WIMA MKM 4

Metallized Capacitors with Mixed Dielectric PCM 7.5 mm to 37.5 mm

Special Features

- **High volume/capacitance ratio**
- **Self-healing**
- **Constant capacitance value versus temperature (similar to the obsolete Polycarbonate)**
- **Low dissipation factor**
- **According to RoHS 2002/95/EC**

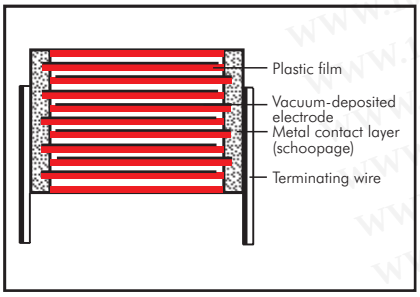
Typical Applications

For general DC-applications requiring a high capacitance stability versus temperature e.g.

- **Automotive electronics**
- **Lighting**

Construction

Dielectric:
Mixed film
Capacitor electrodes:
Vacuum-deposited
Internal construction:

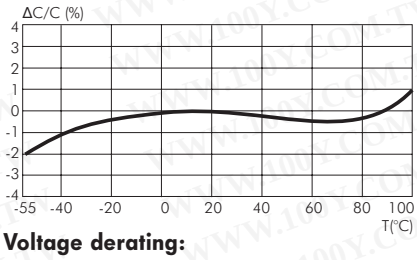


Encapsulation:
Solvent-resistant, flame-retardent plastic case with epoxy resin seal, UL 94 V-0
Terminations:
Tinned wire.
Marking:
Colour: Red. Marking: Black.
Epoxy resin seal: Red

Electrical Data

Capacitance range:
1000 pF to 22 µF (E12-values on request)
Rated voltages:
63 VDC, 100 VDC, 250 VDC, 400 VDC
Capacitance tolerances:
±20%, ±10%, ±5%
Operating temperature range:
–55° C to +100° C
Climatic test category:
55/100/56 in accordance with IEC
Insulation resistance at +20° C:
C ⩽ 0.33 µF: ⩾ 3×10^4 MΩ
(mean value: 1×10^5 MΩ)
C > 0.33 µF: ⩾ 10 000 sec (MΩ x µF)
(mean value: 40 000 sec)
Measuring voltage: 100 V/1 min.
Test voltage:
1.6 U_r, 2 sec.

Capacitance change versus temperature (f = 1 kHz) (general guide)



Voltage derating:
A voltage derating factor of 1.35 % per K must be applied from +85° C for DC voltages and from +75° C for AC voltages.
Reliability:
Operational life> 300 000 hours
Failure rate< 2 fit (0.5 x U_r and 40° C)

Dissipation factors at + 20° C: tan δ

at f	C ⩽ 0.1 µF	0.1 µF < C ⩽ 1.0 µF	C > 1.0 µF
1 kHz	⩽ 5×10^{-3}	⩽ 5×10^{-3}	⩽ 5×10^{-3}
10 kHz	⩽ 8×10^{-3}	⩽ 9×10^{-3}	–
100 kHz	⩽ 11×10^{-3}	–	–

Maximum pulse rise time:

Capacitance pF/µF	Pulse rise time V/µsec max. operating/test			
	63 VDC	100 VDC	250 VDC	400 VDC
1000 ... 6800	50/500	50/500	60/600	60/600
0.01 ... 0.022	30/300	30/300	35/350	38/380
0.033 ... 0.068	15/150	15/150	20/200	25/250
0.1 ... 0.22	10/100	12/120	15/150	15/150
0.33 ... 0.68	9/90	9/90	10/100	10/100
1.0 ... 2.2	6/60	5/50	6/60	9/90
3.3 ... 6.8	3/30	3/30	6/60	7/70
10 ... 22	2.5/25	2.5/25	3/30	6/60

for pulses equal to the rated voltage

Mechanical Tests

Pull test on leads:
d ⩽ 0.8 ø: 10 N in direction of leads
d > 0.8 ø: 20 N in direction of leads
according to IEC 60068-2-21
Vibration:
6 hours at 10 ... 2000 Hz and 0.75 mm displacement amplitude or 10 g in accordance with IEC 60068-2-6
Low air density:
1kPa = 10 mbar in accordance with IEC 60068-2-13
Bump test:
4000 bumps at 390 m/sec^2
in accordance with IEC 60068-2-29

Packing

Available taped and reeled up to and including case size 15 x 26 x 31.5 / PCM 27.5 mm.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

WIMA MKM 4

Continuation

General Data

Capacitance	63 VDC/40 VAC*				100 VDC/63 VAC*				250 VDC/160 VAC*				400 VDC/200 VAC*			
	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**
1000 pF	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
1500 "	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
2200 "	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
3300 "	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
4700 "	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
6800 "	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**	2.5	7	10	**7.5**
0.01 µF	2.5	7	10	**7.5***	2.5	7	10	**7.5***	2.5	7	10	**7.5***	3	8.5	10	**7.5***
	4	9	13	10*	4	9	13	10*	4	9	13	10*	4	9	13	10*
0.015 "	2.5	7	10	**7.5***	2.5	7	10	**7.5***	2.5	7	10	**7.5***	3	8.5	10	**7.5***
	4	9	13	10*	4	9	13	10*	4	9	13	10*	4	9	13	10*
0.022 "	3	8.5	10	**7.5***	3	8.5	10	**7.5***	3	8.5	10	**7.5***	4	9	10	**7.5***
	4	9	13	10*	4	9	13	10*	4	9	13	10*	4	9	13	10*
0.033 "	3	8.5	10	**7.5***	3	8.5	10	**7.5***	3	8.5	10	**7.5***	4.5	9.5	10.3	**7.5***
	4	9	13	10*	4	9	13	10*	4	9	13	10*	4	9	13	10*
0.047 "	4	9	10	**7.5***	4	9	10	**7.5***	4	9	10	**7.5***	5	10.5	10.3	**7.5***
	4	9	13	10*	4	9	13	10*	4	9	13	10*	5	11	13	10*
0.068 "	4	9	10	**7.5***	4	9	10	**7.5***	4	9	10	**7.5***	5	11	13	10*
	4	9	13	10*	4	9	13	10*	4	9	13	10*	5	11	18	15*
0.1 µF	4.5	9.5	10.3	**7.5***	4.5	9.5	10.3	**7.5***	4.5	9.5	10.3	**7.5***	6	12	13	10*
	5	11	13	10*	5	11	13	10*	5	11	13	10*	5	11	18	15*
	5	11	18	15*	5	11	18	15*	5	11	18	15*				
0.15 "	5	10.5	10.3	**7.5***	5	10.5	10.3	**7.5***	5	10.5	10.3	**7.5***	6	12.5	18	15*
	5	11	13	10*	5	11	13	10*	5	11	13	10*	6	15	26.5	22.5*
	5	11	18	15*	5	11	18	15*	5	11	18	15*				
0.22 "	6	12	13	10*	6	12	13	10*	6	12	13	10*	7	14	18	15*
	5	11	18	15*	5	11	18	15*	5	11	18	15*	6	15	26.5	22.5*
0.33 "	6	12.5	18	15*	6	12.5	18	15*	6	12.5	18	15*	8	15	18	15*
	6	15	26.5	22.5*	6	15	26.5	22.5*	6	15	26.5	22.5*	6	15	26.5	22.5*
0.47 "	7	14	18	15*	7	14	18	15*	7	14	18	15*	7	16.5	26.5	22.5
	6	15	26.5	22.5*	6	15	26.5	22.5*	6	15	26.5	22.5*				
0.68 "	8	15	18	15*	8	15	18	15*	8	15	18	15*	10.5	19	26.5	22.5
	6	15	26.5	22.5*	6	15	26.5	22.5*	6	15	26.5	22.5*				
1.0 µF	9	16	18	15*	9	16	18	15*	9	16	18	15*	11	21	26.5	22.5*
	7	16.5	26.5	22.5*	7	16.5	26.5	22.5*	7	16.5	26.5	22.5*	11	21	31.5	27.5*
1.5 "	10.5	19	26.5	22.5*	10.5	19	26.5	22.5*	10.5	19	26.5	22.5*	13	24	31.5	27.5
	9	19	31.5	27.5*	9	19	31.5	27.5*	9	19	31.5	27.5*				
2.2 "	11	21	26.5	22.5*	11	21	26.5	22.5*	11	21	26.5	22.5*	15	26	31.5	27.5
	11	21	31.5	27.5*	11	21	31.5	27.5*	11	21	31.5	27.5*				
3.3 "	13	24	31.5	27.5	13	24	31.5	27.5	13	24	31.5	27.5	17	29	31.5	27.5
4.7 "	15	26	31.5	27.5	15	26	31.5	27.5	15	26	31.5	27.5	20	39.5	31.5	27.5*
													17	29	41.5	37.5*
6.8	17	29	31.5	27.5*	17	29	31.5	27.5*	17	29	31.5	27.5*	19	32	41.5	37.5
	15	26	41.5	37.5*	15	26	41.5	37.5*	15	26	41.5	37.5*				
10 µF	19	32	41.5	37.5	19	32	41.5	37.5	19	32	41.5	37.5	24	45.5	41.5	37.5
15 "	20	39.5	41.5	37.5	20	39.5	41.5	37.5	20	39.5	41.5	37.5				
22 "	24	45.5	41.5	37.5	24	45.5	41.5	37.5	24	45.5	41.5	37.5				

* AC voltage: f = 50 Hz; 1.4 x U_{rms} + UDC ⩽ U_r

** PCM = Printed circuit module = lead spacing

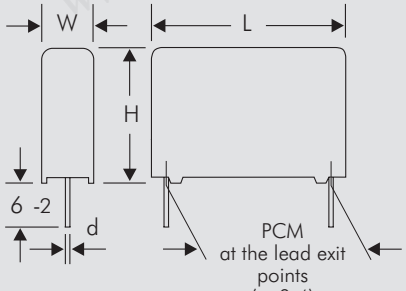
New values and ranges.

* On ordering please state the required PCM (lead spacing)!
If not specified, smaller PCM will be booked.

Dims. in mm.

Taped version see page 100.

ø d	PCM	W
0.5	7.5	⩽ 3
0.7	7.5	⩾ 4
0.7	10	
0.8	15 - 22.5	
0.8	27.5	⩽ 15
1.0	27.5	> 15
1.0	37.5	



Typical Characteristics and Graphs of the Mixed Dielectric

Film and Foil Types with Mixed Dielectric

FKM 02 FKM 2 FKM 3

Metallized Types with Mixed Dielectric

MKM 2 MKM 4

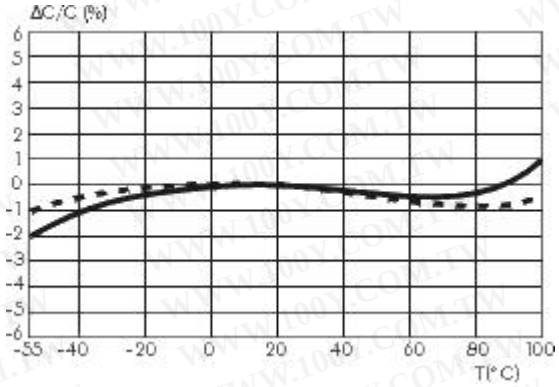
Typical Applications

For applications requiring a high capacitance stability versus temperature e.g.

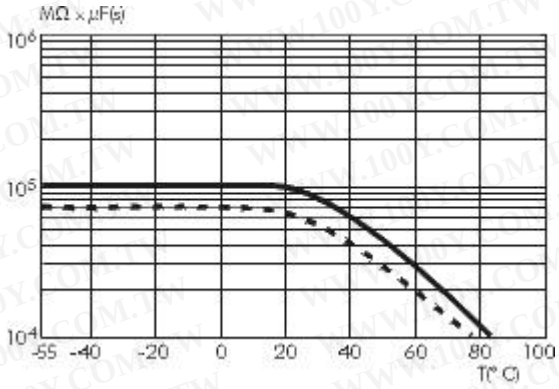
- **Automotive electronics**
- **Lighting**
- **Replacement of obsolete Polycarbonate capacitors**

Film Properties

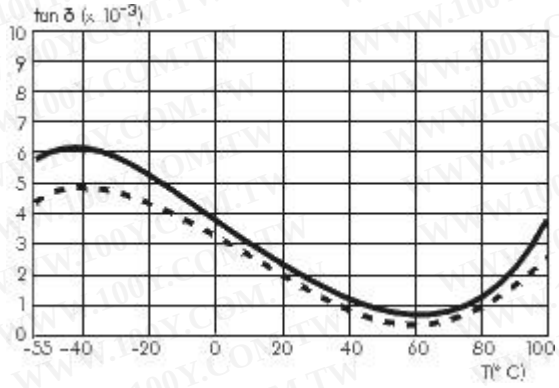
Dielectric constant
see data for Polyester and Polypropylene
Specific volume resistance
see data for Polyester and Polypropylene
Dielectric strength (DC voltage)
see data for Polyester and Polypropylene
Preferred temperature range
in °C:
-55 to +100
Dielectric absorption
in % at +23°C:
0.12 to 0.18



Capacitance change versus temperature (f=1 kHz) (general guide)



Insulation resistance change versus temperature (general guide)



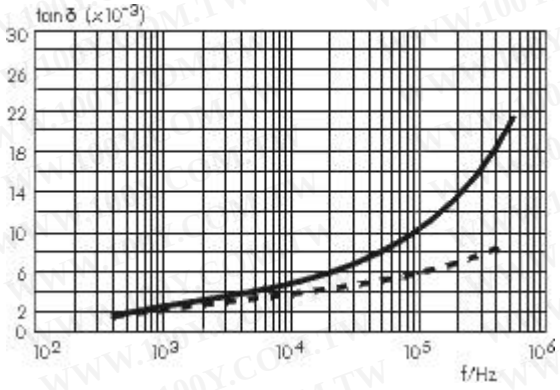
Dissipation factor change versus temperature (f=1 kHz) (general guide)

Dissipation factor change versus frequency (general guide)

Annotation:

The full lines characterize the metallized versions.

Mixed dielectric



The broken lines show the film/foil types.

Recommendation for Processing and Application of Through-Hole Capacitors

Soldering Process

A preheating of through-hole WIMA capacitors is allowed for temperatures $T_{max.}$ < 100 °C.
In practice a preheating duration of t < 5 min. has been proven to be best.

Single wave soldering:
Soldering bath temperature: T < 260°C
Immersion time: t < 5 sec

Double wave soldering:
Soldering bath temperature T < 260°C
Immersion time: 2 x t < 3 sec

Wave Soldering

Temperature/time graph for the maximum permissible solder bath temperature for the wave soldering of through-hole WIMA capacitors.