

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

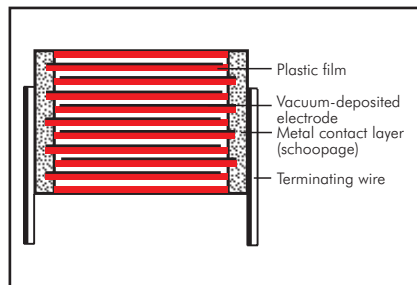
Dielectric:

Mixed film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-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:

0.01 μF to 22 μF (E12-values on request)

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, $\pm 5\%$

Operating temperature range:

-55°C to $+100^\circ\text{C}$

Climatic test category:

55/100/56 in accordance with IEC

Insulation resistance at $+20^\circ\text{C}$:

$C \leq 0.33 \mu\text{F}$: $\geq 3 \times 10^4 \text{ M}\Omega$

(mean value: $1 \times 10^5 \text{ M}\Omega$)

$C > 0.33 \mu\text{F}$: $\geq 10\,000 \text{ sec (M}\Omega \times \mu\text{F)}$

(mean value: $40\,000 \text{ sec}$)

Measuring voltage:

$U_r = 63 \text{ V}$: $U_{\text{test}} = 50 \text{ V/1 min.}$

$U_r \geq 100 \text{ V}$: $U_{\text{test}} = 100 \text{ V/1 min.}$

Test voltage:

$1.6 U_r$, 2 sec.

Dissipation factors at $+20^\circ\text{C}$: $\tan \delta$

at f	$C \leq 0.1 \mu\text{F}$	$0.1 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$C > 1.0 \mu\text{F}$
1 kHz	$\leq 5 \times 10^{-3}$	$\leq 5 \times 10^{-3}$	$\leq 5 \times 10^{-3}$
10 kHz	$\leq 8 \times 10^{-3}$	$\leq 9 \times 10^{-3}$	–
100 kHz	$\leq 11 \times 10^{-3}$	–	–

Maximum pulse rise time:

Capacitance μF	Pulse rise time V/ μsec max. operating/test			
	63 VDC	100 VDC	250 VDC	400 VDC
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:

$d \leq 0.8 \phi$: 10 N in direction of leads

$d > 0.8 \phi$: 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:

1 kPa = 10 mbar in accordance with

IEC 60068-2-13

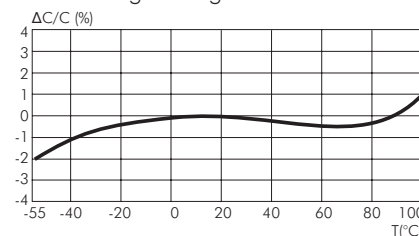
Bump test:

4000 bumps at 390 m/sec²

in accordance with IEC 60068-2-29

Capacitance change versus temperature

(f = 1 kHz) (general guide)



Voltage derating:

A voltage derating factor of 1.35 % per K must be applied from $+85^\circ\text{C}$ for DC voltages and from $+75^\circ\text{C}$ for AC voltages.

Reliability:

Operational life > 300 000 hours

Failure rate < 2 fit ($10.5 \times U_r$ and 40°C)

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**
0.01 μ F	3	8.5	10	7.5*	3	8.5	10	7.5*	3	8.5	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 "	3	8.5	10	7.5*	3	8.5	10	7.5*	3	8.5	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 μ F	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*
0.15 "	5	11	18	15*	5	11	18	15*	5	11	18	15*	6	12.5	18	15*
	5	10.5	10.3	7.5*	5	10.5	10.3	7.5*	5	10.5	10.3	7.5*	6	15	26.5	22.5*
0.22 "	5	11	13	10*	5	11	13	10*	5	11	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*	10.5	19	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 μ F	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
	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*
4.7 "													17	29	41.5	37.5*
													19	32	41.5	37.5
6.8 "	17	29	31.5	27.5*	17	29	31.5	27.5*	17	29	31.5	27.5*				
	15	26	41.5	37.5*	15	26	41.5	37.5*	15	26	41.5	37.5*				
10 μ F	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: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

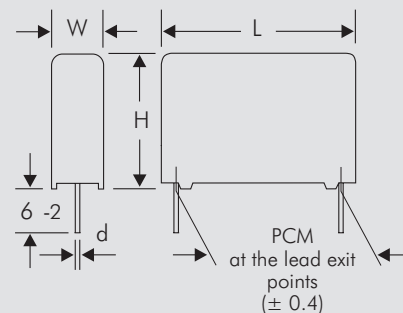
** PCM = Printed circuit module = lead spacing

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

Dims. in mm.

Taped version see page 121.

$\varnothing d$	PCM	W
0.5	7.5	≤ 3
0.6	7.5	≥ 4
0.6	10	
0.8	15 - 27.5	
1.0	37.5	



Rights reserved to amend design data without prior notification.

Recommendation for Processing and Application of Through-Hole Capacitors

Soldering Process

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

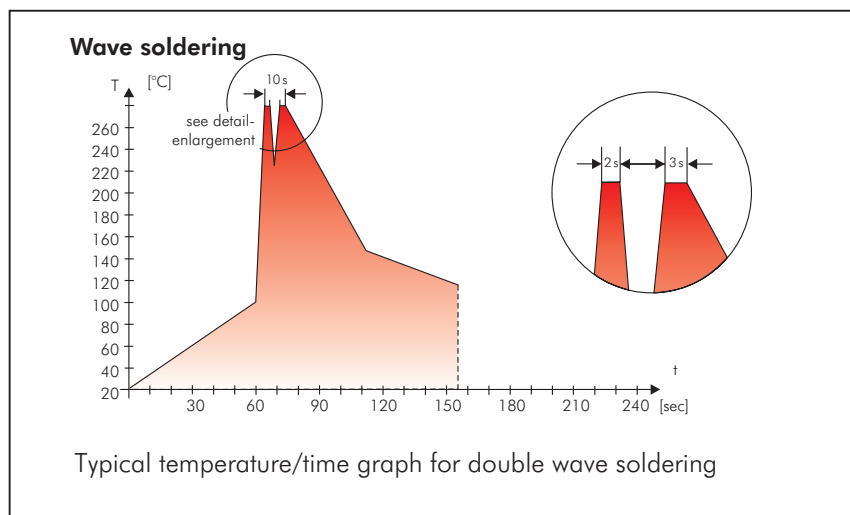
Single wave soldering

Soldering bath temperature: $T < 260^{\circ}\text{C}$
Immersion time: $t < 5$ sec

Double wave soldering

Soldering bath temperature: $T < 260^{\circ}\text{C}$
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.



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 | – PBB/PBDE |
| – PCB | – Arsenic |
| – CFC | – Cadmium |
| – Hydrocarbon chloride | – Mercury |
| – Chromium 6+ | – 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 refrained from using such substances since years already.



WIMA Kondensatoren sind bleifrei
konform RoHS 2002/95/EG

WIMA capacitors are lead free
in accordance with RoHS 2002/95/EC

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.

Typical Dimensions for Taping Configuration

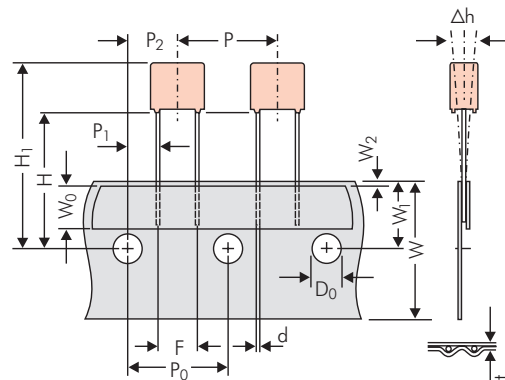


Diagram 1:
PCM 2.5/5/7.5mm

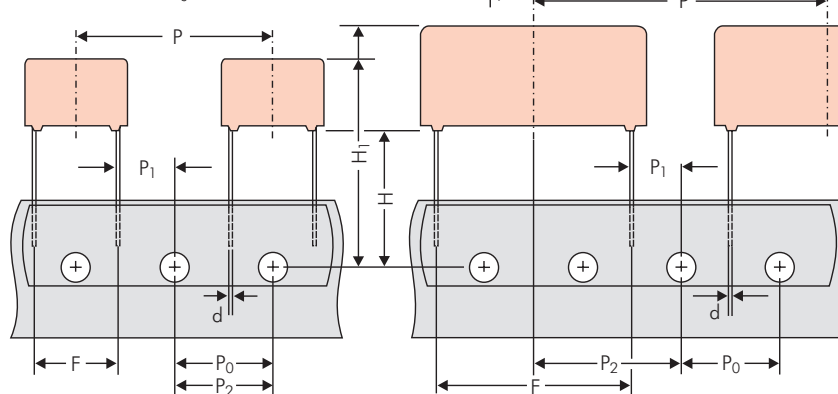


Diagram 2: PCM 10/15 mm

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	52 ±2 58 ±2 or 66 ±2	REEL ø 500 max. ø 25 ±1	54 ±2 60 ±2 or 68 ±2 } depending on PCM and component dimensions
Unit		see details page 124.						

▲ Please give „H“ dimensions and desired packaging type when ordering.

Dims in mm.

• Diameter of leads see General Data.

Please clarify customer-specific deviations with the manufacturer.

* PCM 10 and PCM 15 can be crimped to PCM 7.5.

Position of components according to PCM 7.5 (sketch 11). P₀ = 12.7 or 15.0 is possible

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[WIMA:](#)

[MKM4-.1/250/5 PCM7.5](#) [MKM4-4.7/250/5](#) [MKM4-.47/250/5](#) [MKM4-.22/250/5](#) [MKM4-.33/250/5](#) [MKM4-.15/250/5](#)
[MKM4-.68/250/5](#) [MKM4-1.0/250/5](#) [MKM4-1.5/250/5](#) [MKM4-2.2/250/5](#) [MKM4-.047/250/5](#) [MKM4-3.3/250/5](#) [MKM4-](#)
[.068/250/5](#) [MKM4-.1/250/5P10](#)