

R71 Single Metallized Polypropylene Film, Radial, SMPS PFC Applications

Overview

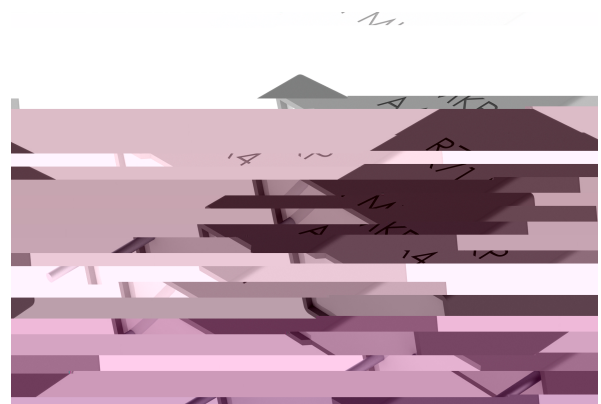
The R71 is constructed of metallized polypropylene film with radial leads of tinned wire. The radial leads are electrically welded to the metal layer on the ends of the capacitor winding. The capacitor is encapsulated in a self-extinguishing solvent resistant plastic case with thermosetting resin material meeting UL 94V-0 requirements.

Applications

Typical applications include power factor correction and pulse applications. Not suitable for across-the-line application (see Suppressor Capacitors).

Benefits

- Voltage range: 420 – 1,000 VDC
- Capacitance range: 0.01 – 22 μ F
- Lead Spacing: 10 – 37.5 mm
- Capacitance tolerance: \pm 10%, \pm 20%, \pm 5% (on request)
- Climatic category: 55/105/56 IEC 60068-1
- Operating temperature range of -55°C to +105°C
- RoHS compliance and lead-free terminations
- Tape and reel packaging in accordance with IEC 60286-2
- Self-healing



Part Number System

R71	M	F	2100	AA	00	J
Series	Rated Voltage (VDC)	Lead Spacing (mm)	Capacitance Code (pF)	Packaging	Internal Use	Capacitance Tolerance
Metallized						

Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
10 15 22.5	Standard Lead and Packaging Options		
	Bulk (Bag) – Short Leads	4 +2/-0	AA
	Ammo Pack	H ₀ = 18.5 ±0.5	DQ
	Other Lead and Packaging Options		
	Tape & Reel (Standard Reel)	H ₀ =18.5 ±0.5	GY
	Tape & Reel (Large Reel)	H ₀ =18.5 ±0.5	CK
	Bulk (Bag) – Short Leads	3.5 +0.5/-0	JB
	Bulk (Bag) – Short Leads	4.0 +0.5/-0	JE
	Bulk (Bag) – Short Leads	3.2 +0.3/-0.2	JH
	Bulk (Bag) – Long Leads	18 ±1	JM
Bulk (Bag) – Long Leads	30 +5/-0	40	
Bulk (Bag) – Long Leads	25 +2/-1	50	
27.5	Standard Lead and Packaging Options		
	Bulk (Tray) – Straight Leads	4 +2/-0	AA
	Other Lead and Packaging Options		
	Tape & Reel (Large Reel)	H ₀ =18.5 ±0.5	CK
	Bulk (Bag) – Short Leads	3.5 +0.5/-0	JB
	Bulk (Bag) – Short Leads	4.0 +0.5/-0	JE
	Bulk (Bag) – Short Leads	3.2 +0.3/-0.2	JH
	Bulk (Bag) – Long Leads	18 ±1	JM
	Bulk (Bag) – Long Leads	30 +5/-0	40
	Bulk (Bag) – Long Leads	25 +2/-1	50
37.5	Standard Lead and Packaging Options		
	Bulk (Tray) – Straight Leads	4 +2/-0	AA
	Other Lead and Packaging Options		
	Bulk (Bag) – Short Leads	3.5 +0.5/-0	JB
	Bulk (Bag) – Short Leads	4.0 +0.5/-0	JE
	Bulk (Bag) – Short Leads	3.2 +0.3/-0.2	JH
	Bulk (Bag) – Long Leads	18 ±1	JM
	Bulk (Bag) – Long Leads	30 +5/-0	40
	Bulk (Bag) – Long Leads	25 +2/-1	50

Dimensions – Millimeters

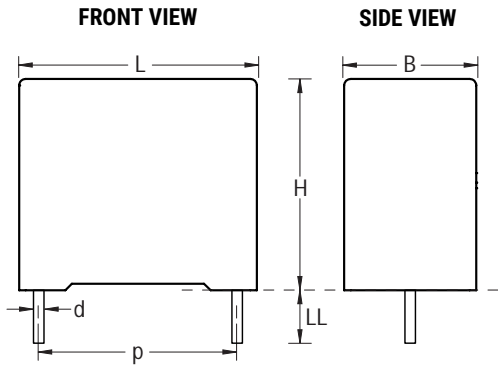
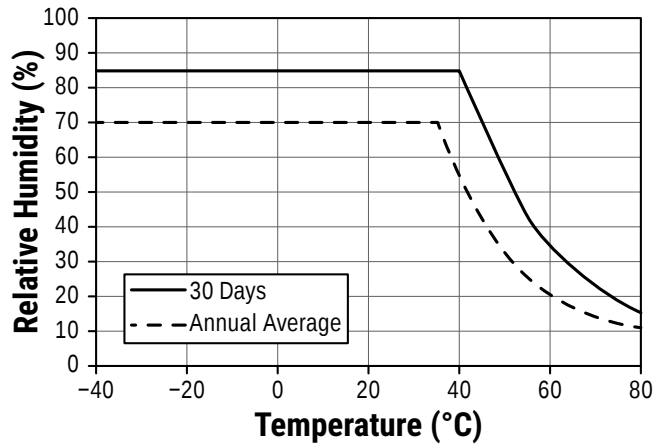


Table with 8 columns and 10 rows for technical specifications.							

Performance Characteristics

Dielectric	Polypropylene film				
Plates	Metal layer deposited by evaporation under vacuum				
Winding	Non-inductive type				
Leads	Tinned wire				
Protection	Plastic case, thermosetting resin filled. Box material is solvent resistant and flame retardant according to UL94.				
Rated Voltage V_R (VDC)	420	520	630	1,000	
Rated Voltage V_R (VAC)	220	250	275	275	
Capacitance Range (μ F)	0.01 – 22	0.01 – 22	0.01 – 15	0.22 – 10	
Capacitance Values	E12 series (IEC 60063) measured at 1 kHz and +20 \pm 1°C				
Capacitance Tolerance	\pm 10%, \pm 20%, \pm 5% on request				
Operating Temperature Range	-40°C to +110°C				
Rated Temperature T_R	+105°C				
Voltage Derating	Above +105°C DC and AC voltage derating is 4%/°C				

Maximum Humidity in Storage Conditions

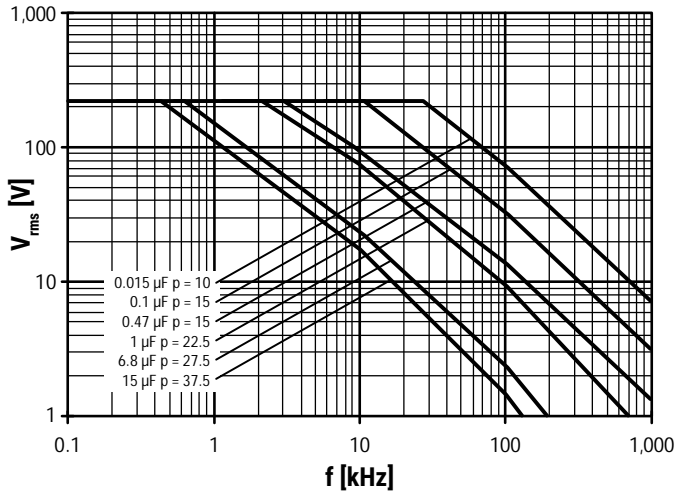


Performance Characteristics cont'd

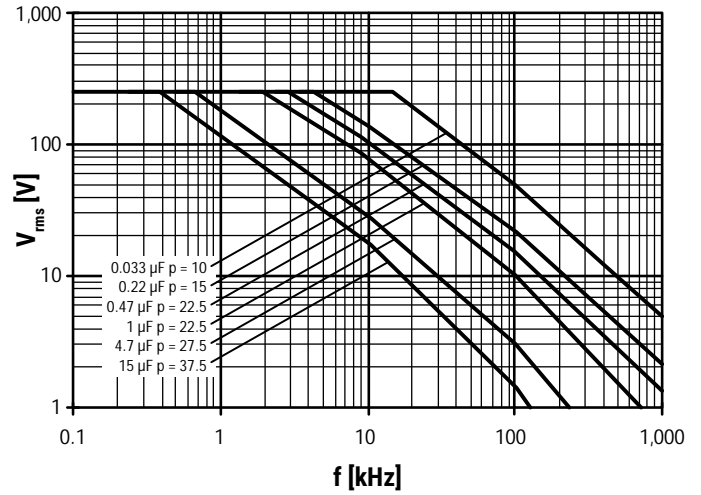
Climatic Category	40/110/56 IEC 60068-1					
Storage Conditions	Storage time: ≤ 24 months from the date marked on the package label					
	Average relative humidity per year ≤ 70%					
	RH ≤ 85% for 30 days randomly distributed throughout the year					
	Dew is absent					
	Temperature: -40 to 80°C (see "Maximum Humidity in Storage Conditions" graph below)					
Test Voltage	1.6 x V _R VDC for 2 seconds (between terminations) at +25°C ±5°C					
Capacitance Drift	Maximum 0.5% after a 2 year storage period at a temperature of +10°C to +40°C and a relative humidity of 40% to 60%					
Maximum Pulse Steepness	dV/dt according to Table 1. For peak to peak voltages lower than rated voltage (V _{pp} < V _R), the specified dv/dt can be multiplied by the factor V _R /V _{pp}					
Temperature Coefficient	-(200 ±100) ppm/°C at 1 kHz					
Self Inductance (Lead Length ~ 2 mm)	Lead Spacing (mm)	10	15	22.5	27.5	37.5
	L (nH) ≈	9	10	18	18	20
	Maximum 1 nH per 1 mm lead and capacitor length.					
Dissipation Factor tanδ	≤ 0.1% (0.06%)* at 25°C ±5°C (* typical value)					
Insulation Resistance	Measured at +25°C ±5°C, 100 VDC 60 seconds					
	Minimum Values Between Terminals					
	C ≤ 0.33 μF			C > 0.33 μF		
	≥ 100,000 MΩ (≥ 500,000 MΩ)*			≥ 30,000 MΩ • μF (≥ 150,000 MΩ • μF)*		

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

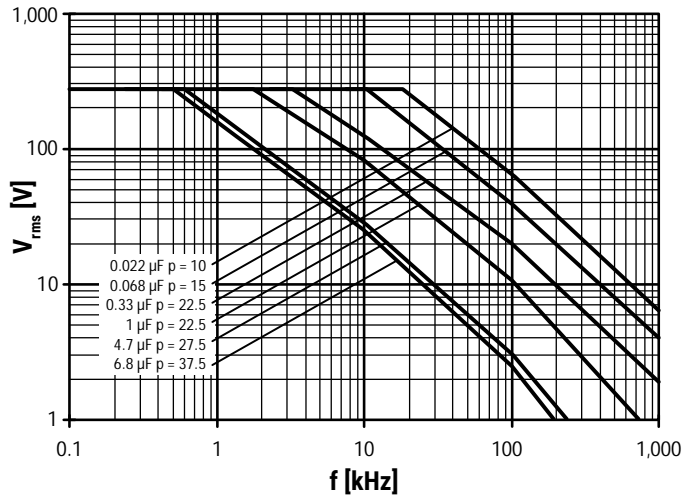
420 VDC/220 VAC



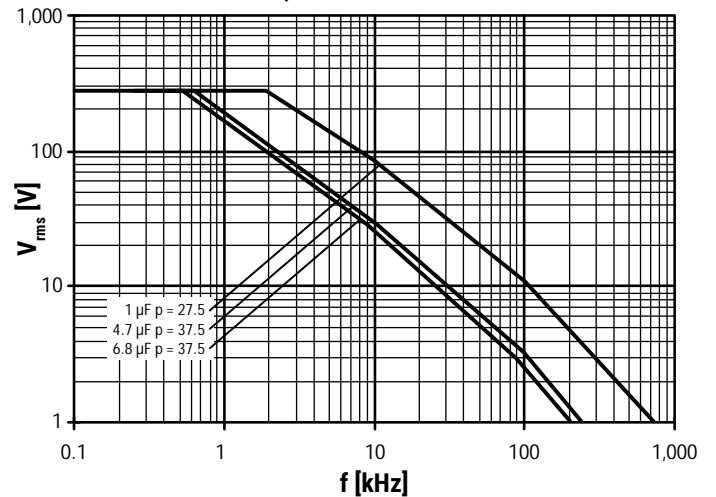
520 VDC/250 VAC



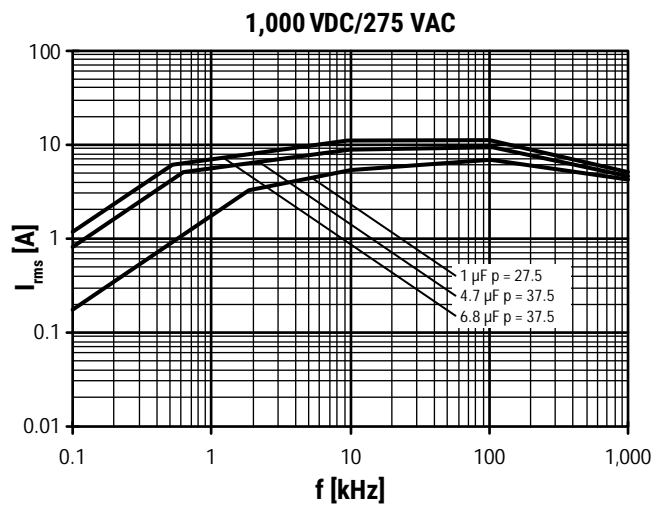
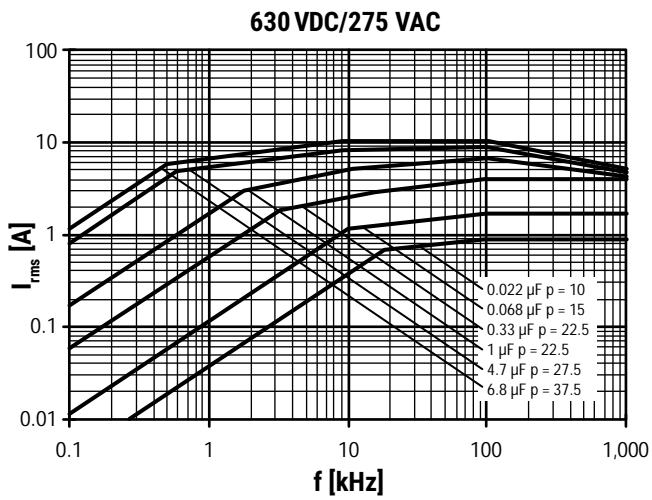
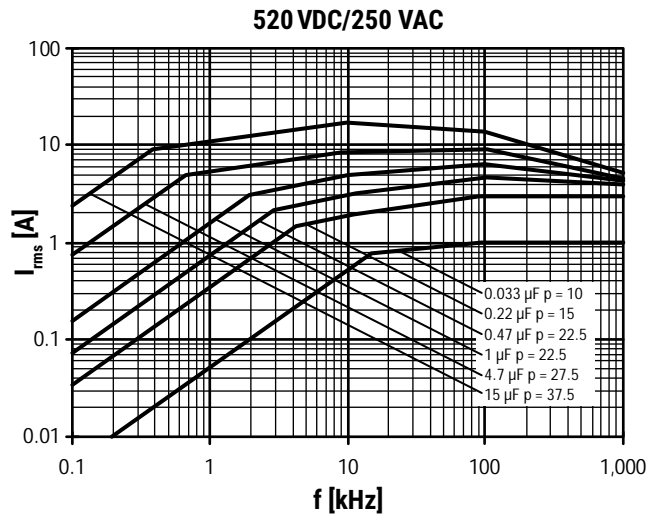
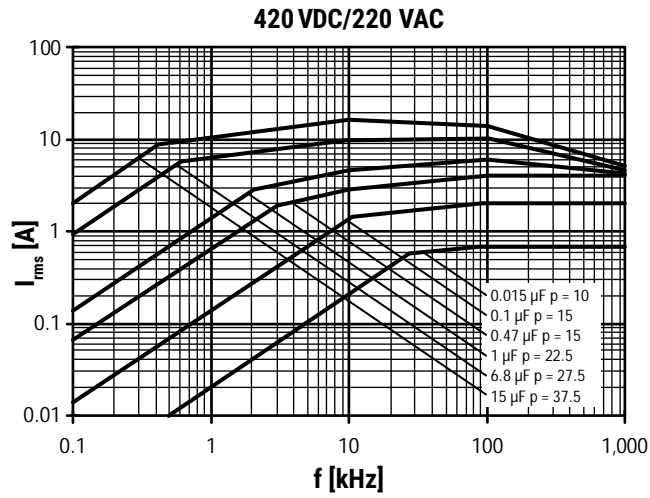
630 VDC/275 VAC



1,000 VDC/275 VAC



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



Environmental Test Data

Damp Heat, Steady State Test	Test Conditions:		Performances
Test 1st	Temperature: Relative humidity (RH): Test duration:	+40°C	

Table 1 – Ratings & Part Number Reference

VDC	VAC	Capacitance Value (µF)	Dimensions in mm			Lead Spacing (p)	Φ d (mm)	dV/dt (V/µs)	Max K ₀ (V ² /µs)	New KEMET Part Number	Legacy Part Number
			B	H	L						
420	220	0.010	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2100(1)00(2)	R71MF2100(1)00(2)
420	220	0.015	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2150(1)00(2)	R71MF2150(1)00(2)
420	220	0.022	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2220(1)00(2)	R71MF2220(1)00(2)
420	220	0.033	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2330(1)00(2)	R71MF2330(1)00(2)
420	220	0.047	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2470(1)00(2)	R71MF2470(1)00(2)
420	220	0.068	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF2680(1)30(2)	R71MF2680(1)30(2)
420	220	0.10	4.0	9.0	13.0	10.0	0.6	250	210,000	71MF3100(1)30(2)	R71MF3100(1)30(2)
420	220	0.15	5.0	11.0	13.0	10.0	0.6	250	210,000	71MF3150(1)30(2)	R71MF3150(1)30(2)
420	220	0.22	6.0	12.0	13.0	10.0	0.6	250	210,000	71MF3220(1)30(2)	R71MF3220(1)30(2)
420	220	0.10	5.0	11.0	18.0	15.0	0.6	160	134,400	71MI3100(1)00(2)	R71MI3100(1)00(2)
420	220	0.15	5.0	11.0	18.0	15.0	0.6	160	134,400	71MI3150(1)00(2)	R71MI3150(1)00(2)
420	220	0.22	5.0	11.0	18.0	15.0	0.6	160	134,400	71MI3220(1)00(2)	R71MI3220(1)00(2)
420	220	0.33	6.0	12.0	18.0	15.0	0.6	160	134,400	71MI3330(1)00(2)	R71MI3330(1)00(2)
420	220	0.47	7.5	13.5	18.0	15.0	0.6	160	134,400	71MI3470(1)00(2)	R71MI3470(1)00(2)
420	220	0.47	6.0	17.5	18.0	15.0	0.6	160	134,400	71MI3470(1)10(2)	R71MI3470(1)10(2)
420	220	0.47	9.0	12.5	18.0	15.0	0.6	160	134,400	71MI3470(1)20(2)	R71MI3470(1)20(2)
420	220	0.68	6.0	17.5	18.0	15.0	0.6	160	134,400	71MI3680(1)40(2)	R71MI3680(1)40(2)
420	220	0.68	8.5	14.5	18.0	15.0	0.6	160	134,400	71MI3680(1)30(2)	R71MI3680(1)30(2)
420	220	0.68	13.0	12.0	18.0	15.0	0.8	160	134,400	71MI3680(1)20(2)	R71MI3680(1)20(2)
420	220	1.0	7.5	18.5	18.0	15.0	0.8	160	134,400	71MI4100(1)40(3)	R71MI4100(1)40(3)
420	220	1.0	10.0	16.0	18.0	15.0	0.8	160	134,400	71MI4100(1)30(2)	R71MI4100(1)30(2)
420	220	1.5	11.0	19.0	18.0	15.0	0.8	160	134,400	71MI4150(1)30(2)	R71MI4150(1)30(2)
420	220	0.22	6.0	15.0	26.5	22.5	0.8	100	84,000	71MN3220(1)00(2)	R71MN3220(1)00(2)
420	220	0.33	6.0	15.0	26.5	22.5	0.8	100	84,000	71MN3330(1)00(2)	R71MN3330(1)00(2)
420	220	0.47	6.0	15.0	26.5	22.5	0.8	100	84,000	71MN3470(1)00(2)	R71MN3470(1)00(2)
420	220	0.68	6.0	15.0	26.5	22.5	0.8	100	84,000	71MN3680(1)00(2)	R71MN3680(1)00(2)
420	220	1.0	7.0	16.0	26.5	22.5	0.8	100	84,000	71MN4100(1)30(2)	R71MN4100(1)30(2)
420	220	1.5	8.5	17.0	26.5	22.5	0.8	100	84,000	71MN4150(1)30(3)	R71MN4150(1)30(3)
420	220	1.5	10.0	18.5	26.5	22.5	0.8	100	84,000	71MN4150(1)00(2)	R71MN4150(1)00(2)
420	220	2.2	10.0	18.5	26.5	22.5	0.8	100	84,000	71MN4220(1)40(3)	R71MN4220(1)40(3)
420	220	2.2	11.0	20.0	26.5	22.5	0.8	100	84,000	71MN4220(1)30(2)	R71MN4220(1)30(2)
420	220	3.3	13.0	22.0	26.5	22.5	0.8	100	84,000	71MN4330(1)30(2)	R71MN4330(1)30(2)
420	220	0.68	9.0	17.0	32.0	27.5	0.8	80	67,200	71MR3680(1)00(2)	R71MR3680(1)00(2)
420	220	1.0	9.0	17.0	32.0	27.5	0.8	80	67,200	71MR4100(1)00(2)	R71MR4100(1)00(2)
420	220	1.5	11.0	20.0	32.0	27.5	0.8	80	67,200	71MR4150(1)00(2)	R71MR4150(1)00(2)
420	220	2.2	13.0	22.0	32.0	27.5	0.8	80	67,200	71MR4220(1)00(2)	R71MR4220(1)00(2)
420	220	3.3	13.0	25.0	32.0	27.5	0.8	80	67,200	71MR4330(1)40(2)	R71MR4330(1)40(2)
420	220	4.7	18.0	33.0	32.0	27.5	0.8	80	67,200	71MR4470(1)00(2)	R71MR4470(1)00(2)
420	220	6.8	22.0	37.0	32.0	27.5	0.8	80	67,200	71MR4680(1)00(2)	R71MR4680(1)00(2)
420	220	3.3	13.0	24.0	41.5	37.5	1.0	60	50,400	71MW4330(1)20(2)	R71MW4330(1)20(2)
420	220	4.7	16.0	28.5	41.5	37.5	1.0	60	50,400	71MW4470(1)00(2)	R71MW4470(1)00(2)
420	220	6.8	19.0	32.0	41.5	37.5	1.0	60	50,400	71MW4680(1)00(2)	R71MW4680(1)00(2)
420	220	10	20.0	40.0	41.5	37.5	1.0	60	50,400	71MW5100(1)00(2)	R71MW5100(1)00(2)
420	220	15	24.0	44.0	41.5	37.5	1.0	60	50,400	71MW5150(1)00(2)	R71MW5150(1)00(2)
420	220	22	30.0	45.0	41.5	37.5	1.0	60	50,400	71MW5220(1)00(2)	R71MW5220(1)00(2)
520	250	0.010	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2100(1)00(2)	R71VF2100(1)00(2)
520	250	0.015	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2150(1)00(2)	R71VF2150(1)00(2)
520	250	0.022	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2220(1)00(2)	R71VF2220(1)00(2)
520	250	0.033	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2330(1)00(2)	R71VF2330(1)00(2)
520	250	0.047	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2470(1)30(2)	R71VF2470(1)30(2)
520	250	0.068	4.0	9.0	13.0	10.0	0.6	300	312,000	71VF2680(1)30(2)	R71VF2680(1)30(2)
520	250	0.10	5.0	11.0	13.0	10.0	0.6	300	312,000	71VF3100(1)30(2)	R71VF3100(1)30(2)
520	250	0.15	6.0	12.0	13.0	10.0	0.6	300	312,000	71VF3150(1)30(2)	R71VF3150(1)30(2)
520	250	0.10	5.0	11.0	18.0	15.0	0.6	200	208,000	71VI3100(1)00(2)	R71VI3100(1)00(2)
520	250	0.15	5.0	11.0	18.0	15.0	0.6	200	208,000	71VI3150(1)30(2)	R71VI3150(1)30(2)
520	250	0.22	6.0	12.0	18.0	15.0	0.6	200	208,000	71VI3220(1)30(2)	R71VI3220(1)30(2)
520	250	0.22	6.0	17.5	18.0	15.0	0.6	200	208,000	71VI3220(1)10(2)	R71VI3220(1)10(2)
520	250	0.33	6.0	17.5	18.0	15.0	0.6	200	208,000	71VI3330(1)40(2)	R71VI3330(1)40(2)
520	250	0.33	7.5	13.5	18.0	15.0	0.6	200	208,000	71VI3330(1)30(2)	R71VI3330(1)30(2)
VDC	VAC	Capacitance Value (µF)	B (mm)	H (mm)	L (mm)	Lead Spacing (p)	Φ d (mm)	dV/dt (V/µs)	Max K ₀ (V ² /µs)	New KEMET Part Number	Legacy Part Number

Table 1 – Ratings & Part Number Reference cont'd

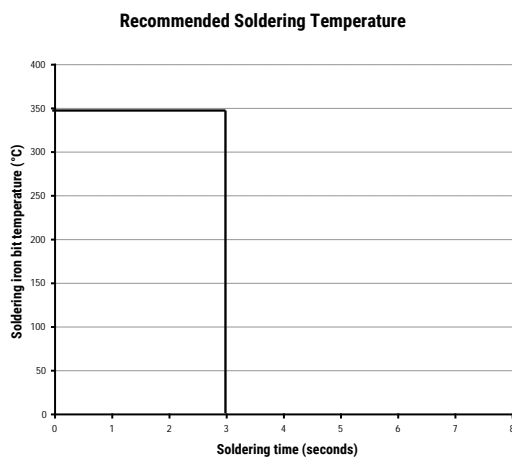
Table 1 – Ratings & Part Number Reference cont'd

VDC	VAC	Capacitance Value (µF)	Dimensions in mm			Lead Spacing (p)	Φ d (mm)	dV/dt (V/µs)	Max K ₀ (V ² /µs)	New KEMET Part Number	Legacy Part Number
			B	H	L						
1,000	275	1.8	19.0	32.0	41.5	37.5	1.0	150	300,000	71QW4180(1)00(2)	R71QW4180(1)00(2)
1,000	275	2.2	16.0	28.5	41.5	37.5	1.0	120	240,000	71QW4220(1)10(2)	R71QW4220(1)10(2)
1,000	275	2.2	20.0	40.0	41.5	37.5	1.0	120	240,000	71QW4220(1)20(2)	R71QW4220(1)20(2)
1,000	275	2.7	16.0	28.5	41.5	37.5	1.0	120	240,000	71QW4270(1)10(2)	R71QW4270(1)10(2)
1,000	275	2.7	24.0	44.0	41.5	37.5	1.0	120	240,000	71QW4270(1)20(2)	R71QW4270(1)20(2)
1,000	275	3.3	19.0	32.0	41.5	37.5	1.0	120	240,000	71QW4330(1)10(2)	R71QW4330(1)10(2)
1,000	275	3.3	24.0	44.0	41.5	37.5	1.0	120	240,000	71QW4330(1)00(2)	R71QW4330(1)00(2)
1,000	275	3.9	19.0	32.0	41.5	37.5	1.0	120	240,000	71QW4390(1)10(2)	R71QW4390(1)10(2)
1,000	275	3.9	24.0	44.0	41.5	37.5	1.0	120	240,000	71QW4390(1)00(2)	R71QW4390(1)00(2)
1,000	275	4.7	20.0	40.0	41.5	37.5	1.0	80	160,000	71QW4470(1)10(2)	R71QW4470(1)10(2)
1,000	275	4.7	24.0	44.0	41.5	37.5	1.0	80	160,000	71QW4470(1)00(2)	R71QW4470(1)00(2)
1,000	275	5.6	24.0	44.0	41.5	37.5	1.0	80	160,000	71QW4560(1)20(2)	R71QW4560(1)20(2)
1,000	275	5.6	30.0	45.0	41.5	37.5	1.0	80	160,000	71QW4560(1)00(2)	R71QW4560(1)00(2)
1,000	275	6.8	24.0	44.0	41.5	37.5	1.0	80	160,000	71QW4680(1)10(2)	R71QW4680(1)10(2)
1,000	275	8.2	24.0	44.0	41.5	37.5	1.0	80	160,000	71QW4820(1)10(2)	R71QW4820(1)10(2)
1,000	275	10.0	30.0	45.0	41.5	37.5	1.0	80	160,000	71QW5100(1)10(2)	R71QW5100(1)10(2)
VDC	VAC	Capacitance Value (µF)	B (mm)	H (mm)	L (mm)	Lead Spacing (p)	Φ d (mm)	dV/dt (V/µs)	Max K ₀ (V ² /µs)	New KEMET Part Number	Legacy Part Number

Soldering Process

Manual Soldering Recommendations

The following is recommended for manual soldering with a soldering iron.



The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.

Soldering Process cont'd

Wave Soldering Recommendations cont'd

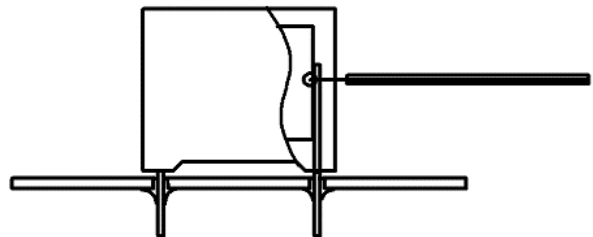
1. The table indicates the maximum set-up temperature of the soldering process
Figure 1.

Dielectric Film Material	Maximum Preheat Temperature			Maximum Peak Soldering Temperature	
	Capacitor Pitch ≤ 10 mm	Capacitor Pitch = 15 mm	Capacitor Pitch > 15 mm	Capacitor Pitch ≤ 15 mm	Capacitor Pitch > 15 mm
Polyester	130°C	130°C	130°C	270°C	270°C
Polypropylene	100°C	110°C	130°C	260°C	270°C
Paper	130°C	130°C	140°C	270°C	270°C
Polyphenylene Sulphide	150°C	150°C	160°C	270°C	270°C

2. The maximum temperature measured inside the capacitor:

Set the temperature so that inside the element the maximum temperature is below the limit:

Dielectric Film Material	Maximum temperature measured inside the element
Polyester	160°C
Polypropylene	110°C
Paper	160°C
Polyphenylene Sulphide	160°C

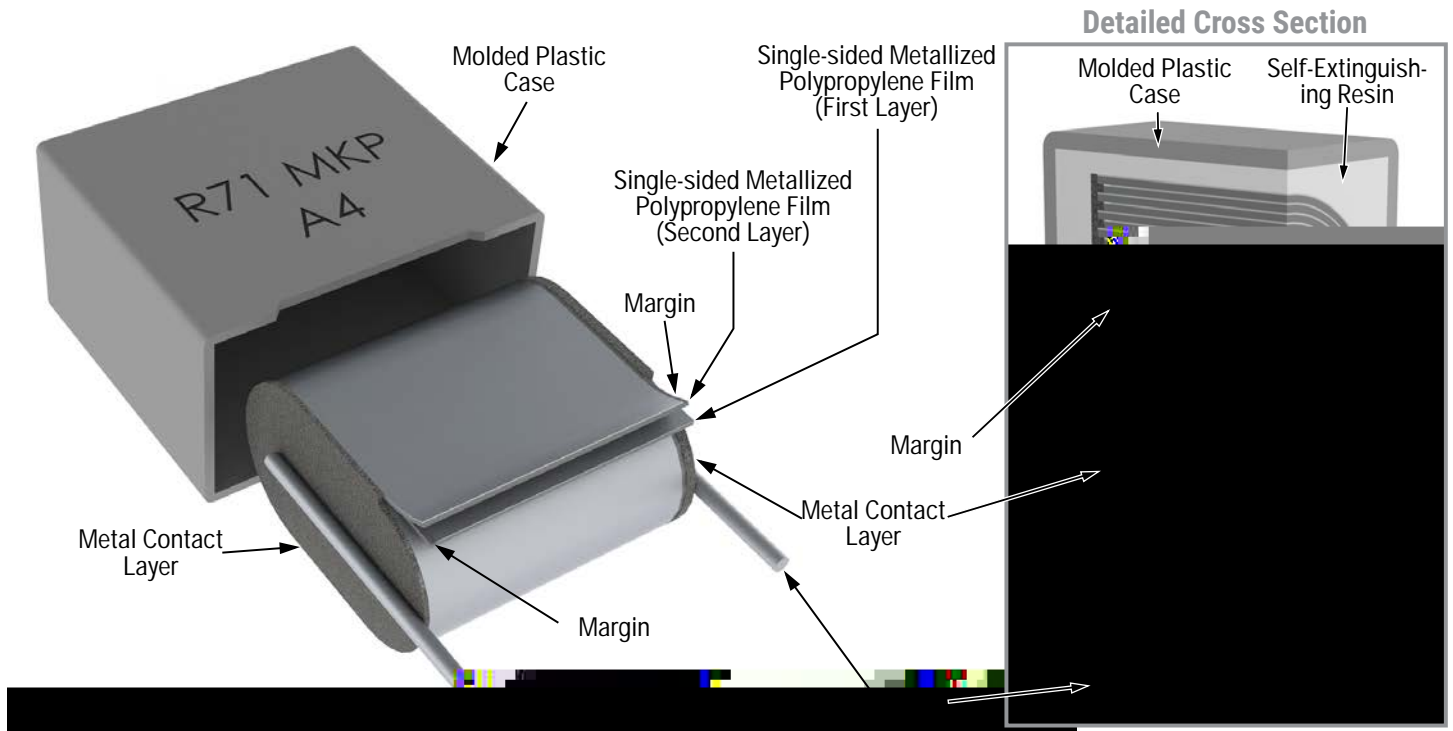


Selective Soldering Recommendations

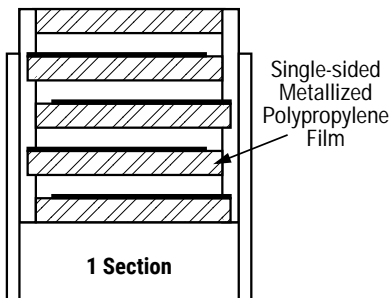
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal reflow soldering without touching the solder. When the board is over the bath, it is stopped and pre-designed solder pots are lifted from the bath with molten solder only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

The temperature profile for selective soldering is similar to the double wave reflow soldering outlined in this document, **however, instead of two baths, there is only one bath with a time from 3 to 10 seconds.** In selective soldering, the risk of overheating is greater than in double wave reflow soldering, and great care must be taken so that the parts are not overheated.

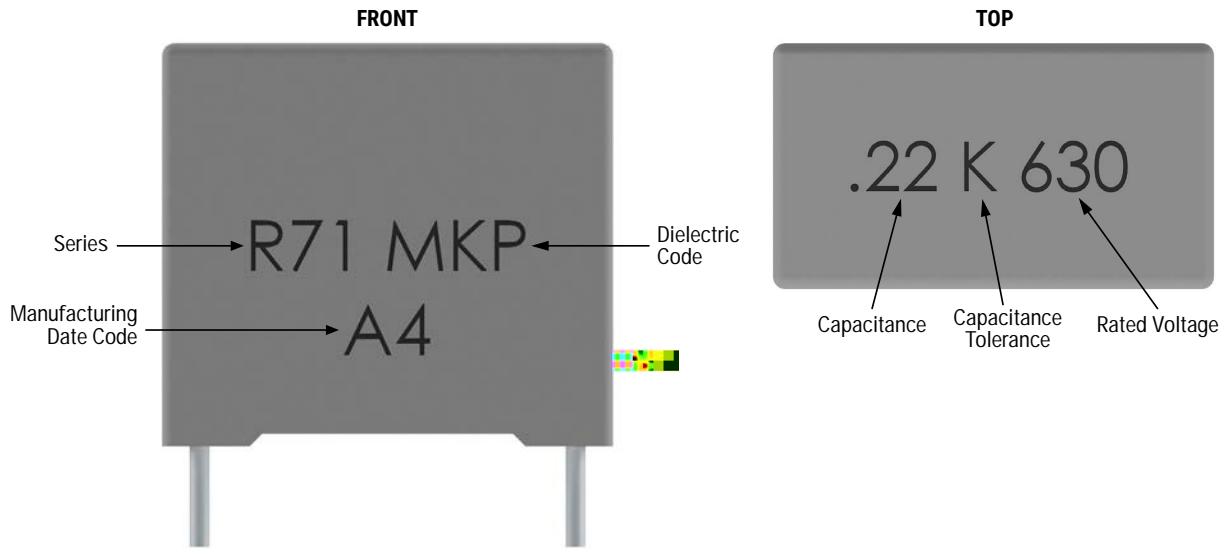
Construction



Winding Scheme



Marking

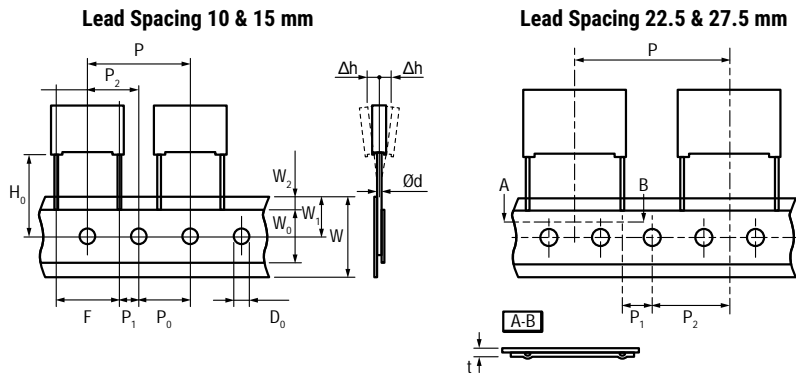


Packaging Quantities Lead

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Lead Taping & Packaging (IEC 60286-2)



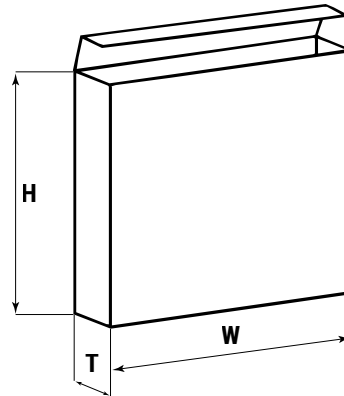
Taping Specification

Description	Symbol	Dimensions (mm)				Tolerance
		Lead Spacing				
		10.0	15.0	22.5	27.5	
Lead wire diameter	d	0.6	0.6 – 0.8	0.8	0.8	±0.05
Taping lead space	P	25.4	25.4	38.1	38.1	±1
Feed hole lead space *	P ₀	12.7	12.7	12.7	12.7	±0.2 **
Centering of the lead wire	P ₁	7.7	5.2	7.8	5.3	±0.7
Centering of the body	P ₂	12.7	12.7	19.05	19.05	±1.3
Lead spacing ***	F	10.0	15.0	22.5	27.5	+0.6/-0.1
Component 0820 Td (1)0.8 (5)-9.9TJ TJ -0.0 nte5c 0.001 T5.030.00.075(.).9 (f t)-9.8 (h)-12.941.5						

Lead Taping & Packaging (IEC 60286-2) cont'd

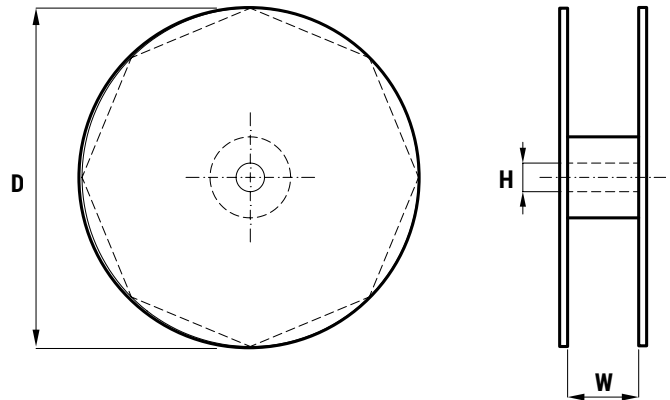
Ammo Specifications

Dimensions (mm)		
H	W	T
360	340	59



Reel Specifications

Dimensions (mm)		
D	H	W
355	30	55 Maximum
500	25	



Manufacturing Date Code (IEC-60062)

Y = Year, Z = Month			
Year	Code	Month	Code
2010	A	January	1
2011	B	February	2
2012	C	March	3
2013	D	April	4
2014	E	May	5
2015	F	June	6
2016	H	July	7
2017	J	August	8
2018	K	September	9
2019	L	October	0
2020	M	November	N
2021	N	December	D
2022	P		
2023	R		
2024	S		
2025	T		
2026	U		
2027	V		
2028	W		
2029	X		
2030	A		

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