

A72 Series Polypropylene Film/Foil, Axial

Overview

The A72 Series is a capacitor with polypropylene film and metal foil or metallized film and metal foil electrodes. The capacitor is encapsulated in self-extinguishing resin in a box of material meeting the requirements of UL 94 V-0 and protected with polyester tape wrapping and thermosetting resin end fill.

Applications

Typical applications include switching spikes suppression and resonant capacitors in switched mode power supply (SMPS), and deflection circuits in televisions (S-correction and flyback tuning) as well as applications with high voltage and high current.

Benefits

- Rated voltage: 100 – 2,000 VDC
- Rated voltage: 63 – 500 VAC
- Capacitance range: 47 – 0.33 μ F
- Diameter: 5 – 22.5 mm
- Length: 11 – 33 mm
- Capacitance tolerance: $\pm 5\%$, $\pm 10\%$, $\pm 20\%$
- Climatic category: 55/105/56, IEC 60068-1
- Tape and reel packaging in accordance with IEC 60286-1
- Category temperature range of -55°C to +105°C



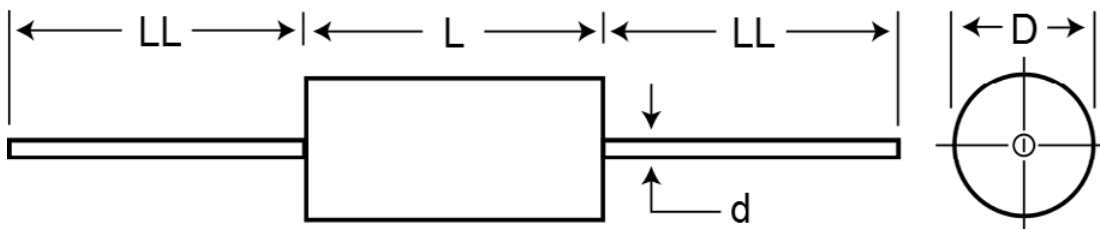
Part Number System

A72	E	F	1470	AA	00	J
Series	Rated Voltage (VDC)	Length (mm)	Capacitance Code (pF)	Lead and Packaging Code	Internal Use	Capacitance Tolerance
Polypropylene Film/Foil	E = 100 I = 250 M = 400 P = 630 Q = 1000 S = 1500 U = 2000	F = 11 H = 14 K = 20.5 Q = 28 T = 33	Digits 2 – 4 indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.	See Ordering Options Table	00, 02 (Standard)	J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$

Ordering Options Table

Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
Bulk (Bag) – Straight Leads	40 +/-5	AA
Tape & Reel (Standard Reel)		26

Dimensions – Millimeters



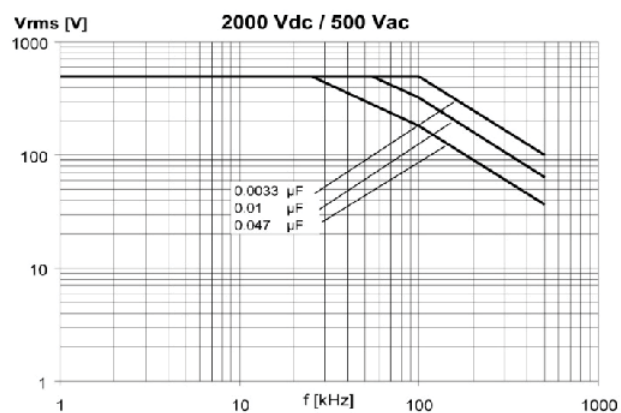
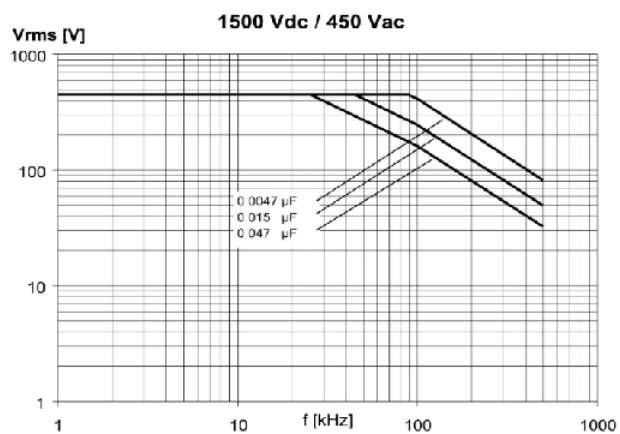
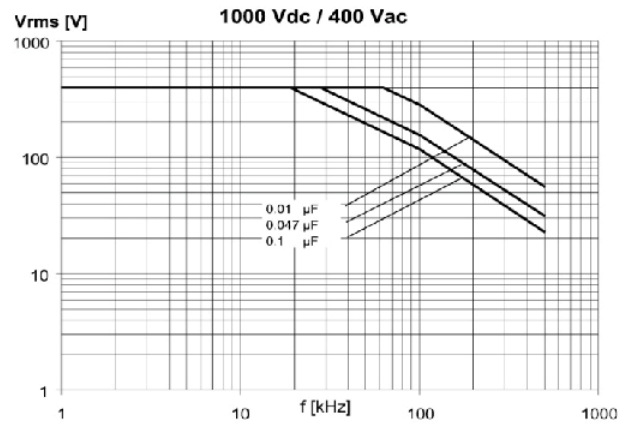
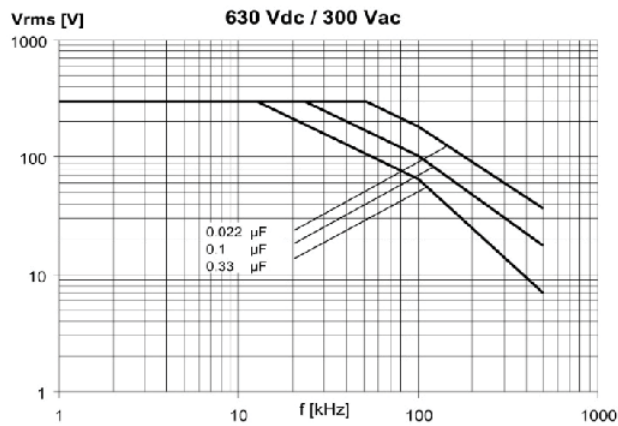
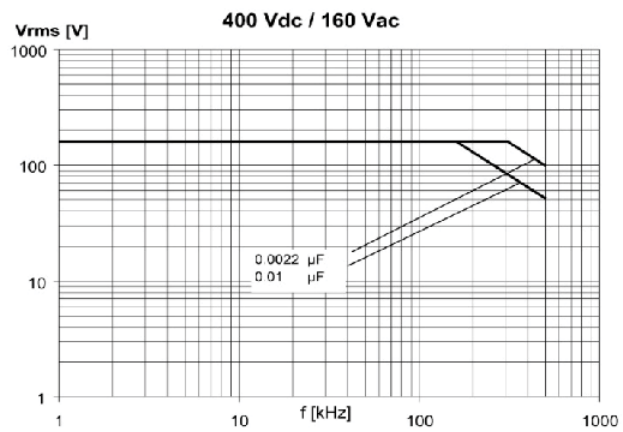
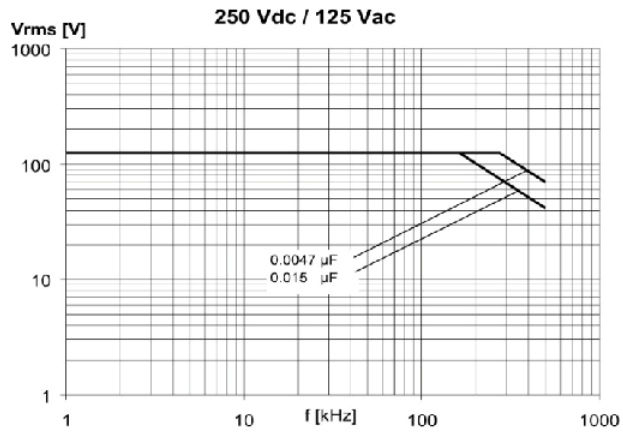
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Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
5	Maximum	11	Maximum	0.5	+/-0.05
6.5	Maximum	16.5	Maximum	0.6	+/-0.05
7	Maximum	16.5	Maximum	0.6	+/-0.05
7.5	Maximum	16.5	Maximum	0.8	+/-0.05
8	Maximum	16.5	Maximum	0.8	+/-0.05
8	Maximum	20.5	Maximum	0.8	+/-0.05
8	Maximum	28	Maximum	0.8	+/-0.05
8.5	Maximum	16.5	Maximum	0.8	+/-0.05
8.5	Maximum	20.5	Maximum	0.8	+/-0.05
8.5	Maximum	28	Maximum	0.8	+/-0.05
9	Maximum	16.5	Maximum	0.8	+/-0.05
9	Maximum	28	Maximum	0.8	+/-0.05
9.5	Maximum	20.5	Maximum	0.8	+/-0.05
9.5	Maximum	28	Maximum	0.8	+/-0.05
10	Maximum	28	Maximum	0.8	+/-0.05
Note: See Ordering Options Table for lead length (LL) options.					

D		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
11	Maximum	20.5	Maximum	0.8	+/-0.05
11	Maximum	28	Maximum	0.8	+/-0.05
11.5	Maximum	28	Maximum	0.8	+/-0.05
12.5	Maximum	28	Maximum	0.8	+/-0.05
13	Maximum	28	Maximum	0.8	+/-0.05
13.5	Maximum	28	Maximum	0.8	+/-0.05
13.5	Maximum	33	Maximum	0.8	+/-0.05
14	Maximum	33	Maximum	0.8	+/-0.05
16	Maximum	33	Maximum	1	+/-0.05
16.5	Maximum	33	Maximum	1	+/-0.05
18	Maximum	33	Maximum	1	+/-0.05
19	Maximum	33	Maximum	1	+/-0.05
19.5	Maximum	33	Maximum	1	+/-0.05
20	Maximum	33	Maximum	1	+/-0.05
22.5	Maximum	33	Maximum	1	+/-0.05
Note: See Ordering Options Table for lead length (LL) options.					

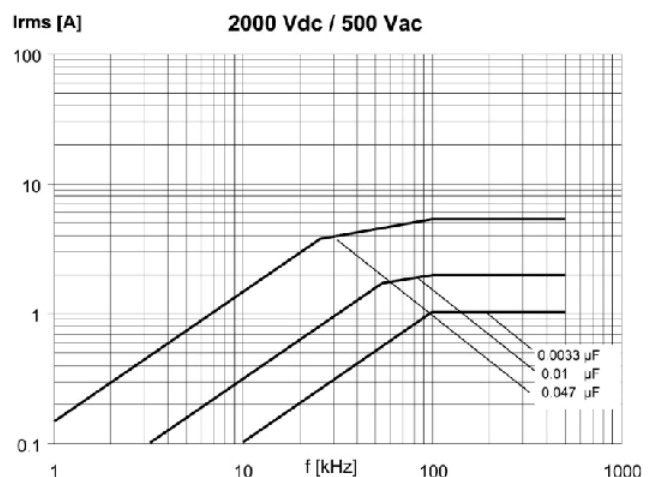
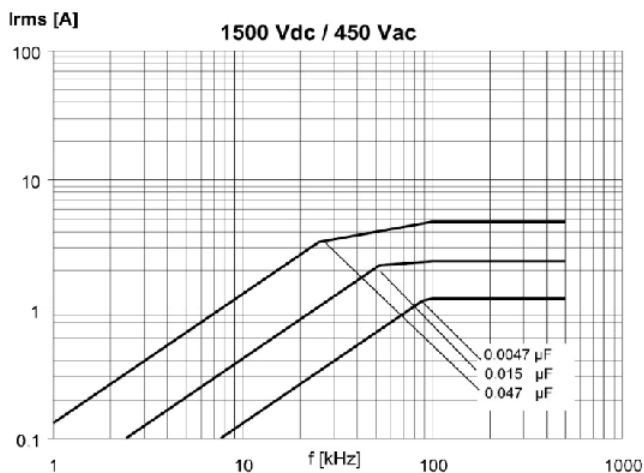
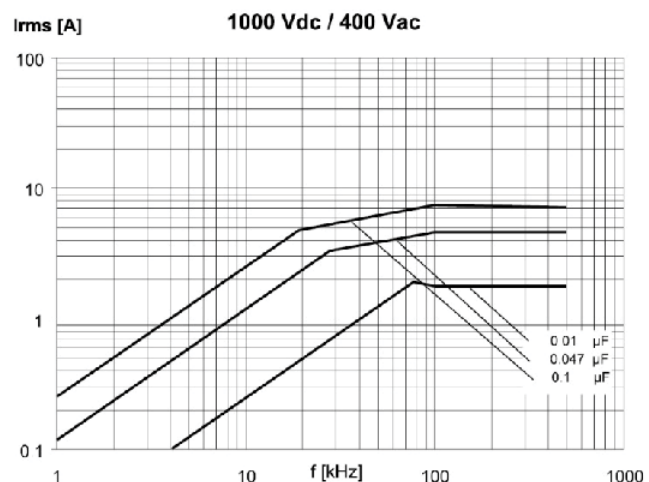
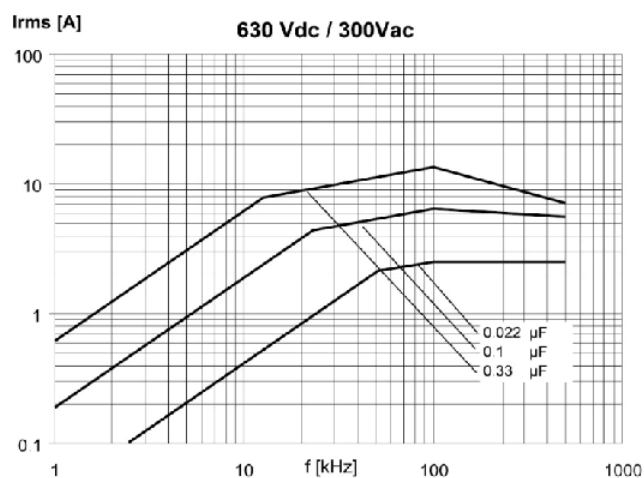
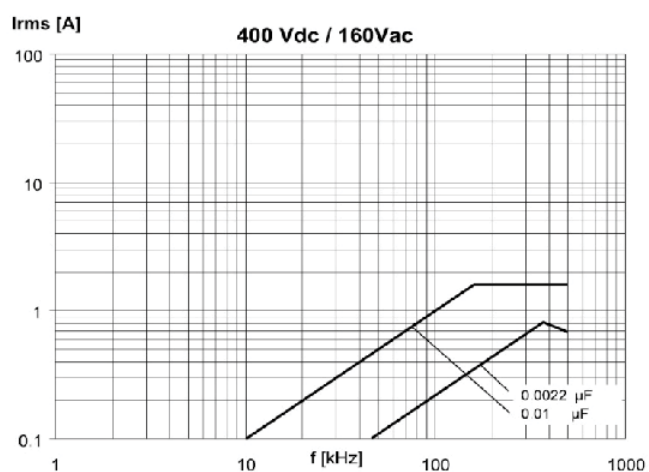
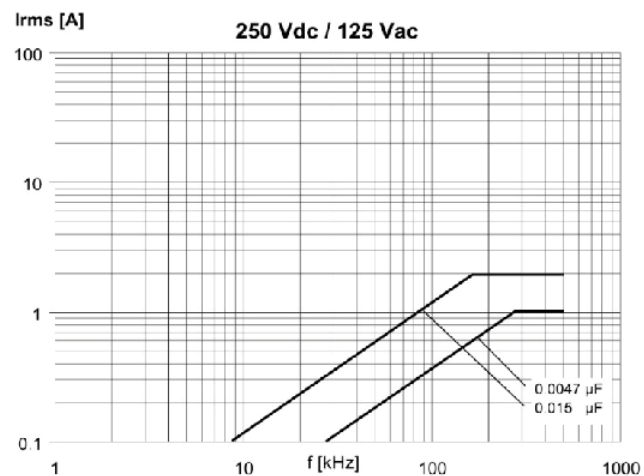
Performance Characteristics

Voltage Range (VDC)	100	250	400	630	1000	1500	2000
Voltage Range (VAC)	63	125	160	300	400	450	500
Capacitance Range (μF)	0.0047 – 0.01	0.0022 – 0.015	0.000047 – 0.01	0.015 – 0.33	0.0033 – 0.1	0.0022 – 0.068	0.001 – 0.047
Capacitance Values	IEC E6 Values						
Capacitance Tolerance	±5%, ±10%, ±20%						
Category Temperature Range	-55°C to +105°C						
Voltage Derating	The rated voltage is decreased with 1.25%/°C between +85°C and +105°C						
Climatic Category	IEC 60068–1, 55/105/56						
Self-Inductance	Approximately 1 nH/mm for the total length of capacitor winding and the leads						
Dissipation Factor tanδ	Measured at 25°C ±5°C						
		C ≤ 0.1 μF			C ≥ 0.1 μF		
	10 kHz	0.0005			0.0005		
	100 kHz	0.001			-		
Insulation Resistance	Measured at +25°C, 100 VDC 60 seconds						
	Minimum Values Between Terminals						
	100,000 MΩ						
Test Voltage Between Terminals	2 x V _R applied for 2 seconds at 25°C ±5°C						

Maximum Voltage (V_{rms}) vs. Frequency (Sinusoidal Waveform/ $T \leq +40^\circ\text{C}$)



Maximum Current (I_{rms}) vs. Frequency (Sinusoidal Waveform/ $T \leq +40^\circ\text{C}$)



Environmental Test Data

Test	IEC Publication	Procedure	Requirements
Voltage Proof	60384-1 Clause 4.6	$1.6 \times V_R$ after 60 seconds	The capacitors must withstand the voltage without breakdowns or flashovers and without decreased insulation resistance below the value in each detail specification. No visible damage
	Clause 4.6 2.3	$2 \times V_R$ (minimum 400 VDC to case) after 60 seconds	As above
Resistance to Soldering Heat	60068-2-20 Method 1A	Solder bath at $+260^\circ\text{C} \pm 5^\circ\text{C}$ with screening	Immersion of the terminations into the solder bath shall be completed in a time not exceeding 1 second and the terminations shall remain immersed to the specified depth for $10 + 1$ second and then be withdrawn. $\Delta C/C \leq \pm 1.0\%$ $\tan\delta$ increase < 0.001 No visible damage
Climatic Sequence	60384-1 Paragraph 4:21	60068-2.2 dry heat 16 hours 60068-2-34 damp heat, one cycle 60068-2-1 Test Aa 2 hours	Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega \cdot \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 0.5\%$ $\tan\delta \leq 1.2 \times \text{stated value at } 100 \text{ kHz}$ 56 days no visible damage
Damp Heat Steady State	60068-2-3 Test Ca	$+40^\circ\text{C}$ and 90 – 95% RH	Insulation resistance: $\geq 50,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 15,000 \text{ M}\Omega \cdot \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 1\%$ $\tan\delta \leq 1.2 \times \text{stated value at } 100 \text{ kHz}$
Endurance, AC		1,000 hours at $+85^\circ\text{C}$ and $1.25 \times V_R$ AC	No visible damage $\Delta C/C \leq \pm 3\%$ $\tan\delta \leq 1.5 \times \text{stated value at } 100 \text{ kHz}$ Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega \cdot \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$

Environmental Compliance

Capacitors with capacitance values $\leq 0.0042 \mu\text{F}$ are not RoHS Compliant.

Capacitors with capacitance values $> 0.0042 \mu\text{F}$ are RoHS Compliant.



RoHS Compliant

Table 1 – Ratings & Part Number Reference

VDC	VAC	Capacitance Value (μF)	Dimensions in mm		dV/dt (V/μs)	Max K ₀ (V ² /μs)	New KEMET Part Number	Legacy Part Number
			D Max	L Max				
100	63	0.0047	5.0	11.0	3000	0.60 E3	72EF1470(1)00(2)	A72EF1470(1)00(2)
100	63	0.0068	5.0	11.0	3000	0.60 E3	72EF1680(1)00(2)	A72EF1680(1)00(2)
100	63	0.01	5.0	11.0	3000	0.60 E3	72EF2100(1)00(2)	A72EF2100(1)00(2)
250	125	0.0022	5.0	11.0	5000	2.50 E3	72IF1220(1)00(2)	A72IF1220(1)00(2)
250	125	0.0033	5.0	11.0	5000	2.50 E3	72IF1330(1)00(2)	A72IF1330(1)00(2)
250	125	0.0047	7.0	16.5	4500	2.30 E3	72II1470(1)00(2)	A72II1470(1)00(2)
250	125	0.0068	7.0	16.5	4500	2.30 E3	72II1680(1)00(2)	A72II1680(1)00(2)
250	125	0.01	7.5	16.5	4500	2.30 E3	72II2100(1)00(2)	A72II2100(1)00(2)
250	125	0.015	8.5	16.5	4500	2.30 E3	72II2150(1)00(2)	A72II2150(1)00(2)
400	160	0.000047	5.0	11.0	13000	10.0 E3	72MF0047(1)00(2)	A72MF0047(1)00(2)
400	160	0.000068	5.0	11.0	13000	10.0 E3	72MF0068(1)00(2)	A72MF0068(1)00(2)
400	160	0.0001	5.0	11.0	13000	10.0 E3	72MF0100(1)00(2)	A72MF0100(1)00(2)
400	160	0.00015	5.0	11.0	13000	10.0 E3	72MF0150(1)00(2)	A72MF0150(1)00(2)
400	160	0.00022	5.0	11.0	13000	10.0 E3	72MF0220(1)00(2)	A72MF0220(1)00(2)
400	160	0.00033	5.0	11.0	13000	10.0 E3	72MF0330(1)00(2)	A72MF0330(1)00(2)
400	160	0.00047	5.0	11.0	13000	10.0 E3	72MF0470(1)00(2)	A72MF0470(1)00(2)
400	160	0.00068	5.0	11.0	13000	10.0 E3	72MF0680(1)00(2)	A72MF0680(1)00(2)
400	160	0.001	5.0	11.0	13000	10.0 E3	72MF1100(1)00(2)	A72MF1100(1)00(2)
400	160	0.0015	5.0	11.0	13000	10.0 E3	72MF1150(1)00(2)	A72MF1150(1)00(2)
400	160	0.0022	6.5	16.5	6500	5.2 E3	72MI1220(1)00(2)	A72MI1220(1)00(2)
400	160	0.0033	6.5	16.5	6500	5.2 E3	72MI1330(1)00(2)	A72MI1330(1)00(2)
400	160	0.0047	7.0	16.5	6500	5.2 E3	72MI1470(1)00(2)	A72MI1470(1)00(2)
400	160	0.0068	8.0	16.5	6500	5.2 E3	72MI1680(1)00(2)	A72MI1680(1)00(2)
400	160	0.01	9.0	16.5	6500	5.2 E3	72MI2100(1)00(2)	A72MI2100(1)00(2)
630	300	0.015	8.5	20.5	4300	5.4 E3	72PK2150(1)00(2)	A72PK2150(1)00(2)
630	300	0.022	9.5	20.5	4300	5.4 E3	72PK2220(1)00(2)	A72PK2220(1)00(2)
630	300	0.033	9.0	28.0	2600	3.3 E3	72PQ2330(1)00(2)	A72PQ2330(1)00(2)
630	300	0.047	10.0	28.0	2600	3.3 E3	72PQ2470(1)00(2)	A72PQ2470(1)00(2)
630	300	0.068	11.5	28.0	2600	3.3 E3	72PQ2680(1)00(2)	A72PQ2680(1)00(2)
630	300	0.1	13.5	28.0	2600	3.3 E3	72PQ3100(1)00(2)	A72PQ3100(1)00(2)
630	300	0.15	14.0	33.0	1800	2.3 E3	72PT3150(1)00(2)	A72PT3150(1)00(2)
630	300	0.22	16.5	33.0	1800	2.3 E3	72PT3220(1)00(2)	A72PT3220(1)00(2)
630	300	0.33	19.5	33.0	1800	2.3 E3	72PT3330(1)00(2)	A72PT3330(1)00(2)
1000	400	0.0033	8.5	20.5	14000	28.0 E3	72QK1330(1)00(2)	A72QK1330(1)00(2)
1000	400	0.0047	9.5	20.5	14000	28.0 E3	72QK1470(1)00(2)	A72QK1470(1)00(2)
1000	400	0.0068	8.0	28.0	5000	10.0 E3	72QQ1680(1)02(2)	A72QQ1680(1)02(2)
1000	400	0.01	8.5	28.0	5000	10.0 E3	72QQ2100(1)02(2)	A72QQ2100(1)02(2)
1000	400	0.015	10.0	28.0	5000	10.0 E3	72QQ2150(1)02(2)	A72QQ2150(1)02(2)
1000	400	0.022	11.0	28.0	5000	10.0 E3	72QQ2220(1)02(2)	A72QQ2220(1)02(2)
1000	400	0.033	13.0	28.0	5000	10.0 E3	72QQ2330(1)02(2)	A72QQ2330(1)02(2)
1000	400	0.047	14.0	33.0	3700	7.4 E3	72QT2470(1)02(2)	A72QT2470(1)02(2)
1000	400	0.068	16.0	33.0	3700	7.4 E3	72QT2680(1)02(2)	A72QT2680(1)02(2)
1000	400	0.1	19.0	33.0	3700	7.4 E3	72QT3100(1)02(2)	A72QT3100(1)02(2)
1500	450	0.0022	8.0	20.5	17000	51 E3	72SK1220(1)00(2)	A72SK1220(1)00(2)
1500	450	0.0033	9.5	20.5	17000	51 E3	72SK1330(1)00(2)	A72SK1330(1)00(2)
1500	450	0.0047	8.5	28.0	6000	18 E3	72SQ1470(1)00(2)	A72SQ1470(1)00(2)
1500	450	0.0068	8.5	28.0	6000	18 E3	72SQ1680(1)00(2)	A72SQ1680(1)00(2)
1500	450	0.01	9.5	28.0	6000	18 E3	72SQ2100(1)00(2)	A72SQ2100(1)00(2)
1500	450	0.015	11.0	28.0	6000	18 E3	72SQ2150(1)00(2)	A72SQ2150(1)00(2)
1500	450	0.022	12.5	28.0	6000	18 E3	72SQ2220(1)00(2)	A72SQ2220(1)00(2)
1500	450	0.033	13.5	33.0	4500	13 E3	72ST2330(1)00(2)	A72ST2330(1)00(2)
1500	450	0.047	16.0	33.0	4500	13 E3	72ST2470(1)00(2)	A72ST2470(1)00(2)
1500	450	0.068	18.0	33.0	4500	13 E3	72ST2680(1)00(2)	A72ST2680(1)00(2)
2000	500	0.001	8.5	20.5	27000	108 E3	72UK1100(1)00(2)	A72UK1100(1)00(2)
2000	500	0.0015	9.5	20.5	27000	108 E3	72UK1150(1)00(2)	A72UK1150(1)00(2)
2000	500	0.0022	11.0	20.5	27000	108 E3	72UK1220(1)00(2)	A72UK1220(1)00(2)
2000	500	0.0033	9.0	28.0	9800	39 E3	72UQ1330(1)00(2)	A72UQ1330(1)00(2)
2000	500	0.0047	9.5	28.0	9800	39 E3	72UQ1470(1)00(2)	A72UQ1470(1)00(2)
2000	500	0.0068	11.0	28.0	9800	39 E3	72UQ1680(1)00(2)	A72UQ1680(1)00(2)
VDC	VAC	Capacitance Value (μF)	B (mm)	H (mm)	dV/dt (V/μs)	Max K ₀ (V ² /μs)	New KEMET Part Number	Legacy Part Number

(1) Insert lead and packaging code. See Ordering Options Table for available options.

(2) J = 5%, K = 10%, M = 20%.

Table 1 – Ratings & Part Number Reference

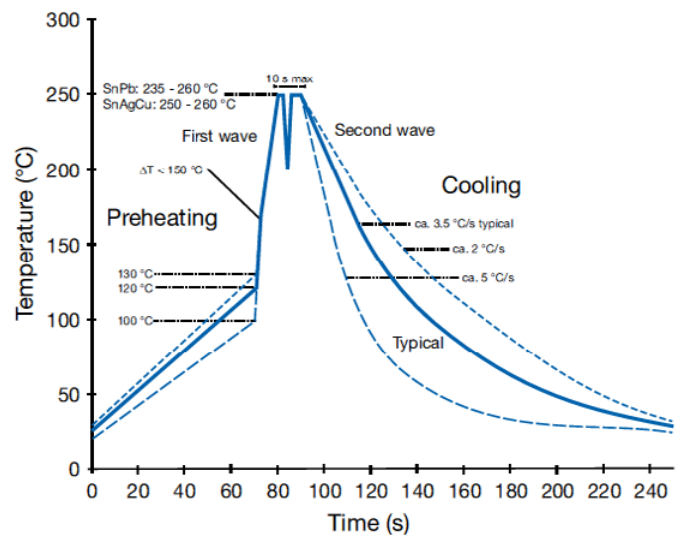
VDC	VAC	Capacitance Value (μF)	Dimensions in mm		dV/dt (V/μs)	Max K ₀ (V ² /μs)	New KEMET Part Number	Legacy Part Number
			D Max	L Max				
2000	500	0.01	13.0	28.0	9800	39 E3	72UQ2100(1)00(2)	A72UQ2100(1)00(2)
2000	500	0.015	13.5	33.0	7000	28 E3	72UT2150(1)00(2)	A72UT2150(1)00(2)
2000	500	0.022	16.0	33.0	7000	28 E3	72UT2220(1)00(2)	A72UT2220(1)00(2)
2000	500	0.033	20.0	33.0	7000	28 E3	72UT2330(1)00(2)	A72UT2330(1)00(2)
2000	500	0.047	22.5	33.0	7000	28 E3	72UT2470(1)00(2)	A72UT2470(1)00(2)
VDC	VAC	Capacitance Value (μF)	B (mm)	H (mm)	dV/dt (V/μs)	Max K ₀ (V ² /μs)	New KEMET Part Number	Legacy Part Number

(1) Insert lead and packaging code. See Ordering Options Table for available options.

(2) J = 5%, K = 10%, M = 20%.

Soldering Process

The implementation of the RoHS Directive has required the selection SnAuCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217°C – 221°C for the new alloys. As a result, the heat stress to components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (melting point of polypropylene is 160°C – 170°C). Wave soldering can be destructive especially for mechanically small polypropylene capacitors and great care must be taken during soldering. The solder profiles from KEMET are highly recommended. You may also refer to the wave soldering curve from IEC Publication 61760–1 Edition 2. Please consult KEMET with any questions.



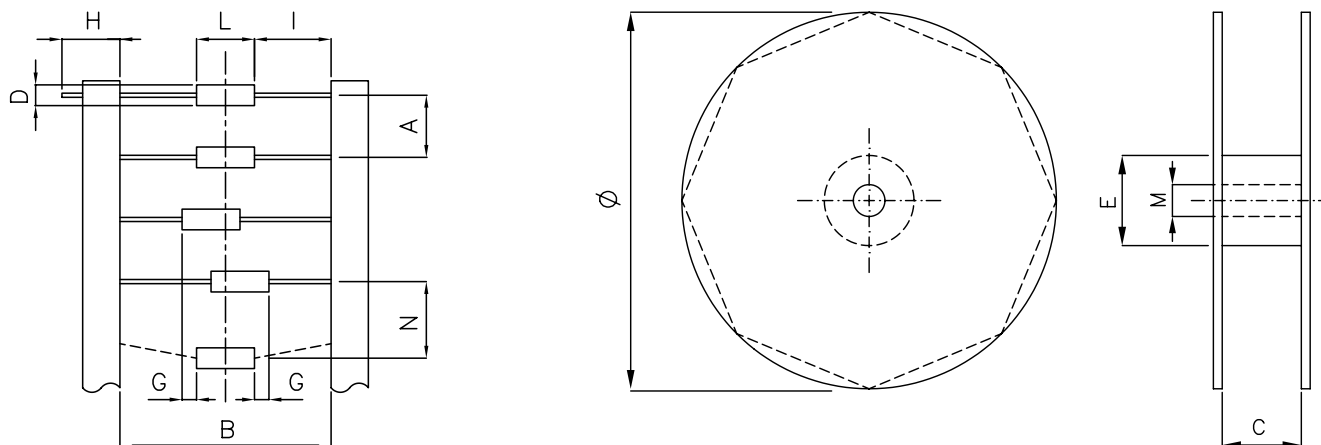
Marking

- KEMET's logo
- Series
- Dielectric code MKP
- Capacitance
- Capacitance tolerance
- Rated DC voltage

Packaging Quantities

Diameter	Length	Bulk Long Leads	Standard Reel ø 355 mm
5	11	1500	3000
6.5	16.5	1200	1300
7	16.5	1750	1100
7.5	16.5	1500	1000
8	16.5	1250	900
8	20.5	1000	900
8	28	500	900
8.5	16.5	1000	800
8.5	20.5	750	800
8.5	28	500	800
9	16.5	1000	800
9	28	500	800
9.5	20.5	750	600
9.5	28	500	600
10	28	500	600
11	20.5	500	400
11	28	500	400
11.5	28	300	400
12.5	28	300	400
13	28	300	400
13.5	28	300	300
13.5	33	300	300
14	33	300	300
16	33	200	250
16.5	33	200	250
18	33	200	200
19	33	150	150
19.5	33	150	150
20	33	150	150
22.5	33	100	

Lead Taping & Packaging (IEC 60286-1)



Taping Specification

Description	Symbol	Dimensions (mm)
Component diameter	D	4.5 – 19.5
Body length	L	11 – 33
Component lead spacing	A ⁽¹⁾	See Table 1
Reel core diameter	E	85
Arbor hole diameter	M	30
Reel diameter	Ø	355 maximum
Tape width	H	6 ±0.5/9 ±1 ⁽²⁾
Body location (lateral deviation)	G	≤ 0.7
Body location (longitudinal deviation)	N	≤ 1.2
Tape spacing	B	See Table 2
Lead length from the component body to the adhesive tape	I	≥ 20
Distance between reel flanges	C	See Table 2

(1) Maximum cumulative feed hole error 1.5 mm per 6 parts.

(2) 9 ±1 for capacitor with L ≥ 31.5.

Table 1

Dimensions in mm	
Diameter	A ^{±0.5}
≤ 5	5
5.1 – 9.5	10
9.6 – 14.7	15
14.8 – 19.5	15

Table 2

Dimensions in mm			
Length	Class	B ^{±1.5}	C
≤ 11	I	52.4	75
14 – 20.5	II	63.6	86
≥ 26	III	73	98

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Other KEMET Resources

Tools	
Resource	Location
Configure A Part: CapEdge	http://capacitoredge.kemet.com
SPICE & FIT Software	http://www.kemet.com/spice
Search Our FAQs: KnowledgeEdge	http://www.kemet.com/keask
Electrolytic LifeCalculator	http://www.kemet.com:8080/elc

Product Information	
Resource	Location
Products	http://www.kemet.com/products
Technical Resources (Including Soldering Techniques)	http://www.kemet.com/technicalpapers
RoHS Statement	http://www.kemet.com/rohs
Quality Documents	http://www.kemet.com/qualitydocuments

Product Request	
Resource	Location
Sample Request	http://www.kemet.com/sample
Engineering Kit Request	http://www.kemet.com/kits

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Resource	Location
Website	www.kemet.com
Contact Us	http://www.kemet.com/contact
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