

## Metallized Polyester Film Capacitors MKT Radial Type



### FEATURES

- 10.0 mm to 27.5 mm lead pitch
- Self-healing properties
- Flame retardant case
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

Blocking, bypassing, filtering, timing, coupling and decoupling circuits, interference suppression in low voltage applications.

QUICK REFERENCE DATA	
Capacitance range (E12 series)	1000 pF to 15 $\mu$ F (preferred values according to E6)
Capacitance tolerance	$\pm 20\%$ (M), $\pm 10\%$ (K), $\pm 5\%$ (J) (on request)
Climatic testing class according to IEC 60068	55/100/56
Reference standards	IEC 60384-2
Dielectric	Polyester film
Electrodes	Vacuum deposited aluminum
Construction	Extended metallized film
Encapsulation	Flame retardant plastic case UL-class 94 V-0
Leads	Tinned wire
Marking	Manufacturer's logo; type; C-value; rated voltage; tolerance; date of manufacture
Temperature range	-55 °C to +100 °C
Rated DC voltage	63 V <sub>DC</sub> , 100 V <sub>DC</sub> , 250 V <sub>DC</sub> , 400 V <sub>DC</sub> , 630 V <sub>DC</sub> , 1000 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> , 220 V <sub>AC</sub>
Capacitance drift	Up to +40 °C, $\pm 1.5\%$ for a period of two years
Derating for DC and AC category voltage U <sub>C</sub>	At +85 °C: U <sub>C</sub> = 1.0 U <sub>R</sub> At +100 °C: U <sub>C</sub> = 0.8 U <sub>R</sub>
Self inductance	~ 6 nH measured with 2 mm long leads
Pull test on leads	$\geq 30$ N in direction of leads according to IEC 60068-2-21

#### Note

- For more detailed data and test requirements, contact [dc-film@vishay.com](mailto:dc-film@vishay.com)

DIMENSIONS in millimeters

**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 “Recommended Packaging” table

SPECIFIC REFERENCE DATA						
DESCRIPTION				MAX. VALUE		
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$ $0.1 \mu\text{F} < C \leq 1.0 \mu\text{F}$ $C > 1.0 \mu\text{F}$				at 1 kHz	at 10 kHz	at 100 kHz
				$8 \times 10^{-3}$	$15 \times 10^{-3}$	$25 \times 10^{-3}$
				$8 \times 10^{-3}$	$15 \times 10^{-3}$	-
			$10 \times 10^{-3}$	-	-	
PCM (mm)	MAXIMUM PULSE RISE TIME (dV/dt) [V/μs]					
	63 V <sub>DC</sub>	100 V <sub>DC</sub>	250 V <sub>DC</sub>	400 V <sub>DC</sub>	630 V <sub>DC</sub>	1000 V <sub>DC</sub>
10	11	13	22	37	60	130
15	7	8	13	21	33	65
22.5	4	5	8	13	19	34
27.5	3	4	6	10	14	25
If the maximum pulse voltage is less than the rated voltage higher dV/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 leads and case, 100 V; (foil method)				> 30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time < 1000 V/s				$1.6 \times U_{\text{RDC}}$ , 1 min		
Withstanding (DC) voltage between leads and case				$2 \times U_{\text{RDC}}$ , 1 min		
Maximum application temperature				100 °C		



ELECTRICAL DATA						
U <sub>RDC</sub> (V)	CAP. (μF)	CAPACITANCE CODE	VOLTAGE CODE	V <sub>AC</sub>	DIMENSIONS W x H x L	PCM
63	0.22	-422	06	40	4.0 x 9.0 x 13.0	10
	0.33	-433			4.0 x 9.0 x 13.0	10
	0.47	-447			5.5 x 10.5 x 13.0	10
	0.68	-468			5.5 x 10.5 x 18.0	15
	1.0	-510			5.5 x 10.5 x 18.0	15
	1.5	-515			6.5 x 12.5 x 18.0	15
	2.2	-522			7.5 x 13.5 x 18.0	15
	3.3	-533			7.5 x 15.5 x 26.5	22.5
	4.7	-547			8.5 x 16.5 x 26.5	22.5
	6.8	-568			10.5 x 18.5 x 26.5	22.5
	10.0	-610			11.5 x 20.5 x 31.5	27.5
	15.0	-615			13.5 x 23.5 x 31.5	27.5
100	0.068	-368	01	63	4.0 x 9.0 x 13.0	10
	0.10	-410			4.0 x 9.0 x 13.0	10
	0.15	-415			4.0 x 9.0 x 13.0	10
	0.22	-422			4.5 x 9.5 x 13.0	10
	0.33	-433			5.5 x 10.5 x 18.0	15
	0.47	-447			5.5 x 10.5 x 18.0	15
	0.68	-468			6.5 x 12.5 x 18.0	15
	1.0	-510			7.5 x 13.5 x 18.0	15
	1.5	-515			7.5 x 15.5 x 26.5	22.5
	2.2	-522			8.5 x 16.5 x 26.5	22.5
	3.3	-533			10.5 x 18.5 x 26.5	22.5
	4.7	-547			11.5 x 20.5 x 31.5	27.5
	6.8	-568			13.5 x 23.5 x 31.5	27.5
	10.0	-610			15.0 x 24.5 x 31.5	27.5
	15.0	-615			16.5 x 29.5 x 31.5	27.5
250	0.033	-333	25	160	4.0 x 9.0 x 13.0	10
	0.047	-347			4.0 x 9.0 x 13.0	10
	0.068	-368			4.5 x 9.5 x 13.0	10
	0.10	-410			5.5 x 10.5 x 18.0	15
	0.15	-415			5.5 x 10.5 x 18.0	15
	0.22	-422			5.5 x 10.5 x 18.0	15
	0.33	-433			6.5 x 12.5 x 18.0	15
	0.47	-447			6.5 x 14.5 x 26.5	22.5
	0.68	-468			7.5 x 15.5 x 26.5	22.5
	1.0	-510			8.5 x 16.5 x 26.5	22.5
	1.5	-515			9.0 x 18.5 x 31.5	27.5
	2.2	-522			11.5 x 20.5 x 31.5	27.5
	3.3	-533			13.5 x 23.5 x 31.5	27.5
	400	0.0010			-210	40
0.0015		-215	4.0 x 9.0 x 13.0	10		
0.0022		-222	4.0 x 9.0 x 13.0	10		
0.0033		-233	4.0 x 9.0 x 13.0	10		
0.0047		-247	4.0 x 9.0 x 13.0	10		
0.0068		-268	4.0 x 9.0 x 13.0	10		
0.010		-310	4.0 x 9.0 x 13.0	10		
0.015		-315	4.0 x 9.0 x 13.0	10		
0.022		-322	4.0 x 9.0 x 13.0	10		
0.033		-333	4.0 x 9.0 x 13.0	10		
0.047		-347	5.5 x 10.5 x 18.0	15		
0.068		-368	5.5 x 10.5 x 18.0	15		
0.10		-410	5.5 x 10.5 x 18.0	15		
0.15		-415	6.5 x 12.5 x 18.0	15		
0.22		-422	7.5 x 15.5 x 26.5	22.5		
0.33		-433	8.5 x 16.5 x 26.5	22.5		
0.47		-447	10.5 x 18.5 x 26.5	22.5		
0.68		-468	11.5 x 20.5 x 31.5	27.5		
1.0		-510	11.5 x 20.5 x 31.5	27.5		
1.5		-515	13.5 x 23.5 x 31.5	27.5		



ELECTRICAL DATA						
U <sub>RDC</sub> (V)	CAP. (μF)	CAPACITANCE CODE	VOLTAGE CODE	V <sub>AC</sub>	DIMENSIONS W x H x L	PCM
630	0.0010	-210	63 <sup>(1)</sup>	220	4.0 x 9.0 x 13.0	10
	0.0015	-215			4.0 x 9.0 x 13.0	10
	0.0022	-222			4.0 x 9.0 x 13.0	10
	0.0033	-233			4.0 x 9.0 x 13.0	10
	0.0047	-247			4.0 x 9.0 x 13.0	10
	0.0068	-268			4.0 x 9.0 x 13.0	10
	0.010	-310			4.0 x 9.0 x 13.0	10
	0.015	-315			5.5 x 10.5 x 13.0	10
	0.022	-322			6.5 x 11.5 x 13.0	10
	0.033	-333			5.5 x 10.5 x 18.0	15
	0.047	-347			6.5 x 12.5 x 18.0	15
	0.068	-368			7.5 x 13.5 x 18.0	15
	0.10	-410			6.5 x 14.5 x 26.5	22.5
	0.15	-415			7.5 x 15.5 x 26.5	22.5
	0.22	-422			8.5 x 16.5 x 26.5	22.5
	0.33	-433			11.5 x 20.5 x 31.5	27.5
	0.47	-447			11.5 x 20.5 x 31.5	27.5
	0.68	-468			13.5 x 23.5 x 31.5	27.5
1.0	-510	15.0 x 24.5 x 31.5	27.5			
1000	0.0010	-210	10 <sup>(1)</sup>	220	4.0 x 9.0 x 13.0	10
	0.0015	-215			4.0 x 9.0 x 13.0	10
	0.0022	-222			4.0 x 9.0 x 13.0	10
	0.0033	-233			4.0 x 9.0 x 13.0	10
	0.0047	-247			5.5 x 10.5 x 13.0	10
	0.0068	-268			6.5 x 11.5 x 13.0	10
	0.010	-310			5.5 x 10.5 x 18.0	15
	0.015	-315			6.5 x 12.5 x 18.0	15
	0.022	-322			7.5 x 13.5 x 18.0	15
	0.033	-333			6.5 x 14.5 x 26.5	22.5
	0.047	-347			7.5 x 15.5 x 26.5	22.5
	0.068	-368			8.5 x 16.5 x 26.5	22.5
	0.10	-410			10.5 x 18.5 x 26.5	22.5
	0.15	-415			11.5 x 20.5 x 31.5	27.5
	0.22	-422			13.5 x 23.5 x 31.5	27.5
	0.33	-433			16.5 x 29.5 x 31.5	27.5
	0.47	-447			20.0 x 35.0 x 31.5	27.5

**Note**

<sup>(1)</sup> Not suitable for mains applications

RECOMMENDED PACKAGING							
LETTER CODE	TYPE OF PACKAGING	HEIGHT (H) (mm)	REEL DIAMETER (mm)	ORDERING CODE EXAMPLES	PCM 10	PCM 15	PCM 22.5 TO 27.5
G	Ammo	18.5	S <sup>(1)</sup>	MKT1822-422-065-G	X	X	-
W	Reel	18.5	350	MKT1822-422-065-W	X	X	-
V	Reel	18.5	500	MKT1822-510-255-V	-	X	X
G	Ammo	18.5	L <sup>(2)</sup>	MKT1822-510-255-G	-	-	X
-	Bulk	-	-	MKT1822-510-255	X	X	X
-	Bulk	-	-	MKT1822-522-255	X	-	X

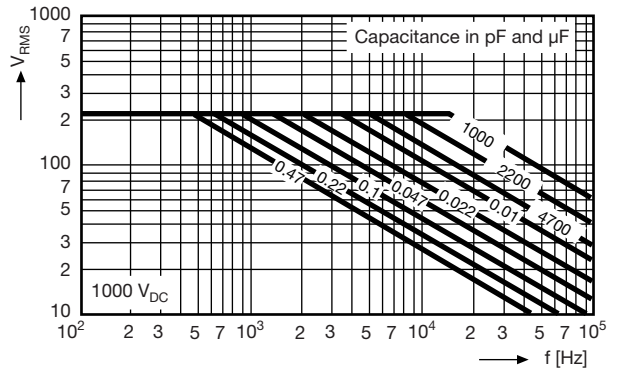
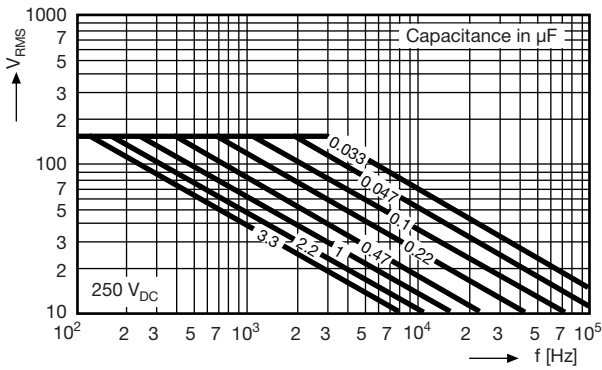
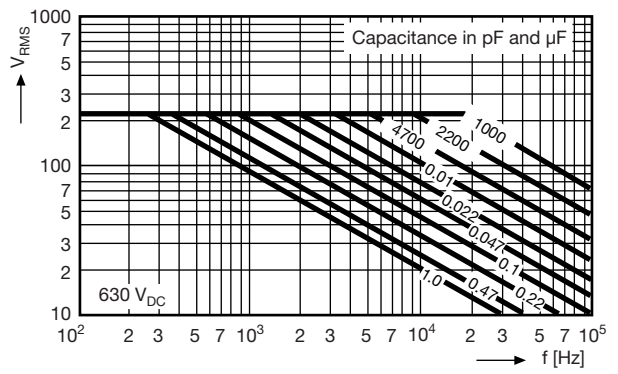
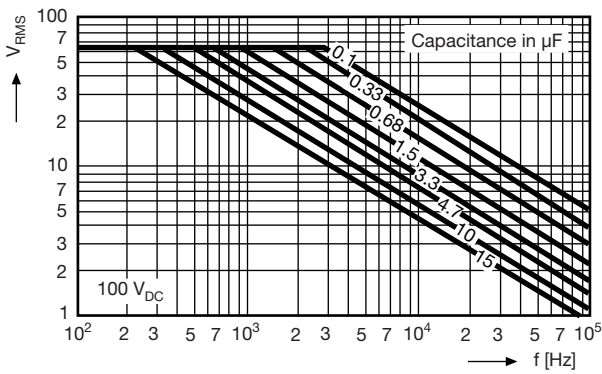
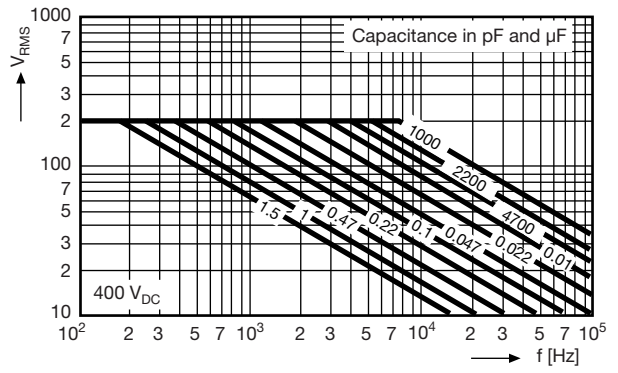
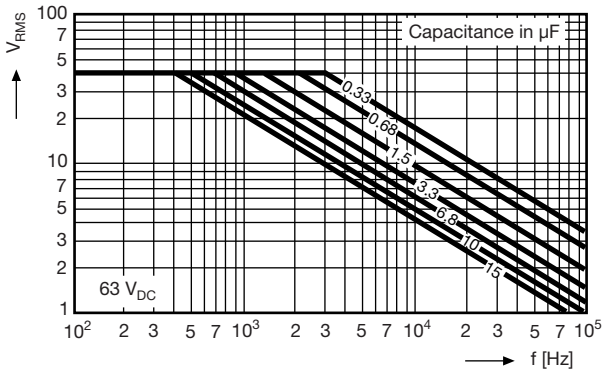
**Notes**

<sup>(1)</sup> S = Box size 55 mm x 210 mm x 340 mm (W x H x L)

<sup>(2)</sup> L = Box size 60 mm x 360 mm x 510 mm (W x H x L)



PERMISSIBLE AC VOLTAGE VS. FREQUENCY





APPLICATION NOTE AND LIMITING CONDITIONS

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: dc-film@vishay.com

To select the capacitor for a certain application, the following conditions must be checked:

- 1. The peak voltage (Up) shall not be greater than the rated DC voltage (URDC)
2. The peak-to-peak voltage (Up-p) shall not be greater than 2\*sqrt(2) \* URAC to avoid the ionization inception level
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing.

For all other pulses following equation must be fulfilled:

2 x integral from 0 to T of (dU/dt)^2 x dt < URDC x (dU/dt)\_rated

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3 % per K shall be applied.

- 4. The maximum component surface temperature rise must be lower than the limits (see graph "Max. allowed component temperature rise").
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in the table: "Heat Conductivity"
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications the applicant must guarantee that the following conditions are fulfilled in any case (spikes and surge voltages from the mains included).
7. For continuous use as series connection with an impedance to the mains, please refer to application note www.vishay.com/doc?28153

Table with 3 columns: ALLOWED VOLTAGES, Tamb <= 85 °C, 85 °C < Tamb <= 105 °C. Rows include Maximum continuous RMS voltage, Maximum temperature RMS-overvoltage (< 24 h), and Maximum peak voltage (Vo-p) (< 2 s).

Example

C = 3300 nF - 100 V used for the voltage signal shown in next drawing.

Up-p = 80 V; Up = 70 V; T1 = 0.5 ms; T2 = 1 ms

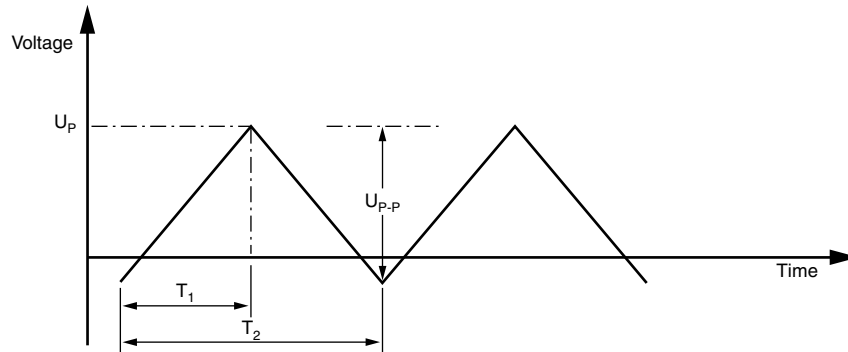
The ambient temperature is 35 °C

Checking conditions:

- 1. The peak voltage Up = 70 V is lower than 100 VDC
2. The peak-to-peak voltage 80 V is lower than 2\*sqrt(2) \* 63 VAC = 178 Up-p
3. The voltage pulse slope (dU/dt) = 80 V/500 us = 0.16 V/us. This is lower than 8 V/us (see specific reference data for each version)
4. The dissipated power is 60 mW as calculated with fourier terms. The temperature rise for wmax = 8.5 mm and pitch = 22.5 mm will be 60 mW/8 mW/°C = 3.3 °C. This is lower than 15 °C temperature rise at 35 °C, according figure "Max. allowed component temperature rise"
5. Not applicable
6. Not applicable
7. Not applicable



Voltage Signal





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.