

**Metallized Paper (MP) RFI-Capacitors Class X2
in PCM 10 mm to 27.5 mm. Capacitances from 1000 pF to 1.0 μF.
Rated Voltages 250 VAC and 275 VAC.**

Special Features

- Particularly high reliability against active and passive flammability
- Excellent self-healing as well as high voltage strength
- High degree of interference suppression due to good attenuation and low ESR
- For temperatures up to +110° C
- According to RoHS 2011/65/EU

Typical Applications

Class X2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase and neutral or phase and phase conductors
- General requirements, pulse peak voltage ≤ 2.5 kV

Construction

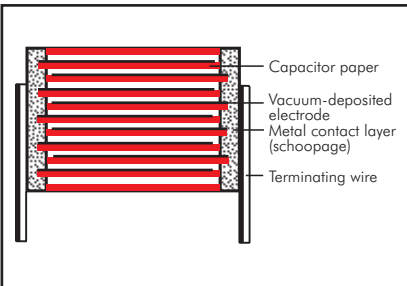
Dielectric:

Paper, epoxy resin impregnated

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Self-extinguishing epoxy resin, UL 94 V-0, metal foil

Terminations:

Tinned wire.

Marking:

Marking: Black on Silver.

Electrical Data

Capacitance range:

1000 pF to 1.0 μF (E12-values on request)

Rated voltages: 250 VAC, 275 VAC

Continuous DC voltage* (general guide): ≤ 630 V

Capacitance tolerances: ±20%

Operating temperature range:

-40° C to +110° C

Climatic test category:

40/110/56/C in accordance with IEC

Insulation resistance at +20° C:

C ≤ 0.33 μF: ≥ 12 x 10³ MΩ

C > 0.33 μF: ≥ 4000 sec (MΩ x μF)

Measuring voltage: 100 V/1 min.

Dissipation factors:

tan δ ≤ 13 x 10⁻³ at 1 kHz and +20° C

Test specifications:

In accordance with IEC 60384-14

Approvals:

Country	Authority	Specification	Symbol	Approval-No.
Germany	VDE	IEC 60384-14		89749
USA/Canada	UL	UL 60384-14 CAN/CSA-E60384-14		E 100438

Maximum pulse rise time:

Capacitance pF/μF	Pulse rise time V/μsec max. operation
1000 ... 0.068	1500
0.1 ... 0.33	750
0.47	500
0.68 ... 1.0	250

for pulses equal to a voltage amplitude with $\sqrt{2} \times U_{AC} = 390 \text{ V}$

according to IEC 60384-14

Test voltage: 1300 VDC, 2 sec.

Reliability:

Operational life > 300 000 hours

Failure rate < 1 fit (0.5 x U_r and 40° C)

Mounting Recommendation

To minimize or avoid shock and/or vibration stresses to terminating wires and solder connections we recommend to fix voluminous resin-potted MP capacitors as from e.g. PCM 22.5 mm in an appropriate way since for constructional reasons they do not sit tight on the board.

* If safety-approved EMI suppression capacitors are operated with a DC voltage being above the specified AC voltage rating the given approvals are no longer valid (IEC 60384-14).

Furthermore the permissible pulse rise time du/dt (F_{max.}) will be subject to a reduction according to

$$F_{max.} = F_r \times \sqrt{2} \times U_{AC} / U_{DC}$$

if the DC operating voltage U_{DC} is higher than $\sqrt{2} \times U_{AC}$

Packing

Available taped and reeled up to and including PCM 22.5 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	250 VAC*					275 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	8.5	13.5	10	MPX20W1100FA00_____	4	8.5	13.5	10	MPX21W1100FA00_____
1500 „	4	8.5	13.5	10	MPX20W1150FA00_____	4	8.5	13.5	10	MPX21W1150FA00_____
2200 „	4	8.5	13.5	10	MPX20W1220FA00_____	4	8.5	13.5	10	MPX21W1220FA00_____
3300 „	4	8.5	13.5	10	MPX20W1330FA00_____	4	8.5	13.5	10	MPX21W1330FA00_____
4700 „	5	10	13.5	10	MPX20W1470FB00_____	5	10	13.5	10	MPX21W1470FB00_____
6800 „	5	13	19	15	MPX20W1680FC00_____	5	13	19	15	MPX21W1680FC00_____
0.01 µF	5	13	19	15	MPX20W2100FC00_____	5	13	19	15	MPX21W2100FC00_____
0.015 „	5	13	19	15	MPX20W2150FC00_____	5	13	19	15	MPX21W2150FC00_____
0.022 „	5	13	19	15	MPX20W2220FC00_____	5	13	19	15	MPX21W2220FC00_____
0.033 „	6	14	19	15	MPX20W2330FD00_____	6	14	19	15	MPX21W2330FD00_____
0.047 „	7	15	19	15	MPX20W2470FE00_____	7	15	19	15	MPX21W2470FE00_____
0.068 „	8	17	19	15	MPX20W2680FF00_____	8	17	19	15	MPX21W2680FF00_____
0.1 µF	10	18	19	15	MPX20W3100FG00_____	10	18	19	15	MPX21W3100FG00_____
	8	20	28	22.5	MPX20W3100FH00_____	8	20	28	22.5	MPX21W3100FH00_____
0.15 „	8	20	28	22.5	MPX20W3150FH00_____	8	20	28	22.5	MPX21W3150FH00_____
0.22 „	10	22	28	22.5	MPX20W3220FI00_____	10	22	28	22.5	MPX21W3220FI00_____
0.33 „	12	24	28	22.5	MPX20W3330FJ00_____	12	24	28	22.5	MPX21W3330FJ00_____
0.47 „	13	25	33	27.5	MPX20W3470FK00_____	13	25	33	27.5	MPX21W3470FK00_____
0.68 „	15	26	33	27.5	MPX20W3680FL00_____	15	26	33	27.5	MPX21W3680FL00_____
1.0 µF	20	32	33	27.5	MPX20W4100FM00_____	20	32	33	27.5	MPX21W4100FM00_____

* f = 50/60 Hz

** PCM = Printed circuit module = pin spacing

Upon request with long pins 35-2 mm max.

Dims. in mm.

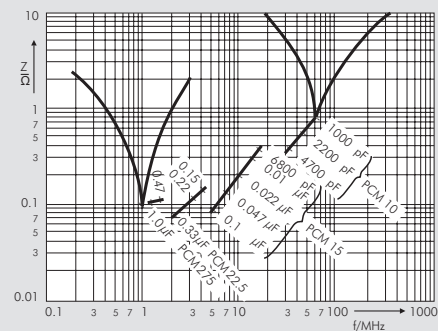
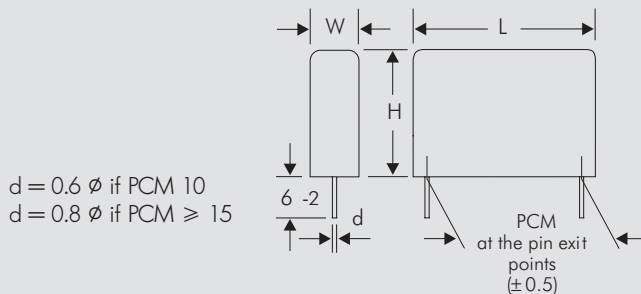
Part number completion:

Tolerance: 20 % = M

Packing: bulk = S

Pin length: 6-2 = SD

Taped version see page 148.



Impedance change with frequency (general guide)

Rights reserved to amend design data without prior notification.

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: $T_{max.} \leq 110^{\circ}C$

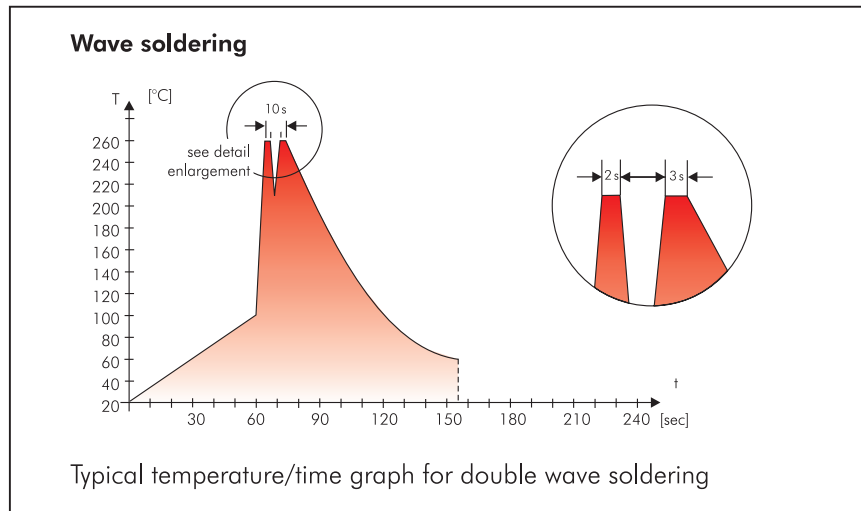
Single wave soldering

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 9001:2008 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 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:

- 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

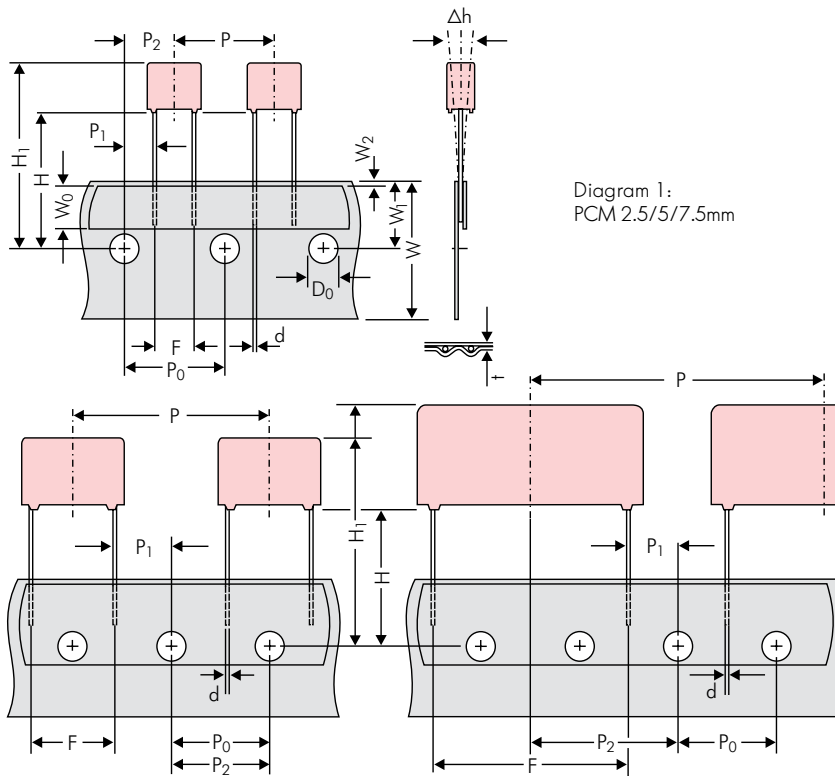


Diagram 2: PCM 10/15 mm

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	0.6 ±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 149)	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	B 52 ±2 58 ±2 or 66 ±2	REEL	φ 500 max. φ 25 ±1	B 60 ±2 68 ±2	depending on PCM and component dimensions
Unit	see details page 150.											

Dims in mm.

* Diameter of pins see General Data.

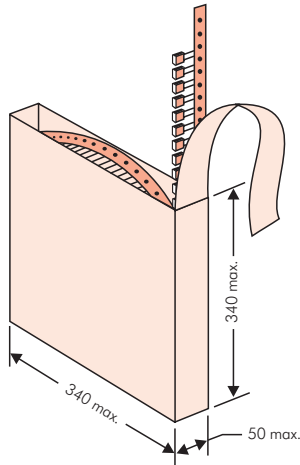
* PCM 10 and PCM 15 can be crimped to PCM 7.5.

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

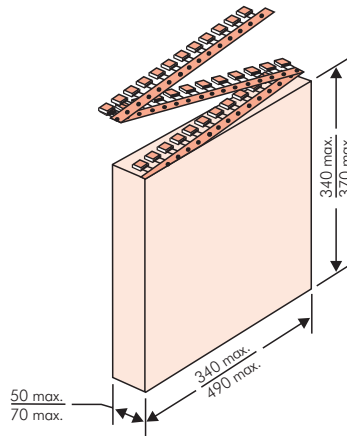
Please clarify customer-specific deviations with the manufacturer.

Types of Tape Packaging of Capacitors for Automatic Radial Insertion

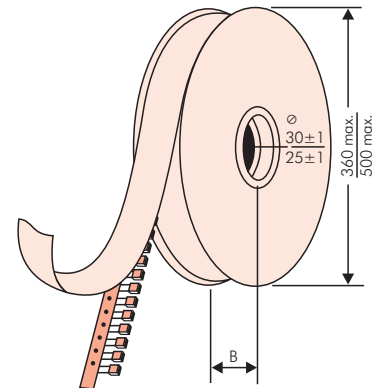
■ ROLL Packaging



■ 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/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: MKS 2	QTY: 5.000	COO: DE	
	MKS 2 0.47 µF 63 VDC 3.5x8.5x7.2 RMS		
1000067326	Standard 10% Loss - Standard	Drhte 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	ø 500	340 × 340	490 × 370		
					N	O	F	I	H	J	A	C	B	D
2.5 mm	2.5	7	4.6	0B	5000		2200	2500				2800		
	3	7.5	4.6	0C	5000		2000	2300				2300		
	3.8	8.5	4.6	0D	5000		1500	1800				1800		
	4.6	9	4.6	0E	5000		1200	1500				1500		
	5.5	10	4.6	0F	5000		900	1200				1200		
5 mm	2.5	6.5	7.2	1A	5000		2200	2500				2800		
	3	7.5	7.2	1B	5000		2000	2300				2300		
	3.5	8.5	7.2	1C	5000		1600	2000				2000		
	4.5	6	7.2	1D	6000		1300	1500				1500		
	4.5	9.5	7.2	1E	4000		1300	1500				1500		
	5	10	7.2	1F	3500		1100	1400				1400		
	5.5	7	7.2	1G	4000		1000	1200				1200		
	5.5	11.5	7.2	1H	2500		1000	1200				1200		
	6.5	8	7.2	1I	2500		800	1000				1000		
	7.2	8.5	7.2	1J	2500		700	1000				1000		
	7.2	13	7.2	1K	2000		700	950				1000		
	8.5	10	7.2	1L	2000		600	800				800		
	8.5	14	7.2	1M	1500		600	800				800		
11	16	7.2	1N	1000		500	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		2700	
	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	570*				420				380	
	10.5	19	26.5	5G	594*				400				360	
	10.5	20.5	26.5	5H	594*				400				360	
	11	21	26.5	5I	561*				380				350	
	12	24	28	FJ	480*				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	pcs. per packing unit									
						ROLL		REEL				AMMO			
	W	H	L	Codes		S	H16.5	H18.5	ø 360		ø 500		340 × 340		490 × 370
					N	O	F	I	H	J	A	C	B	D	
27.5 mm	9	19	31.5	6A	567*	–	–	–	–	460/340*	–	–	420		
	11	21	31.5	6B	459*	–	–	–	–	380/280*	–	–	350		
	13	24	31.5	6D	378*	–	–	–	–	300	–	–	290		
	13	25	33	FK	405*	–	–	–	–	–	–	–	–		
	15	26	31.5	6F	324*	–	–	–	–	270	–	–	250		
	15	26	33	FL	324*	–	–	–	–	–	–	–	–		
	17	29	31.5	6G	198*	–	–	–	–	–	–	–	–		
	17	34.5	31.5	6I	198*	–	–	–	–	–	–	–	–		
	20	32	33	FM	162*	–	–	–	–	–	–	–	–		
	20	39.5	31.5	6J	162*	–	–	–	–	–	–	–	–		
37.5 mm	9	19	41.5	7A	441*	–	–	–	–	–	–	–	–		
	11	22	41.5	7B	357*	–	–	–	–	–	–	–	–		
	13	24	41.5	7C	294*	–	–	–	–	–	–	–	–		
	15	26	41.5	7D	252*	–	–	–	–	–	–	–	–		
	17	29	41.5	7E	154*	–	–	–	–	–	–	–	–		
	19	32	41.5	7F	140*	–	–	–	–	–	–	–	–		
	20	39.5	41.5	7G	126*	–	–	–	–	–	–	–	–		
	24	45.5	41.5	7H	112*	–	–	–	–	–	–	–	–		
	31	46	41.5	7I	84*	–	–	–	–	–	–	–	–		
	35	50	41.5	7J	35*	–	–	–	–	–	–	–	–		
	40	55	41.5	7K	28*	–	–	–	–	–	–	–	–		
48.5 mm	19	31	56	8D	120*	–	–	–	–	–	–	–	–		
	23	34	56	8E	80*	–	–	–	–	–	–	–	–		
	27	37.5	56	8H	84*	–	–	–	–	–	–	–	–		
	33	48	56	8J	25*	–	–	–	–	–	–	–	–		
	37	54	56	8L	25*	–	–	–	–	–	–	–	–		
52.5 mm	25	45	57	9D	70*	–	–	–	–	–	–	–	–		
	30	45	57	9E	60*	–	–	–	–	–	–	–	–		
	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.

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