

## Polypropylene (PP) Capacitors for Pulse Applications with Double-Sided Metallized Electrodes in PCM 7.5 mm to 52.5 mm. Capacitances from 1000 pF to 47 µF. Rated Voltages from 100 VDC to 3000 VDC.

### 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.

### Electrical Data

#### Capacitance range:

1000 pF to 47 µF (E12-values on request)

**Rated voltages:** 100 VDC, 250 VDC, 400 VDC, 630 VDC, 850 VDC, 1000 VDC, 1250 VDC, 1600 VDC, 2000 VDC, 2500 VDC, 3000 VDC

#### Capacitance tolerances:

±20%, ±10%, ±5%

#### Operating temperature range:

-55° C to +110° C

#### Insulation resistance at +20° C:

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

$C > 0.33 \mu\text{F}$ :  $\geq 30\,000 \text{ sec} (\text{M}\Omega \times \mu\text{F})$

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 $U_r$

#### 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° 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)

#### Specific dissipation:

Box size* WxHxL 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 11.

#### Dissipation factors at +20° 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	$\leq 6 \times 10^{-4}$	$\leq 6 \times 10^{-4}$	$\leq 6 \times 10^{-4}$
10 kHz	$\leq 6 \times 10^{-4}$	$\leq 6 \times 10^{-4}$	-
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 $T_A < 40^\circ \text{C}$										
	100VDC	250VDC	400VDC	630VDC	850VDC	1000VDC	1250VDC	1600VDC	2000VDC	2500VDC	3000VDC
1000 ... 2200	1250	2300	2300	2300	3500	3500	7000	7000	11500	11500	-
3300 ... 6800	1150	1500	1500	1500	3500	3500	7000	7000	11500	11500	-
0.01 ... 0.022	900	1400	1500	1500	2700	2700	3800	3800	4400	11500	-
0.033 ... 0.068	500	1000	1150	1400	2700	2700	2700	2700	2700	2700	2700
0.1 ... 0.22	250	650	650	1150	1800	1800	1800	1800	1800	1800	1800
0.33 ... 0.68	130	390	500	900	1150	1150	1150	1150	1150	1150	1150
1.0 ... 2.2	90	250	250	500	500	500	650	650	650	650	500
3.3 ... 4.7	65	100	130	190	230	230	330	330	-	-	-
6.8 ... 15	45	65	90	160	-	-	-	-	-	-	-
22 ... 47	30	45	45	-	-	-	-	-	-	-	-

### 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:** 1kPa = 10 mbar in accordance with IEC 60068-2-13

**Bump test:** 4000 bumps at 390 m/sec<sup>2</sup> 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.



## 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	10	7.5	MKP1F021502C
0.022 "	4	9	10	7.5	MKP1D022202C	4	9	10	7.5	MKP1F022202C
0.033 "	5	10.5	10.3	7.5	MKP1D023302E	5	10.5	10.3	7.5	MKP1F023302E
0.047 "	4	9	13	10	MKP1D023303C	4	9	13	10	MKP1F023303C
0.068 "	5	10.5	10.3	7.5	MKP1D024702E	5	10.5	10.3	7.5	MKP1F024702E
	4	9	13	10	MKP1D024703C	4	9	13	10	MKP1F024703C
	5	11	13	10	MKP1D026803F	5	11	13	10	MKP1F026803F
	5	11	18	15	MKP1F026804B					
0.1 µF	6	12	13	10	MKP1D031003G	6	12	13	10	MKP1F031003G
0.15 "	6	12.5	18	15	MKP1D031504C	6	12.5	18	15	MKP1F031504C
0.22 "	7	14	18	15	MKP1D032204D	7	14	18	15	MKP1F032204D
0.33 "	8	15	18	15	MKP1D033304F	8	15	18	15	MKP1F033304F
0.47 "	9	16	18	15	MKP1D034704J	9	16	18	15	MKP1F034704J
0.68 "	7	16.5	26.5	22.5	MKP1D034705D	7	16.5	26.5	22.5	MKP1F034705D
	8.5	18.5	26.5	22.5	MKP1D036805F	8.5	18.5	26.5	22.5	MKP1F036805F
						9	19	31.5	27.5	MKP1F036806A
1.0 µF	10.5	19	26.5	22.5	MKP1D041005G	11	21	26.5	22.5	MKP1F041005I
1.5 "	11	21	31.5	27.5	MKP1D041506B	11	21	31.5	27.5	MKP1F041006B
2.2 "	13	24	31.5	27.5	MKP1D042206D	13	24	31.5	27.5	MKP1F041506D
3.3 "	17	29	31.5	27.5	MKP1D043306G	13	24	41.5	37.5	MKP1F041507C
4.7 "	20	39.5	31.5	27.5	MKP1D044706J	15	26	31.5	27.5	MKP1F042206F
6.8 "	17	29	41.5	37.5	MKP1D044707E	13	24	41.5	37.5	MKP1F042207C
	19	32	41.5	37.5	MKP1D046807F	17	34.5	31.5	27.5	MKP1F043306I
						17	29	41.5	37.5	MKP1F043307E
10 µF	20	39.5	41.5	37.5	MKP1D051007G	20	39.5	31.5	27.5	MKP1F044706J
15 "	24	45.5	41.5	37.5	MKP1D051507H	19	32	41.5	37.5	MKP1F044707F
	31	46	41.5	37.5	MKP1D051507I	20	39.5	41.5	37.5	MKP1F046807G
	35	50	41.5	37.5	MKP1D052207J	24	45.5	41.5	37.5	MKP1F051007H
	40	55	41.5	37.5	MKP1D053307K	35	50	41.5	37.5	MKP1F051507J
	35	50	57	52.5	MKP1D053309F	35	50	57	52.5	MKP1F051509F
	45	65	57	52.5	MKP1D054709J	35	50	57	52.5	MKP1F052209F
						45	65	57	52.5	MKP1F053309J

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

\*\* PCM = Printed circuit module = pin spacing

Dims. in mm.

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

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#### 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 149.		

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

\*\* PCM = Printed circuit module = pin spacing

\* Admissible AC voltage 280 VAC.

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 149.

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## Continuation

### General Data

Capacitance	850 VDC/450 VAC*					1000 VDC/600 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	10	<b>7.5</b>	MKP1M011002C	4	9	10	<b>7.5</b>	MKP1O111002C
	4	9	13	10	MKP1M011003C	4	9	13	10	MKP1O111003C
1500 "	4	9	10	<b>7.5</b>	MKP1M011502C	4	9	10	<b>7.5</b>	MKP1O111502C
	4	9	13	10	MKP1M011503C	4	9	13	10	MKP1O111503C
2200 "	4	9	10	<b>7.5</b>	MKP1M012202C	4	9	10	<b>7.5</b>	MKP1O112202C
	4	9	13	10	MKP1M012203C	4	9	13	10	MKP1O112203C
3300 "	4	9	10	<b>7.5</b>	MKP1M013302C	4	9	10	<b>7.5</b>	MKP1O113302C
	4	9	13	10	MKP1M013303C	4	9	13	10	MKP1O113303C
4700 "	4.5	9.5	10.3	<b>7.5</b>	MKP1M014702D	4.5	9.5	10.3	<b>7.5</b>	MKP1O114702D
	4	9	13	10	MKP1M014703C	4	9	13	10	MKP1O114703C
6800 "	5.7	12.5	10.3	<b>7.5</b>	MKP1M016802F	5.7	12.5	10.3	<b>7.5</b>	MKP1O116802F
	5	11	13	10	MKP1M016803F	5	11	13	10	MKP1O116803F
0.01 µF	5	11	13	10	MKP1M021003F	5	11	13	10	MKP1O121003F
	5	11	18	15	MKP1M021004B	5	11	18	15	MKP1O121004B
0.015 "	6	12	13	10	MKP1M021503G	6	12	13	10	MKP1O121503G
	5	11	18	15	MKP1M021504B	5	11	18	15	MKP1O121504B
0.022 "	6	12.5	18	15	MKP1M022204C	6	12.5	18	15	MKP1O122204C
	6	15	26.5	22.5	MKP1M022205B	6	15	26.5	22.5	MKP1O122205B
0.033 "	7	14	18	15	MKP1M023304D	7	14	18	15	MKP1O123304D
	6	15	26.5	22.5	MKP1M023305B	6	15	26.5	22.5	MKP1O123305B
0.047 "	8	15	18	15	MKP1M024704F	8	15	18	15	MKP1O124704F
	6	15	26.5	22.5	MKP1M024705B	6	15	26.5	22.5	MKP1O124705B
0.068 "	7	16.5	26.5	22.5	MKP1M026805D	7	16.5	26.5	22.5	MKP1O126805D
	8.5	18.5	26.5	22.5	MKP1M031005F	8.5	18.5	26.5	22.5	MKP1O131005F
0.1 µF	11	21	31.5	27.5	MKP1M031006B	11	21	31.5	27.5	MKP1O131006B
	11	21	26.5	22.5	MKP1M031505I	11	21	26.5	22.5	MKP1O131505I
0.15 "	11	21	31.5	27.5	MKP1M031506B	11	21	31.5	27.5	MKP1O131506B
	11	21	31.5	27.5	MKP1M032206B	11	21	31.5	27.5	MKP1O132206B
0.22 "	13	24	31.5	27.5	MKP1M033306D	13	24	31.5	27.5	MKP1O133306D
	15	26	31.5	27.5	MKP1M033306F	15	26	31.5	27.5	MKP1O133306F
0.33 "	13	24	41.5	37.5	MKP1M033307C	13	24	41.5	37.5	MKP1O133307C
	17	29	31.5	27.5	MKP1M034706G	17	29	31.5	27.5	MKP1O134706G
0.47 "	13	24	41.5	37.5	MKP1M034707C	13	24	41.5	37.5	MKP1O134707C
	20	39.5	31.5	27.5	MKP1M036806J	20	39.5	31.5	27.5	MKP1O136806J
0.68 "	17	29	41.5	37.5	MKP1M036807E	17	29	41.5	37.5	MKP1O136807E
	20	39.5	41.5	37.5	MKP1M041007G	20	39.5	41.5	37.5	MKP1O141007G
1.0 µF	24	45.5	41.5	37.5	MKP1M041507H	24	45.5	41.5	37.5	MKP1O141507H
1.5 "	31	46	41.5	37.5	MKP1M042207I	31	46	41.5	37.5	MKP1O142207I
3.3 "	40	55	41.5	37.5	MKP1M043307K	40	55	41.5	37.5	MKP1O143307K
	35	50	57	52.5	MKP1M043309F	35	50	57	52.5	MKP1O143309F
4.7 "	45	55	57	52.5	MKP1M044709H	45	55	57	52.5	MKP1O144709H

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

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 149.

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Continuation page 69

## Continuation

### General Data

Capacitance	1250 VDC/600 VAC*					1600 VDC/650 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	13	10	MKP1R011003C	4	9	13	10	MKP1T011003C
1500 "	4	9	13	10	MKP1R011503C	4	9	13	10	MKP1T011503C
2200 "	4	9	13	10	MKP1R012203C	4	9	13	10	MKP1T012203C
3300 "	4	9	13	10	MKP1R013303C	4	9	13	10	MKP1T013303C
4700 "	5	11	13	10	MKP1R014703F	5	11	13	10	MKP1T014703F
6800 "	6	12	13	10	MKP1R016803G	6	12	13	10	MKP1T016803G
	5	11	18	15	MKP1R016804B	5	11	18	15	MKP1T016804B
0.01 µF	5	11	18	15	MKP1R021004B	5	11	18	15	MKP1T021004B
0.015 "	6	12.5	18	15	MKP1R021504C	6	12.5	18	15	MKP1T021504C
	6	15	26.5	22.5	MKP1R021505B	6	15	26.5	22.5	MKP1T021505B
0.022 "	7	14	18	15	MKP1R022204D	7	14	18	15	MKP1T022204D
	6	15	26.5	22.5	MKP1R022205B	6	15	26.5	22.5	MKP1T022205B
0.033 "	8	15	18	15	MKP1R023304F	8	15	18	15	MKP1T023304F
	6	15	26.5	22.5	MKP1R023305B	6	15	26.5	22.5	MKP1T023305B
0.047 "	7	16.5	26.5	22.5	MKP1R024705D	7	16.5	26.5	22.5	MKP1T024705D
	9	19	31.5	27.5	MKP1R024706A	9	19	31.5	27.5	MKP1T024706A
0.068 "	10.5	19	26.5	22.5	MKP1R026805G	10.5	19	26.5	22.5	MKP1T026805G
	9	19	31.5	27.5	MKP1R026806A	9	19	31.5	27.5	MKP1T026806A
0.1 µF	11	21	26.5	22.5	MKP1R031005I	11	21	26.5	22.5	MKP1T031005I
	11	21	31.5	27.5	MKP1R031006B	11	21	31.5	27.5	MKP1T031006B
0.15 "	13	24	31.5	27.5	MKP1R031506D	13	24	31.5	27.5	MKP1T031506D
0.22 "	15	26	31.5	27.5	MKP1R032206F	15	26	31.5	27.5	MKP1T032206F
	13	24	41.5	37.5	MKP1R032207C	13	24	41.5	37.5	MKP1T032207C
0.33 "	17	34.5	31.5	27.5	MKP1R033306I	17	34.5	31.5	27.5	MKP1T033306I
	17	29	41.5	37.5	MKP1R033307E	17	29	41.5	37.5	MKP1T033307E
0.47 "	20	39.5	31.5	27.5	MKP1R034706J	20	39.5	31.5	27.5	MKP1T034706J
	19	32	41.5	37.5	MKP1R034707F	19	32	41.5	37.5	MKP1T034707F
0.68 "	20	39.5	41.5	37.5	MKP1R036807G	20	39.5	41.5	37.5	MKP1T036807G
1.0 µF	24	45.5	41.5	37.5	MKP1R041007H	24	45.5	41.5	37.5	MKP1T041007H
1.5 "	31	46	41.5	37.5	MKP1R041507I	31	46	41.5	37.5	MKP1T041507I
2.2 "	40	55	41.5	37.5	MKP1R042207K	40	55	41.5	37.5	MKP1T042207K
	35	50	57	52.5	MKP1R042209F	35	50	57	52.5	MKP1T042209F
3.3 "	45	65	57	52.5	MKP1R043309J	45	65	57	52.5	MKP1T043309J

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

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 149.	

#### 2-pin version



#### 4-pin version



Rights reserved to amend design data without prior notification.

Continuation page 70

## Continuation

### General Data

Capacitance	2000 VDC/700 VAC*					2500 VDC/700 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_____
						6	15	26.5	22.5	MKP1V011005B_____
1500 "	4	9	13	10	MKP1U011503C_____	5	11	18	15	MKP1V011504B_____
						6	15	26.5	22.5	MKP1V011505B_____
2200 "	5	11	13	10	MKP1U012203F_____	5	11	18	15	MKP1V012204B_____
						6	15	26.5	22.5	MKP1V012205B_____
3300 "	5	11	18	15	MKP1U013304B_____	5	11	18	15	MKP1V013304B_____
						6	15	26.5	22.5	MKP1V013305B_____
4700 "	5	11	18	15	MKP1U014704B_____	6	12.5	18	15	MKP1V014704C_____
						6	15	26.5	22.5	MKP1V014705B_____
6800 "	6	12.5	18	15	MKP1U016804C_____	7	14	18	15	MKP1V016804D_____
						6	15	26.5	22.5	MKP1U016805B_____
0.01 µF	7	14	18	15	MKP1U021004D_____	8.5	18.5	26.5	22.5	MKP1V021005F_____
0.015 "	8	15	18	15	MKP1U021504F_____	10.5	19	26.5	22.5	MKP1V021505G_____
0.022 "	9	16	18	15	MKP1U022204J_____	11	21	26.5	22.5	MKP1V022205I_____
0.033 "	8.5	18.5	26.5	22.5	MKP1U023305F_____	11	21	26.5	22.5	MKP1V023305I_____
0.047 "	10.5	19	26.5	22.5	MKP1U024705G_____	11	21	31.5	27.5	MKP1V024706B_____
0.068 "	11	21	26.5	22.5	MKP1U026805I_____	13	24	31.5	27.5	MKP1V026806D_____
0.1 µF	13	24	31.5	27.5	MKP1U031006D_____	15	26	31.5	27.5	MKP1V031006F_____
0.15 "	15	26	31.5	27.5	MKP1U031506F_____	17	34.5	31.5	27.5	MKP1V031506I_____
0.22 "	17	34.5	31.5	27.5	MKP1U032206I_____	15	26	41.5	37.5	MKP1V031507D_____
0.33 "	19	32	41.5	37.5	MKP1U033307F_____	24	45.5	41.5	37.5	MKP1V033307H_____
0.47 "	20	39.5	41.5	37.5	MKP1U034707G_____	31	46	41.5	37.5	MKP1V034707I_____
1.0 µF	35	50	41.5	37.5	MKP1U041007J_____	40	55	41.5	37.5	MKP1V041007K_____
1.5 "	40	55	41.5	37.5	MKP1U041507K_____	45	55	57	52.5	MKP1V041509H_____
2.2 "	45	55	57	52.5	MKP1U042209H_____					

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

\*\* 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 149.		

Continuation page 71



## Continuation

### General Data

Capacitance	3000 VDC/700 VAC*				Part number
	W	H	L	PCM**	
0.01 $\mu$ F	8.5	18.5	26.5	22,5	MKP1W021005F
0.015 "	10.5	19	26.5	22,5	MKP1W021505G
0.022 "	11	21	26.5	22,5	MKP1W022205I
0.033 "	11	21	26.5	22,5	MKP1W023305L
	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 $\mu$ F	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 $\mu$ F	40	55	41.5	37.5	MKP1W041007K
	35	50	57	52.5	MKP1W041009F
1.5 "	45	55	57	52.5	MKP1W041509H

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

\*\* PCM = Printed circuit module = pin spacing

Dims. in mm.

The box sizes according to the main catalogue 2015 are still available on request

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 149.	



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

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

### Single wave soldering

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

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

### Double wave soldering

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

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.



## WIMA Quality and Environmental Philosophy

### ISO 9001:2015 Certification

ISO 9001:2015 is an international basic standard of quality assurance systems for all branches of industry. The approval according to ISO 9001:2015 of our factories by the infaz (Institut für Auditierung und Zertifizierung) 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 during production process:

- incoming material inspection
- metallization
- film inspection
- schoopage
- pre-healing
- pin attachment
- cast resin preparation/encapsulation
- 100% final inspection
- Testing as per customer requirements

### 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:

- adhesive tapes made of plastic
- metal clips

### RoHS Compliance

According to the RoHS Directive 2011/65/EU as amended from time to time 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 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 <sub>0</sub>	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 <sub>1</sub>	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 <sub>2</sub>	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 <sub>0</sub>	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 <sub>0</sub>	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 <sub>1</sub>	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 <sub>2</sub>	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 <sub>1</sub>	H+H <sub>component</sub> < H <sub>1</sub> 32.25 max.	H+H <sub>component</sub> < H <sub>1</sub> 32.25 max.	H+H <sub>component</sub> < H <sub>1</sub> 24.5 to 31.5	H+H <sub>component</sub> < H <sub>1</sub> 25.0 to 31.5	H+H <sub>component</sub> < H <sub>1</sub> 26.0 to 37.0	H+H <sub>component</sub> < H <sub>1</sub> 30.0 to 43.0	H+H <sub>component</sub> < H <sub>1</sub> 35.0 to 45.0
Pin spacing at upper edge of carrier tape	F	2.5 ±0.5	5.0 <sup>+0.8</sup> <sub>-0.2</sub>	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 <sup>+0.06</sup> <sub>-0.05</sub>	0.5 ±0.05 or 0.6 <sup>+0.06</sup> <sub>-0.05</sub>	0.8 <sup>+0.08</sup> <sub>-0.05</sub>	0.8 <sup>+0.08</sup> <sub>-0.05</sub>	0.8 <sup>+0.08</sup> <sub>-0.05</sub>
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	0.6 ±0.2	0.6 ±0.2	0.6 ±0.2	0.6 ±0.2	0.6 ±0.2	0.6 ±0.2	0.6 ±0.2
Package (see also page 150)	ROLL/AMMO			AMMO				
	REEL	φ 360 max. φ 30 ±1	B 52 ±2 58 ±2 } depending on comp. dimensions	REEL	φ 360 max. φ 30 ±1	52 ±2 58 ±2 or 66 ±2	REEL	φ 500 max. φ 25 ±1
Unit	see details page 151.							

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). P<sub>0</sub> = 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.

<b>WIMA</b> Best Capacitors Made In Germany		Werk Unna
Supplier-ID: 123456789	<b>RoHS</b> 2011/65/EU	Date Code: 08.10.10
Purchase Order No. (P/O): Bestellung xyz		Quantity: 5.000
Customer Part No.: KUNDETEILENUMMER		Customer No.: 0000100002
		Gross Weight [g]: 1870
WIMA Confirmation No.: 0001004053000100	WIMA Part No.: MKS2C034701C00K88D	
Handling Unit: <b>MKS 2</b>	<b>QTY: 5.000</b>	<b>COO: DE</b>
	<b>MKS 2 0.47 µF 63 VDC 3.5x8.5x7.2 RM5</b>	
<b>1000067326</b>	Standard 10% Loss - Standard Dichte 6-2	Week 03/2011
	Vorlage Debitor Inland	

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			
	W	H	L	Codes		S	H16.5	H18.5	ø 360	H16.5	H18.5	ø 500	H16.5	H18.5	340 x 340
					N	O	F	I	H	J	A	C	B	D	
<b>2.5 mm</b>	2.5	7	4.6	<b>0B</b>	5000		2200		2500		–		2800		–
	3	7.5	4.6	<b>0C</b>	5000		2000		2300		–		2300		–
	3.8	8.5	4.6	<b>0D</b>	5000		1500		1800		–		1800		–
	4.6	9	4.6	<b>0E</b>	5000		1200		1500		–		1500		–
	5.5	10	4.6	<b>0F</b>	5000		900		1200		–		1200		–
<b>5 mm</b>	2.5	6.5	7.2	<b>1A</b>	5000		2200		2500		–		2800		–
	3	7.5	7.2	<b>1B</b>	5000		2000		2300		–		2300		–
	3.5	8.5	7.2	<b>1C</b>	5000		1600		2000		–		2000		–
	4.5	6	7.2	<b>1D</b>	6000		1300		1500		–		1500		–
	4.5	9.5	7.2	<b>1E</b>	4000		1300		1500		–		1500		–
	5	10	7.2	<b>1F</b>	3500		1100		1400		–		1400		–
	5.5	7	7.2	<b>1G</b>	4000		1000		1200		–		1200		–
	5.5	11.5	7.2	<b>1H</b>	2500		1000		1200		–		1200		–
	6.5	8	7.2	<b>1I</b>	2500		800		1000		–		1000		–
	7.2	8.5	7.2	<b>1J</b>	2500		700		1000		–		1000		–
	7.2	13	7.2	<b>1K</b>	2000		700		950		–		1000		–
	8.5	10	7.2	<b>1L</b>	2000		600		800		–		800		–
8.5	14	7.2	<b>1M</b>	1500		600		800		–		800		–	
11	16	7.2	<b>1N</b>	1000		500		600		–		640		–	
<b>7.5 mm</b>	2.5	7	10	<b>2A</b>	5000		–		2500		4400		2500		–
	3	8.5	10	<b>2B</b>	5000		–		2200		4300		2300		4150
	4	9	10	<b>2C</b>	4000		–		1700		3200		1700		3100
	4.5	9.5	10.3	<b>2D</b>	3500		–		1500		2900		1400		2700
	5	10.5	10.3	<b>2E</b>	3000		–		1300		2500		1300		–
	5.7	12.5	10.3	<b>2F</b>	2000		–		1000		2200		1100		–
	7.2	12.5	10.3	<b>2G</b>	1500		–		900		1800		1000		–
<b>10 mm</b>	3	9	13	<b>3A</b>	3000		–		1100		2200		–		1900
	4	8.5	13.5	<b>FA</b>	3000		–		900		1600		–		1450
	4	9	13	<b>3C</b>	3000		–		900		1600		–		1450
	4	9.5	13	<b>3D</b>	3000		–		900		1600		–		1400
	5	10	13.5	<b>FB</b>	2000		–		700		1300		–		1200
	5	11	13	<b>3F</b>	3000		–		700		1300		–		1200
	6	12	13	<b>3G</b>	2400		–		550		1100		–		1000
	6	12.5	13	<b>3H</b>	2400		–		550		1100		–		1000
8	12	13	<b>3I</b>	2000		–		400		800		–		740	
<b>15 mm</b>	5	11	18	<b>4B</b>	2400		–		600		1200		–		1150
	5	13	19	<b>FC</b>	1000		–		600		1200		–		1200
	6	12.5	18	<b>4C</b>	2000		–		500		1000		–		1000
	6	14	19	<b>FD</b>	1000		–		500		1000		–		1000
	7	14	18	<b>4D</b>	1600		–		450		900		–		850
	7	15	19	<b>FE</b>	1000		–		450		900		–		850
	8	15	18	<b>4F</b>	1200		–		400		800		–		740
	8	17	19	<b>FF</b>	500		–		400		800		–		740
	9	14	18	<b>4H</b>	1200		–		350		700		–		650
	9	16	18	<b>4J</b>	900		–		350		700		–		650
	10	18	19	<b>FG</b>	500		–		300		650		–		590
11	14	18	<b>4M</b>	1000		–		300		600		–		540	
<b>22.5 mm</b>	5	14	26.5	<b>5A</b>	1200		–		–		800		–		770
	6	15	26.5	<b>5B</b>	1000		–		–		700		–		640
	7	16.5	26.5	<b>5D</b>	760		–		–		600		–		550
	8	20	28	<b>FH</b>	500		–		–		500		–		480
	8.5	18.5	26.5	<b>5F</b>	500		–		–		480		–		450
	10	22	28	<b>FI</b>	570*		–		–		420		–		380
	10.5	19	26.5	<b>5G</b>	594*		–		–		400		–		360
	10.5	20.5	26.5	<b>5H</b>	594*		–		–		400		–		360
	11	21	26.5	<b>5I</b>	561*		–		–		380		–		350
	12	24	28	<b>FJ</b>	480*		–		–		350		–		310

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

■ Moulded versions.

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

PCM	Size				bulk	pcs. per packing unit											
						ROLL		REEL				AMMO					
	W	H	L	Codes		S	N	O	ø 360		ø 500		340 x 340		490 x 370		
								H16.5	H18.5	H16.5	H18.5	H16.5	H18.5	H16.5	H18.5	H16.5	H18.5
								F	I	H	J	A	C	B	D		
<b>27.5 mm</b>	9	19	31.5	<b>6A</b>	567*	-	-	-	-	460/340*	-	-	420				
	11	21	31.5	<b>6B</b>	459*	-	-	-	-	380/280*	-	-	350				
	13	24	31.5	<b>6D</b>	378*	-	-	-	-	300	-	-	290				
	13	25	33	<b>FK</b>	405*	-	-	-	-	-	-	-	-				
	15	26	31.5	<b>6F</b>	324*	-	-	-	-	270	-	-	250				
	15	26	33	<b>FL</b>	324*	-	-	-	-	-	-	-	-				
	17	29	31.5	<b>6G</b>	198*	-	-	-	-	-	-	-	-				
	17	34.5	31.5	<b>6I</b>	198*	-	-	-	-	-	-	-	-				
	20	32	33	<b>FM</b>	162*	-	-	-	-	-	-	-	-				
20	39.5	31.5	<b>6J</b>	162*	-	-	-	-	-	-	-	-					
<b>37.5 mm</b>	9	19	41.5	<b>7A</b>	441*	-	-	-	-	-	-	-	-				
	11	22	41.5	<b>7B</b>	357*	-	-	-	-	-	-	-	-				
	13	24	41.5	<b>7C</b>	294*	-	-	-	-	-	-	-	-				
	15	26	41.5	<b>7D</b>	252*	-	-	-	-	-	-	-	-				
	17	29	41.5	<b>7E</b>	154*	-	-	-	-	-	-	-	-				
	19	32	41.5	<b>7F</b>	140*	-	-	-	-	-	-	-	-				
	20	39.5	41.5	<b>7G</b>	126*	-	-	-	-	-	-	-	-				
	24	45.5	41.5	<b>7H</b>	112*	-	-	-	-	-	-	-	-				
	31	46	41.5	<b>7I</b>	84*	-	-	-	-	-	-	-	-				
	35	50	41.5	<b>7J</b>	35*	-	-	-	-	-	-	-	-				
	40	55	41.5	<b>7K</b>	28*	-	-	-	-	-	-	-	-				
<b>48.5 mm</b>	19	31	56	<b>8D</b>	120*	-	-	-	-	-	-	-	-				
	23	34	56	<b>8E</b>	80*	-	-	-	-	-	-	-	-				
	27	37.5	56	<b>8H</b>	84*	-	-	-	-	-	-	-	-				
	33	48	56	<b>8J</b>	25*	-	-	-	-	-	-	-	-				
	37	54	56	<b>8L</b>	25*	-	-	-	-	-	-	-	-				
<b>52.5 mm</b>	25	45	57	<b>9D</b>	70*	-	-	-	-	-	-	-	-				
	30	45	57	<b>9E</b>	60*	-	-	-	-	-	-	-	-				
	35	50	57	<b>9F</b>	25*	-	-	-	-	-	-	-	-				
	45	55	57	<b>9H</b>	20*	-	-	-	-	-	-	-	-				
	45	65	57	<b>9J</b>	20*	-	-	-	-	-	-	-	-				

\* for 2-inch transport pitches.

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

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Updated data on [www.wima.com](http://www.wima.com)



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