

R76 Series Double Metallized Polypropylene Film, Radial, DC and Pulse Applications (Automotive Grade)

Overview

The R76 Series is constructed of polypropylene film and double metallized polyester film as electrodes 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 the UL 94V-0 requirements. Two different winding constructions are used depending on voltage parameters. Please see the Performance Characteristics for more information.

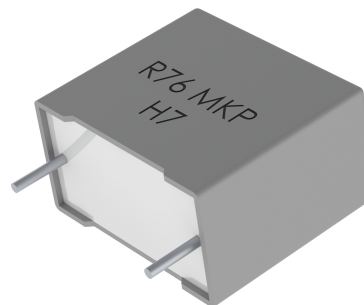
Automotive grade devices are available (up to lead spacing 22.5 mm) and meet the demanding Automotive Electronics Council's AEC-Q200 qualification requirements.

Applications

Typical applications include deflection circuits in televisions (S-correction and flyback tuning) and monitors, switching spikes suppression in switched mode power supplies (SMPS), lamp capacitors for electronic ballasts and compact lamps, and snubber and silicon-controlled rectifier (SCR) commutation circuits as well as applications with high voltage and high current. Not suitable for across-the-line application (see Suppressor Capacitors).

Benefits

- Voltage range: 250 – 2,000 VDC
- Capacitance range: 100 pF – 15 μ F
- Lead Spacing: 7.5 mm – 37.5 mm
- Capacitance tolerance: \pm 5%, \pm 10%, \pm 20%
- Climatic category: 55/105/56 IEC 60068-1
- Operating temperature range of -55°C to $+105^{\circ}\text{C}$
- RoHS compliance and lead-free terminations
- Tape and reel packaging in accordance with IEC 60286-2
- Self-healing
- Automotive (AEC-Q200) grades available up to lead spacing 22.5mm



Part Number System

R76	I	D	1680	SE	30	K
Series	Rated Voltage (VDC)	Lead Spacing (mm)	Capacitance Code (pF)	Packaging	Internal Use	Capacitance Tolerance
Double Metallized Polypropylene	I = 250 M = 400 P = 630 Q = 1,000 T = 1,600 U = 2,000	D = 7.5 F = 10 I = 15 N = 22.5 R = 27.5 W = 37.5	The last three digits represent significant figures. The first digit specifies the total number of zeros to be added.	See Ordering Options Table	00 10 30 40 50 60 70 80	H = 2.5% J = \pm 5% K = \pm 10%

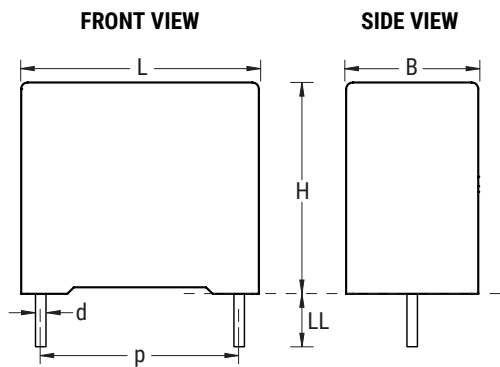
Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
7.5	Standard Lead and Packaging Options		
	Bulk (Bag) – Short Leads	4 +2/-0	SE
	Ammo Pack	$H_0 = 18.5 \pm 0.5$	DQ
	Other Lead and Packaging Options		
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	CK
	Bulk (Bag) – Short Leads	2.7 +0.5/-0	JA
	Bulk (Bag) – Short Leads	3.5 +0.5/-0	JB
	Bulk (Bag) – Short Leads	10 +/-1	JC
	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/-1	JM
Bulk (Bag) – Long Leads	17 +1/-2	Z3	
10 15 22.5	Standard Lead and Packaging Options		
	Bulk (Bag) – Short Leads	4 +2/-0	SE
	Ammo Pack	$H_0 = 18.5 \pm 0.5$	DQ
	Other Lead and Packaging Options		
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	GY
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	CK
	Bulk (Bag) – Short Leads	2.7 +0.5/-0	JA
	Bulk (Bag) – Short Leads	3.5 +0.5/-0	JB
	Bulk (Bag) – Short Leads	10 +/-1	JC
	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/-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 (Bag) – Short Leads	4 +2/-0	SE
	Other Lead and Packaging Options		
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	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	30 +5/-0	40
Bulk (Bag) – Long Leads	25 +2/-1	50	

Ordering Options Table cont'd

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
37.5	Standard Lead and Packaging Options		
	Bulk (Bag)–Short Leads	4 +2/-0	SE
	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	30 +5/-0	40
	Bulk (Bag) – Long Leads	25 +2/-1	50

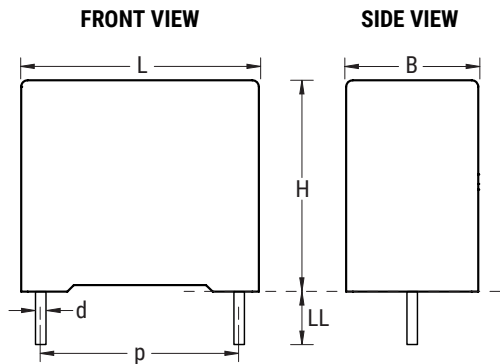
Dimensions – Millimeters



p		B		H		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
7.5	+/- 0.4	3.0	+0.1	8.0	+0.1	10.0	+0.2	0.5	+/- 0.05
7.5	+/- 0.4	4.0	+0.1	9.0	+0.1	10.0	+0.2	0.6	+/- 0.05
7.5	+/- 0.4	5.0	+0.1	10.5	+0.1	10.0	+0.2	0.6	+/- 0.05
7.5	+/-0.4	6.0	+0.1	12.0	+0.1	10.0	+0.2	0.6	+/- 0.05
10.0	+/- 0.4	4.0	+0.2	9.0	+0.1	13.0	+0.2	0.6	+/- 0.05
10.0	+/- 0.4	5.0	+0.2	11.0	+0.1	13.0	+0.2	0.6	+/- 0.05
10.0	+/-0.4	6.0	+0.2	12.0	+0.1	13.0	+0.2	0.6	+/- 0.05
15.0	+/- 0.4	4.0	+0.2	10.0	+0.1	18.0	+0.3	0.8	+/- 0.05
15.0	+/- 0.4	5.0	+0.2	11.0	+0.1	18.0	+0.3	0.8	+/- 0.05
15.0	+/- 0.4	6.0	+0.2	12.0	+0.1	18.0	+0.3	0.8	+/- 0.05
15.0	+/- 0.4	7.5	+0.2	13.5	+0.1	18.0	+0.5	0.8	+/- 0.05
15.0	+/- 0.4	8.5	+0.2	14.5	+0.1	18.0	+0.5	0.8	+/- 0.05
15.0	+/- 0.4	9.0	+0.2	12.5	+0.1	18.0	+0.5	0.8	+/- 0.05
15.0	+/- 0.4	10.0	+0.2	16.0	+0.1	18.0	+0.5	0.8	+/- 0.05

Note: See Ordering Options Table for lead length (LL/Ho) options.

Dimensions – Millimeters cont'd



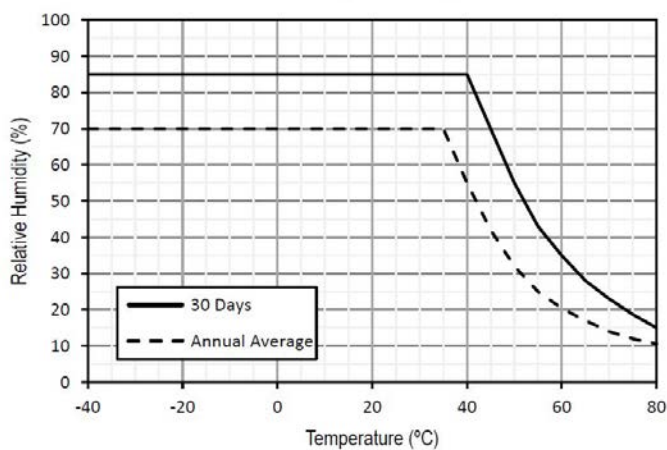
p		B		H		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
15.0	+/- 0.4	11.0	+0.2	19.0	+0.1	18.0	+0.5	0.8	+/- 0.05
15.0	+/- 0.4	13.0	+0.2	12.0	+0.1	18.0	+0.5	0.8	+/- 0.05
22.5	+/- 0.4	6.0	+0.2	15.0	+0.1	26.5	+0.3	0.8	+/- 0.05
22.5	+/- 0.4	7.0	+0.2	16.0	+0.1	26.5	+0.3	0.8	+/- 0.05
22.5	+/- 0.4	8.5	+0.2	17.0	+0.1	26.5	+0.3	0.8	+/- 0.05
22.5	+/- 0.4	10.0	+0.2	18.5	+0.1	26.5	+0.3	0.8	+/- 0.05
22.5	+/- 0.4	11.0	+0.2	20.0	+0.1	26.5	+0.3	0.8	+/- 0.05
22.5	+/- 0.4	13.0	+0.2	22.0	+0.1	26.5	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	9.0	+0.2	17.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	11.0	+0.2	20.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	13.0	+0.2	22.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	13.0	+0.2	25.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	14.0	+0.2	28.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	18.0	+0.2	33.0	+0.1	32.0	+0.3	0.8	+/- 0.05
27.5	+/- 0.4	22.0	+0.2	37.0	+0.1	32.0	+0.3	0.8	+/- 0.05
37.5	+/- 0.4	11.0	+0.3	22.0	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	13.0	+0.3	24.0	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	16.0	+0.3	28.5	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	19.0	+0.3	32.0	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	20.0	+0.3	40.0	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	24.0	+0.3	44.0	+0.1	41.5	+0.3	1.0	+/- 0.05
37.5	+/- 0.4	30.0	+0.3	45.0	+0.1	41.5	+0.3	1.0	+/- 0.05

Note: See Ordering Options Table for lead length (LL/Ho) options.

Performance Characteristic

Dielectric	Polypropylene film							
Plates	Double sided metallized polyester film							
Winding	Non-inductive type							
Leads	Tinned wire							
Protection	Plastic case, thermosetting resin filled. Box material is solvent resistant and flame retardant according to UL94.							
Related Documents	IEC 60384-16							
Sections	1				2			
Voltage Range (VDC)	250	400	630	630	1000	1000	1600	2000
Voltage Range (VAC)	180	250	250	400	400	600	650	700
Capacitance Range (μF)	0.0068 – 12	0.0027 – 8.2	0.00068 – 0.012	0.00039 – 4.7	0.00022 – 0.0033	0.00047 – 2.2	0.0033 – 1.2	0.0001 – 0.68
Capacitance Values	E12 series (IEC 60063) measured @ 1 kHz and +20 ±1°C							
Capacitance Tolerance	±2.5%, ±5%, ±10%							
Operating Temperature Range	-55°C to +105°C							
Rated Temperature T _R	+85°C for V _R (DC) +75°C for V _R (AC)							
Voltage Derating	The following decreasing factor has to be applied on the rated voltage: +85°C to +105°C: 1.25% per °C for V _R (DC) +75°C to +105°C: 1.35% per °C for V _R (AC)							
Climatic Category	55/105/56 IEC 60068-1							

Maximum Humidity in Storage Conditions



Performance Characteristics cont'd

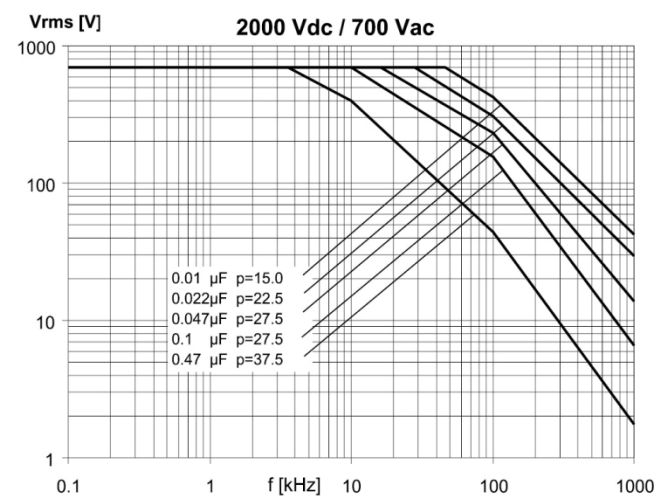
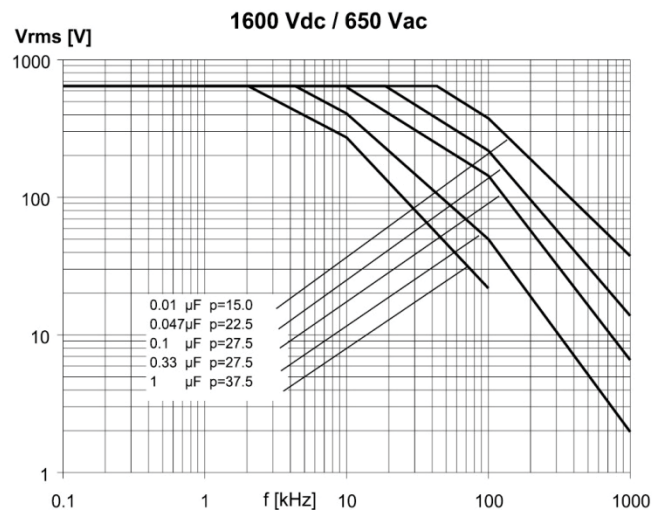
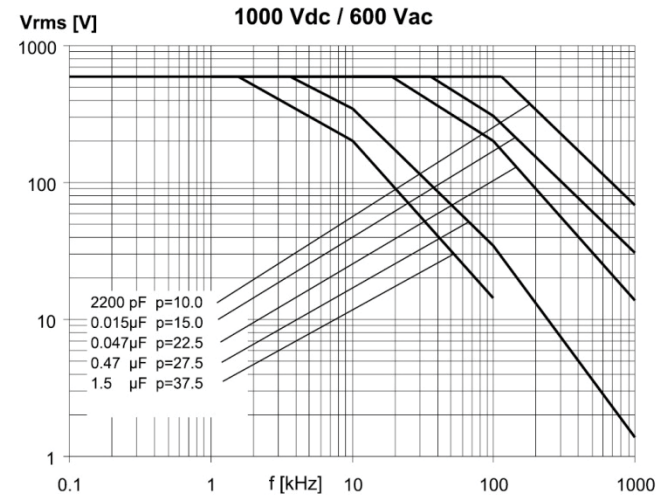
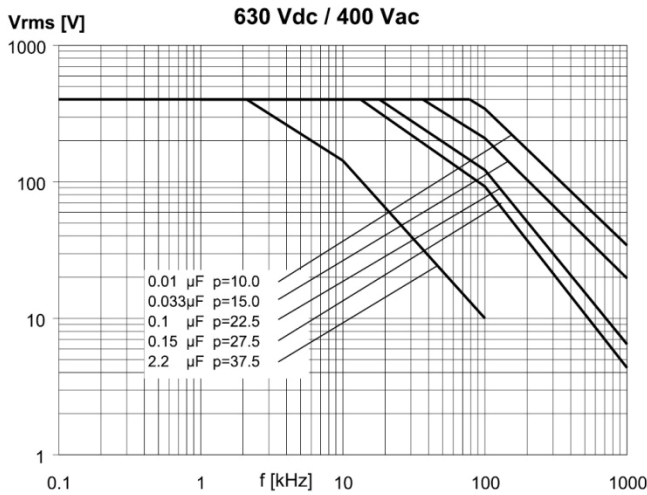
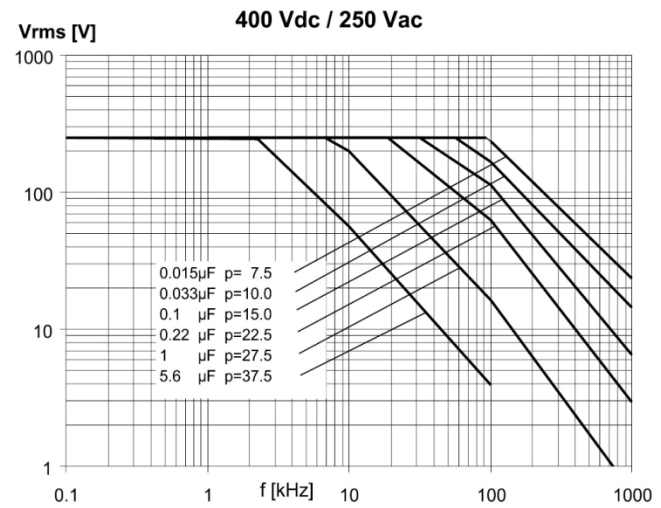
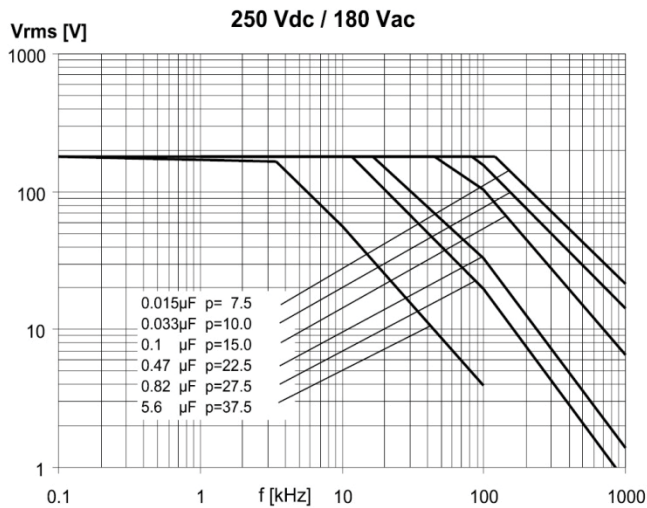
* typical value

Storage Conditions	Storage time: ≤ 24 months from the date marked on the label package							
	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) @ +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 L (Lead Length ~ 2 mm)	Lead Spacing (mm)	7.5	10	15	22.5	27.5	37.5	
	L (nH) ≈	8	9	10	18	18	20	
Dissipation Factor tanδ	Measured at 25°C ± 5°C							
	Frequency	C ≤ 0.1 μF		0.1 μF < C ≤ 1.0 μF		1.0 μF < C ≤ 4.7 μF		C > 4.7 μF
	1 kHz	0.04%		0.05%		0.06%		0.10%
	10 kHz	0.06%		0.08%		-		-
	100 kHz	0.25%		-		-		-
Insulation Resistance	Measured at +25°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)*			

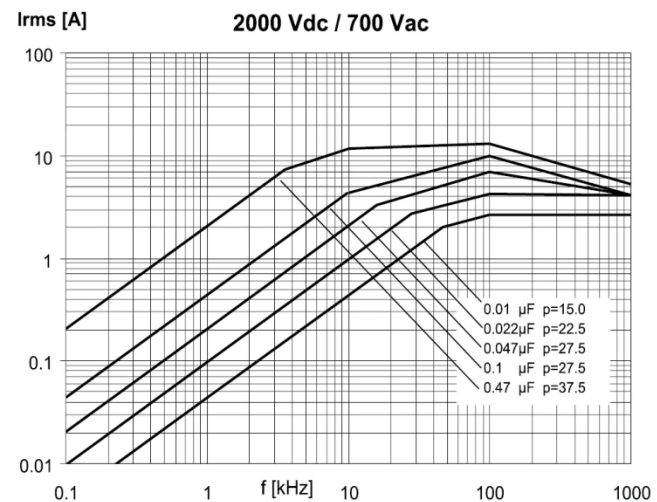
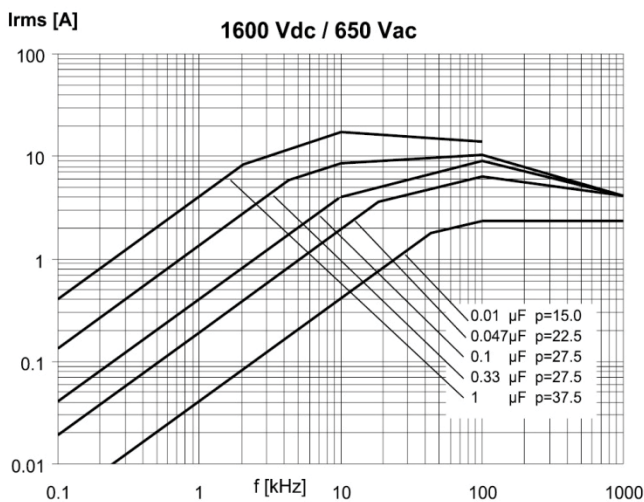
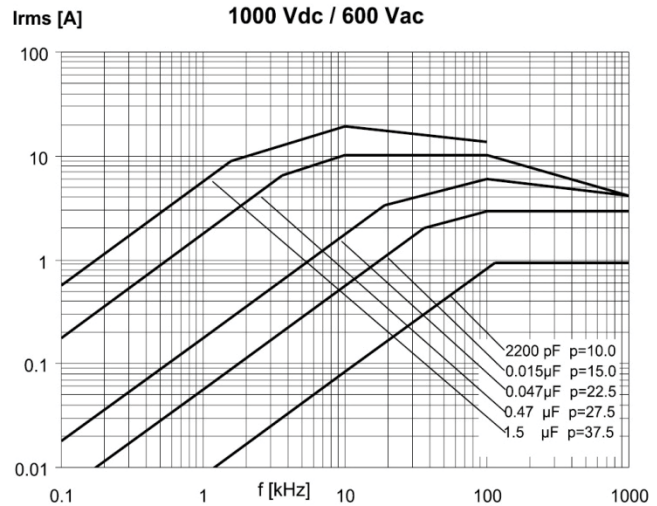
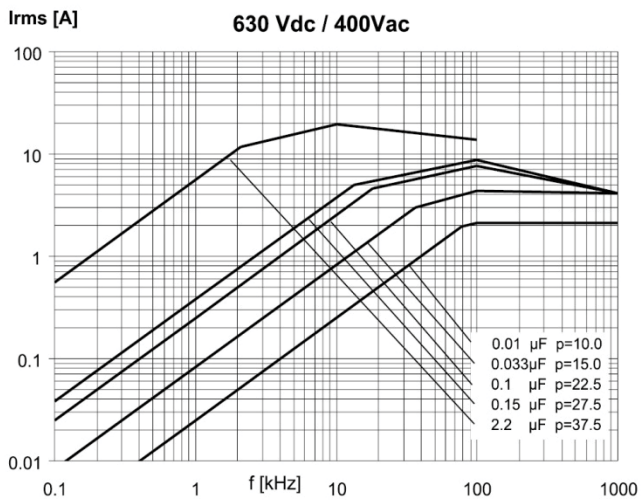
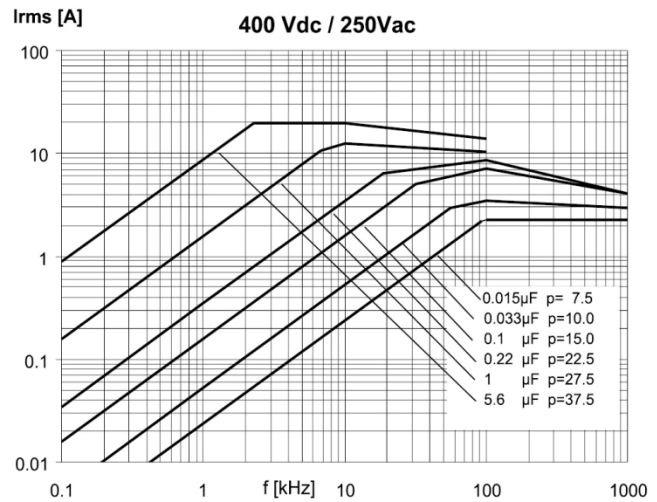
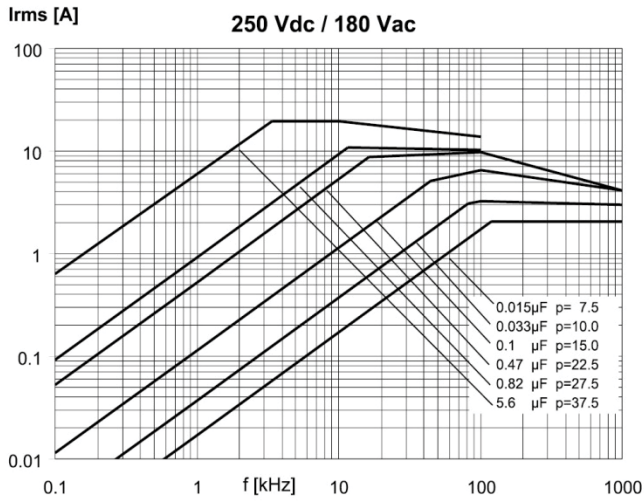
Qualification

Automotive Grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC-Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics Council and AEC-Q200, please visit their website at www.aecouncil.com.

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



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



Note: p (pitch) in mm.

Environmental Test Data

Damp Heat, Steady State Test	Test Conditions:		Performances
	Temperature:	+40°C ± 2°C	Δ C/C ≤ 2%, Δ tanδ ≤ 0.001 @ 1 kHz IR after test ≥ 50% of initial limit
	Relative humidity (RH):	93% ± 2%	
	Test duration:	56 days	
Endurance Test	Test Conditions		Performances
	Temperature:	+85°C ± 2°C	Δ C/C ≤ 2%, Δ tanδ ≤ 0.001 @ 10 kHz for C ≤ 1μF Δ tanδ ≤ 0.001 @ 1 kHz for C > 1μF IR after test ≥ 50% of initial limit
	Voltage applied:	1.25 x V _R (DC)	
	Test duration:	2,000 hours	
Resistance to Soldering Heat Test	Test Conditions		Performances
	Solder bath temperature:	260°C ± 5°C	Δ C/C ≤ 1%, Δ tanδ ≤ 0.001 @ 10 kHz for C ≤ 1μF Δ tanδ ≤ 0.001 @ 1 kHz for C > 1μF IR after test ≥ initial limit
	Dipping time (with heat screen):		

Environmental Compliance

All KEMET pulse capacitors are RoHS Compliant.

Table 1 – Ratings & Part Number Reference cont'd

VDC	VAC	Capacitance Value (µF)	Dimensions in mm			Lead Spacing (p)	dV/dt (V/µs)	Max K ₀ (V ² /µs)	New KEMET Part Number	Legacy Part Number
			B	H	L					
2,000	700	0.0022	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1220(1)00(2)	R76UN1220(1)00(2)
2,000	700	0.0027	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1270(1)00(2)	R76UN1270(1)00(2)
2,000	700	0.0033	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1330(1)00(2)	R76UN1330(1)00(2)
2,000	700	0.0039	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1390(1)00(2)	R76UN1390(1)00(2)
2,000	700	0.0047	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1470(1)00(2)	R76UN1470(1)00(2)
2,000	700	0.0056	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1560(1)00(2)	R76UN1560(1)00(2)
2,000	700	0.0068	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1680(1)00(2)	R76UN1680(1)00(2)
2,000	700	0.0082	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN1820(1)30(2)	R76UN1820(1)30(2)
2,000	700	0.010	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN2100(1)30(2)	R76UN2100(1)30(2)
2,000	700	0.012	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN2120(1)30(2)	R76UN2120(1)30(2)
2,000	700	0.015	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN2150(1)40(2)	R76UN2150(1)40(2)
2,000	700	0.018	6.0	15.0	26.5	22.5	3,500	14,000,000	76UN2180(1)40(2)	R76UN2180(1)40(2)
2,000	700	0.022	7.0	16.0	26.5	22.5	3,500	14,000,000	76UN2220(1)40(2)	R76UN2220(1)40(2)
2,000	700	0.027	7.0	16.0	26.5	22.5	3,500	14,000,000	76UN2270(1)40(2)	R76UN2270(1)40(2)
2,000	700	0.033	8.5	17.0	26.5	22.5	3,500	14,000,000	76UN2330(1)40(2)	R76UN2330(1)40(2)
2,000	700	0.039	10.0	18.5	26.5	22.5	3,500	14,000,000	76UN2390(1)40(2)	R76UN2390(1)40(2)
2,000	700	0.047	10.0	18.5	26.5	22.5	3,500	14,000,000	76UN2470(1)40(2)	R76UN2470(1)40(2)
2,000	700	0.056	11.0	20.0	26.5	22.5	3,500	14,000,000	76UN2560(1)40(2)	R76UN2560(1)40(2)
2,000	700	0.022	9.0	17.0	32.0	27.5	2,300	9,200,000	76UR2220(1)30(2)	R76UR2220(1)30(2)
2,000	700	0.027	9.0	17.0	32.0	27.5	2,300	9,200,000	76UR2270(1)30(2)	R76UR2270(1)30(2)
2,000	700	0.033	9.0	17.0	32.0	27.5	2,300	9,200,000	76UR2330(1)30(2)	R76UR2330(1)30(2)
2,000	700	0.039	11.0	20.0	32.0	27.5	2,300	9,200,000	76UR2390(1)20(2)	R76UR2390(1)20(2)
2,000	700	0.047	11.0	20.0	32.0	27.5	2,300	9,200,000	76UR2470(1)30(2)	R76UR2470(1)30(2)
2,000	700	0.056	13.0	22.0	32.0	27.5	2,300	9,200,000	76UR2560(1)30(2)	R76UR2560(1)30(2)
2,000	700	0.068	13.0	22.0	32.0	27.5	2,300	9,200,000	76UR2680(1)30(2)	R76UR2680(1)30(2)
2,000	700	0.082	13.0	25.0	32.0	27.5	2,300	9,200,000	76UR2820(1)40(2)	R76UR2820(1)40(2)
2,000	700	0.10	14.0	28.0	32.0	27.5	2,300	9,200,000	76UR3100(1)30(2)	R76UR3100(1)30(2)
2,000	700	0.12	18.0	33.0	32.0	27.5	2,300	9,200,000	76UR3120(1)30(2)	R76UR3120(1)30(2)
2,000	700	0.15	18.0	33.0	32.0	27.5	2,300	9,200,000	76UR3150(1)30(2)	R76UR3150(1)30(2)
2,000	700	0.18	22.0	37.0	32.0	27.5	2,300	9,200,000	76UR3180(1)30(2)	R76UR3180(1)30(2)
2,000	700	0.22	22.0	37.0	32.0	27.5	2,300	9,200,000	76UR3220(1)30(2)	R76UR3220(1)30(2)
2,000	700	0.033	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2330(1)30(2)	R76UW2330(1)30(2)
2,000	700	0.039	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2390(1)30(2)	R76UW2390(1)30(2)
2,000	700	0.047	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2470(1)30(2)	R76UW2470(1)30(2)
2,000	700	0.056	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2560(1)30(2)	R76UW2560(1)30(2)
2,000	700	0.068	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2680(1)30(2)	R76UW2680(1)30(2)
2,000	700	0.082	11.0	22.0	41.5	37.5	1,500	6,000,000	76UW2820(1)30(2)	R76UW2820(1)30(2)
2,000	700	0.10	13.0	24.0	41.5	37.5	1,500	6,000,000	76UW3100(1)30(2)	R76UW3100(1)30(2)
2,000	700	0.12	13.0	24.0	41.5	37.5	1,500	6,000,000	76UW3120(1)30(2)	R76UW3120(1)30(2)
2,000	700	0.15	16.0	28.5	41.5	37.5	1,500	6,000,000	76UW3150(1)30(2)	R76UW3150(1)30(2)
2,000	700	0.18	16.0	28.5	41.5	37.5	1,500	6,000,000	76UW3180(1)30(2)	R76UW3180(1)30(2)
2,000	700	0.22	19.0	32.0	41.5	37.5	1,500	6,000,000	76UW3220(1)30(2)	R76UW3220(1)30(2)
2,000	700	0.27	20.0	40.0	41.5	37.5	1,500	6,000,000	76UW3270(1)30(2)	R76UW3270(1)30(2)
2,000	700	0.33	20.0	40.0	41.5	37.5	1,500	6,000,000	76UW3330(1)30(2)	R76UW3330(1)30(2)
2,000	700	0.39	24.0	44.0	41.5	37.5	1,500	6,000,000	76UW3390(1)30(2)	R76UW3390(1)30(2)
2,000	700	0.47	24.0	44.0	41.5	37.5	1,500	6,000,000	76UW3470(1)30(2)	R76UW3470(1)30(2)
2,000	700	0.56	30.0	45.0	41.5	37.5	1,500	6,000,000	76UW3560(1)30(2)	R76UW3560(1)30(2)
2,000	700	0.68	30.0	45.0	41.5	37.5	1,500	6,000,000	76UW3680(1)30(2)	R76UW3680(1)30(2)
VDC	VAC	Capacitance Value (µF)	B (mm)	H (mm)	L (mm)	Lead Spacing (p)	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) H = 2.5%, J = 5%, K = 10%

Soldering Process

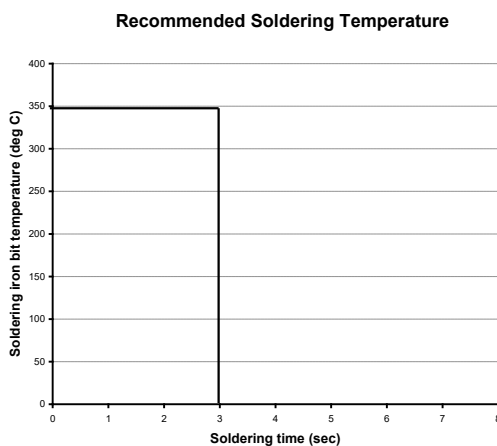
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 mm to 15 mm), and great care has to be taken during soldering. The recommended solder profiles from KEMET should be used. Please consult KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760-1 Edition 2 serves as a solid guideline for successful soldering. Please see Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the above the recommended limits may result to degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after the curing of surface mount parts. Consult KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum two soldering cycles is recommended. Please allow time for the capacitor surface temperature to return to a normal temperature before the second soldering cycle.

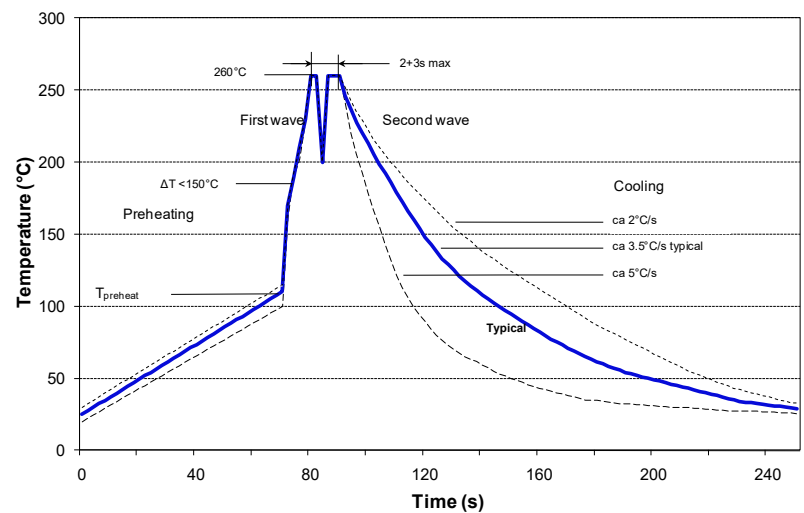
Manual Soldering Recommendations

Following is the recommendation 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.

Wave Soldering Recommendations



Soldering Process cont'd

Wave Soldering Recommendations cont'd

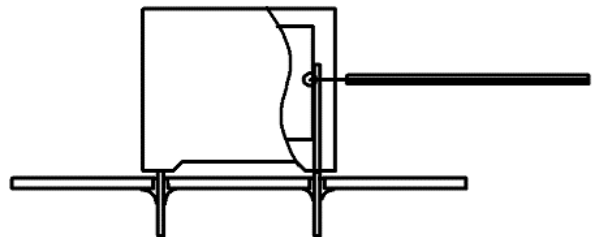
1. The table indicates the maximum set-up temperature of the soldering process
 Figure 1

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



Temperature monitored inside the capacitor.

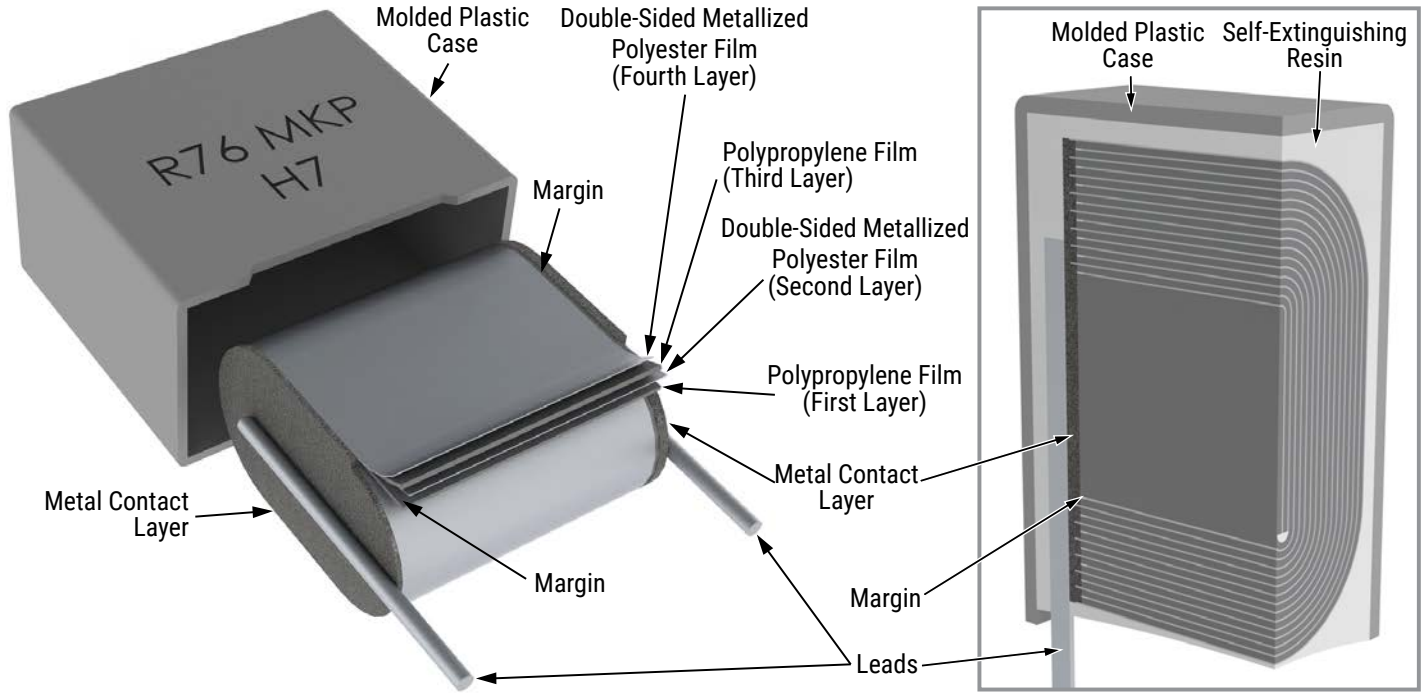
Selective Soldering Recommendations

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 flow 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.

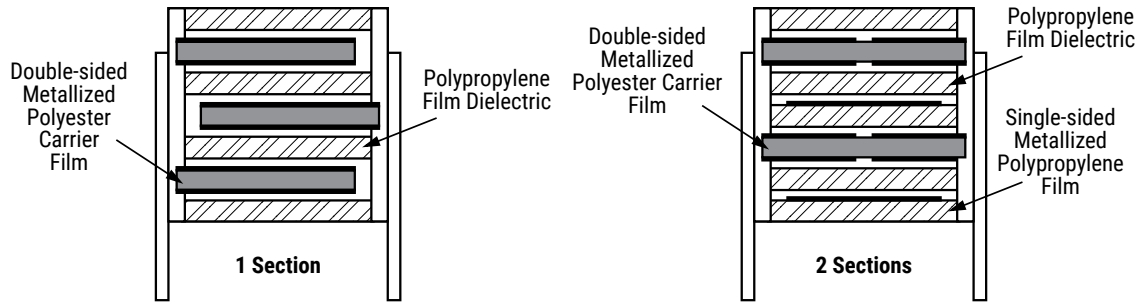
The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document, **however, instead of two baths, there is only one bath with a time from 3 to 10 seconds.** In selective soldering, the risk of overheating is greater than in double wave flow soldering,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

Construction

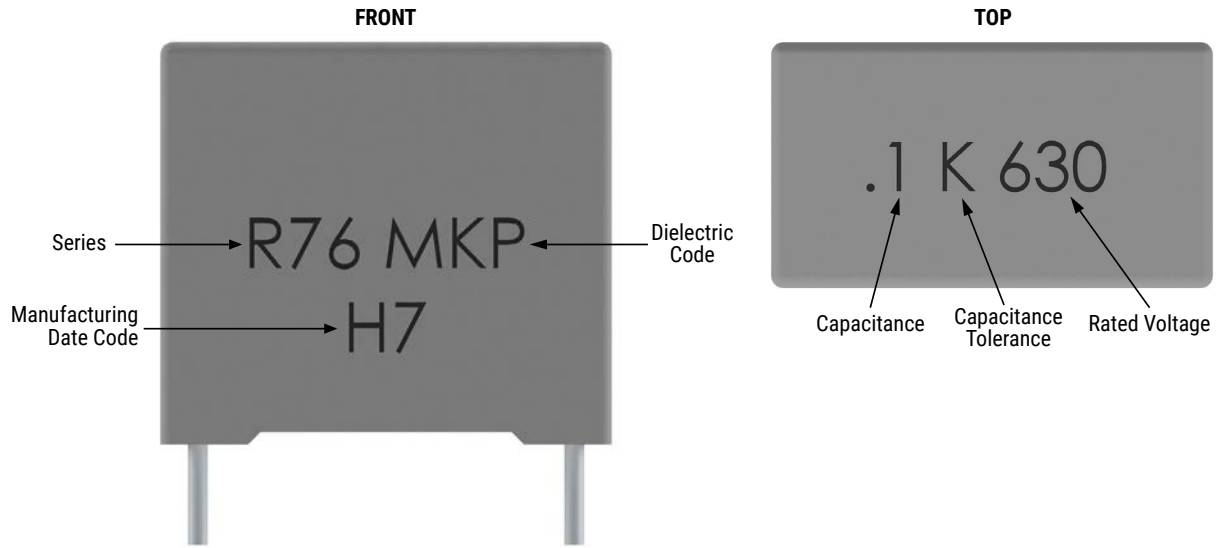
1 Section



Winding Schemes



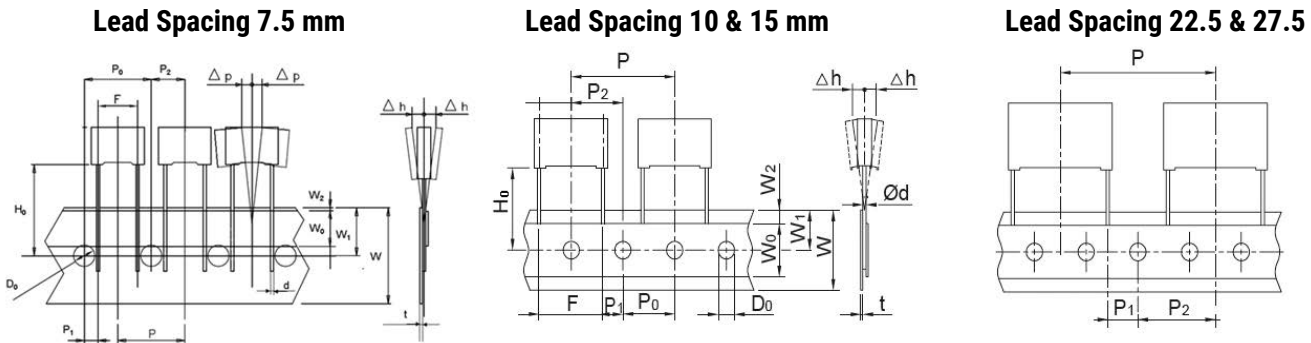
Marking



Packaging Quantities

Lead Spacing	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 355 mm	Large Reel ø 500 mm	Ammo Taped
7.5	3.0	8.0	10.0	1,500	1,750	2,100		2,800
	4.0	9.0	10.0	2,000	1,500	1,500		2,100
	5.0	10.5	10.0	1,500	1,000	1,200		1,600
	6.0	12.0	10.5	1,000	800	1,000		1,350
10	4.0	9.0	13.0	2,000	1,800	750	1,500	1,000
	5.0	11.0	13.0	1,300	1,500	600	1,250	800
	6.0	12.0	13.0	1,000	1,200	500	1,000	680
15	4.0	10.0	18.0	2,500	1,500	-	1,500	1,000
	5.0	11.0	18.0	2,000	1,000	600	1,250	800
	6.0	12.0	18.0	1,750	900	500	1,000	680
	7.5	13.5	18.0	1,000	700	350	800	500
	8.5	14.5	18.0	1,000	500	300	700	440
	9.0	12.5	18.0	1,000	520	270	650	410
	10.0	16.0	18.0	750	500	300	600	380
	11.0	19.0	18.0	450	350	-	500	340
22.5	6.0	15.0	26.5	805	500		700	464
	7.0	16.0	26.5	700	500		550	380
	8.5	17.0	26.5	468	300		450	280
	10.0	18.5	26.5	396	300		350	235
	11.0	20.0	26.5	360	250		350	217
	13.0	22.0	26.5	300	200		300	-
27.5	9.0	17.0	32.0	816	408		450	
	11.0	20.0	32.0	560	336		350	
	13.0	22.0	32.0	480	288		300	
	13.0	25.0	32.0	480	288			
	14.0	28.0	32.0	352	176			
	18.0	33.0	32.0	256	128			
	22.0	37.0	32.0	168	112			
37.5	11.0	22.0	41.5	420	252			
	13.0	24.0	41.5	360	216			
	16.0	28.5	41.5	216	108			
	19.0	32.0	41.5	192	96			
	20.0	40.0	41.5	126	84			
	24.0	44.0	41.5	108	72			
	30.0	45.0	41.5	90	60			

Lead Taping & Packaging (IEC 60286-2)



Taping Specification

Description	Symbol	Dimensions (mm)					Tolerance
		Lead Spacing					
		7.5	10.0	15.0	22.5	27.5	
Lead wire diameter	d	0.5 - 0.6	0.6	0.6 - 0.8	0.8	0.8	±0.05
Taping lead space	P	12.7	25.4	25.4	38.1	38.1	±1
Feed hole lead space *	P ₀	12.7	12.7	12.7	12.7	12.7	±0.2 **
Centering of the lead wire	P ₁	2.6	7.7	5.2	7.8	5.3	±0.7
Centering of the body	P ₂	6.35	12.7	12.7	19.05	19.05	±1.3
Lead spacing ***	F	7.5	10.0	15.0	22.5	27.5	+0.6/-0.1
Component alignment	Δh	0	0	0	0	0	±2
Component deviation	Δp	0	0	0	0	0	±1
Height of component from tape center	H ₀ ****	18.5	18.5	18.5	18.5	18.5	±0.5
Carrier tape width	W	18	18	18	18	18	+1/-0.5
Hold down tape width	W ₀	6	9	10	10	10	Minimum
Hole position	W ₁	9	9	9	9	9	±0.5
Hold down tape position	W ₂	3	3	3	3	3	Maximum
Feed hole diameter	D ₀	4	4	4	4	4	±0.2
Tape thickness	t	0.7	0.7	0.7	0.7	0.7	±0.2

* Available also 15 mm.

** Maximum 1 mm on 20 lead spacing.

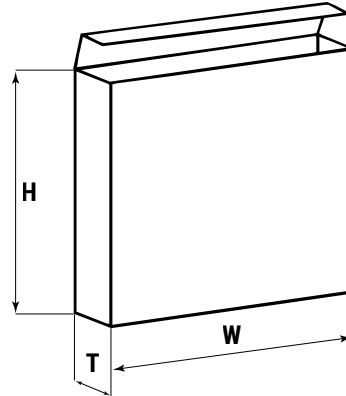
*** 15 mm and 10 mm taped to 7.5 mm (crimped leads) available upon request.

**** H₀ = 16.5 mm is available upon request.

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

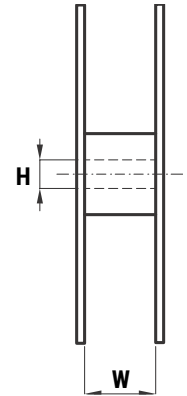
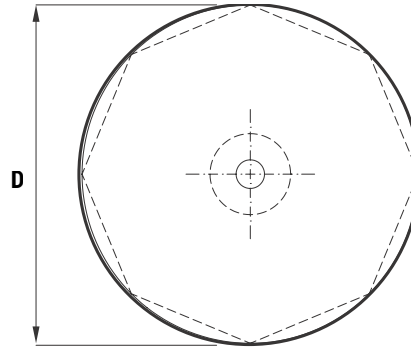
Ammo Specifications

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
2000	M	January	1
2001	N	February	2
2002	P	March	3
2003	R	April	4
2004	S	May	5
2005	T	June	6
2006	U	July	7
2007	V	August	8
2008	W	September	9
2009	X	October	0
2010	A	November	N
2011	B	December	D
2012	C		
2013	D		
2014	E		
2015	F		
2016	H		
2017	J		
2018	K		
2019	L		
2020	M		

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