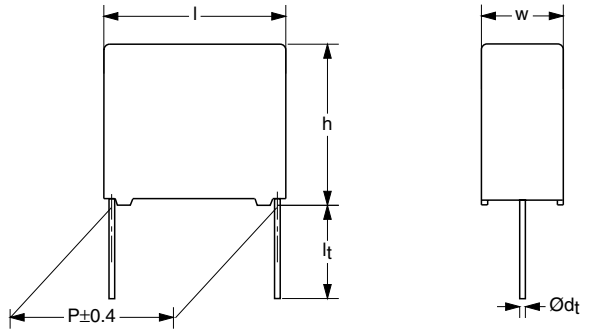
AC and Pulse Metallized Polypropylene Film Capacitors
MKP/MKP Radial Potted Type



Dimensions in mm

APPLICATIONS

Where steep pulses occur e.g. SMPS (switch mode power supplies). Motor control circuits. It is not advised to use these products as resonance capacitors in fly-back applications.

MARKING

C-value; tolerance; rated voltage; manufacturer's type designation; code for dielectric material; manufacturer's emblem; code for factory of origin; year and week of manufacture

DIELECTRIC

Polypropylene film

ELECTRODES

Metallized film

ENCAPSULATION

Flame retardant plastic case and epoxy resin (UL-class 94 V-0)

CONSTRUCTION

Internal serial construction

LEADS

Tinned wire

CAPACITANCE RANGE (E24 SERIES)

0.002 to 0.68 µF

CAPACITANCE TOLERANCE

± 5 %

FEATURES

15 to 27.5 mm pitch. Supplied loose in box and taped on reel

Lead (Pb)-free product

RoHS-compliant product

Pb-free

e3

RoHS COMPLIANT

RATED (DC) VOLTAGE

630 V; 1000 V; 1600 V; 2000 V

RATED (AC) VOLTAGE

300 V; 400 V; 500 V; 600 V

RATED PEAK-TO-PEAK VOLTAGE

850 V; 1130 V; 1400 V; 1700 V

CLIMATIC CATEGORY

55/085/56

RATED (DC) TEMPERATURE

85 °C

RATED (AC) TEMPERATURE

70 °C

MAXIMUM APPLICATION TEMPERATURE

85 °C

REFERENCE SPECIFICATIONS

IEC 60384-17

PERFORMANCE GRADE

Grade 1 (long life)

STABILITY GRADE

Pitch 15 mm: grade 2
Pitch 22.5 and 27.5 mm: grade 1

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-17/102"*

COMPOSITION OF CATAOG NUMBER

TYPE AND PITCHES	
378	15.0 mm
	22.5 mm
	27.5 mm

MULTIPLIER (nF)	
0.1	2
1	3
10	4

CAPACITANCE (numerically)

Example:
104 = 10 x 10 = 100 nF

2222	378	XX	XX	X
BFC2*	378	XX	XX	X

* Use this partnumber for those with access to the Vishay's SAP system and Partners website within the Americas

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES					
			C-TOL	630 V	1000 V	1600 V	2000 V	2500 V
378	loose in box	lead length 3.5 ± 0.3 mm	± 5 %	64	74	84	94	04
			ON REQUEST					
378	loose in box	lead length 5.0 ±1 .0 mm	± 5 %	62	72	82	92	02
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm		65	75	85	95	05

SPECIFIC REFERENCE DATA (630 VDC)

DESCRIPTION	VALUE	
Tangent of loss angle:	at 10 kHz	at 100 kHz
C ≤ 0.18 µF	≤ 8×10^{-4}	≤ 15×10^{-4}
0.2 µF ≤ C ≤ 0.3 µF	≤ 10×10^{-4}	≤ 25×10^{-4}
0.33 µF ≤ C ≤ 0.39 µF	≤ 10×10^{-4}	≤ 30×10^{-4}
0.43 µF ≤ C ≤ 0.51 µF	≤ 10×10^{-4}	≤ 40×10^{-4}
C > 0.51 µF	≤ 10×10^{-4}	≤ 45×10^{-4}
Rated voltage pulse slope $(dU/dt)_R$:		
P = 15 mm	500 V/µs	
P = 22.5 mm	370 V/µs	
P = 27.5 mm	230 V/µs (b < 15 mm)	
P = 27.5 mm	120 V/µs (b ≥ 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	> 100000 MΩ	
R between leads and case; 500 V; 1 minute	> 100000 MΩ	
Ionization (AC)voltage (typical value) at 50 pC peak discharge	> 400 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

U_{Rdc} = 630 V; U_{Rac} = 300 V; U_{p-p} = 850 V

C (µF)	DIMENSIONS W × H × L (mm)	MASS (g)	CATAOG NUMBER 2222 378 ..... AND PACKAGING		
			LOOSE IN BOX		REEL
			l_t = 3.5 ± 0.3 mm	ALL LEADS	
			C-tol = ± 5 %		
			LAST 5 DIGITS OF CATAOG NUMBER	SPQ	SPQ
Pitch = 15.0 ± 0.4 mm; d_t = 0.60 ± 0.06 mm					
0.015	5.0 × 11.0 × 17.5	1.2	64153	1000	1100
0.016			64163		
0.018			64183		
0.02			64203		
0.022			64223		
0.024	6.0 × 12.0 × 17.5	1.4	64243	1000	900
0.027			64273		
0.03			64303		
0.033			64333		
Pitch = 15.0 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.036	7.0 × 13.5 × 17.5	1.9	64363	1000	800
0.039			64393		
0.043			64433		
0.047	8.5 × 15.0 × 17.5	2.6	64473	1000	650
0.051			64513		
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.068	7.0 × 16.5 × 26.0	3.2	64683	200	550
0.075			64753		
0.082			64823		
0.091			64913		
0.1	8.5 × 18.0 × 26.0	4.4	64104	200	450
0.11			64114		
0.12			64124		
0.13			64134		
0.15	10.0 × 19.5 × 26.0	5.5	64154	200	350
0.16			64164		
0.18			64184		
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.2	11.0 × 21.0 × 31.0	7.8	64204	100	
0.22			64224		
0.24			64244		
0.27			64274		
0.3	13.0 × 23.0 × 31.0	10.4	64304	100	
0.33			64334		
0.36			64364		
0.39			64394		
0.43	15.0 × 25.0 × 31.0	12.8	64434	100	
0.47			64474		
0.51			64514		
0.56	18.0 × 28.0 × 31.0	17.2	64564	100	
0.62			64624		
0.68			64684		

SPECIFIC REFERENCE DATA (1000 VDC)

DESCRIPTION	VALUE	
Tangent of loss angle:	at 10 kHz	at 100 kHz
$C \leq 0.051\ \mu F$	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.056\ \mu F \leq C \leq 0.22\ \mu F$	$\leq 8 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$:		
P = 15 mm	1300 V/µs	
P = 22.5 mm	1200 V/µs	
P = 27.5 mm	600 V/µs (b < 15 mm)	
P = 27.5 mm	300 V/µs (b ≥ 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	> 100000 MΩ	
R between leads and case; 500 V; 1 minute	> 100000 MΩ	
Ionization (AC)voltage (typical value) at 50 pC peak discharge	> 500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

U_{Rdc} = 1000 V; U_{Rac} = 400 V; U_{p-p} = 1130 V

C (µF)	DIMENSIONS W × H × L (mm)	MASS (g)	CATAOG NUMBER 2222 378 ..... AND PACKAGING		
			LOOSE IN BOX		REEL
			l_t = 3.5 ± 0.3 mm	ALL LEADS	
			C-tol = ± 5 %		
			LAST 5 DIGITS OF CATAOG NUMBER	SPQ	SPQ
Pitch = 15.0 ± 0.4 mm; d_t = 0.60 ± 0.06 mm					
0.003	5.0 × 11.0 × 17.5	1.2	74302	1000	1100
0.0033			74332		
0.0036			74362		
0.0039			74392		
0.0043			74432		
0.0047			74472		
0.0051			74512		
0.0056			74562		
0.0062			74622		
0.0068			74682		
0.0075			74752		
0.0082	6.0 × 12.0 × 17.5	1.4	74822	1100	900
0.0091			74912		
0.01			74103		
0.011			74113		
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.02	7.0 × 16.5 × 26.0	3.2	74203	200	550
0.022			74223		
0.024			74243		
0.027	8.5 × 18.0 × 26.0	4.4	74273	200	450
0.03			74303		
0.033			74333		
0.036			74363		
0.039	10.0 × 19.5 × 26.0	5.5	74393	200	350
0.043			74433		
0.047			74473		
0.051			74513		

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C (µF)	DIMENSIONS W × H × L (mm)	MASS (g)	CATAOG NUMBER 2222 378 ..... AND PACKAGING		
			LOOSE IN BOX		REEL
			l_t = 3.5 ± 0.3 mm	ALL LEADS	
			C-tol = ± 5 %		
			LAST 5 DIGITS OF CATAOG NUMBER	SPQ	SPQ
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.056	11.0 × 21.0 × 31.0	7.8	74563	100	
0.062			74623		
0.068			74683		
0.075			74753		
0.082			74823		
0.091	13.0 × 23.0 × 31.0	10.4	74913	100	
0.1			74104		
0.11			74114		
0.12	15.0 × 25.0 × 31.0	12.8	74124	100	
0.13			74134		
0.15			74154		
0.16	18.0 × 28.0 × 31.0	17.5	74164	100	
0.18			74184		
0.2			74204		
0.22			74224		

SPECIFIC REFERENCE DATA (1600 VDC)

DESCRIPTION	VALUE	
Tangent of loss angle:	at 10 kHz	at 100 kHz
C ≤ 0.022 µF	≤ 5×10^{-4}	≤ 10×10^{-4}
0.024 µF ≤ C ≤ 0.1 µF	≤ 6×10^{-4}	≤ 15×10^{-4}
Rated voltage pulse slope $(dU/dt)_R$ at 1600 $V_{(DC)}$:		
P = 22.5 mm	1600 V/µs	
P = 27.5 mm	900 V/µs (b < 15 mm)	
P = 27.5 mm	450 V/µs (b ≥ 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	> 100000 MΩ	
R between leads and case; 500 V; 1 minute	> 100000 MΩ	
Ionization (AC)voltage (typical value) at 20 pC peak discharge	> 600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

U_{Rdc} = 1600 V; U_{Rac} = 500 V; U_{p-p} = 1400 V

C (µF)	DIMENSIONS W × H × L (mm)	MASS (g)	CATAOG NUMBER 2222 378 ..... AND PACKAGING		
			LOOSE IN BOX		REEL
			l_t = 3.5 ± 0.3 mm	ALL LEADS	
			C-tol = ± 5 %		
			LAST 5 DIGITS OF CATAOG NUMBER	SPQ	SPQ
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.0056	6.0 × 15.5 × 26.0	2.6	84562	300	600
0.0062			84622		
0.0068			84682		
0.0075	7.0 × 16.5 × 26.0	3.2	84752	200	550
0.0082			84822		
0.0091			84912		
0.01			84103		
0.011	8.5 × 18.0 × 26.0	4.4	84113	200	450
0.012			84123		
0.013			84133		
0.015			84153		
0.016			84163		
0.018	10.0 × 19.5 × 26.0	5.5	84183	200	350
0.02			84203		
0.022			84223		
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.024	11.0 × 21.0 × 31.0	7.8	84243	100	
0.027			84273		
0.03			84303		
0.033			84333		
0.036			84363		
0.039	13.0 × 23.0 × 31.0	10.4	84393	100	
0.043			84433		
0.047			84473		
0.051			84513		
0.056	15.0 × 25.0 × 31.0	12.8	84563	100	
0.062			84623		
0.068			84683		
0.075	18.0 × 28.0 × 31.0	17.2	84753	100	
0.082			84823		
0.091			84913		
0.1			84104		

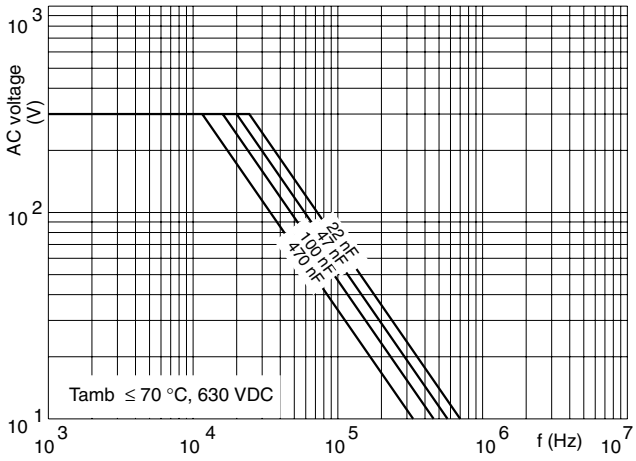
SPECIFIC REFERENCE DATA (2000 VDC)

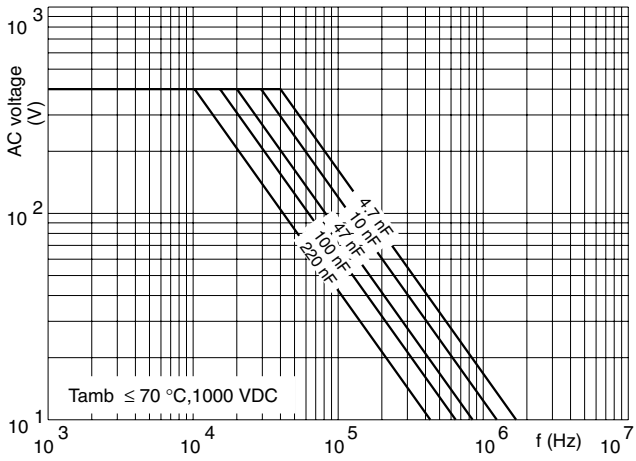
DESCRIPTION	VALUE	
Tangent of loss angle:	at 10 kHz	at 100 kHz
$C \leq 0.051$ µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC):		
P = 22.5 mm	2000 V/µs	
P = 27.5 mm	1200 V/µs (b < 15 mm)	
P = 27.5 mm	600 V/µs (b ≥ 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	> 100000 MΩ	
R between leads and case; 500 V; 1 minute	> 100000 MΩ	
Ionization (AC)voltage (typical value) at 20 pC peak discharge	> 600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

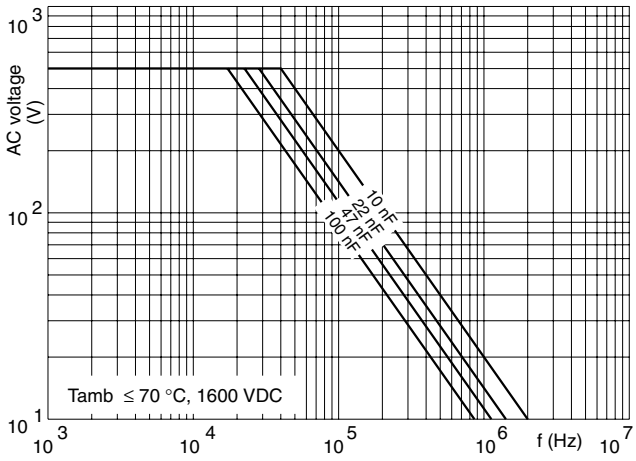
U_{Rdc} = 2000 V; U_{Rac} = 600 V; U_{p-p} = 1700 V

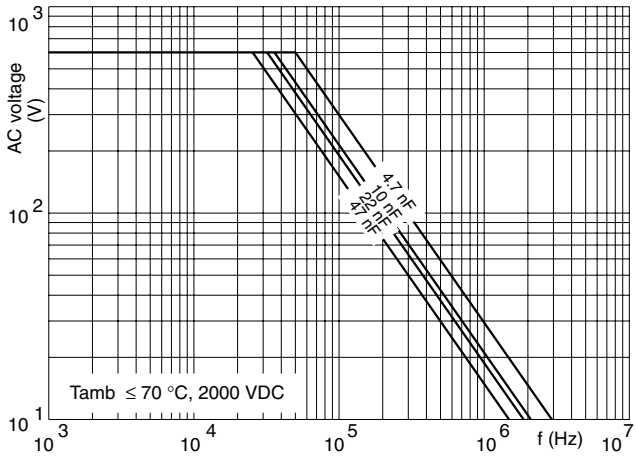
C (µF)	DIMENSIONS W × H × L (mm)	MASS (g)	CATAOG NUMBER 2222 378 ..... AND PACKAGING		
			LOOSE IN BOX		REEL
			$l_t = 3.5 \pm 0.3$ mm	ALL LEADS	
			C-tol = ± 5 %		
			LAST 5 DIGITS OF CATAOG NUMBER	SPQ	SPQ
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.0033	6.0 × 15.5 × 26.0	2.6	94332	300	600
0.0036			94362		
0.0039	7.0 × 16.5 × 26.0	3.2	94392	200	550
0.0043			94432		
0.0047			94472		
0.0051			94512		
0.0056	8.5 × 18.0 × 26.0	4.4	94562	200	450
0.0062			94622		
0.0068			94682		
0.0075			94752		
0.0082			94822		
0.0091	10.0 × 19.5 × 26.0	5.5	94912	200	350
0.01			94103		
0.011			94113		
0.012			94123		
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm					
0.013	11.0 × 21.0 × 31.0	7.8	94133	100	
0.015			94153		
0.016			94163		
0.018			94183		
0.02			94203		
0.022	13.0 × 23.0 × 31.0	10.4	94223	100	
0.024			94243		
0.027			94273		
0.030	15.0 × 25.0 × 31.0	12.8	94303	100	
0.033			94333		
0.036			94363		
0.039	18.0 × 28.0 × 31.0	17.5	94393	100	
0.043			94433		
0.047			94473		
0.051			94513		

MAXIMUM RMS VOLTAGE (SINEWAVE) AS A FUNCTION OF FREQUENCY

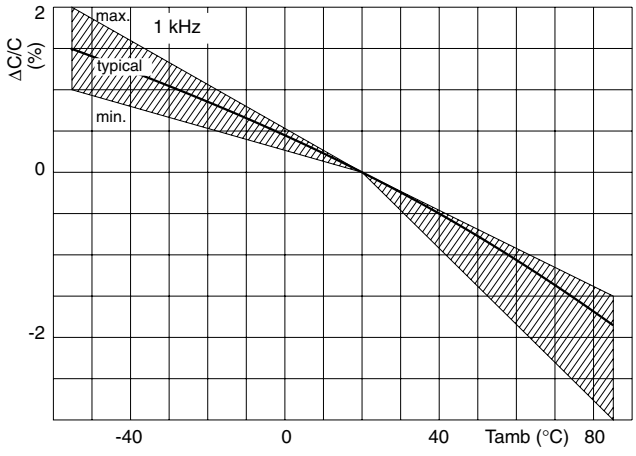




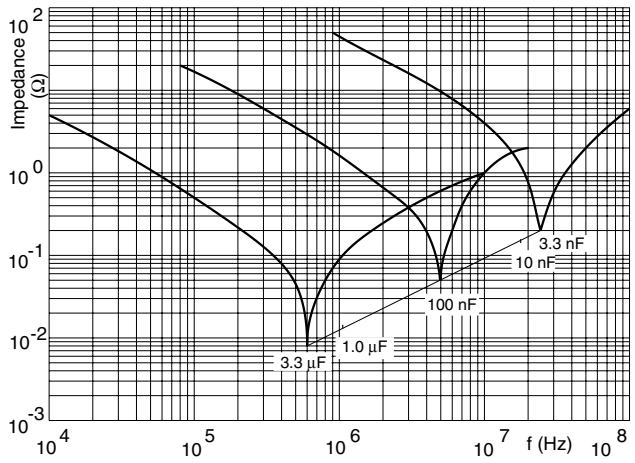




CAPACITANCE



IMPEDANCE



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