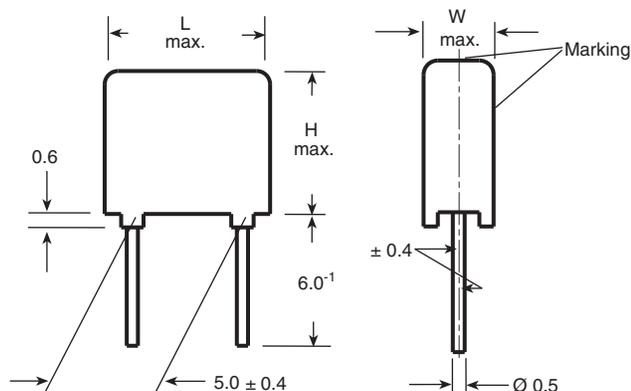


## Metallized Polyester Film Capacitors MKT Radial Potted Types



### APPLICATIONS

Blocking, bypassing, filtering and timing, high frequency coupling and decoupling for fast digital and analog ICs, interference suppression in low voltage applications.

### REFERENCE SPECIFICATIONS

IEC 60384-2

### MARKING

Manufacturer's logo/type/C-value/rated/tolerance/date of manufacture

### DIELECTRIC

Polyester film

### ELECTRODES

Metallized

### CONSTRUCTION

Extended metallized film

### TEST VOLTAGE (ELECTRODE/ELECTRODE)

$1.6 \times U_R$  for 2 s

### RATED VOLTAGES ( $U_R$ )

63 V<sub>DC</sub>, 100 V<sub>DC</sub>, 250 V<sub>DC</sub>, 400 V<sub>DC</sub>

### PERMISSIBLE AC VOLTAGES (RMS) UP TO 60 Hz

40 V<sub>AC</sub>, 63 V<sub>AC</sub>, 160 V<sub>AC</sub>, 200 V<sub>AC</sub>

### FEATURES

- Compliant to RoHS Directive 2002/95/EC

### ENCAPSULATION

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

### CLIMATIC TESTING ACC. TO IEC 60068-1

55/100/56

### CAPACITANCE RANGE (E12 SERIES)

1000 pF to 1.0  $\mu$ F

### CAPACITANCE TOLERANCES

$\pm 20\%$  (M),  $\pm 10\%$  (K),  $\pm 5\%$  (J)

### LEADS

Tinned wire

### RATED TEMPERATURE

85 °C

### OPERATING TEMPERATURE RANGE

- 55 °C to + 100 °C

### PULL TEST ON LEADS

$\geq 30$  N in direction of leads according to IEC 60068-2-21

### RELIABILITY

Operational life > 300 000 h

Failure rate < 2 FIT (40 °C/ 0.5  $U_R$ )

### DETAIL SPECIFICATION

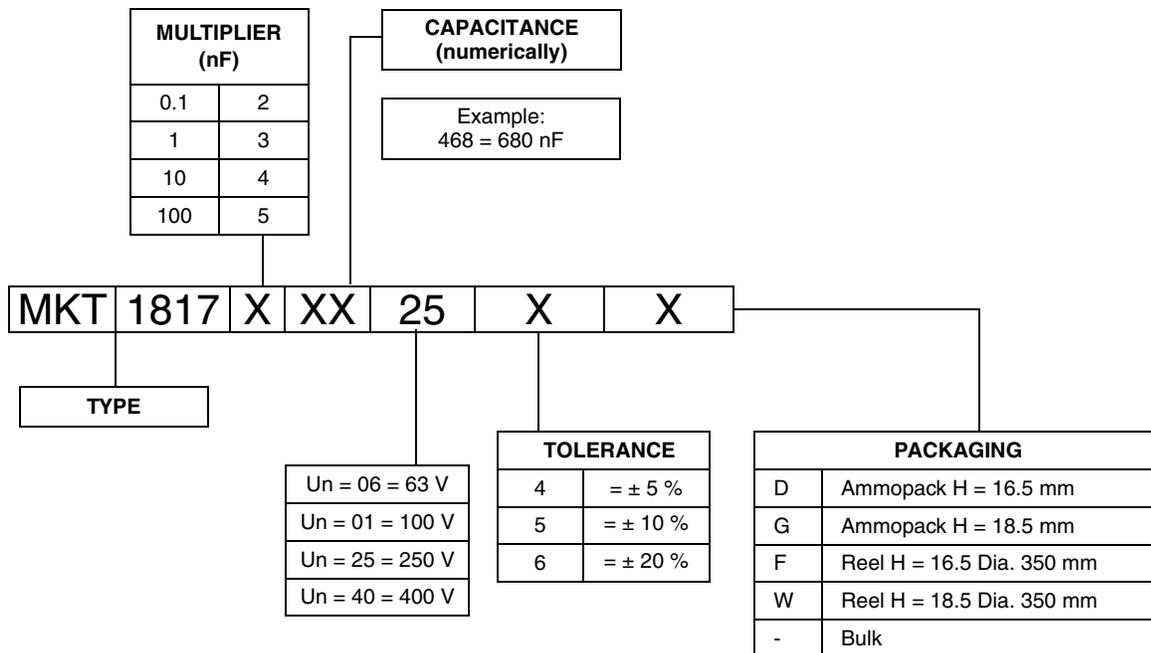
For more detailed data and test requirements contact:

[dc-film@vishay.com](mailto:dc-film@vishay.com)





COMPOSITION OF CATALOG NUMBER



Note

• For detailed tape specifications refer to “Packaging information” [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139) or end of catalog

SPECIFIC REFERENCE DATA

DESCRIPTION		VALUE		
Tangent of loss angle:		at 1 kHz	at 10 kHz	at 100 kHz
$C \leq 0.1 \mu\text{F}$		$\leq 80 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 1.0 \mu\text{F}$		$\leq 80 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	-
Pitch (mm)	Rated voltage pulse slope $(dU/dt)_R$ at			
	63 V <sub>DC</sub>	100 V <sub>DC</sub>	250 V <sub>DC</sub>	400 V <sub>DC</sub>
5	15	24	44	100
If the maximum pulse voltage is less than the rated voltage higher dU/dt values can be permitted.				
R between leads, for $C \leq 0.33 \mu\text{F}$ and $U_R \leq 100 \text{ V}$		> 15 000 MΩ		
R between leads, for $C \leq 0.33 \mu\text{F}$ and $U_R > 100 \text{ V}$		> 30 000 MΩ		
RC between leads, for $C > 0.33 \mu\text{F}$ and $U_R \leq 100 \text{ V}$		> 5000 s		
RC between leads, for $C > 0.33 \mu\text{F}$ and $U_R > 100 \text{ V}$		> 10 000 s		
R between interconnecting leads and casing 100 V (foil method)		> 30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		1.6 x U <sub>RDC</sub> , 1 min		
Withstanding (DC) voltage between leads and case		2.0 x U <sub>RDC</sub> , with minimum of 200 V <sub>DC</sub> ; 1 min		
Maximum application temperature		100 °C		



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CAPACITANCE	CAPACITANCE CODE	VOLTAGE CODE 06 63 V <sub>DC</sub> /40 V <sub>AC</sub>			VOLTAGE CODE 01 100 V <sub>DC</sub> /63 V <sub>AC</sub>			VOLTAGE CODE 25 250 V <sub>DC</sub> /160 V <sub>AC</sub>			VOLTAGE CODE 40 400 V <sub>DC</sub> /200 V <sub>AC</sub>		
		w (mm)	h (mm)	l (mm)	w (mm)	h (mm)	l (mm)	w (mm)	h (mm)	l (mm)	w (mm)	h (mm)	l (mm)
1000 pF	-210	-	-	-	-	-	-	-	-	-	2.5	6.0	7.5
1500 pF	-215	-	-	-	-	-	-	-	-	-	2.5	6.0	7.5
2200 pF	-222	-	-	-	-	-	-	-	-	-	2.5	6.0	7.5
3300 pF	-233	-	-	-	-	-	-	2.5	6.0	7.5	3.0	6.5	7.5
4700 pF	-247	-	-	-	-	-	-	2.5	6.0	7.5	3.5	8.5	7.5
6800 pF	-268	-	-	-	-	-	-	2.5	6.0	7.5	3.5	8.5	7.5
0.01 μF	-310	-	-	-	-	-	-	2.5	6.0	7.5	4.5	9.5	7.5
0.015 μF	-315	-	-	-	-	-	-	2.5	6.0	7.5	4.5	9.5	7.5
0.022 μF	-322	-	-	-	2.5	6.0	7.5	3.0	6.5	7.5	5.5	11.5	7.5
0.033 μF	-333	-	-	-	2.5	6.0	7.5	3.5	8.5	7.5	-	-	-
0.047 μF	-347	-	-	-	2.5	6.0	7.5	4.5	9.5	7.5	-	-	-
0.068 μF	-368	-	-	-	2.5	6.0	7.5	4.5	9.5	7.5	-	-	-
0.10 μF	-410	2.5	6.0	7.5	3.5	8.5	7.5	5.5	11.5	7.5	-	-	-
0.15 μF	-415	3.5	8.5	7.5	4.5	9.5	7.5	-	-	-	-	-	-
0.22 μF	-422	3.5	8.5	7.5	5.0	10.0	7.5	-	-	-	-	-	-
0.33 μF	-433	4.5	9.5	7.5	5.5	11.5	7.5	-	-	-	-	-	-
0.47 μF	-447	5.0	10.0	7.5	-	-	-	-	-	-	-	-	-
0.68 μF	-468	5.0	10.5	7.5	-	-	-	-	-	-	-	-	-
1.0 μF	-510	5.5	11.5	7.5	-	-	-	-	-	-	-	-	-

## RECOMMENDED PACKAGING

PACKAGING CODE	TYPE OF PACKAGING	HEIGHT (H) (mm)	REEL DIAMETER (mm)	ORDERING CODE EXAMPLES	PITCH 5
D	Ammo	16.5	S <sup>(1)</sup>	MKT1817-233-255-D	x
G	Ammo	18.5	S <sup>(1)</sup>	MKT1817-233-255-G	x
F	Reel	16.5	350	MKT1817-233-255-F	x
W	Reel	18.5	350	MKT1817-233-255-W	x
-	Bulk	-	-	MKT1817-233-255	x

## Note

<sup>(1)</sup> S = box size 55 mm x 210 mm x 340 mm (w x h x l)

## MOUNTING

### Normal Use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.

For detailed tape specifications refer to "Packaging Information" [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)

### Specific Method of Mounting to Withstand Vibration and Shock

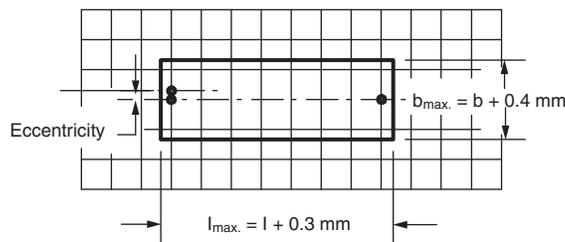
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches  $\leq 15$  mm the capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

### Space Requirements on Printed-Circuit Board

The maximum length and width of film capacitors is shown in the drawing:

- Eccentricity as in drawing. The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned
- Product height with seating plane as given by "IEC 60717" as reference:  $h_{\max.} \leq h + 0.3$  mm



### Ratings and Characteristics Reference Conditions

Unless otherwise specified, all electrical values apply to an ambient temperature of  $23 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$ , an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of  $50 \% \pm 2 \%$ .

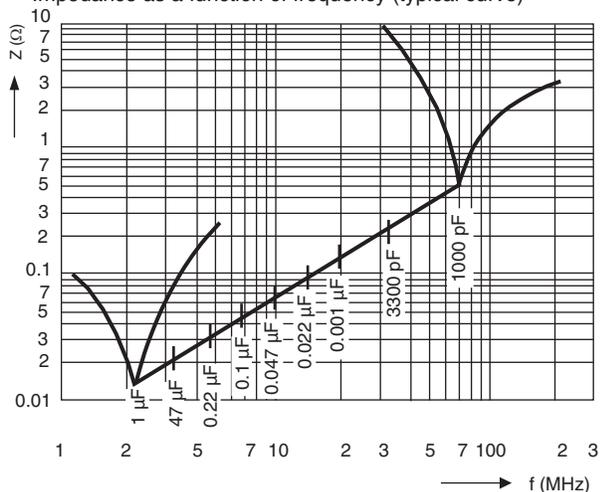
For reference testing, a conditioning period shall be applied over  $96 \text{ h} \pm 4 \text{ h}$  by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



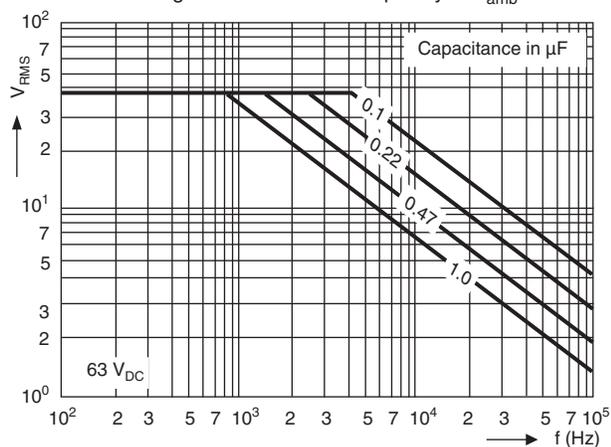
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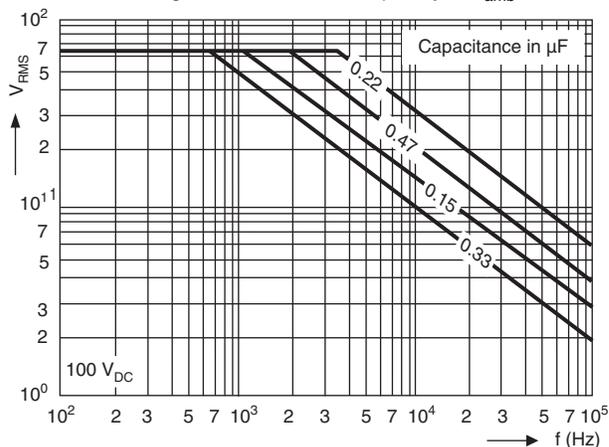
Impedance as a function of frequency (typical curve)



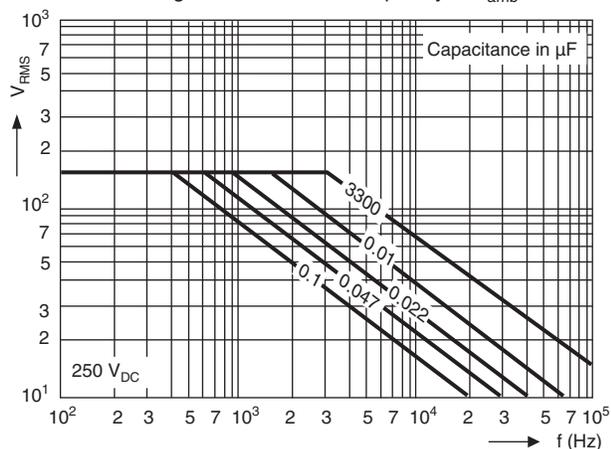
Max. RMS voltage as a function of frequency at  $T_{\text{amb}} \leq 85^\circ\text{C}$



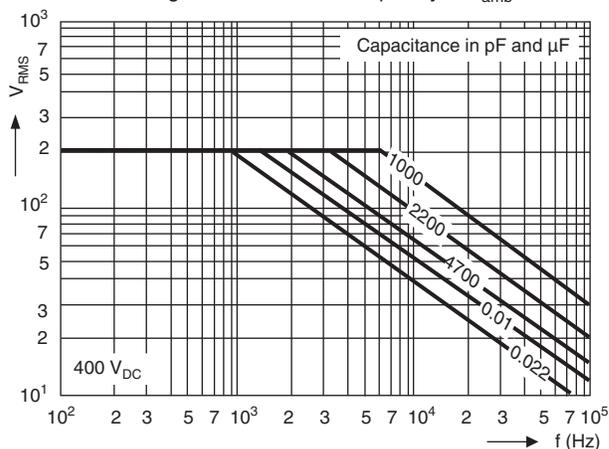
Max. RMS voltage as a function of frequency at  $T_{\text{amb}} \leq 85^\circ\text{C}$



Max. RMS voltage as a function of frequency at  $T_{\text{amb}} \leq 85^\circ\text{C}$



Max. RMS voltage as a function of frequency at  $T_{\text{amb}} \leq 85^\circ\text{C}$





**INSPECTION REQUIREMENTS**

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-2 and Specific Reference Data”.

**Group C Inspection**

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
<b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b>		
4.1 Dimensions (detail)		As specified in chapters “General data” of this specification
4.3.1 Initial measurements	Capacitance Tangent of loss angle: For $C \leq 1 \mu\text{F}$ at 10 kHz for $C > 1 \mu\text{F}$ at 1 kHz	
4.3 Robustness of terminations	Method: 1A Solder bath: $280 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$	No visible damage
4.4 Resistance to soldering heat (see note 3)	Duration: 10 s Isopropylalcohol at room temperature Method: 2	
4.14 Component solvent resistance	Immersion time: $5 \text{ min} \pm 0.5 \text{ min}$ Recovery time: Min. 1 h, max. 2 h	
4.4.2 Final measurements	Visual examination  Capacitance Tangent of loss angle	No visible damage Legible marking $ \Delta C/C  \leq 2 \%$ of the value measured initially Increase of $\tan \delta$ : $\leq 0.003$ for: $C \leq 1 \mu\text{F}$ or $\leq 0.002$ for: $C > 1 \mu\text{F}$ Compared to values measured in 4.3.1
<b>SUB-GROUP C1B OTHER PART OF SAMPLE OF SUB-GROUP C1</b>		
4.6.1 Initial measurements	Capacitance Tangent of loss angle: For $C \leq 1 \mu\text{F}$ at 10 kHz for $C > 1 \mu\text{F}$ at 1 kHz	
4.6 Rapid change of temperature	$\theta\text{A} = - 55 \text{ }^\circ\text{C}$ $\theta\text{B} = + 100 \text{ }^\circ\text{C}$ 5 cycles Duration $t = 30 \text{ min}$  Visual examination	
4.7 Vibration (see note 3)	Mounting: See section “Mounting” of this specification Procedure B4 Frequency range: 10 Hz to 55 Hz Amplitude: 0.75 mm or Acceleration $98 \text{ m/s}^2$ (whichever is less severe) Total duration 6 h	No visible damage



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SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
4.7.2 Final inspection	Visual examination	No visible damage
4.9 Shock (see note 3)	Mounting: See section "Mounting" of this specification Pulse shape: Half sine Acceleration: 490 m/s <sup>2</sup> Duration of pulse: 11 ms	No visible damage $ \Delta C/C  \leq 5\%$ of the value measured in 4.6.1  Increase of tan $\delta$ : $\leq 0.003$ for: $C \leq 1 \mu\text{F}$ or $\leq 0.002$ for: $C > 1 \mu\text{F}$ Compared to values measured in 4.6.1 $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
4.9.2 Final measurements	Visual examination Capacitance  Tangent of loss angle  Insulation resistance	
<b>SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B</b>		
4.10 Climatic sequence 4.10.2 Dry heat	Temperature: + 100 °C Duration: 16 h	No breakdown or flash-over  No visible damage Legible marking $ \Delta C/C  \leq 5\%$ of the value measured in 4.4.2 or 4.9.3.  Increase of tan $\delta$ : $\leq 0.005$ for: $C \leq 1 \mu\text{F}$ or $\leq 0.003$ for: $C > 1 \mu\text{F}$ Compared to values measured in 4.3.1. or 4.6.1 $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
4.10.3 Damp heat cyclic Test Db First cycle	Temperature: - 55 °C	
4.10.4 Cold	Duration: 2 h	
4.10.6 Damp heat cyclic Test Db remaining cycles	Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from testchamber Visual examination  Capacitance  Tangent of loss angle  Insulation resistance	
4.10.6.2 Final measurements		
<b>SUB-GROUP C2</b>		
4.11 Damp heat steady state 4.11.1 Initial measurements	56 days; 40 °C; 90 % to 95 % RH Capacitance Tangent of loss angle at 1 kHz	



SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
4.11.3 Final measurements	Voltage proof = $U_{RDC}$ for 1 min within 15 min after removal from testchamber Visual examination  Capacitance  Tangent of loss angle  Insulation resistance	No breakdown or flash-over  No visible damage Legible marking $ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1. Increase of tan $\delta$ : $\leq 0.005$ for: $C \leq 1 \mu F$ or Compared to values measured in 4.11.1.  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
<b>SUB-GROUP C3</b>		
4.12 Endurance	Duration: 2000 h $1.25 \times U_{RDC}$ at $85^\circ C$ $1.0 \times U_{RDC}$ at $100^\circ C$	
4.12.1 Initial measurements	Capacitance Tangent of loss angle: For $C \leq 1 \mu F$ at 10 kHz for $C > 1 \mu F$ at 1 kHz	
4.12.5 Final measurements	Visual examination  Capacitance  Tangent of loss angle  Insulation resistance	No visible damage Legible marking  $ \Delta C/C  \leq 5\%$ compared to values measured in 4.12.1. Increase of tan $\delta$ : $\leq 0.003$ for: $C \leq 1 \mu F$ or $\leq 0.002$ for: $C > 1 \mu F$ Compared to values measured in 4.12.1.  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
<b>SUB-GROUP C4</b>		
4.13 Charge and discharge	10 000 cycles Charged to $U_{RDC}$ Discharge resistance: $R = \frac{U_R}{C \times 5 \times (dU/dt)_R}$	
4.13.1 Initial measurements	Capacitance Tangent of loss angle: For $C \leq 1 \mu F$ at 10 kHz for $C > 1 \mu F$ at 1 kHz	
4.13.3 Final measurements	Capacitance  Tangent of loss angle  Insulation resistance	$ \Delta C/C  \leq 3\%$ compared to values measured in 4.13.1. Increase of tan $\delta$ : $\leq 0.003$ for: $C \leq 1 \mu F$ $\leq 0.002$ for: $C > 1 \mu F$ Compared to values measured in 4.13.1.  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification



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