Radial Leaded Ceramic Disc Capacitors

Safety Standard Recognized, ERO610 Encapsulated, X1 440 VAC/Y2 250 VAC (Industrial Grade)

Overview

KEMET's ERO610 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.

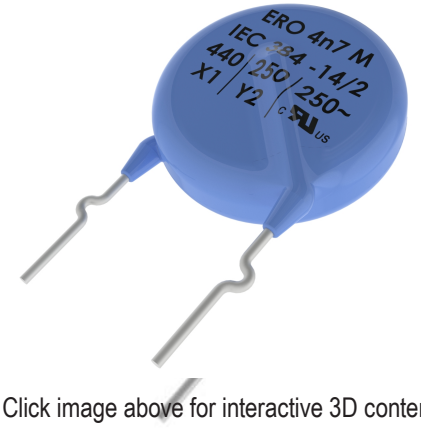
Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to line (across-the-line) applications.

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 440 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 94 V–0.

Benefits

- Safety Standard Recognized (IEC 60384-14)
- Reliable operation up to 125°C
- Class X1/Y2
- 5.0 mm, 7.5 mm, 10 mm, and 12.5 mm lead spacing
- RoHS compliant
- Capacitance offerings ranging from 1.0 nF up to 12 nF
- Available capacitance tolerances of ±20%
- High reliability
- Preformed (crimped) or straight lead configurations
- Non-polar device, minimizing installation concerns
- Encapsulation meets flammability standard UL 94 V–0



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Applications

- 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 invertors)

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Ordering Information

ERK610	Z	102	K	CF0
Ceramic Series	Voltage Rating (Safety Subclass Rating)	Capacitance Code (pF)	Capacitance Tolerance	Lead configuration/ Packaging Code
ERK610	Z = X1 440 VAC/Y2 300 VAC	Two significant digits and number of zeroes	K = ±10% M = ±20%	*See Packaging Options

Packaging C-Spec Ordering Options Tables

Bulk Packaging

	LEAD LENGTH L	LEAD DIAMETER D	LEAD SPACING F			
			5 mm	7.5 mm	10 mm	12.5 mm
Straight leads	30 mm – 3 mm	0.6 mm	BF0	CF0	DF0	EF0
		0.8 mm		CJ0	DJ0	EJ0
	10 mm ±1 mm	0.6 mm	BD0	CD0	DD0	ED0
		0.8 mm		CH0	DH0	EH0
	6 mm – 1 mm	0.6 mm/0.8 mm	BB0	CB0	DB0	EB0
Preformed leads inside crimp	30 mm – 3 mm	0.6 mm			DFG	EFG
		0.8 mm			DJG	EJG
Preformed leads outside crimp	5 mm ±1 mm	0.6 mm	TA0	TC0	TE0	TG0
		0.8 mm		TD0	TF0	TH0
Preformed leads snap-in	Minimum 2.8 mm	0.6 mm			QE0	QG0
	Minimum 3.5 mm	0.8 mm			QF0	QH0
Inline wire	Minimum 2.8 mm + 1.5 mm	0.6 mm	YA0	YC0	YE0	YG0
	Minimum 3.0 mm + 2.0 mm	0.8 mm	YB0	YD0	YF0	YH0

Reel Packaging Component Pitch 12.7 mm[1,2]

	TAPING P		TAPING T		TAPING U	
Lead diameter 0.6 mm	H = 16.5 mm		H = 18.0 mm straight leads only H0 = 16.0 mm preformed leads only		H = 20.0 mm	
Lead spacing F	5 mm	7.5 mm	5 mm	7.5 mm	5 mm	7.5 mm
Body diameter D	Valid for ≤ 12 mm standard (> 12 mm to ≤ 13 mm on request)					
Straight leads		CRE	BRA	CRA	BRC	CRC
Preformed leads inside crimp						
Preformed leads outside crimp			TAR	TCR		
Preformed leads 7.5 mm to 5 mm			UAR			
Preformed leads snap-in						
Inline wire				YCR		

[1] When requiring the 12.7 mm pitch option, 5 mm and 7.5 mm lead spacing is only available for body diameters less than or equal to 12 mm. See Product Ordering Codes and Ratings (Table 1) for Body Diameter.

[2] 10 mm and 12.5 mm lead spacing options are not available in 12.7 mm pitch.

Packaging C-Spec Ordering Options Tables cont.

Reel Packaging Component Pitch 25.4 mm[1,2]					
		TAPING F			
Lead spacing F		5 mm	7.5 mm	10 mm	12.5 mm
Body diameter D		> 12 mm		All diameters	
Straight leads	H = 16.5 mm	BRT	CRT	DRT	ERT
	H = 18.0 mm	BRU	CRU	DRU	ERU
	H = 20.0 mm	BRY	CRY	DRY	ERY
Preformed leads inside crimp	H0 = 16.0 mm			DRZ	ERZ
Preformed leads outside crimp	H0 = 16.0 mm			TDR	TER
Inline wire	H0 = 16.0 mm	YRB	YRC	YRD	YRE

[1] When requiring the 25.4 mm pitch option, 5 mm and 7.5 mm lead spacing is only available for body diameters greater than 12 mm. See Product Ordering Codes and Ratings (Table 1) for Body Diameter.

[2] 10 mm and 12.5 mm lead spacing is available for all body diameters.

Ammo Packaging Component Pitch 12.7 mm[1,2]				
	TAPING P	TAPING T		TAPING U
Lead diameter 0.6 mm	H = 16.5 mm	H = 18.0 mm straight leads only H0 = 16.0 mm preformed leads only		H = 20.0 mm
Lead spacing F	5 mm	5 mm	7.5 mm	5 mm
Body diameter D	Valid for ≤ 12 mm standard (> 12 mm to ≤ 13 mm on request)			
Straight leads	BLE	BLA	CLA	BLC
Preformed leads inside crimp				
Preformed leads 7.5 mm to 5 mm		UAL		
Inline wire		YAL	YLC	

[1] When requiring the 12.7 mm pitch option, 5 mm and 7.5 mm lead spacing is only available for body diameters less than or equal to 12 mm. See Product Ordering Codes and Ratings (Table 1) for Body Diameter.

[2] 10 mm and 12.5 mm lead spacing options are not available in 12.7 mm pitch.

Approval Standard and Certification Number

Safety Standard	Specification	Certificate Number
VDE	EN 132400	40001990
UL CAN/CSA	UL 60384–14 and E60384–14	E356389

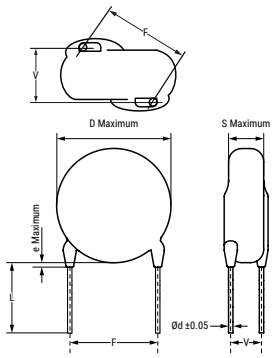
These devices are VDE/ENEC recognized for antenna coupling and AC line-to-line (Class X) and line-to-ground (Class Y) applications per IEC60384–14.

Environmental Compliance

These devices are RoHS compliant. They meet all the requirements set forth by both EU and China RoHS directives.

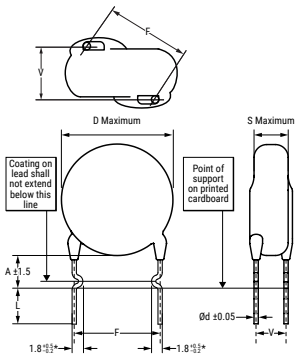
Lead Configurations

Straight Leads



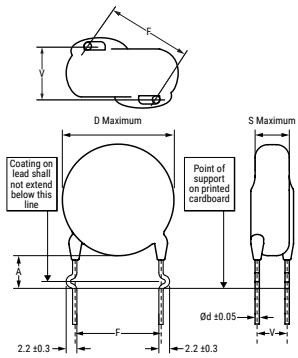
Φd	0.6 or 0.8			
L	30-3 or 10±1			
F	5	7.5	10	12.5
e	3.0 mm Maximum			

Inside Kink



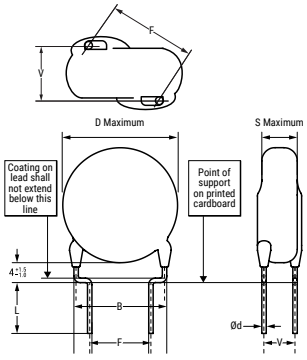
Φd	0.6 or 0.8		
F	7.5	10	12.5
A	4.0±1.5	5.0±1.5	6.0±1.5
L	3.0 mm Minimum Tolerance: 1.0 mm absolute		

Outside Kink



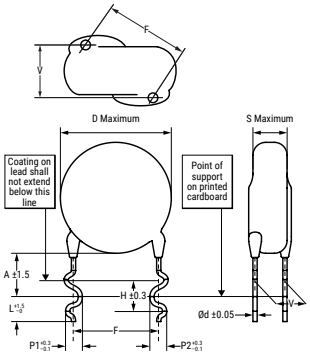
Φd	0.6	0.6 or 0.8			
F	5.0	7.5	7.5	10.0	12.5
A	5.0	5.0	6.0	6.0	6.0

5 mm to 7.5 mm



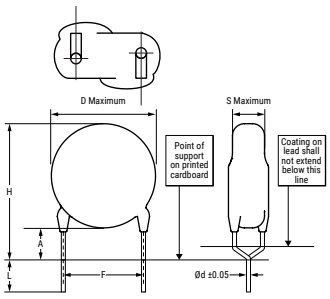
Φd	0.6
B	D - 9: 6.8±0.7 D >9: 7.5±0.7
L	2.0 mm Minimum
	Tolerance: 2.0 mm absolute

Snap-In Leads



Φd	0.6	0.8
F	7.5/10/12.5	7.5/10/12.5
L	2.8 mm Minimum	3.5 mm Minimum
H	2.6	3.3
P1	1.25	1.65
P2	1.65	1.95
A	D - 8: 6.0±1.5 D > 8: 7.0±1.5	

Vertical Crimp



F	7.5	10	12.5
D	0.6	0.8	0.8
A	4.5 Maximum	6.0 Maximum	6.0 Maximum
L	2.8 Minimum 1.5 absolute	3.0 Minimum 2.0 absolute	3.0 Minimum 2.0 absolute

General Specifications/Performance Characteristics

Dielectric/Temperature Characteristic	Y5U
Operating Temperature Range:	−40°C to +125°C
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):	22%/−56%
Test Voltage Between Terminals	Component test: 2,600 VAC, 50 Hz, 2 seconds As repeated test admissible only once with 2,600 VAC, 50 Hz, 60 seconds Random sampling test (destructive test): 2,600 VAC, 50 Hz, 60 seconds
Dielectric Strength of Body Insulation	2,000 VAC, 50 Hz,60 seconds (destructive test)
[1]Dissipation Factor (tanδ) at +25ºC[1]	2.50%
Insulation Resistance (IR) Limit at +25°C	6,000 MΩ Minimum (500 VDC applied for 60±5 seconds at 25°C)

**C = Nominal capacitance*

[1] Capacitance and Dissipation Factor (DF) measured under the following conditions:

Y5U: 1 kHz ± 50 Hz and 1.0 ±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."

Table 1 – Product Ordering Codes and Ratings

Dielectric/ Temp. Char.	KEMET Part Number	Capacitance	Capacitance Tolerance	Dimensions (mm)				Lead Spacing	
				Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Width V ±0.5 mm	Bulk Packaging	Ammo Packaging
Y5U	ERO610T102	1,000 pF	±20%	6.5	4.5	0.6 0.8	1.4	5 7.5 10 12.5	
	ERO610T152	1,500 pF		8.0					
	ERO610T182	1,800 pF							
	ERO610T222	2,200 pF		9.0					
	ERO610T252	2,500 pF							
	ERO610T332	3,300 pF		10.0					
	ERO610T472	4,700 pF		12.0					
	ERO610T502	5,000 pF							
	ERO610T682	6,800 pF		17.0			1.6		
	ERO610T822	8,200 pF							
	ERO610T103	10,000 pF		21.0					
	ERO610T123	12,000 pF							
	KEMET Part Number	Capacitance	Capacitance Tolerance	Body Diameter (Maximum)	Body Thickness (Maximum)	Lead Diameter	Width V ±0.5 mm	Lead Spacing	

(1) To properly complete ordering code, enter the three-digit alphanumeric "Packaging Code." See "Dimensions" section of this document, page 2, for available options.

Soldering and Mounting Information

Soldering Specifications		
	Solderability	Resistance to Soldering Heat
Soldering Temperature	235°C ± 5°C	260°C ± 5°C
Solder Duration	2 seconds ± 0.5 seconds	10 seconds ± 1.0 seconds
Distance from component body	≥ 2 mm	≥ 5 mm
CSA (cUL recognition)	C 22.2 No. 1-M90 (Ur=250 VAC)	216038

Soldering test for capacitors with wire leads: (according to IEC 60068-2-20, solder bath method)

Sodering Recommendations

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.

Cleaning Recommendations

The components should be cleaned immediately following the soldering operation with vapor degreasers.

Marking

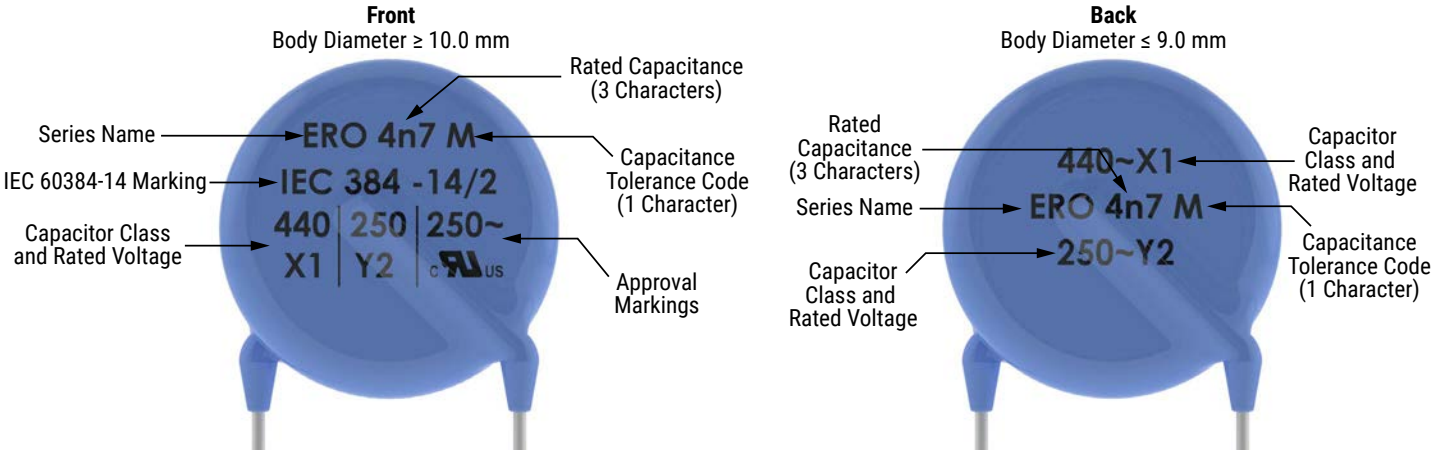
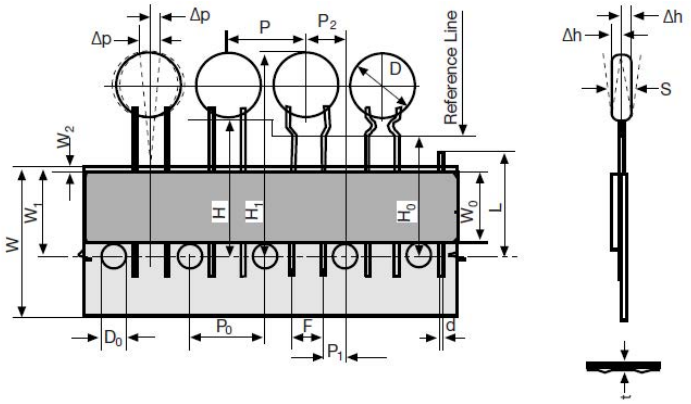
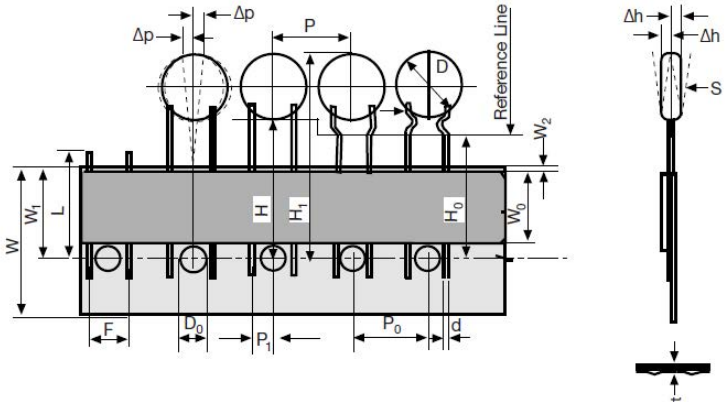


Figure 1 - Ammo Pack Taping Format

TAPING P/T/U
COMPONENT PITCH 0.5 inch
LEAD SPACING 5.0 mm



TAPING P/T/U
COMPONENT PITCH 0.5 inch
LEAD SPACING 7.5 mm



TAPING F
COMPONENT PITCH 1.0 inch
LEAD SPACING 5.0 mm, 7.5 mm, 10.0 mm, and 12.5 mm

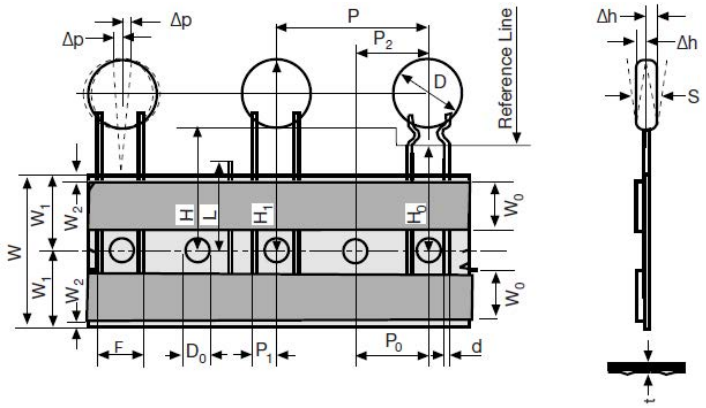


Table 2 – Ammo Pack Taping Specifications

Lead Style		TAPING P	TAPING T	TAPING U	TAPING F
Item	Symbol	Dimensions(mm)			
Pitch of component	P	12.7±1			25.4±1
Pitch of sprocket hole	P0	12.7±0.3			12.7±0.3
Distance, hole to lead	P1	3.85±0.7			(0.5F) ±0.7
Distance, hole to center of component	P2	6.35±1.3			12.7±1.3
Lead spacing	F	5.0/7.5+0.8/−0.2			5/7.5/10/12.5±0.8
Average deviation across tape	Δh	±2.0 Maximum			±3.0 Maximum
Average deviation in direction of reeling	Δp	±1.3 Maximum			±1.3 Maximum
Carrier tape width	W	18.0+1/−0.5			18.0+1/−0.5
Hold-down tape width	W0	6			6
Position of sprocket hole	W1	9.0+0.75/−0.5			9.0+0.75/−0.5
Distance of hold-down tape	W2	3.0 Maximum			3.0 Maximum
Distance between the abscissa and the bottom place of the component body (straight leads)	H	16.5±0.5	18.0+2/−0	20±1	16.5±0.5 18.0+2/−0 20.0±1
Distance between the abscissa and the bottom place of the component body (kinked leads)	H0	16.0±0.5			16.0±0.5
Length of cut leads	L	11.0 Maximum			11.0 Maximum
Diameter of sprocket hole	D0	4.0±0.2			4.0±0.2
Total tape thickness	t	0.9 Maximum			0.9 Maximum

[1]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.
[2]Also referred to as "lead length" in this document.

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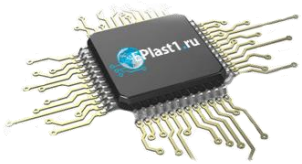

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