

# R71 Single Metallized Polypropylene Film, Radial, SMPS PFC Applications

## Overview

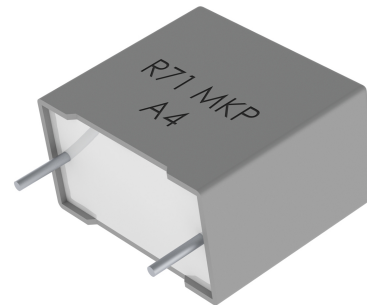
The R71 is constructed of metallized polypropylene film with radial leads of tinned wire. The radial leads are electrically welded to the metal layer on the ends of the capacitor winding. The capacitor is encapsulated in a self-extinguishing solvent resistant plastic case with thermosetting resin material 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  $\mu$ 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  $-55^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
- RoHS compliance and lead-free terminations
- Tape and reel packaging in accordance with IEC 60286-2
- Self-healing



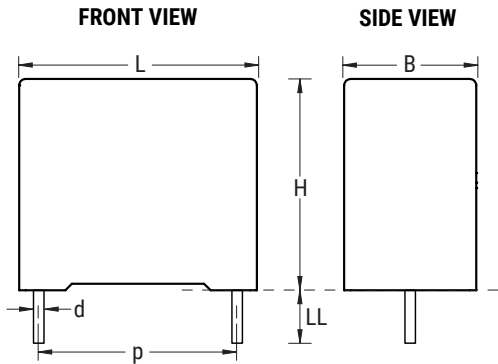
## Part Number System

R71	M	F	2100	AA	00	J
Series	Rated Voltage (VDC)	Lead Spacing (mm)	Capacitance Code (pF)	Packaging	Internal Use	Capacitance Tolerance
Metallized Polypropylene	M = 420 V = 520 P = 630 Q = 1,000	F = 10.0 I = 15.0 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 20 30 40	J = $\pm$ 5% K = $\pm$ 10% M = $\pm$ 20%

## Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
10  15  22.5	<b>Standard Lead and Packaging Options</b>		
	Bulk (Bag) – Short Leads	4 +2/-0	AA
	Ammo Pack	H <sub>0</sub> = 18.5 ±0.5	DQ
	<b>Other Lead and Packaging Options</b>		
	Tape & Reel (Standard Reel)	H <sub>0</sub> =18.5 ±0.5	GY
	Tape & Reel (Large Reel)	H <sub>0</sub> =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	<b>Standard Lead and Packaging Options</b>		
	Bulk (Tray) – Straight Leads	4 +2/-0	AA
	<b>Other Lead and Packaging Options</b>		
	Tape & Reel (Large Reel)	H <sub>0</sub> =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	<b>Standard Lead and Packaging Options</b>		
	Bulk (Tray) – Straight Leads	4 +2/-0	AA
	<b>Other Lead and Packaging Options</b>		
	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



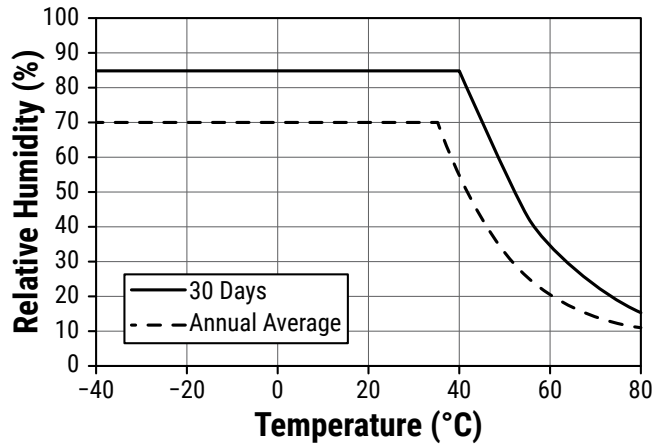
p		B		H		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
10.0	±0.4	4.0	+0.2	9.0	+0.1	13.0	+0.2	0.6	±0.05
10.0	±0.4	5.0	+0.2	11.0	+0.1	13.0	+0.2	0.6	±0.05
10.0	±0.4	6.0	+0.2	12.0	+0.1	13.0	+0.2	0.6	±0.05
15.0	±0.4	5.0	+0.2	11.0	+0.1	18.0	+0.3	0.6	±0.05
15.0	±0.4	6.0	+0.2	12.0	+0.1	18.0	+0.3	0.6	±0.05
15.0	±0.4	6.0	+0.2	17.5	+0.1	18.0	+0.3	0.6	±0.05
15.0	±0.4	7.5	+0.2	13.5	+0.1	18.0	+0.5	0.6	±0.05
15.0	±0.4	7.5	+0.2	18.5	+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	0.6	±0.05
15.0	±0.4	9.0	+0.2	12.5	+0.1	18.0	+0.5	0.6	±0.05
15.0	±0.4	10.0	+0.2	16.0	+0.1	18.0	+0.5	0.8	±0.05
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 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 ( $\mu$ 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

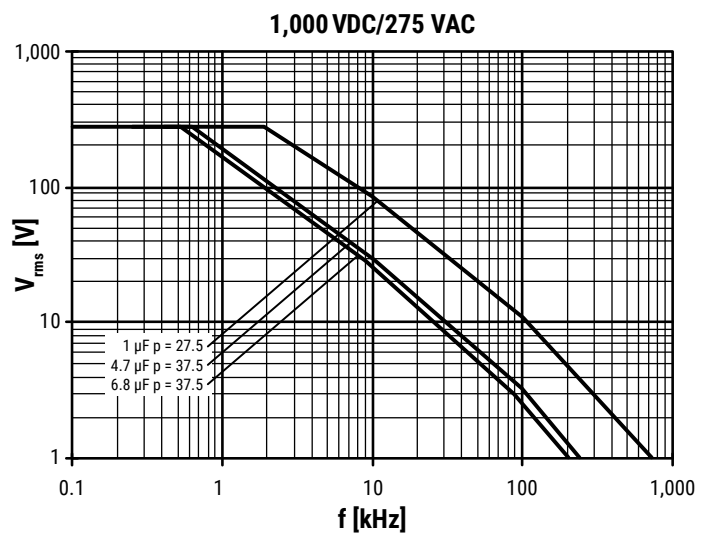
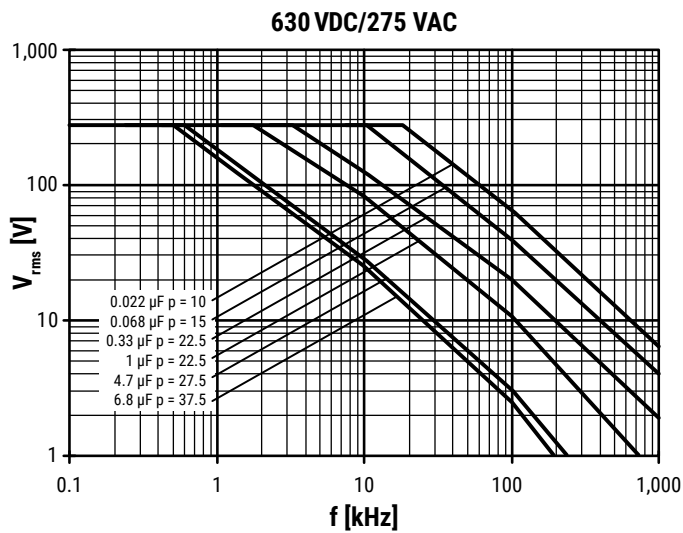
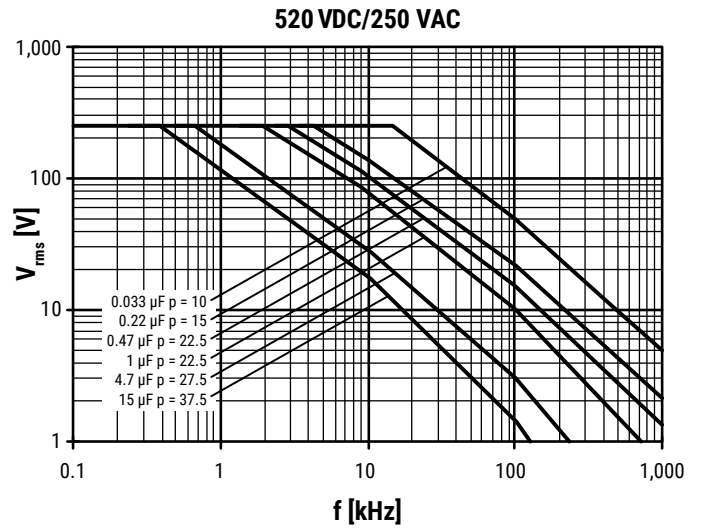
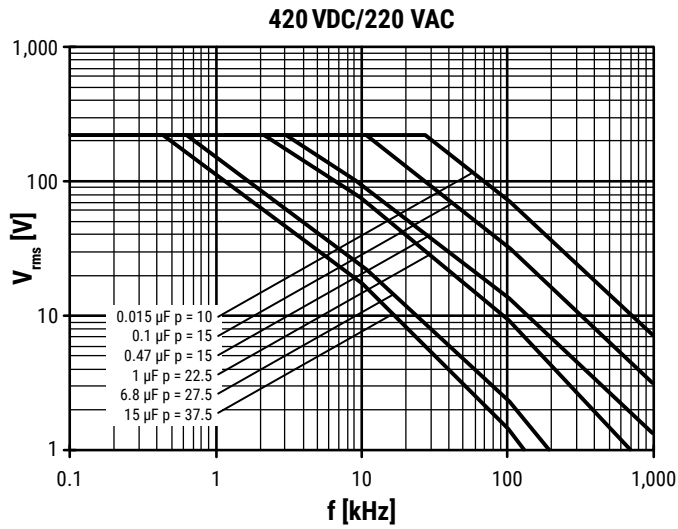


## Performance Characteristics cont'd

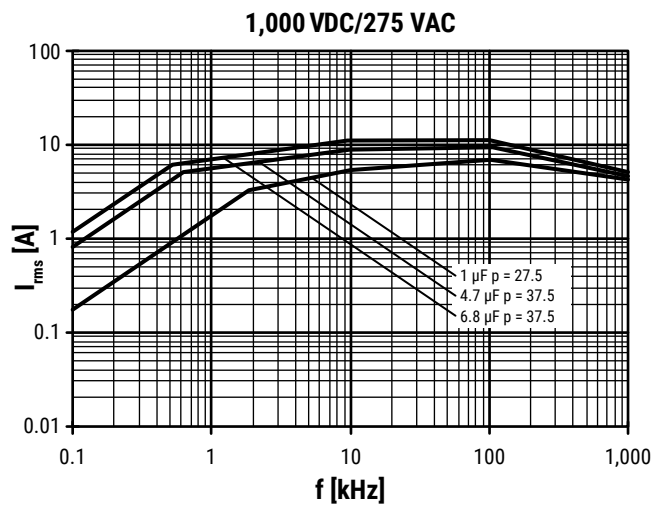
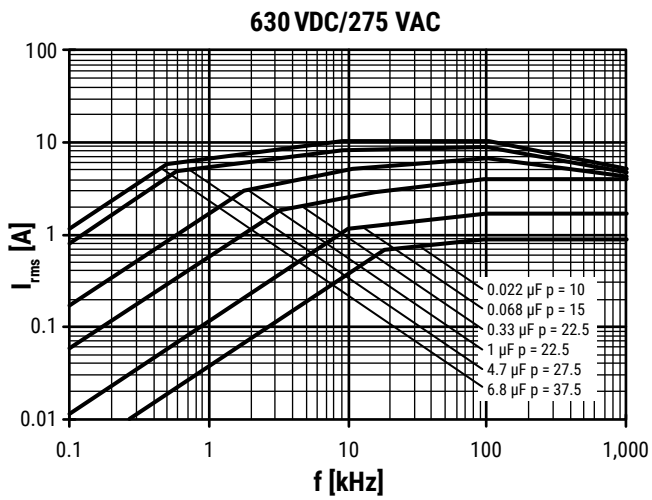
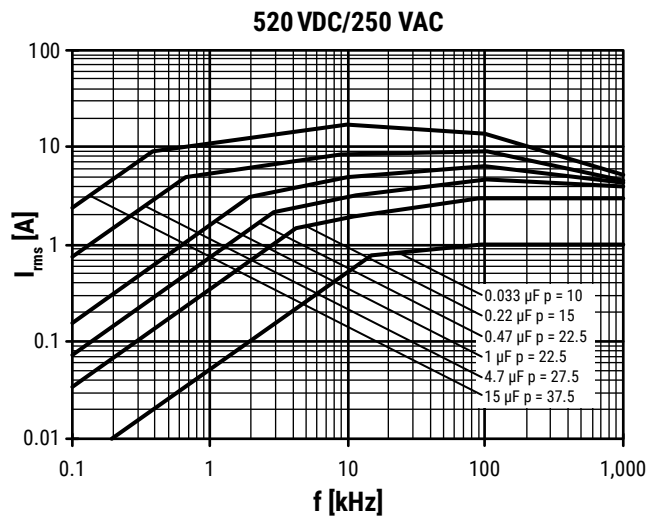
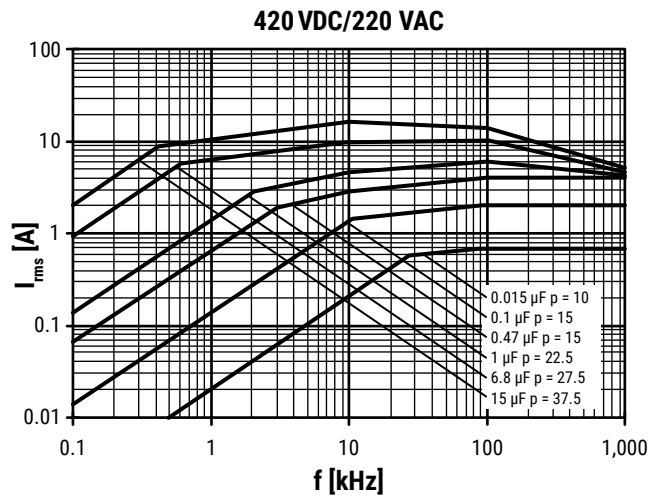
Climatic Category	40/110/56 IEC 60068-1					
Storage Conditions	Storage time: ≤ 24 months from the date marked on the package label					
	Average relative humidity per year ≤ 70%					
	RH ≤ 85% for 30 days randomly distributed throughout the year					
	Dew is absent					
	Temperature: -40 to 80°C (see "Maximum Humidity in Storage Conditions" graph below)					
Test Voltage	1.6 x V <sub>R</sub> 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 <sub>pp</sub> < V <sub>R</sub> ), the specified dv/dt can be multiplied by the factor V <sub>R</sub> /V <sub>pp</sub>					
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)*		

\* typical value

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



## 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 ±2°C 93% ±2% 56 days	Δ C/C  ≤ 5%, IR after test ≥ 50% of initial limit
Test 2nd	Temperature: Relative humidity (RH): Test duration:	+60°C ±2°C 95% ±2% 500 hours	
Endurance Test	Test Conditions		Performances
	Temperature: Voltage applied: Test duration:	+105°C ±2°C 1.25 x V <sub>R</sub> (DC) 2,000 hours	Δ C/C  ≤ 5%, IR after test ≥ 50% of initial limit
Resistance to Soldering Heat Test	Test Conditions		Performances
	Solder bath temperature: Dipping time (with heat screen):	260°C ±5°C 10 seconds ±1 second	Δ C/C  ≤ 2%

## Environmental Compliance

All KEMET pulse capacitors are RoHS Compliant.



**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 <sub>0</sub> (V <sup>2</sup> /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 <sub>0</sub> (V <sup>2</sup> /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%.

(3) M = ±20% (only available tolerance).





**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 <sub>0</sub> (V <sup>2</sup> /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 <sub>0</sub> (V <sup>2</sup> /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%.

(3) M = ±20% (only available tolerance).

## Soldering Process

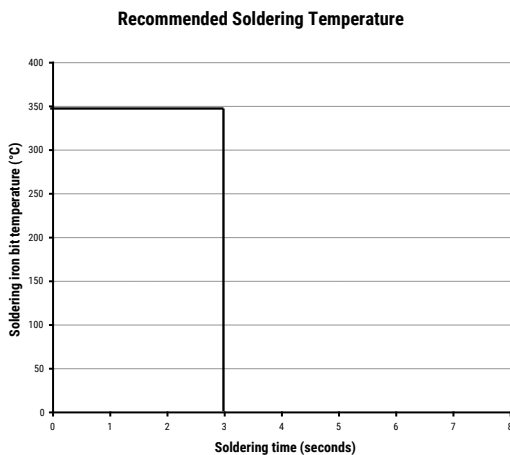
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as a primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even 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 in 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.

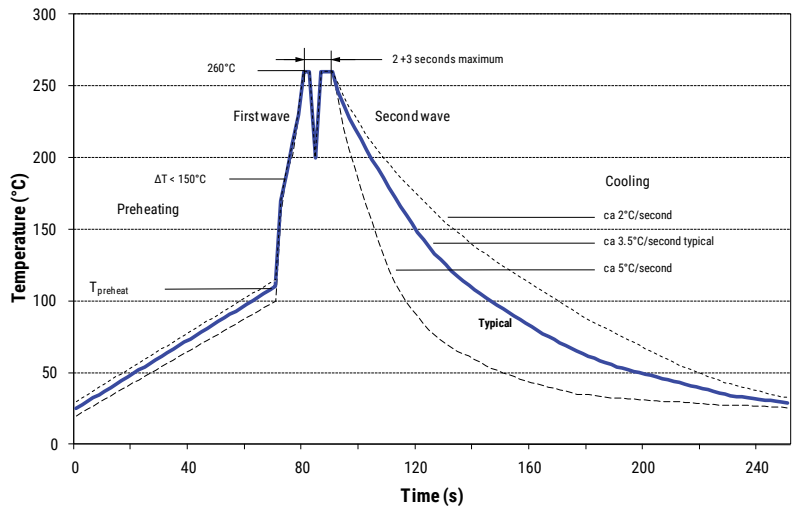
### Manual Soldering Recommendations

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.

### Wave Soldering Recommendations



## Soldering Process cont'd

### Wave Soldering Recommendations cont'd

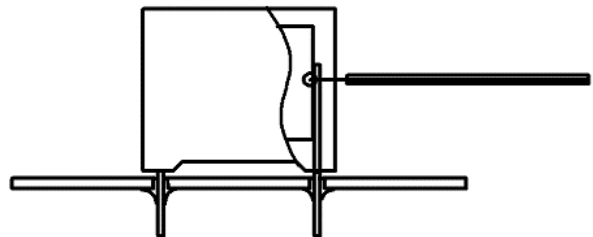
1. The table indicates the maximum set-up temperature of the soldering process  
 Figure 1.

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



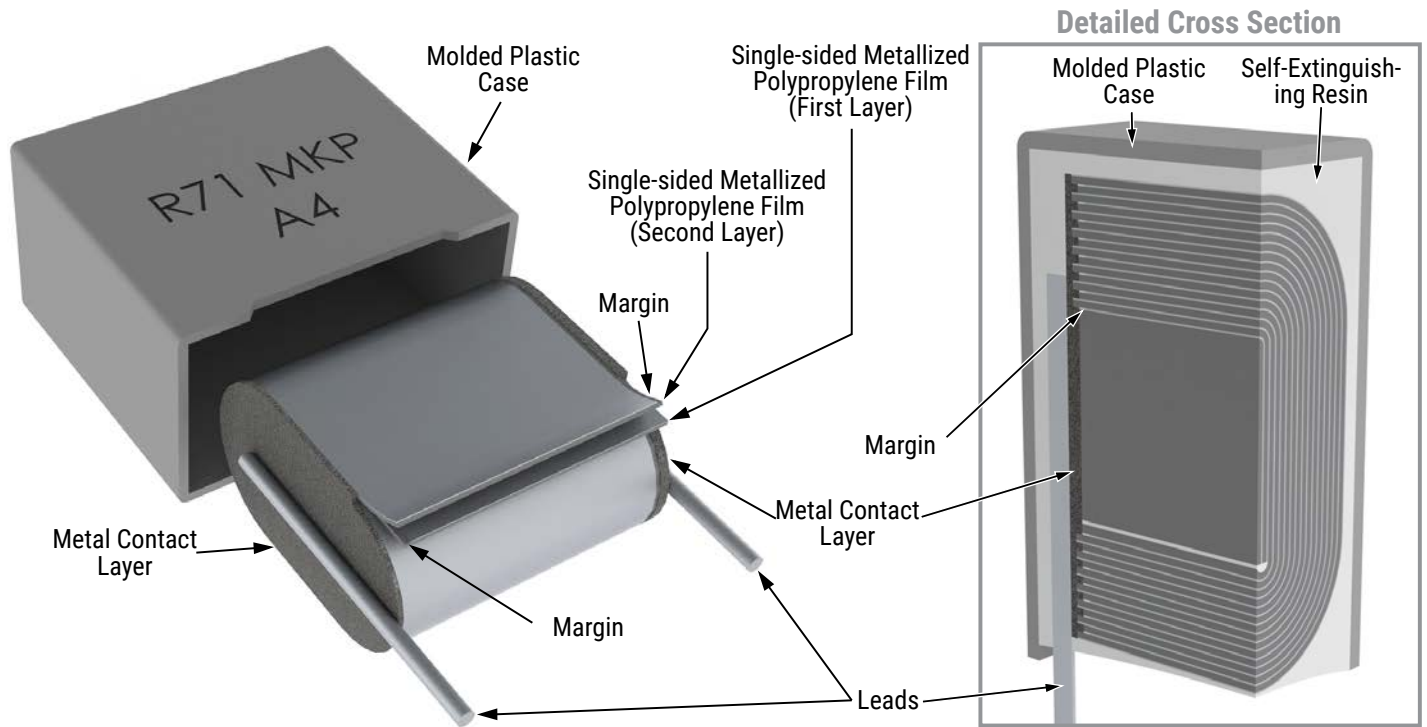
*Temperature monitored inside the capacitor.*

### Selective Soldering Recommendations

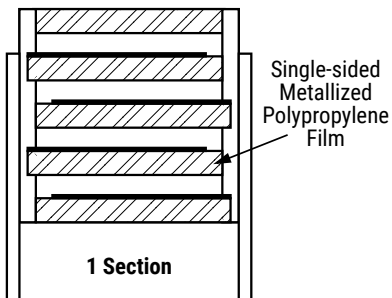
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and 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.

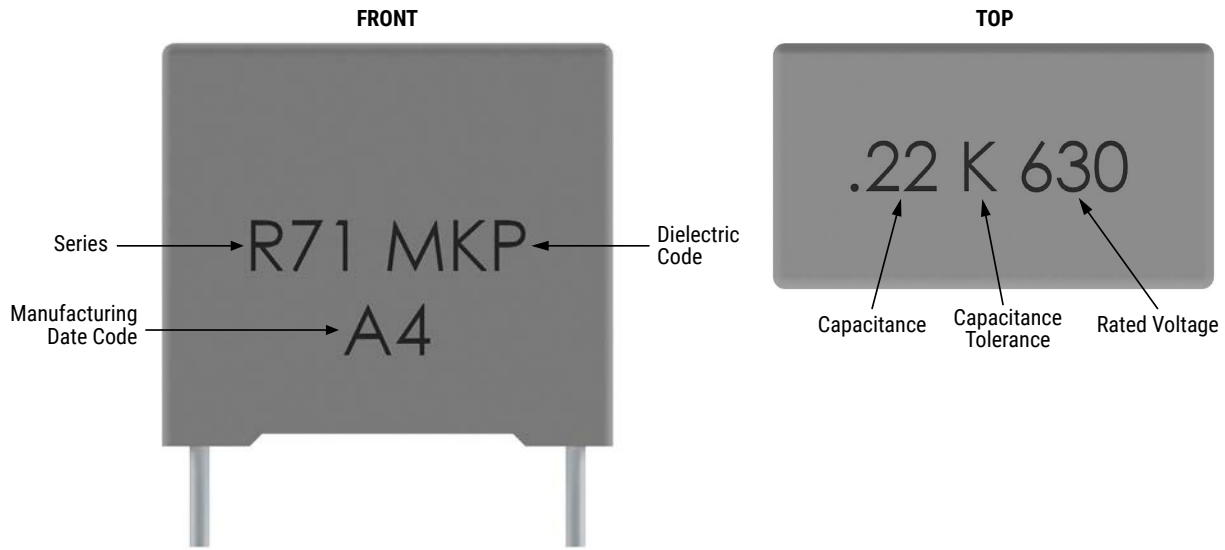
## Construction



## Winding Scheme



## Marking

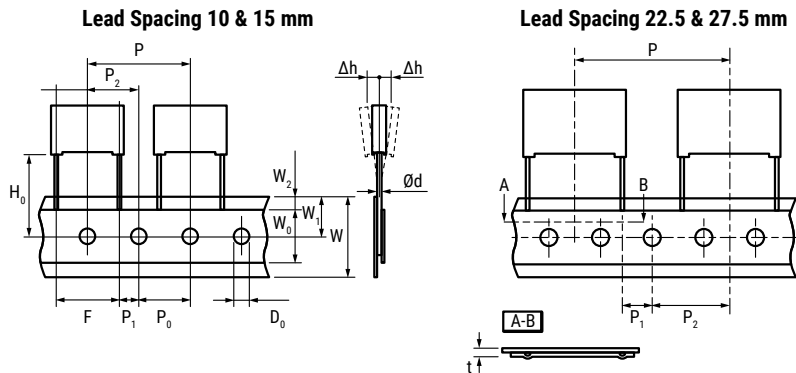




## Packaging Quantities

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
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	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
	6.0	17.5	18.0	1,000	700	500	1,000	680
	7.5	13.5	18.0	1,000	700	350	800	500
	7.5	18.5	18.0	900	500	-	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
13.0	12.0	18.0	750	490	200	480	280	
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					
		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 <sub>0</sub>	12.7	12.7	12.7	12.7	±0.2 **	
Centering of the lead wire	P <sub>1</sub>	7.7	5.2	7.8	5.3	±0.7	
Centering of the body	P <sub>2</sub>	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 alignment	Δh	0	0	0	0	±2	
Component deviation	Δp	0	0	0	0	±1	
Height of component from tape center	H <sub>0</sub> ****	18.5	18.5	18.5	18.5	±0.5	
Carrier tape width	W	18	18	18	18	+1/-0.5	
Hold down tape width	W <sub>0</sub>	9	10	10	10	Minimum	
Hole position	W <sub>1</sub>	9	9	9	9	±0.5	
Hold down tape position	W <sub>2</sub>	3	3	3	3	Maximum	
Feed hole diameter	D <sub>0</sub>	4	4	4	4	±0.2	
Total tape thickness	t	0.7	0.7	0.7	0.7	±0.2	

\* Available also 15 mm.

\*\* Maximum 1 mm on 20 lead spacing.

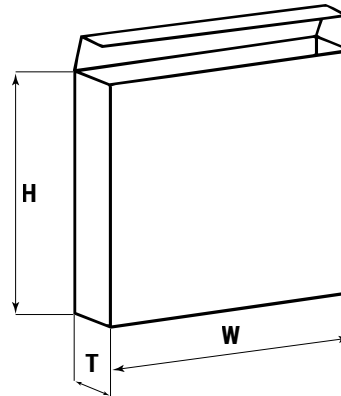
\*\*\* 15 mm and 10 mm taped to 7.5 mm (crimped leads) available upon request.

\*\*\*\* H<sub>0</sub> = 16.5 mm is available upon request.

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

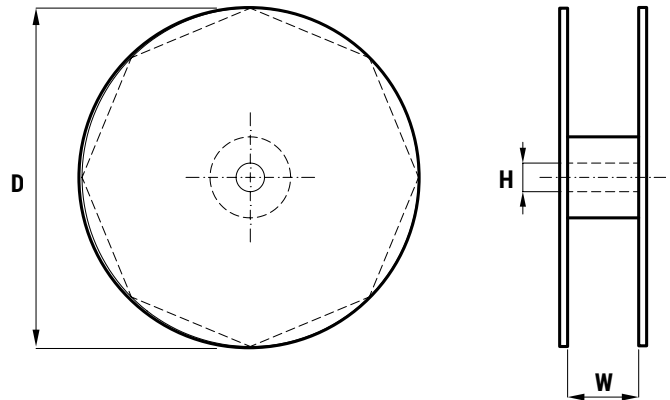
### Ammo Specifications

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
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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