R66, Radial, 7.5 mm Lead Spacing, 50 - 630 VDC (Automotive Grade)



Overview

The R66 is constructed of metallized polyester film (wound or stacked technology) with radial leads of tinned wire. Radial leads are electrically welded to the contact metal layer on the ends of the capacitor winding. The capacitor is encapsulated with thermosetting resin in a box of material meeting the UL 94 V-0 requirements.

Automotive grade devices meet the demanding Automotive Electronics Council's AEC-Q200 qualification requirements.

Applications

Typical applications include blocking, coupling, decoupling, bypassing, and interference suppression in low voltage applications such as automotive. Not suitable for across-the-line application (see Suppressor Capacitors).

Benefits

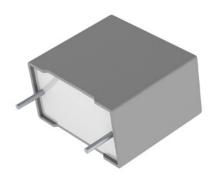
Voltage range: 50 – 630 VDC
Capacitance range: 0.001 – 4.7 μF

• Lead Spacing: 7.5 mm

• Capacitance tolerance: ±5%, ±10%, ±20%

• Climatic category: 55/105/56

- Operating temperature range of -55°C to +105°C
- · RoHS compliance and lead (Pb)-free terminations
- Tape & Reel packaging in accordance with IEC 60286-2
- Self-healing
- Automotive grade (AEC-Q200)



Part Number System

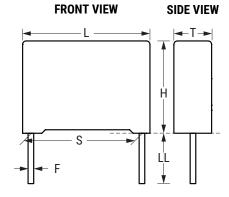
R66	E	D	3100	AA	7A	J
Series	Rated Voltage (VDC)	Length (mm)	Capacitance Code (pF)	Packaging	Internal Use	Capacitance Tolerance
Metallized Polyester	C = 50 D = 63 E = 100 I = 250 M = 400 P = 630	D = 7.5	The last three digits represent significant figures. First digit specifies the number of zeros to be added.	See Ordering Options Table	10 6A 7A	J = ±5% K = ±10% M = ±20%



Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	LL Lead Length (mm)	Lead and Packaging Code
	Standard Lead and Packaging Options		
	Bulk – Short Leads	4 +2/-0	AA
	Ammo Pack in Taping Style Figure 1	H ₀ =18.5 ±0.5	DQ
	Ammo Pack in Taping Style Figure 2	H ₀ =18.5 ±0.5	28
	Other Lead and Packaging Options		
7.5	Tape & Reel (Standard Reel Ø 355 mm)	H ₀ = 18.5 ±0.5	CK
	Bulk – Short Leads	2.7 +0.5/-0	JA
	Bulk - Short Leads	3.5 +0.5/-0	JB
	Bulk - Short Leads	10 ±1	JC
	Bulk – Short Leads	3.2 +0.3/-0.2	JH
	Bulk – Long Leads	17 +1/-2	Z3

Dimensions - Millimeters



5	3		Т		Н		Ĺ		F
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
7.5	±0.4	3.0	+0.1/-0.5	8.0	+0.1/-0.5	10.0	+0.2/-0.5	0.5	±0.05
7.5	±0.4	4.0	+0.1/-0.5	9.0	+0.1/-0.5	10.0	+0.2/-0.5	0.6	±0.05
7.5	±0.4	5.0	+0.1/-0.5	10.5	+0.1/-0.5	10.0	+0.2/-0.5	0.6	±0.05
7.5	±0.4	6.0	+0.1/-0.5	12.0	+0.1/-0.5	10.5	+0.2/-0.5	0.6	±0.05
	Note: See Ordering Options Table for lead length (LL/H₀) options.								



Performance Characteristics

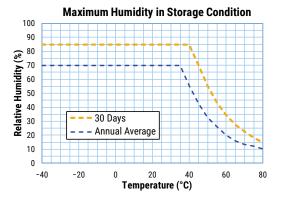
Dielectric	Polyester film (po	Polyester film (polyethylene terephthalate)						
Plates	Metal layer deposited by evaporation under vacuum							
Winding	Non-inductive ty	Non-inductive type						
Leads	Tinned wire							
Protection	Plastic case, the UL94	rmosetting resin fill	ed. Box material is	solvent resistant ar	nd flame retardant a	ccording to		
Related Documents	IEC 60384-2							
Rated Voltage V _R (VDC)	50	63	100	250	400	630		
Rated Voltage V _R (VAC)	30	40	63	160	200	220		
Capacitance Range (μF)	0.68 - 4.7	0.33 - 3.3	0.068 - 1.5	0.022 - 0.33	0.0068 - 0.15	0.001 - 0.047		
Capacitance Values	E6 series (IEC 60	063) measured at 1	kHz and +20 ±1°C					
Capacitance Tolerance	±5%, ±10%, ±20%							
Operating Temperature Range		-55°C to +105°C Upper operating temperature of +125°C is allowed for a maximum operating time of 1,000 hours. (Stacked technology only)						
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 60	55/105/56 IEC 60068-1						
	Storage time: ≤ 2	Storage time: ≤ 24 months from the date marked on the label package						
	Average relative	humidity per year ≤	70%					
Storage Conditions	RH ≤ 85% for 30 (days randomly distr	ibuted throughout t	the year				
	Dew is absent							
	Temperature: -4	0 to 80°C (see "Max	imum Humidity in S	Storage Conditions'	graph below)			
Test Voltage	1.6 x V _R VDC for 2	2 seconds (betweer	n terminations) at +:	25°C ±5°C				
Capacitance Drift	Maximum 3% aft to 60%	er a 2 year storage	period at a tempera	ture of +10°C to +4	0°C and a relative h	umidity of 40%		
	Operational life >	200,000 hours						
Reliability (Reference IEC-61709)	Failure rate ≤ 1 F	Failure rate \leq 1 FIT, T = +40°C, V = 0.5 x V _R						
(Neterende 120 01703)	Failure criteria: open or short circuit, capacitance change > 10%, DF 2 times the catalog limits, IR < 0.005 x initial limit							
Maximum Pulse Steepness	dV/dt according to Table 1. For peak to peak voltages lower than rated voltage (Vpp $<$ V $_R$), the specified dv/dt can be multiplied by the factor V $_R$ /Vpp							
Temperature Coefficient	+400 (±200) ppn	+400 (±200) ppm/°C at 1 kHz						
Self Inductance (Lead Length ~ 2 mm)	Approximately 8	nH. Maximum 1nH	per 1 mm lead and	capacitor length.				

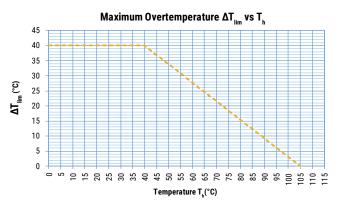


Performance Characteristics cont.

	Maximum Values at 25°C ±5°C					
Dissipation Factor tons	Frequency	Frequency For all Capacitance Values				
Dissipation Factor tanδ	1 kHz	1.00%				
	10 kHz	1.50%				
	Measured at +25°C ±5°C, according to IEC 60384-2					
	Minimum Values Between Terminals					
Insulation Resistance	Voltage Charge/Time	C ≤ 0.33 µF	C > 0.33 μF			
insulation resistance	50 VDC for $V_R \le 100 \text{ VDC}$ 1 minute	≥ 3,750 MΩ (≥ 50,000 MΩ)*	≥ 1,250 MΩ • µF (≥ 5,000 MΩ • µF)*			
	100 VDC for $V_R > 100 VDC$ 1 minute	≥ 30,00 (≥ 50,000				

^{*} typical value





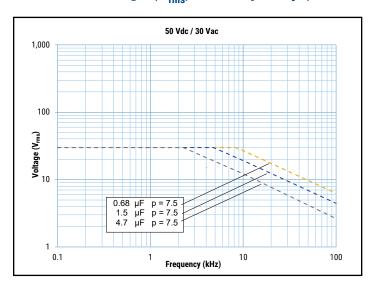
 T_h is the maximum ambient temperature surrounding the capacitor or hottest contact point (e.g. tracks), whichever is higher, in the worst operation conditions in °C.

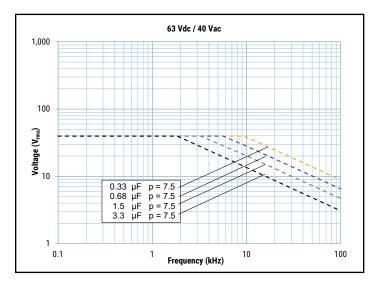
Qualification

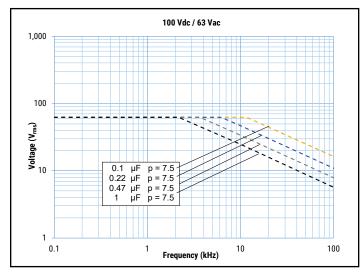
Automotive grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC-Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics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

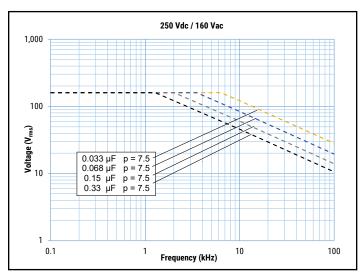


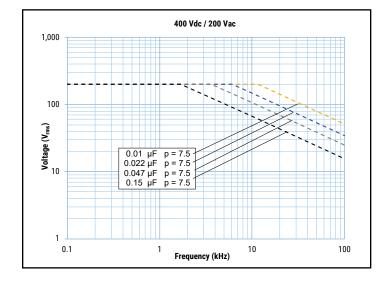
Maximum Voltage (V_{rms}) vs. Frequency (Sinusoidal Waveform/Th ≤ 40 °C)

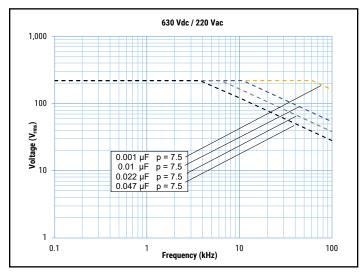






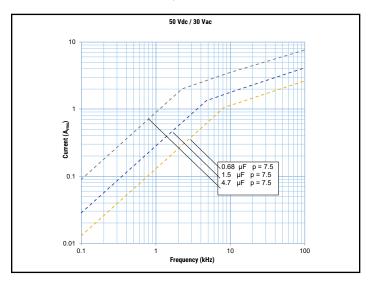


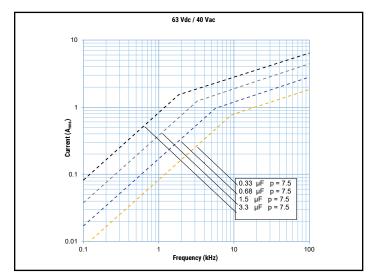


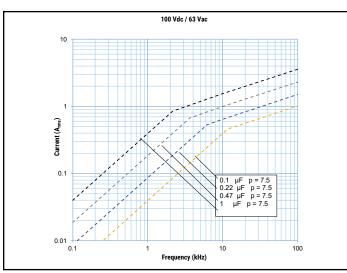


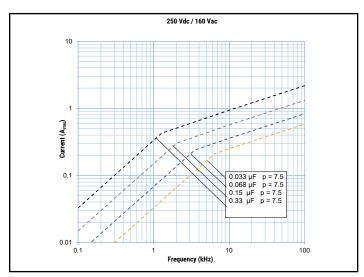


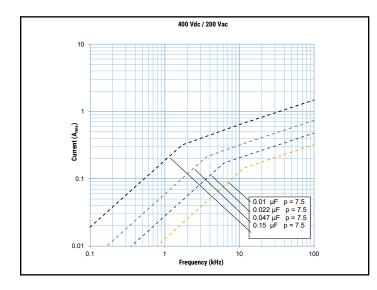
Maximum Current (I_{rms}) vs. Frequency (Sinusoidal Waveform/Th ≤ 40 °C)

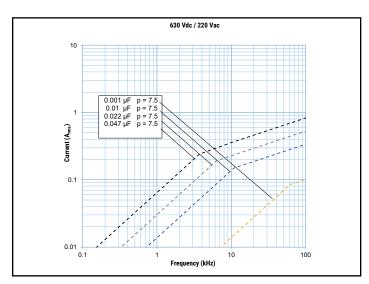














Environmental Test Data

Damp Heat, Steady State Test	Test Cor	nditions:	Performances
	Temperature: Relative humidity (RH): Test duration:	+40°C ±2°C 93% ±2% 56 days	$ \Delta$ C/C ≤ 5%, Δ tan δ ≤ 0.005 at 1 kHz IR after test ≥ 50% of initial limit
Endurance Test	Test Conditions		Performances
	Temperature: Voltage applied: Test duration:	+105°C ±2°C 1.25 x V _c 2,000 hours	$ \Delta$ C/C ≤ 5%, Δ tan δ ≤ 0.005 at 10 kHz for C ≤ 1 μ F Δ tan δ ≤ 0.003 at 1 kHz for C > 1 μ F 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 tan δ ≤ 0.005 at 10 kHz for C ≤ 1 μ F Δ tan δ ≤ 0.003 at 1 kHz for C > 1 μ F IR after test ≥ initial limit

Environmental Compliance

All KEMET MKT capacitors are RoHS compliant.





Table 1 - Ratings & Part Number Reference

VDO	WAO	Capacitance	Dime	nsions i	in mm	Lead	dV/dt	Maximum K	KEMET Internal	Customer
VDC	VAC	Value (µF)	В	Н	L	Spacing	(V/µs)	(V²/μs) ⁰	Part Number	Part Number
50	30	0.68	3.0	8.0	10.0	7.5	100	10000	66CD3680(1)6A(2)	R66CD3680(1)6A(2)
50	30	1.0	3.0	8.0	10.0	7.5	100	10000	66CD4100(1)6A(2)	R66CD4100(1)6A(2)
50	30	1.5	4.0	9.0	10.0	7.5	100	10000	66CD4150(1)6A(2)	R66CD4150(1)6A(2)
50	30	2.2	5.0	10.5	10.0	7.5	100	10000	66CD4220(1)6A(2)	R66CD4220(1)6A(2)
50	30	4.7	6.0	12.0	10.5	7.5	100	10000	66CD4470(1)6A(2)	R66CD4470(1)6A(2)
63	40	0.33	3.0	8.0	10.0	7.5	120	15120	66DD3330(1)7A(2)	R66DD3330(1)7A(2)
63	40	0.47	3.0	8.0	10.0	7.5	120	15120	66DD3470(1)6A(2)	R66DD3470(1)6A(2)
63	40	0.68	4.0	9.0	10.0	7.5	120	15120	66DD3680(1)7A(2)	R66DD3680(1)7A(2)
63	40	1.0	4.0	9.0	10.0	7.5	120	15120	66DD4100(1)7A(2)	R66DD4100(1)7A(2)
63	40	1.5	5.0	10.5	10.0	7.5	120	15120	66DD4150(1)7A(2)	R66DD4150(1)7A(2)
63	40	2.2	6.0	12.0	10.5	7.5	120	15120	66DD4220(1)6A(2)	R66DD4220(1)6A(2)
63	40	3.3	6.0	12.0	10.5	7.5	120	15120	66DD4330(1)6A(2)	R66DD4330(1)6A(2)
100	63	0.068	3.0	8.0	10.0	7.5	150	30000	66ED2680(1)7A(2)	R66ED2680(1)7A(2)
100	63	0.10	3.0	8.0	10.0	7.5	150	30000	66ED3100(1)7A(2)	R66ED3100(1)7A(2)
100	63	0.15	3.0	8.0	10.0	7.5	150	30000	66ED3150(1)7A(2)	R66ED3150(1)7A(2)
100	63	0.22	3.0	8.0	10.0	7.5	150	30000	66ED3220(1)7A(2)	R66ED3220(1)7A(2)
100	63	0.33 0.47	4.0	9.0 9.0	10.0 10.0	7.5 7.5	150	30000	66ED3330(1)7A(2)	R66ED3330(1)7A(2)
100	63 63		4.0	9.0	10.0	7.5 7.5	150 150	30000	66ED3470(1)7A(2)	R66ED3470(1)7A(2)
100 100	63	0.68 1.0	4.0 5.0	10.5	10.0	7.5 7.5	150	30000 30000	66ED3680(1)7A(2)	R66ED3680(1)7A(2)
100	63	1.5	6.0	12.0	10.0	7.5	150	30000	66ED4100(1)7A(2) 66ED4150(1)6A(2)	R66ED4100(1)7A(2) R66ED4150(1)6A(2)
250	160	0.022	3.0	8.0	10.5	7.5 7.5	200	100000	66ID2220(1)7A(2)	R66ID2220(1)7A(2)
250	160	0.022	3.0	8.0	10.0	7.5 7.5	200	100000	66ID2330(1)7A(2)	R66ID2330(1)7A(2)
250	160	0.033	3.0	8.0	10.0	7.5 7.5	200	100000	66ID2470(1)7A(2)	R66ID2470(1)7A(2)
250	160	0.047	3.0	8.0	10.0	7.5	200	100000	66ID2680(1)6A(2)	R66ID2680(1)6A(2)
250	160	0.10	4.0	9.0	10.0	7.5	200	100000	66ID3100(1)7A(2)	R66ID3100(1)7A(2)
250	160	0.15	4.0	9.0	10.0	7.5	200	100000	66ID3150(1)7A(2)	R66ID3150(1)7A(2)
250	160	0.22	5.0	10.5	10.0	7.5	200	100000	66ID3220(1)7A(2)	R66ID3220(1)7A(2)
250	160	0.33	6.0	12.0	10.5	7.5	200	100000	66ID3330(1)6A(2)	R66ID3330(1)6A(2)
400	200	0.0068	3.0	8.0	10.0	7.5	275	220000	66MD1680(1)7A(2)	R66MD1680(1)7A(2)
400	200	0.010	3.0	8.0	10.0	7.5	275	220000	66MD2100(1)7A(2)	R66MD2100(1)7A(2)
400	200	0.015	3.0	8.0	10.0	7.5	275	220000	66MD2150(1)7A(2)	R66MD2150(1)7A(2)
400	200	0.022	3.0	8.0	10.0	7.5	275	220000	66MD2220(1)6A(2)	R66MD2220(1)6A(2)
400	200	0.033	4.0	9.0	10.0	7.5	275	220000	66MD2330(1)7A(2)	R66MD2330(1)7A(2)
400	200	0.047	4.0	9.0	10.0	7.5	275	220000	66MD2470(1)7A(2)	R66MD2470(1)7A(2)
400	200	0.068	5.0	10.5	10.0	7.5	275	220000	66MD2680(1)7A(2)	R66MD2680(1)7A(2)
400	200	0.10	6.0	12.0	10.5	7.5	275	220000	66MD3100(1)6A(2)	R66MD3100(1)6A(2)
400	200	0.15	6.0	12.0	10.5	7.5	275	220000	66MD3150(1)6A(2)	R66MD3150(1)6A(2)
630	220	0.0010	3.0	8.0	10.0	7.5	40	50400	66PD1100(1)10(2)	R66PD1100(1)10(2)
630	220	0.0015	3.0	8.0	10.0	7.5	40	50400	66PD1150(1)10(2)	R66PD1150(1)10(2)
630	220	0.0022	3.0	8.0	10.0	7.5	40	50400	66PD1220(1)10(2)	R66PD1220(1)10(2)
630	220	0.0033	3.0	8.0	10.0	7.5	40	50400	66PD1330(1)10(2)	R66PD1330(1)10(2)
630	220	0.0047	3.0	8.0	10.0	7.5	40	50400	66PD1470(1)10(2)	R66PD1470(1)10(2)
630	220	0.0068	4.0	9.0	10.0	7.5	40	50400	66PD1680(1)10(2)	R66PD1680(1)10(2)
630	220	0.010	4.0	9.0	10.0	7.5	300	378000	66PD2100(1)7A(2)	R66PD2100(1)7A(2)
630	220	0.015	4.0	9.0	10.0	7.5	300	378000	66PD2150(1)7A(2)	R66PD2150(1)7A(2)
630	220	0.022	5.0	10.5	10.0	7.5	300	378000	66PD2220(1)7A(2)	R66PD2220(1)7A(2)
630	220	0.033	6.0	12.0	10.5	7.5	300	378000	66PD2330(1)6A(2)	R66PD2330(1)6A(2)
630	220	0.047	6.0	12.0	10.5	7.5	300	378000	66PD2470(1)6A(2)	R66PD2470(1)6A(2)
VDC	VAC	Capacitance Value (µF)	B (mm)	H (mm)	L (mm)	Lead Spacing	dV/dt (V/ µs)	Max K ₀ (V²/μs)	KEMET Internal Part Number	Customer Part Number

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

Bold denotes wound capacitor technology

⁽²⁾ J = 5%, K = 10%, M = 20%



Soldering Process

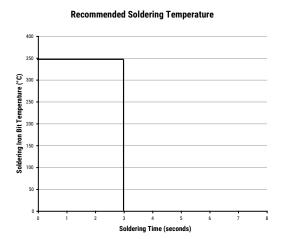
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even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

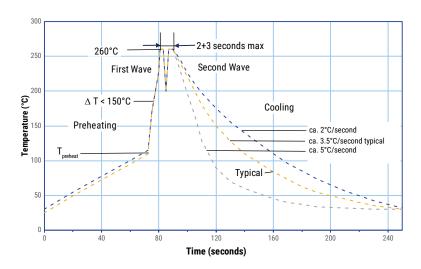
Manual Soldering Recommendations

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.

Wave Soldering Recommendations cont.

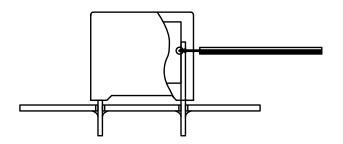
1. The table indicates the maximum set-up temperature of the soldering process Figure 1.

Dielectric		mum heat erature	Maximum Peak Soldering Temperature		
Film Material	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.

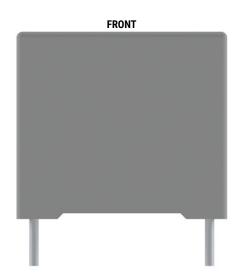
Selective Soldering Recommendations

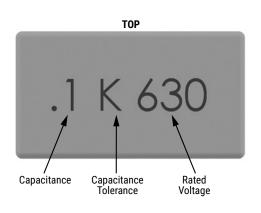
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and 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, and great care must be taken so that the parts are not overheated.



Marking





Packaging Quantities

Lead Spacing	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel 355 mm	Ammo Taped
	3.0	8.0	10.0	1,500	1,750	2,100	2,800
7.5	4.0	9.0	10.0	2,000	1,500	1,500	2,100
7.5	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



Lead Taping & Packaging (IEC 60286-2)

Figure 1 — Lead Spacing 5 & 7.5 mm

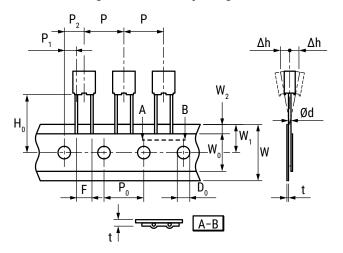
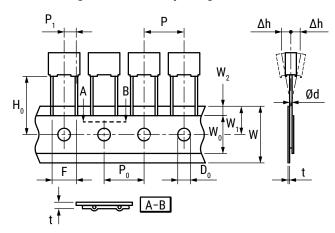


Figure 2 — Lead Spacing 7.5 mm



		Dimensions (mm)				
Description	Symbol	l	_ead Spacing			
Description	Cymbol	5	7.5	7.5	Tolerance	
		Figure 1	Figure 1	Figure 2		
Lead wire diameter	d	0.5 - 0.6	0.5 - 0.6	0.5 - 0.6	±0.05	
Taping lead space	Р	12.7	12.7	12.7	±1	
Feed hole lead space	$P_{\scriptscriptstyle{0}}$	12.7	12.7	12.7	±0.2*	
Centering of the lead wire	P ₁	3.85	2.6	3.75	±0.7	
Centering of the body	$P_{_2}$	6.35	6.35		±1.3	
Lead spacing	F	5	7.5	7.5	+0.6/-0.1	
Component alignment	Δh	0	0	0	±2	
Height of component from tape center	H ₀ **	18.5	18.5	18.5	±0.5	
Carrier tape width	W	18	18	18	+1/-0.5	
Hold down tape width	W_{0}	6	6	6	Minimum	
Hole position	$W_{_1}$	9	9	9	±0.5	
Hold down tape position	W ₂	3	3	3	Maximum	
Feed hole diameter	D_{o}	4	4	4	±0.2	
Tape thickness	t	0.7	0.7	0.7	±0.2	

^{*}Maximum 1 mm on 20 lead spaces.

For orders of capacitors with lead space = 7.5 mm, please specify the

requested version: Figure 1 = Packaging code "CK" / Figure 2 - Packaging code "28"

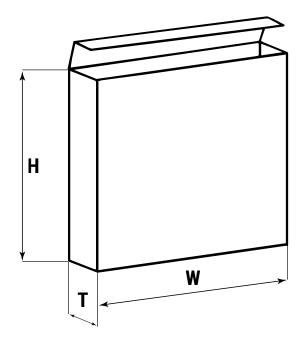
^{**} H_0 = 16.5 mm is available upon request.



Ammo Specifications

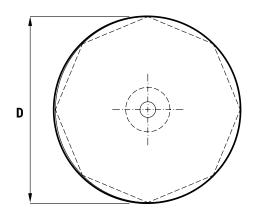
Dimensions in mm						
H W T						
360 *	340	59				

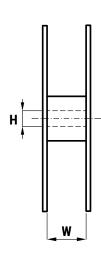
^{*} Lower dimension available upon request (maximum 295 mm)



Reel Specifications

Dimensions in mm		
D	Н	W
355	30	55 maximum







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46KR415050M1K 4BSNBX4100ZBFJ 4DCNAQ4450ZA0J MKP383510063JKP2T0 MKT 1813-368-015 MKT182022263473 4055292001

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B25620B118K883 ECW-F2105JAC B25620B158K883 66MD2100CK7AK A521HH471M450C 97F8038 NRM-S225K250F

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