

Polypropylene (PP) Capacitors for Pulse Applications with Double-Sided Metallized Electrodes and Schoopage Contacts PCM 7.5 mm to 52.5 mm

Special Features

- Pulse duty construction
- Self-healing
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EU

Typical Applications

For pulse applications e.g.

- Switch mode power supplies
- TV and monitor sets
- Lighting
- Audio/video equipment

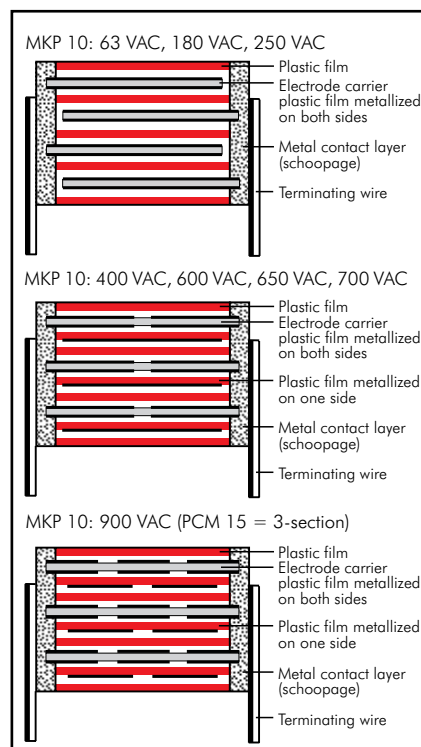
Construction

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 47 μ F (E12-values on request)

Rated voltages: 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC, 1600 VDC, 2000 VDC, 2500 VDC, 3000 VDC

Capacitance tolerances:

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

Operating temperature range:

-55°C to $+100^{\circ}\text{C}$

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

$C \leq 0.33 \mu\text{F}$: $\geq 1 \times 10^5 \text{ M}\Omega$

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

$C > 0.33 \mu\text{F}$: $\geq 30000 \text{ sec (M}\Omega \times \mu\text{F)}$

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

Test voltage: 2 sec.

L	$\leq 2000 \text{ VDC}$	2500 VDC	$\geq 3000 \text{ VDC}$
< 41.5	1.6 U_r	1.4 U_r	1.2 U_r
41.5	1.4 U_r	1.4 U_r	1.2 U_r
57	1.2 U_r	1.2 U_r	1.2 U_r

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	$\leq 3 \times 10^{-4}$	$\leq 3 \times 10^{-4}$	$\leq 3 \times 10^{-4}$
10 kHz	$\leq 4 \times 10^{-4}$	$\leq 6 \times 10^{-4}$	–
100 kHz	$\leq 15 \times 10^{-4}$	–	–

Maximum pulse rise time for pulses equal to the rated voltage

Capacitance pF/ μF	max. pulse rise time V/ μsec at $T_A < 40^{\circ}\text{C}$								
	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC	1600 VDC	2000 VDC	2500 VDC	3000 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	3400
0.033 ... 0.068	400	800	900	1800	2100	2100	2100	–	2100
0.1 ... 0.22	200	500	500	900	1400	1400	1400	–	1400
0.33 ... 0.68	100	300	400	700	900	900	900	–	900
1.0 ... 2.2	70	200	200	400	400	500	320	–	400
3.3 ... 4.7	50	80	100	150	180	250	–	–	–
6.8 ... 15	35	50	70	130	–	–	–	–	–
22 ... 47	25	35	35	–	–	–	–	–	–

Mechanical Tests

Pull test on pins:

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

$d > 0.8 \phi$: 20 N in direction of pins

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

Climatic test category:

55/100/56 in accordance with IEC

Dielectric absorption: 0.05 %

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 < 1 fit ($0.5 \times U_r$ and 40°C)

Specific dissipation:

Box size* W x H x L in mm	Specific dissipation in Watts per K above the ambient temperature
35 x 50 x 57	0.132
45 x 55 x 57	0.164
45 x 65 x 57	0.184

* other box sizes see page 10.

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.

Continuation

General Data

Capacitance	100 VDC/63 VAC*					250 VDC/180 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	10	7.5	MKP1D011002C	4	9	10	7.5	MKP1F011002C
1500 "	4	9	10	7.5	MKP1D011502C	4	9	10	7.5	MKP1F011502C
2200 "	4	9	10	7.5	MKP1D012202C	4	9	10	7.5	MKP1F012202C
3300 "	4	9	10	7.5	MKP1D013302C	4	9	10	7.5	MKP1F013302C
4700 "	4	9	10	7.5	MKP1D014702C	4	9	10	7.5	MKP1F014702C
6800 "	4	9	10	7.5	MKP1D016802C	4	9	10	7.5	MKP1F016802C
0.01 µF	4	9	10	7.5	MKP1D021002C	4	9	10	7.5	MKP1F021002C
0.015 "	4	9	10	7.5	MKP1D021502C	4	9	13	10	MKP1F021003C
0.022 "	4	9	10	7.5	MKP1D022202C	4	9	10	7.5	MKP1F021502C
0.033 "	5	10.5	10.3	7.5	MKP1D023302E	4	9	13	10	MKP1F021503C
0.047 "	4	9	13	10	MKP1D023303C	4	9	10	7.5	MKP1F022202C
0.068 "	5	10.5	10.3	7.5	MKP1D024702E	4	9	13	10	MKP1F022203C
	4	9	13	10	MKP1D024703C	5	10.5	10.3	7.5	MKP1F023302E
	5	11	13	10	MKP1D026803F	4	9	13	10	MKP1F023303C
						5	11	13	10	MKP1F024702E
						5	11	18	15	MKP1F024703C
0.1 µF	6	12	13	10	MKP1D031003G	6	12	13	10	MKP1F026803F
0.15 "	6	12.5	18	15	MKP1D031504C	5	11	18	15	MKP1F026804B
0.22 "	7	14	18	15	MKP1D032204D	6	12.5	18	15	MKP1F031003G
0.33 "	8	15	18	15	MKP1D033304F	6	15	26.5	22.5	MKP1F031004B
0.47 "	9	16	18	15	MKP1D034704J	7	14	18	15	MKP1F031504C
0.68 "	7	16.5	26.5	22.5	MKP1D034705D	6	15	26.5	22.5	MKP1F031505B
	8.5	18.5	26.5	22.5	MKP1D036805F	8	15	18	15	MKP1F032204D
						6	15	26.5	22.5	MKP1F032205B
						9	16	18	15	MKP1F033304F
						7	16.5	26.5	22.5	MKP1F033305B
						8.5	18.5	26.5	22.5	MKP1F033305B
						9	19	31.5	27.5	MKP1F034704J
1.0 µF	10.5	19	26.5	22.5	MKP1D041005G	11	21	26.5	22.5	MKP1F034705D
1.5 "	11	21	31.5	27.5	MKP1D041506B	11	21	31.5	27.5	MKP1F036805F
2.2 "	13	24	31.5	27.5	MKP1D042206D	13	24	31.5	27.5	MKP1F036806A
3.3 "	17	29	31.5	27.5	MKP1D043306G	13	24	41.5	37.5	MKP1F041005I
4.7 "	20	39.5	31.5	27.5	MKP1D044706J	15	26	31.5	27.5	MKP1F041006B
	17	29	41.5	37.5	MKP1D044707E	13	24	41.5	37.5	MKP1F041506D
	19	32	41.5	37.5	MKP1D046807F	17	34.5	31.5	27.5	MKP1F041507C
10 µF	20	39.5	41.5	37.5	MKP1D051007G	17	29	41.5	37.5	MKP1F042206F
15 "	24	45.5	41.5	37.5	MKP1D051507H	20	39.5	31.5	27.5	MKP1F042207C
	31	46	41.5	37.5	MKP1D051507I	19	32	41.5	37.5	MKP1F043306I
22 "	35	50	41.5	37.5	MKP1D052207J	20	39.5	41.5	37.5	MKP1F043307E
33 "	40	55	41.5	37.5	MKP1D053307K	19	32	41.5	37.5	MKP1F044706J
	35	50	57	52.5	MKP1D053309F	20	39.5	41.5	37.5	MKP1F044707F
47 "	45	65	57	52.5	MKP1D054709J	20	39.5	41.5	37.5	MKP1F046807G

* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

■ New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

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

Rights reserved to amend design data without prior notification.

Part number completion:

Version code:	2-pin	= 00
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 128.		

Continuation

General Data

Capacitance	400 VDC/250 VAC*					630 VDC/400 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	10	7.5	MKP1G011002C	4	9	10	7.5*	MKP1J011002C
1500 "	4	9	10	7.5	MKP1G011502C	4	9	10	7.5*	MKP1J011502C
2200 "	4	9	10	7.5	MKP1G012202C	4	9	10	7.5*	MKP1J012202C
3300 "	4	9	10	7.5	MKP1G013302C	4	9	10	7.5*	MKP1J013302C
4700 "	4	9	10	7.5	MKP1G014702C	4	9	10	7.5*	MKP1J014702C
6800 "	4	9	10	7.5	MKP1G016802C	4	9	10	7.5*	MKP1J016802C
						4	9	13	10	MKP1J016803C
0.01 µF	4	9	10	7.5	MKP1G021002C	5	10.5	10.3	7.5*	MKP1J021002E
	4	9	13	10	MKP1G021003C	4	9	13	10	MKP1J021003C
0.015 "	5	10.5	10.3	7.5	MKP1G021502E	5	11	13	10	MKP1J021503F
	4	9	13	10	MKP1G021503C	5	11	18	15	MKP1J021504B
0.022 "	5	10.5	10.3	7.5	MKP1G022202E	5	11	13	10	MKP1J022203F
	4	9	13	10	MKP1G022203C	5	11	18	15	MKP1J022204B
0.033 "	5.7	12.5	10.3	7.5	MKP1G023302F	6	12	13	10	MKP1J023303G
	5	11	13	10	MKP1G023303F	5	11	18	15	MKP1J023304B
0.047 "	6	12	13	10	MKP1G024703G	6	12.5	18	15	MKP1J024704C
	5	11	18	15	MKP1G024704B	6	15	26.5	22.5	MKP1J024705B
0.068 "	6	12.5	18	15	MKP1G026804C	7	14	18	15	MKP1J026804D
	6	15	26.5	22.5	MKP1G026805B	6	15	26.5	22.5	MKP1J026805B
0.1 µF	7	14	18	15	MKP1G031004D	9	16	18	15	MKP1J031004J
	6	15	26.5	22.5	MKP1G031005B	7	16.5	26.5	22.5	MKP1J031005D
0.15 "	8	15	18	15	MKP1G031504F	8.5	18.5	26.5	22.5	MKP1J031505F
	6	15	26.5	22.5	MKP1G031505B	9	19	31.5	27.5	MKP1J031506A
0.22 "	9	16	18	15	MKP1G032204J	8.5	18.5	26.5	22.5	MKP1J032205F
	7	16.5	26.5	22.5	MKP1G032205D	9	19	31.5	27.5	MKP1J032206A
0.33 "	8.5	18.5	26.5	22.5	MKP1G033305F	11	21	26.5	22.5	MKP1J033305I
	9	19	31.5	27.5	MKP1G033306A	11	21	31.5	27.5	MKP1J033306B
0.47 "	10.5	19	26.5	22.5	MKP1G034705G	11	21	31.5	27.5	MKP1J034706B
	9	19	31.5	27.5	MKP1G034706A					
0.68 "	11	21	26.5	22.5	MKP1G036805I	15	26	31.5	27.5	MKP1J036806F
	11	21	31.5	27.5	MKP1G036806B	13	24	41.5	37.5	MKP1J036807C
1.0 µF	13	24	31.5	27.5	MKP1G041006D	17	29	31.5	27.5	MKP1J041006G
	13	24	41.5	37.5	MKP1G041007C	15	26	41.5	37.5	MKP1J041007D
1.5 "	17	29	31.5	27.5	MKP1G041506G	20	39.5	31.5	27.5	MKP1J041506J
	13	24	41.5	37.5	MKP1G041507C	19	32	41.5	37.5	MKP1J041507F
2.2 "	20	39.5	31.5	27.5	MKP1G042206J	20	39.5	41.5	37.5	MKP1J042207G
	17	29	41.5	37.5	MKP1G042207E					
3.3 "	20	39.5	41.5	37.5	MKP1G043307G	24	45.5	41.5	37.5	MKP1J043307H
4.7 "	20	39.5	41.5	37.5	MKP1G044707G	35	50	41.5	37.5	MKP1J044707J
6.8 "	24	45.5	41.5	37.5	MKP1G046807H	40	55	41.5	37.5	MKP1J046807K
						35	50	57	52.5	MKP1J046809F
10 µF	35	50	41.5	37.5	MKP1G051007J	45	55	57	52.5	MKP1J051009H
	35	50	57	52.5	MKP1G051009F					
15 "	40	55	41.5	37.5	MKP1G051507K					
	35	50	57	52.5	MKP1G051509F					
22 "	45	65	57	52.5	MKP1G052209J					

* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

■ New values

** PCM = Printed circuit module = pin spacing

* Admissible AC voltage 280 VAC max..

Dims. in mm.

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

Rights reserved to amend design data without prior notification.

Part number completion:

Version code: 2-pin = 00
4-pin = D4
Tolerance: 20 % = M
10 % = K
5 % = J
Packing: bulk = S
Pin length: 6-2 = SD

Taped version see page 128.

Continuation

General Data

Capacitance	1000 VDC/600 VAC*					1600 VDC/650 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	10	7.5	MKP1O111002C_____	4	9	13	10	MKP1T011003C_____
	4	9	13	10	MKP1O111003C_____					
1500 "	4	9	10	7.5	MKP1O111502C_____	4	9	13	10	MKP1T011503C_____
	4	9	13	10	MKP1O111503C_____					
2200 "	4	9	10	7.5	MKP1O112202C_____	4	9	13	10	MKP1T012203C_____
	4	9	13	10	MKP1O112203C_____					
3300 "	4	9	10	7.5	MKP1O113302C_____	4	9	13	10	MKP1T013303C_____
	4	9	13	10	MKP1O113303C_____					
4700 "	4.5	9.5	10.3	7.5	MKP1O114702D_____	5	11	13	10	MKP1T014703F_____
	4	9	13	10	MKP1O114703C_____					
6800 "	5.7	12.5	10.3	7.5	MKP1O116802F_____	6	12	13	10	MKP1T016803G_____
	5	11	13	10	MKP1O116803F_____	5	11	18	15	MKP1T016804B_____
0.01 µF	5	11	13	10	MKP1O121003F_____	5	11	18	15	MKP1T021004B_____
	5	11	18	15	MKP1O121004B_____					
0.015 "	6	12	13	10	MKP1O121503G_____	6	12.5	18	15	MKP1T021504C_____
	5	11	18	15	MKP1O121504B_____	6	15	26.5	22.5	MKP1T021505B_____
0.022 "	6	12.5	18	15	MKP1O122204C_____	7	14	18	15	MKP1T022204D_____
	6	15	26.5	22.5	MKP1O122205B_____	6	15	26.5	22.5	MKP1T022205B_____
0.033 "	7	14	18	15	MKP1O123304D_____	8	15	18	15	MKP1T023304F_____
	6	15	26.5	22.5	MKP1O123305B_____	6	15	26.5	22.5	MKP1T023305B_____
0.047 "	8	15	18	15	MKP1O124704F_____	7	16.5	26.5	22.5	MKP1T024705D_____
	6	15	26.5	22.5	MKP1O124705B_____	9	19	31.5	27.5	MKP1T024706A_____
0.068 "	7	16.5	26.5	22.5	MKP1O126805D_____	10.5	19	26.5	22.5	MKP1T026805G_____
						9	19	31.5	27.5	MKP1T026806A_____
0.1 µF	8.5	18.5	26.5	22.5	MKP1O131005F_____	11	21	26.5	22.5	MKP1T031005I_____
	11	21	31.5	27.5	MKP1O131006B_____	11	21	31.5	27.5	MKP1T031006B_____
0.15 "	11	21	26.5	22.5	MKP1O131505I_____	13	24	31.5	27.5	MKP1T031506D_____
	11	21	31.5	27.5	MKP1O131506B_____					
0.22 "	11	21	31.5	27.5	MKP1O132206B_____	15	26	31.5	27.5	MKP1T032206F_____
						13	24	41.5	37.5	MKP1T032207C_____
0.33 "	15	26	31.5	27.5	MKP1O133306F_____	17	34.5	31.5	27.5	MKP1T033306I_____
	13	24	41.5	37.5	MKP1O133307C_____	17	29	41.5	37.5	MKP1T033307E_____
0.47 "	17	29	31.5	27.5	MKP1O134706G_____	20	39.5	31.5	27.5	MKP1T034706J_____
	13	24	41.5	37.5	MKP1O134707C_____	19	32	41.5	37.5	MKP1T034707F_____
0.68 "	20	39.5	31.5	27.5	MKP1O136806J_____	20	39.5	41.5	37.5	MKP1T036807G_____
	17	29	41.5	37.5	MKP1O136807E_____					
1.0 µF	20	39.5	41.5	37.5	MKP1O141007G_____	24	45.5	41.5	37.5	MKP1T041007H_____
1.5 "	24	45.5	41.5	37.5	MKP1O141507H_____	31	46	41.5	37.5	MKP1T041507I_____
2.2 "	31	46	41.5	37.5	MKP1O142207I_____	40	55	41.5	37.5	MKP1T042207K_____
3.3 "						35	50	57	52.5	MKP1T042209F_____
	40	55	41.5	37.5	MKP1O143307K_____	45	65	57	52.5	MKP1T043309J_____
4.7 "	35	50	57	52.5	MKP1O143309F_____					
	45	55	57	52.5	MKP1O144709H_____					

* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

 New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

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

Rights reserved to amend design data without prior notification.

Part number completion:

Version code:	2-pin	= 00
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 128.		

Continuation page 60

Continuation

General Data

Capacitance	2000 VDC/700 VAC*					2500 VDC/900 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	13	10	MKP1U011003C_____	5	11	18	15	MKP1V011004B_____
1500 "	4	9	13	10	MKP1U011503C_____	6	15	26.5	22.5	MKP1V011005B_____
2200 "	5	11	13	10	MKP1U012203F_____	6	15	26.5	22.5	MKP1V011504B_____
3300 "	5	11	18	15	MKP1U012204B_____	6	15	26.5	22.5	MKP1V011505B_____
4700 "	5	11	18	15	MKP1U013304B_____	5	11	18	15	MKP1V012204B_____
6800 "	6	15	26.5	22.5	MKP1U014704B_____	6	15	26.5	22.5	MKP1V012205B_____
	6	15	26.5	22.5	MKP1U014705B_____	5	11	18	15	MKP1V013304B_____
	6	12.5	18	15	MKP1U016804C_____	6	15	26.5	22.5	MKP1V013305B_____
	6	15	26.5	22.5	MKP1U016805B_____	6	12.5	18	15	MKP1V014704C_____
0.01 µF	7	14	18	15	MKP1U021004D_____	6	15	26.5	22.5	MKP1V014705B_____
0.015 "	8	15	18	15	MKP1U021504F_____	7	14	18	15	MKP1V016804D_____
0.022 "	9	16	18	15	MKP1U022204J_____	7	16.5	26.5	22.5	MKP1V016805D_____
0.033 "	8.5	18.5	26.5	22.5	MKP1U022205D_____	8.5	18.5	26.5	22.5	MKP1V021005F_____
0.047 "	9	19	31.5	27.5	MKP1U023305F_____	10.5	19	26.5	22.5	MKP1V021505G_____
0.068 "	10.5	19	26.5	22.5	MKP1U023306A_____	11	21	26.5	22.5	MKP1V022205I_____
	11	21	31.5	27.5	MKP1U024705G_____					
	11	21	26.5	22.5	MKP1U024706B_____					
	11	21	31.5	27.5	MKP1U026805I_____					
	11	21	31.5	27.5	MKP1U026806B_____					
0.1 µF	13	24	31.5	27.5	MKP1U031006D_____					
0.15 "	15	26	31.5	27.5	MKP1U031506F_____					
	13	24	41.5	37.5	MKP1U031507C_____					
0.22 "	17	34.5	31.5	27.5	MKP1U032206I_____					
	17	29	41.5	37.5	MKP1U032207E_____					
0.33 "	19	32	41.5	37.5	MKP1U033307F_____					
0.47 "	20	39.5	41.5	37.5	MKP1U034707G_____					
0.68 "	24	45.5	41.5	37.5	MKP1U036807H_____					
1.0 µF	35	50	41.5	37.5	MKP1U041007J_____					
1.5 "	40	55	41.5	37.5	MKP1U041507K_____					
	35	50	57	52.5	MKP1U041509F_____					
2.2 "	45	55	57	52.5	MKP1U042209H_____					

* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

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

Part number completion:

Version code: 2-pin = 00
 4-pin = D4
 Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: 6-2 = SD
 Taped version see page 128.

Rights reserved to amend design data without prior notification.

Continuation page 61

Continuation

General Data

Capacitance	W	H	L	PCM**	Part number
0.01 μF	6	15	26.5	22.5	MKP1W021005B
0.015 "	7	16.5	26.5	22.5	MKP1W021505D
0.022 "	8.5	18.5	26.5	22.5	MKP1W022205F
0.033 "	11	21	26.5	22.5	MKP1W023305I
	9	19	31.5	27.5	MKP1W023306A
0.047 "	11	21	31.5	27.5	MKP1W024706B
0.068 "	13	24	31.5	27.5	MKP1W026806D
0.1 μF	15	26	31.5	27.5	MKP1W031006F
	13	24	41.5	37.5	MKP1W031007C
0.15 "	17	34.5	31.5	27.5	MKP1W031506I
	15	26	41.5	37.5	MKP1W031507D
0.22 "	19	32	41.5	37.5	MKP1W032207F
0.33 "	24	45.5	41.5	37.5	MKP1W033307H
0.47 "	31	46	41.5	37.5	MKP1W034707I
0.68 "	35	50	41.5	37.5	MKP1W036807J
1.0 μF	40	55	41.5	37.5	MKP1W041007K
	35	50	57	52.5	MKP1W041009F
1.5 "	45	55	57	52.5	MKP1W041509H

* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

New range

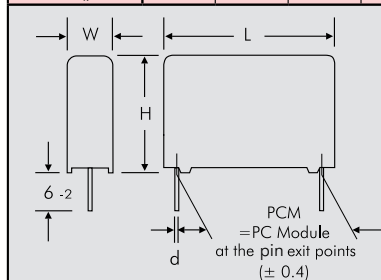
** PCM = Printed circuit module = pin spacing

Dims. in mm.

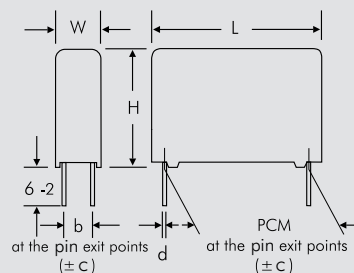
Ionisation inception level in isolated cases may be lower than admissible rated AC voltage.

Part number completion:

Version code:	2-pin	= 00
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 128.		



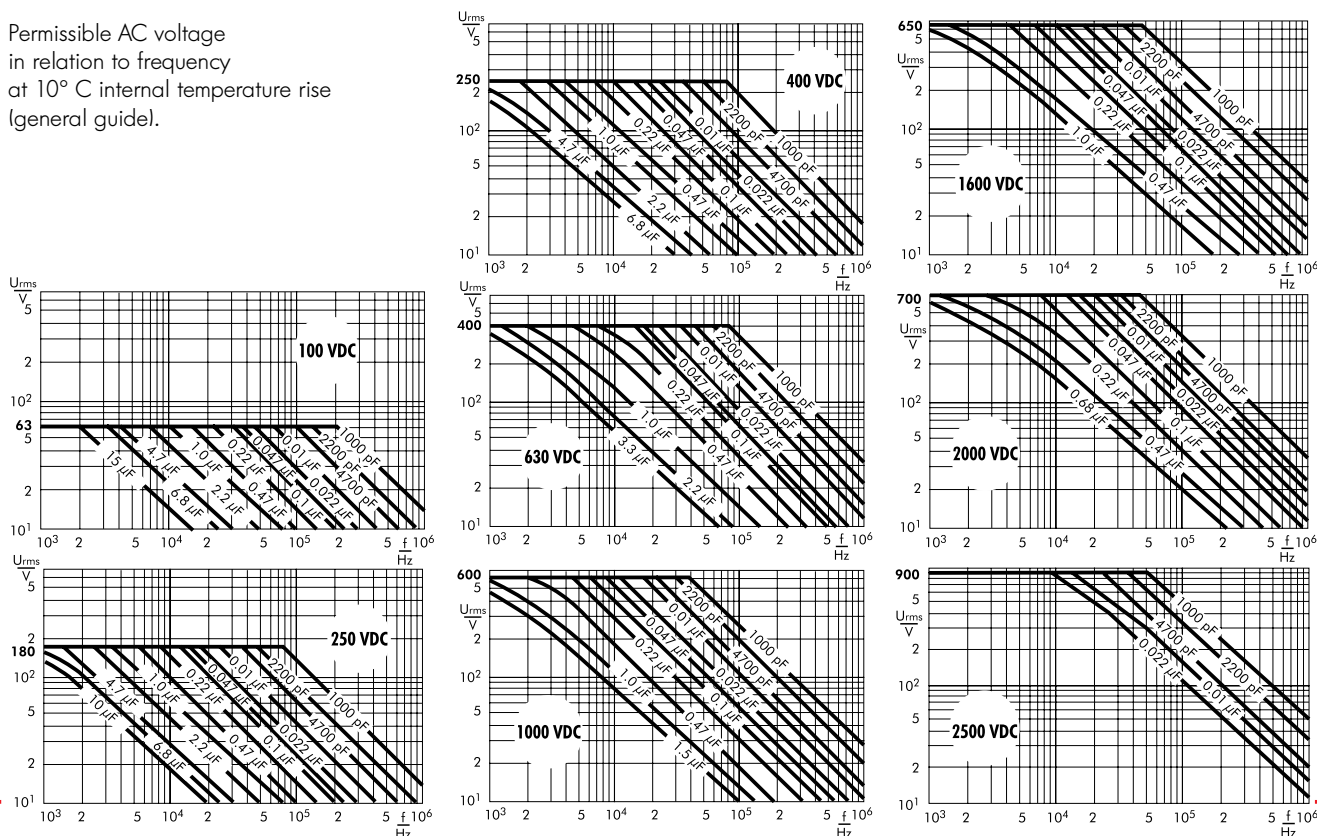
ϕd	PCM
0.6	7.5 - 10
0.8	15 - 27.5
1.0	37.5



W	PCM	b	ϕd	c
17	37.5	10	1.0	0.4
19	37.5	10	1.0	0.4
20	37.5	12.5	1.0	0.4
24	37.5	12.5	1.0	0.4
31	37.5	20	1.0	0.4
35	37.5	20	1.0	0.4
40	37.5	20	1.0	0.4
35	52.5	20	1.2	0.8
45	52.5	20	1.2	0.8

Rights reserved to amend design data without prior notification.

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



Recommendation for Processing and Application of Through-Hole Capacitors

Soldering Process

Internal temperature of the capacitor must be kept as follows:

Polyester: preheating: $T_{\max.} \leq 125^{\circ}\text{C}$
soldering: $T_{\max.} \leq 135^{\circ}\text{C}$

Polypropylene: preheating: $T_{\max.} \leq 100^{\circ}\text{C}$
soldering: $T_{\max.} \leq 110^{\circ}\text{C}$

Single wave soldering

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

Dwell time: $t < 5\text{ sec}$

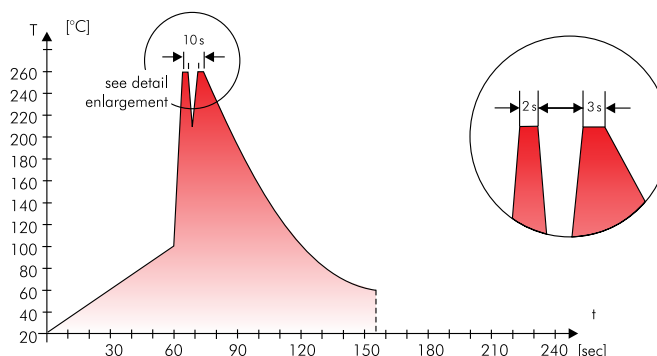
Double wave soldering

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

Dwell time: $\Sigma t < 5\text{ sec}$

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 9001:2008 Certification

ISO 9001:2008 is an international basic standard of quality assurance systems for all branches of industry. The approval according to ISO 9001:2008 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
- pin 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 2011/65/EU 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 2011/65/EU

WIMA capacitors are lead free
in accordance with RoHS 2011/65/EU

Tape for lead-free WIMA capacitors

DIN EN ISO 14001:2004

WIMA's environmental management has been established in accordance with the guidelines of DIN EN ISO 14001:2004 to optimize the production processes with regard to energy and resources.

Typical Dimensions for Taping Configuration

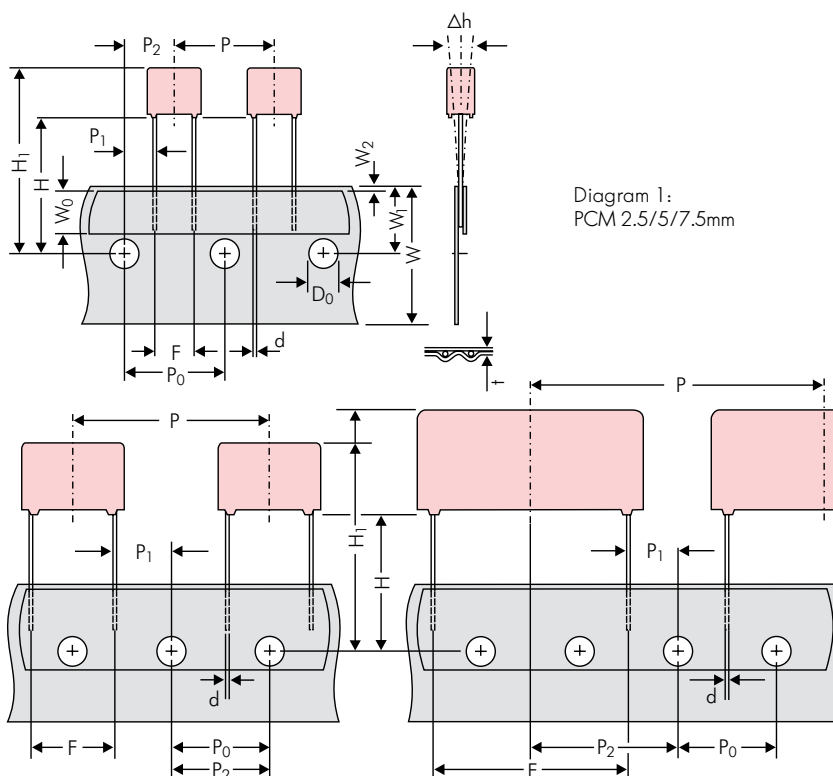


Diagram 2: PCM 10/15 mm

Diagram 3: PCM 22.5 and 27.5*mm

*PCM 27.5 tapping possible with two feed holes between components

Designation	Symbol	Dimensions for Radial Taping						
		PCM 2.5 tapping	PCM 5 tapping	PCM 7.5 tapping	PCM 10 tapping*	PCM 15 tapping*	PCM 22.5 tapping	PCM 27.5 tapping
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 pin	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
Pin 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
Pin 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 129)		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 B 58 ±2 or 66 ±2	REEL ø 500 max. ø 25 ±1	54 ±2 B 60 ±2 68 ±2 } depending on PCM and component dimensions
Unit		see details page 130.						

Dims in mm.

* Diameter of pins see General Data.

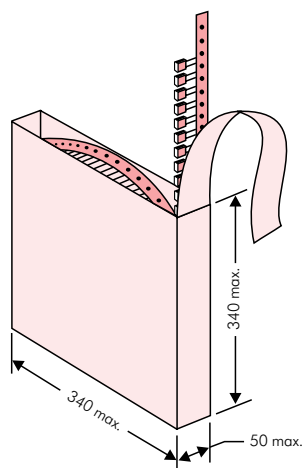
* PCM 10 and PCM 15 can be crimped to PCM 7.5.

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

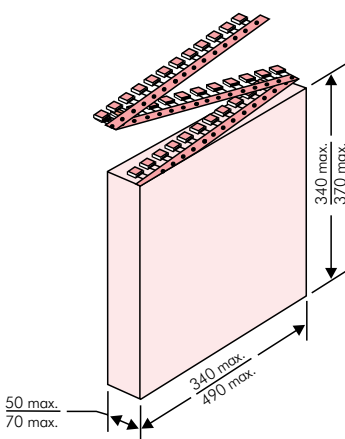
Please clarify customer-specific deviations with the manufacturer.

Types of Tape Packaging of Capacitors for Automatic Radial Insertion

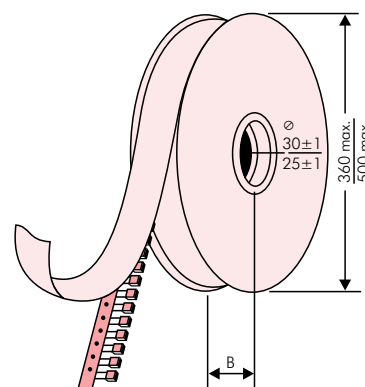
■ ROLL Packaging



■ AMMO Packaging



■ REEL Packaging



BAR CODE (Labelling)

Labelling of package units in plain text and with alphanumerical Bar Code

Scanner decoding of

- WIMA supplier number
- Customer's P/O number
- Customer's part number
- WIMA confirmation number
- WIMA part number
- Lot number
- Date code
- Quantity

In addition part description of

- article
- capacitance value
- rated voltage
- dimensions
- capacitance tolerance
- packing

as well as gross weight and customer's name are indicated in plain text.

WIMA Best Capacitors Made in Germany		Werk Unna	
Supplier-ID: 123456789	RoHS 2011/65/EC	Date Code: 08.10.10	
Purchase Order No. (P/O): Bestellung xyz		Quantity: 5.000	
Customer Part No.: KUNDETEILENUMMER		Customer No.: 0000100002	
WIMA Confirmation No.: 0001004063000100		Gross Weight [g]: 1870	
WIMA Part No.: MKS2C034701C00K89D			
Handling Unit:	MKS 2	QTY: 5.000	COO: DE
1000067326	MKS 2 0.47 μ F 63 VDC 3.5x8.5x7.2 RMS		
	Standard 10% Loss - Standard Drähte 6-2		
	Vorlage Debitur Inland	Week 03/2011	

BARCODE „Code 39“



Packing Quantities for Capacitors with Radial Pins in PCM 2.5 mm to 22.5 mm

PCM	Size				bulk	pcs. per packing unit									
						ROLL		REEL				AMMO			
	H16.5	H18.5	ø 360	ø 500		340 × 340		490 × 370							
	W	H	L	Codes	S	N	O	F	I	H	J	A	C	B	D
2.5 mm	2.5	7	4.6	0B	5000			2500		—		2800		—	
	3	7.5	4.6	0C	5000	2200		2300		—		2300		—	
	3.8	8.5	4.6	0D	5000	2000		1800		—		1800		—	
	4.6	9	4.6	0E	5000	1500		1500		—		1500		—	
	5.5	10	4.6	0F	5000	1200		1200		—		1200		—	
5 mm	2.5	6.5	7.2	1A	5000	900		2500		—		2800		—	
	3	7.5	7.2	1B	5000	2200		2300		—		2300		—	
	3.5	8.5	7.2	1C	5000	2000		2000		—		2000		—	
	4.5	6	7.2	1D	6000	1600		1500		—		1500		—	
	4.5	9.5	7.2	1E	4000	1300		1500		—		1500		—	
	5	10	7.2	1F	3500	1300		1400		—		1400		—	
	5.5	7	7.2	1G	4000	1100		1200		—		1200		—	
	5.5	11.5	7.2	1H	2500	1000		1200		—		1200		—	
	6.5	8	7.2	1I	2500	1000		1000		—		1000		—	
	7.2	8.5	7.2	1J	2500	800		1000		—		1000		—	
	7.2	13	7.2	1K	2000	700		950		—		1000		—	
	8.5	10	7.2	1L	2000	700		800		—		800		—	
	8.5	14	7.2	1M	1500	800		800		—		800		—	
	11	16	7.2	1N	1000	600		600		—		400		—	
7.5 mm	2.5	7	10	2A	5000	—		2500		4400		2500		—	
	3	8.5	10	2B	5000	—		2200		4300		2300		4150	
	4	9	10	2C	4000	—		1700		3200		1700		3100	
	4.5	9.5	10.3	2D	3500	—		1500		2900		1400		2800	
	5	10.5	10.3	2E	3000	—		1300		2500		1300		—	
	5.7	12.5	10.3	2F	2000	—		1000		2200		1100		—	
	7.2	12.5	10.3	2G	1500	—		900		1800		1000		—	
10 mm	3	9	13	3A	3000	—		1100		2200		—		1900	
	4	8.5	13.5	FA	3000	—		900		1600		—		1450	
	4	9	13	3C	3000	—		900		1600		—		1450	
	4	9.5	13	3D	3000	—		900		1600		—		1400	
	5	10	13.5	FB	2000	—		700		1300		—		1200	
	5	11	13	3F	3000	—		700		1300		—		1200	
	6	12	13	3G	2400	—		550		1100		—		1000	
	6	12.5	13	3H	2400	—		550		1100		—		1000	
8	12	13	3I	2000	—		400		800		—		740		
15 mm	5	11	18	4B	2400	—		600		1200		—		1150	
	5	13	19	FC	1000	—		600		1200		—		1200	
	6	12.5	18	4C	2000	—		500		1000		—		1000	
	6	14	19	FD	1000	—		500		1000		—		1000	
	7	14	18	4D	1600	—		450		900		—		850	
	7	15	19	FE	1000	—		450		900		—		850	
	8	15	18	4F	1200	—		400		800		—		740	
	8	17	19	FF	500	—		400		800		—		740	
	9	14	18	4H	1200	—		350		700		—		650	
	9	16	18	4J	900	—		350		700		—		650	
	10	18	19	FG	500	—		300		650		—		590	
11	14	18	4M	1000	—		300		600		—		540		
22.5 mm	5	14	26.5	5A	1200	—		—		800		—		770	
	6	15	26.5	5B	1000	—		—		700		—		640	
	7	16.5	26.5	5D	760	—		—		600		—		550	
	8	20	28	FH	500	—		—		500		—		480	
	8.5	18.5	26.5	5F	500	—		—		480		—		450	
	10	22	28	FI	540*	—		—		420		—		380	
	10.5	19	26.5	5G	680*	—		—		400		—		360	
	10.5	20.5	26.5	5H	680*	—		—		400		—		360	
	11	21	26.5	5I	680*	—		—		380		—		350	
	12	24	28	FJ	450*	—		—		350		—		310	

* TPS (Tray-Packing-System). Plate versions may have different packing units.
Samples and pre-production needs on request.

■ Moulded versions.

Rights reserved to amend design data without prior notification.

Packing Quantities for Capacitors with Radial Pins in PCM 27.5 mm to 52.5 mm

PCM	Size				bulk	ROLL		pcs. per packing unit				AMMO			
								REEL							
	W	H	L	Codes		H16.5	H18.5	ø 360	ø 500	340 × 340	490 × 370	H16.5	H18.5	H16.5	H18.5
					S	N	O	F	I	H	J	A	C	B	D
27.5 mm	9	19	31.5	6A	640*	–	–	–	–	460/340*	–	–	–	420	–
	11	21	31.5	6B	544*	–	–	–	–	380/280*	–	–	–	350	–
	13	24	31.5	6D	448*	–	–	–	–	300	–	–	–	290	–
	13	25	33	6K	336*	–	–	–	–	–	–	–	–	–	–
	15	26	31.5	6F	384*	–	–	–	–	270	–	–	–	250	–
	15	26	33	6L	288*	–	–	–	–	–	–	–	–	–	–
	17	29	31.5	6G	176*	–	–	–	–	–	–	–	–	–	–
	17	34.5	31.5	6I	176*	–	–	–	–	–	–	–	–	–	–
	20	32	33	6M	216*	–	–	–	–	–	–	–	–	–	–
	20	39.5	31.5	6J	144*	–	–	–	–	–	–	–	–	–	–
37.5 mm	9	19	41.5	7A	480*	–	–	–	–	–	–	–	–	–	–
	11	22	41.5	7B	408*	–	–	–	–	–	–	–	–	–	–
	13	24	41.5	7C	252*	–	–	–	–	–	–	–	–	–	–
	15	26	41.5	7D	144*	–	–	–	–	–	–	–	–	–	–
	17	29	41.5	7E	132*	–	–	–	–	–	–	–	–	–	–
	19	32	41.5	7F	108*	–	–	–	–	–	–	–	–	–	–
	20	39.5	41.5	7G	108*	–	–	–	–	–	–	–	–	–	–
	24	45.5	41.5	7H	84*	–	–	–	–	–	–	–	–	–	–
	31	46	41.5	7I	72*	–	–	–	–	–	–	–	–	–	–
	35	50	41.5	7J	35*	–	–	–	–	–	–	–	–	–	–
	40	55	41.5	7K	28*	–	–	–	–	–	–	–	–	–	–
48.5 mm	19	31	56	8D	50*	–	–	–	–	–	–	–	–	–	–
	23	34	56	8E	72*	–	–	–	–	–	–	–	–	–	–
	27	37.5	56	8H	60*	–	–	–	–	–	–	–	–	–	–
	33	48	56	8J	48*	–	–	–	–	–	–	–	–	–	–
	37	54	56	8L	25*	–	–	–	–	–	–	–	–	–	–
52.5 mm	35	50	57	9F	25*	–	–	–	–	–	–	–	–	–	–
	45	55	57	9H	20*	–	–	–	–	–	–	–	–	–	–
	45	65	57	9J	20*	–	–	–	–	–	–	–	–	–	–

* for 2-inch transport pitches.

* TPS (Tray-Packing-System). Plate versions may have different packing units.
Samples and pre-production needs on request.

■ Moulded versions.

Rights reserved to amend design data without prior notification.

WIMA Part Number System

A WIMA part number consists of 18 digits and is composed as follows:

Field 1 - 4: Type description
 Field 5 - 6: Rated voltage
 Field 7 - 10: Capacitance
 Field 11 - 12: Size and PCM
 Field 13 - 14: Version code (e.g. Snubber versions)
 Field 15: Capacitance tolerance
 Field 16: Packing
 Field 17 - 18: Pin length (untaped)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
M	K	S	2	C	0	2	1	0	0	1	A	0	0	M	S	S	D
MKS 2				63 VDC		0.01 μF				2.5x6.5x7.2		-		20%	bulk	6 -2	
Type description:				Rated voltage:		Capacitance:				Size:				Tolerance:			
SMD-PET = SMDT				50 VDC = B0		22 pF = 0022				4.8x3.3x3 Size 1812 = KA				±20% = M			
SMD-PPS = SMDI				63 VDC = C0		47 pF = 0047				4.8x3.3x4 Size 1812 = KB				±10% = K			
FKP 02 = FKP0				100 VDC = D0		100 pF = 0100				5.7x5.1x3.5 Size 2220 = QA				±5% = J			
MKS 02 = MKS0				250 VDC = F0		150 pF = 0150				5.7x5.1x4.5 Size 2220 = QB				±2.5% = H			
FKS 2 = FKS2				400 VDC = G0		220 pF = 0220				7.2x6.1x3 Size 2824 = TA				±1 % = E			
FKP 2 = FKP2				450 VDC = H0		330 pF = 0330				7.2x6.1x5 Size 2824 = TB				...			
MKS 2 = MKS2				600 VDC = I0		470 pF = 0470				10.2x7.6x5 Size 4030 = VA				Packing: AMMO H16.5 340x340 = A AMMO H16.5 490x370 = B AMMO H18.5 340x340 = C AMMO H18.5 490x370 = D REEL H16.5 360 = F REEL H16.5 500 = H REEL H18.5 360 = I REEL H18.5 500 = J ROLL H16.5 = N ROLL H18.5 = O BLISTER W12 180 = P BLISTER W12 330 = Q BLISTER W16 330 = R BLISTER W24 330 = T Bulk/TPS Standard = S ...			
MKP 2 = MKP2				630 VDC = J0		680 pF = 0680				12.7x10.2x6 Size 5040 = XA							
FKS 3 = FKS3				700 VDC = K0		1000 pF = 1100				15.3x13.7x7 Size 6054 = YA							
FKP 3 = FKP3				800 VDC = L0		1500 pF = 1150				2.5x7x4.6 PCM 2.5 = 0B							
MKS 4 = MKS4				850 VDC = M0		2200 pF = 1220				3x7.5x4.6 PCM 2.5 = 0C							
MKP 4 = MKP4				900 VDC = N0		3300 pF = 1330				2.5x6.5x7.2 PCM 5 = 1A							
MKP 10 = MKP1				1000 VDC = O1		4700 pF = 1470				3x7.5x7.2 PCM 5 = 1B							
FKP 4 = FKP4				1100 VDC = P0		6800 pF = 1680				2.5x7x10 PCM 7.5 = 2A							
FKP 1 = FKP1				1200 VDC = Q0		0.01 μF = 2100				3x8.5x10 PCM 7.5 = 2B							
MKP-X2 = MKX2				1250 VDC = R0		0.022 μF = 2220				3x9x13 PCM 10 = 3A							
MKP-X2 R = MKXR				1500 VDC = S0		0.047 μF = 2470				4x9x13 PCM 10 = 3C							
MKP-Y2 = MKY2				1600 VDC = T0		0.1 μF = 3100				5x11x18 PCM 15 = 4B							
MP 3-X2 = MPX2				2000 VDC = U0		0.22 μF = 3220				6x12.5x18 PCM 15 = 4C							
MP 3-X1 = MPX1				2500 VDC = V0		0.47 μF = 3470				5x14x26.5 PCM 22.5 = 5A							
MP 3-Y2 = MPY2				3000 VDC = W0		1 μF = 4100				6x15x26.5 PCM 22.5 = 5B							
MP 3R-Y2 = MPRY				4000 VDC = X0		2.2 μF = 4220				9x19x31.5 PCM 27.5 = 6A							
Snubber MKP = SNMP				6000 VDC = Y0		4.7 μF = 4470				11x21x31.5 PCM 27.5 = 6B							
Snubber FKP = SNFP				250 VAC = 0W		10 μF = 5100				9x19x41.5 PCM 37.5 = 7A							
GTO MKP = GTOM				275 VAC = 1W		22 μF = 5220				11x22x41.5 PCM 37.5 = 7B							
DC-LINK MKP 3 = DCP3				300 VAC = 2W		47 μF = 5470				94x49x182 DCH_ = H0							
DC-LINK MKP 4 = DCP4				400 VAC = 3W		100 μF = 6100				94x77x182 DCH_ = H1							
DC-LINK MKP 4S = DCPS				440 VAC = 4W		220 μF = 6220				...							
DC-LINK MKP 5 = DCP5				500 VAC = 5W		1000 μF = 7100				...							
DC-LINK MKP 6 = DCP6							Version code:							
DC-LINK HC = DCH_										Standard = 00							
DC-LINK HY = DCHY										Version A1 = 1A							
										Version A1.1.1 = 1B							
										Version A2 = 2A							
										...							