	See "Quality Factor"	2.50%	2.50%	5.0%	
Insulation Resistance (IR) Limit at +25°C			2 Minimum 0 ±5 seconds @ 25°C)		

<sup>\*</sup> C = Nominal capacitance

SL: 1 MHz ±100 kHz and 1.0 ±0.2 Vrms

X5P, Y5U and Y5V: 1 kHz  $\pm$ 50 Hz and 1.0  $\pm$ 0.2 Vrms

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

<sup>&</sup>lt;sup>1</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:



## Table 1 – Product Ordering Codes and Ratings

Dielectric/				Din	nensions (mn	1)	Lead S	pacing
Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Bulk Packaging	Ammo Packaging
	C901U150JVSD(1)A(2)	15 pF 18 pF						
	C901U180JVSD(1)A(2) C901U200JVSD(1)A(2)	18 pF 20 pF						
	C901U220JVSD(1)A(2)	20 pF 22 pF						
	C901U240JVSD(1)A(2)	24 pF						
	C901U270JVSD(1)A(2)	27 pF		7.0				
	C901U300JVSD(1)A(2)	30 pF						
	C901U330JVSD(1)A(2)	33 pF						
	C901U360JVSD(1)A(2)	36 pF						
SL	C901U390JVSD(1)A(2)	39 pF	±5%		5.0	0.55 ±0.1	10	mm
	C911U470JVSD(1)A(2)	47 pF			1			
	C911U500JVSD(1)A(2)	50 pF						
	C911U510JVSD(1)A(2)	51 pF		8.0				
	C911U560JVSD(1)A(2)	56 pF						
	C911U620JVSD(1)A(2)	62 pF						
	C921U680JVSD(1)A(2) C921U750JVSD(1)A(2)	68 pF		9.0				
		75 pF						
	C921U820JVSD(1)A(2)	82 pF						
	C931U101JVSD(1)A(2)	100 pF		10.0				
	C901U101KVYD(1)A(2)	400 - 5			Υ	1		
		100 pF						
	C901U151KVYD(1)A(2) C901U221KVYD(1)A(2)	150 pF 220 pF		7.0				
	C901U331KVYD(1)A(2)	330 pF						
Y5P	C911U471KVYD(1)A(2)	470 pF	±10%	8.0	5.0	0.55 ±0.1	10	mm
	C921U561KVYD(1)A(2)	560 pF		0.0	1			
	C921U681KVYD(1)A(2)	680 pF		9.0				
	C941U102KVYD(1)A(2)	1,000 pF		11.0				
	00+10102RV1D(1/A(2)	1,000 μι		11.0				
	C911U102MVWD(1)A(2)	1,000 pF		8.0				
	C921U152MVWD(1)A(2)	1,500 pF		9.0	]			
Y5U	C931U222MVWD(1)A(2)	2,200 pF	±20%	10.0	5.0	0.55 ±0.1	10	mm
130	C951U332MVWD(1)A(2)	3,300 pF	<b>±</b> 20%	12.0	5.0	0.55 ±0.1	10	111111
	C961U392MVWD(1)A(2)	3,900 pF		13.0				
	C971U472MVWD(1)A(2)	4,700 pF		14.0	<u> </u>	<u> </u>	<u> </u>	
	C00411400M\/\/D/4\A/0\	1,000 pF		7.0				
	C901U102MVVD(1)A(2)	1,000 pF		7.0 8.0				
VEV	C911U152MVVD(1)A(2)	1,500 pF	. 200/	9.0	E	0.55 : 0.4	40	mm
Y5V	C921U222MVVD(1)A(2)	2,200 pF 3,300 pF	±20%	9.0	5.5	0.55 ±0.1	10	mm
	C941U332MVVD(1)A(2) C951U472MVVD(1)A(2)	3,300 pF 4,700 pF		12.0				
	09310412WVVD(1)A(2)	4,700 μι		12.0				
	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Lead S	pacing

<sup>(1)</sup> To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)

- A = Straight
- B = Vertical Kink
- C = Outside Kink

<sup>(2)</sup> To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.



Ite	em	Specif	ication			Test Meth	nod	
Operating Tem	perature Range				-40°C to +125°C			
	Between lead wires	No fa	illures	1 b	The capacitor shall not be damaged when 4,000 VAC(rms) is applied between the lead wires for 60 seconds.			
Dielectric Strength	Body Insulation	No fa	No failures		The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 4,000 VAC(rms) is applied for 60 seconds between the capacitor lead wires and metal balls.			
Insulation Re	esistance (IR)	10,000 MΩ	Ω minimum		he insulation resis		ured with 500 ±50 VDC applied	
Capac	citance	Within specif	fied tolerance					
		Temperature Characteristics	Specification					
		Y5P, Y5U	DF ≤ 2.5%	Y5P, Y5U and Y5V: Capacitance is measured at 1 kHz ±20% and 5 Vrms or less. (20 ±2°C) SL: Capacitance is measured at 1 MHz ±20% and 1.0 ±0.2 Vrms				
Dissipation Fa	actor (DF) or Q	Y5V	DF ≤ 5.0%					
Dissipation Fa	icici (Di ) di Q	SL	≥ 30 pF: Q ≥ 1,000 < 30 pF: Q ≥ 400 +(20 x C) C = Nominal capacitance	(25°C)				
				A capacitance measurement is made at each step specified:				
		Temperature Characteristics	Capacitance Change		Step 1	Temperature +20 ±2°C		
		Y5P	Within ±10%		2	-25 ±2°C		
Temperature (	Characteristics	Y5U	Within +22%/-56%		3	+20 ±2°C		
Tomporataro	Silaractoriotico	Y5V	Within ~+30%/-80%		4	+85 ±2°C		
		SL	-1,000 ~+350 ppm°C		5	+20 ±2°C		
			(+20°C ~+85°C)	Pre-treatment: Capacitor is stored at 85 ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before measurement.				
	Tensile	Lead wire or capacito	r body shall not break.	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 tensile force of 10 N is applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.			he termination is vertical; a mination in the direction of its	
Terminal Strength	Bending	Lead wire or capacitor body shall not break.		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 force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed 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.				
Solder	rability	solder in the axial direct	e a uniform coating of ction and over 3/4 of its ference.	s r	The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.  Solder Temperature: Lead free solder (Sn-3Ag – 0.5Cu) 245°C ±5°C.			

<sup>1 &</sup>quot;Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specif	ication	Test N	<b>lethod</b>			
	Appearance No visual defect As shown in the figure solder up to 1.5 mm (-				ad wires are immersed in molten in the end of the epoxy meniscus			
	IR	1,000	Ο ΜΩ	(root of lead wire).  Duration/Solder Temperature: 3.5 ±	:0.5 seconds/350°C ±10°C or 10 ±1			
	Dielectric Strength	Per i	tem 1	seconds/260°C ±5°C  Thermal Capacitor				
Soldering Effect (Non-Preheat)	Capacitance	SL: Within ±2.5% or :	5V: Within ±10% ±0.25 pF, whichever is ger.	Pre-treatment: Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.				
	Appearance	No visu	al defect	Capacitor is stored at 120°C +0/-5°	C for 60 +0/-5 seconds. Then, as			
	IR	1,000	Ο ΜΩ	up to 1.5 mm (+5/-0mm) from the er	wires are immersed in molten solder and of the epoxy meniscus (root of			
	Dielectric Strength	Per i	tem 1	lead wire). Duration/Solder Temperature: 7.5 +0/-1 seconds/260°C ±5°C				
Soldering Effect (Preheat)	Capacitance	SL: Within ±2.5% or :	5V: Within ±10% ±0.25 pF, whichever is ger.	Pre-treatment: Capacitor stored at 85°C ±2°C for 1 hour and then placed at room condition¹ for 24 ±2 hours before initial measurements.  Post-treatment: Capacitor is stored for 1 to 2 hours at room condition¹.				
	Appearance	No visu	al defect	Steady State Humidity:	Load Humidity:			
	Capacitance	Temperature Characteristics Y5P Y5U Y5V	Capacitance Change Within ±10% Within ±20% Within ±30%					
Biased Humidity		SL	Within ±2.5% or ±0.25 pF, whichever is larger.	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours. Post Treatment:	90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.			
	DF		5.0% maximum maximum	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .	Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> .			
	Q	More than 30	F: Q ≥ 100+10×C/3 ) pF: Q ≥ 200 capacitance					
	IR	Y5P, Y5V and Y5U:	3,000 M $\Omega$ minimum I $\Omega$ minimum					
	Dielectric Strength	No fa	ilures					

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	m	Specification	Test Method			
	Appearance	No visual defect	Impulse Voltage: Each individual capacitor is subjected to three 8 kv impulses prior to life testing.			
	Capacitance Change	Y5P, Y5V and Y5U: Within ±20% SL: Within ±3 or ±0.3 pF, whichever is larger.	Cx tr td  (us) (us)			
	IR	3,000 M $\Omega$ minimum SL: 1,000 M $\Omega$ minimum	0.9Vp			
High Temperature Life	Dielectric Strength	No failures	Capacitors are placed in a circulating air oven for a period of 1,000 hours. The air in the oven is maintained at a temperature of 125°C ±2°C throughout the test. The capacitors are subjected to AC 680 Vrms. Each hour the voltage is increased to AC 1,000 Vrms for 0.1 seconds.			
Flame Test		The capacitor flame extinguishes as follows:    Cycle Time   1 ~ 4 30 seconds maximum   5 60 seconds maximum	The capacitor is exposed to a flame for 15 seconds and then removed for 15 seconds. This test is repeated for 5 cycles.  Capacitor Flame  Gas Burner  (Unit:mm)			
Active Flammability		The cheesecloth should not ignite.	The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.			
			F Fuse, Rated 10A Vt Voltage applied to Ct			

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



Ite	em	Specifi	cation		Test Me	thod		
Passive FI	lammability	seco	best promotes burning. Each specimen is expositime.  The burning time should not exceed 30 seconds.  The tissue paper should not ignite.  Time of exposure to flame: 30 second Length of flame: 12 ±1 mr  Gas burner length: 35 mm m Inside diameter: 0.5 ±0.1  Outside diameter: 0.9 mm m			·	he flame one	
	Appearance	No visua	al defect					
	Capacitance	Temperature Characteristics	Capacitance Change Within ±5%	The capacitor is subjected to 5 temperature cycles.  Temperature Cycle				
	·	Y5P Within ±10% Y5U, Y5V Within ±20%		Step	Temperature (°C)	Dwell Time (minutes)	Transition Time (minutes)	
Temperature		SL	≥30 pF: Q ≥ 350	1	-40 +0/-3	30		
Cycle			<30 pF: Q ≥ 275 +5/2C	2	Room temperature	3	3	
	DF/Q		C = Nominal	3	125 +3/-0	30	3	
	21/00		capacitance	4	Room temperature	3		
		Y5P Y5U, Y5V	DF ≤ 5% DF ≤ 7.5%	Pre-treatment: Capacitor shall be stored at 85 ±2 for 1 hour then				
	IR	3,000 MΩ SL: 1,000 M			om condition¹ for 24 ±2 honent: Capacitor is stored for		room condition <sup>1</sup> .	
	Dielectric Strength	No fa	ilures					

<sup>&</sup>lt;sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



## **Soldering and Mounting Information**

#### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

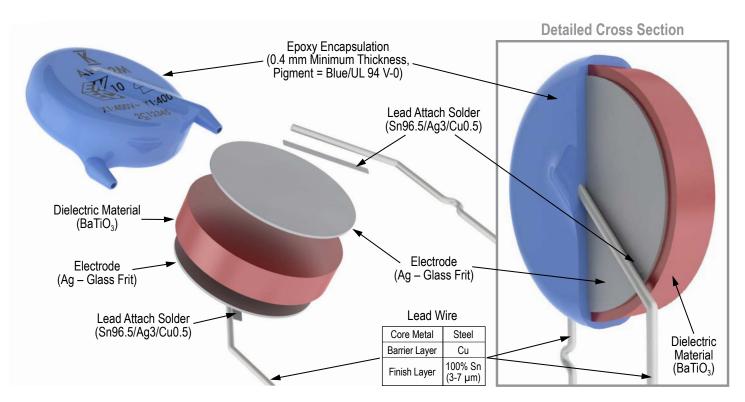
- Temperature of iron-tip: 400°C maximum
- · Soldering iron wattage: 50 W maximum
- · Soldering time: 3.5 seconds maximum

#### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- · Rinse bath capacity: Output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

#### Construction

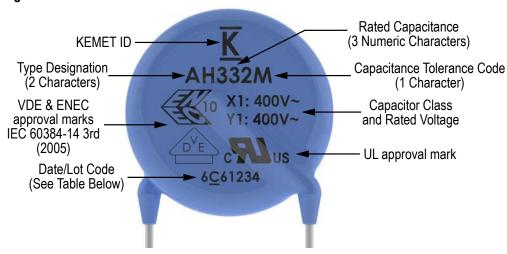




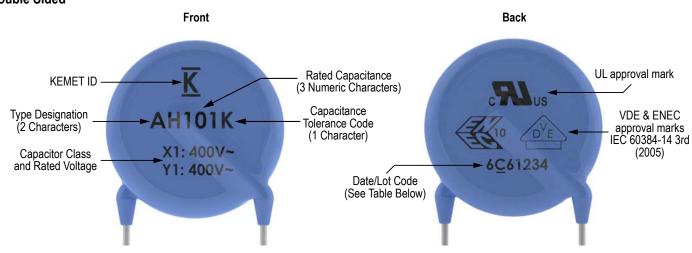
## Marking

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two sided marking is limited to capacitors with body diameters ≤ 8.0 mm.)

#### Single Sided



#### **Double Sided**



Date/Lot Code Explanation

6	<u>C</u>	6	1234
Last digit of year, e.g., 6 = 2016	Manufacturing Location Code	Manufacturing Month:  1-9 = Jan - Sept A = October N = November D = December	Last 4 digits of lot no.



## **Packaging Quantities**

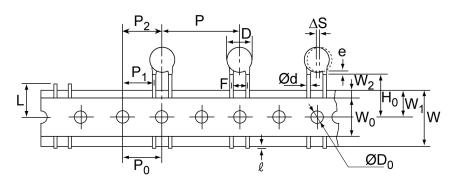
	Body Diameter Code <sup>1</sup>	Bulk Bag (Loose)	Ammo Pack (Carrier Tape)	
Capacitor Body Diameter (mm)			Component pitch on carrier tape <sup>2</sup>	
			25.4 mm	
7.0	0			
8.0	1		1,000 pieces/box	
9.0	2			
10.0	3	EOO niceas/bas		
11.0	4	500 pieces/bag		
13.0	6			
14.0	7		500 pieces/box	
15.0	8			

<sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

<sup>&</sup>lt;sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.



Figure 1 - Ammo Pack Taping Format (10 mm Lead Spacing)



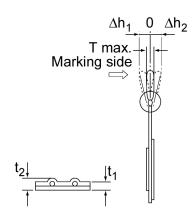


Table 3 – Ammo Pack Taping Specifications

Lead Spacing		10 mm	
Lead Style		Straight	Preformed <sup>1</sup>
Item	Symbol	Dimensions (mm)	
Lead Spacing	F	10.0 ±1.0	
Component Pitch	Р	25.4 ±2	
Sprocket Hole Pitch	P <sub>0</sub>	12.7 ±0.3	
Sprocket Hole Center to Component Center	P <sub>2</sub>	12.7 ±1.5	
Sprocket Hole Center to Lead Center	P <sub>1</sub>	7.7 ±1.5	
Body Diameter	D	See "Product Ordering Codes and Ratings" section of this document.	
Component Alignment (side/side)	ΔS	0 ±2.0	
Carrier Tape Width	W	18.0 +1.0/-0.5	
Sprocket Hole Position	W <sub>1</sub>	9.0 ±0.5	
Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> )	H <sub>o</sub>	N/A	18.0 +2.0/-0
Height to Seating Plane <sup>2</sup> (straight leads)	Н	20.0 +1.5/-1.0	N/A
Lead Protrusion	l	2.0 maximum	
Diameter of Sprocket Hole	D <sub>o</sub>	4.0 ±0.2	
Lead Diameter	φd	0.55 ±0.1	
Carrier Tape Thickness	t <sub>1</sub>	0.6 ±0.3	
Total Thickness (Carrier Tape, Hold-Down Tape and Lead)	t <sub>2</sub>	1.5 maximum	
Component Alignment (front/back)	$\Delta h_1$	2.0 maximum	
Component Anginnent (nont/back )	$\Delta h_2$	2.0 maximum	
Cut Out Length	L	11.0 maximum	
Hold-Down Tape Width	W <sub>0</sub>	11.0 minimum	
Hold-Down Tape Position	W <sub>2</sub>	1.5 ±1.5	
Coating Extension on Leads (meniscus)	е	3.0 maximum for straight lead; not to exceed the bend for preformed¹ lead configurations.	
Body Thickness	Т	See "Product Ordering Codes and Ratings" section of this document.	

<sup>1</sup>Preformed (crimped) lead configurations include vertical kink and outside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>&</sup>lt;sup>2</sup>Also referred to as "lead length" in this document.



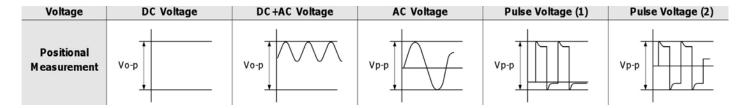
## **Application Notes:**

#### **Storage and Operating Conditions:**

The insulating coating of these devices does not form an air and moisture-tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt, or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees Centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

#### **Working Voltage:**

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.



#### **Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

#### **Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



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Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.