Polypropylene Pulse/High Frequency Capacitors

R79, Single Metallized Polypropylene Film, Radial, 5 mm Lead Spacing, Multipurpose Applications

Overview

The R79 Series 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 with a self-extinguishing thermosetting resin in a box material meeting the UL 94 V–0 requirements.

Applications

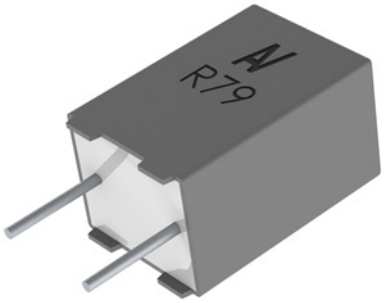
Typical applications include timing, oscillator circuits, high frequency coupling and decoupling applications.

Not suitable for across-the-line application (see Suppressor Capacitors).

ATTENTION -- This series was replaced by the R75 series. Please click on the link to the R75 series datasheet HERE.

Benefits

- Voltage range: 160 – 630 VDC
- Capacitance range: 0.001 – 0.22 µF
- Lead Spacing: 5 mm
- Capacitance tolerance: ±5%, ±10%, ±20%
- Climatic category: 55/105/56 IEC 60068–1
- Operating temperature range of −55˚C to +105˚C
- RoHS compliance and lead-free terminations
- Tape & Reel packaging in accordance with IEC 60286–2
- Self-healing



Part Number System

R79	G	C	2390	AA	40	K
Series	Rated Voltage (VDC)	Lead Spacing (mm)	Capacitance Code (pF)	Packaging	Internal Use	Capacitance Tolerance
Metallized Polypropylene	G = 160 I = 250 M = 400 P = 630	C = 5	The last three digits represent significant figures. The first digit specifies the total number of zeros to be added.	See Ordering Options Table	40 45	H = 2.5% J = ±5% K = ±10%

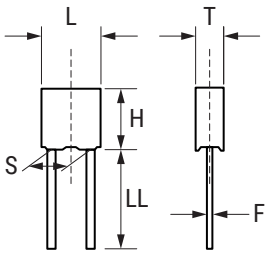
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Ordering Options Table

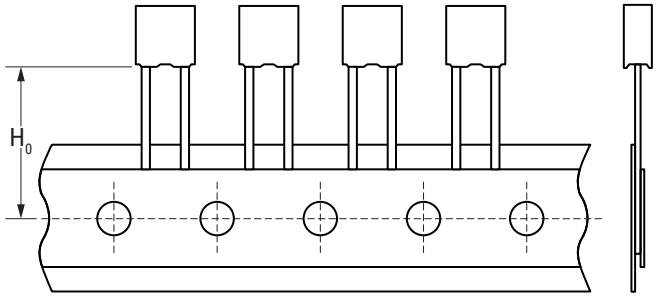
Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	Lead and Packaging Code
5	**Standard Lead and Packaging Options**		
	Bulk (Bag) – Short Leads	4 +1.5/−0	AA
	Ammo Pack	H_0 = 18.5 ±0.5	DQ
	Other Lead and Packaging Options		
	Tape & Reel (Standard Reel Ø 355 mm)	H_0 = 18.5 ±0.5	CK
	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	17 +1/−2	Z3

Dimensions – Millimeters

Loose



Taped



S		T		H		L		F	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
5.0	±0.4	3.5	+0.1/−0.5	7.5	+0.1/−0.5	7.2	+0.2/−0.5	0.5	±0.05
5.0	±0.4	4.5	+0.1/−0.5	9.5	+0.1/−0.5	7.2	+0.3/−0.5	0.5	±0.05
5.0	±0.4	5.0	+0.1/−0.5	10.0	+0.1/−0.5	7.2	+0.3/−0.5	0.5	±0.05
5.0	±0.4	6.0	+0.1/−0.5	11.0	+0.1/−0.5	7.2	+0.3/−0.5	0.5	±0.05
5.0	±0.4	7.2	+0.1/−0.5	13.0	+0.1/−0.5	7.2	+0.3/−0.5	0.5	±0.05

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

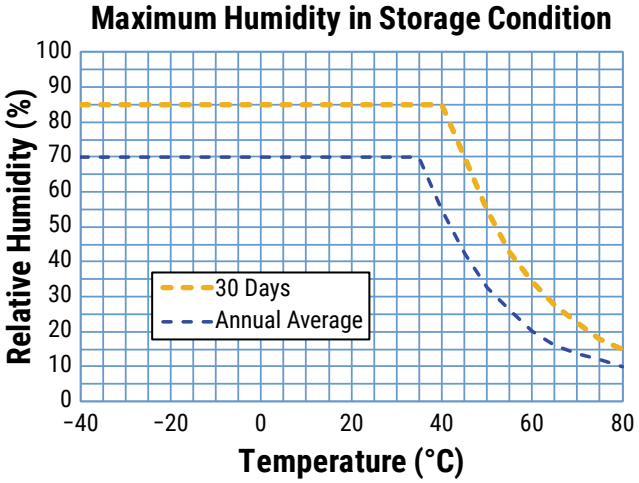
Performance Characteristics

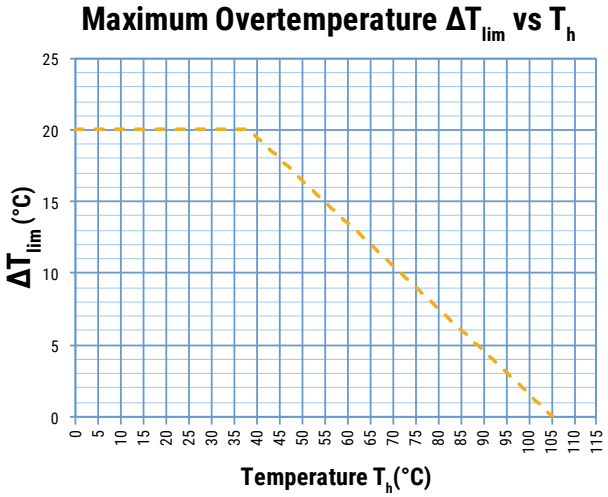
Dielectric	Polypropylene film				
Plates	Metal layer deposited by evaporation under vacuum				
Winding	Non-inductive type				
Leads	Tinned wire				
Protection	Plastic case, thermosetting resin filled. Box material is solvent resistant and flame retardant according to UL94.				
Related Documents	IEC 60384–16				
Rated Voltage V_R (VDC)	160	250	400	630	
Rated Voltage V_R (VAC)	70	160	200	220	
Capacitance Range (µF)	0.039 – 0.22	0.012 – 0.15	0.0039 – 0.047	0.001 – 0.018	
Capacitance Values	E12 series (IEC 60063) measured at 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				
Voltage Derating	Above +85°C DC and AC voltage derating is 1.25%/°C				
Climatic Category	55/105/56 IEC 60068–1				
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) 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 working voltages lower than rated voltage (V < VR), the specified dV/dt can be multiplied by the factor VR/V.				
Temperature Coefficient	–(200 ±100) ppm/°C at 1 kHz				
Self Inductance	Approximately 6 nH. Maximum 1 nH per 1 mm lead and capacitor length.				
Dissipation Factor tanδ	Maximum Values at 25°C ±5°C				
	Frequency	C ≤ 0.1 µF	C > 0.1 µF		
	1 kHz	0.06%	0.06%		
	10 kHz	0.10%	0.10%		
	100 kHz	0.30%	-		

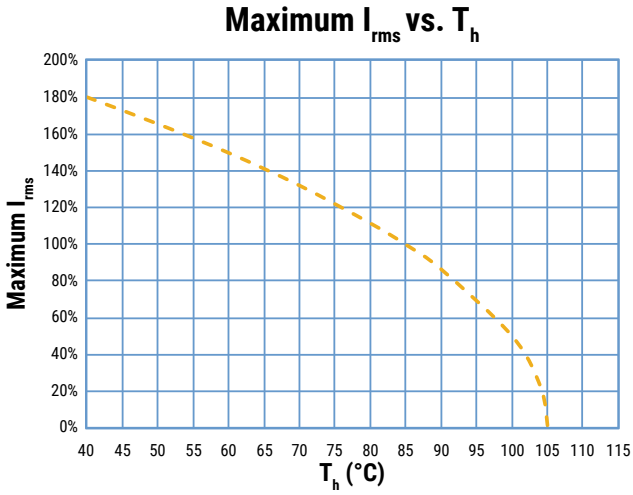
Performance Characteristics cont.

Insulation Resistance	Measured at +25°C ±5°C, 100 VDC 60 seconds
	Minimum Values Between Terminals
	All Capacitance Values
	≥ 100,000 MΩ (≥ 500,000 MΩ)*

** Typical value*

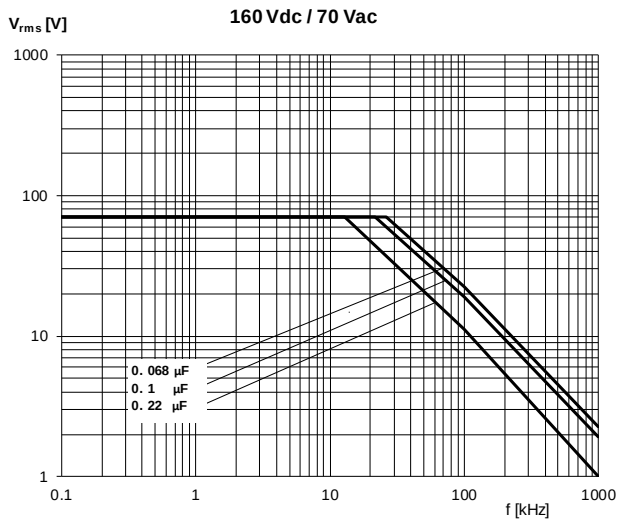


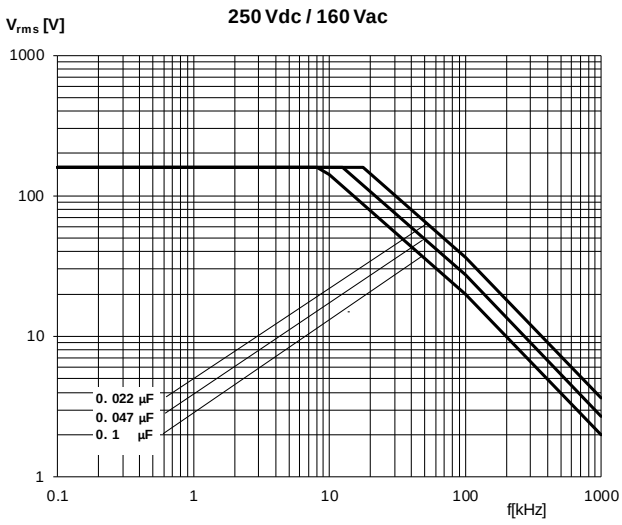


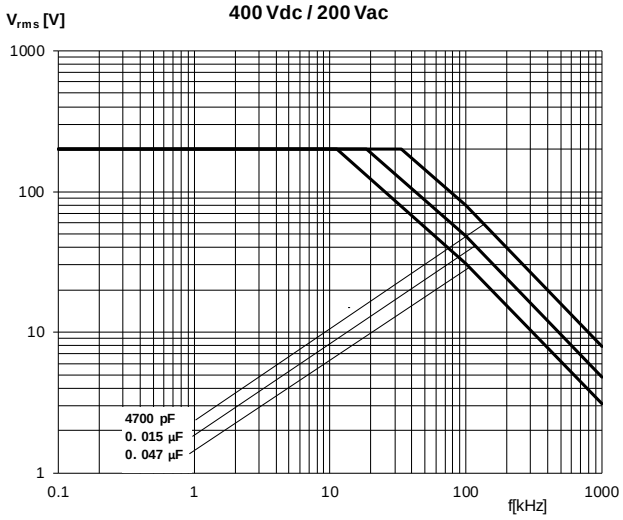


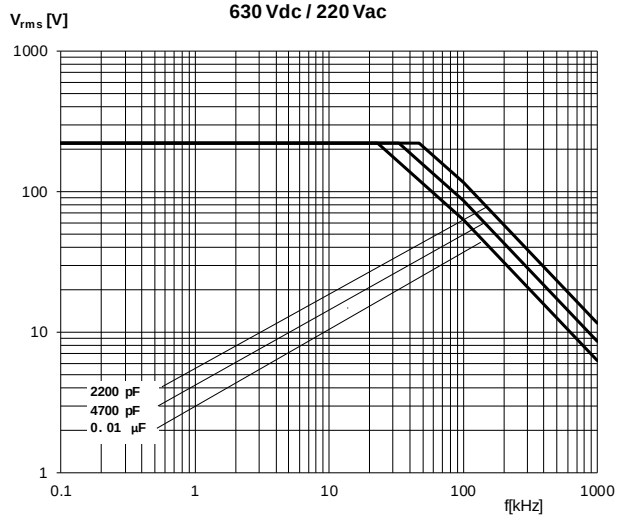
T_h is the maximum ambient temperature surrounding the capacitor or hottest contact point (e.g. tracks), whichever is higher, in the worst operation conditions in °C.

Maximum Voltage (V_{rms}) vs. Frequency (Sinusoidal Waveform/Th ≤ 85°C)

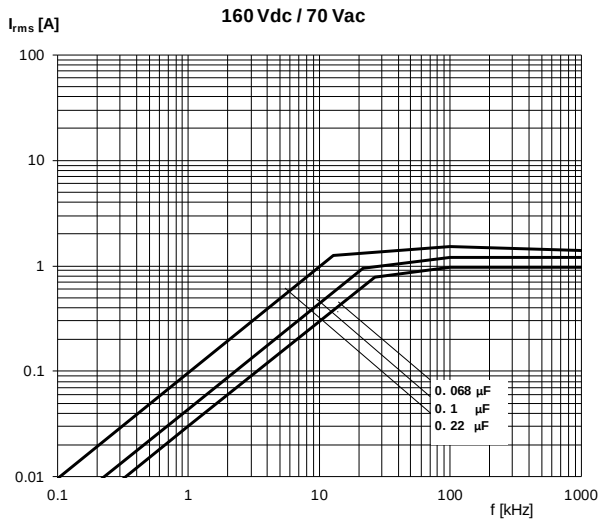


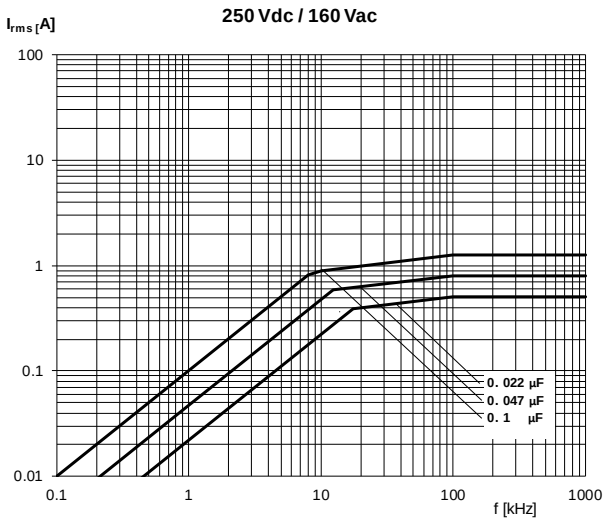


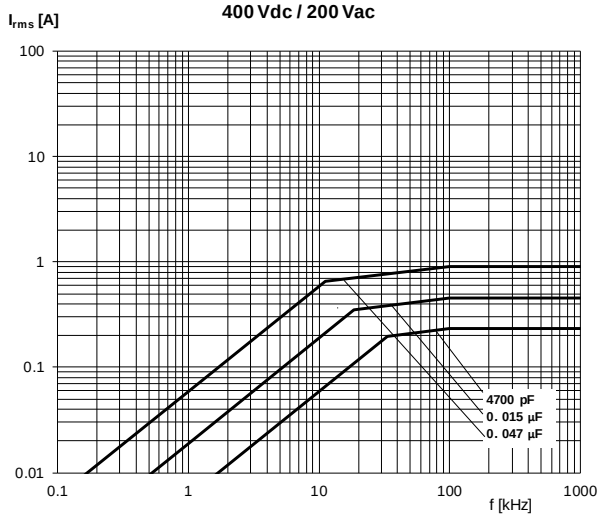


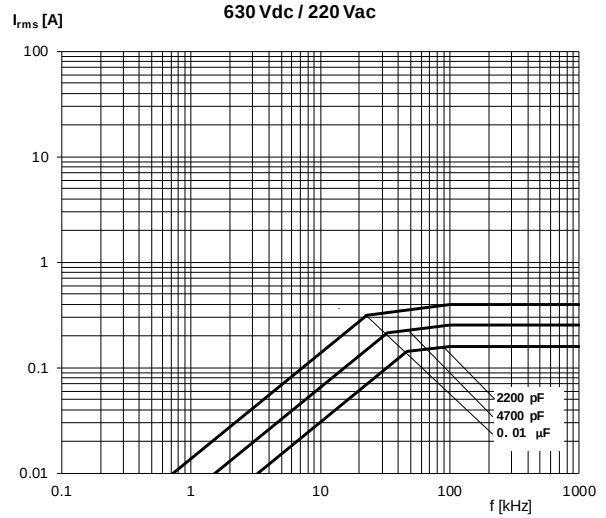


Maximum Current (I_{rms}) vs. Frequency (Sinusoidal Waveform/Th ≤ 85°C)









Environmental Test Data

Damp Heat, Steady State Test	Test Conditions:		Performances
	Temperature: Relative humidity (RH): Test duration:	+40°C ±2°C 93% ±2% 56 days	|Δ C/C| ≤ 3%, Δ tanδ ≤ 0.001 at 1 kHz IR after test ≥ 50% of initial limit
Endurance Test	**Test Conditions**		**Performances**
	Temperature: Voltage applied: Test duration:	+85°C ±2°C 1.25 x V_R (DC) 2,000 hours	|Δ C/C| ≤ 3%, Δ tanδ ≤ 0.001 at 10 kHz 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%, Δ tanδ ≤ 0.001 at 10 kHz for C ≤ 1 µF IR after test ≥ initial limit

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 (S)	dV/dt (V/µs)	Max K_0 (V^2/µs)	KEMET Internal Part Number	Customer Part Number
			T	H	L					
160	70	0.039	3.5	7.5	7.2	5.0	100	32,000	79GC2390(1)40(2)	R79GC2390(1)40(2)
160	70	0.047	4.5	9.5	7.2	5.0	100	32,000	79GC2470(1)40(2)	R79GC2470(1)40(2)
160	70	0.056	4.5	9.5	7.2	5.0	100	32,000	79GC2560(1)40(2)	R79GC2560(1)40(2)
160	70	0.068	4.5	9.5	7.2	5.0	100	32,000	79GC2680(1)40(2)	R79GC2680(1)40(2)
160	70	0.082	5.0	10.0	7.2	5.0	100	32,000	79GC2820(1)40(2)	R79GC2820(1)40(2)
160	70	0.10	5.0	10.0	7.2	5.0	100	32,000	79GC3100(1)40(2)	R79GC3100(1)40(2)
160	70	0.12	6.0	11.0	7.2	5.0	100	32,000	79GC3120(1)40(2)	R79GC3120(1)40(2)
160	70	0.15	6.0	11.0	7.2	5.0	100	32,000	79GC3150(1)40(2)	R79GC3150(1)40(2)
160	70	0.18	7.2	13.0	7.2	5.0	100	32,000	79GC3180(1)40(2)	R79GC3180(1)40(2)
160	70	0.22	7.2	13.0	7.2	5.0	100	32,000	79GC3220(1)40(2)	R79GC3220(1)40(2)
250	160	0.012	3.5	7.5	7.2	5.0	250	125,000	79IC2120(1)45(2)	R79IC2120(1)45(2)
250	160	0.015	3.5	7.5	7.2	5.0	250	125,000	79IC2150(1)45(2)	R79IC2150(1)45(2)
250	160	0.018	3.5	7.5	7.2	5.0	250	125,000	79IC2180(1)45(2)	R79IC2180(1)45(2)
250	160	0.022	3.5	7.5	7.2	5.0	250	125,000	79IC2220(1)45(2)	R79IC2220(1)45(2)
250	160	0.027	3.5	7.5	7.2	5.0	250	125,000	79IC2270(1)45(2)	R79IC2270(1)45(2)
250	160	0.033	3.5	7.5	7.2	5.0	250	125,000	79IC2330(1)45(2)	R79IC2330(1)45(2)
250	160	0.039	4.5	9.5	7.2	5.0	250	125,000	79IC2390(1)40(2)	R79IC2390(1)40(2)
250	160	0.047	4.5	9.5	7.2	5.0	250	125,000	79IC2470(1)40(2)	R79IC2470(1)40(2)
250	160	0.056	4.5	9.5	7.2	5.0	250	125,000	79IC2560(1)40(2)	R79IC2560(1)40(2)
250	160	0.068	5.0	10.0	7.2	5.0	250	125,000	79IC2680(1)40(2)	R79IC2680(1)40(2)
250	160	0.082	6.0	11.0	7.2	5.0	250	125,000	79IC2820(1)40(2)	R79IC2820(1)40(2)
250	160	0.10	6.0	11.0	7.2	5.0	250	125,000	79IC3100(1)40(2)	R79IC3100(1)40(2)
250	160	0.12	7.2	13.0	7.2	5.0	250	125,000	79IC3120(1)40(2)	R79IC3120(1)40(2)
250	160	0.15	7.2	13.0	7.2	5.0	250	125,000	79IC3150(1)40(2)	R79IC3150(1)40(2)
400	200	0.0039	3.5	7.5	7.2	5.0	400	320,000	79MC1390(1)40(2)	R79MC1390(1)40(2)
400	200	0.0047	3.5	7.5	7.2	5.0	400	320,000	79MC1470(1)40(2)	R79MC1470(1)40(2)
400	200	0.0056	3.5	7.5	7.2	5.0	400	320,000	79MC1560(1)40(2)	R79MC1560(1)40(2)
400	200	0.0068	3.5	7.5	7.2	5.0	400	320,000	79MC1680(1)40(2)	R79MC1680(1)40(2)
400	200	0.0082	3.5	7.5	7.2	5.0	400	320,000	79MC1820(1)40(2)	R79MC1820(1)40(2)
400	200	0.010	3.5	7.5	7.2	5.0	400	320,000	79MC2100(1)40(2)	R79MC2100(1)40(2)
400	200	0.012	4.5	9.5	7.2	5.0	400	320,000	79MC2120(1)40(2)	R79MC2120(1)40(2)
400	200	0.015	4.5	9.5	7.2	5.0	400	320,000	79MC2150(1)40(2)	R79MC2150(1)40(2)
400	200	0.018	5.0	10.0	7.2	5.0	400	320,000	79MC2180(1)40(2)	R79MC2180(1)40(2)
400	200	0.022	5.0	10.0	7.2	5.0	400	320,000	79MC2220(1)40(2)	R79MC2220(1)40(2)
400	200	0.027	6.0	11.0	7.2	5.0	400	320,000	79MC2270(1)40(2)	R79MC2270(1)40(2)
400	200	0.033	6.0	11.0	7.2	5.0	400	320,000	79MC2330(1)40(2)	R79MC2330(1)40(2)
400	200	0.039	7.2	13.0	7.2	5.0	400	320,000	79MC2390(1)40(2)	R79MC2390(1)40(2)
400	200	0.047	7.2	13.0	7.2	5.0	400	320,000	79MC2470(1)40(2)	R79MC2470(1)40(2)
630	220	0.0010	3.5	7.5	7.2	5.0	500	630,000	79PC1100(1)40(2)	R79PC1100(1)40(2)
630	220	0.0012	3.5	7.5	7.2	5.0	500	630,000	79PC1120(1)40(2)	R79PC1120(1)40(2)
630	220	0.0015	3.5	7.5	7.2	5.0	500	630,000	79PC1150(1)40(2)	R79PC1150(1)40(2)
630	220	0.0018	3.5	7.5	7.2	5.0	500	630,000	79PC1180(1)40(2)	R79PC1180(1)40(2)
630	220	0.0022	3.5	7.5	7.2	5.0	500	630,000	79PC1220(1)40(2)	R79PC1220(1)40(2)
630	220	0.0027	3.5	7.5	7.2	5.0	500	630,000	79PC1270(1)40(2)	R79PC1270(1)40(2)
630	220	0.0033	3.5	7.5	7.2	5.0	500	630,000	79PC1330(1)40(2)	R79PC1330(1)40(2)
630	220	0.0039	4.5	9.5	7.2	5.0	600	756,000	79PC1390(1)40(2)	R79PC1390(1)40(2)
630	220	0.0047	4.5	9.5	7.2	5.0	600	756,000	79PC1470(1)40(2)	R79PC1470(1)40(2)
630	220	0.0056	4.5	9.5	7.2	5.0	600	756,000	79PC1560(1)40(2)	R79PC1560(1)40(2)
630	220	0.0068	5.0	10.0	7.2	5.0	600	756,000	79PC1680(1)40(2)	R79PC1680(1)40(2)
630	220	0.0082	5.0	10.0	7.2	5.0	600	756,000	79PC1820(1)40(2)	R79PC1820(1)40(2)
630	220	0.010	6.0	11.0	7.2	5.0	600	756,000	79PC2100(1)40(2)	R79PC2100(1)40(2)
630	220	0.012	6.0	11.0	7.2	5.0	600	756,000	79PC2120(1)40(2)	R79PC2120(1)40(2)
630	220	0.015	7.2	13.0	7.2	5.0	600	756,000	79PC2150(1)40(2)	R79PC2150(1)40(2)
630	220	0.018	7.2	13.0	7.2	5.0	600	756,000	79PC2180(1)40(2)	R79PC2180(1)40(2)
VDC	**VAC**	**Capacitance Value (µF)**	**T (mm)**	**H (mm)**	**L (mm)**	**Lead Spacing (S)**	**dV/dt (V/µs)**	**Max K_0 (V^2/µs)**	**KEMET Internal Part Number**	**Customer Part Number**

(1) Insert lead and packaging code. See Ordering Options Table for available options.
(2) J = 5%, K = 10%, M = 20%

Soldering Process

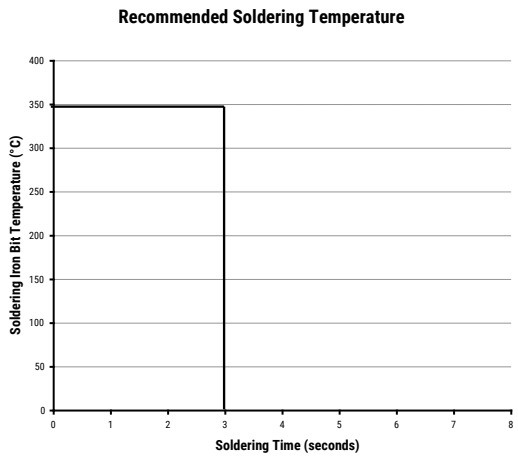
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as a primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even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

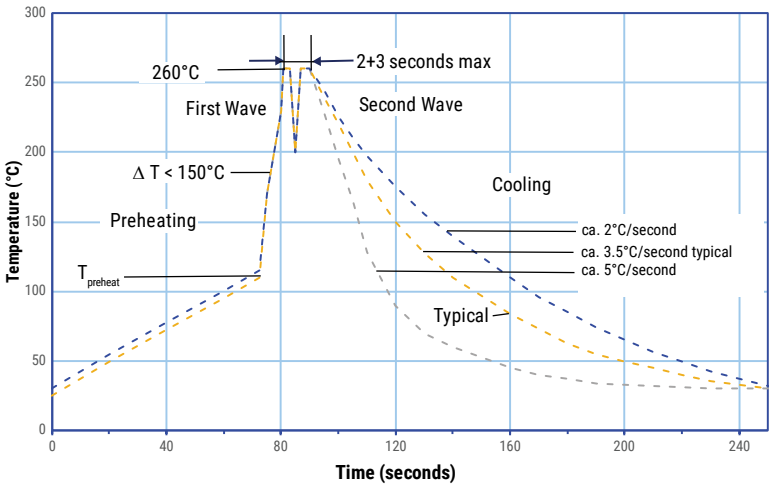
Manual Soldering Recommendations

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.

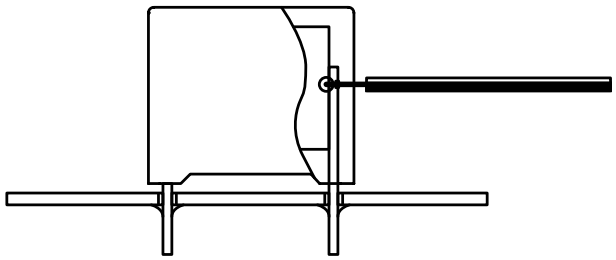
Wave Soldering Recommendations cont.

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 ≤ 15 mm	Capacitor Pitch > 15 mm	Capacitor Pitch ≤ 15 mm	Capacitor Pitch > 15 mm
Polyester	130°C	130°C	270°C	270°C
Polypropylene	110°C	130°C	260°C	270°C
Paper	130°C	140°C	270°C	270°C
Polyphenylene Sulphide	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.

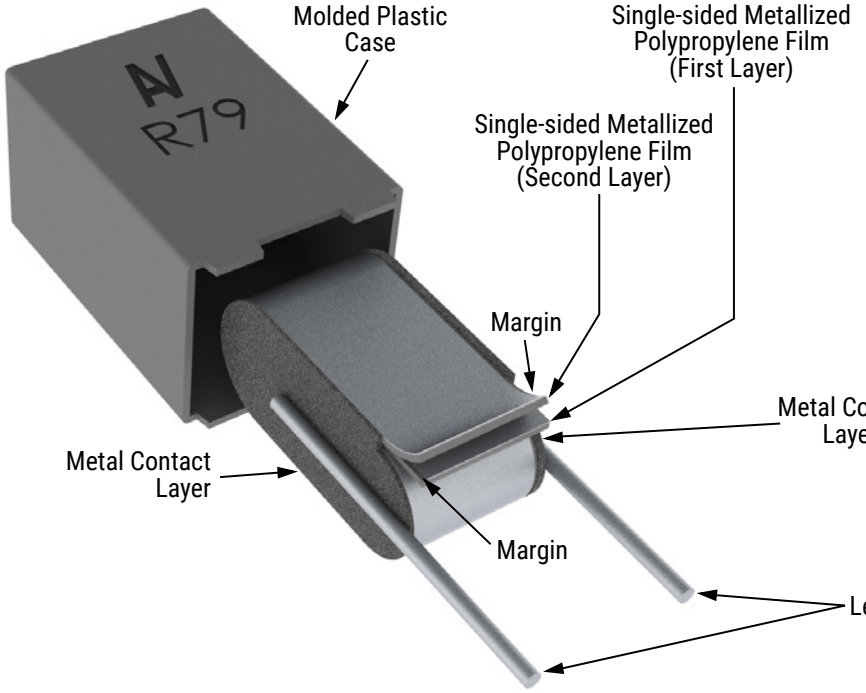
Selective Soldering Recommendations

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.

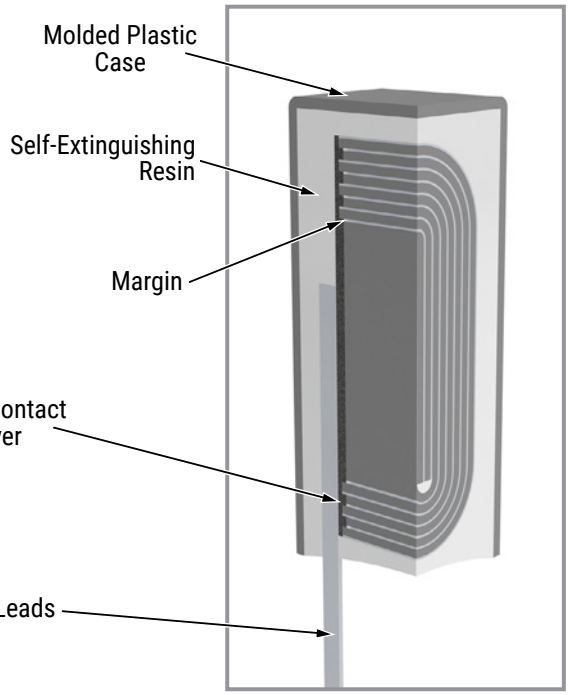
The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document, **however, instead of two baths, there is only one bath with a time from 3 to 10 seconds.** In selective soldering, the risk of overheating is greater than in double wave flow soldering.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

Construction

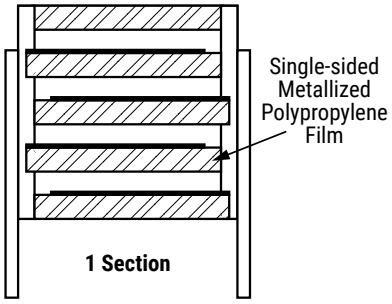
Wound



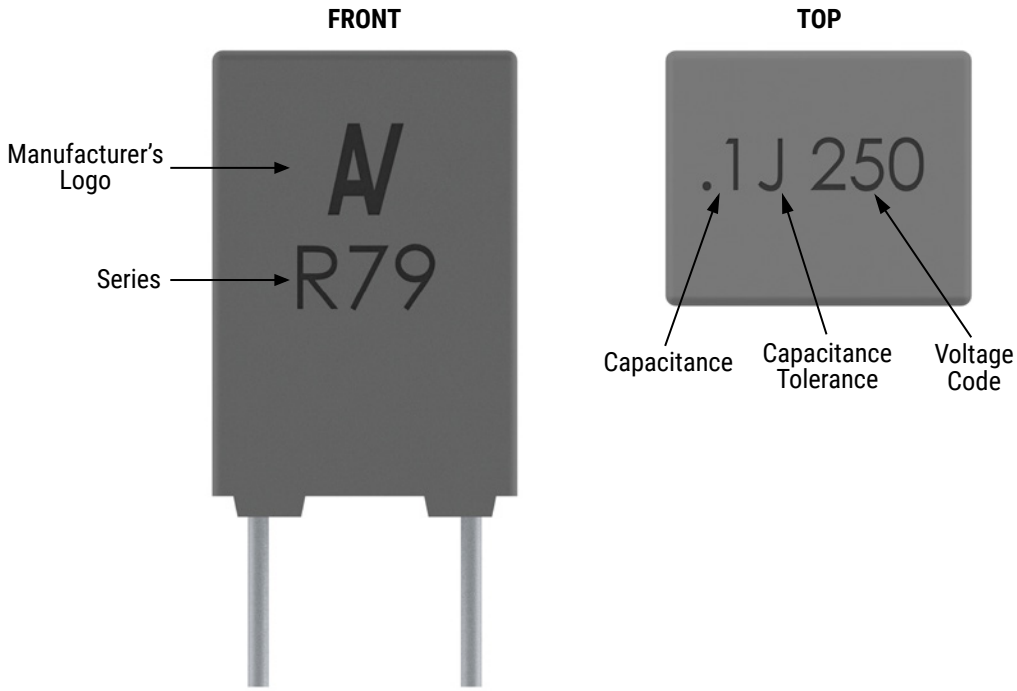
Detailed Cross Section



Winding Scheme



Marking


FRONT
TOP
Manufacturer's Logo
Series
R79
.1 J 250
Capacitance
Capacitance Tolerance
Voltage Code

Marking cont.

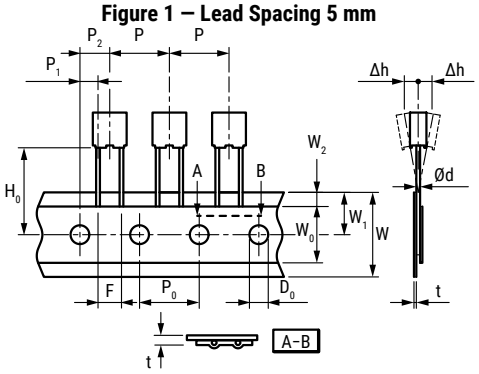
Manufacturing Date Code (IEC–60062)							
Year	Code	Year	Code	Month	Code	Month	Code
2020	M	2030	A	January	1	July	7
2021	N	2031	B	February	2	August	8
2022	P	2032	C	March	3	September	9
2023	R	2033	D	April	4	October	O
2024	S	2034	E	May	5	November	N
2025	T	2035	F	June	6	December	D
2026	U	2036	H				
2027	V	2037	J				
2028	W	2038	K				
2029	X	2039	L				
2030	A	2040	M				

Packaging Quantities

Lead Spacing	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 355 mm	Ammo Taped
	Lead and Packaging Code			AA - JC JE - JH	Z3	CK	DQ
5.0	3.5	7.5	7.2	2,000	3,000	1,800	2,500
	4.5	9.5	7.2	1,500	2,000	1,400	1,900
	5.0	10	7.2	1,000	1,500	1,200	1,700
	6.0	11	7.2	2,000	1,000	1,000	1,400
	7.2	13	7.2	1,500	750	800	1,150

Lead Taping & Packaging (IEC 60286–2)

Figure 1 — Lead Spacing 5 mm



Taping Specification

Description	Symbol	Dimensions (mm)	
		Lead Spacing	Tolerance
		5	
		Figure 1	
Lead wire diameter	d	0.5	±0.05
Taping lead space	P	12.7	±1
Feed hole lead space	P_0	12.7	±0.2**
Centering of the lead wire	P_1	3.85	±0.7
Centering of the body	P_2	6.35	±1.3
Lead spacing	F	5	+0.6/−0.1
Component alignment	Dh	0	±2
Height of component from tape center	H_0*	18.5	±0.5
Carrier tape width	W	18	+1/−0.5
Hold down tape width	W_0	6	Minimum
Hole position	W_1	9	±0.5
Hold down tape position	W_2	3	Maximum
Feed hole diameter	D_0	4	±0.2
Total Tape thickness	t	0.7	±0.2

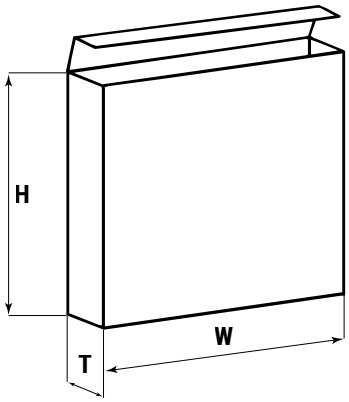
H_0 = 16.5 mm is available upon request.
***Maximum 1 mm on 20 lead spacing.*

Lead Taping & Packaging (IEC 60286–2) cont.

Ammo Specifications

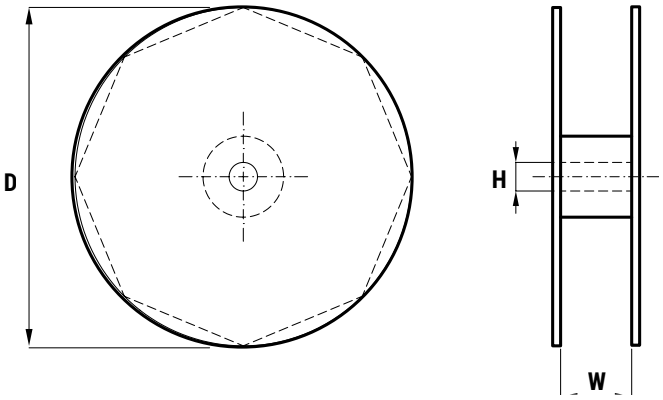
Dimensions (mm)		
H	W	T
360*	340	59

** Lower dimension available upon request (Maximum 295 mm)*



Reel Specifications

Dimensions (mm)		
D	H	W
355	30	55 Maximum



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Although all product–related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

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