WIMA MKP 10

Polypropylene (PP) Capacitors for Pulse Applications with Double-Sided Metallized Electrodes and Schoopage Contacts PCM 7.5 mm to 37.5 mm

Special Features

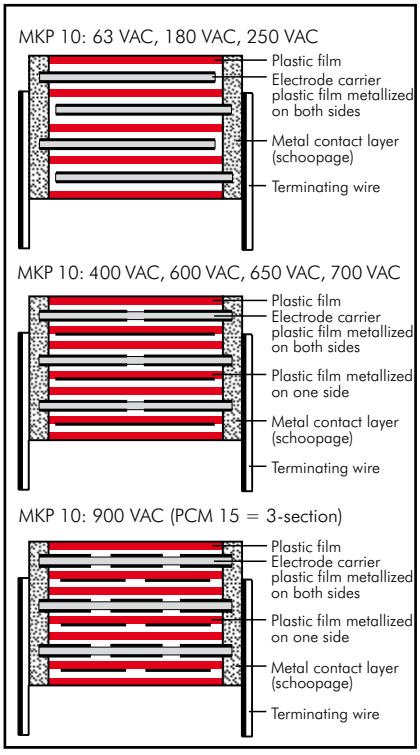
- **Pulse duty construction**
- **Self-healing**
- **Very low dissipation factor**
- **Negative capacitance change versus temperature**
- **According to RoHS 2002/95/EC**

Typical Applications

For pulse applications e.g.
- **Switch mode power supplies**
- **TV and monitor sets**
- **Lighting**
- **Audio/video equipment**

Construction

Dielectric: Polypropylene (PP) film
Capacitor electrodes:
Double-sided metallized plastic film
Internal construction:



Encapsulation:
Solvent-resistant, flame-retardant 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 15 µF (E12-values on request)
Rated voltages:
100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC, 1600 VDC, 2000 VDC, 2500 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: ⩾ 1 x 10^5 MΩ
(mean value: 5 x 10^5 MΩ)
C > 0.33 µF: ⩾ 30 000 sec (MΩ x µF)
(mean value: 100 000 sec)
Measuring voltage: 100 V/1 min.
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	⩽ 3 x 10^{-4}	⩽ 3 x 10^{-4}	⩽ 3 x 10^{-4}
10 kHz	⩽ 4 x 10^{-4}	⩽ 6 x 10^{-4}	–
100 kHz	⩽ 15 x 10^{-4}	–	–

Maximum pulse rise time:

Capacitance pF/µF	max. pulse rise time V/µsec at T_A < 40° C							
	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC	1600 VDC	2000 VDC	2500 VDC
1000 ... 2200	1000	1800	1800	1800	2800	5400	9000	11000
3300 ... 6800	900	1200	1200	1200	2800	5400	9000	11000
0.01 ... 0.022	700	1100	1200	1800	2100	3000	3400	11000
0.033 ... 0.068	400	800	900	1800	2100	2100	2100	–
0.1 ... 0.22	200	500	500	900	1400	1400	1400	–
0.33 ... 0.68	100	300	400	700	900	900	900	–
1.0 ... 2.2	70	200	200	400	400	500	–	–
3.3 ... 4.7	50	80	100	150	–	–	–	–
6.8 ... 15	35	50	70	–	–	–	–	–

for pulses equal to the rated voltage

Test voltage: 1.6 U_r, 2 sec.
Dielectric absorption:
0.05 %
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 < 1 fit (0.5 x U_r and 40° C)

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/sec²
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.

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Continuation

General Data

Capacitance	100 VDC/63 VAC*				250 VDC/180 VAC*				400 VDC/250 VAC*				630 VDC/400 VAC*			
	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**
1000 pF	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
1500 „	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
2200 „	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
3300 „	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
4700 „	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
6800 „	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5**	4	9	10	**7.5****
													4	9	13	10*
0.01 µF	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*
0.015 „	4	9	10	**7.5**	4	9	10	**7.5***	5	10.5	10.3	**7.5***	5	11	13	10*
					4	9	13	10*	4	9	13	10*	5	11	18	15*
0.022 „	4	9	10	**7.5**	4	9	10	**7.5***	5	10.5	10.3	**7.5***	5	11	13	10*
					4	9	13	10*	4	9	13	10*	5	11	18	15*
0.033 „	5	10.5	10.3	**7.5***	5	10.5	10.3	**7.5***	5.7	12.5	10.3	**7.5***	6	12	13	10*
	4	9	13	10*	4	9	13	10*	5	11	13	10*	5	11	18	15*
0.047 „	5	10.5	10.3	**7.5***	5	10.5	10.3	**7.5***	6	12	13	10*	6	12.5	18	15*
	4	9	13	10*	4	9	13	10*	5	11	18	15*	6	15	26.5	22.5*
0.068 „	5	11	13	10	5	11	13	10*	6	12.5	18	15*	7	14	18	15*
					5	11	18	15*	6	15	26.5	22.5*	6	15	26.5	22.5*
0.1 µF	6	12	13	10	6	12	13	10*	7	14	18	15*	9	16	18	15*
					5	11	18	15*	6	15	26.5	22.5*	7	16.5	26.5	22.5*
0.15 „	6	12.5	18	15	6	12.5	18	15*	8	15	18	15*	8.5	18.5	26.5	22.5*
					6	15	26.5	22.5*	6	15	26.5	22.5*	9	19	31.5	27.5*
0.22 „	7	14	18	15	7	14	18	15*	9	16	18	15*	8.5	18.5	26.5	22.5*
					6	15	26.5	22.5*	7	16.5	26.5	22.5*	9	19	31.5	27.5*
0.33 „	8	15	18	15	8	15	18	15*	8.5	18.5	26.5	22.5*	11	21	26.5	22.5*
					6	15	26.5	22.5*	9	19	31.5	27.5*	11	21	31.5	27.5*
0.47 „	9	16	18	15*	9	16	18	15*	10.5	19	26.5	22.5*	11	21	31.5	27.5
	7	16.5	26.5	22.5*	7	16.5	26.5	22.5*	9	19	31.5	27.5*				
0.68 „	8.5	18.5	26.5	22.5	8.5	18.5	26.5	22.5*	11	21	26.5	22.5*	15	26	31.5	27.5*
					9	19	31.5	27.5*	11	21	31.5	27.5*	13	24	41.5	37.5*
1.0 µF	10.5	19	26.5	22.5	11	21	26.5	22.5*	13	24	31.5	27.5*	17	29	31.5	27.5*
					11	21	31.5	27.5*	13	24	41.5	37.5*	15	26	41.5	37.5*
1.5 „	11	21	31.5	27.5	13	24	31.5	27.5*	17	29	31.5	27.5*	20	39.5	31.5	27.5*
					13	24	41.5	37.5*	13	24	41.5	37.5*	19	32	41.5	37.5*
2.2 „	13	24	31.5	27.5	15	26	31.5	27.5*	20	39.5	31.5	27.5*	20	39.5	41.5	37.5
					13	24	41.5	37.5*	17	29	41.5	37.5*				
3.3 „	17	29	31.5	27.5	17	34.5	31.5	27.5*	20	39.5	41.5	37.5	24	45.5	41.5	37.5
					17	29	41.5	37.5*								
4.7 „	20	39.5	31.5	27.5*	20	39.5	31.5	27.5*	20	39.5	41.5	37.5				
	17	29	41.5	37.5*	19	32	41.5	37.5*								
6.8 „	19	32	41.5	37.5	20	39.5	41.5	37.5	24	45.5	41.5	37.5				
10 µF	20	39.5	41.5	37.5	24	45.5	41.5	37.5								
15 „	24	45.5	41.5	37.5												

* AC voltage: f ⩽ 1000 Hz; 1.4 x U_{rms} + UDC ⩽ U_r

** PCM = Printed circuit module = lead spacing

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

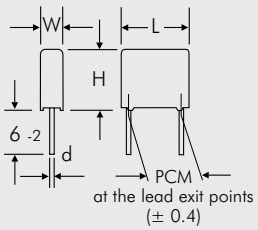
** Admissible AC voltage 280 VAC max.

Dims. in mm.

Ionisation inception level in isolated cases may be lower than admissible AC voltage.

Taped version see page 121.

ø d	PCM
0.6	7.5 - 10
0.8	15 - 27.5
1.0	37.5



Continuation page 70

Continuation

General Data

Capacitance	1000 VDC/600 VAC*				1600 VDC/650 VAC*				2000 VDC/700 VAC*				2500 VDC/900 VAC*			
	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**	W	H	L	PCM**
1000 pF	4	9	10	**7.5***	4	9	13	10	4	9	13	10	5	11	18	15*
	4	9	13	10*									6	15	26.5	22.5*
1500 „	4	9	10	**7.5***	4	9	13	10	4	9	13	10	5	11	18	15*
	4	9	13	10*									6	15	26.5	22.5
2200 „	4	9	10	**7.5***	4	9	13	10	5	11	13	10*	5	11	18	15*
	4	9	13	10*					5	11	18	15*	6	15	26.5	22.5*
3300 „	4	9	10	**7.5***	4	9	13	10	5	11	18	15	5	11	18	15*
	4	9	13	10*									6	15	26.5	22.5*
4700 „	4.5	9.5	10.3	**7.5***	5	11	13	10	5	11	18	15*	6	12.5	18	15*
	4	9	13	10*					6	15	26.5	22.5*	6	15	26.5	22.5*
6800 „	5.7	12.5	10.3	**7.5***	6	12	13	10*	6	12.5	18	15*	7	14	18	15*
	5	11	13	10*	5	11	18	15*	6	15	26.5	22.5*	7	16.5	26.5	22.5*
0.01 µF	5	11	13	10*	5	11	18	15	7	14	18	15*	8.5	18.5	26.5	22.5
	5	11	18	15*					6	15	26.5	22.5*				
0.015 „	6	12	13	10*	6	12.5	18	15*	8	15	18	15*	10.5	19	26.5	22.5
	5	11	18	15*	6	15	26.5	22.5*	6	15	26.5	22.5*				
0.022 „	6	12.5	18	15*	7	14	18	15*	9	16	18	15*	11	21	26.5	22.5
	6	15	26.5	22.5*	6	15	26.5	22.5*	7	16.5	26.5	22.5*				
0.033 „	7	14	18	15*	8	15	18	15*	8.5	18.5	26.5	22.5*				
	6	15	26.5	22.5*	6	15	26.5	22.5*	9	19	31.5	27.5*				
0.047 „	8	15	18	15*	7	16.5	26.5	22.5*	10.5	19	26.5	22.5*				
	6	15	26.5	22.5*	9	19	31.5	27.5*	11	21	31.5	27.5*				
0.068 „	7	16.5	26.5	22.5	10.5	19	26.5	22.5*	11	21	26.5	22.5*				
					9	19	31.5	27.5*	11	21	31.5	27.5*				
0.1 µF	8.5	18.5	26.5	22.5*	11	21	26.5	22.5*	13	24	31.5	27.5				
	11	21	31.5	27.5*	11	21	31.5	27.5*								
0.15 „	11	21	26.5	22.5*	13	24	31.5	27.5	15	26	31.5	27.5*				
	11	21	31.5	27.5*					13	24	41.5	37.5*				
0.22 „	11	21	31.5	27.5	15	26	31.5	27.5*	17	34.5	31.5	27.5*				
					13	24	41.5	37.5*	17	29	41.5	37.5*				
0.33 „	15	26	31.5	27.5*	17	34.5	31.5	27.5*	19	32	41.5	37.5				
	13	24	41.5	37.5*	17	29	41.5	37.5*								
0.47 „	17	29	31.5	27.5*	20	39.5	31.5	27.5*	20	39.5	41.5	37.5				
	13	24	41.5	37.5*	19	32	41.5	37.5*								
0.68 „	20	39.5	31.5	27.5*	20	39.5	41.5	37.5	24	45.5	41.5	37.5				
	17	29	41.5	37.5*												
1.0 µF	20	39.5	41.5	37.5	24	45.5	41.5	37.5								
1.5 „	24	45.5	41.5	37.5												

* AC voltage: $f \leqslant 1000$ Hz; $1.4 \times U_{rms} + UDC \leqslant U_r$

** PCM = Printed circuit module = lead spacing

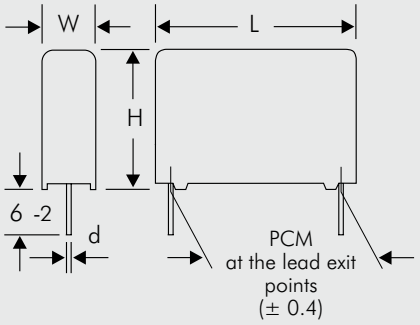
* On ordering please state the required PCM (lead spacing)!
If not specified, smaller PCM will be booked.

Dims. in mm.

Ionisation inception level in isolated cases may be lower than admissible rated AC voltage.

Taped version see page 121.

ø d	PCM
0.6	7.5 - 10
0.8	15 - 27.5
1.0	37.5



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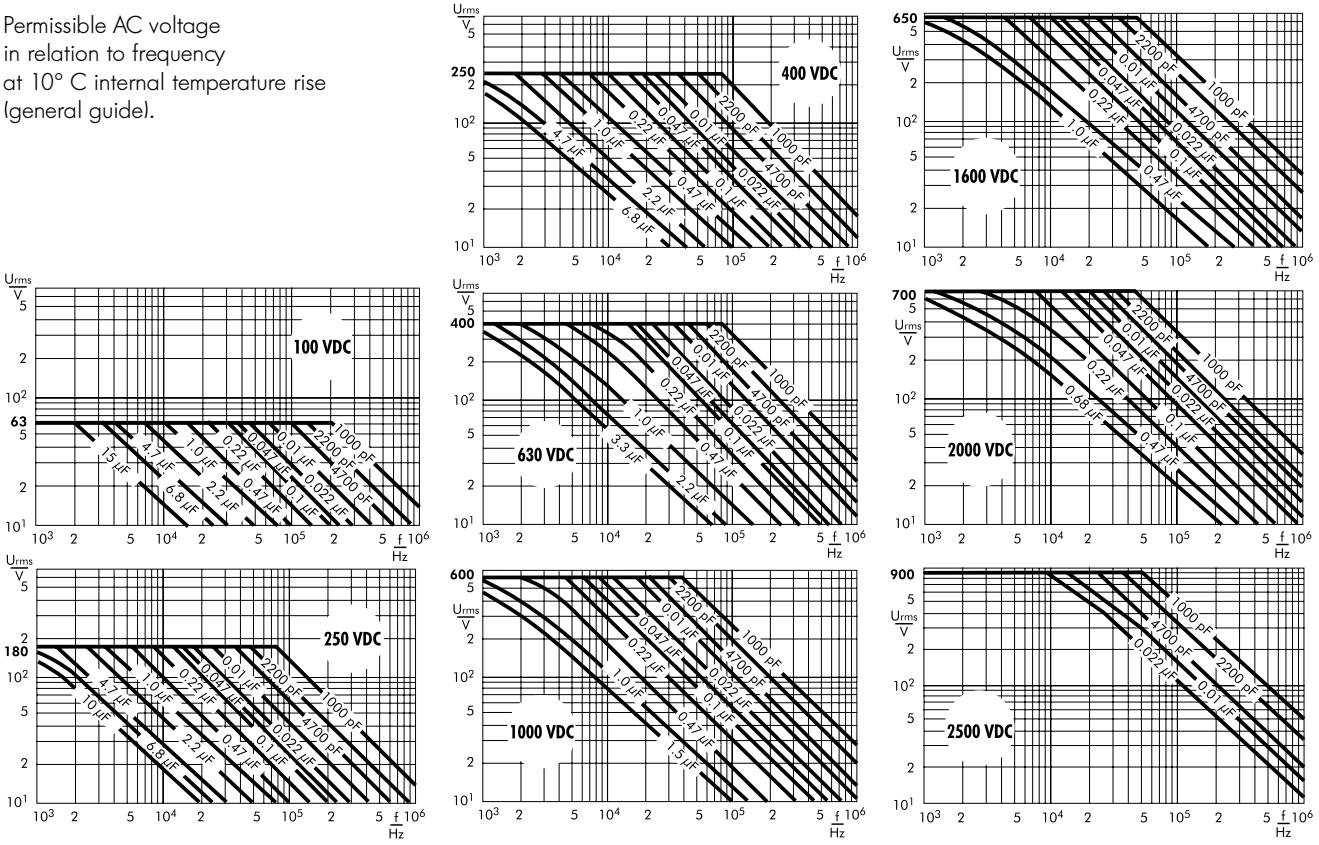
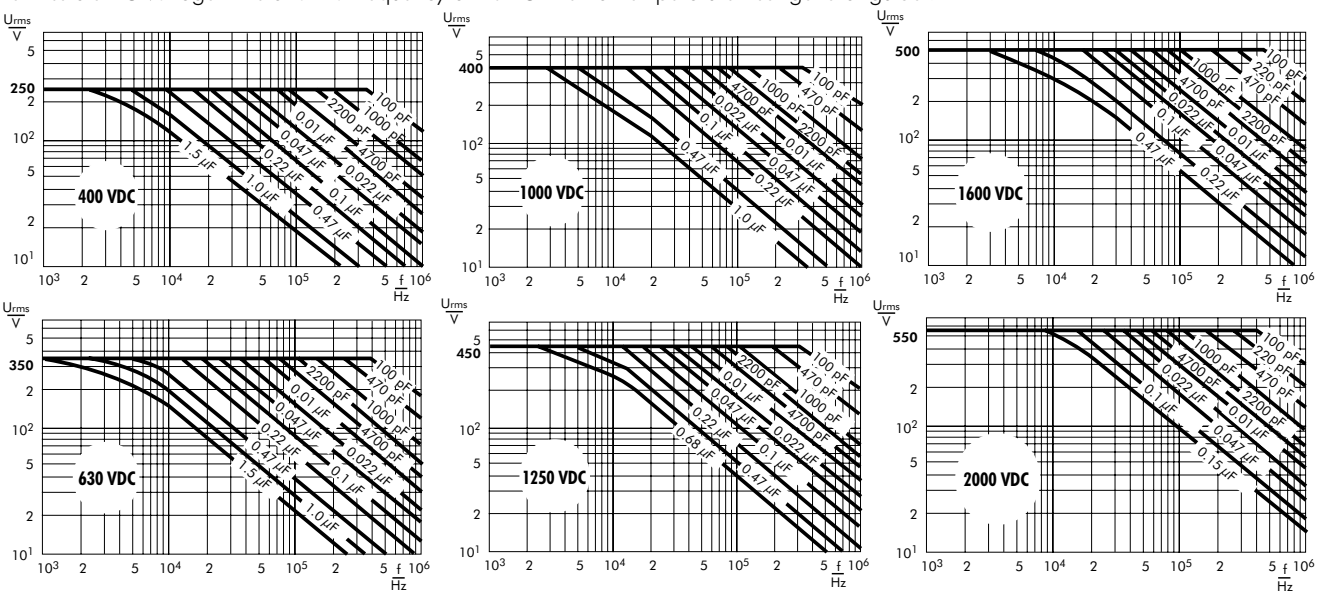
Continuation

Permissible AC voltage
in relation to frequency
at 10° C internal temperature rise
(general guide).



WIMA FKP 4

Permissible AC voltage in relation to frequency at 10° C internal temperature rise (general guide).



Technical information and general data see page 72.

Recommendation for Processing and Application of Through-Hole Capacitors

Soldering Process

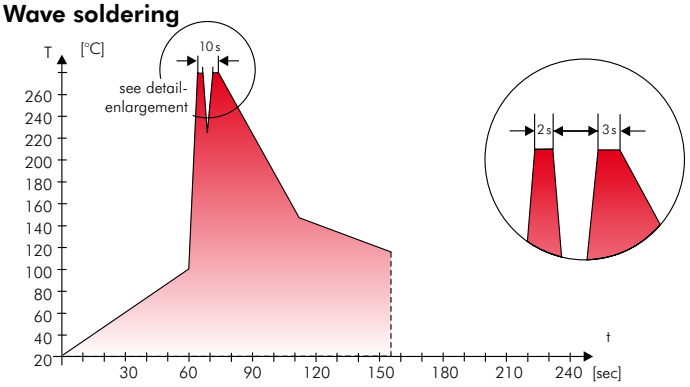
A preheating of through-hole WIMA capacitors is allowed for temperatures $T_{max} < 100°C$.
In practice a preheating duration of $t < 5$ min. has been proven to be best.

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: $2 \times t < 3$ sec

Due to different soldering processes and heat requirements the graphs are to be regarded as a recommendation only.

Wave soldering



Typical temperature/time graph for double wave soldering

WIMA Quality and Environmental Philosophy

ISO 9001:2000 Certification

ISO 9001:2000 is an international basic standard of quality assurance systems for all branches of industry. The approval according to ISO 9001:2000 of our factories by the VDE inspectorate certifies that organisation, equipment and monitoring of quality assurance in our factories correspond to internationally recognized standards.

WIMA WPCS

The WIMA Process Control System (WPCS) is a quality surveillance and optimization system developed by WIMA. WPCS is a major part of the quality-oriented WIMA production. Points of application of WPCS during production process:

- **incoming material inspection**
- **metallization**
- **film inspection**
- **schoopage**
- **pre-healing**
- **lead attachment**
- **cast resin preparation/ encapsulation**
- **100% final inspection**
- **AQL check**

WIMA Environmental Policy

All WIMA capacitors, irrespective of whether through-hole devices or SMD, are made of environmentally friendly materials. Neither during manufacture nor in the product itself any toxic substances are used, e.g.

- **Lead**
- **PCB**
- **CFC**
- **Hydrocarbon chloride**
- **Chromium 6+**
- **PBB/PBDE**
- **Arsenic**
- **Cadmium**
- **Mercury**
- **etc.**

We merely use pure, recyclable materials for packing our components, such as:

- **carton**
- **cardboard**
- **adhesive tape made of paper**
- **polystyrene**

We almost completely refrain from using packing materials such as:

- **foamed polystyrene (Styropor®)**
- **adhesive tapes made of plastic**
- **metal clips**

RoHS Compliance

According to the RoHS Directive 2002/95/EC certain hazardous substances like e.g. lead, cadmium, mercury must not be used any longer in electronic equipment as of July 1st, 2006. For the sake of the environment WIMA has refraind from using such substances since years already.

Tape for lead-free WIMA capacitors

DIN EN ISO 14001:2005

WIMA's environmental management has been established in accordance with the guidelines of DIN EN ISO 14001:2005. The certification has been granted in June 2006.

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Typical Dimensions for Taping Configuration

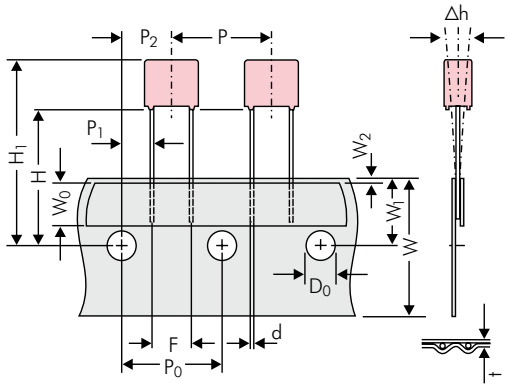

Diagram 1:
PCM 2.5/5/7.5mm

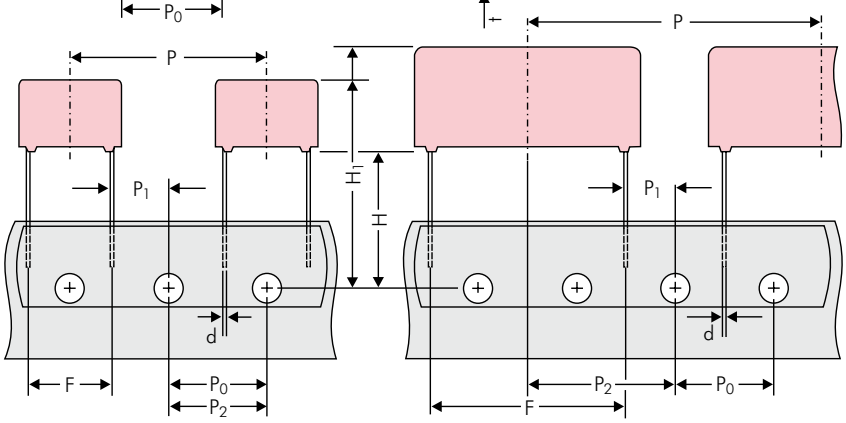

Diagram 2: PCM 10/15 mm

Diagram 3: PCM 22.5 and 27.5*mm
*PCM 27.5 taping possible with two feed holes between components

Designation	Symbol	Dimensions for Radial Taping						
		PCM 2.5 taping	**PCM 5 taping**	**PCM 7.5 taping**	**PCM 10 taping***	**PCM 15 taping***	**PCM 22.5 taping**	**PCM 27.5 taping**
Carrier tape width	W	18.0 ±0.5	18.0 ±0.5	18.0 ±0.5	18.0 ±0.5	18.0 ±0.5	18.0 ±0.5	18.0 ±0.5
Hold-down tape width	W_0	6.0 for hot-sealing adhesive tape	6.0 for hot-sealing adhesive tape	12.0 for hot-sealing adhesive tape	12.0 for hot-sealing adhesive tape	12.0 for hot-sealing adhesive tape	12.0 for hot-sealing adhesive tape	12.0 for hot-sealing adhesive tape
Hole position	W_1	9.0 ±0.5	9.0 ±0.5	9.0 ±0.5	9.0 ±0.5	9.0 ±0.5	9.0 ±0.5	9.0 ±0.5
Hold-down tape position	W_2	0.5 to 3.0 max.	0.5 to 3.0 max.	0.5 to 3.0 max.	0.5 to 3.0 max.	0.5 to 3.0 max.	0.5 to 3.0 max.	0.5 to 3.0 max.
Feed hole diameter	D_0	4.0 ±0.2	4.0 ±0.2	4.0 ±0.2	4.0 ±0.2	4.0 ±0.2	4.0 ±0.2	4.0 ±0.2
Pitch of component	P	12.7 ±1.0	12.7 ±1.0	12.7 ±1.0	25.4 ±1.0	25.4 ±1.0	38.1 ±1.5	*38.1 ±1.5 or 50.8 ±1.5
Feed hole pitch	P_0	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch	12.7 ±0.3 cumulative pitch error max. 1.0 mm/20 pitch
Feed hole centre to lead	P_1	5.1 ±0.5	3.85 ±0.7	2.6 ±0.7	7.7 ±0.7	5.2 ±0.7	7.8 ±0.7	5.3 ±0.7
Hole centre to component centre	P_2	6.35 ±1.3	6.35 ±1.3	6.35 ±1.3	12.7 ±1.3	12.7 ±1.3	19.05 ±1.3	19.05 ±1.3
Feed hole centre to bottom edge of the component	H▲	16.5 ±0.3 18.5 ±0.5	16.5 ±0.3 18.5 ±0.5	16.5 ±0.5 18.5 ±0.5	16.5 ±0.5 18.5 ±0.5	16.5 ±0.5 18.5 ±0.5	16.5 ±0.5 18.5 ±0.5	16.5 ±0.5 18.5 ±0.5
Feed hole centre to top edge of the component	H_1	$H+H_{component} < H_1$ 32.25 max.	$H+H_{component} < H_1$ 32.25 max.	$H+H_{component} < H_1$ 24.5 to 31.5	$H+H_{component} < H_1$ 25.0 to 31.5	$H+H_{component} < H_1$ 26.0 to 37.0	$H+H_{component} < H_1$ 30.0 to 43.0	$H+H_{component} < H_1$ 35.0 to 45.0
Lead spacing at upper edge of carrier tape	F	2.5 ±0.5	5.0 +0.8 −0.2	7.5 ±0.8	10.0 ±0.8	15 ±0.8	22.5 ±0.8	27.5 ±0.8
Lead diameter	d	0.4 ±0.05	0.5 ±0.05	•0.5 ±0.05 or 0.6 +0.06 −0.05	•0.5 ±0.05 or 0.6 +0.06 −0.05	0.8 +0.08 −0.05	0.8 +0.08 −0.05	0.8 +0.08 −0.05
Component alignment	Δh	± 2.0 max.	± 2.0 max.	± 3.0 max.	± 3.0 max.	± 3.0 max.	± 3.0 max.	± 3.0 max.
Total tape thickness	t	0.7 ±0.2	0.7 ±0.2	0.7 ±0.2	0.7 ±0.2	0.7 ±0.2	0.7 ±0.2	0.7 ±0.2
Package (see also page 122)	▲	ROLL/AMMO		AMMO				
		REEL ø 360 max. ø 30 ±1 B 52 ±2 / 58 ±2 } depending on comp. dimensions		REEL ø 360 max. ø 30 ±1 B 52 ±2 / 58 ±2 / 66 ±2 or REEL ø 500 max. ø 25 ±1 B 54 ±2 / 60 ±2 / 68 ±2 } depending on PCM and component dimensions				
Unit		see details page 124.						

▲ Please give „H" dimensions and desired packaging type when ordering.
• Diameter of leads see General Data.
* PCM 10 and PCM 15 can be crimped to PCM 7.5.
Position of components according to PCM 7.5 (sketch 1). P_0 = 12.7 or 15.0 is possible

Dims in mm.
Please clarify customer-specific deviations with the manufacturer.

11.08