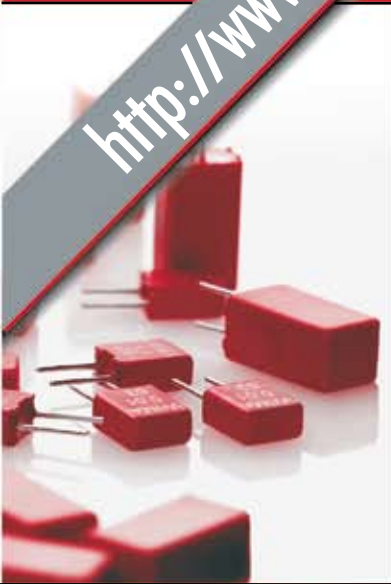


<http://www.wima.com>



BEST CAPACITORS MADE IN GERMANY



Capacitors for Electronic Equipment

Edition 2013



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General Information

Explanation of Important Terminology

Nominal Capacitance

The nominal capacitance of a capacitor is usually given in pF, nF or μF .

Operating/Rated Voltage

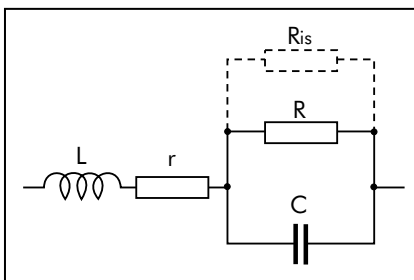
Each capacitor is designed for a specified rated voltage in continuous operation. This is usually only valid for ambient temperatures of $T \leq +85^\circ\text{C}$. In the case of higher temperatures a derating factor must be applied to the rated voltage from 85°C .

Insulation Resistance/Time Constant

The insulation resistance is normally expressed in megohms ($M\Omega$) and is measured at a specified voltage after 1 minute. The time constant defines the time in seconds, in which the voltage across the capacitor self-discharges to 37% of the fully charged state and it is expressed as $\tau = R_{is} \times C$. The insulation resistance or time constant value denotes the quality of the dielectric insulation.

Dissipation Factor

The dissipation factor $\tan \delta$ is the quotient of the resistive and reactive parts of the impedance. The dielectric losses are illustrated by R in the equivalent circuit diagram. The insulation resistance R_{is} is in parallel with R, and affects the $\tan \delta$ only at very low frequencies. The dissipation factor is also affected by the resistance of both electrodes and of the termination – electrode interface. This is represented by the series resistance r. L represents the remaining self-inductance.



Capacitance Tolerance

The tolerance is the permissible actual capacitance relative to the nominal capacitance and it is defined in per cent. The tolerance is to be measured at $+20^\circ\text{C}$ and the permissible tolerance is only valid at the time of shipment.

The capacitance may change after long storage or long usage.

The tolerance, with the exception of $\pm 20\%$, is usually marked on the capacitor body in clear digits.

Temperature Coefficient of Capacitance

The temperature coefficient α expresses the change in capacitance with temperature, relative to the capacitance at the reference temperature of $+20^\circ\text{C}$; it is usually expressed in ppm per $^\circ\text{C}$.

$$C_T = C_{20} \times [1 + \alpha \times (T - 20^\circ\text{C})]$$

C_{20} = capacitance at $+20^\circ\text{C}$

C_T = capacitance at T

α = may be positive or negative.

Pulse Stressing

The ratings on pulse rise time are based on tests in accordance with DIN-IEC 60384 part 1.

The test voltage corresponds to the rated voltage and the test comprises 10 000 pulses with a repetition frequency of 1 Hz.

The catalogue ratings are in accordance with the CECC specifications which specify that the test pulse rise time shall be 10 times the catalogue rating.

It should also be noted that the pulse rise time (F) i.e. $V/\mu\text{sec}$ also provides the maximum current capability, as it can be determined from the following formula.

$$I = F \times C \times 1.6$$

C in μF / I in amps.

The information on the pulse rise time refers to pulses equal to the rated voltage so that, at lower operating voltages, the permissible pulse rise times may be increased.

Warning Notice/Technical Support

AC voltage load at the mains

Anticipating possible interfering pulses, DC

voltage capacitors must not be operated at the mains (power line), irrespective of the rated AC voltage. For this purpose, use approved electromagnetic interference suppression capacitors only.

Thermal load in the application

If a plastic film capacitor is overstressed due to inappropriate usage under AC voltage conditions, the temperature inside the component may rise to an impermissibly high level. Thus, the dielectric film may subsequently be damaged leading to a short circuit or formation of smoke and even fire in the capacitor.

This may also happen if the capacitor is overheated by an external heat source.

Shock and/or vibration load for larger case sizes

For increased shock and vibration applications involving larger case sizes (i.e., PCM 22.5 mm pin spacing or greater), it is recommended to fix capacitors in an appropriate way; or special pin and plate terminations may be required respectively to minimize lead separation from the capacitor element or the solder joint.

Processing

When processing plastic film capacitors it is mandatory to observe the application recommendations with regard to soldering and/or cleaning and drying processes.

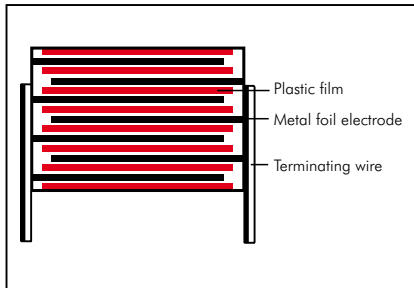
General remarks

All catalogue data, range surveys and application data correspond to the actual state of the art and were elaborated as thoroughly and precisely as possible. They are to be understood as general information, and the right for amendments and construction changes is reserved. Special customized designs which deviate from our catalogue data, irrespective of whether being based on factory standards, specifications or related data, do not release the user from his duty of care with regard to incoming goods inspection and production monitoring. In case of the components being purchased through second or third suppliers we urgently ask to compare the technical details with the data given by the manufacturer. In cases of doubt we recommend use is made of our technical support, since we do not take any responsibility for damages caused by inappropriate use or processing of our capacitors.



Construction Principles of WIMA Capacitors

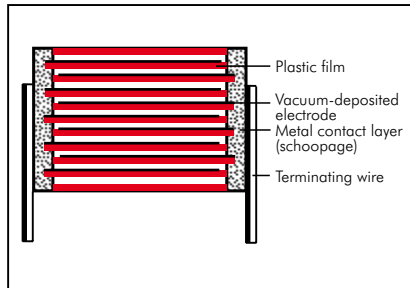
Film and Foil Construction



WIMA Types:

FKP 02	FKS 2	FKP 2
FKP 3	FKP 3	

Metallized Construction



WIMA Types:

SMD-PET	SMD-PPS	MKS 02
MKP 4	MKP-X2	MP 3-X2
DC-LINK MKP 4	DC-LINK MKP4S	DC-LINK MKP 5

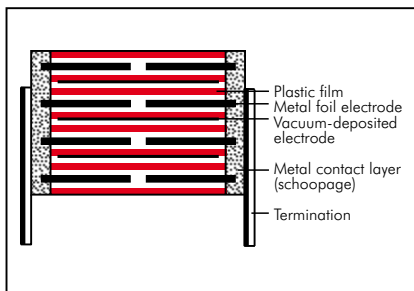
Advantages of Film/Foil Construction:

- High pulse and current rating
 - High insulation resistance
 - Close tolerances up to $\pm 1\%$
- Disadvantages: short circuit at end of life

Advantages of Metallized Construction:

- High capacitances in small box sizes
 - Excellent self-healing ability
 - Very good price/performance ratio
- Disadvantage: low pulse resistance

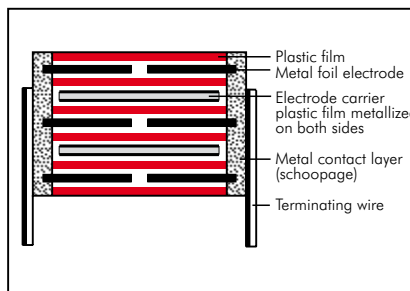
Film and Foil Construction with Internal Series Connection and Self-Healing, Metallized Plastic Film



WIMA Types:

FKP 4	Snubber FKP
-------	-------------

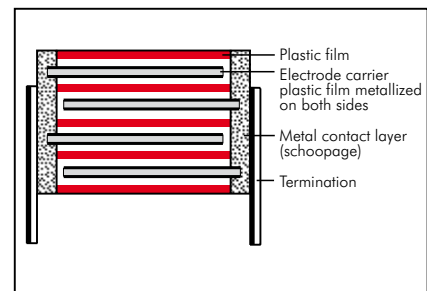
Film and Foil Construction with Internal Series Connection and Self-Healing Plastic Film Metallized on Both Sides



WIMA Types:

FKP 1

Pulse Duty Construction with Self-Healing Plastic Film Metallized on Both Sides

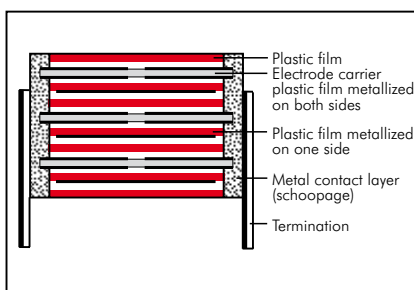


WIMA Types:

MKP 10*	Snubber MKP*	GTO MKP*
---------	--------------	----------

*up to 250 VAC *up to 250 VAC *up to 250 VAC

Pulse Duty Construction with Internal Series Connection and Self-Healing Plastic Film Metallized on Both Sides

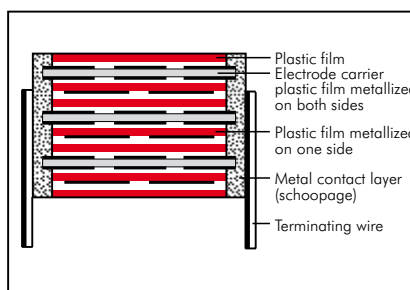


WIMA Types:

MKP 10*	Snubber MKP*	GTO MKP*
---------	--------------	----------

*400 to 700 VAC *from 400 VAC *from 400 VAC

Pulse Duty Construction with Multiple Series Connection and Self-Healing Plastic Film Metallized on Both Sides

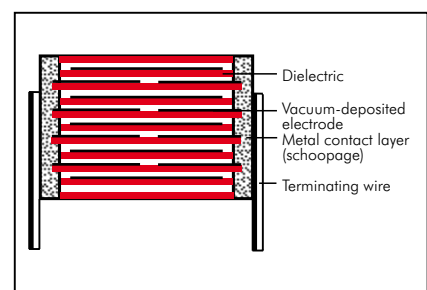


WIMA Types:

MKP 10*

*900 VAC

Metallized Construction with Internal Series Connection



WIMA Types:

MKS 4*	MKP 4*	MKP-X2 R
--------	--------	----------

*400 VAC *400 VAC

MKP-Y2	MP 3R-Y2
--------	----------

Typical Characteristics and Graphs of the Polyester (PET) Film

Polyester Film and Foil Types

FKS 2

FKS 3

Metallized Polyester Types

SMD-PET

MKS 02

MKS 2

MKS 4

Typical Applications

For general DC-applications e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing

Film Properties

Dielectric constant

at 1 kHz and +23° C:

3.3 positive as temperature rise

Specific volume resistance

in Ω cm at +23° C:

10^{18}

Dielectric strength (DC voltage)

in V/ μ m at +23° C:

580

Preferred temperature range

in ° C:

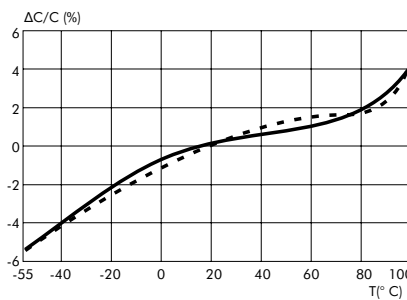
-55 to +100

Dielectric absorption

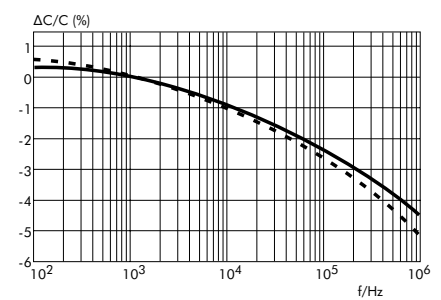
in % at + 23° C:

0.20 to 0.25

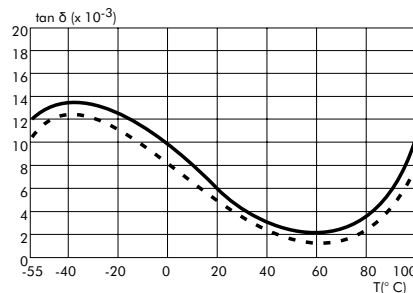
Typical Graphs



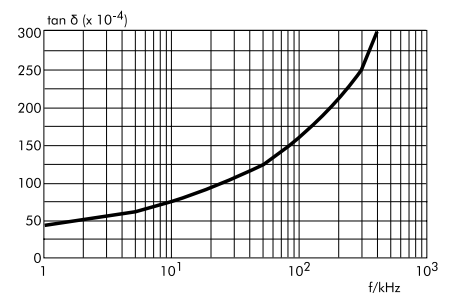
Capacitance change versus temperature (f=1 kHz) (general guide)



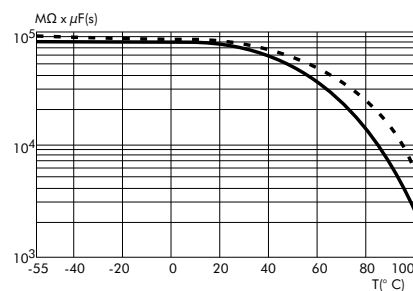
Capacitance change versus frequency (general guide)



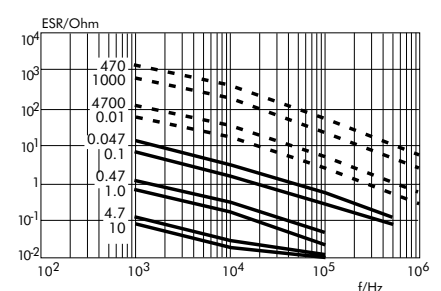
Dissipation factor change versus temperature (f=1 kHz) (general guide)



Dissipation factor change versus frequency. Example: MKS 4, 0.1 μ F/400VDC (general guide)



Insulation resistance change versus temperature (general guide)



ESR change versus frequency (general guide)

The broken lines show the film and foil types.

The full lines characterize the metallized versions.

Typical Characteristics and Graphs of the Polypropylene (PP) Film

Polypropylene Film and Foil Types

FKP 02	FKP 2	FKP 3	FKP 4	FKP 1	Snubber FKP
--------	-------	-------	-------	-------	-------------

Metallized Polypropylene Types

MKP 2	MKP 4	MKP 10	MKP-X2	MKP-X2 R	MKP-Y2
Snubber MKP	GTO MKP	DC-LINK MKP 3	DC-LINK MKP 4	DC-LINK MKP 4S	DC-LINK MKP 5
DC-LINK MKP 6	DC-LINK HC	DC-LINK HY			

Typical Applications

For high frequency and high pulse applications e.g.

- Sample and hold
- Timing
- LC-Filtering
- Oscillating circuits
- Audio equipment
- High frequency coupling and decoupling
- TV and monitor sets
- Lighting
- Power electronics

Film Properties

Dielectric constant

at 1 kHz and +23° C:
2.2 negative as temperature rise

Specific volume resistance

in Ω cm at +23° C:
 6×10^{18}

Dielectric strength (DC voltage)

in V/ μ m at +23° C:
650

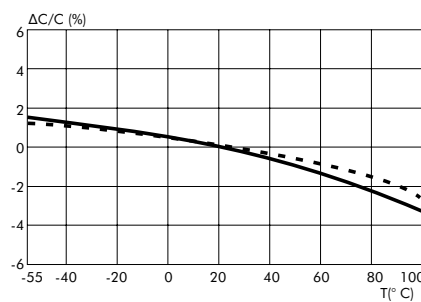
Preferred temperature range

in ° C:
-55 to +100

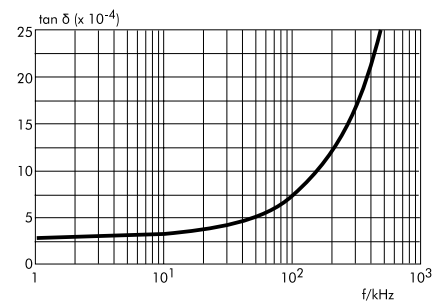
Dielectric absorption

in % at + 23° C:
0.05 to 0.10

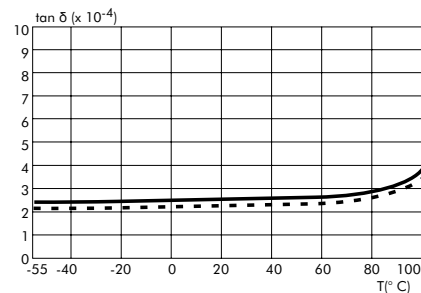
Typical Graphs



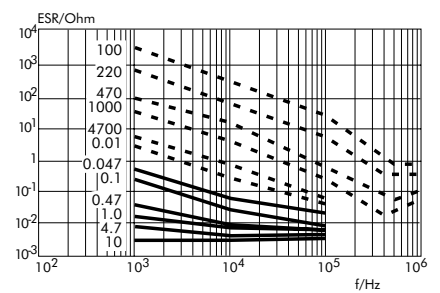
Capacitance change versus temperature (f=1 kHz) (general guide)



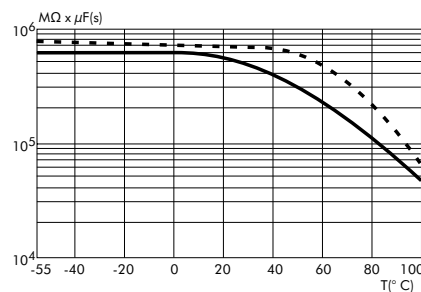
Dissipation factor change versus frequency. Example: MKP 10, 0.01 μ F/400VDC (general guide)



Dissipation factor change versus temperature (f=1 kHz) (general guide)



ESR change versus frequency (general guide)



Insulation resistance change versus temperature (general guide)

The broken lines show the film and foil types.

The full lines characterize the metallized versions.

Typical Characteristics and Graphs of the Polyphenylene-Sulphide (PPS) Film

Metallized Polyphenylene-Sulphide Type

SMD-PPS

Typical Applications

For general applications in high frequency and high temperature circuits e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing
- Filtering
- Oscillating circuits
- TV and monitor sets
- Lighting
- Automotive electronics

Film Properties

Dielectric constant

at 1 kHz and +23° C:

3.0 very constant versus temperature

Specific volume resistance

in Ω cm at +23° C:

5×10^{17}

Dielectric strength (DC voltage)

in V/ μ m at +23° C:

470

Preferred temperature range

in ° C:

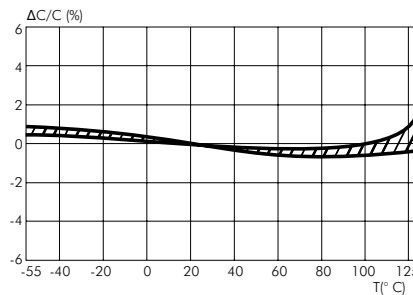
-55 to +140

Dielectric absorption

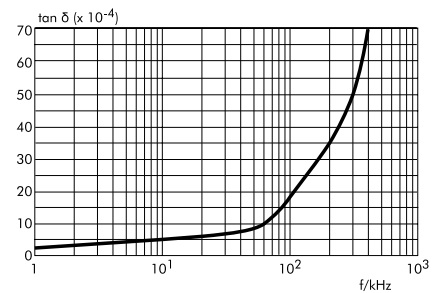
in % at + 23° C:

0.05 to 0.10

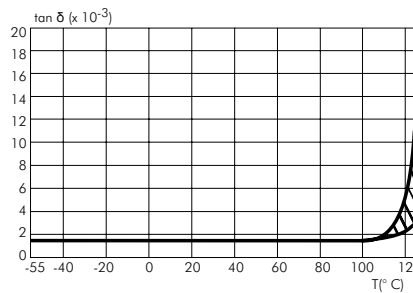
Typical Graphs



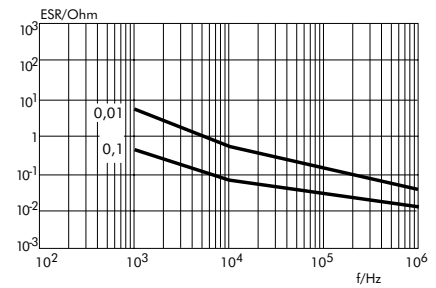
Capacitance change versus temperature ($f=1$ kHz) (general guide)



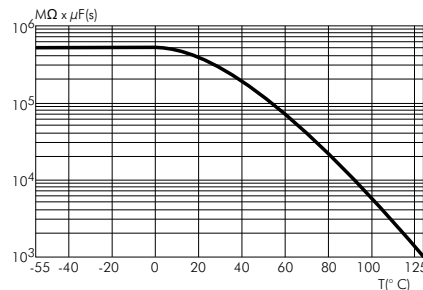
Dissipation factor change versus frequency. Example: SMD-PPS, 0.1 μ F/63 VDC (general guide)



Dissipation factor change versus temperature ($f=1$ kHz) (general guide)



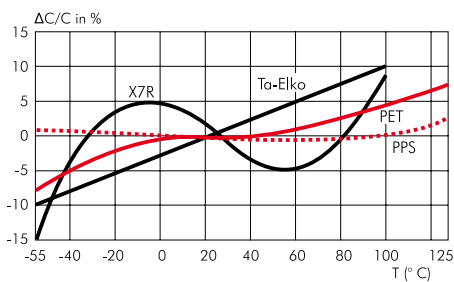
ESR change versus frequency (general guide)



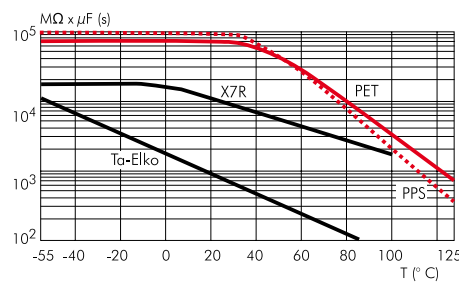
Insulation resistance change versus temperature (general guide)

Characteristics of Metallized Film Capacitors in Comparison with Other Dielectrics

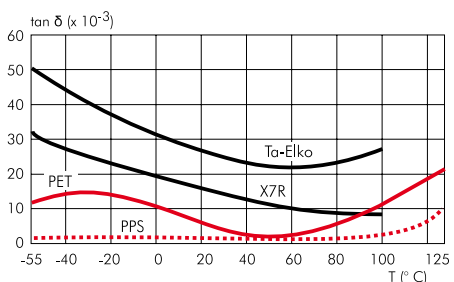
	PET	PP	PPS	NPO	X7R	Tantalum
Dielectric constant 1 kHz/23° C	3.3 positive as temperature rise	2.2 negative as temperature rise	3.0 very constant versus temperature	12 ... 40	700...2000	26
Operating temp. (° C)	-55...+100	-55...+100	-55...+140	-55...+125	-55...+125	-55...+125
Dielectric absorption (%)	0.2 ... 0.25	0.05 ... 0.10	0.05	0.6	2.5	n. a.
$\Delta C/C$ versus temperature (%)	± 5	± 2.5	± 1.5	± 1	± 15	± 10
$\Delta C/C$ versus voltage (%)	negligible	negligible	negligible	negligible	-20	negligible
ΔC aging rate (%/h decreasing)	negligible	negligible	negligible	negligible	2	n. a.
Dissipation factor (%) 1 kHz 10 kHz 100 kHz	0.8 1.5 3.0	0.05 0.08 0.25	0.2 0.25 0.5	0.10 0.10 0.10	2.5	8
ESR	low	very low	very low	low	moderate	high
Ris (M Ω x μ F) 25° C 85° C	10 000 1 000	100 000 10 000	10 000 1 000	10 000 1 000	1 000 500	100 10
Capacitance range from pF to μ F	1 000 ... 220	27 ... 100	10 000 ... 6.8	1... 0.1	100 ... 2.2	100 000 ... 1 000
Capacitance tolerance (\pm %)	5/10/20	1/2.5/5/10/20	2.5/5/10/20	5/10	10/20	10/20
Self-healing	yes	yes	yes	no	no	no
Typical failure mode at end of life	open	open	open	short	short	short
Reliability	high	high	high	high	moderate	low
Piezoelectric effect	no	no	no	yes	yes	yes
Resistance to thermal and mechanical shock	high	high	high	moderate to low	moderate to low	high
Polarity	no	no	no	no	no	yes



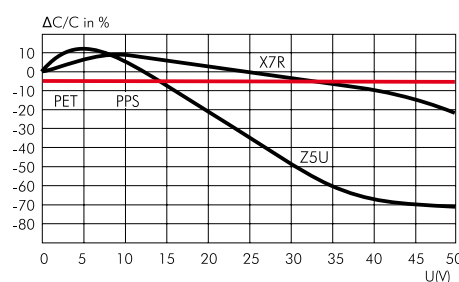
Capacitance change versus temperature (f=1 kHz) (general guide)



Insulation resistance change versus temperature (general guide)



Dissipation factor change versus temperature (f=1 kHz) (general guide)



Capacitance change versus voltage (general guide)

Technical Data and Advantages of the Film Capacitors

Reliability

The failure rate in fit ($10^{-9}/h$) for plastic film capacitors is shown in the formula:

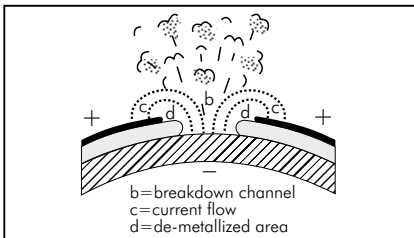
$$\lambda = \lambda_0 \times \pi_T \times \pi_V$$

λ_0 = expected value
 π_T = temperature factor
 π_V = voltage factor

The expected value has been determined for each component on the basis of life tests. If such a test is carried out at e.g. $T=85^\circ C$, this corresponds to an operating time of approx. 150 000 - 200 000 h in an equipment with $\leq 40^\circ C$ ambient temperature. Nowadays the best values are achieved by our metallized Polyester film capacitors with an expected value of 2 fit and a failure rate of $\lambda=10$ fit.

Self-Healing

The self-healing process in metallized plastic film capacitors is started by an electric breakdown, which takes about 10^{-8} sec. Temperatures of approximately 6000 K occur and evaporate the metallization around the failure spot. Insulated areas are formed and the capacitor continues to function properly.

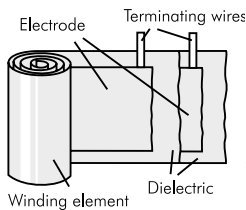


Inductance and Self-Resonance

Depending on the construction, an alternating current in the capacitor winding creates a more or less distinctive magnetic field which can be measured as inductance L. Nowadays, modern plastic film capacitors are contacted over the whole end surface of the winding element. In this way the self-inductance of the winding element is short-circuited and is reduced to the PCM (0.8 nH/mm) and the remaining length of the terminating wires (in case of SMD capacitors the distance between the soldering plates). L and C form a series oscillating circuit; at a frequency of

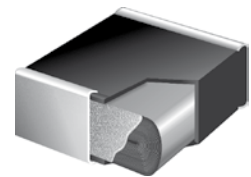
Old type with high self-inductance

The tape length of the winding element determines the value of the self-inductance



Modern WIMA type with low self-inductance

WIMA MKS 02/PCM 2.5 mm Self-inductance $L < 8$ nH
WIMA SMD/Size Code 1812 Self-inductance $L < 6$ nH



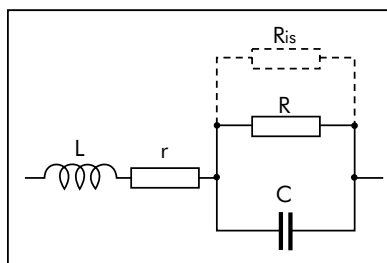
Average value for practical applications: inductance related to length = 0.8 nH/mm
Example: length of the terminating wires = 2 x 3 mm + PCM.

$$f_0 = \frac{1}{2\pi \times \sqrt{L \times C}}$$

the capacitor is in self-resonance and has the lowest impedance, which only consists of r (ESR).

Dissipation Factor and ESR

The dissipation factor $\tan \delta$ is the quotient of the active and reactive components of the impedance. The losses occur mainly in the dielectric and are represented by R in the equivalent circuit diagram. Parallel to R is the insulation resistance R_{is} , which, in fact, only affects $\tan \delta$ at very low frequencies. Further dissipation is caused by the finite conductivity of the electrodes and the transfer resistance between the electrodes and the terminating wires. This is represented in the equivalent circuit diagram by the series resistance r. L represents the remaining self-inductance.



The dissipation factor is, for example, of importance for AC capacitors, which are subjected to strong currents: too high a $\tan \delta$ can lead to excessive heating brought about by the incoming active power and thus to a shorter life time of the capacitor.

Values of ESR are not directly stated in the data sheets of plastic film capacitors. The ESR for an individual capacitance value C can be calculated by the formula:

$$ESR = \tan \delta \times (2 \times \pi \times f \times C)^{-1}$$

$\tan \delta$: see data sheet of the respective WIMA type
f: frequency of the AC voltage share in the application.
ESR values for certain capacitances see characteristics of film dielectrics page 5.

Box Encapsulation

All WIMA series are produced with the proven box technology, showing the following advantages in comparison with non-encapsulated or dipped versions

- Safe protection of the capacitor element against mechanical stresses during processing and operation
- No danger of internal cracks, delamination or tearing away of the contacts due to construction elasticity
- Excellent self-healing properties of metallized capacitors due to pressure free layers in the winding element
- Solvent-resistant and flame-retardant plastic case in accordance with UL 94 V-0
- Clearly defined dimensions allows for close placement and exact setting of parts on PC-boards. Even larger parts are easily robotically insertable.



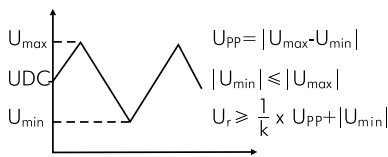
Stress Computation for WIMA Capacitors

The maximum permissible AC voltage that can be applied to capacitors in **sinusoidal** waveform applications, can be determined from the graphs in this catalogue.

However, where **pulse conditions** exist, the following procedure is to be observed to ensure that the correct capacitor rating is selected for a particular duty:

1. **Rated Voltage (U_r):** The rated voltage of a capacitor against a zero potential reference point shall take into consideration that the dielectric strength of the capacitor film diminishes with rising frequency. The calculation of the required rated voltage of a capacitor must therefore allow for the correction factor k; where k = dielectric strength of the film at the frequency f in % is shown in graph 1.

The calculation of the required dielectric strength is shown in the following example (U_{min}, U_{max} have the same polarity).



Furthermore the rms voltage derived from the peak to peak voltage shall not be greater than the nominal AC voltage rating of the capacitor to avoid the ionization inception level:
 $U_{rms} \leq U_{AC \text{ rated}}$

2. **Maximum current:** The voltage gradient or rise time of the pulse is taken as the reference point when calculating the maximum current rating of the end contacts. The maximum permissible current load on the end contacts is calculated by means of the voltage rise of the pulses (pulse rise time F).
 $I_{max} = F \times C \times 1.6$
 The data of the rated pulse rise time F_r for pulses equal to the rated voltage figure in the technical data of the different types.

With low voltage rise in operation (U_{pp}) the permissible current load is calculated as follows:

$$F_{max} = \frac{U_r}{U_{pp}} \times F_r$$

for example
 $U_r = 63 \text{ V}, U_{pp} = 12 \text{ V}, F_r = 50 \text{ V}/\mu\text{sec}$.

$$\text{hence } F_{max} = \frac{63}{12} \times 50 = 262.5 \text{ V}/\mu\text{sec}$$

When using maximum current ratings, self-heating must be taken into account at higher frequencies, and must not exceed 10 K.

3. **Dissipation (heat losses):** The heat dissipated by a capacitor when stressed by non-sinusoidal voltages or when under pulse conditions can be approximately determined from the following formula:

$$P_d = U_{rms}^2 \times \omega C \times \tan \delta$$

where
 P_d = dissipation in Watts
 (see table 1 for the max. W per Kl.)

$$U_{rms} = \text{root mean square value of the AC voltage share.}$$

$$\omega = 2\pi \times f, \text{ where } f \text{ is the repetition frequency of the pulse waveform}$$

(C = capacitance in Farad)

$$\tan \delta = \text{dissipation factor corresponding to the frequency of the steepest part of the pulse.}$$

$$\text{pulse frequency} = \frac{1}{\text{pulse width}}$$

The temperature rise is as follows:
 Temperature rise in K = $\frac{\text{calculated dissipation}}{\text{specific dissipation}}$ (see table 1)

In applications where reliability is critical, it is recommended to measure the surface temperature of the capacitor and to take into account that the temperature within the capacitor will be approximately 5 K above the case temperature.

4. **Determining the permissible AC voltage and AC current at given frequencies:**

To determine the permissible AC voltage (sinusoidal) for applications in a higher frequency spectrum, graphs showing AC voltage derating with frequency are available for the respective WIMA series. The diagrams refer to a permissible self-heating of:

$$\Delta \theta \leq 10 \text{ K}$$

For the WIMA MKP 10/0.01 μF/630 VDC/400 VAC, for example, this shows – when f = 50 kHz – a permissible AC voltage of
 $U_{rms} = 280 \text{ V}$ (graph 2)

The AC voltage given in the diagrams can also be used to determine the maximum effective current.

$$X_c = \frac{1}{\omega \times C} = \frac{1}{2 \pi \times 50 \text{ kHz} \times 0.01 \mu\text{F}}$$

$$X_c = 318 \Omega$$

$$I_c = \frac{U_c}{X_c} = \frac{280 \text{ V}}{318 \Omega}$$

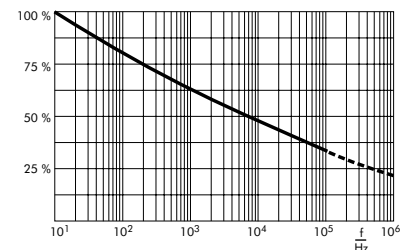
$$I_c = 0.88 \text{ A}$$

The calculated maximum value of the effective current

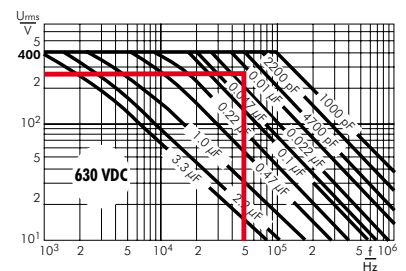
$$I_p = I_c \times \sqrt{2} = 0.88 \text{ A} \times \sqrt{2}$$

$$I_p = 1.24 \text{ A}$$

must not exceed the maximum current rating specified in the maximum pulse rise time calculation (cf. F_{max} on left). In this case, the operating AC voltage is to be reduced accordingly.



Graph 1: Dielectric strength of Polypropylene film as a factor of frequency (general guide).

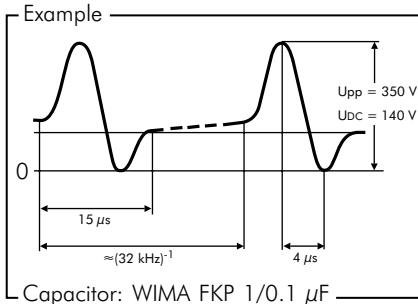


Graph 2: Permissible AC voltage in relation to frequency at 10°C internal temperature rise (general guide).

Printed circuit module PCM (in mm)	Specific dissipation in Watts per K above the ambient temperature
2.5	0.0025
5	0.004
7.5	0.006
10	0.0075
15	0.012
22.5	0.015
27.5	0.025
37.5	0.03

Table 1: The data is for ordinary assembly and ventilation conditions avoiding radiant heat within the chassis of the equipment

The Selection of Capacitors for Pulse Applications



Value from table "pulse rise time WIMA FKP 1", page 66: 7000 V/μsec.

The calculated voltage gradient is lower than the permissible value shown in the catalogue for this capacitor.

Dissipation

Given: $U_{rms} = 85 \text{ V}$
 $f = 32 \text{ kHz}$
 $C = 0.1 \text{ μF}$

The frequency determined from the steepest part of the pulse is:
Pulse width = 15 μsec. = 1 cycle

Hence pulse frequency =
 $\frac{1}{15 \times 10^{-6}} \approx 66 \text{ kHz}$

The $\tan \delta$ of WIMA FKP 1 at 66 kHz $\approx 10 \times 10^{-4}$ (graph 4).

$P_d = 85^2 \times 2 \pi \times 32 \times 10^3 \times 0.1 \times 10^{-6} \times 10 \times 10^{-4} \approx 0.145 \text{ Watts}$

The selected capacitor has a pin spacing of 27.5 mm (table 1, page 10 specific dissipation = 0.025 Watts/K) and the

temperature rise due to self-heating is:

Temperature rise = $\frac{0.145 \text{ Watts}}{0.025 \text{ Watts/K}} \approx + 6 \text{ K}$

The temperature rise plus the max. ambient temperature \leq max. permissible operating temperature (taking into account the voltage derating factor as detailed in the Technical Data). If the permissible temperature is exceeded, please select a capacitor with a higher voltage rating.

Determination of nominal voltage

Calculation is based on an operating temperature $< +60^\circ \text{ C}$ unless other data is given by the user.

$U_r \geq 350 \text{ V}$

$U_{rms} = 85 \text{ V}$ (referring to AC voltage share)

Selected nominal voltage:

400 VDC/250 VAC pin spacing 27.5 mm

Permissible voltage gradient

The voltage rise time is:

$\frac{350 \text{ V}}{4 \text{ μsec.}} \approx 87.5 \text{ V/μsec}$

Optionally a recommendation can be offered by our engineers upon receipt of voltage and current oscillogrammes.

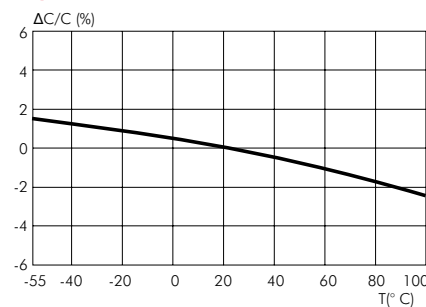
Questionnaire available on demand.

WIMA FKP 1 Pulse Capacitors for Very High Current Ratings

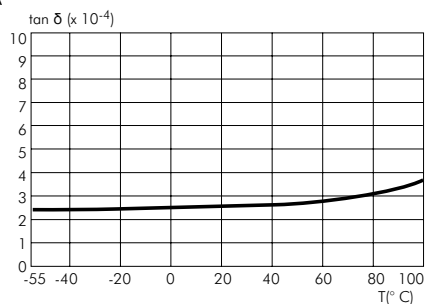
The WIMA FKP1 series was developed for extremely high pulse loads. It has an internal series connection, the metal foil electrodes being combined with a floating electrode metallized on both sides. The metal foil electrodes are safely contacted on both sides of the end surfaces and allow for high current and pulse loading capabilities. At the same time the capacitor is fully self-healing due to the floating electrode metallized on both sides.

As regards pulse loading capability, WIMA FKP 1 represent the high-end of capacitor technology.

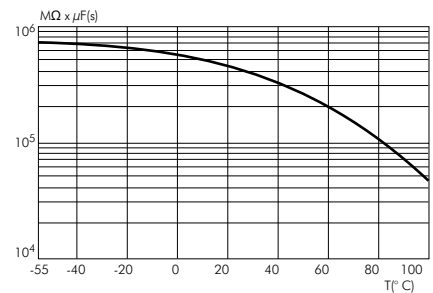
More information see page 66.



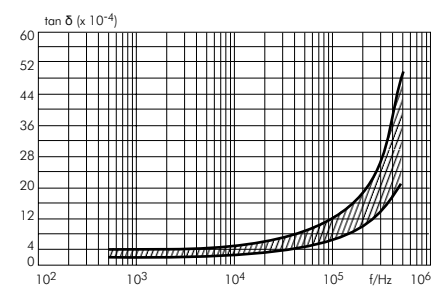
Capacitance change versus temperature (f=1 kHz) (general guide).



Dissipation factor change versus temperature (f=1 kHz) (general guide).



Insulation resistance change versus temperature (general guide).



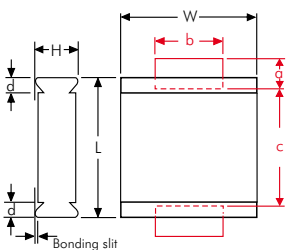
Dissipation factor change versus frequency (general guide).

Recommendation for Processing and Application of SMD Capacitors

Layout Form

The components can generally be positioned on the carrier material as desired. In order to prevent soldering shadows or ensure regular temperature distribution, extreme concentration of the components should be avoided. In practice, it has proven best to keep a minimum distance of the soldering surfaces between two WIMA SMDs of twice the height of the components.

Solder Pad Recommendation



Size code	L ± 0.3	W ± 0.3	d	a min.	b min.	c max.
1812	4.8	3.3	0.5	1.2	3.5	3.5
2220	5.7	5.1	0.5	1.2	4	4.5
2824	7.2	6.1	0.5	1.2	4	6.5
4030	10.2	7.6	0.5	2.5	6	9
5040	12.7	10.2	0.7	2.5	6	11.5
6054	15.3	13.7	0.7	2.5	6	14

The solder pad size recommendations given for each individual series are to be understood as minimum dimensions which can at any time be adjusted to the layout form.

Processing

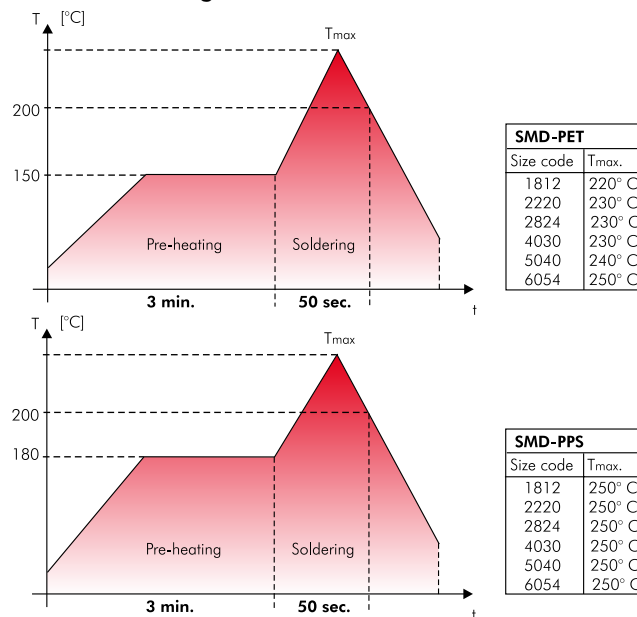
The processing of SMD components

- assembling
- soldering
- electrical final inspection/ calibrating

must be regarded as a complete process. The soldering of the printed circuit board, for example, can constitute considerable stress on all the electronic components. The manufacturer's instructions on the processing of the components are mandatory.

Soldering Process

Re-flow soldering



Temperature/time graph for the permissible processing temperature of the WIMA SMD film capacitor for typical convection soldering processes.

Due to the diverse procedures and the varying heat requirements of the different types of components, an exact processing temperature for re-flow soldering processes cannot be specified. The graph shows the upper limits of temperature and time which

must not be exceeded when establishing the solder profile according to your actual requirements. As short term limit a max. temperature of $T = 210^{\circ} \text{C}$ inside the component should not be exceeded when processing WIMA SMD capacitors.

SMD Hand soldering

WIMA SMD capacitors with plastic film dielectric are generally suitable for hand-soldering, e.g. for lab purposes, with a soldering iron where, however, similar to automated soldering processes, a certain duration and temperature should not be exceeded. These parameters are dependent on the physical size of the components and the relevant heat absorption involved.

The below data are to be regarded as guideline values and should serve to avoid damage to the dielectric caused by excessive heat during the soldering process. The soldering quality depends on the tool used and on the skill and experience of the person with the soldering iron in hand.

Size code	Temperature °C / °F	Time duration
1812	250 / 482	2 sec plate 1 / 5 sec off / 2 sec plate 2
2220	250 / 482	3 sec plate 1 / 5 sec off / 3 sec plate 2
2824	260 / 500	3 sec plate 1 / 5 sec off / 3 sec plate 2
4030	260 / 500	5 sec plate 1 / 5 sec off / 5 sec plate 2
5040	260 / 500	5 sec plate 1 / 5 sec off / 5 sec plate 2
6054	260 / 500	5 sec plate 1 / 5 sec off / 5 sec plate 2

Recommendation for Processing and Application of SMD Capacitors (Continuation)

Solder Paste

To obtain the best soldering performance we suggest the use of following solder paste alloy:

Lead free solder paste

Sn - Bi
Sn - Zn (Bi)
Sn - Ag - Cu (suitable for SMD-PET 5040/6054 and SMD-PPS)

Solder paste with lead

Sn - Pb - Ag (Sn60-Pb40-A, Sn63-Pb37-A)

Initial Operation/Calibration

Due to the stress which the components are subjected to during processing, reversible parameter changes occur in almost all electronic components. The capacitance recovery accuracy to be expected with careful processing is within a scope of

$$|\Delta C/C| \leq 5 \%$$

For the initial operation of the device a minimum storage time of

$$t \geq 24 \text{ hours}$$

is to be taken into account. With calibrated devices or when the application is largely dependent on capacitance it is advisable to prolong the storage time to

$$t \geq 10 \text{ days}$$

In this way ageing effects of the capacitor structure can be anticipated. Parameter changes due to processing are not to be expected after this period of time

Humidity Protection Bags

Taped WIMA SMD capacitors are shipped in humidity protection bags according to JEDEC standard, level 1 (EMI/static-shielding bags conforming to MIL-B 81705, Type 1, Class 1). Under controlled conditions the

components can be stored two years and more in the originally sealed bag. Opened packing units should be consumed instantly or resealed for specific storage under controlled conditions.

Reliability

Taking account of the manufacturer's guidelines and compatible processing, the WIMA SMD stand out for the same high quality and reliability as the analogous through-hole WIMA series. The technology of metallized film capacitors used e.g. in WIMA SMD-PET achieves the best values for all fields of application. The expected value is about:

$$\lambda_0 \leq 2 \text{ fit}$$

Furthermore the production of all WIMA components is subject to the regulations laid down by ISO 9001:2008 as well as the guidelines for component specifications set out by IEC quality assessment system (IECQ-CECC) for electronic components.

Electrical Characteristics and Fields of Application

Basically the WIMA SMD series have the same electrical characteristics as the analogous through-hole WIMA capacitors. Compared to ceramic or tantalum dielectrics WIMA SMD capacitors have a number of other outstanding qualities:

- favourable pulse rise time
- low ESR
- low dielectric absorption
- available in high voltage series
- large capacitance spectrum
- stand up to high mechanical stress
- good long-term stability

As regards technical performance as well as quality and reliability, the WIMA SMD series offer the possibility to cover nearly all applications of conventionally through-hole film capacitors with SMD components.

Furthermore, the WIMA SMD series can now be used for all the demanding capacitor applications for which, in the past, the use of through-hole components was mandatory:

- measuring techniques
- oscillator circuits
- differentiating and integrating circuits
- A/D or D/A transformers
- sample and hold circuits
- automotive electronics

With the WIMA SMD programme available today, the major part of all plastic film capacitors can be replaced by WIMA SMD components. The field of application ranges from standard coupling capacitors to use in switch-mode power supplies as filter or charging capacitors with high voltage and capacitance values, as well as in telecommunications e.g. the well-known telephone capacitor 1µF/250VDC.

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.

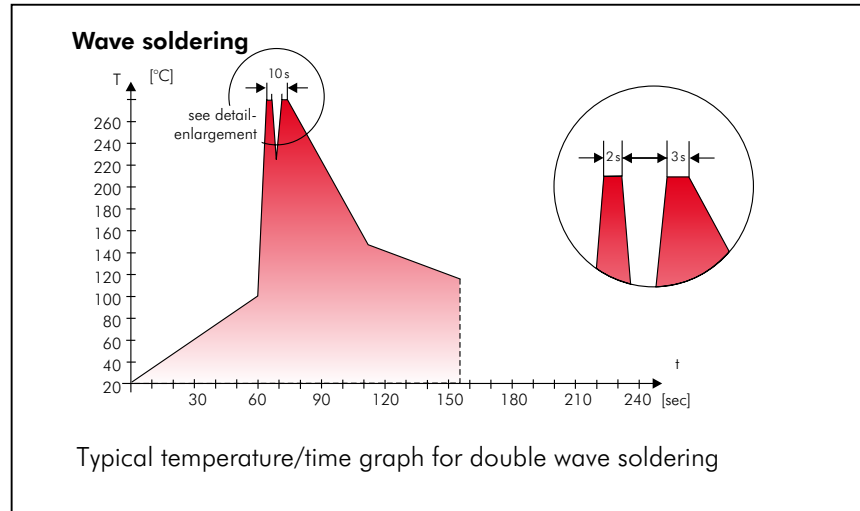
Single wave soldering

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 9001:2008 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/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 2011/65/EC
WIMA capacitors are lead free
in accordance with RoHS 2011/65/EC

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.

WIMA SMD Capacitors in Accordance with RoHS 2011/65/EC



WIMA SMD-PET

WIMA SMD-PPS

WIMA SMD capacitors in size codes 1812, 2220, 2824, 4030, 5040 and 6054, capacitance values from 0.01 μF through 6.8 μF and voltage ranges of 63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC and 1000 VDC cover nearly the entire application range of conventional through-hole plastic film capacitors.

The WIMA SMD-PET is designed for general DC-applications e.g. coupling and decoupling, blocking, by-passing or timing and corresponds to the RoHS 2011/65/EC guidelines (Restriction of Hazardous Substances) of the European Union.

The WIMA SMD-PPS has an operating temperature range up to +140° C and

stands out for its stable capacitance and frequency behaviour versus temperature. Capacitors of this range are environmentally compatible with the RoHS 2011/65/EC guidelines.

All WIMA SMD series are produced with the proven box technology, showing the following advantages in comparison with non-encapsulated or moulded SMD capacitor versions:

- Safe protection of the capacitor element against mechanical and thermal stresses during processing and operation. When using more temperature resistant dielectrics like e.g. PPS an even larger safety margin than with non-encapsulated parts is obtained.
- No danger of internal cracks or tearing away of the contacts due to construction elasticity.
- No danger of delamination due to solder plates covering the capacitor's entire end surfaces.
- Solvent-resistant, flame-retardant plastic case in accordance with UL 94 V-0.

These features and the wide capacitance range enable WIMA SMDs to substitute other capacitor technologies and become standard components in electronic developments.



Metallized Polyester (PET) SMD Film Capacitors with Box Encapsulation

Special Features

- Size codes 1812, 2220, 2824, 4030, 5040 and 6054 with PET and encapsulated
- Operating temperature up to 100° C
- Self-healing
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing

Construction

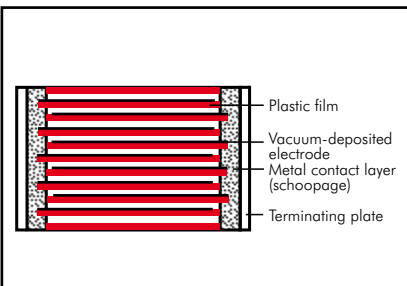
Dielectric:

Polyethylene-terephthalate (PET) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case, UL 94 V-0

Terminations:

Tinned plates.

Marking:

Box colour: Black.

Electrical Data

Capacitance range:

0.01 µF to 6.8 µF

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

Capacitance tolerances:

±20%, ±10% (±5% available subject to special enquiry)

Operating temperature range:

-55° C to +100° C (+125° C available subject to special enquiry)

Climatic test category:

55/100/21 according to IEC

for size codes 1812 to 2824

55/100/56 according to IEC

for size codes 4030 to 6054

Insulation resistance at +20° C:

U_r	U_{test}	$C \leq 0.33 \mu F$	$0.33 \mu F < C \leq 6.8 \mu F$
63 VDC	50 V	$\geq 3.75 \times 10^3 M\Omega$ (mean value: $1 \times 10^4 M\Omega$)	$\geq 1250 \text{ sec } (M\Omega \times \mu F)$ (mean value: 3000 sec)
100 VDC	100 V	$\geq 1 \times 10^4 M\Omega$ (mean value: $5 \times 10^4 M\Omega$)	$\geq 3000 \text{ sec } (M\Omega \times \mu F)$ (mean value: 10000 sec)

Measuring time: 1 min.

Dissipation factors at +20° C: tan δ

at f	$C \leq 0.1 \mu F$	$0.1 \mu F < C \leq 1.0 \mu F$	$C > 1.0 \mu F$
1 kHz	$\leq 8 \times 10^{-3}$	$\leq 8 \times 10^{-3}$	$\leq 10 \times 10^{-3}$
10 kHz	$\leq 15 \times 10^{-3}$	$\leq 15 \times 10^{-3}$	-
100 kHz	$\leq 30 \times 10^{-3}$	-	-

Maximum pulse rise time: for pulses equal to the rated voltage

Capacitance µF	Pulse rise time V/µsec max. operation/test					
	63 VDC	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC
0.01 ... 0.022	30/300	35/350	40/400	35/350	40/400	50/500
0.033 ... 0.068	20/200	20/200	40/400	21/210	25/250	32/320
0.1 ... 0.22	10/100	10/100	12/120	14/140	17/170	-
0.33 ... 0.68	8/80	6/60	9/90	10/100	-	-
1.0 ... 2.2	3.5/35	4/40	7/70	-	-	-
3.3 ... 6.8	3/30	3/30	-	-	-	-

Dip Solder Test/Processing

Resistance to soldering heat:

Test Tb in accordance with DIN IEC

60068-2-58/DIN EN 60384-19.

Soldering bath temperature max. 260° C.

Soldering duration max. 5 sec.

Change in capacitance $\Delta C/C < 5\%$.

Soldering process:

Wave soldering and re-flow soldering

(see temperature/time graphs page 12).

Packing

Available taped and reeled in 12 mm blister pack.

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	63 VDC/40 VAC*			100 VDC/63 VAC*			250 VDC/160 VAC*		
	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number
0.01 µF	1812	3.0	SMDTC02100KA00	1812	3.0	SMDTD02100KA00	1812	4.0	SMDTF02100KB00
	2220	3.5	SMDTC02100QA00	2220	3.5	SMDTD02100QA00	2220	3.5	SMDTF02100QA00
	2824	3.0	SMDTC02100TA00	2824	3.0	SMDTD02100TA00	2824	3.0	SMDTF02100TA00
0.015 "	1812	3.0	SMDTC02150KA00	1812	3.0	SMDTD02150KA00	1812	4.0	SMDTF02150KB00
	2220	3.5	SMDTC02150QA00	2220	3.5	SMDTD02150QA00	2220	3.5	SMDTF02150QA00
	2824	3.0	SMDTC02150TA00	2824	3.0	SMDTD02150TA00	2824	3.0	SMDTF02150TA00
0.022 "	1812	3.0	SMDTC02220KA00	1812	3.0	SMDTD02220KA00	1812	4.0	SMDTF02220KB00
	2220	3.5	SMDTC02220QA00	2220	3.5	SMDTD02220QA00	2220	3.5	SMDTF02220QA00
	2824	3.0	SMDTC02220TA00	2824	3.0	SMDTD02220TA00	2824	3.0	SMDTF02220TA00
0.033 "	1812	3.0	SMDTC02330KA00	1812	3.0	SMDTD02330KA00	2220	3.5	SMDTF02330QA00
	2220	3.5	SMDTC02330QA00	2220	3.5	SMDTD02330QA00	2824	3.0	SMDTF02330TA00
	2824	3.0	SMDTC02330TA00	2824	3.0	SMDTD02330TA00	4030	5.0	SMDTF02330VA00
0.047 "	1812	3.0	SMDTC02470KA00	1812	3.0	SMDTD02470KA00	2220	3.5	SMDTF02470QA00
	2220	3.5	SMDTC02470QA00	2220	3.5	SMDTD02470QA00	2824	3.0	SMDTF02470TA00
	2824	3.0	SMDTC02470TA00	2824	3.0	SMDTD02470TA00	4030	5.0	SMDTF02470VA00
0.068 "	1812	3.0	SMDTC02680KA00	1812	3.0	SMDTD02680KA00	2220	3.5	SMDTF02680QA00
	2220	3.5	SMDTC02680QA00	2220	3.5	SMDTD02680QA00	2824	3.0	SMDTF02680TA00
	2824	3.0	SMDTC02680TA00	2824	3.0	SMDTD02680TA00	4030	5.0	SMDTF02680VA00
0.1 µF	1812	3.0	SMDTC03100KA00	1812	3.0	SMDTD03100KA00	2220	3.5	SMDTF03100QA00
	2220	3.5	SMDTC03100QA00	2220	3.5	SMDTD03100QA00	2824	5.0	SMDTF03100TB00
	2824	3.0	SMDTC03100TA00	2824	3.0	SMDTD03100TA00	4030	5.0	SMDTF03100VA00
0.15 "	1812	3.0	SMDTC03150KA00	1812	4.0	SMDTD03150KB00	2220	4.5	SMDTF03150QB00
	2220	3.5	SMDTC03150QA00	2220	3.5	SMDTD03150QA00	2824	5.0	SMDTF03150TB00
	2824	3.0	SMDTC03150TA00	2824	3.0	SMDTD03150TA00	4030	5.0	SMDTF03150VA00
0.22 "	1812	3.0	SMDTC03220KA00	1812	4.0	SMDTD03220KB00	2220	4.5	SMDTF03220QB00
	2220	3.5	SMDTC03220QA00	2220	3.5	SMDTD03220QA00	2824	5.0	SMDTF03220TB00
	2824	3.0	SMDTC03220TA00	2824	3.0	SMDTD03220TA00	4030	5.0	SMDTF03220VA00
0.33 "	1812	4.0	SMDTC03330KB00	2220	4.5	SMDTD03330QB00	2824	5.0	SMDTF03330TB00
	2220	3.5	SMDTC03330QA00	2824	5.0	SMDTD03330TB00	4030	5.0	SMDTF03330VA00
	2824	3.0	SMDTC03330TA00	4030	5.0	SMDTD03330VA00	5040	6.0	SMDTF03330XA00
0.47 "	1812	4.0	SMDTC03470KB00	2220	4.5	SMDTD03470QB00	4030	5.0	SMDTF03470VA00
	2220	3.5	SMDTC03470QA00	2824	5.0	SMDTD03470TB00	5040	6.0	SMDTF03470XA00
	2824	3.0	SMDTC03470TA00	4030	5.0	SMDTD03470VA00			
0.68 "	2220	4.5	SMDTC03680QB00	2824	5.0	SMDTD03680TB00	5040	6.0	SMDTF03680XA00
	2824	3.0	SMDTC03680TA00	4030	5.0	SMDTD03680VA00			
	4030	5.0	SMDTC03680VA00	5040	6.0	SMDTD03680XA00			
1.0 µF	2220	4.5	SMDTC04100QB00	2824	5.0	SMDTD04100TB00	6054	7.0	SMDTF04100YA00
	2824	3.0	SMDTC04100TA00	4030	5.0	SMDTD04100VA00			
	4030	5.0	SMDTC04100VA00	5040	6.0	SMDTD04100XA00			
1.5 "	2824	5.0	SMDTC04150TB00	4030	5.0	SMDTD04150VA00			
	4030	5.0	SMDTC04150VA00	5040	6.0	SMDTD04150XA00			
2.2 "	2824	5.0	SMDTC04220TB00	5040	6.0	SMDTD04220XA00			
	4030	5.0	SMDTC04220VA00						
3.3 "	4030	5.0	SMDTC04330VA00	5040	6.0	SMDTD04330XA00			
4.7 "	5040	6.0	SMDTC04470XA00	6054	7.0	SMDTD04470YA00			
6.8 "	6054	7.0	SMDTC04680YA00						

Part number completion:
Tolerance: 20 % = M
 10 % = K
 5 % = J
Packing: bulk = S
Pin length: none = 00
Taped version see page 147.

* AC voltage: $f = 50 \text{ Hz}; 1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

Dims. in mm.

Rights reserved to amend design data without prior notification.

Continuation

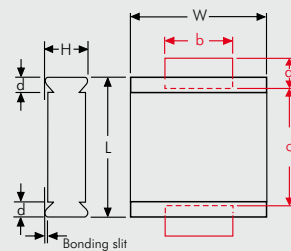
General Data

Capacitance	400 VDC/200 VAC*			630 VDC/300 VAC*			1000 VDC/400 VAC*		
	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number
0.01 μ F	2824 4030	3.0 5.0	SMDTG02100TA00_____ SMDTG02100VA00_____ SMDTG02100XA00_____	4030	5.0	SMDTJ02100VA00_____ SMDTJ02100XA00_____			
0.015 "	2824 4030	3.0 5.0	SMDTG02150TA00_____ SMDTG02150VA00_____ SMDTG02150XA00_____	4030	5.0	SMDTJ02150VA00_____ SMDTJ02150XA00_____	5040	6.0	SMDTO12150XA00_____ SMDTO12150YA00_____
0.022 "	2824 4030	3.0 5.0	SMDTG02220TA00_____ SMDTG02220VA00_____ SMDTG02220XA00_____	5040	6.0	SMDTJ02220XA00_____ SMDTJ02220YA00_____	5040	6.0	SMDTO12220XA00_____ SMDTO12220YA00_____
0.033 "	2824 4030	5.0 5.0	SMDTG02330TB00_____ SMDTG02330VA00_____ SMDTG02330XA00_____	5040	6.0	SMDTJ02330XA00_____ SMDTJ02330YA00_____	5040	6.0	SMDTO12330XA00_____ SMDTO12330YA00_____
0.047 "	2824 4030	5.0 5.0	SMDTG02470TB00_____ SMDTG02470VA00_____ SMDTG02470XA00_____	5040	6.0	SMDTJ02470XA00_____ SMDTJ02470YA00_____	6054	7.0	SMDTO12470YA00_____ SMDTO12470XA00_____
0.068 "	4030 5040	5.0 6.0	SMDTG02680VA00_____ SMDTG02680XA00_____ SMDTG02680YA00_____	5040	6.0	SMDTJ02680XA00_____ SMDTJ02680YA00_____			
0.1 μ F	4030 5040	5.0 6.0	SMDTG03100VA00_____ SMDTG03100XA00_____ SMDTG03100YA00_____	6054	7.0	SMDTJ03100YA00_____ SMDTJ03100XA00_____			
0.15 "	4030 5040	5.0 6.0	SMDTG03150VA00_____ SMDTG03150XA00_____ SMDTG03150YA00_____	6054	7.0	SMDTJ03150YA00_____ SMDTJ03150XA00_____			
0.22 "	5040	6.0	SMDTG03220XA00_____ SMDTG03220YA00_____	6054	7.0	SMDTJ03220YA00_____ SMDTJ03220XA00_____			
0.33 "	5040	6.0	SMDTG03330XA00_____ SMDTG03330YA00_____						
0.47 "	6054	7.0	SMDTG03470YA00_____ SMDTG03470XA00_____						

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

Dims. in mm.

Solder pad recommendation



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S

Pin length: none = 00

Taped version see page 147.

The values of the WIMA SMD-PEN range according to the main catalogue 2009 are still available on request.

Size code	L ±0.3	W ±0.3	d	a min.	b min.	c max.
1812	4.8	3.3	0.5	1.2	3.5	3.5
2220	5.7	5.1	0.5	1.2	4	4.5
2824	7.2	6.1	0.5	1.2	4	6.5
4030	10.2	7.6	0.5	2.5	6	9
5040	12.7	10.2	0.7	2.5	6	11.5
6054	15.3	13.7	0.7	2.5	6	14

Metallized Polyphenylene-Sulphide (PPS) SMD Film Capacitors with Box Encapsulation

Special Features

- Size codes 1812, 2220, 2824, 4030, 5040 and 6054 with PPS and encapsulated
- Operating temperature up to 140° C
- Self-healing
- Suitable for lead-free soldering
- Low dissipation factor
- Low dielectric absorption
- Very constant capacitance value versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For general applications in high temperature circuits e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing
- Filtering
- Oscillating circuits

Construction

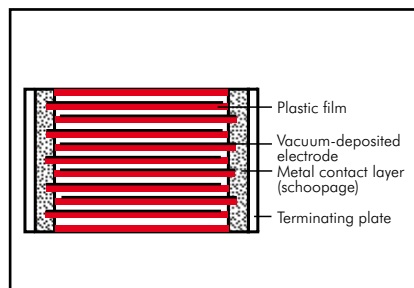
Dielectric:

Polyphenylene-sulphide (PPS) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case, UL 94 V-0

Terminations:

Tinned plates.

Marking:

Box colour: Black.

Electrical Data

Capacitance range:

0.01 µF to 6.8 µF

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

Capacitance tolerances:

±20%, ±10% (±5% available subject to special enquiry)

Operating temperature range:

-55° C to +140° C

Climatic test category:

55/140/56 in accordance with IEC

Insulation resistance at +20° C:

U_r	U_{test}	$C \leq 0.33 \mu F$	$0.33 \mu F < C \leq 6.8 \mu F$
63 VDC 100 VDC	50 V 100 V	$\geq 1 \times 10^4 M\Omega$ (mean value: $3 \times 10^4 M\Omega$)	$\geq 3000 \text{ sec} (M\Omega \times \mu F)$ (mean value: 6000 sec)
$\geq 250 \text{ VDC}$	100 V	$\geq 3 \times 10^4 M\Omega$ (mean value: $6 \times 10^4 M\Omega$)	$\geq 6000 \text{ sec} (M\Omega \times \mu F)$ (mean value: 12000 sec)

Measuring time: 1 min.

Dissipation factors at +20° C: $\tan \delta$

at f	$C \leq 0.1 \mu F$	$0.1 \mu F < C \leq 1.0 \mu F$	$C > 1.0 \mu F$
1 kHz	$\leq 15 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
10 kHz	$\leq 20 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	-
100 kHz	$\leq 50 \times 10^{-4}$	-	-

Maximum pulse rise time: for pulses equal to the rated voltage

Capacitance µF	Pulse rise time V/µsec max. operation/test					
	63 VDC	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC
0.01 ... 0.022	25/250	25/250	30/300	35/350	40/400	45/450
0.033 ... 0.068	15/150	15/150	20/200	25/250	28/280	32/320
0.1 ... 0.22	10/100	10/100	12/120	15/150	-	-
0.33 ... 0.68	5/50	5/50	6/60	8/80	-	-
1.0 ... 2.2	3/30	3/30	-	-	-	-
3.3 ... 6.8	2/20	-	-	-	-	-

Dip Solder Test/Processing

Resistance to soldering heat:

Test Tb in accordance with DIN IEC

60068-2-58/DIN EN 60384-20.

Soldering bath temperature max. 260° C.

Soldering duration max. 5 sec.

Change in capacitance $\Delta C/C < 5\%$.

Soldering process:

Wave soldering and re-flow soldering
(see temperature/time graphs page 12).

Packing

Available taped and reeled in 12 mm blister pack.

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	63 VDC/40 VAC*			100 VDC/63 VAC*			250 VDC/160 VAC*						
	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number				
0.01 µF	1812	3.0	SMDIC02100KA00_____	1812	3.0	SMDID02100KA00_____	2220	3.5	SMDIF02100QA00_____				
	2220	3.5	SMDIC02100QA00_____	2220	3.5	SMDID02100QA00_____							
0.015 "	1812	3.0	SMDIC02150KA00_____	1812	3.0	SMDID02150KA00_____	2220	3.5	SMDIF02150QA00_____				
	2220	3.5	SMDIC02150QA00_____	2220	3.5	SMDID02150QA00_____							
0.022 "	1812	3.0	SMDIC02220KA00_____	1812	3.0	SMDID02220KA00_____	2220	3.5	SMDIF02220QA00_____				
	2220	3.5	SMDIC02220QA00_____	2220	3.5	SMDID02220QA00_____		2824	3.0	SMDIF02220TA00_____			
0.033 "	1812	3.0	SMDIC02330KA00_____	1812	3.0	SMDID02330KA00_____	2824	3.0	SMDIF02330TA00_____				
	2220	3.5	SMDIC02330QA00_____	2220	3.5	SMDID02330QA00_____		4030	5.0	SMDIF02330VA00_____			
	2824	3.0	SMDIC02330TA00_____	2824	3.0	SMDID02330TA00_____							
0.047 "	1812	3.0	SMDIC02470KA00_____	1812	3.0	SMDID02470KA00_____	2824	5.0	SMDIF02470TB00_____				
	2220	3.5	SMDIC02470QA00_____	2220	3.5	SMDID02470QA00_____		4030	5.0	SMDIF02470VA00_____			
	2824	3.0	SMDIC02470TA00_____	2824	3.0	SMDID02470TA00_____							
0.068 "	1812	3.0	SMDIC02680KA00_____	2220	3.5	SMDID02680QA00_____	2824	5.0	SMDIF02680TB00_____				
	2220	3.5	SMDIC02680QA00_____	2824	3.0	SMDID02680TA00_____		4030	5.0	SMDIF02680VA00_____			
	2824	3.0	SMDIC02680TA00_____										
0.1 µF	1812	3.0	SMDIC03100KA00_____	2220	3.5	SMDID03100QA00_____	2824	5.0	SMDIF03100TB00_____				
	2220	3.5	SMDIC03100QA00_____	2824	3.0	SMDID03100TA00_____		4030	5.0	SMDIF03100VA00_____			
	2824	3.0	SMDIC03100TA00_____	5040	6.0	SMDIF03100XA00_____							
0.15 "	1812	4.0	SMDIC03150KB00_____	2824	3.0	SMDID03150TA00_____	4030	5.0	SMDIF03150VA00_____				
	2220	3.5	SMDIC03150QA00_____					5040	6.0	SMDIF03150XA00_____			
	2824	3.0	SMDIC03150TA00_____						6054	7.0	SMDIF03150YA00_____		
0.22 "	2220	4.5	SMDIC03220QB00_____	2220	4.5	SMDID03220QB00_____	4030	5.0	SMDIF03220VA00_____				
	2824	5.0	SMDIC03220TB00_____	2824	5.0	SMDID03220TB00_____		6.0	SMDIF03220XA00_____				
		5.0	SMDIC03220VA00_____					6054	7.0	SMDIF03220YA00_____			
0.33 "	2220	4.5	SMDIC03330QB00_____	2824	5.0	SMDID03330TB00_____	5040	6.0	SMDIF03330XA00_____				
	2824	5.0	SMDIC03330TB00_____					4030	5.0	SMDID03330VA00_____	6054	7.0	SMDIF03330YA00_____
		4030	5.0									SMDIC03330VA00_____	
0.47 "	2220	4.5	SMDIC03470QB00_____	2824	5.0	SMDID03470TB00_____	6054	7.0	SMDIF03470YA00_____				
	2824	5.0	SMDIC03470TB00_____										
	4030	5.0	SMDIC03470VA00_____										
0.68 "	2824	5.0	SMDIC03680TB00_____	4030	5.0	SMDID03680VA00_____							
	4030	5.0	SMDIC03680VA00_____										
1.0 µF	2824	5.0	SMDIC04100TB00_____	5040	6.0	SMDID04100XA00_____							
	4030	5.0	SMDIC04100VA00_____										
	5040	6.0	SMDIC04100XA00_____										
1.5 "	4030	5.0	SMDIC04150VA00_____	6054	7.0	SMDID04150YA00_____							
	5040	6.0	SMDIC04150XA00_____										
2.2 "	5040	6.0	SMDIC04220XA00_____	6054	7.0	SMDID04220YA00_____							
	6054	7.0	SMDIC04220YA00_____										
3.3 "	5040	6.0	SMDIC04330XA00_____										
	6054	7.0	SMDIC04330YA00_____										
4.7 "	6054	7.0	SMDIC04470YA00_____										
6.8 "	6054	7.0	SMDIC04680YA00_____										

Part number completion:

Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: none = 00
 Taped version see page 147.

* AC voltages: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_{\text{r}}$

Dims. in mm.

Rights reserved to amend design data without prior notification.

Continuation

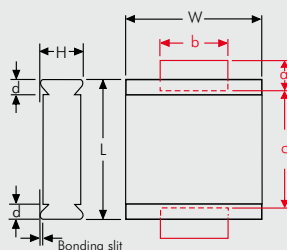
General Data

Capacitance	400 VDC/200 VAC*			630 VDC/300 VAC*			1000 VDC/400 VAC*		
	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number	Size code	H ± 0.3	Part number
0.01 μF				5040	6.0	SMDIJ02100XA00_	5040	6.0	SMDIO12100XA00_
0.015 "				5040	6.0	SMDIJ02150XA00_	5040	6.0	SMDIO12150XA00_
0.022 "	4030 5040	5.0 6.0	SMDIG02220VA00_ SMDIG02220XA00_	5040	6.0	SMDIJ02220XA00_	6054	7.0	SMDIO12220YA00_
0.033 "	4030 5040	5.0 6.0	SMDIG02330VA00_ SMDIG02330XA00_	5040	6.0	SMDIJ02330XA00_	6054	7.0	SMDIO12330YA00_
0.047 "	4030 5040	5.0 6.0	SMDIG02470VA00_ SMDIG02470XA00_	5040	6.0	SMDIJ02470XA00_			
0.068 "	4030 5040	5.0 6.0	SMDIG02680VA00_ SMDIG02680XA00_						
0.1 μF	4030 5040 6054	5.0 6.0 7.0	SMDIG03100VA00_ SMDIG03100XA00_ SMDIG03100YA00_						
0.15 "	5040 6054	6.0 7.0	SMDIG03150XA00_ SMDIG03150YA00_						
0.22 "	6054	7.0	SMDIG03220YA00_						
0.33 "	6054	7.0	SMDIG03330YA00_						

* AC voltages: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_{\text{r}}$

Dims. in mm.

Solder pad recommendation



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S
Pin length: none = 00

Taped version see page 147.

Size code	L ±0.3	W ±0.3	d	a min.	b min.	c max.
1812	4.8	3.3	0.5	1.2	3.5	3.5
2220	5.7	5.1	0.5	1.2	4	4.5
2824	7.2	6.1	0.5	1.2	4	6.5
4030	10.2	7.6	0.5	2.5	6	9
5040	12.7	10.2	0.7	2.5	6	11.5
6054	15.3	13.7	0.7	2.5	6	14

Rights reserved to amend design data without prior notification.

WIMA Miniature Capacitors in PCM 2.5 mm



WIMA FKP 02

WIMA MKS 02

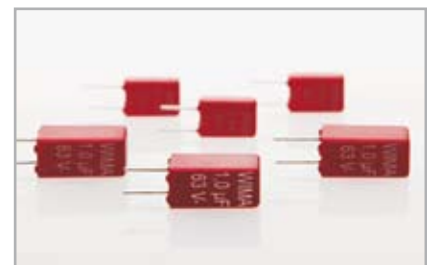
WIMA plastic film capacitors in PCM 2.5 mm are available in metallized, self-healing version WIMA MKS 02 or in pulse duty film and foil versions WIMA FKP 02. As a dielectric, Polyester or Polypropylene film is used. The capacitance range includes values of 100 pF through 1.0 μ F and voltage ratings of 50 VDC, 63 VDC, 100 VDC, 250 VDC and 400 VDC.

The realization of the smallest plastic film capacitors in the world has been made possible by the use of ultra-thin plastic film in thicknesses of 0.8 μ m and below. The film processing with highly sensitive machines requires a high degree of experience and technical know-how.

The WIMA series with PCM 2.5 mm are contacted at the end surfaces and have very low self-inductance due to the small pin spacing of the capacitor and its fully contacted electrodes. Furthermore, the pulse and current loading capacities basically increase, the smaller the PCM can be designed, because – provided that the thickness of the film is the same – a longer band length is needed to achieve a particular capacitance value.

WIMA capacitors are produced with the proven box technology using solvent-resistant, flame-retardant plastic cases according to UL 94 V-0. They are environmentally compatible with the RoHS 2011/65/EC guidelines of the European Union.

WIMA subminiature capacitors in PCM 2.5 mm are outstandingly suitable as reservoir and decoupling capacitors for high-speed digital circuits and for HF decoupling in the field of high frequencies. Due to their excellent electrical properties they can replace ceramic capacitors in applications where quality and reliability are required. Due to their reduced dimensions they open up new possibilities for use in applications with limited space requirements and high package density.



Polypropylene (PP) Film and Foil Capacitors for Pulse Applications in PCM 2.5 mm

Special Features

- Pulse duty construction
- PCM 2.5 mm
- Close tolerances up to $\pm 2.5\%$
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC

Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- LC-Filtering
- Oscillating circuits
- Audio equipment

Construction

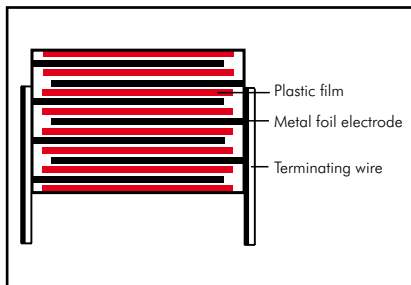
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Metal foil

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: Yellow

Electrical Data

Capacitance range:

100 pF to 0.01 μF (E12-values on request)

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC

Capacitance tolerances:

$\pm 10\%$, $\pm 5\%$, $\pm 2.5\%$

Operating temperature range:

-55°C to $+100^\circ\text{C}$

Test specifications:

In accordance with IEC 60384-13

Climatic test category:

55/100/21 in accordance with IEC

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

$\geq 5 \times 10^5 \text{ M}\Omega$

(mean value: $1 \times 10^6 \text{ M}\Omega$)

Measuring voltage:

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

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

Test voltage: $2 U_r$, 2 sec.

Maximum pulse rise time:

1000 V/ μsec for pulses equal to the rated voltage

Dielectric absorption:

0.05%

Temperature coefficient:

$-200 \times 10^{-6}/^\circ\text{C}$ (typical)

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

at f	$C \leq 0.01 \mu\text{F}$
1 kHz	$\leq 4 \times 10^{-4}$
10 kHz	$\leq 4 \times 10^{-4}$
100 kHz	$\leq 6 \times 10^{-4}$

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 < 5 fit ($0.5 \times U_r$ and 40°C)

Mechanical Tests

Pull test on pins:

10 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 $390 \text{ m}/\text{sec}^2$ in accordance with IEC 60068-2-29

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

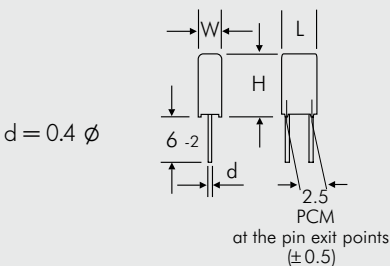
Capacitance	63 VDC/40 VAC*					100 VDC/63 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	2.5	7	4.6	2.5	FKPOC001000B00_____	2.5	7	4.6	2.5	FKPOD001000B00_____
150 "	2.5	7	4.6	2.5	FKPOC001500B00_____	2.5	7	4.6	2.5	FKPOD001500B00_____
220 "	2.5	7	4.6	2.5	FKPOC002200B00_____	2.5	7	4.6	2.5	FKPOD002200B00_____
330 "	2.5	7	4.6	2.5	FKPOC003300B00_____	2.5	7	4.6	2.5	FKPOD003300B00_____
470 "	2.5	7	4.6	2.5	FKPOC004700B00_____	2.5	7	4.6	2.5	FKPOD004700B00_____
680 "	2.5	7	4.6	2.5	FKPOC006800B00_____	2.5	7	4.6	2.5	FKPOD006800B00_____
1000 pF	2.5	7	4.6	2.5	FKPOC011000B00_____	2.5	7	4.6	2.5	FKPOD011000B00_____
1500 "	2.5	7	4.6	2.5	FKPOC011500B00_____	2.5	7	4.6	2.5	FKPOD011500B00_____
2200 "	3	7.5	4.6	2.5	FKPOC012200C00_____	3	7.5	4.6	2.5	FKPOD012200C00_____
3300 "	3.8	8.5	4.6	2.5	FKPOC013300D00_____	3.8	8.5	4.6	2.5	FKPOD013300D00_____
4700 "	4.6	9	4.6	2.5	FKPOC014700E00_____	4.6	9	4.6	2.5	FKPOD014700E00_____
6800 "	4.6	9	4.6	2.5	FKPOC016800E00_____	4.6	9	4.6	2.5	FKPOD016800E00_____
0.01 µF	5.5	10	4.6	2.5	FKPOC021000F00_____	5.5	10	4.6	2.5	FKPOD021000F00_____

Capacitance	250 VDC/160 VAC*					400 VDC/200 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	2.5	7	4.6	2.5	FKPOF001000B00_____	2.5	7	4.6	2.5	FKPOG001000B00_____
150 "	2.5	7	4.6	2.5	FKPOF001500B00_____	2.5	7	4.6	2.5	FKPOG001500B00_____
220 "	2.5	7	4.6	2.5	FKPOF002200B00_____	2.5	7	4.6	2.5	FKPOG002200B00_____
330 "	2.5	7	4.6	2.5	FKPOF003300B00_____	2.5	7	4.6	2.5	FKPOG003300B00_____
470 "	2.5	7	4.6	2.5	FKPOF004700B00_____	2.5	7	4.6	2.5	FKPOG004700B00_____
680 "	2.5	7	4.6	2.5	FKPOF006800B00_____	3	7.5	4.6	2.5	FKPOG006800C00_____
1000 pF	2.5	7	4.6	2.5	FKPOF011000B00_____	3.8	8.5	4.6	2.5	FKPOG011000D00_____
1500 "	3	7.5	4.6	2.5	FKPOF011500C00_____	4.6	9	4.6	2.5	FKPOG011500E00_____
2200 "	3.8	8.5	4.6	2.5	FKPOF012200D00_____	4.6	9	4.6	2.5	FKPOG012200E00_____
3300 "	4.6	9	4.6	2.5	FKPOF013300E00_____	5.5	10	4.6	2.5	FKPOG013300F00_____
4700 "	5.5	10	4.6	2.5	FKPOF014700F00_____					

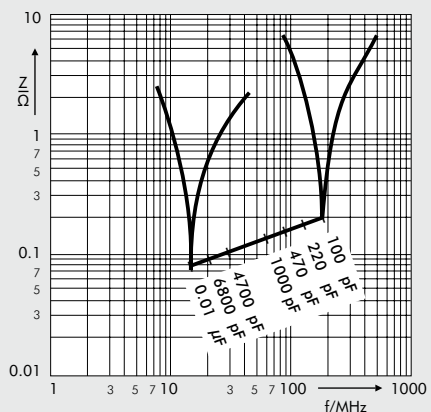
* AC voltage: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing

Dims. in mm.



Part number completion:	
Tolerance:	10 % = K
	5 % = J
	2.5 % = H
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



Impedance change with frequency (general guideline).

Rights reserved to amend design data without prior notification.

The values of the WIMA FKS 02 and WIMA FKM 02 ranges according to the main catalogue 2009 are still available on request.

Metallized Polyester (PET) Capacitors in PCM 2.5 mm

Special Features

- High volume/capacitance ratio and reduced base
- PCM 2.5 mm
- Self-healing
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing

Construction

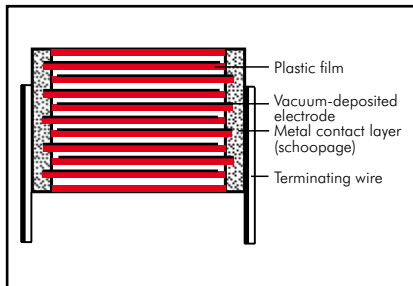
Dielectric:

Polyethylene-terephthalate (PET) 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: Silver.

Epoxy resin seal: Yellow

Electrical Data

Capacitance range:

3300 pF to 1.0 μ F (E12-values on request)

Rated voltages:

50 VDC, 63 VDC, 100 VDC, 250 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$ ($\pm 5\%$ available subject to special enquiry)

Operating temperature range:

-55° C to $+100^{\circ}$ C ($+125^{\circ}$ C available subject to special enquiry)

Test specifications:

In accordance with IEC 60384-2

Climatic test category:

55/100/21 in accordance with IEC

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

U_r	U_{test}	$C \leq 0.33 \mu F$	$0.33 \mu F < C \leq 1.0 \mu F$
50 VDC	10 V	$\geq 3.75 \times 10^3 M\Omega$ (mean value: $1 \times 10^4 M\Omega$)	$\geq 1250 \text{ sec } (M\Omega \times \mu F)$ (mean value: 3000 sec)
63 VDC	50 V	$\geq 3.75 \times 10^3 M\Omega$ (mean value: $1 \times 10^4 M\Omega$)	$\geq 1250 \text{ sec } (M\Omega \times \mu F)$ (mean value: 3000 sec)
≥ 100 VDC	100 V	$\geq 1 \times 10^4 M\Omega$ (mean value: $2 \times 10^4 M\Omega$)	-

Measuring time: 1 min.

Test voltage: $1.6 U_r$, 2 sec.

Maximum pulse rise time:

Capacitance pF/ μ F	Pulse rise time V/ μ sec max. operation/test
3300 ... 6800	100 / 1000
0.01 ... 0.022	50 / 500
0.033 ... 0.068	30 / 300
0.1 ... 0.33	20 / 200
0.47 ... 1.0	15 / 150

for pulses equal to the rated voltage

Mechanical Tests

Pull test on pins:

10 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^2 in accordance with IEC 60068-2-29

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

at f	$C \leq 0.1 \mu F$	$0.1 \mu F < C \leq 1.0 \mu F$
1 kHz	$\leq 8 \times 10^{-3}$	$\leq 8 \times 10^{-3}$
10 kHz	$\leq 15 \times 10^{-3}$	$\leq 15 \times 10^{-3}$
100 kHz	$\leq 30 \times 10^{-3}$	-

Voltage derating:

A voltage derating factor of 1.25 % per K must be applied from $+85^{\circ}$ C for DC voltages and from $+75^{\circ}$ C for AC voltages.

Reliability:

Operational life > 300 000 hours

Failure rate < 2 fit ($0.5 \times U_r$ and 40° C)

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

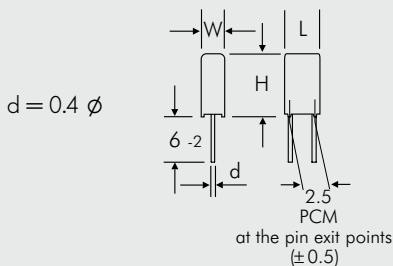
Capacitance	50 VDC/30 VAC*					63 VDC/40 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μ F						2.5	7	4.6	2.5	MKS0C021000B00_
0.015 "						2.5	7	4.6	2.5	MKS0C021500B00_
0.022 "						2.5	7	4.6	2.5	MKS0C022200B00_
0.033 "						2.5	7	4.6	2.5	MKS0C023300B00_
0.047 "						2.5	7	4.6	2.5	MKS0C024700B00_
0.068 "						3	7.5	4.6	2.5	MKS0C026800C00_
0.1 μ F						3	7.5	4.6	2.5	MKS0C031000C00_
0.15 "						3	7.5	4.6	2.5	MKS0C031500C00_
0.22 "						3	7.5	4.6	2.5	MKS0C032200C00_
0.33 "						3.8	8.5	4.6	2.5	MKS0C033300D00_
0.47 "						4.6	9	4.6	2.5	MKS0C034700E00_
0.68 "						5.5	10	4.6	2.5	MKS0C036800F00_
1.0 μ F	5.5	10	4.6	2.5	MKS0B041000F00_					

Capacitance	100 VDC/63 VAC*					250 VDC/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
3300 pF						2.5	7	4.6	2.5	MKS0F013300B00_
4700 "						2.5	7	4.6	2.5	MKS0F014700B00_
6800 "						2.5	7	4.6	2.5	MKS0F016800B00_
0.01 μ F	2.5	7	4.6	2.5	MKS0D021000B00_	2.5	7	4.6	2.5	MKS0F021000B00_
0.015 "	2.5	7	4.6	2.5	MKS0D021500B00_	2.5	7	4.6	2.5	MKS0F021500B00_
0.022 "	2.5	7	4.6	2.5	MKS0D022200B00_	2.5	7	4.6	2.5	MKS0F022200B00_
0.033 "	2.5	7	4.6	2.5	MKS0D023300B00_	3	7.5	4.6	2.5	MKS0F023300C00_
0.047 "	2.5	7	4.6	2.5	MKS0D024700B00_	3.8	8.5	4.6	2.5	MKS0F024700D00_
0.068 "	3	7.5	4.6	2.5	MKS0D026800C00_	4.6	9	4.6	2.5	MKS0F026800E00_
0.1 μ F	3	7.5	4.6	2.5	MKS0D031000C00_	5.5	10	4.6	2.5	MKS0F031000F00_
0.15 "	3.8	8.5	4.6	2.5	MKS0D031500D00_					
0.22 "	4.6	9	4.6	2.5	MKS0D032200E00_					
0.33 "	5.5	10	4.6	2.5	MKS0D033300F00_					

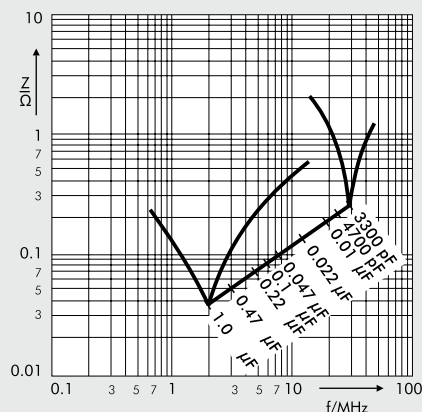
* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing

Dims. in mm.



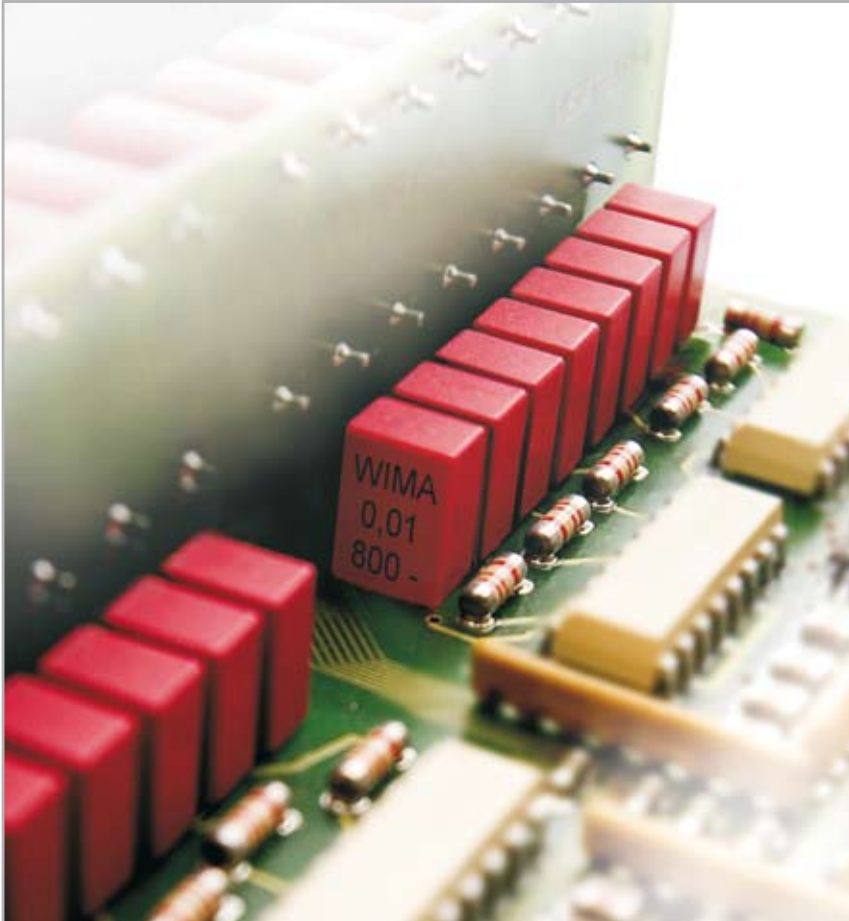
Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



Impedance change with frequency (general guide).

Rights reserved to amend design data without prior notification.

WIMA Capacitors in PCM 5 mm



WIMA FKS 2

WIMA FKP 2

WIMA MKS 2

WIMA MKP 2

WIMA capacitors in PCM 5 mm are available in two dielectric versions as metallized or film and foil capacitors.

WIMA capacitors with a Polyester dielectric (PET) are suitable for general applications such as coupling, decoupling and by-passing. By making use of ultra thin film and appropriate manufacturing experience, it has been possible to achieve high capacitance values in very small box sizes. The WIMA MKS 2 for example is available with capacitance values up to 10 μF in PCM 5 mm.

Polypropylene capacitors (PP) are used in the high frequency field. This includes resonant circuits, power supplies,

deflection circuits, oscillator circuits and audio equipment. WIMA Polypropylene capacitors in PCM 5 mm can also be supplied in film/foil versions for high pulses with rated voltages up to 1000 VDC.

In the case of metallized capacitors, thin layers of aluminium (approx. 0.03 μm) are vacuum-deposited on the insulating film as conducting electrodes. In the case of a breakdown, the short circuit current causes the thin metal coating to evaporate around the point of failure and an insulating area is formed. The capacitor remains intact (self-healing). Due to their construction principle metallized capacitors stand out for their very favourable capacitance/volume ratio.

The film/foil construction is mainly used for capacitors with smaller capacitance value. The advantage of this construction principle is the easy contactability of the metal foil electrodes and the good pulse strength. To avoid breakdowns caused by weak spots in the dielectric, the insulating film chosen is always thicker than theoretically required by the values which are determined from the specific breakdown strength of the material.

WIMA capacitors are produced with the proven box technology using solvent-resistant, flame-retardant plastic cases according to UL 94 V-0. They are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.



Polyester (PET) Film and Foil Capacitors for Pulse Applications in PCM 5 mm

Special Features

- Pulse duty construction
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- Coupling
- Decoupling

Construction

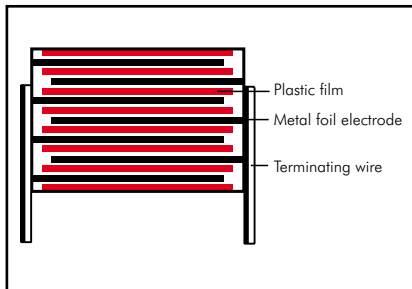
Dielectric:

Polyethylene-terephthalate (PET) film

Capacitor electrodes:

Metal foil

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with epoxy resin seal, UL 94 V-0

Terminations:

Tinned wire.

Marking:

Colour: Red. Marking: Silver.

Epoxy resin seal: Yellow.

Electrical Data

Capacitance range:

1000 pF to 0.047 μ F (E12-values on request)

Rated voltages:

100 VDC, 250 VDC, 400 VDC

Capacitance tolerances:

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

Operating temperature range:

-55°C to $+100^{\circ}\text{C}$ ($+125^{\circ}\text{C}$ available subject to special enquiry)

Test specifications:

In accordance with IEC 60384-11

Climatic test category:

55/100/56 in accordance with IEC

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

$\geq 3 \times 10^4 \text{ M}\Omega$

(mean value: $8 \times 10^5 \text{ M}\Omega$)

Measuring voltage: 100 V/1 min.

Test voltage: $2 U_r$, 2 sec.

Maximum pulse rise time:

1000 V/ μ sec for pulses equal to the rated voltage

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

at f	$C \leq 0.047 \mu\text{F}$
1 kHz	$\leq 7 \times 10^{-3}$
10 kHz	$\leq 15 \times 10^{-3}$
100 kHz	$\leq 20 \times 10^{-3}$

Voltage derating:

A voltage derating factor of 1.25 % 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 < 5 fit ($0.5 \times U_r$ and 40°C)

Mechanical Tests

Pull test on pins:

10 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/sec^2 in accordance with IEC 60068-2-29

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

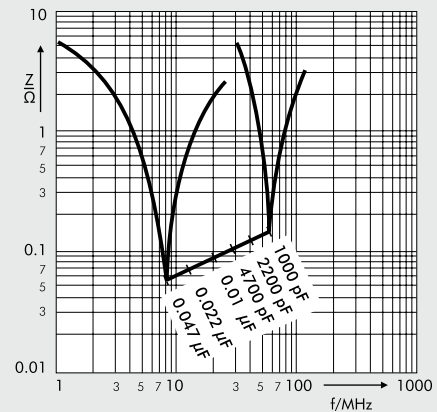
For further details and graphs please refer to Technical Information.

Continuation

General Data

Capacitance	100 VDC/63 VAC*					250 VDC/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	2.5	6.5	7.2	5	FKS2D011001A00_	2.5	6.5	7.2	5	FKS2F011001A00_
1500 "	2.5	6.5	7.2	5	FKS2D011501A00_	2.5	6.5	7.2	5	FKS2F011501A00_
2200 "	2.5	6.5	7.2	5	FKS2D012201A00_	2.5	6.5	7.2	5	FKS2F012201A00_
3300 "	2.5	6.5	7.2	5	FKS2D013301A00_	2.5	6.5	7.2	5	FKS2F013301A00_
4700 "	2.5	6.5	7.2	5	FKS2D014701A00_	2.5	6.5	7.2	5	FKS2F014701A00_
6800 "	2.5	6.5	7.2	5	FKS2D016801A00_	2.5	6.5	7.2	5	FKS2F016801A00_
0.01 μF	3	7.5	7.2	5	FKS2D021001B00_	3	7.5	7.2	5	FKS2F021001B00_
0.015 "	3.5	8.5	7.2	5	FKS2D021501C00_	3.5	8.5	7.2	5	FKS2F021501C00_
0.022 "	4.5	9.5	7.2	5	FKS2D022201E00_	4.5	9.5	7.2	5	FKS2F022201E00_
0.033 "	5.5	11.5	7.2	5	FKS2D023301H00_	5.5	11.5	7.2	5	FKS2F023301H00_
0.047 "	7.2	13	7.2	5	FKS2D024701K00_	7.2	13	7.2	5	FKS2F024701K00_

Capacitance	400 VDC/200 VAC*				
	W	H	L	PCM**	Part number
1000 pF	2.5	6.5	7.2	5	FKS2G011001A00_
1500 "	2.5	6.5	7.2	5	FKS2G011501A00_
2200 "	2.5	6.5	7.2	5	FKS2G012201A00_
3300 "	2.5	6.5	7.2	5	FKS2G013301A00_
4700 "	2.5	6.5	7.2	5	FKS2G014701A00_
6800 "	3	7.5	7.2	5	FKS2G016801B00_
0.01 μF	3.5	8.5	7.2	5	FKS2G021001C00_
0.015 "	4.5	9.5	7.2	5	FKS2G021501E00_
0.022 "	5.5	11.5	7.2	5	FKS2G022201H00_
0.033 "	7.2	13	7.2	5	FKS2G023301K00_



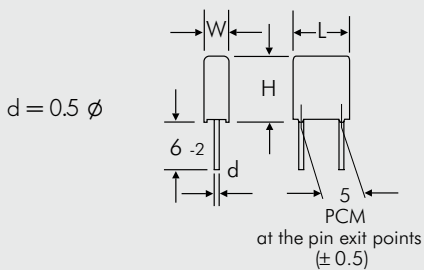
Impedance change with frequency (general guide).

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing

Dims. in mm.

The values of the WIMA FKM 2 range according to the main catalogue 2009 are still available on request.



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S
Pin length: 6-2 = SD

Taped version see page 148.

Rights reserved to amend design data without prior notification.

Polypropylene (PP) Film and Foil Capacitors for Pulse Applications in PCM 5 mm

Special Features

- Pulse duty construction
- Close tolerances up to $\pm 2.5\%$ ($\pm 1\%$ on request)
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC

Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- LC-Filtering
- Oscillating circuits
- Audio equipment

Construction

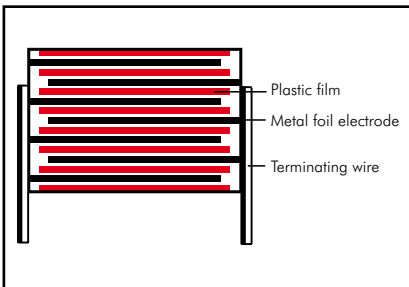
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Metal foil

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: Yellow

Electrical Data

Capacitance range:

33 pF to 0.033 μ F (E12-values on request)

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 800 VDC, 1000 VDC

Capacitance tolerances:

$\pm 10\%$, $\pm 5\%$, $\pm 2.5\%$ ($\pm 2\%$, $\pm 1.5\%$ or $\pm 1\%$ available as precision capacitors subject to special enquiry)

Operating temperature range:

-55°C to $+100^\circ\text{C}$

Test specifications:

In accordance with IEC 60384-13

Climatic test category:

55/100/56 in accordance with IEC

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

$\geq 5 \times 10^5 \text{ M}\Omega$

(mean value: $1 \times 10^6 \text{ M}\Omega$)

Measuring voltage:

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

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

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

at f	$C \leq 1000 \text{ pF}$	$1000 \text{ pF} < C \leq 4700 \text{ pF}$	$C > 4700 \text{ pF}$
1 kHz	$\leq 3 \times 10^{-4}$	$\leq 4 \times 10^{-4}$	$\leq 4 \times 10^{-4}$
10 kHz	$\leq 3 \times 10^{-4}$	$\leq 4 \times 10^{-4}$	$\leq 4 \times 10^{-4}$
100 kHz	$\leq 4 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	-
1 MHz	$\leq 10 \times 10^{-4}$	-	-

Test voltage: $2 U_r$, 2 sec.

Maximum pulse rise time:

1000 V/ μ sec for pulses equal to the rated voltage

Dielectric absorption:

0.05%

Temperature coefficient:

$-200 \times 10^{-6}/^\circ\text{C}$ (typical)

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 $< 5 \text{ fit}$ ($0.5 \times U_r$ and 40°C)

Mechanical Tests

Pull test on pins:

10 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

Packing

Available taped and reeled.

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	63 VDC/40 VAC*					100 VDC/63 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	4.5	6	7.2	5	FKP2C001001D00_____	4.5	6	7.2	5	FKP2D001001D00_____
150 "	4.5	6	7.2	5	FKP2C001501D00_____	4.5	6	7.2	5	FKP2D001501D00_____
220 "	4.5	6	7.2	5	FKP2C002201D00_____	4.5	6	7.2	5	FKP2D002201D00_____
330 "	4.5	6	7.2	5	FKP2C003301D00_____	4.5	6	7.2	5	FKP2D003301D00_____
470 "	4.5	6	7.2	5	FKP2C004701D00_____	4.5	6	7.2	5	FKP2D004701D00_____
680 "	4.5	6	7.2	5	FKP2C006801D00_____	4.5	6	7.2	5	FKP2D006801D00_____
1000 pF	4.5	6	7.2	5	FKP2C011001D00_____	4.5	6	7.2	5	FKP2D011001D00_____
1500 "	4.5	6	7.2	5	FKP2C011501D00_____	4.5	6	7.2	5	FKP2D011501D00_____
2200 "	4.5	6	7.2	5	FKP2C012201D00_____	4.5	6	7.2	5	FKP2D012201D00_____
3300 "	4.5	6	7.2	5	FKP2C013301D00_____	5.5	7	7.2	5	FKP2D013301G00_____
4700 "	4.5	6	7.2	5	FKP2C014701D00_____	5.5	7	7.2	5	FKP2D014701G00_____
6800 "	4.5	6	7.2	5	FKP2C016801D00_____	5.5	7	7.2	5	FKP2D016801G00_____
0.01 µF	5.5	7	7.2	5	FKP2C021001G00_____	6.5	8	7.2	5	FKP2D021001I00_____
0.015 "	6.5	8	7.2	5	FKP2C021501I00_____	7.2	8.5	7.2	5	FKP2D021501J00_____
0.022 "	7.2	8.5	7.2	5	FKP2C022201J00_____	8.5	10	7.2	5	FKP2D022201L00_____
0.033 "	8.5	10	7.2	5	FKP2C023301L00_____					

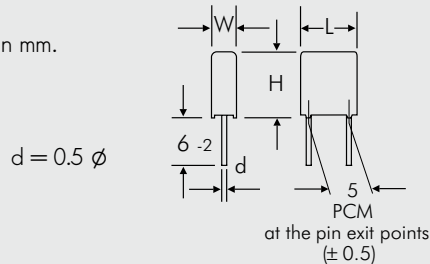
Capacitance	250 VDC/160 VAC*					400 VDC/220 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	4.5	6	7.2	5	FKP2F001001D00_____	4.5	6	7.2	5	FKP2G001001D00_____
150 "	4.5	6	7.2	5	FKP2F001501D00_____	4.5	6	7.2	5	FKP2G001501D00_____
220 "	4.5	6	7.2	5	FKP2F002201D00_____	4.5	6	7.2	5	FKP2G002201D00_____
330 "	4.5	6	7.2	5	FKP2F003301D00_____	4.5	6	7.2	5	FKP2G003301D00_____
470 "	4.5	6	7.2	5	FKP2F004701D00_____	4.5	6	7.2	5	FKP2G004701D00_____
680 "	4.5	6	7.2	5	FKP2F006801D00_____	4.5	6	7.2	5	FKP2G006801D00_____
1000 pF	4.5	6	7.2	5	FKP2F011001D00_____	4.5	6	7.2	5	FKP2G011001D00_____
1500 "	4.5	6	7.2	5	FKP2F011501D00_____	4.5	6	7.2	5	FKP2G011501D00_____
2200 "	4.5	6	7.2	5	FKP2F012201D00_____	4.5	6	7.2	5	FKP2G012201D00_____
3300 "	5.5	7	7.2	5	FKP2F013301G00_____	5.5	7	7.2	5	FKP2G013301G00_____
4700 "	6.5	8	7.2	5	FKP2F014701I00_____	6.5	8	7.2	5	FKP2G014701I00_____
6800 "	6.5	8	7.2	5	FKP2F016801I00_____	7.2	8.5	7.2	5	FKP2G016801J00_____
0.01 µF	7.2	8.5	7.2	5	FKP2F021001J00_____	8.5	10	7.2	5	FKP2G021001L00_____
0.015 "	8.5	10	7.2	5	FKP2F021501L00_____					

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

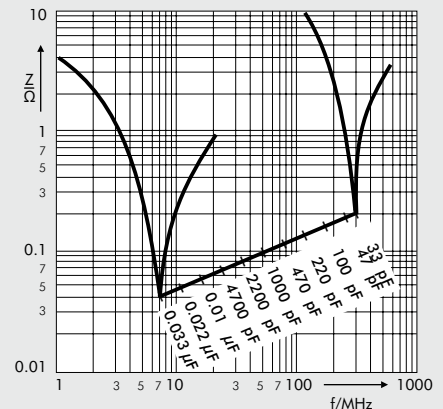
** PCM = Printed circuit module = pin spacing.

E12 values and individual values available from 27 pF up on request.

Dims. in mm.



Part number completion:	
Tolerance:	10 % = K
	5 % = J
	2.5 % = H
	2 % = G
	1.5 % = F
	1 % = E
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.

Continuation page 32

Continuation

General Data

Capacitance	630 VDC/250 VAC*					800 VDC/250 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	4.5	6	7.2	5	FKP2J001001D00_	4.5	6	7.2	5	FKP2L001001D00_
150 "	4.5	6	7.2	5	FKP2J001501D00_	4.5	6	7.2	5	FKP2L001501D00_
220 "	4.5	6	7.2	5	FKP2J002201D00_	4.5	6	7.2	5	FKP2L002201D00_
330 "	4.5	6	7.2	5	FKP2J003301D00_	4.5	6	7.2	5	FKP2L003301D00_
470 "	4.5	6	7.2	5	FKP2J004701D00_	5.5	7	7.2	5	FKP2L004701G00_
680 "	4.5	6	7.2	5	FKP2J006801D00_	5.5	7	7.2	5	FKP2L006801G00_
1000 pF	4.5	6	7.2	5	FKP2J011001D00_	5.5	7	7.2	5	FKP2L011001G00_
1500 "	4.5	6	7.2	5	FKP2J011501D00_	5.5	7	7.2	5	FKP2L011501G00_
2200 "	5.5	7	7.2	5	FKP2J012201G00_	6.5	8	7.2	5	FKP2L012201I00_
3300 "	6.5	8	7.2	5	FKP2J013301I00_	7.2	8.5	7.2	5	FKP2L013301J00_
4700 "	6.5	8	7.2	5	FKP2J014701I00_	8.5	10	7.2	5	FKP2L014701L00_
6800 "	7.2	8.5	7.2	5	FKP2J016801J00_					
0.01 µF	8.5	10	7.2	5	FKP2J021001L00_					

Capacitance	1000 VDC/250 VAC*				
	W	H	L	PCM**	Part number
33 pF	4.5	6	7.2	5	FKP2O100331D00_
47 "	4.5	6	7.2	5	FKP2O100471D00_
68 "	4.5	6	7.2	5	FKP2O100681D00_
100 pF	4.5	6	7.2	5	FKP2O101001D00_
150 "	4.5	6	7.2	5	FKP2O101501D00_
220 "	4.5	6	7.2	5	FKP2O102201D00_
330 "	4.5	6	7.2	5	FKP2O103301D00_
470 "	5.5	7	7.2	5	FKP2O104701G00_
680 "	5.5	7	7.2	5	FKP2O106801G00_
1000 pF	6.5	8	7.2	5	FKP2O111001I00_
1500 "	7.2	8.5	7.2	5	FKP2O111501J00_
2200 "	8.5	10	7.2	5	FKP2O112201L00_

E12 values and individual values available from 27 pF up on request.

Dims. in mm.

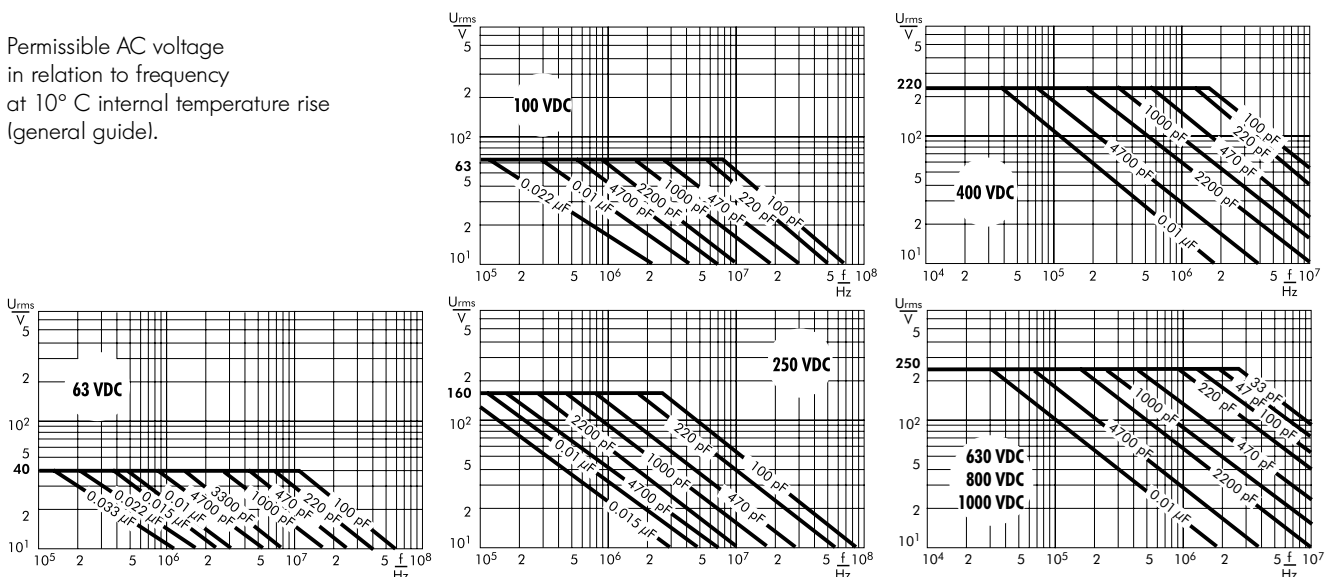
Part number completion:	
Tolerance:	10 % = K
	5 % = J
	2.5 % = H
	2 % = G
	1.5 % = F
	1 % = E
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

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

** PCM = Printed circuit module = pin spacing.

Rights reserved to amend design data without prior notification.

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



Metallized Polyester (PET) Capacitors in PCM 5 mm

Special Features

- High volume/capacitance ratio
- Self-healing
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing

Construction

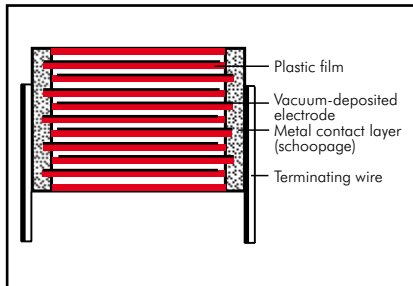
Dielectric:

Polyethylene-terephthalate (PET) 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: Silver/White.
Epoxy resin seal: Red

Electrical Data

Capacitance range:

0.01 μF to 10 μF (E12-values on request)

Rated voltages:

50 VDC, 63 VDC, 100 VDC, 250 VDC,
400 VDC, 630 VDC

Capacitance tolerances:

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

Operating temperature range:

-55°C to $+100^\circ\text{C}$ ($+125^\circ\text{C}$ available
subject to special enquiry)

Climatic test category:

55/100/21 in accordance with IEC

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

U_r	U_{test}	$C \leq 0.33 \mu\text{F}$	$0.33 \mu\text{F} < C \leq 10 \mu\text{F}$
50 VDC	10V	$\geq 5 \times 10^3 \text{ M}\Omega$ (mean value: $3 \times 10^4 \text{ M}\Omega$)	$\geq 1000 \text{ sec (M}\Omega \times \mu\text{F)}$ (mean value: 3000 sec)
63 VDC	50V	$\geq 1 \times 10^4 \text{ M}\Omega$ (mean value: $5 \times 10^4 \text{ M}\Omega$)	$\geq 1250 \text{ sec (M}\Omega \times \mu\text{F)}$ (mean value: 3000 sec)
$\geq 100 \text{ VDC}$	100V	$\geq 1.5 \times 10^4 \text{ M}\Omega$ (mean value: $1 \times 10^5 \text{ M}\Omega$)	$\geq 3000 \text{ sec (M}\Omega \times \mu\text{F)}$ (mean value: 6000 sec)

Measuring time: 1 min.

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	$\leq 8 \times 10^{-3}$	$\leq 8 \times 10^{-3}$	$\leq 10 \times 10^{-3}$
10 kHz	$\leq 15 \times 10^{-3}$	$\leq 15 \times 10^{-3}$	–
100 kHz	$\leq 30 \times 10^{-3}$	–	–

Maximum pulse rise time: for pulses equal to the rated voltage

Capacitance μF	Pulse rise time V/ μsec max. operation/test					
	50 VDC	63 VDC	100 VDC	250 VDC	400 VDC	630 VDC
0.01 ... 0.022	–	35/350	35/350	50/500	80/800	110/1100
0.033 ... 0.068	–	20/200	25/250	50/500	80/800	90/900
0.1 ... 0.47	10/100	15/150	20/200	50/500	80/800	–
0.68 ... 1.0	8/80	12/120	15/150	25/250	–	–
1.5 ... 3.3	8/80	7.5/75	10/100	–	–	–
4.7	5/50	5/50	–	–	–	–
6.8	3/30	3/30	–	–	–	–
10	2.5/25	–	–	–	–	–

Mechanical Tests

Pull test on pins:

10 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

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

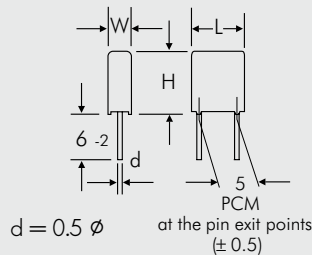
Capacitance	50 VDC/30 VAC*					63 VDC/40 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μF						2.5	6.5	7.2	5	MKS2C021001A00_
0.015 "						2.5	6.5	7.2	5	MKS2C021501A00_
0.022 "						2.5	6.5	7.2	5	MKS2C022201A00_
0.033 "						2.5	6.5	7.2	5	MKS2C023301A00_
0.047 "						2.5	6.5	7.2	5	MKS2C024701A00_
0.068 "						2.5	6.5	7.2	5	MKS2C026801A00_
0.1 μF						2.5	6.5	7.2	5	MKS2C031001A00_
0.15 "						2.5	6.5	7.2	5	MKS2C031501A00_
0.22 "						3	7.5	7.2	5	MKS2C032201B00_
0.33 "	2.5	6.5	7.2	5	MKS2B033301A00_	3.5	8.5	7.2	5	MKS2C033301C00_
0.47 "	3	7.5	7.2	5	MKS2B034701B00_	3.5	8.5	7.2	5	MKS2C034701C00_
0.68 "	3.5	8.5	7.2	5	MKS2B036801C00_	4.5	9.5	7.2	5	MKS2C036801E00_
1.0 μF	3.5	8.5	7.2	5	MKS2B041001C00_	5	10	7.2	5	MKS2C041001F00_
1.5 "	4.5	9.5	7.2	5	MKS2B041501E00_	5.5	11.5	7.2	5	MKS2C041501H00_
2.2 "	5	10	7.2	5	MKS2B042201F00_	7.2	13	7.2	5	MKS2C042201K00_
3.3 "	5.5	11.5	7.2	5	MKS2B043301H00_	7.2	13	7.2	5	MKS2C043301K00_
4.7 "	7.2	13	7.2	5	MKS2B044701K00_	8.5	14	7.2	5	MKS2C044701M00_
6.8 "	8.5	14	7.2	5	MKS2B046801M00_	11	16	7.2	5	MKS2C046801N00_
10 μF	11	16	7.2	5	MKS2B051001N00_					

Capacitance	100 VDC/63 VAC*					250 VDC/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μF	2.5	6.5	7.2	5	MKS2D021001A00_	2.5	6.5	7.2	5	MKS2F021001A00_
0.015 "	2.5	6.5	7.2	5	MKS2D021501A00_	2.5	6.5	7.2	5	MKS2F021501A00_
0.022 "	2.5	6.5	7.2	5	MKS2D022201A00_	2.5	6.5	7.2	5	MKS2F022201A00_
0.033 "	2.5	6.5	7.2	5	MKS2D023301A00_	3.5	8.5	7.2	5	MKS2F023301C00_
0.047 "	2.5	6.5	7.2	5	MKS2D024701A00_	3.5	8.5	7.2	5	MKS2F024701C00_
0.068 "	2.5	6.5	7.2	5	MKS2D026801A00_	3.5	8.5	7.2	5	MKS2F026801C00_
0.1 μF	2.5	6.5	7.2	5	MKS2D031001A00_	4.5	9.5	7.2	5	MKS2F031001E00_
0.15 "	3.5	8.5	7.2	5	MKS2D031501C00_	5	10	7.2	5	MKS2F031501F00_
0.22 "	3.5	8.5	7.2	5	MKS2D032201C00_	5.5	11.5	7.2	5	MKS2F032201H00_
0.33 "	4.5	9.5	7.2	5	MKS2D033301E00_	7.2	13	7.2	5	MKS2F033301K00_
0.47 "	4.5	9.5	7.2	5	MKS2D034701E00_	8.5	14	7.2	5	MKS2F034701M00_
0.68 "	5	10	7.2	5	MKS2D036801F00_	11	16	7.2	5	MKS2F036801N00_
1.0 μF	7.2	13	7.2	5	MKS2D041001K00_					
1.5 "	8.5	14	7.2	5	MKS2D041501M00_					
2.2 "	11	16	7.2	5	MKS2D042201N00_					

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing.

Dims. in mm.



Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

Continuation page 35

Continuation

General Data

Capacitance	400 VDC/200 VAC*					630 VDC/220 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μF	2.5	6.5	7.2	5	MKS2G021001A00	5.5	11.5	7.2	5	MKS2J021001H00
0.015 "	2.5	6.5	7.2	5	MKS2G021501A00	7.2	13	7.2	5	MKS2J021501K00
0.022 "	3.5	8.5	7.2	5	MKS2G022201C00	7.2	13	7.2	5	MKS2J022201K00
0.033 "	4.5	9.5	7.2	5	MKS2G023301E00	7.2	13	7.2	5	MKS2J023301K00
0.047 "	4.5	9.5	7.2	5	MKS2G024701E00	8.5	14	7.2	5	MKS2J024701M00
0.068 "	5.5	11.5	7.2	5	MKS2G026801H00					
0.1 μF	7.2	13	7.2	5	MKS2G031001K00					
0.15 "	8.5	14	7.2	5	MKS2G031501M00					
0.22 "	11	16	7.2	5	MKS2G032201N00					

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

** PCM = Printed circuit module = pin spacing.

Dims. in mm.

The values of the WIMA MKM 2 and WIMA MKI 2 ranges according to the main catalogue 2009 are still available on request.

Part number completion:

Tolerance: 20 % = M

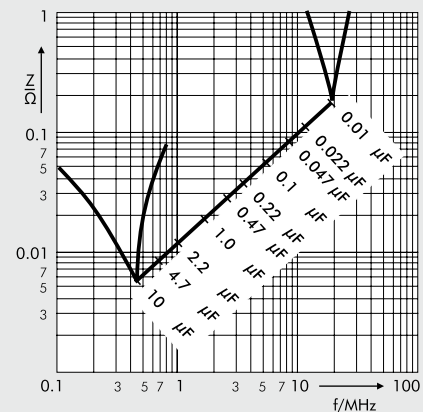
10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

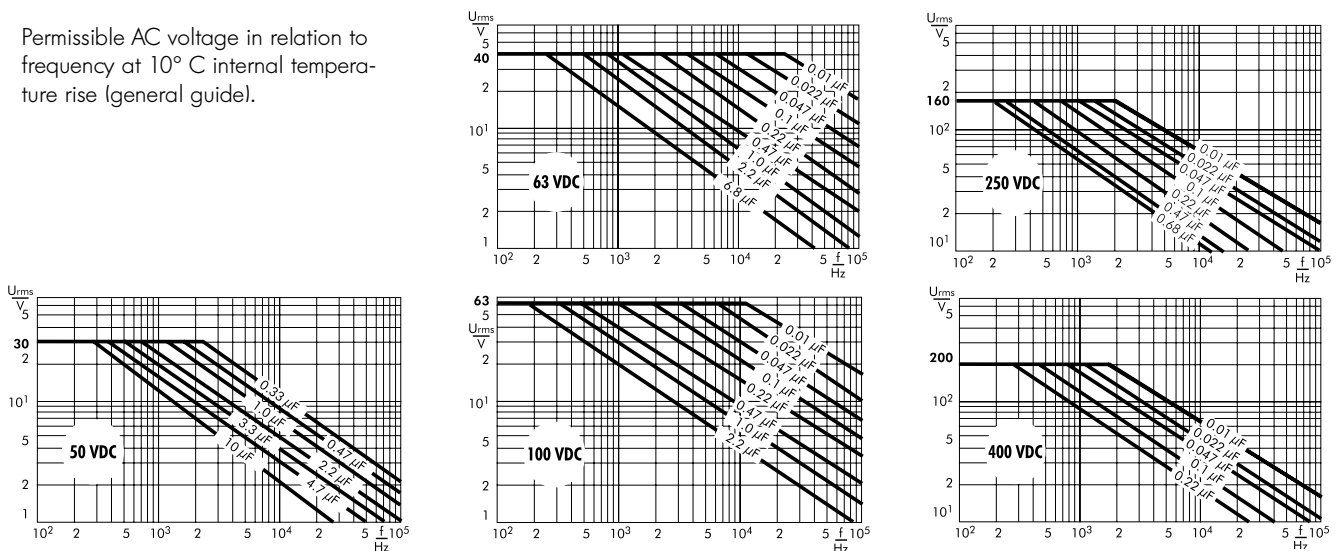
Taped version see page 148.



Impedance change with frequency (general guideline).

Rights reserved to amend design data without prior notification.

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



Metallized Polypropylene (PP) Capacitors in PCM 5 mm

Special Features

- High volume/capacitance ratio
- Self-healing
- Increased pulse duty from 250 VDC rated voltage
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC

Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- Oscillating circuits
- High frequency coupling and decoupling

Construction

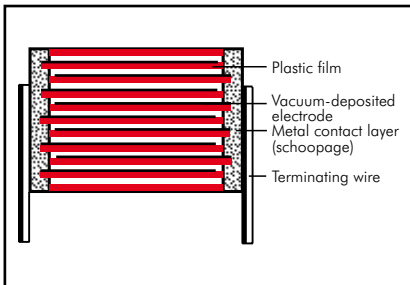
Dielectric:

Polypropylene (PP) 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:

1000 pF to 0.33 μ F (E12-values on request)

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

Capacitance tolerances:

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

Operating temperature range:

-55° C to $+100^{\circ}$ C

Test specifications:

In accordance with IEC 60384-16

Climatic test category:

55/085/56 in accordance with IEC

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

$\geq 3 \times 10^4$ M Ω

(mean value: 1×10^5 M Ω)

Measuring voltage:

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

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

Test voltage:

$1.6 U_r$, 2 sec.

Maximum pulse rise time:

Capacitance pF/ μ F	max. pulse rise time V/ μ sec					
	63 VDC	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC
1000 ... 2200	–	–	–	300	400	500
3300 ... 6800	–	–	–	300	400	500
0.01 ... 0.022	100	100	250	300	400	500
0.033 ... 0.068	100	100	250	300	400	–
0.1 ... 0.22	100	100	250	–	–	–
0.33	100	100	250	–	–	–

for pulses equal to the rated voltage

Dielectric absorption:

0.05 %

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

at f	$C \leq 0.1 \mu\text{F}$	$0.1 \mu\text{F} < C \leq 0.33 \mu\text{F}$
1 kHz	$\leq 0.5 \times 10^{-3}$	$\leq 0.5 \times 10^{-3}$
10 kHz	$\leq 0.8 \times 10^{-3}$	$\leq 0.8 \times 10^{-3}$
100 kHz	$\leq 3.0 \times 10^{-3}$	–

Voltage derating:

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

Reliability:

Operational life $> 300\,000$ hours

Failure rate < 2 fit ($0.5 \times U_r$ and 40° C)

Mechanical Tests

Pull test on pins:

10 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

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

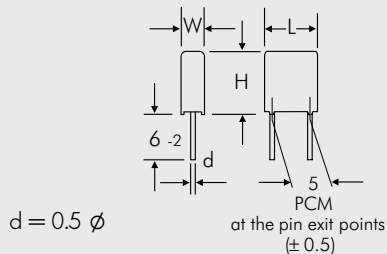
Capacitance	63 VDC/40 VAC*					100 VDC/63 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μ F	3	7.5	7.2	5	MKP2C021001B00_____	3	7.5	7.2	5	MKP2D021001B00_____
0.015 "	3	7.5	7.2	5	MKP2C021501B00_____	3	7.5	7.2	5	MKP2D021501B00_____
0.022 "	3	7.5	7.2	5	MKP2C022201B00_____	3	7.5	7.2	5	MKP2D022201B00_____
0.033 "	3	7.5	7.2	5	MKP2C023301B00_____	3	7.5	7.2	5	MKP2D023301B00_____
0.047 "	3.5	8.5	7.2	5	MKP2C024701C00_____	3.5	8.5	7.2	5	MKP2D024701C00_____
0.068 "	4.5	9.5	7.2	5	MKP2C026801E00_____	4.5	9.5	7.2	5	MKP2D026801E00_____
0.1 μ F	5	10	7.2	5	MKP2C031001F00_____	5	10	7.2	5	MKP2D031001F00_____
0.15 "	5.5	11.5	7.2	5	MKP2C031501H00_____	5.5	11.5	7.2	5	MKP2D031501H00_____
0.22 "	7.2	13	7.2	5	MKP2C032201K00_____	7.2	13	7.2	5	MKP2D032201K00_____
0.33 "	8.5	14	7.2	5	MKP2C033301M00_____	8.5	14	7.2	5	MKP2D033301M00_____

Capacitance	250 VDC/160 VAC*					400 VDC/200 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF						3	7.5	7.2	5	MKP2G011001B00_____
1500 "						3	7.5	7.2	5	MKP2G011501B00_____
2200 "						3	7.5	7.2	5	MKP2G012201B00_____
3300 "						3	7.5	7.2	5	MKP2G013301B00_____
4700 "						3	7.5	7.2	5	MKP2G014701B00_____
6800 "						3	7.5	7.2	5	MKP2G016801B00_____
0.01 μ F	3	7.5	7.2	5	MKP2F021001B00_____	3.5	8.5	7.2	5	MKP2G021001C00_____
0.015 "	3	7.5	7.2	5	MKP2F021501B00_____	3.5	8.5	7.2	5	MKP2G021501C00_____
0.022 "	3	7.5	7.2	5	MKP2F022201B00_____	4.5	9.5	7.2	5	MKP2G022201E00_____
0.033 "	3	7.5	7.2	5	MKP2F023301B00_____	5.5	11.5	7.2	5	MKP2G023301H00_____
0.047 "	3.5	8.5	7.2	5	MKP2F024701C00_____	7.2	13	7.2	5	MKP2G024701K00_____
0.068 "	4.5	9.5	7.2	5	MKP2F026801E00_____	7.2	13	7.2	5	MKP2G026801K00_____
0.1 μ F	5	10	7.2	5	MKP2F031001F00_____					
0.15 "	7.2	13	7.2	5	MKP2F031501K00_____					
0.22 "	7.2	13	7.2	5	MKP2F032201K00_____					
0.33 "	8.5	14	7.2	5	MKP2F033301M00_____					

* AC voltage: $f \leq 400$ Hz; $1.4 \times U_{rms} + U_{DC} \leq U_r$

** PCM = Printed circuit module = pin spacing.

Dims. in mm.



Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

Continuation page 38

Continuation

General Data

Capacitance	630 VDC/250 VAC*					1000 VDC/250 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	3	7.5	7.2	5	MKP2J011001B00_____	3	7.5	7.2	5	MKP2O111001B00_____
1500 "	3	7.5	7.2	5	MKP2J011501B00_____	3	7.5	7.2	5	MKP2O111501B00_____
2200 "	3	7.5	7.2	5	MKP2J012201B00_____	3	7.5	7.2	5	MKP2O112201B00_____
3300 "	3	7.5	7.2	5	MKP2J013301B00_____	3.5	8.5	7.2	5	MKP2O113301C00_____
4700 "	3	7.5	7.2	5	MKP2J014701B00_____	4.5	9.5	7.2	5	MKP2O114701E00_____
6800 "	3.5	8.5	7.2	5	MKP2J016801C00_____	5	10	7.2	5	MKP2O116801F00_____
0.01 µF	4.5	9.5	7.2	5	MKP2J021001E00_____	7.2	13	7.2	5	MKP2O121001K00_____
0.015 "	5	10	7.2	5	MKP2J021501F00_____					
0.022 "	5.5	11.5	7.2	5	MKP2J022201H00_____					
0.033 "	7.2	13	7.2	5	MKP2J023301K00_____					
0.047 "	8.5	14	7.2	5	MKP2J024701M00_____					

* AC voltage: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing.

Dims. in mm.

Part number completion:

Tolerance: 20 % = M

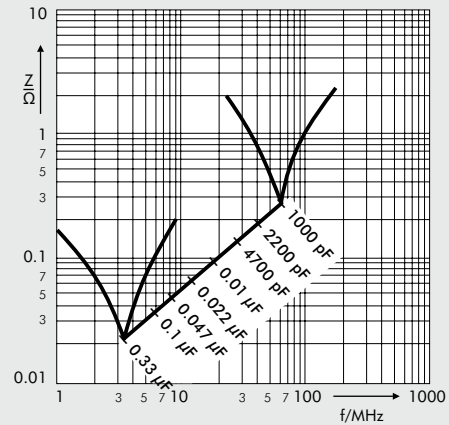
10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

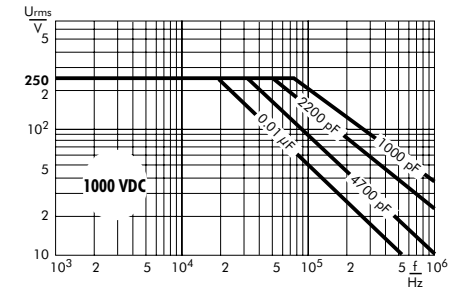
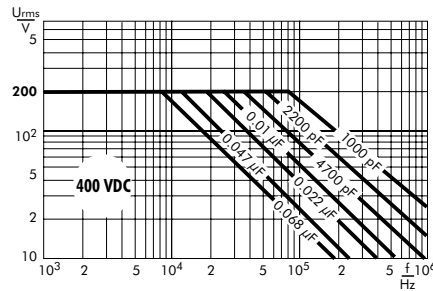
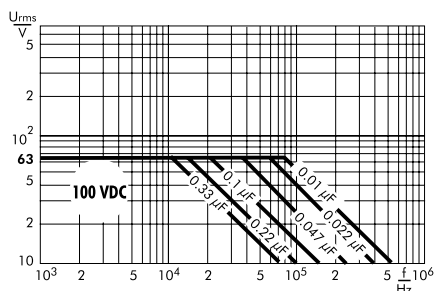
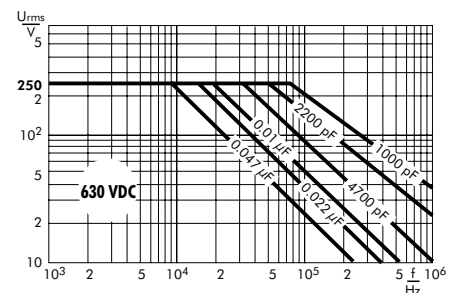
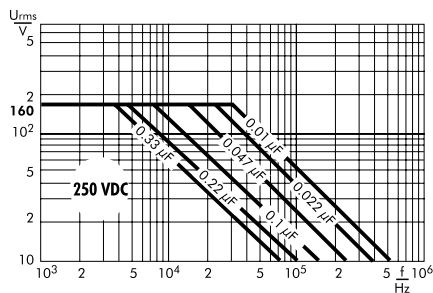
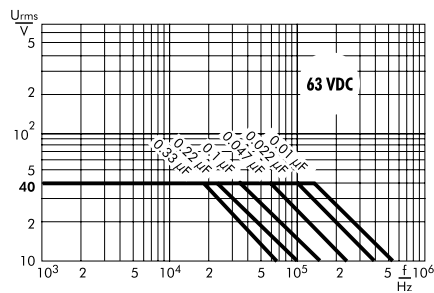
Taped version see page 148.



Impedance change with frequency (general guide).

Rights reserved to amend design data without prior notification.

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



WIMA Capacitors for Stringent Requirements PCM 7.5 to 52.5 mm



WIMA metallized capacitors for stringent requirements with printed circuit modules (PCM) of 7.5 mm through 52.5 mm cover a wide range of capacitances and voltages.

Metallized capacitors exhibit a thin metal coating applied to the plastic film serving as electrode hence making capacitors with a very favourable capacitance/volume ratio possible. The WIMA MKS 4 220 $\mu\text{F}/50\text{ VDC}$ offers the highest capacitance rating in the WIMA range. A further specific characteristic of metallized capacitors is the excellent self-healing ability. In the case of an electric break-down the applied metal layer evaporates. The affected area is isolated and the capacitor continues to function properly.

WIMA capacitors for stringent requirements are available in capacitances ranging from 100 pF through 220 μF with voltage ratings from 50 VDC through 2000 VDC. Upon customer request, larger box sizes can be supplied in 4-pin versions. Types with terminating plates can also be manufactured on request. The advantage of this method of construction, besides the improved mechanical stability of the component on the board, is the excellent electrical contact reliability.

WIMA FKS 3

WIMA FKP 3

WIMA MKS 4

WIMA MKP 4

WIMA capacitors for demanding requirements are available with Polyester or Polypropylene dielectrics with pulse duty film/foil construction or as metallized, self-healing versions.

In case of film and foil types, the electrode is differently applied than for metallized capacitors, namely being wound with the dielectric as a metal foil. Due to their lower series resistance, the components produced this way have excellent pulse and current carrying capability, as well as a very high insulation resistance.

WIMA film/foil capacitors in PCM 7.5 mm – 15 mm are available with values ranging from 100 pF through 0.22 μF with voltage ratings from 63 VDC through 1000 VDC.

WIMA capacitors are produced with the proven box technology using solvent-resistant, flame-retardant plastic cases according to UL 94 V-0. They are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.



Polyester (PET) Film and Foil Capacitors for Pulse Applications PCM 7.5 mm to 15 mm

Special Features

- Pulse duty construction
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- Coupling
- Decoupling

Construction

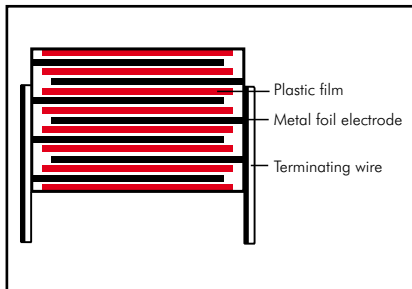
Dielectric:

Polyethylene-terephthalate (PET) film

Capacitor electrodes:

Metal foil

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: Yellow.

Electrical Data

Capacitance range:

1000 pF to 0.22 μ F (E12-values on request)

Rated voltages:

100 VDC, 250 VDC

Capacitance tolerances:

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

Operating temperature range:

-55° C to $+100^{\circ}$ C ($+125^{\circ}$ C available subject to special enquiry)

Test specifications:

In accordance with IEC 60384-11

Climatic test category:

55/100/56 in accordance with IEC

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

$\geq 3 \times 10^4$ M Ω

(mean value: 5×10^5 M Ω)

Measuring voltage: 100 V/1 min.

Test voltage: 2 U_r , 2 sec.

Maximum pulse rise time:

1000 V/ μ sec for pulses equal to the rated voltage

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

at f	$C \leq 0.01 \mu\text{F}$	$0.01 \mu\text{F} < C \leq 0.22 \mu\text{F}$
1 kHz	$\leq 8 \times 10^{-3}$	$\leq 8 \times 10^{-3}$
10 kHz	$\leq 15 \times 10^{-3}$	$\leq 20 \times 10^{-3}$
100 kHz	$\leq 20 \times 10^{-3}$	$\leq 25 \times 10^{-3}$

Voltage derating:

A voltage derating factor of 1.25 % per K must be applied from $+85^{\circ}$ C for DC voltages and from $+75^{\circ}$ C for AC voltages.

Reliability:

Operational life > 300 000 hours

Failure rate < 5 fit ($0.5 \times U_r$ and 40° C)

Mechanical Tests

Pull test on pins:

10 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/sec^2 in accordance with IEC 60068-2-29

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

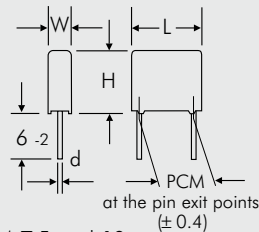
Capacitance	100 VDC/63 VAC*					250 VDC/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	3	8.5	10	7.5	FKS3D011002B00_____	3	8.5	10	7.5	FKS3F011002B00_____
1500 "	3	8.5	10	7.5	FKS3D011502B00_____	3	8.5	10	7.5	FKS3F011502B00_____
2200 "	3	8.5	10	7.5	FKS3D012202B00_____	3	8.5	10	7.5	FKS3F012202B00_____
3300 "	3	8.5	10	7.5	FKS3D013302B00_____	3	8.5	10	7.5	FKS3F013302B00_____
4700 "	3	8.5	10	7.5	FKS3D014702B00_____	3	8.5	10	7.5	FKS3F014702B00_____
6800 "	3	8.5	10	7.5	FKS3D016802B00_____	3	8.5	10	7.5	FKS3F016802B00_____
0.01 µF	3	8.5	10	7.5	FKS3D021002B00_____					
0.015 "	3	8.5	10	7.5	FKS3D021502B00_____					
	3	9	13	10	FKS3D021503A00_____					
0.022 "	3	8.5	10	7.5	FKS3D022202B00_____					
	3	9	13	10	FKS3D022203A00_____					
0.033 "	4	9.5	13	10	FKS3D023303D00_____	6	12	13	10	FKS3F023303G00_____
0.047 "	4	9.5	13	10	FKS3D024703D00_____	6	12.5	18	15	FKS3F024704C00_____
0.068 "	5	11	13	10	FKS3D026803F00_____	7	14	18	15	FKS3F026804D00_____
0.1 µF	6	12	13	10	FKS3D031003G00_____	8	15	18	15	FKS3F031004F00_____
0.15 "	7	14	18	15	FKS3D031504D00_____	9	16	18	15	FKS3F031504J00_____
0.22 "	8	15	18	15	FKS3D032204F00_____					

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

** PCM = Printed circuit module = pin spacing.

Dims. in mm.

The values of the WIMA FKM 3 range according to the main catalogue 2009 are still available on request.



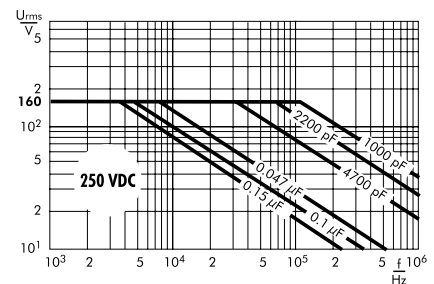
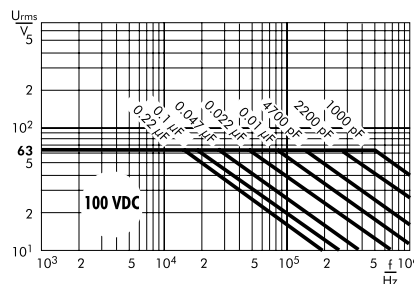
$d = 0.5 \varnothing$ if $W = 3$
 $d = 0.6 \varnothing$ if $W \geq 4$
 $d = 0.8 \varnothing$ if $\text{PCM} = 15$

} PCM 7.5 and 10

Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

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



Polypropylene (PP) Film and Foil Capacitors for Pulse Applications PCM 7.5 mm to 15 mm

Special Features

- Pulse duty construction
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC

Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- LC-Filtering
- Oscillating circuits
- Audio equipment

Construction

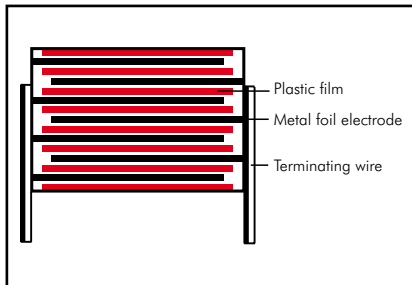
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Metal foil

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: Yellow

Electrical Data

Capacitance range:

100 pF to 0.22 μF (E12-values on request)

Rated voltages:

63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

Capacitance tolerances:

±20%, ±10%, ±5%

Operating temperature range:

-55° C to +100° C

Test specifications:

In accordance with IEC 60384-13

Climatic test category:

55/100/56 in accordance with IEC

Insulation resistance at +20° C:

≥ 5 x 10⁵ MΩ

(mean value: 1 x 10⁶ MΩ)

Measuring voltage:

U_r = 63 V; U_{test} = 50 V/1 min.

U_r ≥ 100 V; U_{test} = 100 V/1 min.

Test voltage: 2 U_r, 2 sec.

Maximum pulse rise time:

1000 V/μsec for pulses equal to the rated voltage

Dielectric absorption:

0.05 %

Temperature coefficient:

-200 x 10⁻⁶/° C (general guide)

Dissipation factors at +20° C: tan δ

at f	C ≤ 0.1 μF	0.1 μF < C ≤ 0.22 μF
1 kHz	≤ 4 x 10 ⁻⁴	≤ 3 x 10 ⁻⁴
10 kHz	≤ 5 x 10 ⁻⁴	≤ 6 x 10 ⁻⁴
100 kHz	≤ 10 x 10 ⁻⁴	-

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 < 5 fit (0.5 x U_r and 40° C)

Mechanical Tests

Pull test on pins:

10 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

Packing

Available taped and reeled.

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	63 VDC/40 VAC*					100 VDC/63 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF						3	8.5	10	7.5	FKP3D001002B00_____
150 "						3	8.5	10	7.5	FKP3D001502B00_____
220 "						3	8.5	10	7.5	FKP3D002202B00_____
330 "						3	8.5	10	7.5	FKP3D003302B00_____
470 "						3	8.5	10	7.5	FKP3D004702B00_____
680 "						3	8.5	10	7.5	FKP3D006802B00_____
1000 pF						3	8.5	10	7.5	FKP3D011002B00_____
1500 "						3	8.5	10	7.5	FKP3D011502B00_____
2200 "						3	8.5	10	7.5	FKP3D012202B00_____
3300 "						3	8.5	10	7.5	FKP3D013302B00_____
4700 "						3	8.5	10	7.5	FKP3D014702B00_____
6800 "						4	9	10	7.5	FKP3D016802C00_____
0.01 µF						4	9	10	7.5	FKP3D021002C00_____
0.015 "	4	9	10	7.5	FKP3C021502C00_____	4	9.5	13	10	FKP3D021503D00_____
0.022 "	4	9.5	13	10	FKP3C022203D00_____	5	11	13	10	FKP3D022203F00_____
0.033 "	4	9.5	13	10	FKP3C023303D00_____	6	12	13	10	FKP3D023303G00_____
0.047 "	5	11	13	10	FKP3C024703F00_____	5	11	18	15	FKP3D024704B00_____
0.068 "	6	12	13	10	FKP3C026803G00_____	6	12.5	18	15	FKP3D026804C00_____
0.1 µF	6	12.5	18	15	FKP3C031004C00_____	7	14	18	15	FKP3D031004D00_____
0.15 "	8	15	18	15	FKP3C031504F00_____	9	16	18	15	FKP3D031504J00_____
0.22 "	9	16	18	15	FKP3C032204J00_____					

Capacitance	250 VDC/160 VAC*					400 VDC/250 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	3	8.5	10	7.5	FKP3F001002B00_____	3	8.5	10	7.5	FKP3G001002B00_____
150 "	3	8.5	10	7.5	FKP3F001502B00_____	3	8.5	10	7.5	FKP3G001502B00_____
220 "	3	8.5	10	7.5	FKP3F002202B00_____	3	8.5	10	7.5	FKP3G002202B00_____
330 "	3	8.5	10	7.5	FKP3F003302B00_____	3	8.5	10	7.5	FKP3G003302B00_____
470 "	3	8.5	10	7.5	FKP3F004702B00_____	3	8.5	10	7.5	FKP3G004702B00_____
680 "	3	8.5	10	7.5	FKP3F006802B00_____	3	8.5	10	7.5	FKP3G006802B00_____
1000 pF	3	8.5	10	7.5	FKP3F011002B00_____	3	8.5	10	7.5	FKP3G011002B00_____
1500 "	3	8.5	10	7.5	FKP3F011502B00_____	4	9	10	7.5	FKP3G011502C00_____
2200 "	4	9	10	7.5	FKP3F012202C00_____	4	9	10	7.5	FKP3G012202C00_____
						4	9.5	13	10	FKP3G012203D00_____
3300 "	3	9	13	10	FKP3F013303A00_____	4	9.5	13	10	FKP3G013303D00_____
4700 "	4	9.5	13	10	FKP3F014703D00_____	5	11	13	10	FKP3G014703F00_____
6800 "	5	11	13	10	FKP3F016803F00_____	6	12	13	10	FKP3G016803G00_____
0.01 µF	5	11	13	10	FKP3F021003F00_____	5	11	18	15	FKP3G021004B00_____
0.015 "	6	12	13	10	FKP3F021503G00_____	6	12.5	18	15	FKP3G021504C00_____
0.022 "	6	12.5	18	15	FKP3F022204C00_____	7	14	18	15	FKP3G022204D00_____
0.033 "	7	14	18	15	FKP3F023304D00_____	8	15	18	15	FKP3G023304F00_____
0.047 "	8	15	18	15	FKP3F024704F00_____	9	16	18	15	FKP3G024704J00_____
0.068 "	9	16	18	15	FKP3F026804J00_____					

* 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.

Part number completion:

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

Taped version see page 148.

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Continuation

General Data

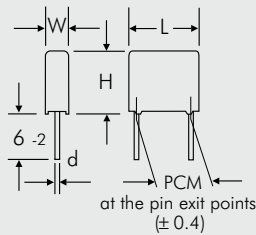
Capacitance	630 VDC/300 VAC*					1000 VDC/300 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	3	8.5	10	7.5	FKP3J001002B00_	3	8.5	10	7.5	FKP3O101002B00_
150 "	3	8.5	10	7.5	FKP3J001502B00_	3	8.5	10	7.5	FKP3O101502B00_
220 "	3	8.5	10	7.5	FKP3J002202B00_	3	8.5	10	7.5	FKP3O102202B00_
330 "	3	8.5	10	7.5	FKP3J003302B00_	3	8.5	10	7.5	FKP3O103302B00_
470 "	3	8.5	10	7.5	FKP3J004702B00_	3	8.5	10	7.5	FKP3O104702B00_
680 "	3	8.5	10	7.5	FKP3J006802B00_	3	8.5	10	7.5	FKP3O106802B00_
1000 pF	4	9	10	7.5	FKP3J011002C00_	4	9	10	7.5	FKP3O111002C00_
1500 "	4	9.5	13	10	FKP3J011503D00_	4	9.5	13	10	FKP3O111503D00_
2200 "	4	9.5	13	10	FKP3J012203D00_	4	9.5	13	10	FKP3O112203D00_
3300 "	5	11	13	10	FKP3J013303F00_	5	11	13	10	FKP3O113303F00_
4700 "	6	12	13	10	FKP3J014703G00_	6	12	13	10	FKP3O114703G00_
6800 "	5	11	18	15	FKP3J016804B00_	5	11	18	15	FKP3O116804B00_
0.01 µF	6	12.5	18	15	FKP3J021004C00_	6	12.5	18	15	FKP3O121004C00_
0.015 "	8	15	18	15	FKP3J021504F00_	8	15	18	15	FKP3O121504F00_
0.022 "	9	16	18	15	FKP3J022204J00_	9	16	18	15	FKP3O122204J00_
0.033 "	9	16	18	15	FKP3J023304J00_	9	16	18	15	FKP3O123304J00_

* 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.

$d = 0.5 \varnothing$ if $W = 3$
 $d = 0.6 \varnothing$ if $W \geq 4$
 $d = 0.8 \varnothing$ if $\text{PCM} = 15$



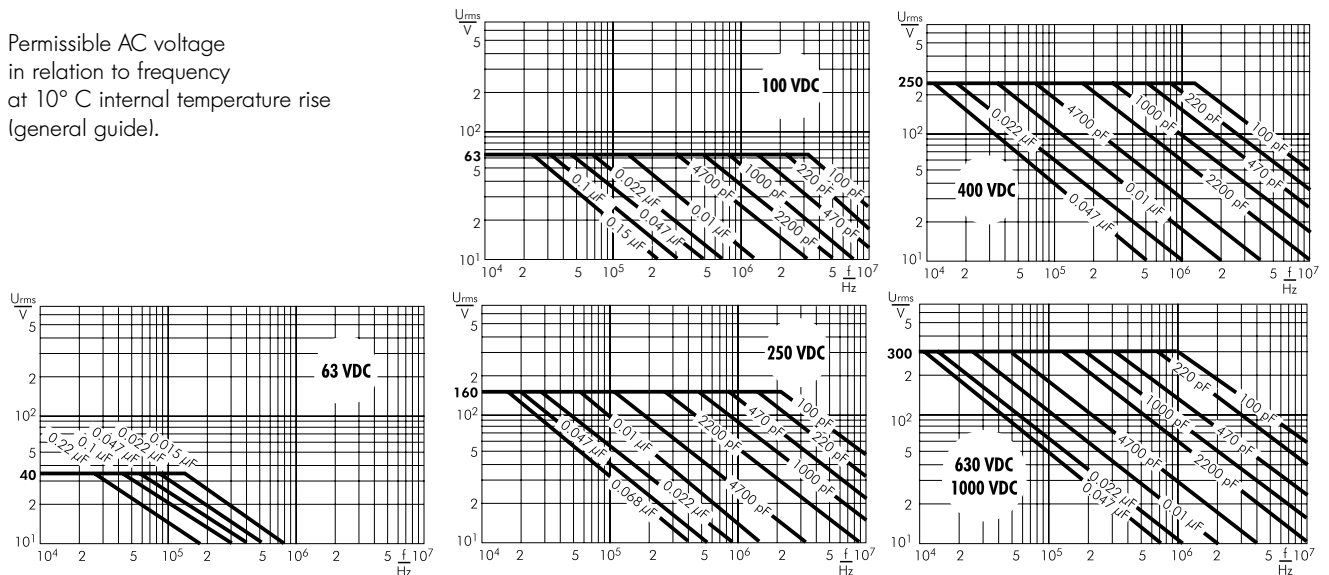
Part number completion:

Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: 6-2 = SD

Taped version see page 148.

Rights reserved to amend design data without prior notification.

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



Metallized Polyester (PET) Capacitors PCM 7.5 mm to 37.5 mm

Special Features

- High volume/capacitance ratio
- Self-healing
- According to RoHS 2011/65/EC

Typical Applications

For general DC-applications e.g.

- By-pass
- Blocking
- Coupling and decoupling
- Timing

Construction

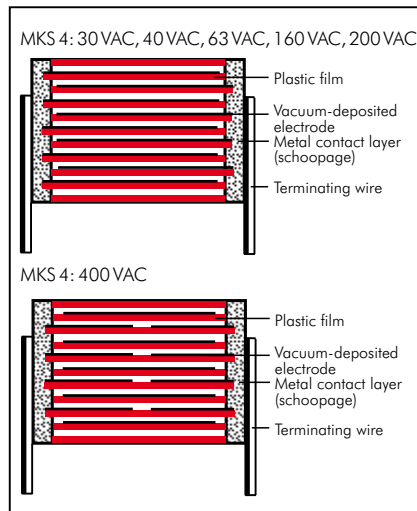
Dielectric:

Polyethylene-terephthalate (PET) 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:

1000 pF to 220 μF (E12-values on request)

Rated voltages:

50 VDC, 63 VDC, 100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC, 1500 VDC, 2000 VDC

Capacitance tolerances:

±20%, ±10% ±5%

Operating temperature range:

-55° C to +100° C (+125° C available subject to special enquiry)

Climatic test category:

55/100/56 in accordance with IEC

Insulation resistance at +20° C:

U _r	U _{test}	C ≤ 0.33 μF	0.33 μF < C ≤ 220 μF
50 VDC	10V	≥ 5 × 10 ³ MΩ (mean value: 3 × 10 ⁴ MΩ)	≥ 1500 sec (MΩ × μF) (mean value: 4500 sec)
63 VDC	50V	≥ 1 × 10 ⁴ MΩ (mean value: 5 × 10 ⁴ MΩ)	≥ 3000 sec (MΩ × μF) (mean value: 6000 sec)
100 VDC	100V	≥ 1.5 × 10 ⁴ MΩ (mean value: 5 × 10 ⁴ MΩ)	≥ 5000 sec (MΩ × μF) (mean value: 15000 sec)
≥ 250 VDC	100V	≥ 3 × 10 ⁴ MΩ (mean value: 1 × 10 ⁵ MΩ)	≥ 10000 sec (MΩ × μF) (mean value: 40000 sec)

Measuring time: 1 min.

Dissipation factors at + 20° C: tan δ

at f	C ≤ 0.1 μF	0.1 μF < C ≤ 1.0 μF	C > 1.0 μF
1 kHz	≤ 8 × 10 ⁻³	≤ 8 × 10 ⁻³	≤ 10 × 10 ⁻³
10 kHz	≤ 15 × 10 ⁻³	≤ 15 × 10 ⁻³	-
100 kHz	≤ 30 × 10 ⁻³	-	-

Maximum pulse rise time:

Capacitance pF/μF	Pulse rise time V/μsec max. operation/test									
	50VDC	63VDC	100VDC	250VDC	400VDC	630VDC	1000VDC	1500VDC	2000VDC	
1000 ... 6800	-	-	-	-	-	-	70/700	90/900	100/1000	
0.01 ... 0.022	-	30/300	30/300	35/350	38/380	40/400	50/500	50/500	60/600	
0.033 ... 0.068	-	15/150	15/150	20/200	25/250	32/320	26/260	35/350	40/400	
0.1 ... 0.22	10/100	10/100	12/120	15/150	15/150	17/170	20/200	35/350	40/400	
0.33 ... 0.68	9/90	9/90	9/90	10/100	10/100	13/130	20/200	20/200	38/380	
1.0 ... 2.2	6/60	6/60	5/50	6/60	9/90	13/130	14/140	15/150	15/150	
3.3 ... 6.8	2.5/25	3/30	3/30	6/60	6/60	9/90	12/120	-	-	
10 ... 220	2.5/25	2.5/25	2.5/25	3/30	6/60	6/60	-	-	-	

for pulses equal to the rated voltage

Mechanical Tests

Pull test on pins:

d ≤ 0.8 φ: 10 N in direction of pins
d > 0.8 φ: 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/sec² in accordance with IEC 60068-2-29

Packing

Available taped and reeled up to and including case size 15 x 26 x 31.5 / PCM 27.5 mm.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Continuation

General Data

Capacitance	50 VDC/30 VAC*					63 VDC/40 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μF						2.5	7	10	7.5	MKS4C021002A
0.015 "						4	9	13	10	MKS4C021003C
0.022 "						2.5	7	10	7.5	MKS4C021502A
0.033 "						4	9	13	10	MKS4C021503C
0.047 "						2.5	7	10	7.5	MKS4C022202A
0.068 "						4	9	13	10	MKS4C022203C
						2.5	7	10	7.5	MKS4C023302A
						4	9	13	10	MKS4C023303C
						2.5	7	10	7.5	MKS4C024702A
						4	9	13	10	MKS4C024703C
						2.5	7	10	7.5	MKS4C026802A
						4	9	13	10	MKS4C026803C
0.1 μF	2.5	7	10	7.5	MKS4B031002A	2.5	7	10	7.5	MKS4C031002A
0.15 "	2.5	7	10	7.5	MKS4B031502A	4	9	13	10	MKS4C031003C
0.22 "	2.5	7	10	7.5	MKS4B032202A	2.5	7	10	7.5	MKS4C031502A
0.33 "	2.5	7	10	7.5	MKS4B033302A	4	9	13	10	MKS4C031503C
0.47 "	3	8.5	10	7.5	MKS4B034702B	3	8.5	10	7.5	MKS4C032202B
0.68 "	4	9	10	7.5	MKS4B036802C	4	9	13	10	MKS4C032203C
						4	9	10	7.5	MKS4C033302C
						4	9	13	10	MKS4C033303C
						4	9	10	7.5	MKS4C034702C
						4	9	13	10	MKS4C034703C
						5	10.5	10.3	7.5	MKS4C036802E
						4	9	13	10	MKS4C036803C
1.0 μF	4	9	10	7.5	MKS4B041002C	5	10.5	10.3	7.5	MKS4C041002E
1.5 "	5	10.5	10.3	7.5	MKS4B041502E	4	9	13	10	MKS4C041003C
2.2 "	5.7	12.5	10.3	7.5	MKS4B042202F	5.7	12.5	10.3	7.5	MKS4C041502F
3.3 "	5.7	12.5	10.3	7.5	MKS4B043302F	5	11	13	10	MKS4C041503F
4.7 "	7.2	12.5	10.3	7.5	MKS4B044702G	5	11	13	10	MKS4C042203F
6.8 "	6	12	13	10	MKS4B044703G	6	12.5	18	15	MKS4C042204C
	7.2	12.5	10.3	7.5	MKS4B046802G	6	12	13	10	MKS4C043303G
	6	12	13	10	MKS4B046803G	7	14	18	15	MKS4C043304D
						7	14	18	15	MKS4C044704D
						6	15	26.5	22.5	MKS4C044705B
						8	15	18	15	MKS4C046804F
						7	16.5	26.5	22.5	MKS4C046805D
10 μF	9	16	18	15	MKS4B051004J	8.5	18.5	26.5	22.5	MKS4C051005F
15 "	11	21	26.5	22.5	MKS4B051505I	11	21	31.5	27.5	MKS4C051006B
22 "	11	21	31.5	27.5	MKS4B052206B	11	21	26.5	22.5	MKS4C051505I
33 "	13	24	31.5	27.5	MKS4B053306D	11	21	31.5	27.5	MKS4C051506B
47 "	15	26	31.5	27.5	MKS4B054706F	13	24	31.5	27.5	MKS4C052206D
68 "	13	24	41.5	37.5	MKS4B054707C	15	26	31.5	27.5	MKS4C053306F
	20	39.5	31.5	27.5	MKS4B056806J	17	29	31.5	27.5	MKS4C054706G
	17	29	41.5	37.5	MKS4B056807E	17	29	41.5	37.5	MKS4C054707E
						20	39.5	31.5	27.5	MKS4C056806J
						19	32	41.5	37.5	MKS4C056807F
100 μF	19	32	41.5	37.5	MKS4B061007F	20	39.5	41.5	37.5	MKS4C061007G
150 "	20	39.5	41.5	37.5	MKS4B061507G	24	45.5	41.5	37.5	MKS4C061507H
220 "	24	45.5	41.5	37.5	MKS4B062207H	40	55	41.5	37.5	MKS4C062207K

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

New values

**PCM = Printed circuit module
= pin spacing

Dims. in mm.

Part number completion:

Version code: 2-pin = D2
4-pin = D4

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

Taped version see page 148.

Rights reserved to amend design data without prior notification.

Continuation

General Data

Capacitance	100 VDC/63 VAC*					250 VDC/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 µF	2.5	7	10	7.5	MKS4D021002A	3	8.5	10	7.5	MKS4F021002B
	4	9	13	10	MKS4D021003C	4	9	13	10	MKS4F021003C
0.015 "	2.5	7	10	7.5	MKS4D021502A	3	8.5	10	7.5	MKS4F021502B
	4	9	13	10	MKS4D021503C	4	9	13	10	MKS4F021503C
0.022 "	2.5	7	10	7.5	MKS4D022202A	3	8.5	10	7.5	MKS4F022202B
	4	9	13	10	MKS4D022203C	4	9	13	10	MKS4F022203C
0.033 "	2.5	7	10	7.5	MKS4D023302A	3	8.5	10	7.5	MKS4F023302B
	4	9	13	10	MKS4D023303C	4	9	13	10	MKS4F023303C
0.047 "	2.5	7	10	7.5	MKS4D024702A	3	8.5	10	7.5	MKS4F024702B
	4	9	13	10	MKS4D024703C	4	9	13	10	MKS4F024703C
0.068 "	2.5	7	10	7.5	MKS4D026802A	4	9	10	7.5	MKS4F026802C
	4	9	13	10	MKS4D026803C	4	9	13	10	MKS4F026803C
0.1 µF	2.5	7	10	7.5	MKS4D031002A	4	9	10	7.5	MKS4F031002C
	4	9	13	10	MKS4D031003C	4	9	13	10	MKS4F031003C
0.15 "	3	8.5	10	7.5	MKS4D031502B	5	10.5	10.3	7.5	MKS4F031502E
	4	9	13	10	MKS4D031503C	4	9	13	10	MKS4F031503C
0.22 "	3	8.5	10	7.5	MKS4D032202B	5	10.5	10.3	7.5	MKS4F032202E
	4	9	13	10	MKS4D032203C	5	11	13	10	MKS4F032203F
0.33 "	4	9	10	7.5	MKS4D033302C	5.7	12.5	10.3	7.5	MKS4F033302F
	4	9	13	10	MKS4D033303C	5	11	13	10	MKS4F033303F
0.47 "	4.5	9.5	10.3	7.5	MKS4D034702D	6	12	13	10	MKS4F034703G
	4	9	13	10	MKS4D034703C	6	12.5	18	15	MKS4F034704C
0.68 "	5	10.5	10.3	7.5	MKS4D036802E	7	14	18	15	MKS4F036804D
	4	9	13	10	MKS4D036803C					
1.0 µF	5.7	12.5	10.3	7.5	MKS4D041002F	8	15	18	15	MKS4F041004F
	5	11	13	10	MKS4D041003F	6	15	26.5	22.5	MKS4F041005B
1.5 "	6	12	13	10	MKS4D041503G	9	16	18	15	MKS4F041504J
	7	14	18	15	MKS4D041504D	7	16.5	26.5	22.5	MKS4F041505D
2.2 "	8	15	18	15	MKS4D042204F	10.5	19	26.5	22.5	MKS4F042205G
	6	15	26.5	22.5	MKS4D042205B	9	19	31.5	27.5	MKS4F042206A
3.3 "	9	16	18	15	MKS4D043304J	11	21	26.5	22.5	MKS4F043305I
	7	16.5	26.5	22.5	MKS4D043305D	11	21	31.5	27.5	MKS4F043306B
4.7 "	10.5	19	26.5	22.5	MKS4D044705G	11	21	31.5	27.5	MKS4F044706B
	9	19	31.5	27.5	MKS4D044706A					
6.8 "	10.5	19	26.5	22.5	MKS4D046805G	13	24	31.5	27.5	MKS4F046806D
	11	21	31.5	27.5	MKS4D046806B					
10 µF	13	24	31.5	27.5	MKS4D051006D	17	29	31.5	27.5	MKS4F051006G
15 "	13	24	31.5	27.5	MKS4D051506D	17	34.5	31.5	27.5	MKS4F051506I
22 "	15	26	31.5	27.5	MKS4D052206F	17	29	41.5	37.5	MKS4F051507E
	17	29	31.5	27.5	MKS4D053306G	19	32	41.5	37.5	MKS4F052207F
33 "	13	24	41.5	37.5	MKS4D053307C	24	45.5	41.5	37.5	MKS4F053307H
47 "	17	29	41.5	37.5	MKS4D054707E	31	46	41.5	37.5	MKS4F054707I
68 "	20	39.5	41.5	37.5	MKS4D056807G	40	55	41.5	37.5	MKS4F056807K
100 µF	24	45.5	41.5	37.5	MKS4D061007H					
150 "	31	46	41.5	37.5	MKS4D061507I					
220 "	40	55	41.5	37.5	MKS4D062207K					

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

■ New values

**PCM = Printed circuit module = pin spacing

Dims. in mm.

Rights reserved to amend design data without prior notification.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		

Continuation page 48

Continuation

General Data

Capacitance	400 VDC/200 VAC*					630 VDC/400 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 µF	3	8.5	10	7.5	MKS4G021002B	3	8.5	10	7.5*	MKS4J021002B
	4	9	13	10	MKS4G021003C	4	9	13	10	MKS4J021003C
0.015 "	3	8.5	10	7.5	MKS4G021502B	4	9	10	7.5*	MKS4J021502C
	4	9	13	10	MKS4G021503C	4	9	13	10	MKS4J021503C
0.022 "	4	9	10	7.5	MKS4G022202C	4.5	9.5	10.3	7.5*	MKS4J022202D
	4	9	13	10	MKS4G022203C	4	9	13	10	MKS4J022203C
0.033 "	4	9	10	7.5	MKS4G023302C	5	10.5	10.3	7.5*	MKS4J023302E
	4	9	13	10	MKS4G023303C	5	11	13	10	MKS4J023303F
0.047 "	5	10.5	10.3	7.5	MKS4G024702E	5.7	12.5	10.3	7.5*	MKS4J024702F
	4	9	13	10	MKS4G024703C	6	12	13	10	MKS4J024703G
0.068 "	5	10.5	10.3	7.5	MKS4G026802E	6	12	13	10	MKS4J026803G
	4	9	13	10	MKS4G026803C	5	11	18	15	MKS4J026804B
0.1 µF	5	10.5	10.3	7.5	MKS4G031002E	6	12.5	18	15	MKS4J031004C
	5	11	13	10	MKS4G031003F	6	15	26.5	22.5	MKS4J031005B
0.15 "	5.7	12.5	10.3	7.5	MKS4G031502F	7	14	18	15	MKS4J031504D
	6	12	13	10	MKS4G031503G	6	15	26.5	22.5	MKS4J031505B
0.22 "	6	12	13	10	MKS4G032203G	8	15	18	15	MKS4J032204F
	6	12.5	18	15	MKS4G032204C	6	15	26.5	22.5	MKS4J032205B
0.33 "	8	15	18	15	MKS4G033304F	7	16.5	26.5	22.5	MKS4J033305D
						9	19	31.5	27.5	MKS4J033306A
0.47 "	8	15	18	15	MKS4G034704F	10.5	19	26.5	22.5	MKS4J034705G
	6	15	26.5	22.5	MKS4G034705B	9	19	31.5	27.5	MKS4J034706A
0.68 "	7	16.5	26.5	22.5	MKS4G036805D	11	21	26.5	22.5	MKS4J036805I
						11	21	31.5	27.5	MKS4J036806B
1.0 µF	10.5	19	26.5	22.5	MKS4G041005G	11	21	31.5	27.5	MKS4J041006B
	11	21	31.5	27.5	MKS4G041006B					
1.5 "	11	21	26.5	22.5	MKS4G041505I	15	26	31.5	27.5	MKS4J041506F
	11	21	31.5	27.5	MKS4G041506B					
2.2 "	11	21	31.5	27.5	MKS4G042206B	17	34.5	31.5	27.5	MKS4J042206I
						15	26	41.5	37.5	MKS4J042207D
3.3 "	13	24	31.5	27.5	MKS4G043306D	20	39.5	31.5	27.5	MKS4J043306J
						19	32	41.5	37.5	MKS4J043307F
4.7 "	17	29	31.5	27.5	MKS4G044706G	20	39.5	41.5	37.5	MKS4J044707G
6.8 "	17	34.5	31.5	27.5	MKS4G046806I	24	45.5	41.5	37.5	MKS4J046807H
	15	26	41.5	37.5	MKS4G046807D					
10 µF	19	32	41.5	37.5	MKS4G051007F	35	50	41.5	37.5	MKS4J051007J
15 "	20	39.5	41.5	37.5	MKS4G051507G	40	55	41.5	37.5	MKS4J051507K
22 "	31	46	41.5	37.5	MKS4G052207I					
33 "	35	50	41.5	37.5	MKS4G053307J					

* AC voltage: $f = 50 \text{ Hz}; 1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

New values

** PCM = Printed circuit module = pin spacing

* Admissible AC voltage 250 VAC max.

Dims. in mm.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		

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Continuation

General Data

Capacitance	1000 VDC/400 VAC*					1500 VDC/400 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	3	8.5	10	7.5	MKS4O111002B	4	9	13	10	MKS4S011003C
	4	9	13	10	MKS4O111003C					
1500 "	3	8.5	10	7.5	MKS4O111502B	4	9	13	10	MKS4S011503C
	4	9	13	10	MKS4O111503C					
2200 "	3	8.5	10	7.5	MKS4O112202B	4	9	13	10	MKS4S012203C
	4	9	13	10	MKS4O112203C					
3300 "	4	9	10	7.5	MKS4O113302C	4	9	13	10	MKS4S013303C
	4	9	13	10	MKS4O113303C					
4700 "	4	9	10	7.5	MKS4O114702C	4	9	13	10	MKS4S014703C
	4	9	13	10	MKS4O114703C					
6800 "	4.5	9.5	10.3	7.5	MKS4O116802D	5	11	13	10	MKS4S016803F
	4	9	13	10	MKS4O116803C					
0.01 µF	5	10.5	10.3	7.5	MKS4O121002E	6	12	13	10	MKS4S021003G
	5	11	13	10	MKS4O121003F					
0.015 "	5.7	12.5	10.3	7.5	MKS4O121502F	6	12.5	18	15	MKS4S021504C
	6	12	13	10	MKS4O121503G					
0.022 "	5	11	18	15	MKS4O122204B	7	14	18	15	MKS4S022204D
	6	15	26.5	22.5	MKS4O123305B					
0.033 "	6	12.5	18	15	MKS4O123304C	8	15	18	15	MKS4S023304F
	6	15	26.5	22.5	MKS4O123305B					
0.047 "	7	14	18	15	MKS4O124704D	7	16.5	26.5	22.5	MKS4S024705D
	6	15	26.5	22.5	MKS4O124705B					
0.068 "	8	15	18	15	MKS4O126804F	8.5	18.5	26.5	22.5	MKS4S026805F
	6	15	26.5	22.5	MKS4O126805B					
0.1 µF	9	16	18	15	MKS4O131004J	10.5	19	26.5	22.5	MKS4S031005G
	7	16.5	26.5	22.5	MKS4O131005D					
0.15 "	8.5	18.5	26.5	22.5	MKS4O131505F	11	21	31.5	27.5	MKS4S031506B
	10.5	19	26.5	22.5	MKS4O132205G					
0.22 "	11	21	26.5	22.5	MKS4O133305I	13	24	31.5	27.5	MKS4S032206D
	11	21	26.5	22.5	MKS4O133306B					
0.33 "	11	21	31.5	27.5	MKS4O133307E	17	29	41.5	37.5	MKS4S033307E
	13	24	31.5	27.5	MKS4O134706D					
0.47 "	13	24	31.5	27.5	MKS4O134706D	20	39.5	31.5	27.5	MKS4S034706J
	17	29	41.5	37.5	MKS4O136806F					
0.68 "	15	26	31.5	27.5	MKS4O136806F	20	39.5	41.5	37.5	MKS4S036807G
	17	29	31.5	27.5	MKS4O141006G					
1.0 µF	17	29	41.5	37.5	MKS4O141007E	24	45.5	41.5	37.5	MKS4S041007H
	19	32	41.5	37.5	MKS4O141507F					
1.5 "	20	39.5	41.5	37.5	MKS4O142207G	35	50	41.5	37.5	MKS4S041507J
2.2 "	24	45.5	41.5	37.5	MKS4O143307H	40	55	41.5	37.5	MKS4S042207K
3.3 "	31	46	41.5	37.5	MKS4O144707I					
4.7 "	40	55	41.5	37.5	MKS4O146807K					
6.8 "										

* AC voltage: $f = 50 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

 New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		

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Continuation

General Data

Capacitance	2000 VDC/400 VAC*				
	W	H	L	PCM**	Part number
1000 pF	4	9	13	10	MKS4U011003C
1500 "	4	9	13	10	MKS4U011503C
2200 "	5	11	13	10	MKS4U012203F
3300 "	6	12	13	10	MKS4U013303H
	5	11	18	15	MKS4U013304B
4700 "	5	11	18	15	MKS4U014704B
6800 "	6	12.5	18	15	MKS4U016804C
0.01 μF	7	14	18	15	MKS4U021004D
	6	15	26.5	22.5	MKS4U021005B
0.015 "	6	15	26.5	22.5	MKS4U021505B
0.022 "	7	16.5	26.5	22.5	MKS4U022205D
0.033 "	10.5	19	26.5	22.5	MKS4U023305G
0.047 "	11	21	26.5	22.5	MKS4U024705I
	11	21	31.5	27.5	MKS4U024706B
0.068 "	11	21	31.5	27.5	MKS4U026806B
0.1 μF	13	24	31.5	27.5	MKS4U031006D
0.15 "	17	29	31.5	27.5	MKS4U031506G
	13	24	41.5	37.5	MKS4U031507C
0.22 "	17	29	41.5	37.5	MKS4U032207E
0.33 "	20	39.5	41.5	37.5	MKS4U033307G
0.47 "	24	45.5	41.5	37.5	MKS4U034707H
0.68 "	31	46	41.5	37.5	MKS4U036807I
1.0 μF	40	55	41.5	37.5	MKS4U041007K

* AC voltage: $f = 50 \text{ Hz}; 1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

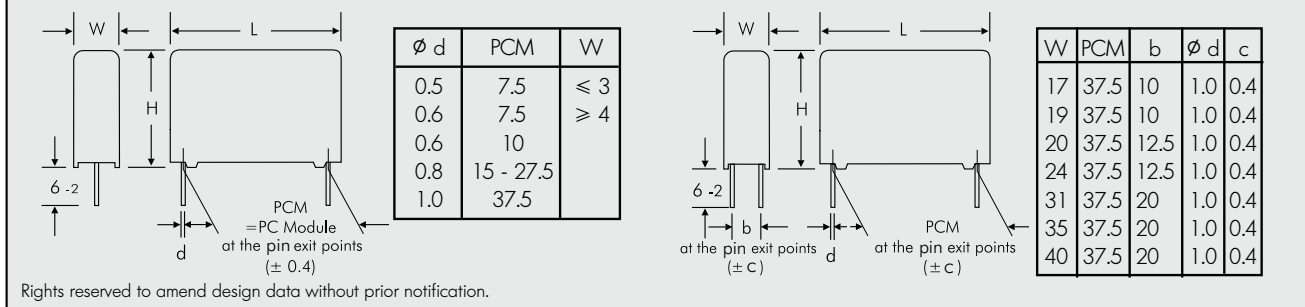
■ New values

** PCM = Printed circuit module = pin spacing

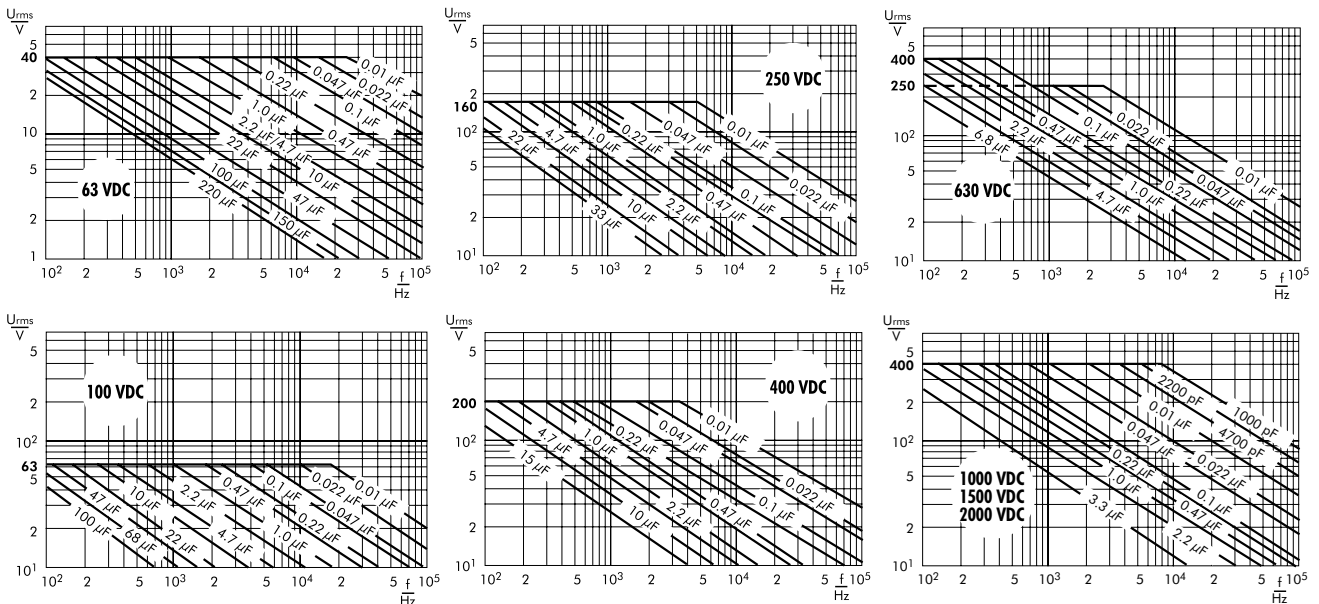
Dims. in mm.

The values of the WIMA MKM 4 ranges according to the main catalogue 2009 are still available on request.

Part number completion:	
Version code:	2-pin = D2 4-pin = D4
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



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



Metallized Polypropylene (PP) Capacitors PCM 7.5 mm to 52.5 mm

Special Features

- High volume/capacitance ratio
- Self-healing
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC

Typical Applications

For high frequency applications e.g.

- Sample and hold
- Timing
- Oscillating circuits
- High frequency coupling and decoupling

Construction

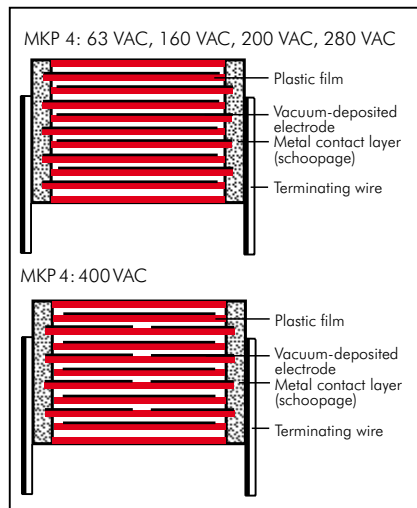
Dielectric:

Polypropylene (PP) 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 μ F to 150 μ F (E12-values on request)

Rated voltages:

100 VDC, 250 VDC, 400 VDC, 630 VDC, 1000 VDC

Capacitance tolerances:

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

Operating temperature range:

-55° C to $+100^{\circ}$ C

Climatic test category:

55/100/56 in accordance with IEC

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

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

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

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

(mean value: 100\,000 sec)

Measuring voltage: 100 V/1 min.

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

$\tan \delta \leq 10 \times 10^{-4}$ at 1 kHz ($C \leq 50 \mu\text{F}$)

$\tan \delta \leq 15 \times 10^{-4}$ at 1 kHz ($C > 50 \mu\text{F}$)

Maximum pulse rise time:

Capacitance μF	max. pulse rise time V/ μsec at $T_A < 40^{\circ}$ C				
	100 VDC	250 VDC	400 VDC	630 VDC	1000 VDC
0.01 ... 0.022	450	450	450	500	550
0.033 ... 0.068	250	250	300	350	400
0.1 ... 0.22	150	150	200	250	300
0.33 ... 0.68	100	100	150	200	200
1.0 ... 2.2	75	100	100	150	150
3.3 ... 4.7	60	100	100	120	140
6.8 ... 10	40	50	60	85	100
15 ... 33	35	50	18	36	-
47 ... 150	10	13	-	-	-

for pulses equal to the rated voltage

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/sec²

in accordance with IEC 60068-2-29

Test specifications:

In accordance with IEC 60384-16

Test voltage: 1.6 U_r , 2 sec.

Dielectric absorption: 0.05 %

Voltage derating:

A voltage derating factor of 1.35 % per K

must be applied from $+85^{\circ}$ C for DC

voltages and from $+75^{\circ}$ C for AC

voltages.

Reliability:

Operational life > 300\,000 hours

Failure rate < 2 fit ($0.5 \times U_r$ 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 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/160 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 µF	3	8.5	10	7.5	MKP4D021002B	3	8.5	10	7.5	MKP4F021002B
0.015 "	3	8.5	10	7.5	MKP4D021502B	3	8.5	10	7.5	MKP4F021502B
0.022 "	3	8.5	10	7.5	MKP4D022202B	3	8.5	10	7.5	MKP4F022202B
0.033 "	3	8.5	10	7.5	MKP4D023302B	3	8.5	10	7.5	MKP4F023302B
	4	9	13	10	MKP4D023303C	4	9	13	10	MKP4F023303C
0.047 "	4	9	10	7.5	MKP4D024702C	4	9	10	7.5	MKP4F024702C
	4	9	13	10	MKP4D024703C	4	9	13	10	MKP4F024703C
0.068 "	4	9	10	7.5	MKP4D026802C	4	9	10	7.5	MKP4F026802C
	4	9	13	10	MKP4D026803C	4	9	13	10	MKP4F026803C
0.1 µF	4.5	9.5	10.3	7.5	MKP4D031002D	4.5	9.5	10.3	7.5	MKP4F031002D
	4	9	13	10	MKP4D031003C	4	9	13	10	MKP4F031003C
0.15 "	5	10.5	10.3	7.5	MKP4D031502E	5	10.5	10.3	7.5	MKP4F031502E
	5	11	13	10	MKP4D031503F	5	11	13	10	MKP4F031503F
0.22 "	6	12	13	10	MKP4D032203G	6	12	13	10	MKP4F032203G
	5	11	18	15	MKP4D032204B	5	11	18	15	MKP4F032204B
0.33 "	6	12.5	18	15	MKP4D033304C	6	12.5	18	15	MKP4F033304C
0.47 "	7	14	18	15	MKP4D034704D	7	14	18	15	MKP4F034704D
0.68 "	8	15	18	15	MKP4D036804F	8	15	18	15	MKP4F036804F
	6	15	26.5	22.5	MKP4D036805B	6	15	26.5	22.5	MKP4F036805B
1.0 µF	7	16.5	26.5	22.5	MKP4D041005D	7	16.5	26.5	22.5	MKP4F041005D
1.5 "	10.5	19	26.5	22.5	MKP4D041505G	10.5	19	26.5	22.5	MKP4F041505G
2.2 "	11	21	26.5	22.5	MKP4D042205I	11	21	26.5	22.5	MKP4F042205I
	11	21	31.5	27.5	MKP4D042206B	11	21	31.5	27.5	MKP4F042206B
3.3 "	13	24	31.5	27.5	MKP4D043306D	13	24	31.5	27.5	MKP4F043306D
4.7 "	13	24	31.5	27.5	MKP4D044706D	15	26	31.5	27.5	MKP4F044706F
6.8 "	15	26	31.5	27.5	MKP4D046806F	17	29	31.5	27.5	MKP4F046806G
	13	24	41.5	37.5	MKP4D046807C	15	26	41.5	37.5	MKP4F046807D
10 µF	17	29	41.5	37.5	MKP4D051007E	19	32	41.5	37.5	MKP4F051007F
15 "	19	32	41.5	37.5	MKP4D051507F	20	39.5	41.5	37.5	MKP4F051007G
22 "	20	39.5	41.5	37.5	MKP4D052207G	24	45.5	41.5	37.5	MKP4F051007H
33 "	24	45.5	41.5	37.5	MKP4D053307H	35	50	41.5	37.5	MKP4F053307J
47 "	35	50	41.5	37.5	MKP4D054707J	35	50	57	52.5	MKP4F054709F
68 "	40	55	41.5	37.5	MKP4D056807K	45	65	57	52.5	MKP4F056809J
	35	50	57	52.5	MKP4D056809F					
100 µF	45	55	57	52.5	MKP4D061009H					
150 "	45	65	57	52.5	MKP4D061509J					

* AC voltage: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{URC} \leq U_r$

New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		

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Continuation

General Data

Capacitance	400 VDC/220 VAC*					630 VDC/280 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
0.01 μ F	3	8.5	10	7.5	MKP4G021002B_____	3	8.5	10	7.5	MKP4J021002B_____
						4	9	13	10	MKP4J021003C_____
0.015 "	3	8.5	10	7.5	MKP4G021502B_____	4	9	10	7.5	MKP4J021502C_____
	4	9	13	10	MKP4G021503C_____	4	9	13	10	MKP4J021503C_____
0.022 "	4	9	10	7.5	MKP4G022202C_____	4.5	9.5	10.3	7.5	MKP4J022202D_____
	4	9	13	10	MKP4G022203C_____	4	9	13	10	MKP4J022203C_____
0.033 "	4.5	9.5	10.3	7.5	MKP4G023302D_____	5	10.5	10.3	7.5	MKP4J023302E_____
	4	9	13	10	MKP4G023303C_____	4	9	13	10	MKP4J023303C_____
0.047 "	5	10.5	10.3	7.5	MKP4G024702E_____	5.7	12.5	10.3	7.5	MKP4J024702F_____
	4	9	13	10	MKP4G024703C_____	5	11	13	10	MKP4J024703F_____
0.068 "	5.7	12.5	10.3	7.5	MKP4G026802F_____	6	12	13	10	MKP4J026803G_____
	5	11	13	10	MKP4G026803F_____	6	12.5	18	15	MKP4J026804C_____
0.1 μ F	6	12	13	10	MKP4G031003G_____	7	14	18	15	MKP4J031004D_____
	5	11	18	15	MKP4G031004B_____					
0.15 "	6	12.5	18	15	MKP4G031504C_____	8	15	18	15	MKP4J031504F_____
						6	15	26.5	22.5	MKP4J031505B_____
0.22 "	7	14	18	15	MKP4G032204D_____	9	16	18	15	MKP4J032204J_____
						7	16.5	26.5	22.5	MKP4J032205D_____
0.33 "	8	15	18	15	MKP4G033304F_____	8.5	18.5	26.5	22.5	MKP4J033305F_____
	6	15	26.5	22.5	MKP4G033305B_____					
0.47 "	7	16.5	26.5	22.5	MKP4G034705D_____	10.5	19	26.5	22.5	MKP4J034705G_____
						11	21	31.5	27.5	MKP4J034706B_____
0.68 "	8.5	18.5	26.5	22.5	MKP4G036805F_____	11	21	31.5	27.5	MKP4J036806B_____
1.0 μ F	11	21	26.5	22.5	MKP4G041005I_____	13	24	31.5	27.5	MKP4J041006D_____
	11	21	31.5	27.5	MKP4G041006B_____					
1.5 "	11	21	31.5	27.5	MKP4G041506B_____	15	26	31.5	27.5	MKP4J041506F_____
2.2 "	15	26	31.5	27.5	MKP4G042206F_____	17	29	41.5	37.5	MKP4J042207E_____
3.3 "	17	29	31.5	27.5	MKP4G043306G_____	19	32	41.5	37.5	MKP4J043307F_____
	17	29	41.5	37.5	MKP4G043307E_____					
4.7 "	19	32	41.5	37.5	MKP4G044707F_____	20	39.5	41.5	37.5	MKP4J044707G_____
6.8 "	20	39.5	41.5	37.5	MKP4G046807G_____	24	45.5	41.5	37.5	MKP4J046807H_____
10 μ F	24	45.5	41.5	37.5	MKP4G051007H_____	35	50	41.5	37.5	MKP4J051007J_____
15 "	31	46	41.5	37.5	MKP4G051507I_____	35	50	57	52.5	MKP4J051509F_____
22 "	40	55	41.5	37.5	MKP4G052207K_____	45	65	57	52.5	MKP4J052209J_____
	35	50	57	52.5	MKP4G052209F_____					
33 "	45	65	57	52.5	MKP4G053309J_____					

* AC voltage: $f \leq 400$ Hz; $1.4 \times U_{rms} + UDC \leq U_r$

New values

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		

Rights reserved to amend design data without prior notification.

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Continuation

General Data

Capacitance	1000 VDC/400 VAC*				Part number
	W	H	L	PCM**	
0.01 μF	5.7	12.5	10,3	7.5	MKP4O121002F
	5	11	13	10	MKP4O121003F
0.015 "	5	11	13	10	MKP4O121503F
	5	11	18	15	MKP4O121504B
0.022 "	5	11	18	15	MKP4O122204B
0.033 "	6	12.5	18	15	MKP4O123304C
0.047 "	7	14	18	15	MKP4O124704D
0.068 "	8	15	18	15	MKP4O126804F
	6	15	26.5	22.5	MKP4O126805B
0.1 μF	9	16	18	15	MKP4O131004J
	7	16.5	26.5	22.5	MKP4O131005D
0.15 "	8.5	18.5	26.5	22.5	MKP4O131505F
0.22 "	11	21	26.5	22.5	MKP4O132205L
	11	21	31.5	27.5	MKP4O132206B
0.33 "	11	21	31.5	27.5	MKP4O133306B
0.47 "	13	24	31.5	27.5	MKP4O134706D
0.68 "	17	29	31.5	27.5	MKP4O136806G
1.0 μF	17	29	41.5	37.5	MKP4O141007E
1.5 "	20	39.5	41.5	37.5	MKP4O141507G
2.2 "	24	45.5	41.5	37.5	MKP4O142207H
3.3 "	31	46	41.5	37.5	MKP4O143307I
4.7 "	35	50	41.5	37.5	MKP4O144707J
6.8 "	35	50	57	52.5	MKP4O146809F
10 μF	45	65	57	52.5	MKP4O151009J

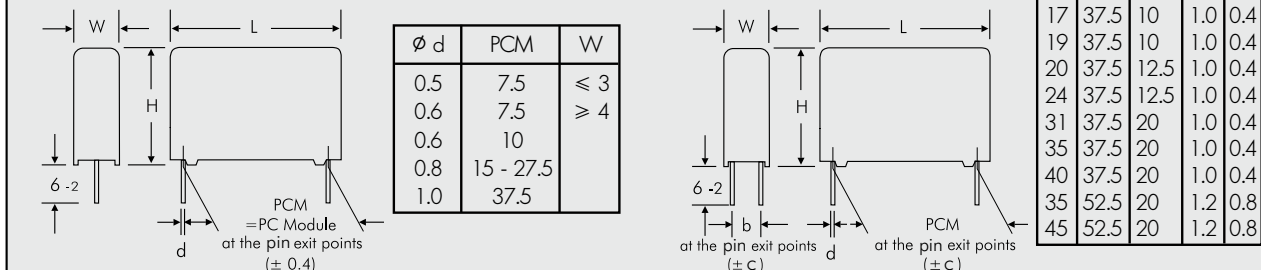
* AC voltage: $f \leq 400 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

New values

** PCM = Printed circuit module = pin spacing

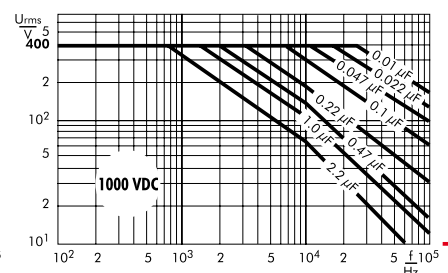
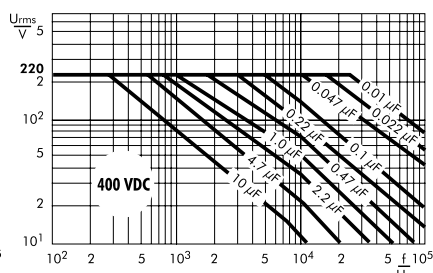
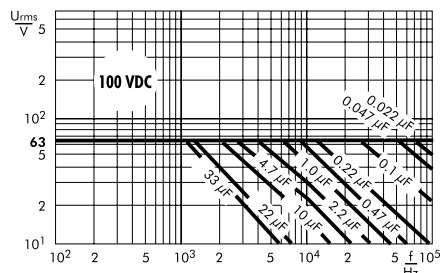
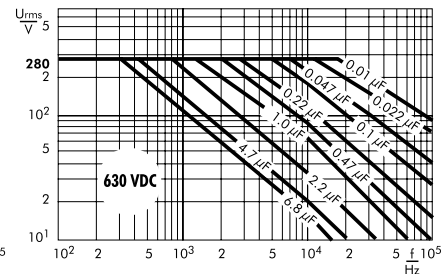
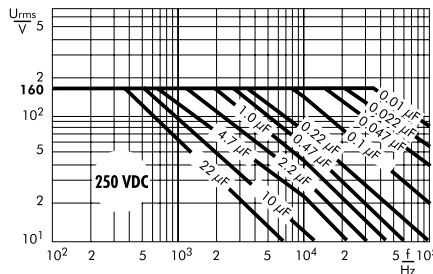
Dims. in mm.

Part number completion:	
Version code:	2-pin = D2
	4-pin = D4
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

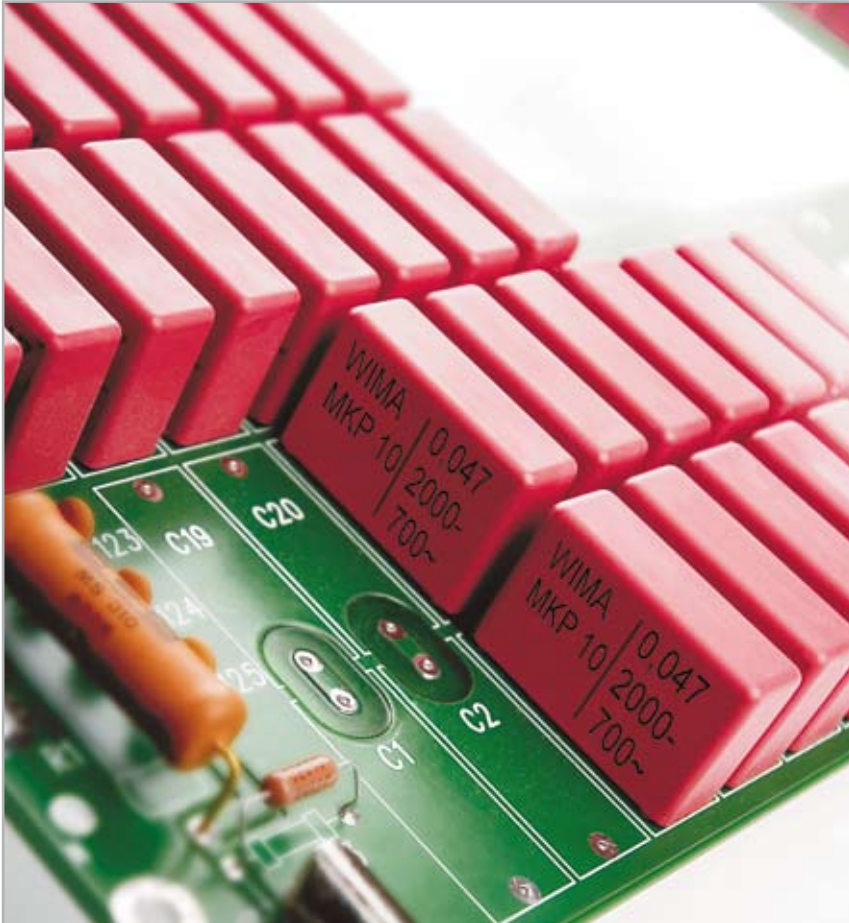


Rights reserved to amend design data without prior notification.

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



WIMA Capacitors for Good Contact at High Pulse Ratings



WIMA MKP 10

WIMA FKP 4

WIMA FKP 1

An important construction criterion in the manufacture of reliable, self-healing capacitors for pulse applications is the current-carrying capacity of the contacts, i.e. the connection between the terminating wires and the electrodes.

The construction principle of the WIMA MKP 10 series consists of a non-metallized dielectric film and an carrier film metallized on both sides acting as electrode. Thanks to the metallization on both sides, the electrical conductivity is considerably improved and the contact surface between the electrodes and the schoopage layer is doubled. This results in better contact and allows high current and pulse loading capability. The properties of metallized capacitors such as excellent self-healing

and high capacitances remain unchanged.

The WIMA FKP 4 is a range of self-healing film/foil Polypropylene capacitors made with a single metallized plastic film and metal foil electrodes in series connection. This construction features a high volume capacitance and at the same time high pulse loading capability.

The WIMA FKP 1 series was developed to withstand extremely high pulse loads. It has an internal series connection, the metal foil electrodes being combined with a floating electrode metallized on both sides. The metal foil electrodes are safely contacted on both sides of the end surfaces. At the same time the capacitor is fully self-healing due to the floating electrode metallized on both sides. As regards pulse loading capability, WIMA FKP 1 represents the high-end of capacitor technology.

WIMA pulse capacitors are suitable for high pulse and high frequency applications in e.g. switch mode power supplies, TV and monitor sets, lighting industry, audio/video equipment, convertes in drives and power electronics or in electronic ballasts. They are available with capacitances from 100 pF through 47 μ F and with voltage ratings from 100 VDC through 6000 VDC.

WIMA pulse capacitors are produced with the proven box technology using solvent-resistant, flame-retardant plastic cases according to UL 94 V-0. They are environmentally compatible with the RoHS 2011/65/EC regulations.



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/EC

Typical Applications

For pulse applications e.g.

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

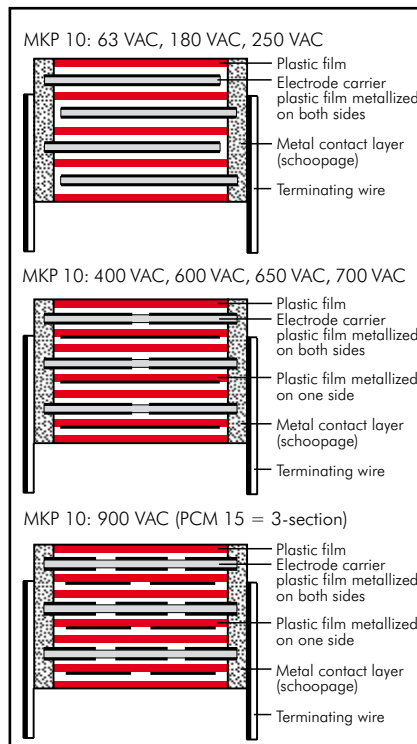
Construction

Dielectric: Polypropylene (PP) film

Capacitor electrodes:

Double-sided metallized plastic film

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with epoxy resin seal, UL 94 V-0

Terminations: Tinned wire.

Marking: Colour: Red.

Marking: Black. Epoxy resin seal: Red

Electrical Data

Capacitance range:

1000 pF to 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 $+100^{\circ}$ C

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

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

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

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

(mean value: 100000 sec)

Measuring voltage: 100 V/1 min.

Test voltage: 2 sec.

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

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 $+85^{\circ}$ C for DC voltages and from $+75^{\circ}$ C for AC voltages.

Reliability:

Operational life > 300000 hours

Failure rate < 1 fit ($0.5 \times U_r$ 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 10.

Dissipation factors at $+20^{\circ}$ 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 $T_A < 40^{\circ}$ 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	-	-	-
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

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	45	65	57	52.5	MKP1F052209F
										MKP1F053309J

* 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 = D2
 4-pin = D4
 Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: 6-2 = SD

Taped version see page 148.



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 = D2
 4-pin = D4
 Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: 6-2 = SD

Taped version see page 148.

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_____
						35	50	57	52.5	MKP1T042209F_____
3.3 "	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	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD

Taped version see page 148.

Continuation page 60

Continuation

General Data

Capacitance	2000 VDC/700 VAC*					2500 VAC/900 VDC*				
	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	MKP1V016805B_____
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_____					
0.047 "	10.5	19	26.5	22.5	MKP1U024705G_____					
0.068 "	11	21	26.5	22.5	MKP1U026805I_____					
0.1 µF	13	24	31.5	27.5	MKP1U031006D_____					
0.15 "	15	26	31.5	27.5	MKP1U031506F_____					
0.22 "	17	34.5	31.5	27.5	MKP1U032206I_____					
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_____					
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 = D2 4-pin = D4
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

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Continuation

General Data

Capacitance	3000 VDC/700 VAC*				Part number
	W	H	L	PCM**	
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
0.047 "	9	19	31.5	27.5	MKP1W023306A
0.068 "	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 μF	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: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + \text{UDC} \leq U_r$

■ New range

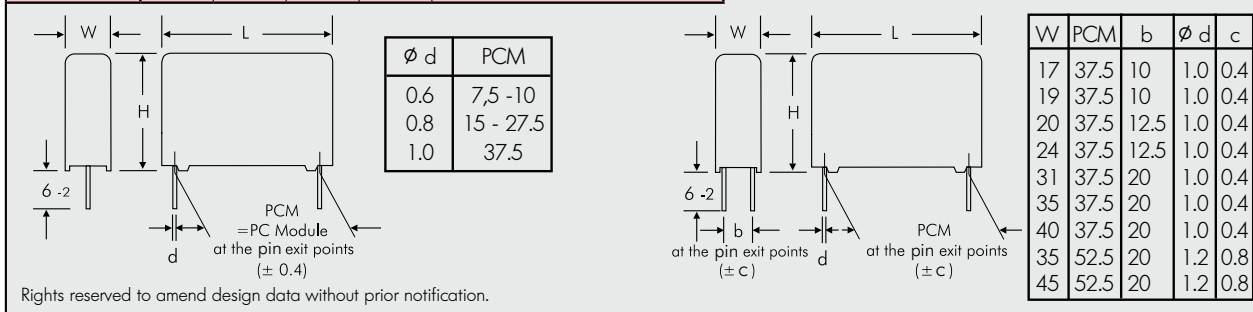
** PCM = Printed circuit module = pin spacing

Dims. in mm.

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

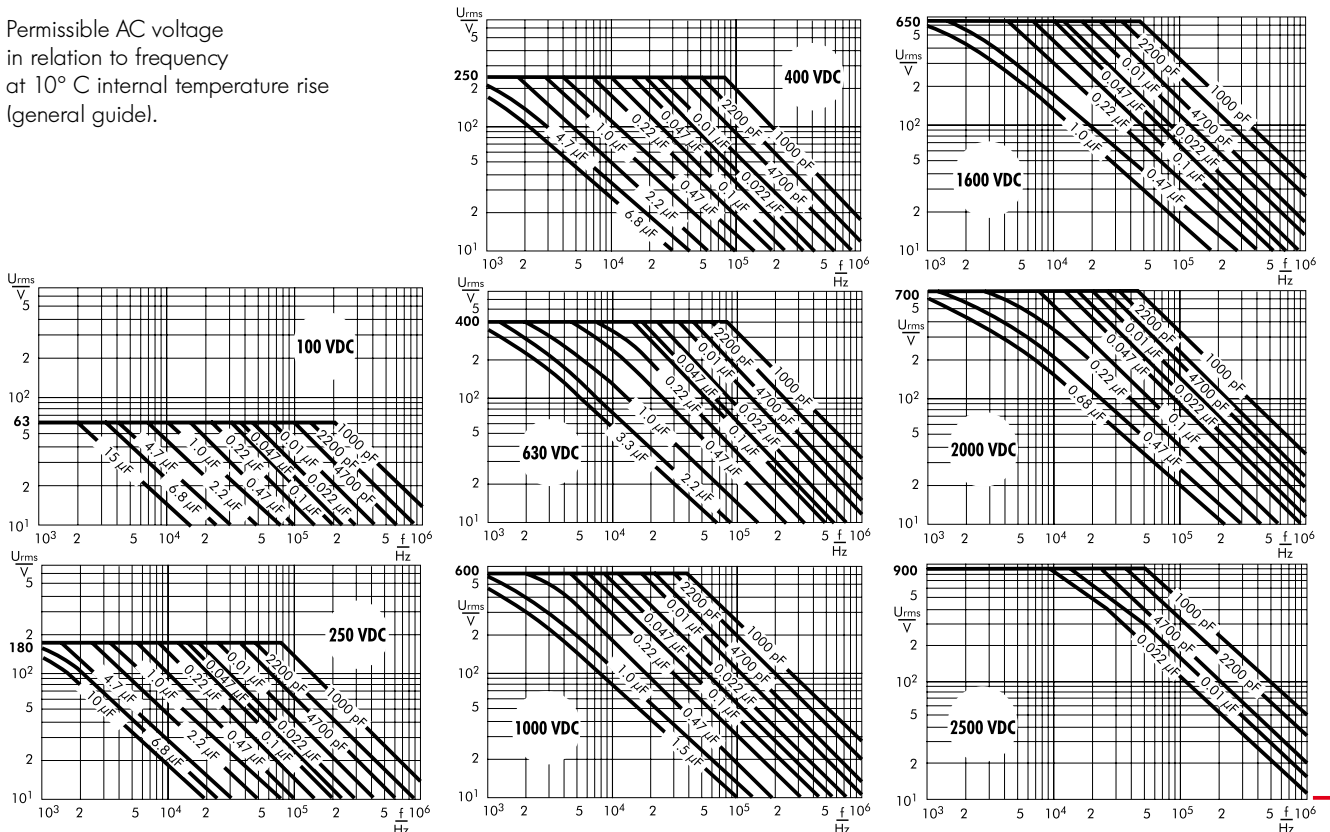
Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD
Taped version see page 148.		



Rights reserved to amend design data without prior notification.

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



Polypropylene (PP) Capacitors for Pulse Applications with Metal Foil Electrodes, Schoopage Contacts and Self-Healing, Internal Series Connection for Increased Current Carrying Capability PCM 15 mm to 37.5 mm

Special Features

- High pulse duty
- Self-healing
- Internal series connection
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For high pulse and high frequency applications e.g.

- Switch mode power supplies
- Converter in drives and power electronics
- Deflection systems in monitors and TV-sets
- Electronic ballasts

Construction

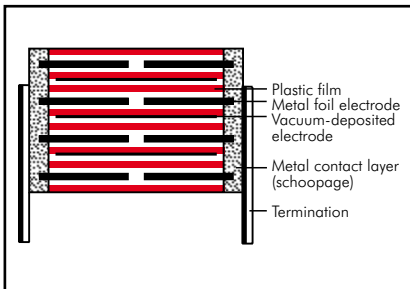
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Aluminium foil and single-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:

100 pF to 1.5 μF (E12-values on request)

Rated voltages:

400 VDC, 630 VDC, 1000 VDC, 1250 VDC, 1600 VDC, 2000 VDC

Capacitance tolerances:

±20%, ±10%, ±5% (other tolerances are available subject to special enquiry)

Operating temperature range:

-55° C to +100° C

Climatic test category:

55/100/56 in accordance with IEC

Insulation resistance at +20° C:

$C \leq 0.1 \mu\text{F}$: $\geq 1 \times 10^5 \text{ M}\Omega$

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

$C > 0.1 \mu\text{F}$: $\geq 10000 \text{ sec (M}\Omega \times \mu\text{F)}$

(mean value: 100000 sec)

Measuring voltage: 100 V/1 min.

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

Maximum pulse rise time:

Capacitance pF/μF	max. pulse rise time V/μsec at $T_A < 40^\circ \text{C}$					
	400 VDC	630 VDC	1000 VDC	1250 VDC	1600 VDC	2000 VDC
100 ... 220	27000	31000	33000	39000	39000	39000
330 ... 680	19000	21000	31000	34000	34000	39000
1000 ... 2200	13000	15000	27000	27000	27000	39000
3300 ... 6800	9000	14000	15000	17000	17000	21000
0.01 ... 0.022	7000	11000	11000	11000	11000	11000
0.033 ... 0.068	7000	9000	9000	9000	9000	9000
0.1 ... 0.22	7000	9000	9000	9000	9000	9000
0.33 ... 0.68	3000	5000	5000	5000	5000	-
1.0 ... 1.5	1000	1600	2000	-	-	-

for pulses equal to the rated voltage

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/sec²

in accordance with IEC 60068-2-29

Packing

Available taped and reeled up to and

including case size 15 x 26 x 31.5 /

PCM 27.5 mm.

Detailed taping information and graphs

at the end of the catalogue.

For further details and graphs please

refer to Technical Information.

Continuation

General Data

Capacitance	400 VDC/250 VAC*					630 VDC/350 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	5	11	18	15	FKP4G001004B00_____	5	11	18	15	FKP4J001004B00_____
150 "	5	11	18	15	FKP4G001504B00_____	5	11	18	15	FKP4J001504B00_____
220 "	5	11	18	15	FKP4G002204B00_____	5	11	18	15	FKP4J002204B00_____
330 "	5	11	18	15	FKP4G003304B00_____	5	11	18	15	FKP4J003304B00_____
470 "	5	11	18	15	FKP4G004704B00_____	5	11	18	15	FKP4J004704B00_____
680 "	5	11	18	15	FKP4G006804B00_____	5	11	18	15	FKP4J006804B00_____
1000 pF	5	11	18	15	FKP4G011004B00_____	5	11	18	15	FKP4J011004B00_____
1500 "	5	11	18	15	FKP4G011504B00_____	5	11	18	15	FKP4J011504B00_____
2200 "	5	11	18	15	FKP4G012204B00_____	5	11	18	15	FKP4J012204B00_____
3300 "	5	11	18	15	FKP4G013304B00_____	5	11	18	15	FKP4J013304B00_____
4700 "	5	11	18	15	FKP4G014704B00_____	5	11	18	15	FKP4J014704B00_____
6800 "	5	11	18	15	FKP4G016804B00_____	5	11	18	15	FKP4J016804B00_____
0.01 μF	5	11	18	15	FKP4G021004B00_____	5	11	18	15	FKP4J021004B00_____
0.015 "	5	11	18	15	FKP4G021504B00_____	6	12.5	18	15	FKP4J021504C00_____
0.022 "	6	12.5	18	15	FKP4G022204C00_____	7	14	18	15	FKP4J022204D00_____
0.033 "	7	14	18	15	FKP4G023304D00_____	8	15	18	15	FKP4J023304F00_____
	5	14	26.5	22.5	FKP4G023305A00_____	6	15	26.5	22.5	FKP4J023305B00_____
0.047 "	8	15	18	15	FKP4G024704F00_____	9	16	18	15	FKP4J024704J00_____
	6	15	26.5	22.5	FKP4G024705B00_____	7	16.5	26.5	22.5	FKP4J024705D00_____
0.068 "	7	16.5	26.5	22.5	FKP4G026805D00_____	8.5	18.5	26.5	22.5	FKP4J026805F00_____
0.1 μF	8.5	18.5	26.5	22.5	FKP4G031005F00_____	10.5	19	26.5	22.5	FKP4J031005G00_____
						11	21	31.5	27.5	FKP4J031006B00_____
0.15 "	11	21	26.5	22.5	FKP4G031505I00_____	11	21	26.5	22.5	FKP4J031505I00_____
	9	19	31.5	27.5	FKP4G031506A00_____	11	21	31.5	27.5	FKP4J031506B00_____
0.22 "	11	21	31.5	27.5	FKP4G032206B00_____	13	24	31.5	27.5	FKP4J032206D00_____
0.33 "	13	24	31.5	27.5	FKP4G033306D00_____	15	26	31.5	27.5	FKP4J033306F00_____
0.47 "	17	29	31.5	27.5	FKP4G034706G00_____	17	34.5	31.5	27.5	FKP4J034706I00_____
0.68 "	17	34.5	31.5	27.5	FKP4G036806I00_____	20	39.5	41.5	37.5	FKP4J036807G00_____
1.0 μF	20	39.5	31.5	27.5	FKP4G041006J00_____	20	39.5	41.5	37.5	FKP4J041007G00_____
1.5 "	20	39.5	41.5	37.5	FKP4G041507G00_____	24	45.5	41.5	37.5	FKP4J041507H00_____

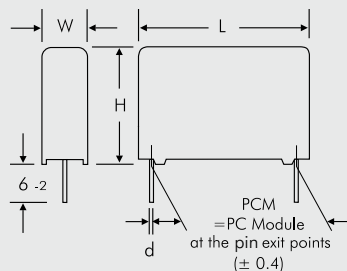
* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing

Dims. in mm.

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

∅ d	PCM
0.8	15 - 27.5
1.0	37.5



Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

Continuation page 64

Continuation

General Data

Capacitance	1000 VDC/400 VAC*					1250 VDC/450 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	5	11	18	15	FKP4O101004B00_____	5	11	18	15	FKP4R001004B00_____
150 "	5	11	18	15	FKP4O101504B00_____	5	11	18	15	FKP4R001504B00_____
220 "	5	11	18	15	FKP4O102204B00_____	5	11	18	15	FKP4R002204B00_____
330 "	5	11	18	15	FKP4O103304B00_____	5	11	18	15	FKP4R003304B00_____
470 "	5	11	18	15	FKP4O104704B00_____	5	11	18	15	FKP4R004704B00_____
680 "	5	11	18	15	FKP4O106804B00_____	5	11	18	15	FKP4R001684B00_____
1000 pF	5	11	18	15	FKP4O111004B00_____	5	11	18	15	FKP4R011004B00_____
1500 "	5	11	18	15	FKP4O111504B00_____	5	11	18	15	FKP4R011504B00_____
2200 "	5	11	18	15	FKP4O112204B00_____	5	11	18	15	FKP4R012204B00_____
3300 "	5	11	18	15	FKP4O113304B00_____	6	12.5	18	15	FKP4R013304C00_____
4700 "	5	11	18	15	FKP4O114704B00_____	7	14	18	15	FKP4R014704D00_____
6800 "	5	11	18	15	FKP4O116804B00_____	8	15	18	15	FKP4R016804F00_____
0.01 µF	6	12.5	18	15	FKP4O121004C00_____	9	16	18	15	FKP4R021004J00_____
	5	14	26.5	22.5	FKP4O121005A00_____	6	15	26.5	22.5	FKP4R021005B00_____
0.015 "	7	14	18	15	FKP4O121504D00_____	7	16.5	26.5	22.5	FKP4R021505D00_____
	6	15	26.5	22.5	FKP4O121505B00_____					
0.022 "	8	15	18	15	FKP4O122204F00_____	8.5	18.5	26.5	22.5	FKP4R022205F00_____
	6	15	26.5	22.5	FKP4O122205B00_____					
0.033 "	7	16.5	26.5	22.5	FKP4O123305D00_____	10.5	19	26.5	22.5	FKP4R023305G00_____
						9	19	31.5	27.5	FKP4R023306A00_____
0.047 "	8.5	18.5	26.5	22.5	FKP4O124705F00_____	11	21	31.5	27.5	FKP4R024706B00_____
	9	19	31.5	27.5	FKP4O124706A00_____					
0.068 "	11	21	26.5	22.5	FKP4O126805I00_____	13	24	31.5	27.5	FKP4R026806D00_____
	9	19	31.5	27.5	FKP4O126806A00_____					
0.1 µF	11	21	31.5	27.5	FKP4O131006B00_____	15	26	31.5	27.5	FKP4R031006F00_____
0.15 "	13	24	31.5	27.5	FKP4O131506D00_____	15	26	31.5	27.5	FKP4R031506F00_____
0.22 "	15	26	31.5	27.5	FKP4O132206F00_____	20	39.5	31.5	27.5	FKP4R032206J00_____
						17	29	41.5	37.5	FKP4R032207E00_____
0.33 "	17	34.5	31.5	27.5	FKP4O133306I00_____	19	32	41.5	37.5	FKP4R033307F00_____
	17	29	41.5	37.5	FKP4O133307E00_____					
0.47 "	19	32	41.5	37.5	FKP4O134707F00_____	20	39.5	41.5	37.5	FKP4R034707G00_____
0.68 "	20	39.5	41.5	37.5	FKP4O136807G00_____	24	45.5	41.5	37.5	FKP4R036807H00_____
1.0 µF	24	45.5	41.5	37.5	FKP4O141007H00_____					

* 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.

Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S
Pin length: 6-2 = SD

Taped version see page 148.

Rights reserved to amend design data without prior notification.

Continuation page 65

Continuation

General Data

Capacitance	1600 VDC/500 VAC*					2000 VDC/550 VAC*																		
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number														
100 pF	5	11	18	15	FKP4T001004B00_____	5	11	18	15	FKP4U001004B00_____														
150 "	5	11	18	15	FKP4T001504B00_____	5	11	18	15	FKP4U001504B00_____														
220 "	5	11	18	15	FKP4T002204B00_____	5	11	18	15	FKP4U002204B00_____														
330 "	5	11	18	15	FKP4T003304B00_____	5	11	18	15	FKP4U003304B00_____														
470 "	5	11	18	15	FKP4T004704B00_____	5	11	18	15	FKP4U004704B00_____														
680 "	5	11	18	15	FKP4T006804B00_____	5	11	18	15	FKP4U006804B00_____														
1000 pF	5	11	18	15	FKP4T011004B00_____	5	11	18	15	FKP4U011004B00_____														
1500 "	5	11	18	15	FKP4T011504B00_____	6	12.5	18	15	FKP4U011504C00_____														
2200 "	6	12.5	18	15	FKP4T012204C00_____	7	14	18	15	FKP4U012204D00_____														
3300 "	7	14	18	15	FKP4T013304D00_____	9	16	18	15	FKP4U013304J00_____														
4700 "	8	15	18	15	FKP4T014704F00_____	6	15	26.5	22.5	FKP4U013305B00_____														
6800 "	9	16	18	15	FKP4T016804J00_____	7	16.5	26.5	22.5	FKP4U014705D00_____														
	6	15	26.5	22.5	FKP4T016805B00_____	8.5	18.5	26.5	22.5	FKP4U016805F00_____														
0.01 μF	6	15	26.5	22.5	FKP4T021005B00_____	10.5	19	26.5	22.5	FKP4U021005G00_____														
0.015 "	8.5	18.5	26.5	22.5	FKP4T021505F00_____	11	21	26.5	22.5	FKP4U021505I00_____														
0.022 "	10.5	19	26.5	22.5	FKP4T022205H00_____	9	19	31.5	27.5	FKP4U021506A00_____														
	9	19	31.5	27.5	FKP4T022206A00_____	11	21	31.5	27.5	FKP4U022206B00_____														
0.033 "	11	21	31.5	27.5	FKP4T023306B00_____	11	22	41.5	37.5	FKP4U022207B00_____														
						13	24	31.5	27.5	FKP4U023306D00_____														
0.047 "	13	24	31.5	27.5	FKP4T024706D00_____	13	24	41.5	37.5	FKP4U023307C00_____														
						15	26	31.5	27.5	FKP4U024706F00_____														
0.068 "	15	26	31.5	27.5	FKP4T026806F00_____	15	26	41.5	37.5	FKP4U024707D00_____														
						17	34.5	31.5	27.5	FKP4U026806I00_____														
						17	29	41.5	37.5	FKP4U026807E00_____														
0.1 μF	17	34.5	31.5	27.5	FKP4T031006I00_____	19	32	41.5	37.5	FKP4U031007F00_____														
0.15 "	20	39.5	31.5	27.5	FKP4T031506J00_____	24	45.5	41.5	37.5	FKP4U031507H00_____														
	17	29	41.5	37.5	FKP4T031507E00_____	Dims. in mm. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Part number completion:</th> </tr> </thead> <tbody> <tr> <td>Tolerance:</td> <td>20 % = M</td> </tr> <tr> <td></td> <td>10 % = K</td> </tr> <tr> <td></td> <td>5 % = J</td> </tr> <tr> <td>Packing:</td> <td>bulk = S</td> </tr> <tr> <td>Pin length:</td> <td>6-2 = SD</td> </tr> <tr> <td></td> <td>Taped version see page 148.</td> </tr> </tbody> </table>					Part number completion:		Tolerance:	20 % = M		10 % = K		5 % = J	Packing:	bulk = S	Pin length:	6-2 = SD		Taped version see page 148.
Part number completion:																								
Tolerance:	20 % = M																							
	10 % = K																							
	5 % = J																							
Packing:	bulk = S																							
Pin length:	6-2 = SD																							
	Taped version see page 148.																							
0.22 "	19	32	41.5	37.5	FKP4T032207F00_____																			
0.33 "	20	39.5	41.5	37.5	FKP4T033307G00_____																			
0.47 "	24	45.5	41.5	37.5	FKP4T034707H00_____																			

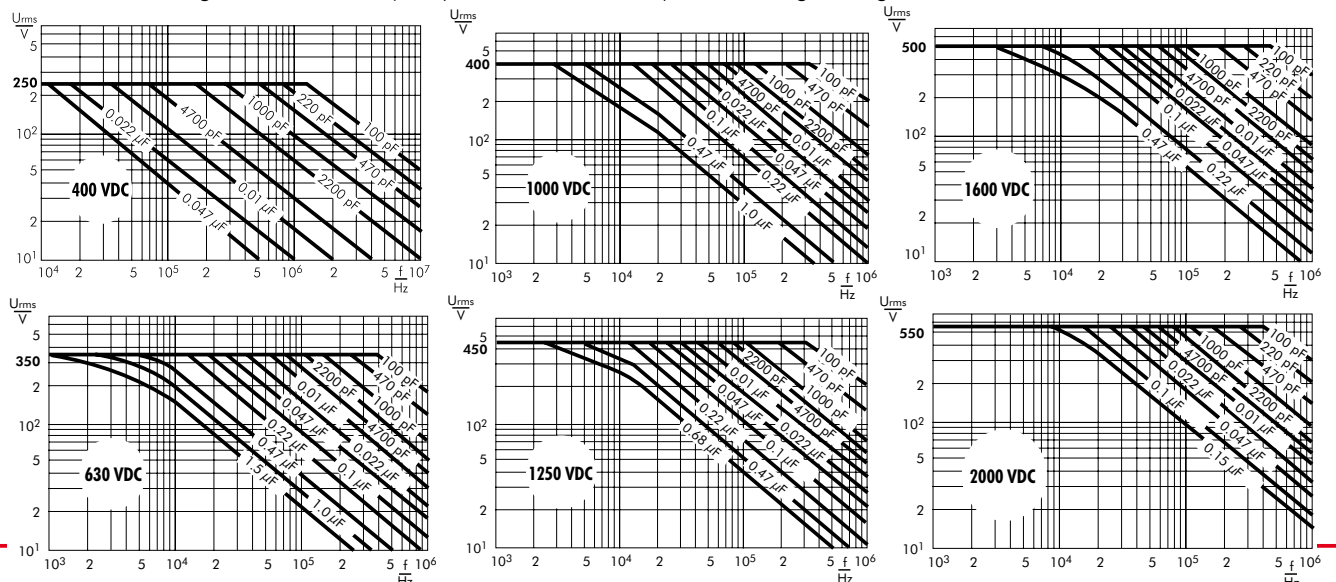
* AC voltage: $f \leq 1000 \text{ Hz}$; $1.4 \times U_{\text{rms}} + U_{\text{DC}} \leq U_r$

** PCM = Printed circuit module = pin spacing

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

Rights reserved to amend design data without prior notification.

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



Polypropylene (PP) Capacitors for Pulse Applications with Metal Foil Electrodes, Schoopage Contacts, Double-Sided Metallization and Self-Healing Internal Series Connection for Highest Current Carrying Capability PCM 15 mm to 37.5 mm

Special Features

- Extremely high pulse duty
- Self-healing
- Internal series connection
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For high pulse and high frequency applications e.g.

- Switch mode power supplies
- Converters in drives and power electronics
- Deflection systems in monitors and TV-sets
- Electronic ballasts

Construction

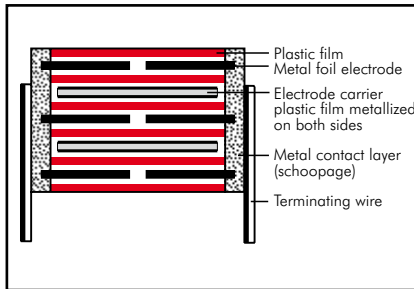
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Aluminium foil and 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: Yellow

Electrical Data

Capacitance range:

100 pF to 0.22 μ F (E12-values on request)

Rated voltages:

400 VDC, 630 VDC, 1000 VDC, 1250 VDC, 1600 VDC, 2000 VDC, 4000 VDC, 6000 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, $\pm 5\%$ (other tolerances are available subject to special enquiry)

Operating temperature range:

-55° C to $+100^{\circ}$ C

Climatic test category:

55/100/56 in accordance with IEC

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

$C \leq 0.1 \mu\text{F}$: $\geq 1 \times 10^5 \text{ M}\Omega$

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

$C > 0.1 \mu\text{F}$: $\geq 30\,000 \text{ sec (M}\Omega \times \mu\text{F)}$

(mean value: 100\,000 sec)

Measuring voltage: 100 V/1 min.

Test voltage:

$2 U_r$, 2 sec / 6 kV: $1.6 U_r$, 2 sec.

Maximum pulse rise time:

Capacitance pF/ μ F	max. pulse rise time V/ μ sec at $T_A < 40^{\circ}$ C							
	400VDC	630VDC	1000VDC	1250VDC	1600VDC	2000VDC	4000VDC	6000VDC
100 ... 220	–	–	–	–	56000	56000	–	–
330 ... 680	–	–	–	–	51000	56000	56000	56000
1000 ... 2200	29000	29000	29000	29000	46000	51000	51000	51000
3300 ... 6800	9000	14000	27000	29000	29000	29000	29000	29000
0.01 ... 0.022	9000	11000	11000	11000	11000	13000	13000	13000
0.033 ... 0.068	9000	11000	11000	11000	11000	11000	–	–
0.1 ... 0.22	7000	11000	11000	11000	11000	–	–	–

for pulses equal to the rated voltage

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^2

in accordance with IEC 60068-2-29

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

at f	$C \leq 0.1 \mu\text{F}$	$0.1 \mu\text{F} < C \leq 0.22 \mu\text{F}$
1 kHz	$\leq 3 \times 10^{-4}$	$\leq 3 \times 10^{-4}$
10 kHz	$\leq 4 \times 10^{-4}$	$\leq 6 \times 10^{-4}$
100 kHz	$\leq 10 \times 10^{-4}$	–

Dielectric absorption:

0.05%

Voltage derating:

A voltage derating factor of 1.35 % per K

must be applied from $+85^{\circ}$ C for DC

voltages and from $+75^{\circ}$ C for AC

voltages

Reliability:

Operational life > 300\,000 hours

Failure rate < 1 fit ($0.5 \times U_r$ and 40° C)

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	400 VDC/250 VAC*					630 VDC/400 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	5	11	18	15	FKP1G011004B00_____	5	11	18	15	FKP1J011004B00_____
1500 "	5	11	18	15	FKP1G011504B00_____	5	11	18	15	FKP1J011504B00_____
2200 "	5	11	18	15	FKP1G012204B00_____	5	11	18	15	FKP1J012204B00_____
3300 "	5	11	18	15	FKP1G013304B00_____	5	11	18	15	FKP1J013304B00_____
4700 "	5	11	18	15	FKP1G014704B00_____	5	11	18	15	FKP1J014704B00_____
6800 "	5	11	18	15	FKP1G016804B00_____	6	12.5	18	15	FKP1J016804C00_____
0.01 µF	5	11	18	15	FKP1G021004B00_____	7	14	18	15	FKP1J021004D00_____
0.015 "	6	12.5	18	15	FKP1G021504C00_____	5	14	26.5	22.5	FKP1J021005A00_____
0.022 "	7	14	18	15	FKP1G022204D00_____	8	15	18	15	FKP1J021504F00_____
0.033 "	5	14	26.5	22.5	FKP1G022205A00_____	6	15	26.5	22.5	FKP1J021505B00_____
0.047 "	8	15	18	15	FKP1G023304F00_____	7	16.5	26.5	22.5	FKP1J022205D00_____
0.068 "	6	15	26.5	22.5	FKP1G023305B00_____	8.5	18.5	26.5	22.5	FKP1J023305F00_____
0.1 µF	7	16.5	26.5	22.5	FKP1G024705D00_____	10.5	20.5	26.5	22.5	FKP1J024705H00_____
0.15 "	8.5	18.5	26.5	22.5	FKP1G026805F00_____	9	19	31.5	27.5	FKP1J024706A00_____
0.22 "	10.5	20.5	26.5	22.5	FKP1G031005H00_____	11	21	31.5	27.5	FKP1J026806B00_____
0.15 "	9	19	31.5	27.5	FKP1G031006A00_____	9	19	41.5	37.5	FKP1J026807A00_____
0.22 "	11	21	31.5	27.5	FKP1G031506B00_____	13	24	31.5	27.5	FKP1J031006D00_____
0.22 "	13	24	31.5	27.5	FKP1G032206D00_____	11	22	41.5	37.5	FKP1J031007B00_____
						13	24	41.5	37.5	FKP1J031507C00_____
						15	26	41.5	37.5	FKP1J032207D00_____
Capacitance	1000 VDC/600 VAC*					1250 VDC/600 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	5	11	18	15	FKP1O111004B00_____	5	11	18	15	FKP1R011004B00_____
1500 "	5	11	18	15	FKP1O111504B00_____	5	11	18	15	FKP1R011504B00_____
2200 "	5	11	18	15	FKP1O112204B00_____	5	11	18	15	FKP1R012204B00_____
3300 "	5	11	18	15	FKP1O113304B00_____	6	12.5	18	15	FKP1R013304C00_____
4700 "	6	12.5	18	15	FKP1O114704C00_____	7	14	18	15	FKP1R014704D00_____
6800 "	7	14	18	15	FKP1O116804D00_____	8	15	18	15	FKP1R016804F00_____
0.01 µF	8	15	18	15	FKP1O121004F00_____	5	14	26.5	22.5	FKP1R016805A00_____
0.015 "	6	15	26.5	22.5	FKP1O121005B00_____	7	16.5	26.5	22.5	FKP1R021005D00_____
0.022 "	6	15	26.5	22.5	FKP1O121505B00_____	8.5	18.5	26.5	22.5	FKP1R021505F00_____
0.033 "	8.5	18.5	26.5	22.5	FKP1O122205F00_____	10.5	20.5	26.5	22.5	FKP1R022205H00_____
0.047 "	10.5	20.5	26.5	22.5	FKP1O123305H00_____	11	21	31.5	27.5	FKP1R023306B00_____
0.068 "	9	19	31.5	27.5	FKP1O123306A00_____	9	19	41.5	37.5	FKP1R023307A00_____
0.1 µF	11	21	31.5	27.5	FKP1O124706B00_____	13	24	31.5	27.5	FKP1R024706D00_____
0.15 "	13	24	31.5	27.5	FKP1O126806D00_____	11	22	41.5	37.5	FKP1R024707B00_____
0.22 "	11	22	41.5	37.5	FKP1O126807B00_____	11	22	41.5	37.5	FKP1R026807B00_____
0.1 µF	13	24	41.5	37.5	FKP1O131007C00_____	15	26	41.5	37.5	FKP1R031007D00_____
0.15 "	15	26	41.5	37.5	FKP1O131507D00_____	17	29	41.5	37.5	FKP1R031507E00_____
0.22 "	19	32	41.5	37.5	FKP1O132207F00_____	19	32	41.5	37.5	FKP1R032207F00_____

* 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:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Continuation

General Data

Capacitance	1600 VDC/650 VAC*					2000 VDC/700 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
100 pF	5	11	18	15	FKP1T001004B00_____	5	11	18	15	FKP1U001004B00_____
150 "	5	11	18	15	FKP1T001504B00_____	5	11	18	15	FKP1U001504B00_____
220 "	5	11	18	15	FKP1T002204B00_____	5	11	18	15	FKP1U002204B00_____
330 "	5	11	18	15	FKP1T003304B00_____	6	12.5	18	15	FKP1U003304C00_____
470 "	5	11	18	15	FKP1T004704B00_____	6	12.5	18	15	FKP1U004704C00_____
680 "	5	11	18	15	FKP1T006804B00_____	6	12.5	18	15	FKP1U006804C00_____
1000 pF	6	12.5	18	15	FKP1T011004C00_____	7	14	18	15	FKP1U011004D00_____
	5	14	26.5	22.5	FKP1T011005A00_____	5	14	26.5	22.5	FKP1U011005A00_____
1500 "	7	14	18	15	FKP1T011504D00_____	6	15	26.5	22.5	FKP1U011505B00_____
	5	14	26.5	22.5	FKP1T011505A00_____					
2200 "	8	15	18	15	FKP1T012204F00_____	7	16.5	26.5	22.5	FKP1U012205D00_____
	5	14	26.5	22.5	FKP1T012205A00_____					
3300 "	6	15	26.5	22.5	FKP1T013305B00_____	7	16.5	26.5	22.5	FKP1U013305D00_____
4700 "	7	16.5	26.5	22.5	FKP1T014705D00_____	8.5	18.5	26.5	22.5	FKP1U014705F00_____
6800 "	8.5	18.5	26.5	22.5	FKP1T016805F00_____	10.5	20.5	26.5	22.5	FKP1U016805H00_____
0.01 µF	10.5	20.5	26.5	27.5	FKP1T021005H00_____	11	21	31.5	27.5	FKP1U021006B00_____
0.015 "	11	21	31.5	27.5	FKP1T021506B00_____	13	24	31.5	27.5	FKP1U021506D00_____
0.022 "	11	21	31.5	27.5	FKP1T022206B00_____	15	26	31.5	27.5	FKP1U022206F00_____
						13	24	41.5	37.5	FKP1U022207C00_____
0.033 "	13	24	31.5	27.5	FKP1T023306D00_____	13	24	41.5	37.5	FKP1U023307C00_____
	13	24	41.5	37.5	FKP1T023307C00_____					
0.047 "	13	24	41.5	37.5	FKP1T024707C00_____	17	29	41.5	37.5	FKP1U024707E00_____
0.068 "	15	26	41.5	37.5	FKP1T026807D00_____	19	32	41.5	37.5	FKP1U026807F00_____
0.1 µF	17	29	41.5	37.5	FKP1T031007E00_____					

* 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.

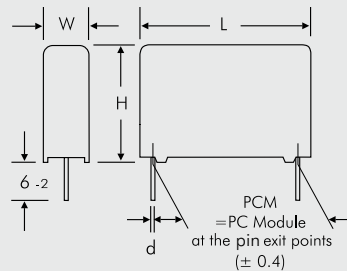
Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S
Pin length: 6-2 = SD

Taped version see page 148.

∅ d	PCM
0.8	15 - 27.5
1.0	37.5



Rights reserved to amend design data without prior notification.

Continuation page 69.

Continuation

General Data

Capacitance	4000 VDC/700 VAC*					6000 VDC/700 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
470 pF	5	14	26.5	22.5	FKP1X004705A00_____	5	14	26.5	22.5	FKP1Y004705A00_____
680 "	5	14	26.5	22.5	FKP1X006805A00_____	5	14	26.5	22.5	FKP1Y006805A00_____
1000 pF	5	14	26.5	22.5	FKP1X011005A00_____	5	14	26.5	22.5	FKP1Y011005A00_____
1500 "	7	16.5	26.5	22.5	FKP1X011505D00_____	7	16.5	26.5	22.5	FKP1Y011505D00_____
2200 "	8.5	18.5	26.5	22.5	FKP1X012205F00_____	10.5	20.5	26.5	22.5	FKP1Y012205H00_____
3300 "	10.5	20.5	26.5	22.5	FKP1X013305H00_____	10.5	20.5	26.5	22.5	FKP1Y013305H00_____
4700 "	11	21	31.5	27.5	FKP1X014706B00_____	11	21	31.5	27.5	FKP1Y014706B00_____
6800 "	13	24	31.5	27.5	FKP1X016806D00_____	13	24	31.5	27.5	FKP1Y016806D00_____
0.01 µF	15	26	31.5	27.5	FKP1X021006F00_____	15	26	31.5	27.5	FKP1Y021006F00_____
0.015 "	13	24	41.5	37.5	FKP1X021507C00_____	13	24	41.5	37.5	FKP1Y021507C00_____
0.022 "	17	29	41.5	37.5	FKP1X022207E00_____	17	29	41.5	37.5	FKP1Y022207E00_____

* 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.

Rights reserved to amend design data without prior notification.

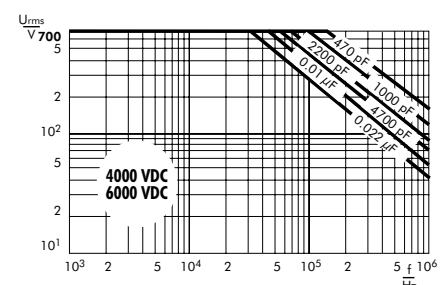
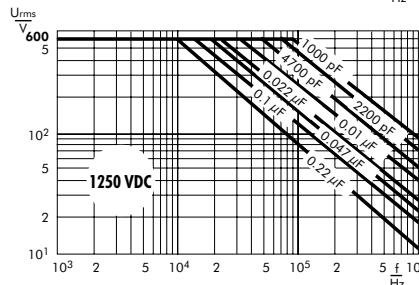
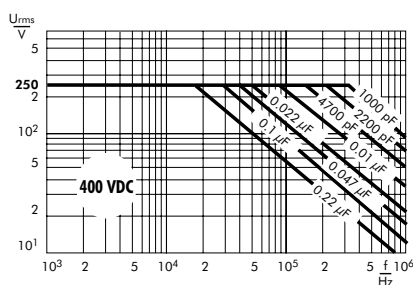
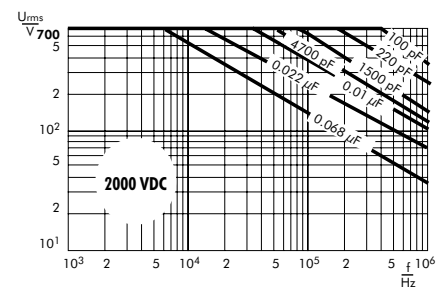
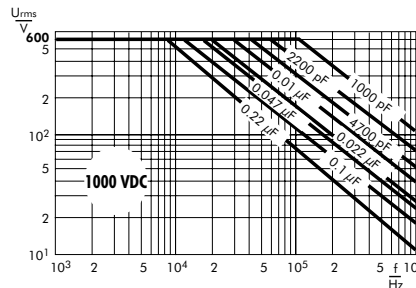
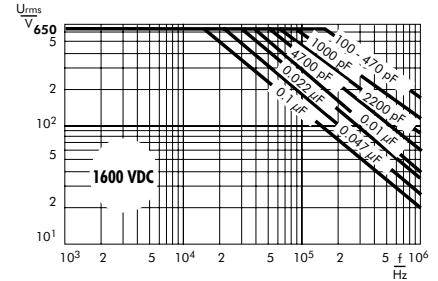
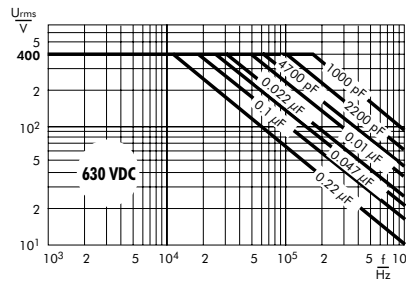
Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J

Packing: bulk = S
Pin length: 6-2 = SD

Taped version see page 148.

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



WIMA Radio Interference Suppression Capacitors for Overvoltage Protection



class X2 and Y2. Based on the dielectric used they are highly cost-effective.

WIMA metallized paper capacitors are neither actively nor passively flammable. The components are resin impregnated under vacuum and encapsulated with self-extinguishing cast resin. Thanks to the good oxidation behaviour of the paper dielectric, they have outstanding self-healing properties even with high energy pulses. The capacitors are specified for temperatures up to 110° C and are available for class X1, X2 and Y2 applications.

Class X capacitors are connected between phase and neutral or phase and phase conductors. Class Y capacitors have an increased degree of electrical and mechanical safety and are connected, for example, between phase conductors and earthed casing, and thus by-pass operating insulation.

WIMA RFI capacitors with metallized paper dielectric are available with capacitances from 1000 pF through 1.0 µF and voltage ratings of 250 VAC, 275 VAC, 300 VAC, 440 VAC and 500 VAC.

The specified rated AC voltage takes into account a rise of the mains voltage of up to 10% above the nominal value, in accordance with IEC 60384-14.

The components are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.

WIMA MKP-X2

WIMA MKP-X2 R

WIMA MKP-Y2

WIMA MP 3-X2

WIMA MP 3-X1

WIMA MP 3-Y2

WIMA MP 3R-Y2

Depending on the application, radio interference suppression capacitors remain on the mains for an uninterrupted period of 10, 20 or more years. They need not only satisfy EMC requirements in suppressing outgoing interference from an application but they also have to protect the application from incoming power surges. Hence careful selection of these components is essential.

The special feature of WIMA Polypropylene RFI capacitors are the high capacitance values at smaller case sizes compared to metallized paper capacitors, being available with capacitances from 1000 pF through 10 µF at AC voltages of 275 VAC, 300 VAC and 400 VAC for



WIMA MKP-X2



Metallized Polypropylene (PP) RFI-Capacitors Class X2 PCM 7.5 mm to 27.5 mm

Special Features

- Reliable self-healing
- High degree of interference suppression due to good attenuation and low ESR
- According to RoHS 2011/65/EC

Typical Applications

Class X2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase and neutral or phase conductors
- Installation category II in accordance with IEC 60664, pulse peak voltage ≤ 2.5 kV

Construction

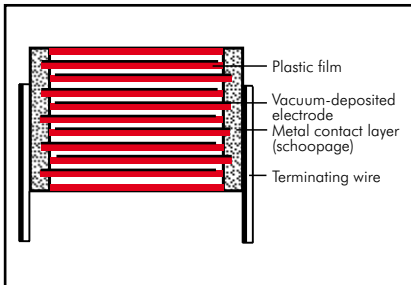
Dielectric:

Polypropylene (PP) 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.

Electrical Data

Capacitance range: 1000 pF to 2.2 μ F

Rated voltage: 275 VAC

Continuous DC voltage* (general guide): ≤ 560 V

Capacitance tolerances: $\pm 20\%$, $\pm 10\%$

Operating temperature range:

-55°C to $+105^\circ\text{C}$

Climatic test category:

55/105/56/B in accordance with IEC

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

$C \leq 0.33 \mu\text{F}$: $\geq 15 \times 10^3 \text{ M}\Omega$

$C > 0.33 \mu\text{F}$: $\geq 5000 \text{ sec (M}\Omega \times \mu\text{F)}$

Measuring voltage: 100 V/1 min.

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	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
10 kHz	$\leq 20 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	-
100 kHz	$\leq 90 \times 10^{-4}$	-	-

Test specifications:

In accordance with IEC 60384-14

Maximum pulse rise time:

100 V/ μsec for pulses equal to a voltage amplitude with $\sqrt{2} \times 275 \text{ VAC} = 390 \text{ V}$ according to IEC 60384-14

Test voltage:

$C \leq 1.0 \mu\text{F}$: 2260 VDC, 2 sec.

$C > 1.0 \mu\text{F}$: 1800 VDC, 2 sec.

Reliability:

Operational life $> 300\,000$ hours

Failure rate < 2 fit ($0.5 \times U_r$ and 40°C)

Approvals:

Country	Authority	Specification	Symbol	Approval-No.
Germany	VDE	IEC 60384-14/3		40003472
USA/Canada	UL	UL 1414 (250 VAC) C 22.2 No. 1 (250 VAC)		E 134915
USA/Canada	UL	UL 1283 (305 VAC) C 22.2 No. 8 (305 VAC)		E 100438

Mechanical Tests

Pull test on pins: 10 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

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.

* 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 $du/dt (F_{\text{max}})$ will be subject to a reduction according to

$$F_{\text{max}} = F_r \times \sqrt{2} \times \text{UAC} / \text{UDC}$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times \text{UAC}$

Continuation

General Data

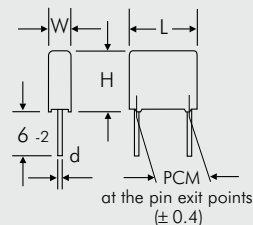
Capacitance	275 VAC*					305 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	9	10	7.5	MKX21W11002C00_____					
1500 "	4	9	10	7.5	MKX21W11502C00_____					
2200 "	4	9	10	7.5	MKX21W12202C00_____					
3300 "	4	9	10	7.5	MKX21W13302C00_____					
4700 "	4	9	10	7.5	MKX21W14702C00_____					
6800 "	4	9	10	7.5	MKX21W16802C00_____					
0.01 µF	4	9	10	7.5	MKX21W21002C00_____					
	5	11	13	10	MKX21W21003F00_____					
0.015 "	4	9	10	7.5	MKX21W21502C00_____	5	11	13	10	MKX2AW21503F00_____
	5	11	13	10	MKX21W21503F00_____					
0.022 "	4	9	10	7.5	MKX21W22202C00_____	5	11	13	10	MKX2AW22203F00_____
	5	11	13	10	MKX21W22203F00_____					
0.033 "	5	10.5	10.3	7.5	MKX21W23302E00_____	5	10.5	10.3	7.5	MKX2AW23302E00_____
	5	11	13	10	MKX21W23303F00_____	5	11	13	10	MKX2AW23303F00_____
0.047 "	5.7	12.5	10.3	7.5	MKX21W24702F00_____	5.7	12.5	10.3	7.5	MKX2AW24702F00_____
	6	12.5	13	10	MKX21W24703H00_____	6	12.5	13	10	MKX2AW24703H00_____
0.068 "	6	12.5	13	10	MKX21W26803H00_____	6	12.5	13	10	MKX2AW26803H00_____
0.1 µF	8	12	13	10	MKX21W31003I00_____	8	12	13	10	MKX2AW31003I00_____
	5	11	18	15	MKX21W31004B00_____	5	11	18	15	MKX2AW31004B00_____
0.15 "	6	12.5	18	15	MKX21W31004C00_____	6	12.5	18	15	MKX2AW31004C00_____
	6	12.5	18	15	MKX21W31504C00_____	6	12.5	18	15	MKX2AW31504C00_____
0.22 "	7	14	18	15	MKX21W31504D00_____	7	14	18	15	MKX2AW31504D00_____
	9	14	18	15	MKX21W32204H00_____	8	15	18	15	MKX2AW32204F00_____
0.33 "	8	15	18	15	MKX21W32204F00_____					
	11	14	18	15	MKX21W33304M00_____	9	16	18	15	MKX2AW33304J00_____
0.47 "	9	16	18	15	MKX21W33304J00_____					
	8.5	18.5	26.5	22.5	MKX21W34705F00_____	8.5	18.5	26.5	22.5	MKX2AW34705F00_____
0.68 "	10.5	19	26.5	22.5	MKX21W34705G00_____	10.5	19	26.5	22.5	MKX2AW34705G00_____
	10.5	19	26.5	22.5	MKX21W36805G00_____	10.5	19	26.5	22.5	MKX2AW36805G00_____
1.0 µF	11	21	26.5	22.5	MKX21W36805I00_____	11	21	26.5	22.5	MKX2AW36805I00_____
	13	24	31.5	27.5	MKX21W41005I00_____	13	24	31.5	27.5	MKX2AW41005I00_____
1.5 "	15	26	31.5	27.5	MKX21W41006D00_____	15	26	31.5	27.5	MKX2AW41006D00_____
2.2 "	17	29	31.5	27.5	MKX21W41506F00_____					
					MKX21W42206G00_____					

* f = 50/60 Hz

** PCM = Printed circuit module = pin spacing

■ Certified for 250 VAC in accordance with UL/CSA.

Dims. in mm.



d = 0.6 ϕ if PCM < 15
d = 0.8 ϕ if PCM \geq 15

Part number completion:

Tolerance: 20 % = M

10 % = K

Packing: bulk = S

Pin length: 6-2 = SD

Taped version see page 148.

Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) RFI-Capacitors Class X2 with Internal Series Connection PCM 15 mm to 48.5 mm

Special Features

- Reliable self-healing
- Increased corona inception level due to internal series connection
- High degree of interference suppression due to good attenuation and low ESR
- According to RoHS 2011/65/EC

Typical Applications

Class X2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase and neutral or phase conductors
- Installation category II in accordance with IEC 60664, pulse peak voltage ≤ 2.5 kV

As capacitor voltage divider in applications requiring a high capacitance stability over time

Construction

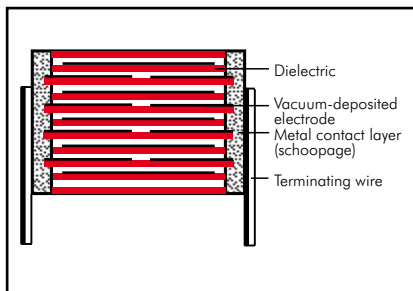
Dielectric:

Polypropylene (PP) 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.

Electrical Data

Capacitance range:

0.033 μ F to 10 μ F

Rated voltage:

400 VAC

Continuous DC voltage* (general guide):

≤ 1000 V

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$ ($\pm 5\%$ available subject to special enquiry)

Operating temperature range:

-55° C to $+105^\circ$ C

Climatic test category:

55/105/56/C in accordance with IEC

Insulation resistance at $+20^\circ$ C:

$C \leq 0.33$ μ F: $\geq 15 \times 10^3$ M Ω

$C > 0.33$ μ F: ≥ 5000 sec (M $\Omega \times \mu$ F)

Measuring voltage: 100 V/1 min.

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

at f	$C \leq 0.1$ μ F	0.1 μ F $< C \leq 1.0$ μ F	$C > 1.0$ μ F
1 kHz	$\leq 8 \times 10^{-4}$	$\leq 8 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
10 kHz	$\leq 12 \times 10^{-4}$	$\leq 12 \times 10^{-4}$	–
100 kHz	$\leq 25 \times 10^{-4}$	–	–

Test specifications:

In accordance with IEC 60384-14

Maximum pulse rise time:

100 V/ μ sec for pulses equal to a voltage amplitude with $\sqrt{2} \times 400$ VAC = 565 V according to IEC 60384-14

Test voltage:

$C \leq 1.0$ μ F: 2260 VDC, 2sec.

$C > 1.0$ μ F: 1800 VDC, 2sec.

Reliability:

Operational life $> 300\,000$ hours

Failure rate < 2 fit ($0.5 \times U_r$ and 40° C)

Mechanical Tests

Pull test on pins:

10 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/sec² in accordance with IEC 60068-2-29

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

$$F_{max.} = F_r \times \sqrt{2} \times UAC / UDC$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times UAC$

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

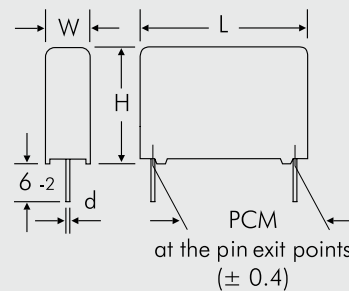
Capacitance	400 VAC*				Part number
	W	H	L	PCM**	
0.033 μ F	5	11	18	15	MKXR3W23304B00_____
0.047 "	5	11	18	15	MKXR3W24704B00_____
0.068 "	6	12.5	18	15	MKXR3W26804C00_____
0.1 μ F	8	15	18	15	MKXR3W31004F00_____
	6	15	26.5	22.5	MKXR3W31005B00_____
0.15 "	9	16	18	15	MKXR3W31504J00_____
	7	16.5	26.5	22.5	MKXR3W31505D00_____
0.22 "	8.5	18.5	26.5	22.5	MKXR3W32205F00_____
0.33 "	10.5	19	26.5	22.5	MKXR3W33305G00_____
0.47 "	11	21	26.5	22.5	MKXR3W34705I00_____
0.68 "	13	24	31.5	27.5	MKXR3W36806D00_____
1.0 μ F	15	26	31.5	27.5	MKXR3W41006F00_____
1.5 "	17	29	31.5	27.5	MKXR3W41506G00_____
2.2 "	20	39.5	31.5	27.5	MKXR3W42206J00_____
3.3 "	20	39.5	41.5	37.5	MKXR3W43307G00_____
4.7 "	24	45.5	41.5	37.5	MKXR3W44707H00_____
6.8 "	31	46	41.5	37.5*	MKXR3W46807ID4_____
10 μ F	33	48	56	48.5*	MKXR3W51008JD4_____

* f = 50/60 Hz

** PCM = Printed circuit module = pin spacing

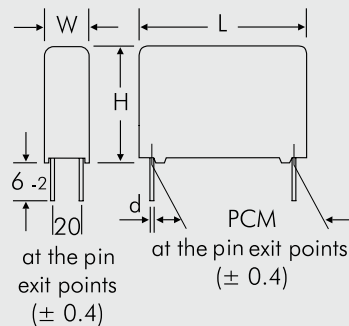
* Values with case size 31 x 46 x 41.5 mm and larger are provided in 4-pin version.

Dims. in mm.



Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

d = 0.8 ϕ if PCM \leq 27.5
d = 1.0 ϕ if PCM \geq 37.5



Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) RFI-Capacitors Class Y2 PCM 10 mm and 15 mm

Special Features

- Reliable self-healing
- High degree of interference suppression due to good attenuation and low ESR
- According to RoHS 2011/65/EC

Typical Applications

Class Y2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase or neutral and earthed casing
- By-passing of the basic or supplementary insulation, pulse peak voltage ≤ 5 kV
- According to cULus also approved for X1 applications

Construction

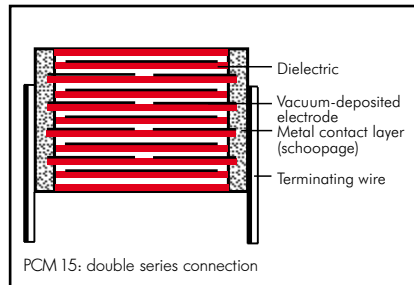
Dielectric:

Polypropylene (PP) 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.

Electrical Data

Capacitance range:

1000 pF to 0.022 μ F

Rated voltage:

300 VAC

Continuous DC voltage* (general guide): ≤ 1000 V

Capacitance tolerances:

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

Operating temperature range:

-55° C to $+105^\circ$ C

Climatic test category:

55/105/56/C in accordance with IEC

Insulation resistance at $+20^\circ$ C:

$\geq 15 \times 10^3$ M Ω

Measuring voltage: 100 V/1 min.

Test specifications:

In accordance with IEC 60384-14

Approvals:

Country	Authority	Specification	Symbol	Approval-No.
Germany	VDE	IEC 60384-14/3		40008997
USA/Canada	UL	UL 1414 (250 VAC) C 22.2 No. 1 (250 VAC)		E 134915

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

at f	$C \leq 0.022 \mu\text{F}$
1 kHz	$\leq 10 \times 10^{-4}$
100 kHz	$\leq 50 \times 10^{-4}$

Maximum pulse rise time:

100 V/ μ sec for pulses equal to a voltage amplitude with $\sqrt{2} \times 300$ VAC = 425 V according to IEC 60384-14

Test voltage:

2700 VDC, 2 sec.

Reliability:

Operational life > 300 000 hours

Failure rate < 2 fit ($0.5 \times U_r$ and 40° C)

Mechanical Tests

Pull test on pins:

10 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/sec² in accordance with IEC 60068-2-29

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

* 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

$$F_{max.} = F_r \times \sqrt{2} \times UAC / UDC$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times UAC$

Continuation

General Data

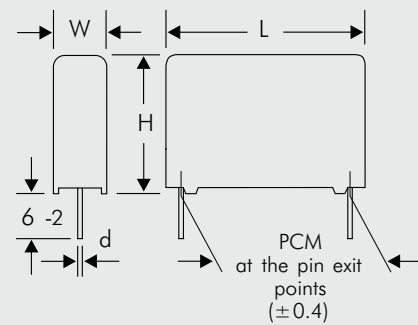
Capacitance	300 VAC*				
	W	H	L	PCM**	Part number
1000 pF	4	9.5	13	10	MKY22W11003D00_
1500 "	4	9.5	13	10	MKY22W11503D00_
2200 "	4	9.5	13	10	MKY22W12203D00_
3300 "	5	11	13	10	MKY22W13303F00_
4700 "	5	11	13	10	MKY22W14703F00_
6800 "	6	12.5	13	10	MKY22W16803H00_
0.01 μF	5	11	18	15	MKY22W21004B00_
0.015 "	6	12.5	18	15	MKY22W21504C00_
0.022 "	7	14	18	15	MKY22W22204D00_

* f = 50/60 Hz

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:	
Tolerance:	20 % = M
	10 % = K
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



d = 0.6 ø if PCM 10
d = 0.8 ø if PCM 15

Rights reserved to amend design data without prior notification.

Metallized Paper (MP) RFI-Capacitors Class X2 PCM 10 mm to 27.5 mm

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/EC

Typical Applications

Class X2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase and neutral or phase and phase conductors
- Installation category II in accordance with IEC 60664, pulse peak voltage ≤ 2.5 kV

Construction

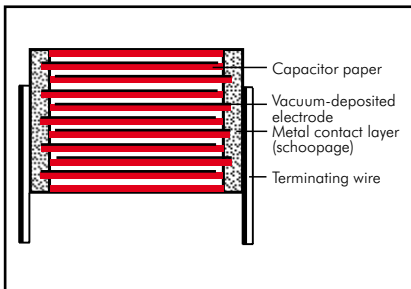
Dielectric:

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 μ F (E12-values on request)

Rated voltages: 250 VAC, 275 VAC

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

Capacitance tolerances: $\pm 20\%$

Operating temperature range:

-40° C to $+110^\circ$ C

Climatic test category:

40/110/56/C in accordance with IEC

Insulation resistance at $+20^\circ$ C:

$C \leq 0.33 \mu\text{F}$: $\geq 12 \times 10^3 \text{ M}\Omega$

$C > 0.33 \mu\text{F}$: $\geq 4000 \text{ sec } (\text{M}\Omega \times \mu\text{F})$

Measuring voltage: 100 V/1 min.

Dissipation factors:

$\tan \delta \leq 13 \times 10^{-3}$ at 1 kHz and $+20^\circ$ C

Test specifications:

In accordance with IEC 60384-14

Approvals:

Country	Authority	Specification	Symbol	Approval-No. 250 VAC	Approval-No. 275 VAC
Germany	VDE	IEC 60384-14/3		89749	89749
USA	UL	UL 1283		E 100438	E 100438
Canada	CSA	C 22.2 No. 8		LR 93312-1	LR 93312-1

Maximum pulse rise time:

Capacitance pF/ μ F	Pulse rise time V/ μ sec max. operation
1000	1100
1500	1100
2200 ... 4700	500
6800 ... 0.022	300
0.033 ... 0.047	200
0.068 ... 1.0	100

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

according to IEC 60384-14

Test voltage: 2700 VDC, 2 sec.

Reliability:

Operational life $> 300\,000$ hours

Failure rate < 1 fit ($0.5 \times U_r$ 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 $du/dt (F_{\text{max}})$ will be subject to a reduction according to

$$F_{\text{max}} = F_r \times \sqrt{2} \times \text{UAC} / \text{UDC}$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times \text{UAC}$

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	MPX20W2168FF00_	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_

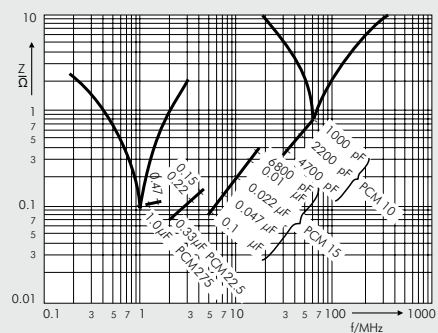
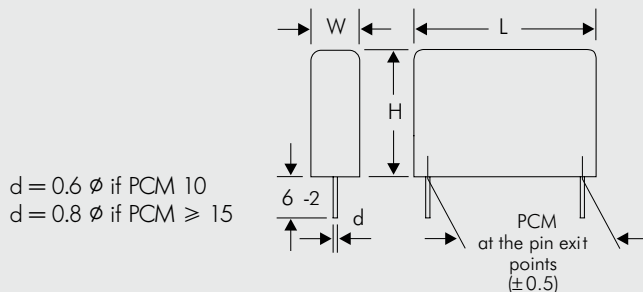
* f = 50/60 Hz

** 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.

Metallized Paper (MP) RFI-Capacitors Class X1 PCM 10 mm to 27.5 mm

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/EC

Typical Applications

Class X1 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase and neutral or phase and phase conductors
- Installation category III in accordance with IEC 60664, pulse peak voltage ≤ 4 kV

Construction

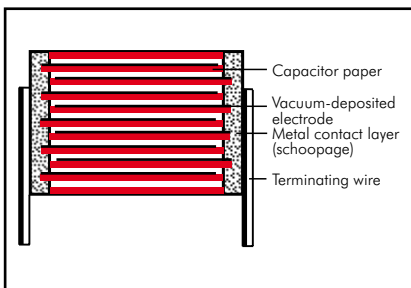
Dielectric:

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 0.22 μ F (E12-values on request)

Rated voltages:

300 VAC, 440 VAC, 500 VAC

Continuous DC voltage* (general guide):

≤ 730 V for 300 VAC

≤ 850 V for 440 VAC and 500 VAC

Capacitance tolerances: $\pm 20\%$

Operating temperature range:

-40° C to $+110^{\circ}$ C

Climatic test category:

40/110/56/C in accordance with IEC

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

$\geq 12 \times 10^3$ M Ω

Measuring voltage:

100 V/1 min. for 300 VAC and 440 VAC

500 V/1 min. for 500 VAC

Dissipation factors:

$\tan \delta \leq 13 \times 10^{-3}$ at 1 kHz and $+20^{\circ}$ C

Approvals:

Country	Authority	Specification	Symbol	Approval-No.
Germany	VDE	IEC 60384-14/3		101355 (440/500 VAC) 89748 (300 VAC)
USA	UL	UL 1283		E 100438 (300 VAC)
Canada	CSA	C 22.2 No. 8		LR 93312-1 (300 VAC)

Test specifications:

In accordance with IEC 60384-14

Maximum pulse rise time:

Capacitance pF/ μ F	Pulse rise time V/ μ sec max. operation
1000 ... 1500	1100
2200 ... 4700	500
6800 ... 0.033	200
0.047 ... 0.22	100

for pulses equal to a voltage amplitude with $\sqrt{2} \times 300$ VAC = 425 V, with $\sqrt{2} \times 440$ VAC = 623 V, with $\sqrt{2} \times 500$ VAC = 707 V according to IEC 60384-14

Test voltage: 3000 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

$$F_{max.} = F_r \times \sqrt{2} \times UAC / UDC$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times UAC$

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.

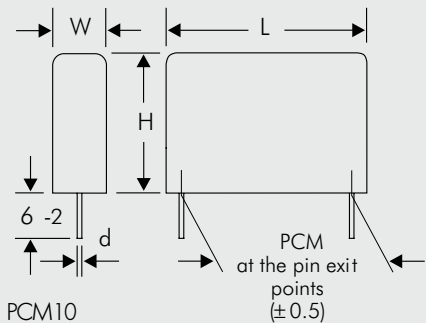
Continuation

General Data

Capacitance	300 VAC*					440 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	4	8.5	13.5	10	MPX12W1100FA00_					
1500 "	4	8.5	13.5	10	MPX12W1150FA00_					
2200 "	4	8.5	13.5	10	MPX12W1220FA00_					
3300 "	4	8.5	13.5	10	MPX12W1330FA00_					
4700 "	5	10	13.5	10	MPX12W1470FB00_					
6800 "	5	13	19	15	MPX12W1680FC00_	5	13	19	15	MPX14W1680FC00_
0.01 µF	5	13	19	15	MPX12W2100FC00_	5	13	19	15	MPX14W2100FC00_
0.015 "	6	14	19	15	MPX12W2150FD00_	6	14	19	15	MPX14W2150FD00_
0.022 "	7	15	19	15	MPX12W2220FE00_	7	15	19	15	MPX14W2220FE00_
0.033 "	8	17	19	15	MPX12W2330FF00_	10	18	19	15	MPX14W2330FG00_
0.047 "	10	18	19	15	MPX12W2470FG00_					
0.068 "	8	20	28	22.5	MPX12W2680FH00_					
0.1 µF	10	22	28	22.5	MPX12W3100FI00_					
0.15 "	12	24	28	22.5	MPX12W3150FJ00_					
0.22 "	13	25	33	27.5	MPX12W3220FK00_					

Capacitance	500 VAC*				
	W	H	L	PCM**	Part number
6800 pF	5	13	19	15	MPX15W1680FC00_
0.01 µF	5	13	19	15	MPX15W2100FC00_
0.015 "	6	14	19	15	MPX15W2150FD00_
0.022 "	7	15	19	15	MPX15W2220FE00_
0.033 "	10	18	19	15	MPX15W2330FG00_

** PCM = Printed circuit module = pin spacing
Upon request with long pins 35-2 mm max.



d = 0.6 φ if PCM10
d = 0.8 φ if PCM ≥ 15

* f = 50/60 Hz

Dims in mm.

Rights reserved to amend design data without prior notification.

Part number completion:
Tolerance: 20 % = M
Packing: bulk = S
Pin length: 6-2 = SD
Taped version see page 148.

Typical Graphs of the Capacitor Paper Dielectric

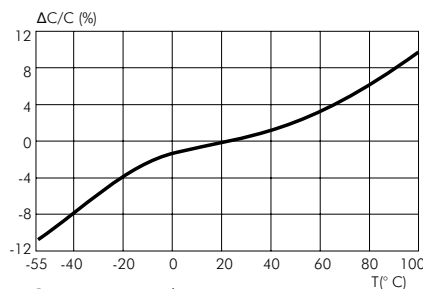
valid for:

MP 3-X2

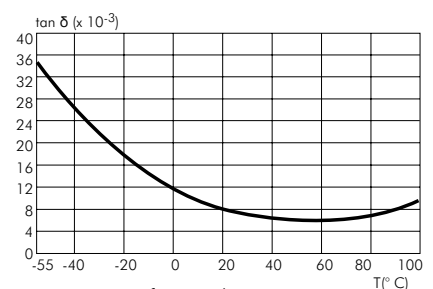
MP 3-X1

MP 3-Y2

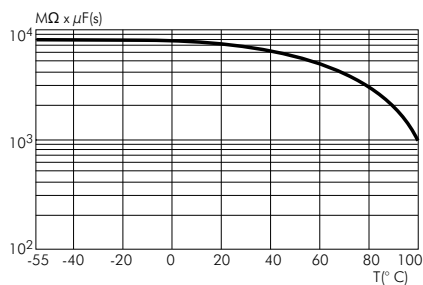
MP 3R-Y2



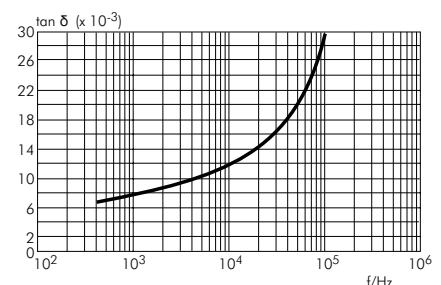
Capacitance change versus temperature (f=1 kHz) (general guide)



Dissipation factor change versus temperature (f=1 kHz) (general guide)



Insulation resistance change versus temperature (general guide)



Dissipation factor change versus frequency (general guide)

Metallized Paper (MP) RFI-Capacitors Class Y2 PCM 10 mm and 15 mm

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/EC

Typical Applications

Class Y2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase or neutral and earthed casing
- By-passing of the basic or supplementary insulation, pulse peak voltage ≤ 5 kV

Construction

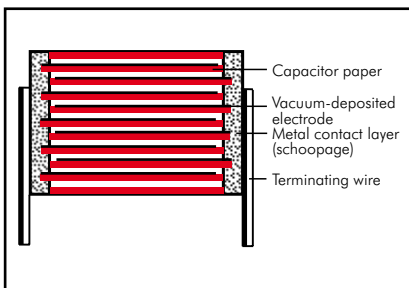
Dielectric:

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 0.022 μ F (E12-values on request)

Rated voltage:

250 VAC

Continuous DC voltage* (general guide):

≤ 1000 V

Capacitance tolerances:

$\pm 20\%$

Operating temperature range:

-40° C to $+110^{\circ}$ C

Climatic test category:

40/110/56/C in accordance with IEC

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

$\geq 12 \times 10^3$ M Ω

Measuring voltage: 100 V/1 min.

Dissipation factors:

$\tan \delta \leq 13 \times 10^{-3}$ at 1 kHz and $+20^{\circ}$ C

Approvals:

Country	Authority	Specification	Symbol	Approval-No.
Germany	VDE	IEC 60384-14/3		87455
USA	UL	UL 1283		E 100438
Canada	CSA	C 22.2 No. 8		LR 93312-1

Test specifications:

In accordance with IEC 60384-14

Maximum pulse rise time:

Capacitance pF/ μ F	Pulse rise time V/ μ sec max. operation
1000	1100
1500	1100
2200 ... 4700	500
6800 ... 0.022	300

for pulses equal to a voltage amplitude with $\sqrt{2} \times 250$ VAC = 355 V

according to IEC 60384-14

Test voltage: 2700 VDC, 2 sec.

Reliability:

Operational life > 300 000 hours

Failure rate < 1 fit ($0.5 \times U_r$ and 40° C)

Mechanical Tests

Pull test on pins:

10 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/sec² in accordance with IEC 60068-2-29

* 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

$$F_{max.} = F_r \times \sqrt{2} \times UAC / UDC$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times UAC$

Packing

Available taped and reeled.

Detailed taping information and graphs at the end of the catalogue.

For further details and graphs please refer to Technical Information.

Capacitance	250 VAC*				Part number
	W	H	L	PCM**	
1000 pF	4	8.5	13.5	10	MPY20W1100FA00_____
1500 „	4	8.5	13.5	10	MPY20W1150FA00_____
2200 „	4	8.5	13.5	10	MPY20W1220FA00_____
3300 „	4	8.5	13.5	10	MPY20W1330FA00_____
4700 „	5	10	13.5	10	MPY20W1470FB00_____
6800 „	5	13	19	15	MPY20W1680FC00_____
0.01 µF	5	13	19	15	MPY20W2100FC00_____
0.015 „	6	14	19	15	MPY20W2150FD00_____
0.022 „	7	15	19	15	MPY20W2220FE00_____

* f = 50/60 Hz

** PCM = Printed circuit module = pin spacing

Upon request with long pins 35-2 mm max.

Dims. in mm.

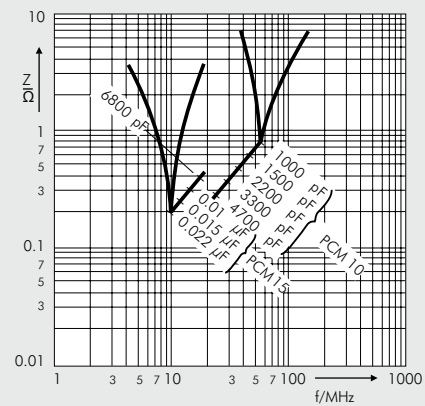
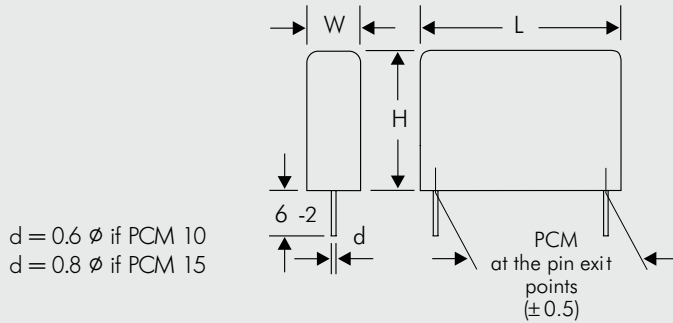
Part number completion:

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.

Metallized Paper (MP) RFI-Capacitors Class Y2 with Internal Series Connection PCM 15 mm to 27.5 mm

Special Features

- Particularly high reliability against active and passive flammability
- Twice the safety by internal series connection
- High degree of interference suppression due to good attenuation and low ESR
- For temperatures up to +110° C
- According to RoHS 2011/65/EC

Typical Applications

Class Y2 RFI applications to meet EMC regulations

- Capacitors connected to the mains between phase or neutral and earthed casing
- By-passing of the basic or supplementary insulation, pulse peak voltage ≤ 5 kV

Construction

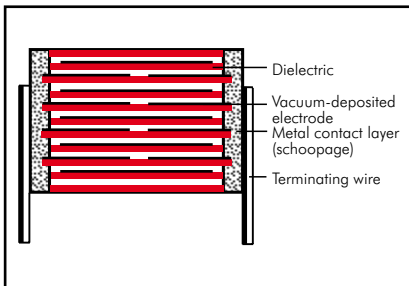
Dielectric:

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 0.1 μ F (E12-values on request)

Rated voltage:

250 VAC, 300 VAC

Continuous DC voltage* (general guide):

≤ 1250 V

Capacitance tolerances:

$\pm 20\%$

Operating temperature range:

-40° C to $+110^{\circ}$ C

Climatic test category:

40/110/56/C according to IEC for 250 VAC

40/110/56/B according to IEC for 300 VAC

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

$\geq 12 \times 10^3$ M Ω

Measuring voltage: 100 V/1 min.

Dissipation factors:

$\tan \delta \leq 13 \times 10^{-3}$ at 1 kHz and $+20^{\circ}$ C

Test specifications:

In accordance with IEC 60384-14

Approvals:

Country	Authority	Specification	Symbol		Approval-No.	
			250 VAC	300 VAC	250 VAC	300 VAC
Germany	VDE	IEC 60384-14/3			91851	40032534
USA	UL	UL 1414 (250 VAC)			E 134915	

Maximum pulse rise time:

Capacitance pF/ μ F	Pulse rise time V/ μ sec max. operation
1000 ... 2200	2000
3300 ... 0.015	1500
0.022 ... 0.1	500

for pulses equal to a voltage amplitude with $\sqrt{2} \times 250$ VAC = 355 V with $\sqrt{2} \times 300$ VAC = 425 V according to IEC 60384-14

Test voltage: 3000 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

$$F_{max.} = F_r \times \sqrt{2} \times UAC / UDC$$

if the DC operating voltage UDC is higher than $\sqrt{2} \times UAC$

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*					300 VAC*				
	W	H	L	PCM**	Part number	W	H	L	PCM**	Part number
1000 pF	5	13	19	15	MPRY0W1100FC00_____	5	13	19	15	MPRY2W1100FC00_____
1500 „	5	13	19	15	MPRY0W1150FC00_____	5	13	19	15	MPRY2W1150FC00_____
2200 „	5	13	19	15	MPRY0W1220FC00_____	5	13	19	15	MPRY2W1220FC00_____
3300 „	5	13	19	15	MPRY0W1330FC00_____	5	13	19	15	MPRY2W1330FC00_____
4700 „	6	14	19	15	MPRY0W1470FD00_____	6	14	19	15	MPRY2W1470FD00_____
6800 „	7	15	19	15	MPRY0W1680FE00_____	7	15	19	15	MPRY2W1680FE00_____
0.01 µF	8	17	19	15	MPRY0W2100FF00_____	8	17	19	15	MPRY2W2100FF00_____
0.015 „	10	18	19	15	MPRY0W2150FG00_____	10	18	19	15	MPRY2W2150FG00_____
0.022 „	8	20	28	22.5	MPRY0W2220FH00_____	8	20	28	22.5	MPRY2W2220FH00_____
0.033 „	8	20	28	22.5	MPRY0W2330FH00_____	8	20	28	22.5	MPRY2W2330FH00_____
0.047 „	10	22	28	22.5	MPRY0W2470FI00_____	10	22	28	22.5	MPRY2W2470FI00_____
0.068 „	12	24	28	22.5	MPRY0W2680FJ00_____	12	24	28	22.5	MPRY2W2680FJ00_____
0.1 µF	13	25	33	27.5	MPRY0W3100FK00_____	13	25	33	27.5	MPRY2W3100FK00_____

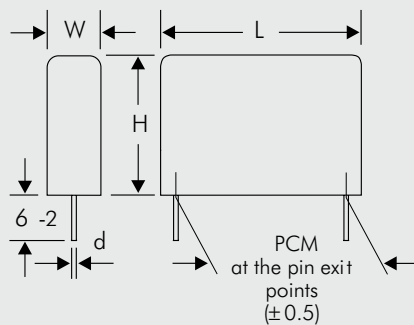
* f = 50/60 Hz

New voltage range

** PCM = Printed circuit module = pin spacing

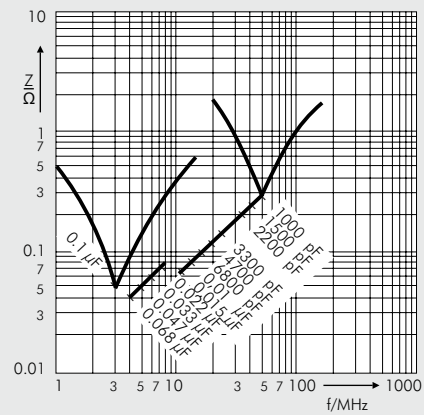
Upon request with long pins 35-2 mm max.

Dims. in mm.



d = 0.8 φ

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.

WIMA Snubber Capacitors with Plates or Lead Terminations for Best Contacts



WIMA Snubber MKP

WIMA Snubber FKP

Development of the WIMA Snubber MKP and WIMA Snubber FKP capacitor series for high power conversion is based on decades of experience with Polypropylene film pulse capacitors.

WIMA Snubber capacitors are available both as double-sided metallized pulse version – WIMA Snubber MKP – and for extremely high pulse ratings in self-healing film/foil technology – WIMA Snubber FKP. Their electrical performance as well as the manifold number of available connecting options makes the WIMA Snubber technology unique:

- Plates soldered directly to the schoopage for safe contacts at high rms currents

- Low inductance construction achieved by end-surface contacts
- High pulse reliability due to double-sided metallization and/or film/foil construction
- High voltage/overvoltage strength by internal series connection with self-healing metallized floating electrode
- Available in various contact configurations
- Solvent-resistant, flame retardant plastic case in accordance with UL 94 V-0
- Production sites ISO 9001:2008 certified

WIMA Snubber capacitors are manufactured under conditions of large volume production, but are also available in small quantities as individually configurable high-rel. components.

WIMA Snubber capacitors are available with capacitances from 0.01 μF through 25 μF and with rated voltages from 250 VDC through 4000 VDC.

All components are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.



Snubber MKP Capacitors for Pulse Applications with Double-Sided Metallized Electrodes, Schoopage Contacts and Internal Series Connection

Special Features

- Pulse duty construction
- Self-healing
- Particularly reliable contact-configurations: 4-pin versions and screwable plate connections
- Internal series connection from 400 VAC
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For high pulse and high frequency applications requiring extremely reliable contacts e.g.

- IGBT-applications

Construction

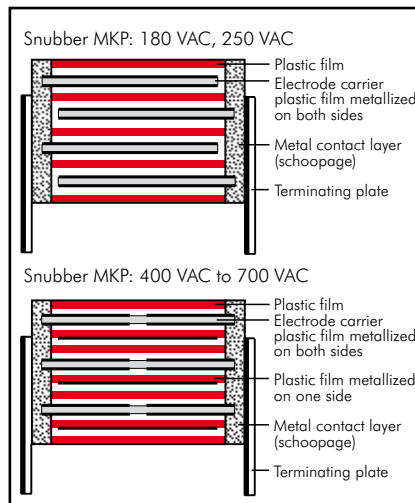
Dielectric:

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 or plates.

Marking:

Colour: Red. Marking: Black.
Epoxy resin seal: Red

Electrical Data

Capacitance range: 0.047 μ F to 25 μ F

Rated voltages:

250 VDC, 400 VDC, 630 VDC, 1000 VDC, 1600 VDC, 2000 VDC, 3000 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, $\pm 5\%$ (other tolerances are available subject to special enquiry)

Operating temperature range:

-55° C to $+100^{\circ}$ C

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

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

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

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

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

Test voltage: 2 sec

L	$\leq 2000 \text{ VDC}$	3000 VDC
≤ 41.5	$1.6 U_N$	$1.2 U_N$
41.5	$1.4 U_N$	$1.2 U_N$
56	$1.2 U_N$	$1.2 U_N$

Climatic test category:

55/100/56 in accordance with IEC

Voltage derating:

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

Reliability:

Operational life $> 300\,000$ hours

Failure rate $< 1 \text{ fit} (0.5 \times U_r \text{ and } 40^{\circ} \text{ C})$

Specific dissipation:

Box size* WxHxL in mm	Specific dissipation in Watts per K above the ambient temperature
19x31x56	0.068
23x34x56	0.079
27x37.5x56	0.092
33x48x56	0.122
37x54x56	0.142

* other box sizes see page 10.

Dissipation factors at $+20^{\circ}$ 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:

Capacitance μF	max. pulse rise time V/ μsec at $T_A < 40^{\circ}$ C						
	250 VDC	400 VDC	630 VDC	1000 VDC	1600 VDC	2000 VDC	3000 VDC
0.047 ... 0.22	500	500	900	1400	1400	1400	1400
0.33 ... 0.68	300	400	700	900	900	900	900
1.0 ... 2.2	200	200	400	400	500	500	500
2.5 ... 6.8	80	100	150	300	400	-	-
7.0 ... 10	50	70	75	-	-	-	-
15 ... 25	35	50	-	-	-	-	-

for pulses equal to the rated voltage

Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors. When fixing the plates the screw torque is to be limited to max. 5 Nm.

For further details and graphs please refer to Technical Information.

Packing

Packing units at the end of the catalogue.

Packing quantities may vary depending on the plate version.

Continuation

General Data

Capacitance	250 VDC/180 VAC*				400 VDC/250 VAC*				630 VDC/400 VAC*			
	W	H	L	Part number	W	H	L	Part number	W	H	L	Part number
0.1 μ F					7	14	18	SNMPG031004D	7	16.5	26.5	SNMPJ031005D
0.15 "					8	15	18	SNMPG031504F	8.5	18.5	26.5	SNMPJ031505F
0.22 "	7	14	18	SNMPF032204D	7	16.5	26.5	SNMPG032205D	10.5	19	26.5	SNMPJ032205G
0.33 "	8	15	18	SNMPF033304F	8.5	18.5	26.5	SNMPG033305F	11	21	26.5	SNMPJ033305I
0.47 "	7	16.5	26.5	SNMPF034705D	10.5	19	26.5	SNMPG034705G	11	21	31.5	SNMPJ034706B
0.68 "	8.5	18.5	26.5	SNMPF036805F	11	21	31.5	SNMPG036806B	15	26	31.5	SNMPJ036806F
									13	24	41.5	SNMPJ036807C
1.0 μ F	11	21	26.5	SNMPF041005I	13	24	31.5	SNMPG041006D	17	29	31.5	SNMPJ041006G
					13	24	41.5	SNMPG041007C	15	26	41.5	SNMPJ041007D
1.5 "	13	24	31.5	SNMPF041506D	17	29	31.5	SNMPG041506G	19	32	41.5	SNMPJ041507F
	11	22	41.5	SNMPF041507B	15	26	41.5	SNMPG041507D				
2.0 "	15	26	31.5	SNMPF042006F	17	29	41.5	SNMPG042007E	20	39.5	41.5	SNMPJ042007G
	13	24	41.5	SNMPF042007C								
2.2 "	15	26	31.5	SNMPF042206F	17	29	41.5	SNMPG042207E	20	39.5	41.5	SNMPJ042207G
	13	24	41.5	SNMPF042207C								
2.5 "	17	29	31.5	SNMPF042506G	19	32	41.5	SNMPG042507F	24	45.5	41.5	SNMPJ042507H
	15	26	41.5	SNMPF042507D								
3.0 "	17	34.5	31.5	SNMPF043006I	20	39.5	41.5	SNMPG043007G	24	45.5	41.5	SNMPJ043007H
	15	26	41.5	SNMPF043007D								
3.3 "	17	34.5	31.5	SNMPF043306I	20	39.5	41.5	SNMPG043307G	24	45.5	41.5	SNMPJ043307H
	15	26	41.5	SNMPF043307D								
4.0 "	19	32	41.5	SNMPF044007F	24	45.5	41.5	SNMPG044007H	31	46	41.5	SNMPJ044007I
4.7 "	19	32	41.5	SNMPF044707F	24	45.5	41.5	SNMPG044707H	31	46	41.5	SNMPJ044707I
5.0 "	20	39.5	41.5	SNMPF045007G	24	45.5	41.5	SNMPG045007H	31	46	41.5	SNMPJ045007I
6.0 "	20	39.5	41.5	SNMPF046007G	31	46	41.5	SNMPG046007I	35	50	41.5	SNMPJ046007J
6.8 "									33	48	56	SNMPJ046008J
									40	55	41.5	SNMPJ046807K
7.0 "	24	45.5	41.5	SNMPF047007H	31	46	41.5	SNMPG047007I	33	48	56	SNMPJ047008J
8.0 "	24	45.5	41.5	SNMPF048007H	33	48	56	SNMPG048008J	37	54	56	SNMPJ048008L
10.0 μ F	31	46	41.5	SNMPF051007I	35	50	41.5	SNMPG051007J				
					33	48	56	SNMPG051008J				
15.0 "	35	50	41.5	SNMPF051507J	40	55	41.5	SNMPG051507K				
	33	48	56	SNMPF051508J	37	54	56	SNMPG051508L				
20.0 "	37	54	56	SNMPF052008L								
25.0 "	37	54	56	SNMPF052508L								

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

New box sizes

Dims in mm.

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

Versions and dimensional drawings see page 93.

Rights reserved to amend design data without prior notification.

Part number completion:

Version codes see page 96.

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

none = 00 (for plate versions)

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Continuation

General Data

Capacitance	1000 VDC/600 VAC*				1600 VDC/650 VAC*			
	W	H	L	Part number	W	H	L	Part number
0.068 μ F	7	16.5	26.5	SNMPO126805D_____	10.5	19	26.5	SNMPT026805G_____
0.1 μ F	8.5	18.5	26.5	SNMPO131005F_____	11	21	26.5	SNMPT031005I_____
0.15 "	11	21	26.5	SNMPO131505I_____	13	24	31.5	SNMPT031506D_____
0.22 "	11	21	31.5	SNMPO132206B_____	11	22	41.5	SNMPT031507B_____
					15	26	31.5	SNMPT032206F_____
					13	24	41.5	SNMPT032207C_____
0.33 "	15	26	31.5	SNMPO133306F_____	17	34.5	31.5	SNMPT033306I_____
					13	24	41.5	SNMPT033307C_____
0.47 "	17	29	31.5	SNMPO134706G_____	15	26	41.5	SNMPT033307D_____
					19	32	41.5	SNMPT034707F_____
0.68 "	15	26	41.5	SNMPO134707D_____	17	29	41.5	SNMPT034707F_____
1.0 μ F	20	39.5	41.5	SNMPO141007G_____	24	45.5	41.5	SNMPT041007H_____
	23	34	56	SNMPO141008E_____				
1.5 "	24	45.5	41.5	SNMPO141507H_____	31	46	41.5	SNMPT041507I_____
	23	34	56	SNMPO141508E_____				
2.0 "	31	46	41.5	SNMPO142007I_____	40	55	41.5	SNMPT042007K_____
	27	37.5	56	SNMPO142008H_____	33	48	56	SNMPT042008J_____
2.2 "	31	46	41.5	SNMPO142207I_____	40	55	41.5	SNMPT042207K_____
	27	37.5	56	SNMPO142208H_____	33	48	56	SNMPT042208J_____
2.5 "	35	50	41.5	SNMPO142507J_____	37	54	56	SNMPT042508L_____
	33	48	56	SNMPO142508J_____				
3.0 "	40	55	41.5	SNMPO143007K_____	37	54	56	SNMPT043008L_____
	33	48	56	SNMPO143008J_____				
3.3 "	40	55	41.5	SNMPO143307K_____				
	33	48	56	SNMPO143308J_____				
4.0 "	37	54	56	SNMPO144008L_____				
4.7 "	37	54	56	SNMPO144708L_____				
5.0 "	37	54	56	SNMPO145008L_____				

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

 New box sizes

Dims. in mm.

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

Versions and dimensional drawings see page 93.

Part number completion:

Version codes see page 96.

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

none = 00 (for plate versions)

Rights reserved to amend design data without prior notification.

Continuation page 89



Continuation

General Data

Capacitance	2000 VDC/700 VAC*				3000 VDC/700 VAC*			
	W	H	L	Part number	W	H	L	Part number
0.047 μ F	10.5	19	26.5	SNMPU024705G	11	21	31.5	SNMPW024706B
0.068 "	11	21	26.5	SNMPU026805I	13	24	31.5	SNMPW026806D
					11	22	41.5	SNMPW026807B
0.1 μ F	13	24	31.5	SNMPU031006D	15	26	31.5	SNMPW031006F
	11	22	41.5	SNMPU031007B	13	24	41.5	SNMPW031007C
0.15 "	15	26	31.5	SNMPU031506F	15	26	41.5	SNMPW031507D
	13	24	41.5	SNMPU031507C				
0.22 "	17	34.5	31.5	SNMPU032206I	19	32	41.5	SNMPW032207F
	15	26	41.5	SNMPU032207D				
0.33 "	19	32	41.5	SNMPU033307F	24	45.5	41.5	SNMPW033307H
					19	31	56	SNMPW033308D
0.47 "	20	39.5	41.5	SNMPU034707G	31	46	41.5	SNMPW034707I
					27	37.5	56	SNMPW034708H
0.68 "	24	45.5	41.5	SNMPU036807H	35	50	41.5	SNMPW036807J
					33	48	56	SNMPW036808J
1.0 μ F	35	50	41.5	SNMPU041007J	40	55	41.5	SNMPW041007K
	33	48	56	SNMPU041008J	33	48	56	SNMPW041008J
1.5 "	40	55	41.5	SNMPU041507K	37	54	56	SNMPW041508L
	33	48	56	SNMPU041508J				
2.0 "	37	54	56	SNMPU042008L				

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

 New box sizes

Dims. in mm.

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

Versions and dimensional drawings see page 93.

Rights reserved to amend design data without prior notification.

Part number completion:

Version codes see page 96.

Tolerance: 20 % = M

10 % = K

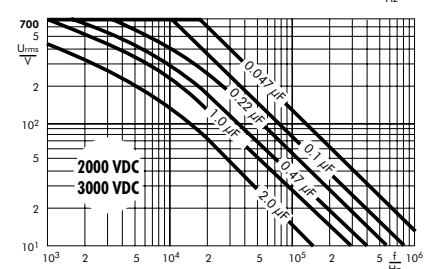
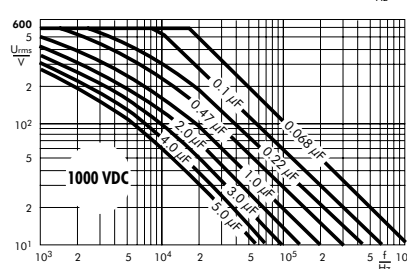
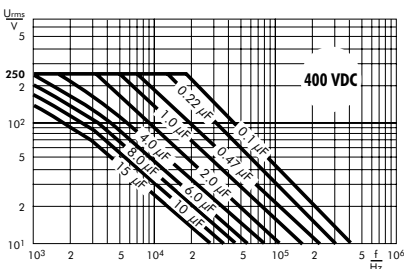
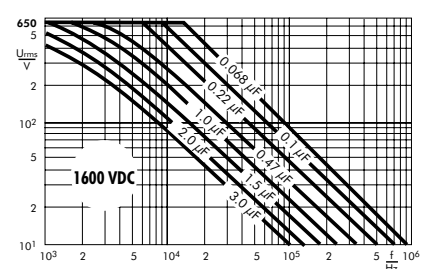
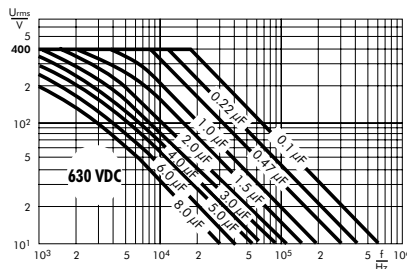
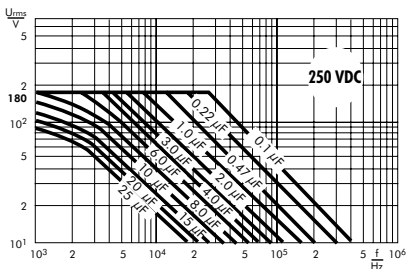
5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

none = 00 (for plate versions)

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



Snubber FKP Capacitors for High Pulse Applications with Metal Foil Electrodes, Schoopage Contacts and Self-Healing Internal Series Connection

Special Features

- High pulse duty
- Self-healing
- Particularly reliable contact-configurations: 4-pin versions and screwable plate connections
- Internal series connection
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For high pulse and high frequency applications requiring extremely reliable contacts e.g.

- IGBT-applications

Construction

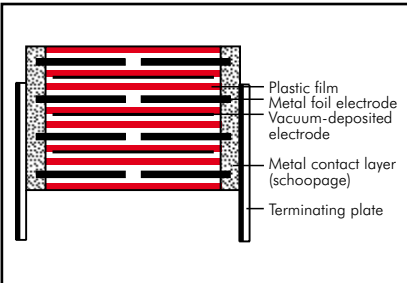
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Aluminium foil and single-sided metallized plastic film

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with epoxy resin seal, UL 94 V-0

Terminations:

Tinned wire or plates.

Marking:

Colour: Red. Marking: Black.
Epoxy resin seal: Red

Electrical Data

Capacitance range: 0.01 μF to 2.2 μF

Rated voltages:

630 VDC, 1000 VDC, 1600 VDC, 2000 VDC, 3000 VDC, 4000 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, $\pm 5\%$ (other tolerances are available subject to special enquiry)

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

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

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

Test voltage: 2 sec

L	$\leq 2000 \text{ VDC}$	$\geq 3000 \text{ VDC}$
≤ 41.5	$1.6 U_N$	$1.2 U_N$
41.5	$1.4 U_N$	$1.2 U_N$
56	$1.2 U_N$	$1.2 U_N$

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:

Capacitance μF	max. pulse rise time V/ μsec at $T_A < 40^\circ\text{C}$					
	630 VDC	1000 VDC	1600 VDC	2000 VDC	3000 VDC	4000 VDC
0.01 ... 0.022	-	11000	11000	11000	11000	11000
0.033 ... 0.068	9000	9000	9000	9000	9000	9000
0.1 ... 0.22	9000	9000	9000	9000	9000	9000
0.33 ... 0.68	5000	5000	5000	5000	5000	5000
1.0 ... 2.2	1600	2000	-	-	-	-

for pulses equal to the rated voltage

Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors. When fixing the plates the screw torque is to be limited to max. 5 Nm.

For further details and graphs please refer to Technical Information.

Climatic test category:

55/100/56 in accordance with IEC

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 $< 1 \text{ fit} (0.5 \times U_r \text{ and } 40^\circ\text{C})$

Specific dissipation:

Box size* WxHxL in mm	Specific dissipation in Watts per K above the ambient temperature
19x31x56	0.068
23x34x56	0.079
27x37.5x56	0.092
33x48x56	0.122
37x54x56	0.142

* other box sizes see page 10.

Packing

Packing units at the end of the catalogue.

Packing quantities may vary depending on the plate version.

Continuation

General Data

Capacitance	630 VDC/400 VAC*				1000 VDC/600VAC*			
	W	H	L	Part number	W	H	L	Part number
0.022 "					7	16.5	26.5	SNFPO122205D_____
0.033 "					8.5	18.5	26.5	SNFPO123305F_____
0.047 "	7	16.5	26.5	SNFPJ024705D_____	10.5	20.5	26.5	SNFPO124705H_____
0.068 "	8.5	18.5	26.5	SNFPJ026805F_____	11	21	31.5	SNFPO126806B_____
0.1 µF	10.5	20.5	26.5	SNFPJ031005H_____	11	22	41.5	SNFPO131007B_____
0.15 "	11	21	26.5	SNFPJ031505I_____	15	26	41.5	SNFPO131507D_____
0.22 "	13	24	31.5	SNFPJ032206D_____	17	29	41.5	SNFPO132207E_____
0.33 "	15	26	31.5	SNFPJ033306F_____	19	32	41.5	SNFPO133307F_____
0.47 "	17	29	41.5	SNFPJ034707E_____	20	39.5	41.5	SNFPO134707G_____
0.68 "	19	32	41.5	SNFPJ036807F_____	24	45.5	41.5	SNFPO136807H_____
					23	34	56	SNFPO136808E_____
1.0 µF	20	39.5	41.5	SNFPJ041007G_____	31	46	41.5	SNFPO141007I_____
1.5 "	24	45.5	41.5	SNFPJ041507H_____	27	37.5	56	SNFPO141008H_____
2.2 "	27	37.5	56	SNFPJ042208H_____				

Capacitance	1600 VDC/650 VAC*				2000 VDC/700 VAC*			
	W	H	L	Part number	W	H	L	Part number
0.01 µF	7	16.5	26.5	SNFPT021005D_____	10.5	20.5	26.5	SNFPU021005H_____
0.015 "	8.5	18.5	26.5	SNFPT021505F_____	11	21	26.5	SNFPU021505I_____
0.022 "	10.5	20.5	26.5	SNFPT022205H_____	11	21	31.5	SNFPU022206B_____
					11	22	41.5	SNFPU022207B_____
0.033 "	11	21	31.5	SNFPT023306B_____	13	24	41.5	SNFPU023307C_____
0.047 "	11	22	41.5	SNFPT024707B_____	15	26	41.5	SNFPU024707D_____
0.068 "	15	26	41.5	SNFPT026807D_____	17	29	41.5	SNFPU026807E_____
0.1 µF	17	29	41.5	SNFPT031007E_____	17	29	41.5	SNFPU031007E_____
0.15 "	19	32	41.5	SNFPT031507F_____	20	39.5	41.5	SNFPU031507G_____
0.22 "	20	39.5	41.5	SNFPT032207G_____	24	45.5	41.5	SNFPU032207H_____
0.33 "	24	45.5	41.5	SNFPT033307H_____	31	46	41.5	SNFPU033307I_____
					27	37.5	56	SNFPU033308H_____
0.47 "	31	46	41.5	SNFPT034707I_____	27	37.5	56	SNFPU034708H_____
	27	37.5	56	SNFPT034708H_____				
0.68 "	27	37.5	56	SNFPT036808H_____				

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

New box sizes

Dims. in mm.

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

Versions and dimensional drawings see page 93.

Rights reserved to amend design data without prior notification.

Part number completion:

Version codes see page 96.

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Pin length: 6-2 = SD

none = 00 (for plate versions)

Continuation page 92

Continuation

General Data

Capacitance	3000 VDC/700 VAC*				4000 VDC/700 VAC*			
	W	H	L	Part number	W	H	L	Part number
0.01 µF	11	21	26.5	SNFPW021005L_____	11	21	31.5	SNFPX021006B_____
0.015 "	11	21	31.5	SNFPW021506B_____	11	22	41.5	SNFPX021507B_____
0.022 "	13	24	31.5	SNFPW022206D_____	13	24	41.5	SNFPX022207C_____
0.033 "	13	24	41.5	SNFPW023307C_____	15	26	41.5	SNFPX023307D_____
0.047 "	15	26	41.5	SNFPW024707D_____	17	29	41.5	SNFPX024707E_____
0.068 "	17	29	41.5	SNFPW026807E_____	19	32	41.5	SNFPX026807F_____
0.1 µF	19	32	41.5	SNFPW031007F_____	20	39.5	41.5	SNFPX031007G_____
0.15 "	20	39.5	41.5	SNFPW031507G_____	24	45.5	41.5	SNFPX031507H_____
0.22 "	24	45.5	41.5	SNFPW032207H_____	31	46	41.5	SNFPX032207I_____
0.33 "	31	46	41.5	SNFPW033307I_____	27	37.5	56	SNFPX032208H_____
	27	37.5	56	SNFPW033308H_____	33	48	56	SNFPX033308J_____
0.47 "	33	48	56	SNFPW034708J_____				

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

 New box sizes

Dims. in mm.

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

Versions and dimensional drawings see page 93.

Rights reserved to amend design data without prior notification.

Part number completion:

Version codes see page 96.

Tolerance: 20 % = M

10 % = K

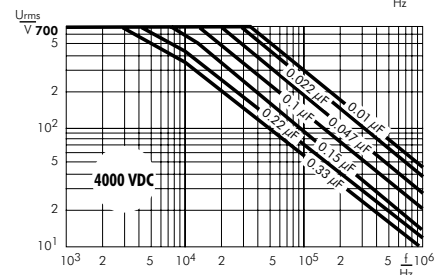
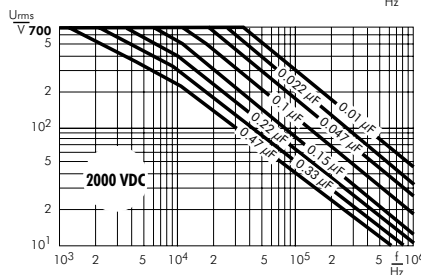
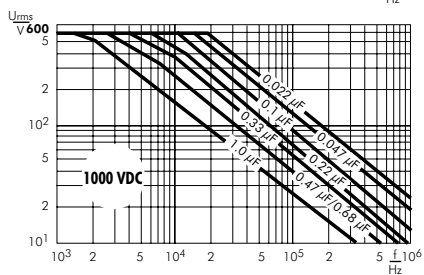
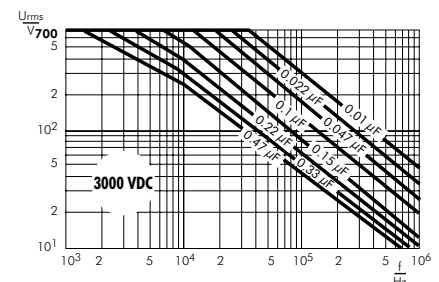
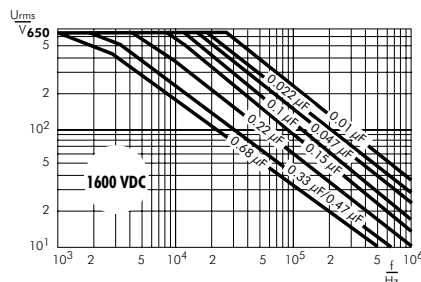
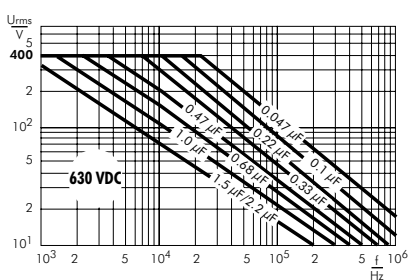
5 % = J

Packing: bulk = S

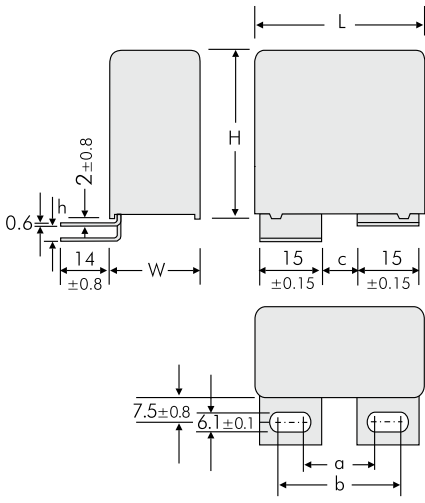
Pin length: 6-2 = SD

none = 00 (for plate versions)

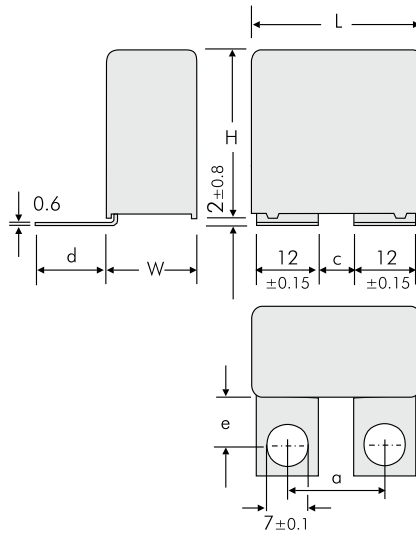
Permissible AC voltage in relation to frequency at 10° C internal temperature rise (general guide).



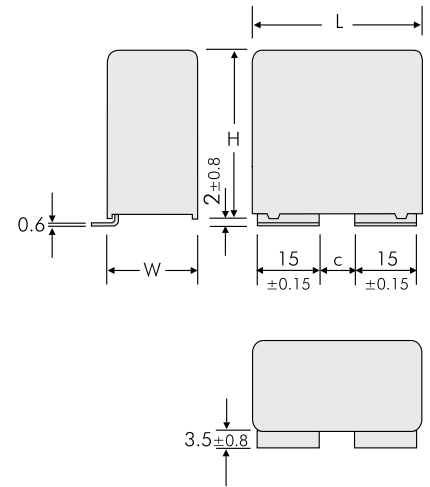
Versions of WIMA Snubber Capacitors



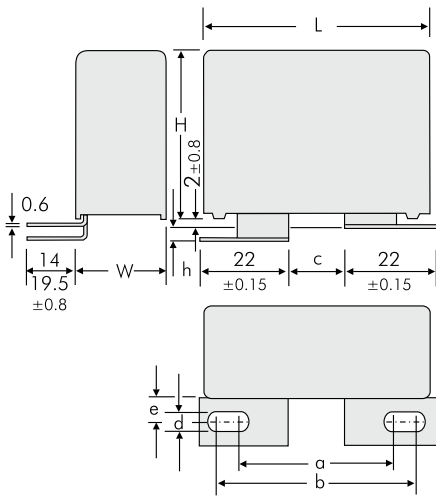
Version	L	a ±0.5	b ±0.5	c ±0.5	h ±0.8
A1	41.5	17.5	27.5	7.5	0
A1.5	41.5	17.5	27.5	7.5	3.5
A1	56	20	30	10	0
A1.1.1	56	28	38	18	0
A1.4	56	20	30	10	3.5
A1.4.1	56	28	38	18	3.5



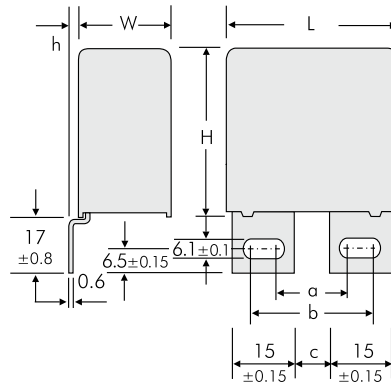
Version	L	a ±0.5	c ±0.5	d ±0.8	e ±0.8
A1.6	41.5	18	6	21.5	16
A1.6.1	41.5	22	10	18.5	13
A1.6	56	29	17	21.5	16



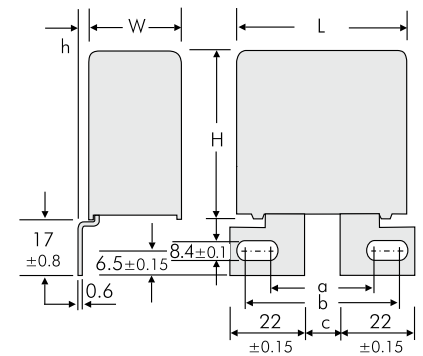
Version	L	c ±0.5
A1.7	41.5	7.5
A1.7	56	10
A1.7.1	56	18



Version	L	a ±0.5	b ±0.5	c ±0.5	d ±0.1	e ±0.8	h ±0.8
A2	41.5	40.5	46.5	14.5	8.4	7.5	0
A2.2	41.5	31	37	5	8.4	7.5	3.5
A2.3	41.5	31	37	5	8.4	13	3.5
A2.4	41.5	33.5	39.5	7.5	8.4	13	3.5
A2.4.1	41.5	33.5	39.5	7.5	8.4	13	0
A2.5	41.5	29.5	39.5	5.5	6.1	7.5	3.5
A2.6	41.5	31.5	41.5	7.5	6.1	13	3.5
A2.6.1	41.5	31.5	41.5	14	6.1	13	3.5
A2.6.2	41.5	31.5	41.5	14	6.1	13	0
A2.8	41.5	40.5	46.5	14.5	8.4	7.5	3.5
A2.1	56	39.5	45.5	13.5	8.4	7.5	0
A2.7	56	39.5	45.5	13.5	8.4	7.5	3.5

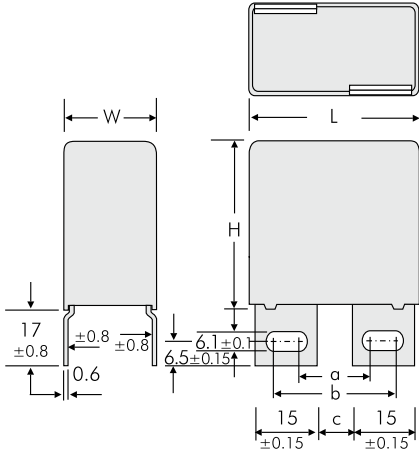


Version	L	a ±0.5	b ±0.5	c ±0.5	h ±0.8
A3	41.5	17.5	27.5	7.5	0
A3.5	41.5	17.5	27.5	7.5	3
A3	56	20	30	10	0
A3.1	56	28	38	18	0
A3.5	56	20	30	10	3
A3.10	56	28	38	18	3

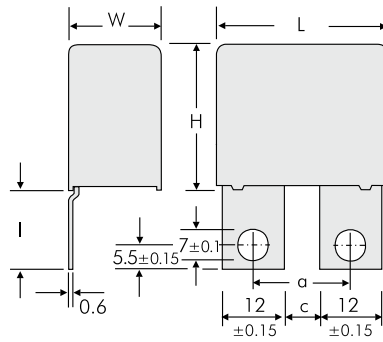


Version	L	a ±0.5	b ±0.5	c ±0.5	h ±0.8
A3.9	41.5	40.5	46.5	14.5	0
A3.11	41.5	40.5	46.5	14.5	3
A3.2	56	40.5	46.5	14.5	0
A3.3	56	40.5	46.5	14.5	3

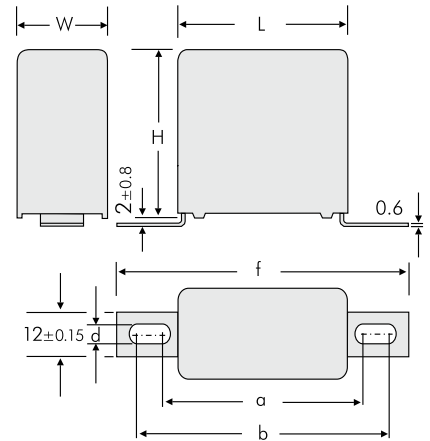
Versions of WIMA Snubber Capacitors



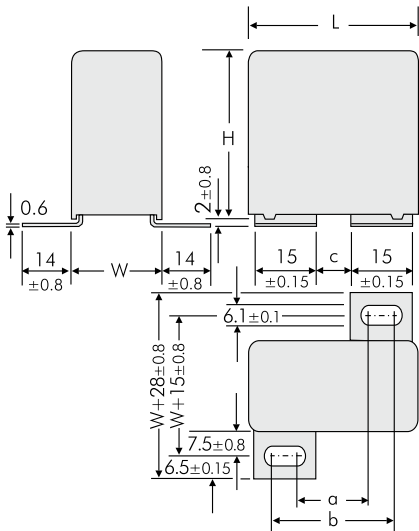
Version	L	a ±0.5	b ±0.5	c ±0.5
A3.6	41.5	17.5	27.5	7.5
A3.7	56	20	30	10



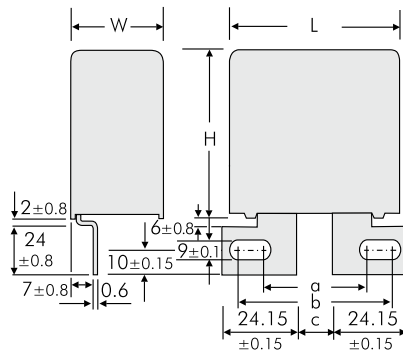
Version	L	a ±0.5	c ±0.5	l ±0.8
A3.8	41.5 W ≥ 17	18	6	23
A3.8.1	41.5 W ≥ 17	22	10	17.5



Version	L	a ±0.8	b ±0.8	f ±0.8	d ±0.1
A4.9	31.5 W ≥ 15	44	47	57	4.5
A4.10	31.5 W ≥ 15	43	59	69	6.1
A4.2	41.5 W ≥ 15	54	57	67	4.5
A4	41.5 W ≥ 15	53	69	79	6.1
A4.7	56	65	68	78	4.5
A4	56	64	80	90	6.1



Version	L	a ±0.5	b ±0.5	c ±0.5
A5	41.5	17.5	27.5	7.5
A5	56	20	30	10

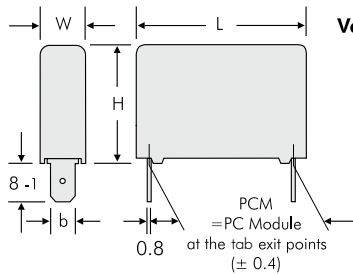


Version	L	a ±0.5	b ±0.5	c ±0.5
A6	56 W ≥ 23	41.5	45.5	15.5

Versions of WIMA Snubber Capacitors

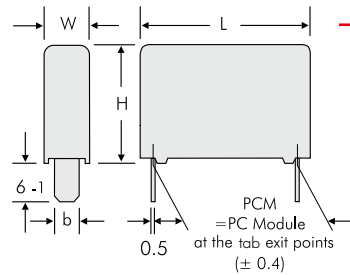


Version FS 6.3
with slip-on terminals according to DIN 46244



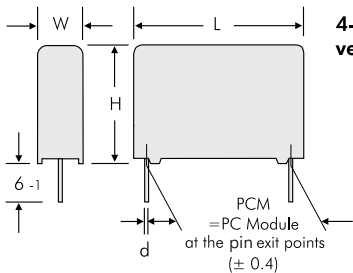
L	W	PCM	b ±0.15
26.5	≥ 11	23.5	6.3
31.5	≥ 11	28.5	6.3
41.5	≥ 11	38.5	6.3
56	≥ 11	49.5	6.3

Version B



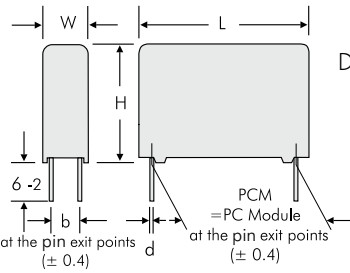
L	PCM	b ±0.15
18	16	5
26.5	23.5	5
31.5	28.5	8
41.5	38.5	8
56	49.5	8

2-pin version



PCM	d
15	0.8
22.5	0.8
27.5	0.8
37.5	1.2
48.5	1.2

4-pin version



W	H	L	PCM	b	d
10.5	19	26.5	22.5	5	0.8
10.5	20.5	26.5	22.5	5	0.8
11	21	26.5	22.5	5	0.8
11	21	31.5	27.5	5	0.8
13	24	31.5	27.5	7.5	0.8
15	26	31.5	27.5	7.5	0.8
17	29	31.5	27.5	10	0.8
19	30	31.5	27.5	10	0.8
17	34.5	31.5	27.5	10	0.8
20	39.5	31.5	27.5	12.5	0.8
22	43.5	31.5	27.5	12.5	0.8
11	22	41.5	37.5	5	1
13	24	41.5	37.5	7.5	1
15	26	41.5	37.5	7.5	1
17	29	41.5	37.5	10	1
19	32	41.5	37.5	10	1
20	39.5	41.5	37.5	12.5	1
24	45.5	41.5	37.5	12.5	1
31	46	41.5	37.5	20	1
19	31	56	48.5	12.5	1
23	34	56	48.5	15	1
27	37.5	56	48.5	15	1
33	48	56	48.5	20	1
37	54	56	48.5	20	1

Dims. in mm.

Additional special versions can be realized. Please contact us with your specific needs.

Versions of WIMA Snubber Capacitors



Version code		D2	D4	B5	B8	1A	1B	1F	1G	1H	1I	1J	1K	1L	2A	2B	2C	2D	2E	2F	2H	2I	2J	2K	2L	2M	3A	3C	3D	3E	3G	3I	3J	3K	3L	3N	3O	3P		
W x H x L	Size code	2-pin	4-pin	B5	B8	A1	A1.1	A1.4	A1.4.1	A1.5	A1.6	A1.6.1	A1.7	A1.7.1	A2	A2.1	A2.2	A2.3	A2.4	A2.4.1	A2.5	A2.6	A2.6.1	A2.6.2	A2.7	A2.8	A3	A3.1	A3.2	A3.3	A3.5	A3.6	A3.7	A3.8	A3.8.1	A3.9	A3.10	A3.11		
7 x 14 x 18	4D																																							
8 x 15 x 18	4F																																							
7 x 16.5 x 26.5	5D																																							
8.5 x 18.5 x 26.5	5F																																							
10.5 x 19 x 26.5	5G																																							
10.5 x 20.5 x 26.5	5H																																							
11 x 21 x 26.5	5I																																							
11 x 21 x 31.5	6B																																							
13 x 24 x 31.5	6D																																							
15 x 26 x 31.5	6F																																							
17 x 29 x 31.5	6G																																							
17 x 34.5 x 31.5	6I																																							
19 x 30 x 31.5	6L																																							
11 x 22 x 41.5	7B																																							
13 x 24 x 41.5	7C																																							
15 x 26 x 41.5	7D																																							
17 x 29 x 41.5	7E																																							
19 x 32 x 41.5	7F																																							
20 x 39.5 x 41.5	7G																																							
24 x 45.5 x 41.5	7H																																							
31 x 46 x 41.5	7I																																							
35 x 50 x 41.5	7J																																							
40 x 55 x 41.5	7K																																							
19 x 31 x 56	8D																																							
23 x 34 x 56	8E																																							
27 x 37.5 x 56	8H																																							
33 x 48 x 56	8J																																							
37 x 54 x 56	8L																																							

Version code		4A	4C	4J	4L	4M	5A	6A	FS
W x H x L	Size code	A4	A4.2	A4.7	A4.9	A4.10	A5	A6	FS 6.3
11 x 21 x 26.5	5I								
11 x 21 x 31.5	6B								
13 x 24 x 31.5	6D								
15 x 26 x 31.5	6F								
17 x 29 x 31.5	6G								
17 x 34.5 x 31.5	6I								
19 x 30 x 31.5	6L								
11 x 22 x 41.5	7B								
13 x 24 x 41.5	7C								
15 x 26 x 41.5	7D								
17 x 29 x 41.5	7E								
19 x 32 x 41.5	7F								
20 x 39.5 x 41.5	7G								
24 x 45.5 x 41.5	7H								
31 x 46 x 41.5	7I								
19 x 31 x 56	8D								
23 x 34 x 56	8E								
27 x 37.5 x 56	8H								
33 x 48 x 56	8J								
37 x 54 x 56	8L								

Possible connecting respective plate versions - depending on box size.

WIMA GTO Capacitors with Screw Connection for High Current Carrying Capability



- High rms current carrying capability
- Very low dissipation factor
- Negative capacitance change versus temperature
- Excellent self-healing properties
- Outstanding mechanical stability
- High shock and vibration resistance
- Solvent-resistant, flame-retardant plastic case in accordance with UL 94 V-0
- Almost unlimited life expectancy

Fields of applications are designs where high current and voltage carrying capabilities are required, e.g. converter equipment in power generation or in traction technology for train drives, hoists, crane drives etc.

WIMA GTO MKP capacitors are available with capacitances from 1.0 μF through 100 μF and with nominal voltages from 400 VDC through 2000 VDC. For mounting purposes M6 and M8 threaded terminations are possible. Customer-specific requirements can be realized on demand.

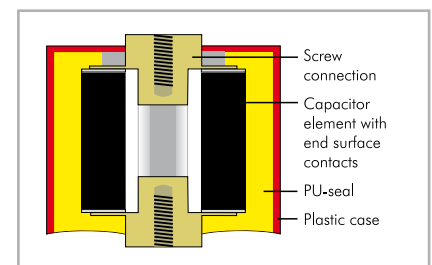
All components are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.

WIMA GTO MKP

WIMA GTO MKP capacitors are especially designed to attenuate voltage spikes on GTO (Gate-Turn-Off) Thyristors and IGBT (Insulated Gate Bipolar Transistor). They are manufactured in dry-type technology with double-sided metallized electrodes and encapsulated in a cylindrical plastic case sealed with self-extinguishing polyurethane resin.

Their construction principle combined with the Polypropylene dielectric used creates outstanding features, e.g.:

- Very low self-inductance
- High pulse reliability



GTO MKP Capacitors for Pulse Applications with Internal Series Connection

Special Features

- Pulse duty construction
- Self-healing
- Cylindrical capacitor body with axial screw and thread connections size M6 or M8
- Internal series connection from 400 VAC
- Very low dissipation factor
- Negative capacitance change versus temperature
- According to RoHS 2011/65/EC

Typical Applications

For high pulse and high frequency applications requiring extremely reliable contacts e.g.

- Damping of voltage spikes on GTO-Thyristors

Construction

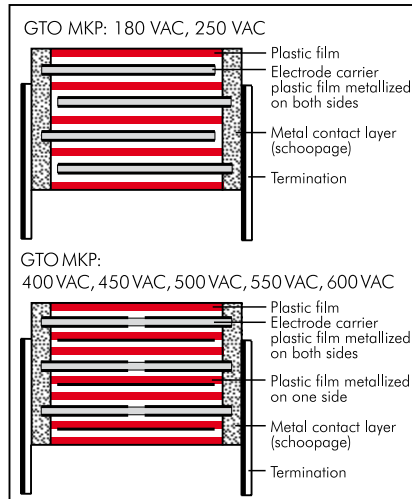
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Double-sided metallized plastic film

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with PU seal, UL 94 V-0

Terminations:

Axial screw connection M6 or M8.

Marking:

Colour: Red. Marking: Black on Silver.

Electrical Data

Capacitance range:

1.0 μF to 100 μF

Rated voltages:

400 VDC, 600 VDC, 850 VDC, 1000 VDC, 1200 VDC, 1500 VDC, 2000 VDC

Capacitance tolerances:

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

Operating temperature range:

-55°C to $+85^\circ\text{C}$

Climatic test category:

55/085/56 in accordance with IEC

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

$\geq 10000 \text{ sec (M}\Omega \times \mu\text{F)}$

(mean value: 50000 sec)

Measuring voltage: 100 V/1 min.

Test voltage: $1.2 U_r$, 2 sec.

Dielectric absorption:

0.05%

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

at f	$C \leq 20 \mu\text{F}$	$20 \mu\text{F} < C \leq 50 \mu\text{F}$	$C > 50 \mu\text{F}$
1 kHz	$\leq 3 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	$\leq 8 \times 10^{-4}$

Voltage derating:

A voltage derating factor of 1.35 % per K must be applied from $+65^\circ\text{C}$ for DC voltages and from $+60^\circ\text{C}$ for AC voltages.

Reliability:

Operational life > 300000 hours

Failure rate $< 1 \text{ fit (} 0.5 \times U_r \text{ and } 40^\circ\text{C)}$

Specific dissipation:

Box size W x L in mm	Specific dissipation in Watts per K above the ambient temperature
60x49	0.186
70x49	0.231
80x49	0.280
90x49	0.333
90x58	0.364
90x97	0.501

Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors. When fixing the capacitor the screw torque is to be limited to max. 5 Nm.

For further details and graphs please refer to Technical Information.

Packing

Transportation-safe packing in cardboard boxes.

Packing units

W	pcs. per packing unit
60	12
70	8
80	6
90	6

Continuation

General Data

Capacitance	400 VDC/180 VAC*				600 VDC/250 VAC*			
	W x L mm	du/dt V/μsec	I _{max.} A	Part number	W x L mm	du/dt V/μsec	I _{max.} A	Part number
3.5 μF					60 x 49	200	770	GTOMI04350GA00_
4 "					60 x 49	200	890	GTOMI04400GA00_
4.5 "					60 x 49	200	990	GTOMI04450GA00_
5 "					60 x 49	180	1090	GTOMI04500GA00_
6 "					60 x 49	180	1310	GTOMI04600GA00_
8 "					60 x 49	80	610	GTOMI04800GA00_
10 μF					60 x 49	80	780	GTOMI05100GA00_
15 "	60 x 49	50	790	GTOMG05150GA00_	60 x 49	80	1150	GTOMI05150GA00_
20 "	60 x 49	50	1050	GTOMG05200GA00_	70 x 49	80	1540	GTOMI05200GB00_
25 "	60 x 49	50	1330	GTOMG05250GA00_	70 x 49	80	1940	GTOMI05250GB00_
30 "	60 x 49	50	1610	GTOMG05300GA00_	80 x 49	80	2340	GTOMI05300GC00_
40 "	70 x 49	50	2090	GTOMG05400GB00_	90 x 49	80	3080	GTOMI05400GD00_
50 "	80 x 49	50	2680	GTOMG05500GC00_	90 x 58	60	3050	GTOMI05500GE00_
60 "	80 x 49	50	3240	GTOMG05600GC00_	90 x 97	35	2140	GTOMI05600GF00_
70 "	90 x 49	50	3630	GTOMG05700GD00_	90 x 97	35	2520	GTOMI05700GF00_
80 "	90 x 49	50	4100	GTOMG05800GD00_	90 x 97	35	2810	GTOMI05800GF00_
90 "	90 x 58	40	3800	GTOMG05900GE00_	90 x 97	35	3200	GTOMI05900GF00_
100 μF	90 x 58	40	4300	GTOMG06100GE00_	90 x 97	35	3550	GTOMI06100GF00_

Capacitance	850 VDC/400 VAC*				1000 VDC/450 VAC*			
	W x L mm	du/dt V/μsec	I _{max.} A	Part number	W x L mm	du/dt V/μsec	I _{max.} A	Part number
3 μF	60 x 49	200	770	GTOMM04300GA00_	60 x 49	260	790	GTOMO14300GA00_
3.5 "	60 x 49	200	770	GTOMM04350GA00_	60 x 49	260	910	GTOMO14350GA00_
4 "	60 x 49	200	890	GTOMM04400GA00_	60 x 49	260	1050	GTOMO14400GA00_
4.5 "	60 x 49	200	990	GTOMM04450GA00_	60 x 49	260	1170	GTOMO14450GA00_
5 "	60 x 49	200	1090	GTOMM04500GA00_	60 x 49	260	1310	GTOMO14500GA00_
6 "	60 x 49	200	1310	GTOMM04600GA00_	60 x 49	260	1550	GTOMO14600GA00_
8 "	60 x 49	200	1740	GTOMM04800GA00_	70 x 49	260	2080	GTOMO14800GB00_
10 μF	70 x 49	200	2190	GTOMM05100GB00_	70 x 49	260	2600	GTOMO15100GB00_
15 "	70 x 49	200	3230	GTOMM05150GB00_	90 x 49	260	3920	GTOMO15150GD00_
20 "	80 x 49	200	4310	GTOMM05200GC00_	90 x 58	200	4300	GTOMO15200GE00_
25 "	90 x 49	200	5390	GTOMM05250GD00_	90 x 97	120	3050	GTOMO15250GF00_
30 "	90 x 58	160	4800	GTOMM05300GE00_	90 x 97	120	3580	GTOMO15300GF00_
40 "	90 x 97	100	3780	GTOMM05400GF00_	90 x 97	120	4770	GTOMO15400GF00_
50 "	90 x 97	100	4790	GTOMM05500GF00_				
60 "	90 x 97	100	5800	GTOMM05600GF00_				

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

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

Part number completion:

Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: none = 00

Rights reserved to amend design data without prior notification.

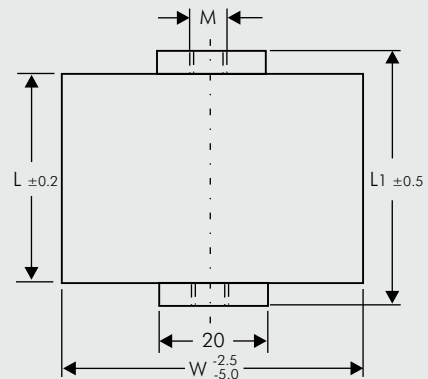
Continuation page 100

Continuation

General Data

Capacitance	1200 VDC/500 VAC*				1500 VDC/550 VAC*			
	W x L mm	du/dt V/μsec	I _{max.} A	Part number	W x L mm	du/dt V/μsec	I _{max.} A	Part number
1 μF					60 x 49	400	420	GTOMS04100GA00
1.5 "					60 x 49	400	590	GTOMS04150GA00
2 "					60 x 49	400	820	GTOMS04200GA00
2.5 "	60 x 49	300	770	GTOMQ04250GA00	60 x 49	400	1010	GTOMS04250GA00
3 "	60 x 49	300	950	GTOMQ04300GA00	60 x 49	400	1220	GTOMS04300GA00
3.5 "	60 x 49	300	1070	GTOMQ04350GA00	60 x 49	400	1400	GTOMS04350GA00
4 "	60 x 49	300	1230	GTOMQ04400GA00	70 x 49	400	1630	GTOMS04400GB00
4.5 "	60 x 49	300	1380	GTOMQ04450GA00	70 x 49	400	1800	GTOMS04450GB00
5 "	60 x 49	300	1570	GTOMQ04500GA00	70 x 49	400	2010	GTOMS04500GB00
6 "	70 x 49	300	1840	GTOMQ04600GB00	80 x 49	400	2390	GTOMS04600GC00
8 "	70 x 49	300	2470	GTOMQ04800GB00	90 x 49	400	3210	GTOMS04800GD00
10 μF	80 x 49	300	3080	GTOMQ05100GC00	90 x 58	320	3210	GTOMS05100GE00
15 "	90 x 58	230	3550	GTOMQ05150GE00	90 x 97	180	2690	GTOMS05150GF00
20 "	90 x 97	130	2690	GTOMQ05200GF00	90 x 97	180	3600	GTOMS05200GF00
25 "	90 x 97	130	3370	GTOMQ05250GF00				
30 "	90 x 97	130	4110	GTOMQ05300GF00				

Capacitance	2000 VDC/600 VAC*			
	W x L mm	du/dt V/μsec	I _{max.} A	Part number
1 μF	60 x 49	500	500	GTOMU04100GA00
1.5 "	60 x 49	500	750	GTOMU04150GA00
2 "	70 x 49	500	1000	GTOMU04200GB00
2.5 "	70 x 49	500	1250	GTOMU04250GB00
3 "	80 x 49	500	1500	GTOMU04300GC00
3.5 "	80 x 49	500	1750	GTOMU04350GC00
4 "	90 x 49	500	2000	GTOMU04400GD00
4.5 "	90 x 49	500	2250	GTOMU04450GD00
5 "	90 x 58	500	2500	GTOMU04500GE00
6 "	90 x 58	450	2700	GTOMU04600GE00
8 "	90 x 97	400	3200	GTOMU04800GF00
10 μF	90 x 97	300	3000	GTOMU05100GF00



W	L	L1	M
60	49	55	M6
70	49	55	M6
80	49	55	M8
90	49	55	M8
90	58	64	M8
90	97	103	M8

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

New range

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

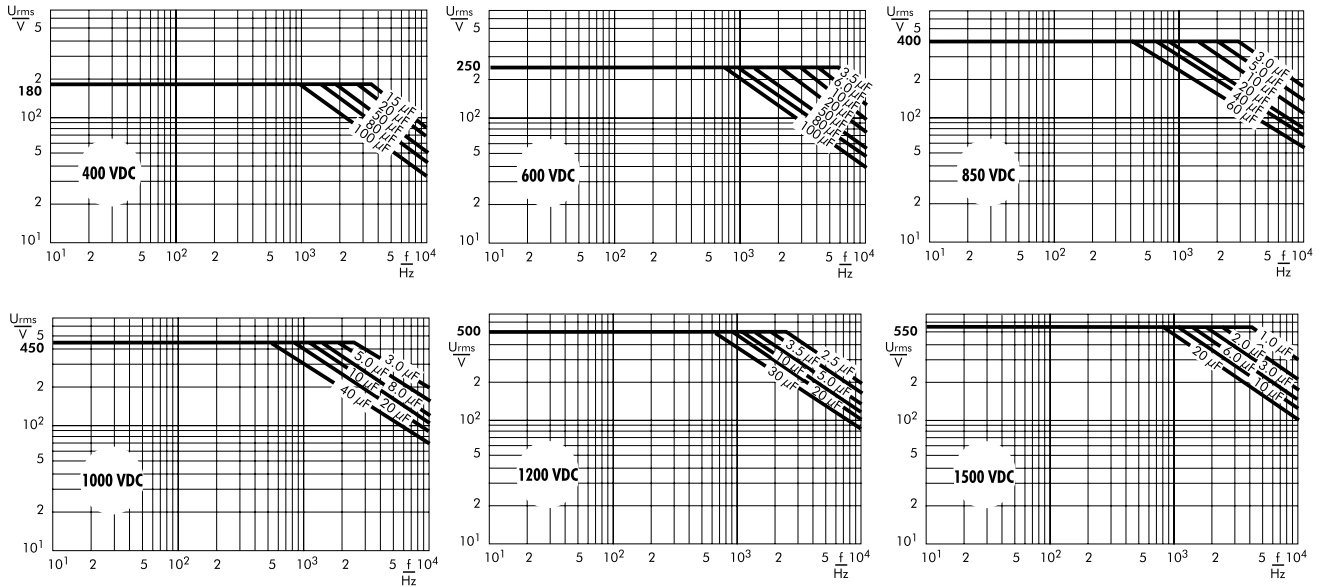
Part number completion:	
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	none = 00

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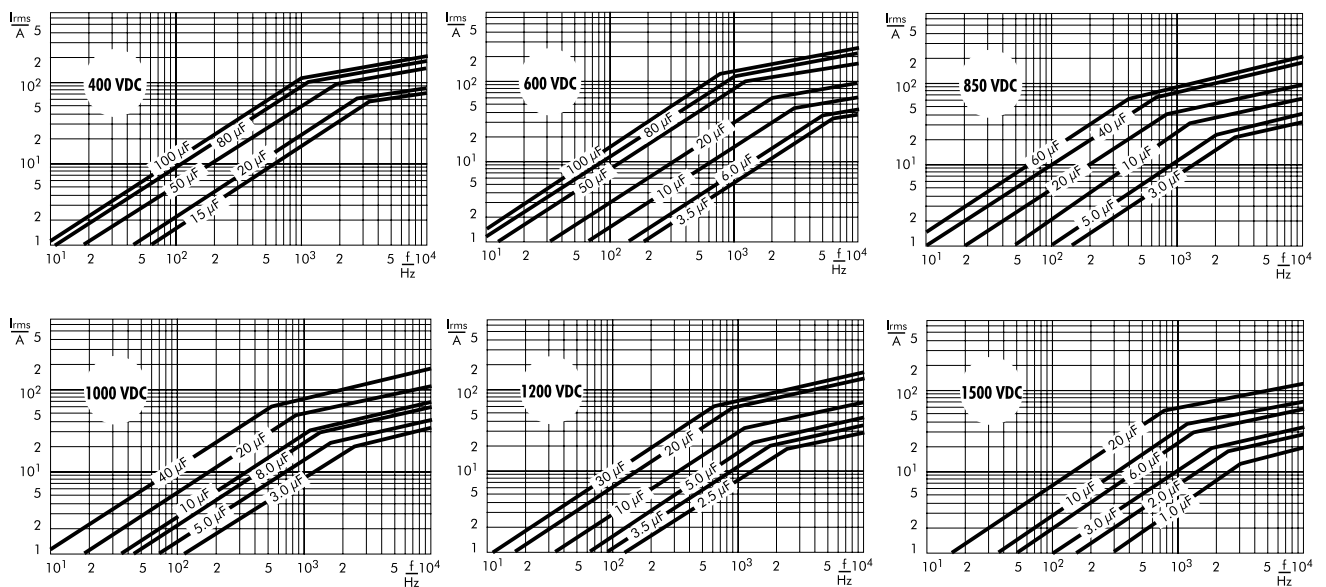
Continuation page 101

Continuation

Permissible AC voltage in relation to frequency at 20° C internal temperature rise (general guide).



Permissible AC current in relation to frequency at 20° C internal temperature rise (general guide).



WIMA Intermediate Circuit Capacitors for Applications in High Power Converter Technology



- Particularly reliable contact configuration
- High shock and vibration resistance
- Outstanding mechanical stability

WIMA DC-LINK MKP 3 capacitors in cylindrical case with screw fixing are available with capacitances from 35 μF through 200 μF and with voltage ranges from 700 VDC through 1500 VDC. They can be provided with male or female terminations.

WIMA DC-LINK MKP 4 capacitors with rectangular case are available with capacitance values from 2 μF through 150 μF and with rated voltages from 600 VDC through 1300 VDC. For mounting purposes 2-pin and 4-pin versions are possible. The WIMA DC-LINK MKP 4S series has been designed for stringent requirements.

WIMA DC-LINK MKP 5 capacitors in cylindrical plastic case are available with capacitances from 16 μF through 260 μF and with rated voltages from 500 VDC through 1300 VDC. They are provided with tinned wire terminations for PCB mounting.

WIMA DC-LINK MKP 6 capacitors have a cylindrical aluminium case. They are available with capacitances from 165 μF through 1560 μF and with rated voltages from 600 VDC through 1500 VDC. For bus bar mounting they are designed with male or female terminations and screw bolt.

Customized solutions e.g. can be realized with WIMA DC-LINK HC and WIMA DC-LINK HY with variable connecting configurations.

All components are environmentally compatible with the RoHS 2011/65/EC regulations of the European Union.

WIMA DC-LINK MKP 3

WIMA DC-LINK MKP 4

WIMA DC-LINK MKP 4S

WIMA DC-LINK MKP 5

WIMA DC-LINK MKP 6

WIMA DC-LINK HC

WIMA DC-LINK HY

WIMA DC-LINK capacitors are especially designed for applications in high power converter technology where they are more and more substituting electrolytic capacitors due to increasing electrical requirements. Manufactured with a low loss Polypropylene dielectric they show a higher current carrying capability as well as lower dissipation/self-heating at high frequencies compared to electrolytic capacitors. Further outstanding features are, e.g.:

- Very high capacitance/volume ratio
- High voltage rating per component
- Very low dissipation factor (ESR)
- Very high insulation resistance
- Excellent self-healing properties
- Long life expectancy
- Non-polar construction



Metallized Polypropylene (PP) - Capacitors for DC-Link Applications

Special Features

- Very high volume/capacitance ratio
- Self-healing properties
- With cylindrical plastic case and screw fixing
- Dry construction without electrolyte or oil
- No internal fuse required
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC
- Customer-specific capacitances or voltages on request

Typical Applications

- DC capacitors with high capacitances for applications in power electronics also at non-sinusoidal voltages and currents e.g. in
- Wind power systems
 - Inverters

Construction

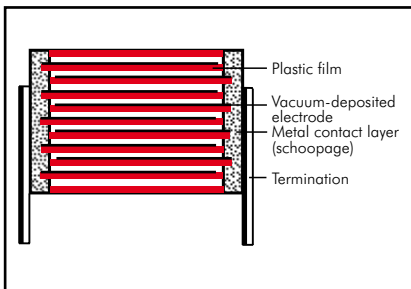
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with PU-sealing and screw fixing, UL 94 V-0

Terminations:

Screw connection (male or female).

Marking:

Colour: Black. Marking: Gold.

Electrical Data

Capacitance range: 35 μF to 200 μF
Rated voltages: 700 VDC, 900 VDC, 1100 VDC, 1300 VDC, 1500 VDC
Capacitance tolerances: $\pm 20\%$, $\pm 10\%$, ($\pm 5\%$ available subject to special enquiry)
Operating temperature range: -40°C to $+85^\circ\text{C}$
Insulation resistance at $+20^\circ\text{C}$:
 $\geq 5000 \text{ sec (M}\Omega \times \mu\text{F)}$
 (mean value: 20 000 sec)
 Measuring voltage: 100 V/1 min.

Dielectric loss factor $\tan \delta_0$: 2×10^{-4}

Test voltage: $1.5 U_n$, 2sec

Dielectric absorption: 0.05 %

Reliability:

Operational life $> 100\,000$ hours
 Failure rate $< 50 \text{ fit (hot spot } \leq 70^\circ\text{C)}$

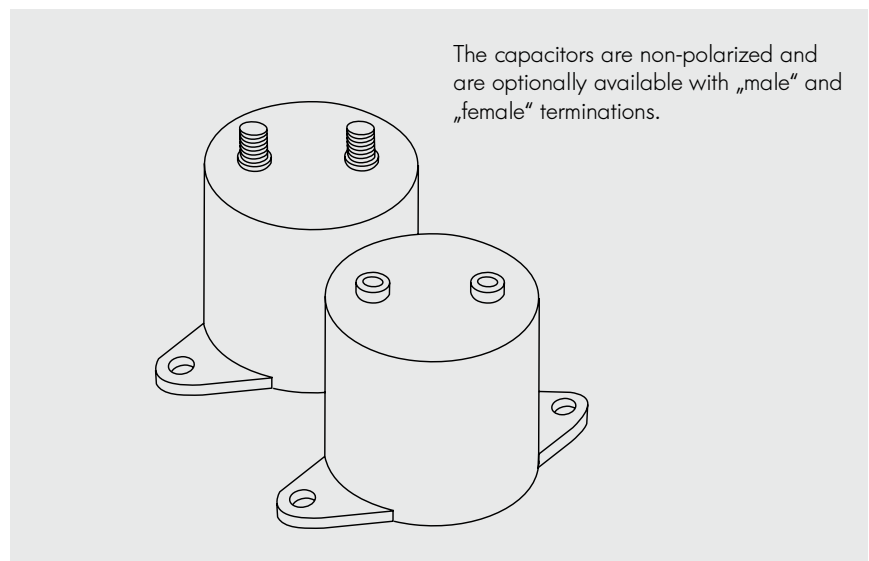
Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors.

Packing

Transport-safe packing in cardboard boxes.

For further details and graphs please refer to Technical Information.



Continuation

General Data

U_R	C_N	D x L mm	I_{rms} (1 kHz)* A	ESR (1 kHz)* m Ω	R_{th} K/W	L_e nH	Approx. weight g	Part number
700 VDC	150 μ F	84.5 x 51	100	0.9	7.0	< 32	430	DCP3K06150G100_-----
	200 "	84.5 x 64	100	1.0	8.5	< 40	510	DCP3K06200G200_-----
900 VDC	100 μ F	84.5 x 51	90	1.0	7.2	< 30	430	DCP3N06100G100_-----
	140 "	84.5 x 64	100	1.3	8.5	< 40	510	DCP3N06140G200_-----
1100 VDC	70 μ F	84.5 x 51	100	1.1	7.0	< 32	430	DCP3P05700G100_-----
	90 "	84.5 x 64	100	1.2	8.5	< 40	510	DCP3P05900G200_-----
1300 VDC	50 μ F	84.5 x 51	60	1.7	7.0	< 35	430	DCP3R25500G100_-----
	70 "	84.5 x 64	50	2.1	8.5	< 40	510	DCP3R25700G200_-----
1500 VDC	35 μ F	84.5 x 51	60	1.7	7.0	< 35	430	DCP3S05350G100_-----
	50 "	84.5 x 64	70	1.9	8.5	< 40	510	DCP3S05500G200_-----

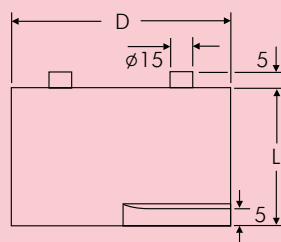
Contacts can handle: peak currents \hat{I} up to 5 kA
surge currents I_S up to 20 kA

Customer-specific capacitances or voltages on request

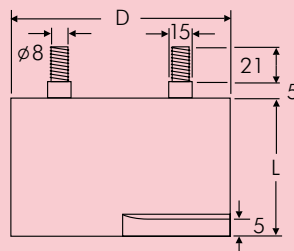
* General guide

Dims. in mm.

female

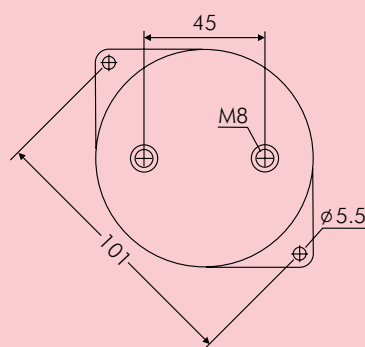
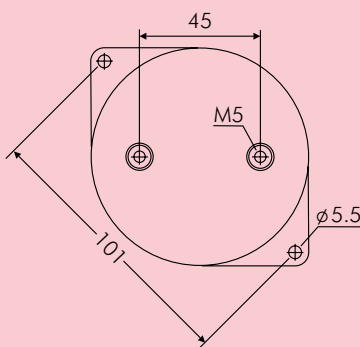


male



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J
Packing: bulk = S
Pin length: none = 00



D	L
84.5	51
84.5	64

Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) - Capacitors for DC-Link Applications

Special Features

- Capacitances up to 150 μF
- High volume/capacitance ratio
- Excellent self-healing properties
- Very low dissipation factor
- High reliability
- 2-pin and 4-pin contact configuration (plate versions on request)
- According to RoHS 2011/65/EC

Typical Applications

As intermediate circuit capacitor e.g. in high power converter technology, power supplies, solar inverters etc.

Construction

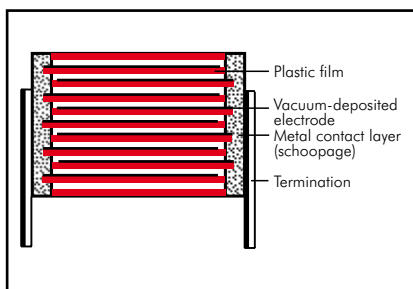
Dielectric:

Polypropylene (PP) 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 (plate versions on request).

Marking:

Colour: Red. Marking: Black.

Epoxy resin seal: Red

Electrical Data

Capacitance range: 2 μF to 150 μF (intermediate values on request)

Rated voltages: 600 VDC, 800 VDC, 900 VDC, 1100 VDC, 1300 VDC

Capacitance tolerances: $\pm 20\%$, $\pm 10\%$, $\pm 5\%$

Operating temperature range: -55°C to $+105^\circ\text{C}$ (hot spot including self-heating)

Climatic test category: 55/085/56 in accordance with IEC

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

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

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

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

$\tan \delta \leq 10 \times 10^{-4}$ at 1 kHz ($C \leq 50 \mu\text{F}$)

$\tan \delta \leq 15 \times 10^{-4}$ at 1 kHz ($C > 50 \mu\text{F}$)

Voltage and current derating:

A derating factor of 1.35% per K must be applied from $+85^\circ\text{C}$ for DC voltages and from $+70^\circ\text{C}$ for AC currents (I_{rms}). Additionally a derating factor of 4.5% per K must be applied from $+85^\circ\text{C}$ for AC currents (I_{rms})

Reliability: Operational life $> 100\,000$ hours (U_r and 70°C)

Failure rate λ_0 ($0.5 \times U_r$ and 40°C)

$\Pi = C_N [\mu\text{F}] \times U_r [\text{V}] $	λ_0
$\Pi \leq 10\,000$	< 2 fit
$10\,000 < \Pi \leq 25\,000$	< 5 fit
$25\,000 < \Pi \leq 50\,000$	< 10 fit
$50\,000 < \Pi \leq 100\,000$	< 20 fit
$\Pi > 100\,000$	< 30 fit

Maximum pulse rise time:

PCM	max. pulse rise time V/ μsec at $T_A < 40^\circ\text{C}$				
	600 VDC	800 VDC	900 VDC	1100 VDC	1300 VDC
27.5	19	21	25	31	36
37.5	14	15	16	21	25
52.5	10	12	13	15	18

for pulses equal to the rated voltage

Test voltage: $1.2 U_r$, 2sec

Dielectric absorption: 0.05 %

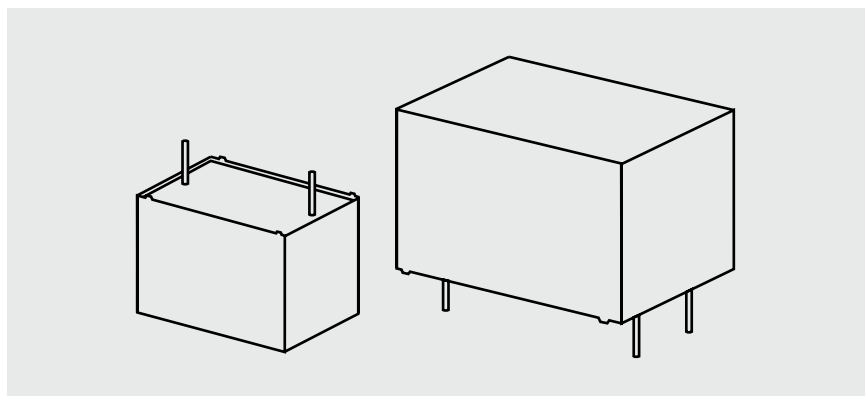
Specific dissipation:

Box size WxHxL in mm	Specific dissipation in Watts per K above the ambient temperature
9x19x31.5	0.021
11x21x31.5	0.025
13x24x31.5	0.030
15x26x31.5	0.034
17x29x31.5	0.039
17x34.5x31.5	0.044
20x39.5x31.5	0.053
19x32x41.5	0.054
20x39.5x41.5	0.065
24x45.5x41.5	0.080
31x46x41.5	0.092
35x50x41.5	0.106
40x55x41.5	0.123
35x50x57	0.132
45x55x57	0.164

Packing

Packing units at the end of the catalogue

For further details and graphs please refer to Technical Information.



Continuation

General Data

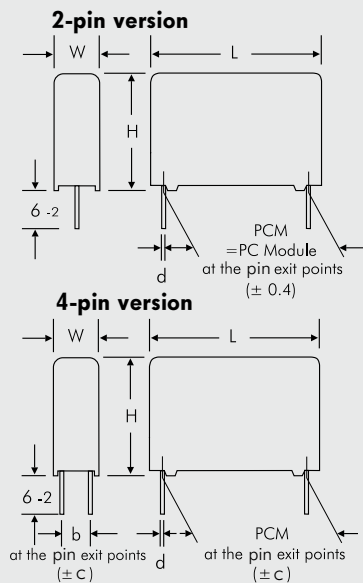
Capacitance	W	H	L	PCM**	Pin	600 VDC (70° C) / 450 VDC (85° C)			Part number
						I_S A	I_{rms} (10 kHz)* A	ESR (10 kHz)* mΩ	
2 μF	9	19	31.5	27.5	2	38	2	56	DCP41042006A
5 "	13	24	31.5	27.5	2/4	95	3.5	22	DCP41045006D
7 "	15	26	31.5	27.5	2/4	133	4.5	16	DCP41047006F
10 μF	17	29	31.5	27.5	2/4	190	6	11	DCP41051006G
15 "	17	34.5	31.5	27.5	2/4	285	7.5	7.4	DCP41051506I
20 "	20	39.5	31.5	27.5	2/4	380	9	6.2	DCP41052006J
	20	39.5	41.5	37.5	2/4	280	10	6.2	DCP41052007G
25 "	20	39.5	41.5	37.5	2/4	350	11.5	5	DCP41052507G
30 "	24	45.5	41.5	37.5	2/4	420	14	4.1	DCP41053007H
35 "	24	45.5	41.5	37.5	2/4	490	14.5	3.8	DCP41053507H
40 "	31	46	41.5	37.5	2/4	560	16.5	3.3	DCP41054007I
45 "	31	46	41.5	37.5	2/4	630	17	3.2	DCP41054507I
50 "	35	50	41.5	37.5	2/4	700	19	2.9	DCP41055007J
55 "	35	50	41.5	37.5	2/4	770	17	3.8	DCP41055507J
60 "	35	50	41.5	37.5	2/4	840	17.5	3.4	DCP41056007J
65 "	40	55	41.5	37.5	2/4	910	19.5	3.3	DCP41056507K
	35	50	57	52.5	4	650	20	3.3	DCP41056509F
70 "	40	55	41.5	37.5	2/4	980	20	3.1	DCP41057007K
	35	50	57	52.5	4	700	20.5	3.1	DCP41057009F
75 "	40	55	41.5	37.5	2/4	1050	20.5	3	DCP41057507K
	35	50	57	52.5	4	750	21	3	DCP41057509F
80 "	40	55	41.5	37.5	2/4	1120	22	2.6	DCP41058007K
	35	50	57	52.5	4	800	22	2.6	DCP41058009F
85 "	35	50	57	52.5	4	850	22.5	2.1	DCP41058509F
90 "	35	50	57	52.5	4	900	23.5	1.9	DCP41059009F
95 "	45	55	57	52.5	4	950	24	2.8	DCP41059509H
100 μF	45	55	57	52.5	4	1000	25	2.6	DCP41061009H
110 "	45	55	57	52.5	4	1100	26.5	2.3	DCP41061109H
115 "	45	65	57	52.5	4	1150	27.5	2.5	DCP41061159J
120 "	45	65	57	52.5	4	1200	28	2.3	DCP41061209J
130 "	45	65	57	52.5	4	1300	29.5	2.1	DCP41061309J
140 "	45	65	57	52.5	4	1400	31	1.9	DCP41061409J
150 "	45	65	57	52.5	4	1500	33	1.7	DCP41061509J

* General guide

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:	
Version code:	2-pin = D2
	4-pin = D4
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



PCM	d
27.5	0.8
37.5	1

W	PCM	b	d	c
11	27.5	5	0.8	0.4
13	27.5	7.5	0.8	0.4
15	27.5	7.5	0.8	0.4
17	27.5	10	0.8	0.4
20	27.5	12.5	0.8	0.4
19	37.5	10	1	0.4
20	37.5	12.5	1	0.4
24	37.5	12.5	1	0.4
31	37.5	20	1	0.4
35	37.5	20	1	0.4
40	37.5	20	1	0.4
35	52.5	20	1.2	0.8
45	52.5	20	1.2	0.8

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Continuation page 107

Continuation

General Data

Capacitance	800 VDC (70° C) / 700 VDC (85° C)					I _s A	I _{rms} (10 kHz)* A	ESR (10 kHz)* mΩ	Part number
	W	H	L	PCM**	Pin				
2 μF	9	19	31.5	27.5	2	42	2	52	DCP4L042006A
5 "	13	24	31.5	27.5	2/4	105	4	21	DCP4L045006D
7 "	17	29	31.5	27.5	2/4	147	5	15	DCP4L047006G
10 μF	17	34.5	31.5	27.5	2/4	210	6.5	10	DCP4L051006I
15 "	20	39.5	31.5	27.5	2/4	315	9	6.9	DCP4L051506J
	20	39.5	41.5	37.5	2/4	225	9.5	6.9	DCP4L051507G
20 "	20	39.5	41.5	37.5	2/4	300	10	6.2	DCP4L052007G
25 "	24	45.5	41.5	37.5	2/4	375	12.5	5	DCP4L052507H
30 "	24	45.5	41.5	37.5	2/4	450	14	4.1	DCP4L053007H
35 "	31	46	41.5	37.5	2/4	525	15.5	3.8	DCP4L053507I
40 "	31	46	41.5	37.5	2/4	600	16.5	3.3	DCP4L054007I
45 "	35	50	41.5	37.5	2/4	675	17.5	3.4	DCP4L054507J
50 "	35	50	41.5	37.5	2/4	750	19	3	DCP4L055007J
55 "	40	55	41.5	37.5	2/4	825	19.5	3.2	DCP4L055507K
	35	50	57	52.5	4	660	20.4	3.2	DCP4L055509F
60 "	40	55	41.5	37.5	2/4	900	20.5	2.9	DCP4L056007K
	35	50	57	52.5	4	720	21.5	2.9	DCP4L056009F
65 "	35	50	57	52.5	4	780	22.5	2.2	DCP4L056509F
70 "	45	55	57	52.5	4	840	23.5	3	DCP4L057009H
75 "	45	55	57	52.5	4	900	24	2.9	DCP4L057509H
80 "	45	55	57	52.5	4	960	24.5	3	DCP4L058009H
85 "	45	65	57	52.5	4	1020	25	2.6	DCP4L058509J
90 "	45	65	57	52.5	4	1080	25.5	2.5	DCP4L059009J
95 "	45	65	57	52.5	4	1140	26	2.4	DCP4L059509J
100 μF	45	65	57	52.5	4	1200	26.5	2.3	DCP4L061009J
110 "	45	65	57	52.5	4	1320	27.5	2.2	DCP4L061109J
115 "	45	65	57	52.5	4	1380	28	2.1	DCP4L061159J

Capacitance	900 VDC (70° C) / 760 VDC (85° C)					I _s A	I _{rms} (10 kHz)* A	ESR (10 kHz)* mΩ	Part number
	W	H	L	PCM**	Pin				
2 μF	11	21	31.5	27.5	2/4	50	2.5	44	DCP4N042006B
5 "	17	29	31.5	27.5	2/4	125	4.5	18	DCP4N045006G
7 "	17	34.5	31.5	27.5	2/4	175	6	13	DCP4N047006I
10 μF	20	39.5	31.5	27.5	2/4	250	8	8.8	DCP4N051006J
	20	39.5	41.5	37.5	2/4	160	8.5	8.8	DCP4N051007G
15 "	20	39.5	41.5	37.5	2/4	240	10.5	5.8	DCP4N051507G
20 "	24	45.5	41.5	37.5	2/4	320	13	4.8	DCP4N052007H
25 "	31	46	41.5	37.5	2/4	400	15.5	3.8	DCP4N052507I
30 "	31	46	41.5	37.5	2/4	480	15.5	3.7	DCP4N053007I
35 "	35	50	41.5	37.5	2/4	560	18	3.2	DCP4N053507J
40 "	40	55	41.5	37.5	2/4	640	19.5	3.2	DCP4N054007K
	35	50	57	52.5	4	520	20.5	3.2	DCP4N054009F
45 "	35	50	57	52.5	4	585	21	2.8	DCP4N054509F
50 "	35	50	57	52.5	4	650	22	3.3	DCP4N055009F
55 "	45	55	57	52.5	4	715	22.5	3.2	DCP4N055509H
60 "	45	55	57	52.5	4	780	23	3	DCP4N056009H
65 "	45	55	57	52.5	4	845	24	2.9	DCP4N056509H
70 "	45	65	57	52.5	4	910	24.5	3.3	DCP4N057009J
75 "	45	65	57	52.5	4	975	25	2.9	DCP4N057509J
80 "	45	65	57	52.5	4	1040	25.5	2.8	DCP4N058009J

New value

* General guide

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Rights reserved to amend design data without prior notification.

Continuation

General Data

Capacitance	W	H	L	PCM**	Pin	1100 VDC (70° C) / 920 VDC (85° C)			Part number
						I_s A	I_{rms} (10 kHz)* A	ESR (10 kHz)* mΩ	
2 μF	13	24	31.5	27.5	2/4	62	3	36	DCP4P042006D
5 "	17	34.5	31.5	27.5	2/4	155	5.5	14	DCP4P045006I
7 "	20	39.5	31.5	27.5	2/4	217	7.5	10	DCP4P047006J
	19	32	41.5	37.5	2/4	147	7.5	10	DCP4P047007F
10 μF	20	39.5	41.5	37.5	2/4	210	9.5	7.2	DCP4P051007G
15 "	31	46	41.5	37.5	2/4	315	13	5.4	DCP4P051507I
20 "	31	46	41.5	37.5	2/4	420	14	5.2	DCP4P052007I
	35	50	41.5	37.5	2/4	420	15	4.7	DCP4P052007J
25 "	40	55	41.5	37.5	2/4	525	16.5	4.6	DCP4P052507K
30 "	35	50	57	52.5	4	450	17.5	4.4	DCP4P053009F
35 "	35	50	57	52.5	4	525	18	4	DCP4P053509F
40 "	45	55	57	52.5	4	600	19	4.5	DCP4P054009H
45 "	45	55	57	52.5	4	675	20	4.1	DCP4P054509H
50 "	45	65	57	52.5	4	750	21	4.1	DCP4P055009J
55 "	45	65	57	52.5	4	825	22	3.8	DCP4P055509J
60 "	45	65	57	52.5	4	900	23	3.5	DCP4P056009J

Capacitance	W	H	L	PCM**	Pin	1300 VDC (70° C) / 1100 VDC (85° C)			Part number
						I_s A	I_{rms} (10 kHz)* A	ESR (10 kHz)* mΩ	
2 μF	15	26	31.5	27.5	2/4	72	3	36	DCP4R242006F
5 "	20	39.5	31.5	27.5	2/4	180	6	14	DCP4R245006J
	20	39.5	41.5	37.5	2/4	125	7	14	DCP4R245007G
7 "	20	39.5	41.5	37.5	2/4	175	8	10	DCP4R247007G
10 μF	24	45.5	41.5	37.5	2/4	250	10.5	7.2	DCP4R251007H
15 "	31	46	41.5	37.5	2/4	375	14	4.8	DCP4R251507I
20 "	40	55	41.5	37.5	2/4	500	17.5	4	DCP4R252007K
	35	50	57	52.5	4	360	18	4	DCP4R252009F
25 "	35	50	57	52.5	4	450	19	3.6	DCP4R252509F
30 "	45	55	57	52.5	4	540	20	4	DCP4R253009H
35 "	45	65	57	52.5	4	630	21	4.1	DCP4R253509J
40 "	45	65	57	52.5	4	720	22	3.7	DCP4R254009J

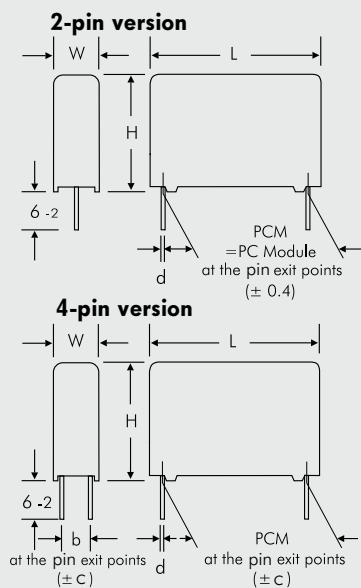
New value

* General guide

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:	
Version code:	2-pin = D2 4-pin = D4
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	



PCM	d
27.5	0.8
37.5	1

W	PCM	b	d	c
11	27.5	5	0.8	0.4
13	27.5	7.5	0.8	0.4
15	27.5	7.5	0.8	0.4
17	27.5	10	0.8	0.4
20	27.5	12.5	0.8	0.4
19	37.5	10	1	0.4
20	37.5	12.5	1	0.4
24	37.5	12.5	1	0.4
31	37.5	20	1	0.4
35	37.5	20	1	0.4
40	37.5	20	1	0.4
35	52.5	20	1.2	0.8
45	52.5	20	1.2	0.8

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Metallized Polypropylene (PP) - DC-Link Capacitors for STRINGENT REQUIREMENTS

Special Features

- Capacitances up to 80 μF
- High volume/capacitance ratio
- Excellent self-healing properties
- For stringent requirements
- Very low dissipation factor
- High reliability
- 2-pin and 4-pin contact configuration (plate versions on request)
- According to RoHS 2011/65/EC

Typical Applications

As intermediate circuit capacitor e.g. in high power converter technology, power supplies, solar inverters etc.

Construction

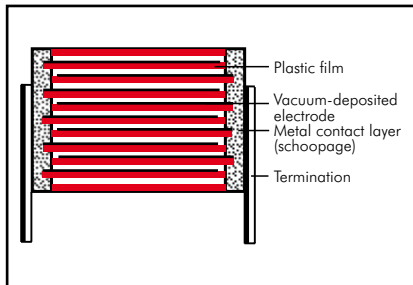
Dielectric:

Polypropylene (PP) 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 (plate versions on request).

Marking:

Colour: Red. Marking: Black.

Epoxy resin seal: Red

Electrical Data

Capacitance range: 0.47 μF to 80 μF (intermediate values on request)

Rated voltages: 450 VDC, 630 VDC, 800 VDC, 900 VDC, 1050 VDC

Capacitance tolerances: $\pm 20\%$, $\pm 10\%$, $\pm 5\%$

Operating temperature range:

-55°C to $+105^\circ\text{C}$ (hot spot including self-heating)

Climatic test category: 55/085/56 in accordance with IEC

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

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

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

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

$\tan \delta \leq 10 \times 10^{-4}$ at 1 kHz ($\text{IC} \leq 50 \mu\text{F}$)

$\tan \delta \leq 15 \times 10^{-4}$ at 1 kHz ($\text{IC} > 50 \mu\text{F}$)

Voltage and current derating:

A derating factor of 1.35% per K must be applied from $+85^\circ\text{C}$ for DC voltages and from $+70^\circ\text{C}$ for AC currents (I_{rms}). Additionally a derating factor of 4.5% per K must be applied from $+85^\circ\text{C}$ for AC currents (I_{rms})

Reliability: Operational life $> 100\,000$ hours (U_r and 70°C)

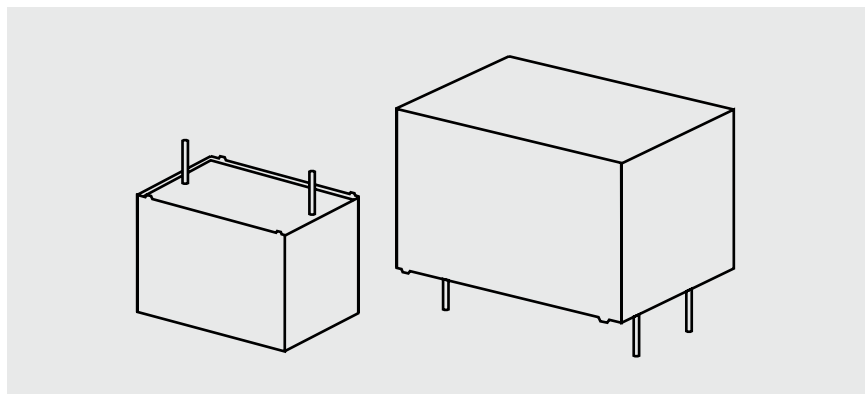
Failure rate λ_0 ($0.5 \times U_r$ and 40°C)

$\Pi = C_N [\mu\text{F}] \times U_r [\text{V}] $	λ_0
$\Pi \leq 10\,000$	< 2 fit
$10\,000 < \Pi \leq 25\,000$	< 5 fit
$25\,000 < \Pi \leq 50\,000$	< 10 fit
$50\,000 < \Pi \leq 100\,000$	< 20 fit
$\Pi > 100\,000$	< 30 fit

Maximum pulse rise time:

PCM	max. pulse rise time V/ μsec at $T_A < 40^\circ\text{C}$				
	450 VDC	630 VDC	800 VDC	900 VDC	1050 VDC
27.5	48	59	71	81	93
37.5	32	41	51	60	69
52.5	27	32	37	43	48

for pulses equal to the rated voltage



Test voltage: $1.6 U_r$, 2sec

Dielectric absorption: 0.05 %

Specific dissipation:

Box size WxHxL in mm	Specific dissipation in Watts per K above the ambient temperature
11x21x31.5	0.025
13x24x31.5	0.030
15x26x31.5	0.034
17x29x31.5	0.039
17x34.5x31.5	0.044
20x39.5x31.5	0.053
15x26x41.5	0.042
17x29x41.5	0.048
19x32x41.5	0.054
20x39.5x41.5	0.065
24x45.5x41.5	0.080
31x46x41.5	0.092
35x50x41.5	0.106
40x55x41.5	0.123
35x50x57	0.132
45x55x57	0.164
45x65x57	0.184

Packing

Packing units at the end of the catalogue.

For further details and graphs please refer to Technical Information.



Continuation

General Data

Capacitance	W	H	L	PCM**	Pin	450 VDC (70° C) / 300 VDC (85° C)				Part number
						I _s A	I _{rms} (10 kHz)* A		ESR (10 kHz)* mΩ	
							10 K	20 K		
2.2 μF	11	21	31.5	27.5	2/4	106	4.3	6.1	13.7	DCPSH042206B_
3.3 "	13	24	31.5	27.5	2/4	158	5.3	7.5	10.6	DCPSH043306D_
4.7 "	15	26	31.5	27.5	2/4	226	6.2	8.8	8.8	DCPSH044706F_
6.8 "	17	29	31.5	27.5	2/4	326	7.4	10.5	7.1	DCPSH046806G_
10 μF	19	32	41.5	37.5	2/4	320	9.6	13.6	5.9	DCPSH051007F_
15 "	20	39.5	41.5	37.5	2/4	480	11.8	16.7	4.7	DCPSH051507G_
20 "	24	45.5	41.5	37.5	2/4	640	13.9	19.7	4.1	DCPSH052007H_
25 "	31	46	41.5	37.5	2/4	800	15.5	21.9	3.8	DCPSH052507I_
30 "	31	46	41.5	37.5	2/4	960	16.3	23.0	3.5	DCPSH053007I_
35 "	35	50	41.5	37.5	2/4	1120	18.3	25.8	3.2	DCPSH053507J_
40 "	40	55	41.5	37.5	2/4	1280	20.3	28.7	3.0	DCPSH054007K_
45 "	35	50	57	52.5	4	1080	21.0	29.7	3.0	DCPSH054009F_
50 "	35	50	57	52.5	4	1215	21.7	30.7	2.8	DCPSH054509F_
55 "	35	50	57	52.5	4	1350	22.4	31.7	2.6	DCPSH055009F_
55 "	45	55	57	52.5	4	1485	25.4	35.9	2.5	DCPSH055509H_
60 "	45	55	57	52.5	4	1620	26.0	36.8	2.4	DCPSH056009H_
65 "	45	55	57	52.5	4	1755	26.3	37.2	2.4	DCPSH056509H_
70 "	45	65	57	52.5	4	1890	28.2	39.8	2.3	DCPSH057009J_
75 "	45	65	57	52.5	4	2025	28.6	40.4	2.3	DCPSH057509J_
80 "	45	65	57	52.5	4	2160	29.0	41.0	2.2	DCPSH058009J_

Capacitance	W	H	L	PCM**	Pin	630 VDC (70° C) / 450 VDC (85° C)				Part number
						I _s A	I _{rms} (10 kHz)* A		ESR (10 kHz)* mΩ	
							10 K	20 K		
1.5 μF	11	21	31.5	27.5	2/4	89	3.8	5.4	17.0	DCPSJ041506B_
2.2 "	13	24	31.5	27.5	2/4	130	4.7	6.6	13.7	DCPSJ042206D_
3.3 "	15	26	31.5	27.5	2/4	195	5.7	8.0	10.6	DCPSJ043306F_
4.7 "	17	34.5	31.5	27.5	2/4	277	7.1	10.0	8.8	DCPSJ044706L_
6.8 "	17	29	41.5	37.5	2/4	279	8.2	11.6	7.1	DCPSJ046807E_
10 μF	20	39.5	41.5	37.5	2/4	410	10.5	14.8	5.9	DCPSJ051007G_
15 "	31	46	41.5	37.5	2/4	615	14.0	19.8	4.7	DCPSJ051507I_
20 "	35	50	41.5	37.5	2/4	820	16.0	22.6	4.1	DCPSJ052007J_
25 "	40	55	41.5	37.5	2/4	1025	18.0	25.5	3.8	DCPSJ052507K_
30 "	35	50	57	52.5	4	960	19.6	27.7	3.5	DCPSJ053009F_
35 "	35	50	57	52.5	4	1120	20.4	28.8	3.1	DCPSJ053509F_
40 "	45	55	57	52.5	4	1280	23.4	33.1	3.0	DCPSJ054009H_
45 "	45	55	57	52.5	4	1440	25.5	36.1	2.8	DCPSJ054509H_
50 "	45	65	57	52.5	4	1600	26.4	37.3	2.6	DCPSJ055009J_
55 "	45	65	57	52.5	4	1760	26.9	38.0	2.5	DCPSJ055509J_
60 "	45	65	57	52.5	4	1920	27.5	38.8	2.4	DCPSJ056009J_

* General guide.

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:

Version code:	2-pin	= D2
	4-pin	= D4
Tolerance:	20 %	= M
	10 %	= K
	5 %	= J
Packing:	bulk	= S
Pin length:	6-2	= SD

Taped version see page 148.

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Continuation page 111

Continuation

General Data

Capacitance	W	H	L	PCM**	Pin	800 VDC (70° C) / 630 VDC (85° C)				Part number
						I _s A	I _{rms} (10 kHz)* A		ESR (10 kHz)* mΩ	
							10 K	20 K		
1.0 μF	11	21	31.5	27.5	2/4	71	3.3	4.6	23.1	DCPSL041006B_
1.5 "	13	24	31.5	27.5	24	107	4.2	5.9	17.0	DCPSL041506D_
2.2 "	15	26	31.5	27.5	2/4	156	5.0	7.0	13.7	DCPSL042206F_
3.3 "	17	29	31.5	27.5	2/4	234	6.1	8.5	10.6	DCPSL043306G_
4.7 "	19	32	41.5	37.5	2/4	240	7.8	11.0	8.8	DCPSL044707F_
6.8 "	20	39.5	41.5	37.5	2/4	347	9.5	13.5	7.1	DCPSL046807G_
10 μF	24	45.5	41.5	37.5	2/4	510	11.7	16.4	5.9	DCPSL051007H_
15 "	31	46	41.5	37.5	2/4	765	14.0	19.8	4.7	DCPSL051507I_
20 "	40	55	41.5	37.5	2/4	1020	17.2	24.3	4.1	DCPSL052007K_
	35	50	57	52.5	4	740	17.9	25.2	4.1	DCPSL052009F_
25 "	35	50	57	52.5	4	925	18.6	26.2	3.8	DCPSL052509F_
30 "	45	55	57	52.5	4	1110	21.8	30.8	3.5	DCPSL053009H_
35 "	45	65	57	52.5	4	1295	24.0	33.9	3.2	DCPSL053509J_
40 "	45	65	57	52.5	4	1480	24.8	35.0	3.0	DCPSL054009J_

Capacitance	W	H	L	PCM**	Pin	900 VDC (70° C) / 750 VDC (85° C)				Part number
						I _s A	I _{rms} (10 kHz)* A		ESR (10 kHz)* mΩ	
							10 K	20 K		
0.68 μF	11	21	31.5	27.5	2/4	55	2.8	3.9	32.8	DCPSN036806B_
1.0 μF	13	24	31.5	27.5	2/4	81	3.6	5.1	23.1	DCPSN041006D_
1.5 "	15	26	31.5	27.5	2/4	122	4.5	6.3	17.0	DCPSN041506F_
2.2 "	17	29	31.5	27.5	2/4	178	5.3	7.5	13.7	DCPSN042206G_
3.3 "	17	29	41.5	37.5	2/4	198	6.7	9.5	10.6	DCPSN043307E_
4.7 "	20	39.5	41.5	37.5	2/4	282	8.6	12.1	8.8	DCPSN044707G_
6.8 "	24	45.5	41.5	37.5	2/4	408	10.6	15.0	7.1	DCPSN046807H_
10 μF	31	46	41.5	37.5	2/4	600	12.5	17.7	5.9	DCPSN051007I_
15 "	40	55	41.5	37.5	2/4	900	16.2	22.9	4.7	DCPSN051507K_
20 "	35	50	57	52.5	4	860	17.9	25.3	4.1	DCPSN052009F_
25 "	45	55	57	52.5	4	1075	20.7	29.3	3.8	DCPSN052509H_

* General guide

** PCM = Printed circuit module = pin spacing

Dims. in mm.

Part number completion:	
Version code:	2-pin = D2 4-pin = D4
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

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Continuation page 112

Continuation

General Data

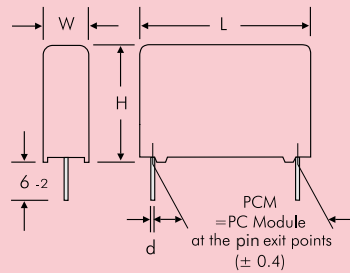
Capacitance	W	H	L	PCM**	Pin	1050 VDC (70° C) / 875 VDC (85° C)				Part number
						I _s A	I _{rms} (10 kHz)* A		ESR (10 kHz)* mΩ	
							10 K	20 K		
0.47 μF	11	21	31.5	27.5	2/4	44	2.4	3.4	44.0	DCPSO334706B
0.68 "	11	21	31.5	27.5	2/4	63	2.8	3.9	32.8	DCPSO336806B
1.0 μF	13	24	31.5	27.5	2/4	93	3.6	5.1	23.1	DCPSO341006D
1.5 "	17	29	31.5	27.5	2/4	140	4.8	6.8	17.0	DCPSO341506G
	15	26	41.5	37.5	2/4	104	5.0	7.0	17.0	DCPSO341507D
2.2 "	17	34.5	31.5	27.5	2/4	205	5.7	8.0	13.7	DCPSO342206I
	17	29	41.5	37.5	2/4	152	5.9	8.4	13.7	DCPSO342207E
3.3 "	20	39.5	31.5	27.5	2/4	307	7.1	10.0	10.6	DCPSO343306J
	19	32	41.5	37.5	2/4	228	7.1	10.1	10.6	DCPSO343307F
4.7 "	20	39.5	41.5	37.5	2/4	324	8.6	12.1	8.8	DCPSO344707G
6.8 "	31	46	41.5	37.5	2/4	469	11.4	16.0	7.1	DCPSO346807L
10 μF	35	50	41.5	37.5	2/4	690	13.4	19.0	5.9	DCPSO351007J
15 "	35	50	57	52.5	4	720	16.8	23.8	4.7	DCPSO351509F
20 "	45	55	57	52.5	4	960	19.9	28.2	4.1	DCPSO352009H

* General guide

** PCM = Printed circuit module = pin spacing

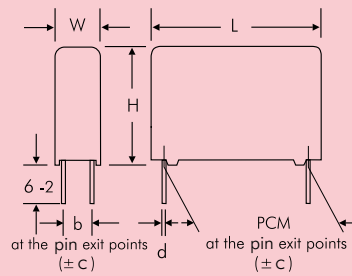
Dims. in mm.

2-pin version



PCM	d
27.5	0.8
37.5	1

4-pin version



W	PCM	b	d	c
11	27.5	5	0.8	0.4
13	27.5	7.5	0.8	0.4
15	27.5	7.5	0.8	0.4
17	27.5	10	0.8	0.4
20	27.5	12.5	0.8	0.4
17	37.5	10	1	0.4
19	37.5	10	1	0.4
20	37.5	12.5	1	0.4
24	37.5	12.5	1	0.4
31	37.5	20	1	0.4
35	37.5	20	1	0.4
40	37.5	20	1	0.4
35	52.5	20	1.2	0.8
45	52.5	20	1.2	0.8

Part number completion:	
Version code:	2-pin = D2 4-pin = D4
Tolerance:	20 % = M 10 % = K 5 % = J
Packing:	bulk = S
Pin length:	6-2 = SD
Taped version see page 148.	

Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) - Capacitors in Cylindrical Case for DC-Link Applications

Special Features

- Very high volume/capacitance ratio
- Self-healing properties
- With cylindrical plastic case for PCB mounting
- Dry construction without electrolyte or oil
- No internal fuse required
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC
- Customer-specific capacitances or voltages on request

Typical Applications

DC capacitors with high capacitances for applications in power electronics also at non-sinusoidal voltages and currents e.g. in

- Wind power systems
- Inverters

Construction

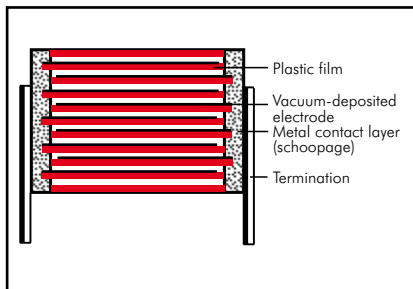
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with PU-sealing, UL 94 V-0

Terminations:

Tinned wire.

Marking:

Colour: Grey. Marking: Black on silver label.

Electrical Data

Capacitance range: 16 μF to 260 μF

Rated voltages: 500 VDC, 700 VDC, 900 VDC, 1100 VDC, 1300 VDC

Capacitance tolerances: $\pm 20\%$, $\pm 10\%$ ($\pm 5\%$ available subject to special enquiry)

Operating temperature range:

-40°C to $+85^\circ\text{C}$

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

≥ 5000 sec ($\text{M}\Omega \times \mu\text{F}$)

(mean value: 20000 sec)

Measuring voltage: 100 V/1 min.

Dielectric loss factor $\tan \delta_0$:
 2×10^{-4}

Test voltage: $1.5 U_r$, 2sec

Dielectric absorption:

0.05 %

Reliability:

Operational life $> 100\,000$ hours

Failure rate < 50 fit (hot spot $\leq 70^\circ\text{C}$)

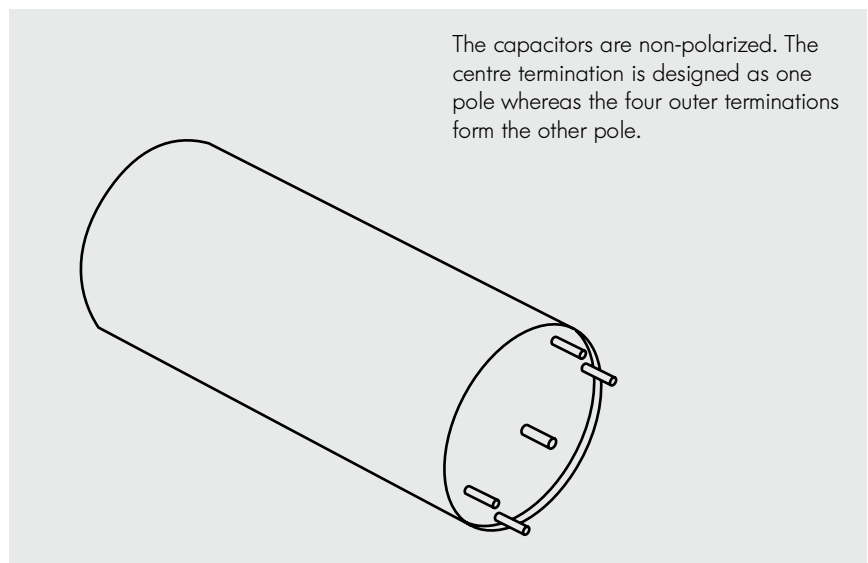
Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors.

Packing

Transportation-safe packing in cardboard boxes.

For further details and graphs please refer to Technical Information.



Continuation

General Data

U_R	C_N	D x L mm	I_{rms} (1 kHz)* A	ESR (1 kHz)* m Ω	R_{th} K/W	L_e nH	Approx. weight g	Part number
500 VDC	85 μ F	50 x 57	35	2.0	11.0	< 45	120	DCP5H15850D000_
	195 "	50 x 95	32	3.4	7.5	< 65	190	DCP5H16195D100_
	260 "	50 x 120	30	5.2	6.0	< 85	220	DCP5H16260D200_
700 VDC	59 μ F	50 x 57	30	1.9	11.0	< 45	120	DCP5K05590D000_
	143 "	50 x 95	32	3.5	7.5	< 65	190	DCP5K06143D100_
	190 "	50 x 120	25	4.7	6.0	< 85	220	DCP5K06190D200_
900 VDC	53 μ F	50 x 57	35	2.3	11.0	< 45	120	DCP5N05530D000_
	114 "	50 x 95	32	4.2	7.5	< 65	190	DCP5N06114D100_
	158 "	50 x 120	30	6.0	6.0	< 85	220	DCP5N06158D200_
1100 VDC	30 μ F	50 x 57	20	2.8	11.0	< 45	120	DCP5P05300D000_
	72 "	50 x 95	25	4.5	7.5	< 65	190	DCP5P05720D100_
	100 "	50 x 120	25	6.1	6.0	< 85	220	DCP5P06100D200_
1300 VDC	16 μ F	50 x 57	20	3.0	11.0	< 45	120	DCP5R25160D000_
	40 "	50 x 95	25	5.7	7.5	< 65	190	DCP5R25400D100_
	55 "	50 x 120	25	7.7	6.0	< 85	220	DCP5R25550D200_

Contacts can handle: peak currents \hat{I} up to 1.1 kA
surge currents I_S up to 3.5 kA

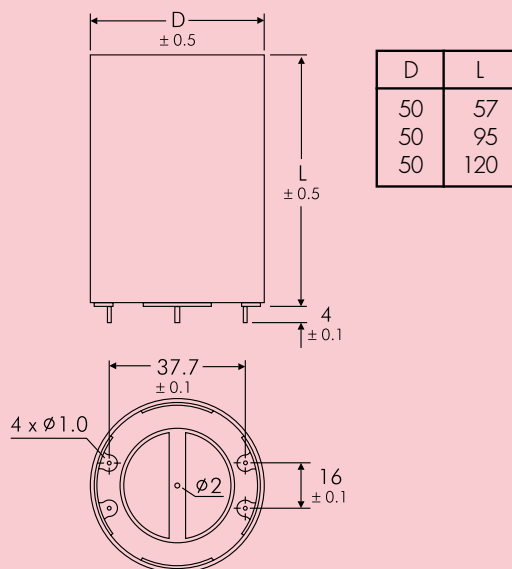
Customer-specific capacitances or voltages on request

* General guide

Dims. in mm.

Part number completion:

Tolerance: 20 % = M
10 % = K
Packing: bulk = S
Pin length: none = 00



Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) - Capacitors in Cylindrical Case MKP 6 with High Volume/Capacitance Ratio MKP 6 HP with Higher Current Carrying Capability

Special Features

- Very high volume/capacitance ratio
- Self-healing properties
- With cylindrical aluminium case for bus bar mounting
- Dry construction without electrolyte or oil
- No internal fuse required
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC
- Customer-specific capacitances or voltages on request

Typical Applications

DC capacitors with high capacitances for applications in power electronics also at non-sinusoidal voltages and currents e.g. in

- Wind power systems
- Inverters

Construction

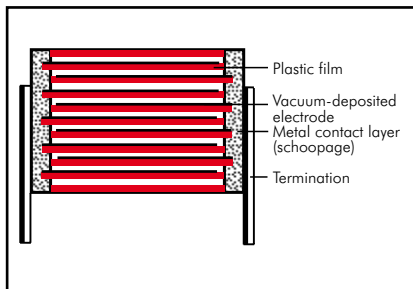
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Aluminium case with PU-sealing, UL 94 V-0

Terminations:

Screw connection (male or female), screw bolt M12 x 16.

Marking:

Colour: Metallic. Marking: Black on silver label.

Electrical Data

Capacitance range: 75 μF to 4920 μF
Rated voltages: 600 VDC, 700 VDC, 900 VDC, 1100 VDC, 1300 VDC, 1500 VDC
Capacitance tolerances: $\pm 20\%$, $\pm 10\%$ ($\pm 5\%$ available subject to special enquiry)
Operating temperature range: -40°C to $+85^\circ\text{C}$
Insulation resistance at $+20^\circ\text{C}$: ≥ 5000 sec ($\text{M}\Omega \times \mu\text{F}$) (mean value: 20000 sec)
 Measuring voltage: 100 V/1 min.

Dielectric loss factor $\tan \delta_0$: 2×10^{-4}

Test voltage: $1.5 U_r$, 2sec

Dielectric absorption: 0.05 %

Reliability:

Operational life > 100 000 hours
 Failure rate < 50 fit (hot spot $\leq 70^\circ\text{C}$)

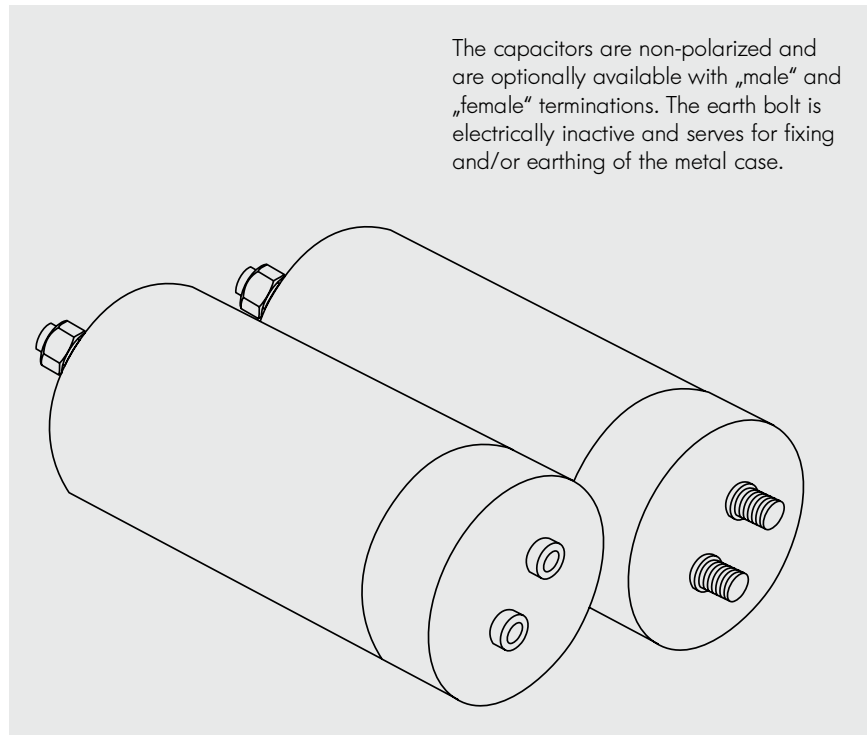
Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors.

Packing

Transportation-safe packing in cardboard boxes.

For further details and graphs please refer to Technical Information.



Continuation

General Data

U _R	C _N	D x L mm	I _{rms} (max.)* A	ESR (1 kHz)* mΩ	L _e nH	Approx. weight g	Bestellnummer
600 VDC	320 μF	85 x 60	25	2.1	< 70	380	DCP6I06320EB00_
	460 "	85 x 76	25	2.1	< 70	480	DCP6I06460EC00_
	520 "	85 x 85	30	2.0	< 70	540	DCP6I06520ED00_
	670 "	85 x 95	30	1.9	< 70	600	DCP6I06670EE00_
	760 "	85 x 110	30	1.7	< 70	690	DCP6I06760EF00_
	780 "	85 x 120	30	1.7	< 70	700	DCP6I06780E000_
	950 "	85 x 132	35	1.8	< 70	850	DCP6I06950E100_
	1030 "	85 x 140	35	1.8	< 70	880	DCP6I07103EG00_
	1220 "	116 x 95	40	1.7	< 70	1200	DCP6I07122EN00_
	1500 "	116 x 110	40	1.7	< 70	1390	DCP6I07150EO00_
	1640 "	116 x 120	40	1.6	< 70	1510	DCP6I07164EP00_
	1890 "	116 x 132	40	1.6	< 70	1660	DCP6I07189EQ00_
	2030 "	116 x 140	40	1.6	< 70	1760	DCP6I07203ER00_
700 VDC	230 μF	85 x 60	25	1.9	< 70	380	DCP6K06230EB00_
	330 "	85 x 76	25	1.9	< 70	480	DCP6K06330EC00_
	380 "	85 x 85	30	1.7	< 70	540	DCP6K06380ED00_
	450 "	85 x 95	30	1.7	< 70	600	DCP6K06450EE00_
	550 "	85 x 110	30	1.8	< 70	690	DCP6K06550EF00_
	585 "	85 x 120	30	1.8	< 70	700	DCP6K06585E000_
	690 "	85 x 132	35	1.8	< 70	850	DCP6K06690E100_
	740 "	85 x 140	35	1.8	< 70	880	DCP6K06740EG00_
	890 "	116 x 95	40	1.7	< 70	1200	DCP6K06890EN00_
	1090 "	116 x 110	40	1.7	< 70	1390	DCP6K07109EO00_
	1190 "	116 x 120	40	1.8	< 70	1510	DCP6K07119EP00_
	1370 "	116 x 132	40	1.8	< 70	1660	DCP6K07137EQ00_
	1470 "	116 x 140	40	1.8	< 70	1760	DCP6K07147ER00_
900 VDC	190 μF	85 x 60	30	1.9	< 70	380	DCP6N06190EB00_
	270 "	85 x 76	30	1.9	< 70	480	DCP6N06270EC00_
	315 "	85 x 85	30	1.8	< 70	540	DCP6N06315ED00_
	360 "	85 x 95	30	1.7	< 70	600	DCP6N06360EE00_
	450 "	85 x 110	30	1.7	< 70	690	DCP6N06450EF00_
	480 "	85 x 120	35	1.8	< 70	700	DCP6N06480E000_
	550 "	85 x 132	35	1.8	< 70	850	DCP6N06550E100_
	620 "	85 x 140	35	1.8	< 70	880	DCP6N06620EG00_
	730 "	116 x 95	40	1.7	< 70	1200	DCP6N06730EN00_
	900 "	116 x 110	40	1.7	< 70	1390	DCP6N06900EO00_
	980 "	116 x 120	40	1.8	< 70	1510	DCP6N06980EP00_
	1130 "	116 x 132	40	1.8	< 70	1660	DCP6N07113EQ00_
	1200 "	116 x 140	40	1.8	< 70	1760	DCP6N07120ER00_
1100 VDC	120 μF	85 x 60	30	2.0	< 70	380	DCP6P06120EB00_
	170 "	85 x 76	30	2.0	< 70	480	DCP6P06170EC00_
	200 "	85 x 85	30	1.9	< 70	540	DCP6P06200ED00_
	230 "	85 x 95	30	1.9	< 70	600	DCP6P06230EE00_
	290 "	85 x 110	30	1.8	< 70	690	DCP6P06290EF00_
	325 "	85 x 120	40	1.8	< 70	700	DCP6P06325E000_
	360 "	85 x 132	40	1.8	< 70	850	DCP6P06630E100_
	390 "	85 x 140	40	2.0	< 70	880	DCP6P06390EG00_
	470 "	116 x 95	40	1.8	< 70	1200	DCP6P06470EN00_
	580 "	116 x 110	40	1.8	< 70	1390	DCP6P06580EO00_
	630 "	116 x 120	40	1.7	< 70	1510	DCP6P06630EP00_
	720 "	116 x 132	40	1.7	< 70	1660	DCP6P06720EQ00_
	780 "	116 x 140	40	1.6	< 70	1760	DCP6P06780ER00_

Contacts can handle: peak currents \hat{I} up to 5 kA
surge currents I_S up to 20 kA

Customer-specific capacitances or voltages on request

* General guide

Part number completion:	
Tolerance:	20 % = M
	10 % = K
	5 % = J
Packing:	bulk = S
Connection:	male = OM
	female = OF

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Continuation

General Data

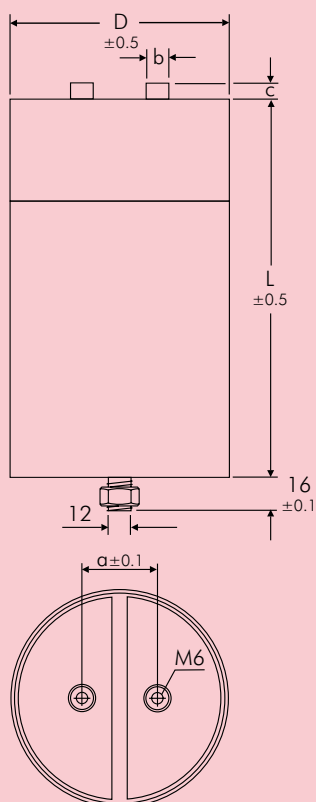
U_R	C_N	D x L mm	I_{rms} (max.)* A	ESR (1 kHz)* m Ω	L_e nH	Approx. weight g	Part number
1300 VDC	85 μ F	85 x 60	30	2.1	< 70	380	DCP6R25850EB00_
	120 "	85 x 76	30	2.1	< 70	480	DCP6R26120EC00_
	135 "	85 x 85	30	1.9	< 70	540	DCP6R26135ED00_
	160 "	85 x 95	30	1.9	< 70	600	DCP6R26160EE00_
	200 "	85 x 110	30	1.8	< 70	690	DCP6R26200EF00_
	215 "	85 x 120	30	1.8	< 70	700	DCP6R26215E000_
	250 "	85 x 132	40	2.2	< 70	850	DCP6R26250E100_
	270 "	85 x 140	40	2.2	< 70	880	DCP6R26270EG00_
	320 "	116 x 95	40	1.8	< 70	1200	DCP6R26320EN00_
	390 "	116 x 110	40	1.8	< 70	1390	DCP6R26390EO00_
	430 "	116 x 120	40	1.7	< 70	1510	DCP6R26430EP00_
	490 "	116 x 132	40	1.7	< 70	1660	DCP6R26490EQ00_
	530 "	116 x 140	40	1.6	< 70	1760	DCP6R26530ER00_
	1500 VDC	75 μ F	85 x 60	25	2.5	< 70	380
110 "		85 x 76	25	2.5	< 70	480	DCP6S06110EC00_
120 "		85 x 85	25	2.3	< 70	540	DCP6S06120ED00_
145 "		85 x 95	30	2.3	< 70	600	DCP6S06145EE00_
180 "		85 x 110	30	2.3	< 70	690	DCP6S06180EF00_
195 "		85 x 120	40	2.4	< 70	700	DCP6S06195E000_
225 "		85 x 132	40	2.4	< 70	850	DCP6S06225E100_
240 "		85 x 140	40	2.5	< 70	880	DCP6S06240EG00_
290 "		116 x 95	40	1.8	< 70	1200	DCP6S06290EN00_
355 "		116 x 110	40	1.8	< 70	1390	DCP6S06355EO00_
390 "		116 x 120	40	1.7	< 70	1510	DCP6S06390EP00_
445 "		116 x 132	40	1.7	< 70	1660	DCP6S06445EQ00_
480 "		116 x 140	40	1.7	< 70	1760	DCP6S06480ER00_

Contacts can handle: peak currents \hat{I} up to 5 kA
surge currents I_S up to 20 kA

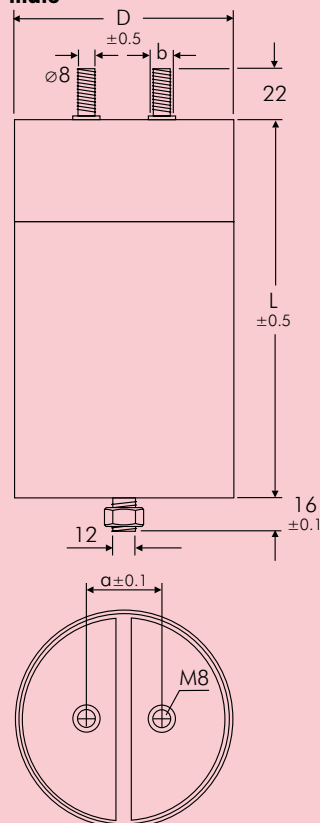
Customer-specific capacitances or voltages on request

* General guide

female



male



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J
Packing: bulk = S
Connection: male = 0M
female = 0F

D	L	a	b	c
85	60	32	12	6
85	76	32	12	6
85	85	32	12	6
85	95	32	12	6
85	110	32	12	6
85	120	32	12	6
85	132	32	12	6
85	140	32	12	6
116	95	50	14	5
116	110	50	14	5
116	120	50	14	5
116	132	50	14	5
116	140	50	14	5

Dims. in mm.

Rights reserved to amend design data without prior notification.

Continuation: Versions with increased dimensioning for higher current carrying capability

General Data

U _R	C _N	D x L mm	I _{rms} (max.)* A	ESR (1 kHz)* mΩ	L _e nH	Approx. weight g	Part number
600 VDC	640 μF	85 x 110	50	1.3	< 50	690	DCHPIO6640EF00_
	920 "	85 x 140	50	1.3	< 50	880	DCHPIO6920EG00_
	1040 "	85 x 155	60	1.3	< 50	980	DCHPIO7104EH00_
	1240 "	85 x 185	60	1.3	< 50	1165	DCHPIO7124EI00_
	1520 "	85 x 210	60	1.2	< 50	1400	DCHPIO7152E200_
	1660 "	85 x 235	60	1.2	< 50	1480	DCHPIO7166EJ00_
	1900 "	85 x 252	60	1.2	< 50	1590	DCHPIO7190EK00_
	2060 "	85 x 260	60	1.2	< 50	1640	DCHPIO7206EL00_
	2490 "	85 x 348	70	1.0	< 50	2190	DCHPIO7249EM00_
	1260 "	116 x 110	80	1.2	< 50	1385	DCHPIO7126EO00_
	1820 "	116 x 140	80	1.2	< 50	1765	DCHPIO7182ER00_
	2060 "	116 x 158	80	1.1	< 50	1990	DCHPIO7206ES00_
	2440 "	116 x 185	80	1.1	< 50	2330	DCHPIO7244ET00_
	3000 "	116 x 215	80	1.0	< 50	2710	DCHPIO7300EU00_
	3280 "	116 x 230	90	1.0	< 50	2900	DCHPIO7328E700_
	3780 "	116 x 255	90	1.0	< 50	3210	DCHPIO7378EV00_
	4060 "	116 x 295	90	1.0	< 50	3720	DCHPIO7406EW00_
	4920 "	116 x 345	100	0.7	< 50	4350	DCHPIO7492EX00_
700 VDC	460 μF	85 x 110	50	1.3	< 50	690	DCHPK06460EF00_
	660 "	85 x 140	50	1.3	< 50	880	DCHPK06660EG00_
	760 "	85 x 155	60	1.2	< 50	980	DCHPK06760EH00_
	900 "	85 x 185	60	1.2	< 50	1165	DCHPK06900EI00_
	1100 "	85 x 210	60	1.2	< 50	1400	DCHPK07110E200_
	1200 "	85 x 235	60	1.2	< 50	1480	DCHPK07120EJ00_
	1380 "	85 x 252	70	1.1	< 50	1590	DCHPK07138EK00_
	1480 "	85 x 260	70	1.1	< 50	1640	DCHPK07148EL00_
	1800 "	85 x 348	80	1.0	< 50	2190	DCHPK07180EM00_
	920 "	116 x 110	80	1.3	< 50	1385	DCHPK06920EO00_
	1320 "	116 x 140	80	1.3	< 50	1765	DCHPK07132ER00_
	1500 "	116 x 158	80	1.3	< 50	1990	DCHPK07150ES00_
	1780 "	116 x 185	80	1.2	< 50	2330	DCHPK07178ET00_
	2180 "	116 x 215	90	1.2	< 50	2710	DCHPK07218EU00_
	2380 "	116 x 230	90	1.0	< 50	2900	DCHPK07238E700_
	2740 "	116 x 255	90	1.0	< 50	3210	DCHPK07274EV00_
	2940 "	116 x 295	90	1.0	< 50	3720	DCHPK07294EW00_
	3570 "	116 x 345	110	0.7	< 50	4350	DCHPK07357EX00_
900 VDC	380 μF	85 x 110	50	1.4	< 50	690	DCHPN06380EF00_
	540 "	85 x 140	50	1.4	< 50	880	DCHPN06540EG00_
	630 "	85 x 155	60	1.3	< 50	980	DCHPN06630EH00_
	720 "	85 x 185	60	1.3	< 50	1165	DCHPN06720EI00_
	900 "	85 x 210	60	1.1	< 50	1400	DCHPN06900E200_
	1000 "	85 x 235	70	1.0	< 50	1480	DCHPN07100EJ00_
	1140 "	85 x 252	70	0.9	< 50	1590	DCHPN07114EK00_
	1240 "	85 x 260	70	0.9	< 50	1640	DCHPN07124EL00_
	1500 "	85 x 348	80	0.7	< 50	2190	DCHPN07150EM00_

Contacts can handle: peak currents \hat{I} up to 10 kA
surge currents I_S up to 40 kA

Customer-specific capacitances or voltages on request

* General guide

Part number completion:

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Connection: male = OM

female = OF

Rights reserved to amend design data without prior notification.

Continuation page 119

Continuation

General Data

U _R	C _N	D x L mm	I _{rms} (max.)* A	ESR (1 kHz)* mΩ	L _e nH	Approx. weight g	Part number
900 VDC	760 μF	116 x 110	80	1.3	< 50	1385	DCHPN06760EO00
	1100 "	116 x 140	80	1.3	< 50	1765	DCHPN07110ER00
	1240 "	116 x 158	80	1,3	< 50	1990	DCHPN07124ES00
	1460 "	116 x 185	80	1.2	< 50	2330	DCHPN07146ET00
	1800 "	116 x 215	90	1.2	< 50	2710	DCHPN07180EU00
	1960 "	116 x 230	90	1.0	< 50	2900	DCHPN07196E700
	2260 "	116 x 255	90	1.0	< 50	3210	DCHPN07226EV00
	2400 "	116 x 295	90	1.0	< 50	3720	DCHPN07240EW00
	2940 "	116 x 345	110	0.7	< 50	4350	DCHPN07294EX00
	1100 VDC	240 μF	85 x 110	50	1.3	< 50	690
340 "		85 x 140	50	1.2	< 50	880	DCHPP06340EG00
400 "		85 x 155	50	1.2	< 50	980	DCHPP06400EH00
460 "		85 x 185	50	1.2	< 50	1165	DCHPP06460EI00
580 "		85 x 210	60	1.2	< 50	1400	DCHPP06580E200
640 "		85 x 235	60	1.1	< 50	1480	DCHPP06640EJ00
720 "		85 x 252	60	1.1	< 50	1590	DCHPP06720EK00
780 "		85 x 260	60	1.2	< 50	1640	DCHPP06780EL00
960 "		85 x 348	80	1.0	< 50	2190	DCHPP06960EM00
480 "		116 x 110	80	1.4	< 50	1385	DCHPP06480EO00
700 "		116 x 140	80	1.3	< 50	1765	DCHPP06700ER00
780 "		116 x 158	80	1.3	< 50	1990	DCHPP06780ES00
940 "		116 x 185	80	1.3	< 50	2330	DCHPP06940ET00
1160 "		116 x 215	90	1.2	< 50	2710	DCHPP07116EU00
1260 "		116 x 230	90	1.2	< 50	2900	DCHPP07126E700
1440 "		116 x 255	90	1.1	< 50	3210	DCHPP07144EV00
1560 "		116 x 295	90	1.0	< 50	3720	DCHPP07156EV00
1890 "	116 x 345	110	0.8	< 50	4350	DCHPP07189EX00	
1300 VDC	170 μF	85 x 110	50	1.3	< 50	690	DCHPR26170EF00
	240 "	85 x 140	50	1.3	< 50	880	DCHPR26240EG00
	270 "	85 x 155	50	1.2	< 50	980	DCHPR26270EH00
	320 "	85 x 185	60	1.2	< 50	1165	DCHPR26320EI00
	400 "	85 x 210	60	1.2	< 50	1400	DCHPR26400E200
	440 "	85 x 235	60	1.1	< 50	1480	DCHPR26440EJ00
	500 "	85 x 252	60	1.1	< 50	1590	DCHPR26500EK00
	540 "	85 x 260	60	1.2	< 50	1640	DCHPR26540EL00
	660 "	85 x 348	80	1.0	< 50	2190	DCHPR26660EM00
	330 "	116 x 110	80	1.4	< 50	1385	DCHPR26330EO00
	480 "	116 x 140	80	1.4	< 50	1765	DCHPR26480ER00
	540 "	116 x 158	80	1.3	< 50	1990	DCHPR26540ES00
	640 "	116 x 185	80	1.3	< 50	2330	DCHPR26640ET00
	780 "	116 x 215	90	1.2	< 50	2710	DCHPR26780EU00
	860 "	116 x 230	90	1.2	< 50	2900	DCHPR26860E700
	980 "	116 x 255	90	1.1	< 50	3210	DCHPR26980EV00
	1060 "	116 x 295	90	1.1	< 50	3720	DCHPR27106EV00
	1290 "	116 x 345	110	0.8	< 50	4350	DCHPR27129EX00

Contacts can handle: peak currents \hat{I} up to 10 kA
surge currents I_S up to 40 kA

Customer-specific capacitances or voltages on request

* General guide

Part number completion:

Tolerance: 20 % = M

10 % = K

5 % = J

Packing: bulk = S

Connection: male = 0M

female = 0F

Rights reserved to amend design data without prior notification.

Continuation page 120

Continuation

General Data

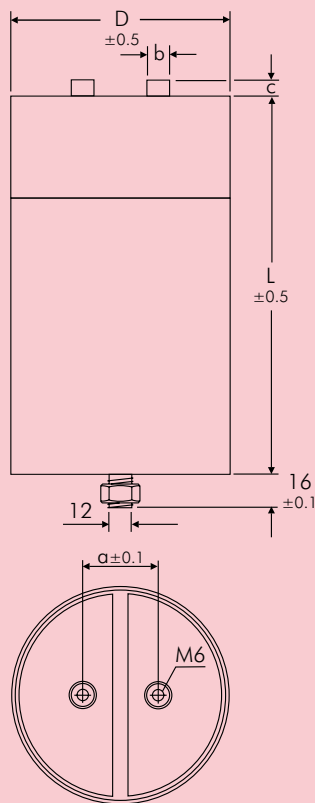
U_R	C_N	D x L mm	I_{rms} (max.)* A	ESR (1 kHz)* m Ω	L_e nH	Approx. weight g	Part number
1500 VDC	150 μ F	85 x 110	50	1,3	< 50	690	DCHPS06150EF00_
	220 "	85 x 140	50	1,3	< 50	880	DCHPS06220EG00_
	240 "	85 x 155	50	1,2	< 50	980	DCHPS06240EH00_
	290 "	85 x 185	60	1,2	< 50	1165	DCHPS06290EI00_
	360 "	85 x 210	60	1,2	< 50	1400	DCHPS06360E200_
	390 "	85 x 235	60	1,1	< 50	1480	DCHPS06390EJ00_
	450 "	85 x 252	60	1,1	< 50	1590	DCHPS06450EK00_
	480 "	85 x 260	60	1,1	< 50	1640	DCHPS06480EL00_
	585 "	85 x 348	80	1,0	< 50	2190	DCHPS06585EM00_
	300 "	116 x 110	80	1,5	< 50	1385	DCHPS06300EO00_
	430 "	116 x 140	80	1,4	< 50	1765	DCHPS06430ER00_
	490 "	116 x 158	80	1,4	< 50	1990	DCHPS06490ES00_
	580 "	116 x 185	80	1,4	< 50	2330	DCHPS06580ET00_
	710 "	116 x 215	90	1,3	< 50	2710	DCHPS06710EU00_
	780 "	116 x 230	90	1,2	< 50	2900	DCHPS06780E700_
	890 "	116 x 255	90	1,2	< 50	3210	DCHPS06890EV00_
	960 "	116 x 295	90	1,1	< 50	3720	DCHPS06960EW00_
	1170 "	116 x 345	110	0,8	< 50	4350	DCHPS07117EX00_

Contacts can handle: peak currents \hat{I} up to 10 kA
surge currents I_S up to 40 kA

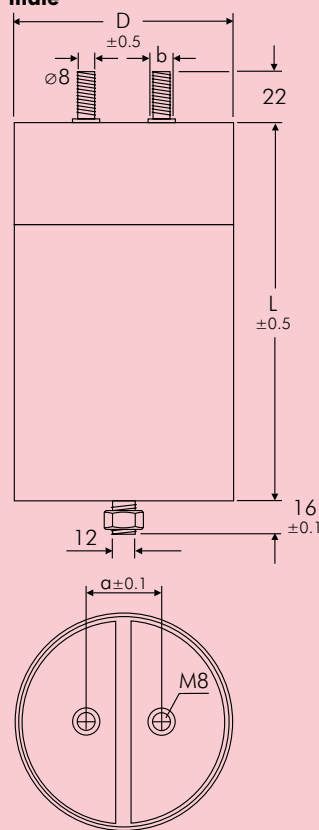
Customer-specific capacitances or voltages on request

* General guide

female



male



Part number completion:

Tolerance: 20 % = M
10 % = K
5 % = J
Packing: bulk = S
Connection: male = OM
female = OF

D	L	a	b	c
85	110	32	12	6
85	140	32	12	6
85	155	32	12	6
85	185	32	12	6
85	210	32	12	6
85	235	32	12	6
85	252	32	12	6
85	260	32	12	6
85	348	32	12	6
116	110	50	14	5
116	140	50	14	5
116	158	50	14	5
116	185	50	14	5
116	215	50	14	5
116	230	50	14	5
116	255	50	14	5
116	295	50	14	5
116	345	50	14	5

Dims. in mm.

Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) - Capacitors for DC-Link Applications

Special Features

- Very high volume/capacitance ratio
- Self-healing, internal safety disconnecter
- Versatile and safe contact configurations by screwable plates
- Dry construction without electrolyte or oil
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC
- Customer-specific capacitances or voltages on request

Typical Applications

As intermediate circuit capacitor e.g. in high power converter technology

Construction

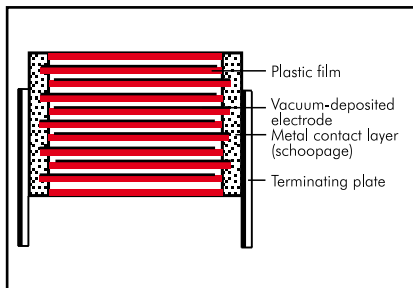
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent resistant, flame-retardant plastic case with resin seal (optional screw fixing) or moulded version (without screw fixing), UL 94 V-0.

Terminations:

Tinned plates, customized plate configurations are possible.

Marking:

Colour: Black. Marking: Gold.

Electrical Data

Capacitance range:

85 μ F to 4500 μ F

Rated voltages:

400 VDC, 800 VDC, 1600 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, ($\pm 5\%$ available subject to special enquiry)

Operating temperature:

-55° C to $+85^{\circ}$ C

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

$\geq 30\,000$ sec ($M\Omega \times \mu$ F)

(mean value: 100 000 sec)

Measuring voltage: 100 V/1 min.

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

See General Data.

Test voltage: 1.1 U_r , 2 sec

Dielectric absorption:

0.05 %

Voltage derating:

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

Reliability:

Operational life > 100 000 hours at 40° C

Failure rate < 36 fit ($10.75 \times U_r$ and 40° C)

Specific dissipation:

See General Data.

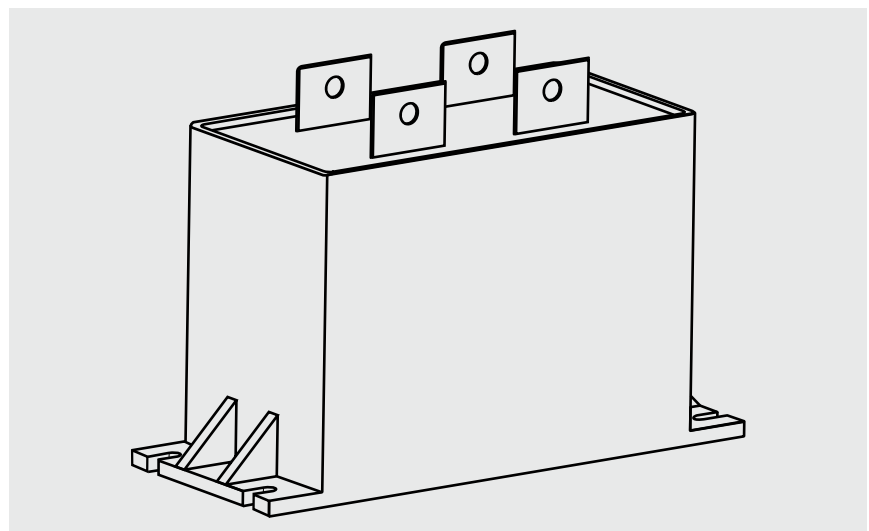
Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors. When fixing the capacitor the screw torque is to be limited to max. 5 Nm.

Packing

Transportation-safe packing in cardboard boxes.

For further details and graphs please refer to Technical Information.



Continuation

General Data

Capacitance			Size	Electrical parameters										Part number
400 VDC/ 180 VAC*	400 VDC/ 180 VAC*	800 VDC/ 360 VAC*	182x94x H in mm	$I_{max.}$ A		I_{rms} (1 kHz)** A		ESR (1 kHz)** mΩ		k_T W/K	$\tan \delta^{**}$ [x 10 ⁻⁴]			
V1	V2	V2	V1	V2	V1	V2	V1	V2		100 Hz	1 kHz			
2x 250 μF	500 μF	125 μF	49	5000	1250	65.4	32.7	1.43	5.73	0.613	8	45	DCH3G06250_00	
2x 500 „	1000 „	250 „	77	10000	2500	103.5	51.7	0.72	2.87	0.767	8	45	DCH3G06500_00	
2x 750 „	1500 „	375 „	105	15000	3750	139.0	69.5	0.48	1.91	0.922	8	45	DCH3G06750_00	
2x 1000 „	2000 „	500 „	133	20000	5000	173.3	86.7	0.36	1.43	1.076	8	45	DCH3G07100_00	
2x 1250 „	2500 „	625 „	161	25000	6250	196.7	98.3	0.32	1.27	1.231	11	50	DCH3G07125_00	
2x 1500 „	3000 „	750 „	189	30000	7500	228.5	114.3	0.27	1.06	1.385	11	50	DCH3G07150_00	
2x 1750 „	3500 „	875 „	217	35000	8750	248.1	124.1	0.25	1.00	1.540	11	55	DCH3G07175_00	
2x 2000 „	4000 „	1000 „	245	40000	10000	278.3	139.2	0.22	0.88	1.695	14	55	DCH3G07200_00	
2x 2250 „	4500 „	1125 „	285	45000	11250	298.7	157.4	0.21	0.76	1.893	14	60	DCH3G07225_00	

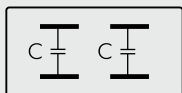
Capacitance			Size	Electrical parameters										Part number
800 VDC/ 240 VAC*	800 VDC/ 240 VAC*	1600 VDC/ 480 VAC*	182x94x H in mm	$I_{max.}$ A		I_{rms} (1 kHz)** A		ESR (1 kHz)** mΩ		k_T W/K	$\tan \delta^{**}$ [x 10 ⁻⁴]			
V1	V2	V2	V1	V2	V1	V2	V1	V2		100 Hz	1 kHz			
2x 170 μF	340 μF	85 μF	49	3740	935	61.2	30.6	1.64	6.55	0.613	7	35	DCH4L06170_00	
2x 340 „	680 „	170 „	77	7480	1870	96.8	48.4	0.82	3.28	0.767	7	35	DCH4L06340_00	
2x 510 „	1020 „	255 „	105	11220	2805	129.9	65.0	0.55	2.18	0.922	7	35	DCH4L06510_00	
2x 680 „	1360 „	340 „	133	14960	3740	162.1	81.0	0.41	1.64	1.076	7	35	DCH4L06680_00	
2x 850 „	1700 „	425 „	161	18700	4675	181.3	90.7	0.37	1.50	1.231	10	40	DCH4L06850_00	
2x 1020 „	2040 „	510 „	189	22440	5610	210.7	105.3	0.31	1.25	1.385	10	40	DCH4L07102_00	
2x 1190 „	2380 „	595 „	217	26180	6545	226.2	113.1	0.30	1.20	1.540	10	45	DCH4L07119_00	
2x 1360 „	2720 „	680 „	245	29920	7480	253.7	126.9	0.26	1.05	1.695	12	45	DCH4L07136_00	
2x 1530 „	3060 „	765 „	285	33660	8415	269.8	134.9	0.26	1.04	1.893	12	50	DCH4L07153_00	

* AC voltages: $f < 50$ Hz

Customized solutions can be realized on request

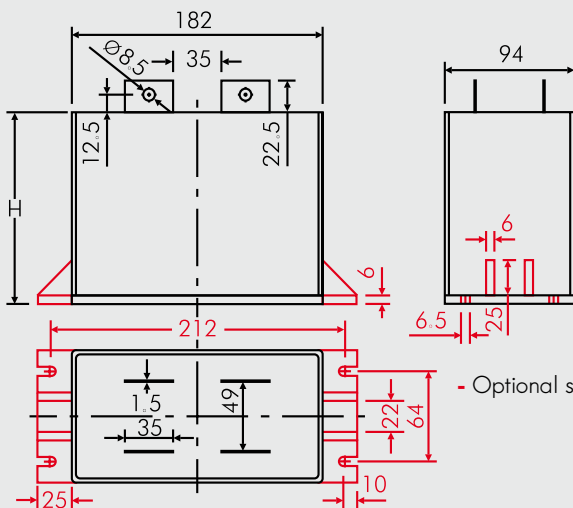
** General guide

The capacitors will be delivered without interconnection.



Insulated in the sense of a breakdown voltage of $2 \times U_r$ between the individual capacitors.

External wiring versions (to be implemented by user):



- Optional screw fixing

Part number completion:					
W	Size		Part number code for digit 11-12		
	H	L	moulded	boxed	box with screw fixing
94	49	182	H0	I0	J0
94	77	182	H1	I1	J1
94	105	182	H2	I2	J2
94	133	182	H3	I3	J3
94	161	182	H4	I4	J4
94	189	182	H5	I5	J5
94	217	182	H6	I6	J6
94	245	182	H7	I7	J7
94	285	182	H8	I8	J8

Tolerance: 20 % = M
10 % = K
5 % = J
Packing: bulk = S
Pin length: none = 00

Rights reserved to amend design data without prior notification.

Metallized Polypropylene (PP) - Capacitors for Hybrid Drives

Special Features

- Very high volume/capacitance ratio
- Self-healing, internal safety disconnecter
- Safe contact configuration by screwable plates
- Dry construction without electrolyte or oil
- Very low dissipation factor
- Negative capacitance change versus temperature
- Very low dielectric absorption
- According to RoHS 2011/65/EC
- Customer-specific capacitances or voltages on request

Typical Applications

As intermediate circuit capacitor e.g. in hybrid drives

Construction

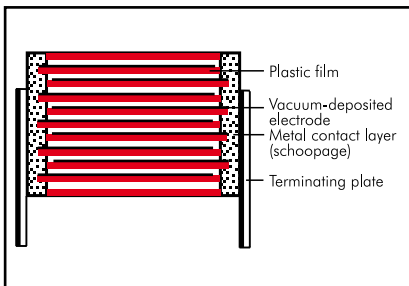
Dielectric:

Polypropylene (PP) film

Capacitor electrodes:

Vacuum-deposited

Internal construction:



Encapsulation:

Solvent-resistant, flame-retardant plastic case with PU seal, UL 94 V-0

Terminations:

Tinned plates

Marking:

Colour: Black. Marking: Gold.

Electrical Data

Capacitance range:

500 μ F

Rated voltage:

450 VDC

Capacitance tolerances:

$\pm 20\%$, $\pm 10\%$, ($\pm 5\%$ available subject to special enquiry)

Operating temperature range:

-55° C to $+85^{\circ}$ C (hot spot $\leq +110^{\circ}$ C in combination with a heatsink)

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

$\geq 10\,000$ sec ($M\Omega \times \mu$ F)

(mean value: 50 000 s)

Measuring voltage: 100 V/1 min.

Dielectric loss factor $\tan \delta_0$: 2×10^{-4}

Test voltage: $1.3 U_r$, 2sec

Dielectric absorption: 0.05 %

Voltage derating:

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

Reliability:

Operational life > 100 000 hours at 40° C

Failure rate < 36 fit ($0.75 \times U_r$ and 40° C)

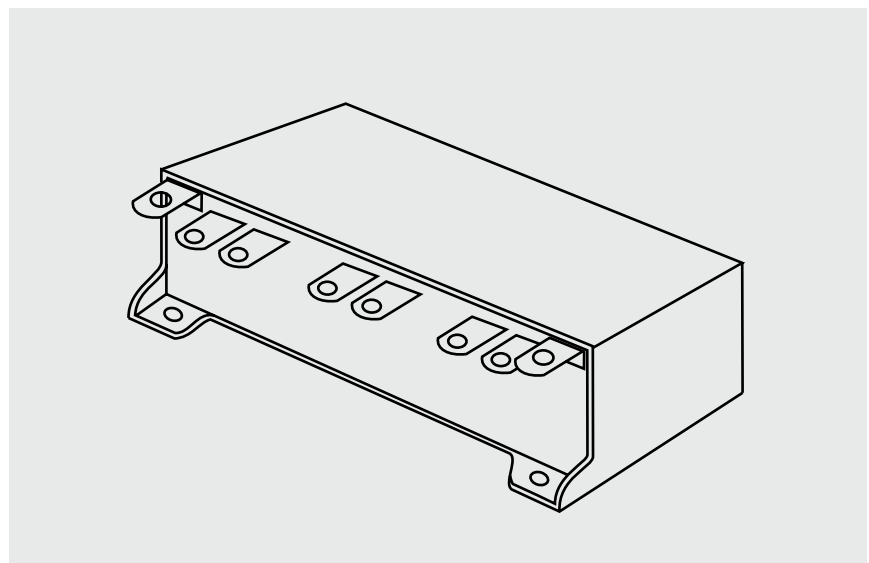
Mounting Recommendation

Excessive mechanical strain, e.g. pressure or shock onto the capacitor body, is to be avoided during mounting and usage of the capacitors. When fixing the capacitor the screw torque is to be limited to max. 5 Nm.

Packing

Transport-safe packing in cardboard boxes.

For further details and graphs please refer to Technical Information.



Continuation

General Data

Capacitance	U_R	I_{max} A	I_{rms}^* A	L_e nH	ESR* m Ω	Approx. weight g	Part number
500 μ F	450 VDC	5000	120**	< 15	0.8**	1400	DCHYH06500IT00_-----

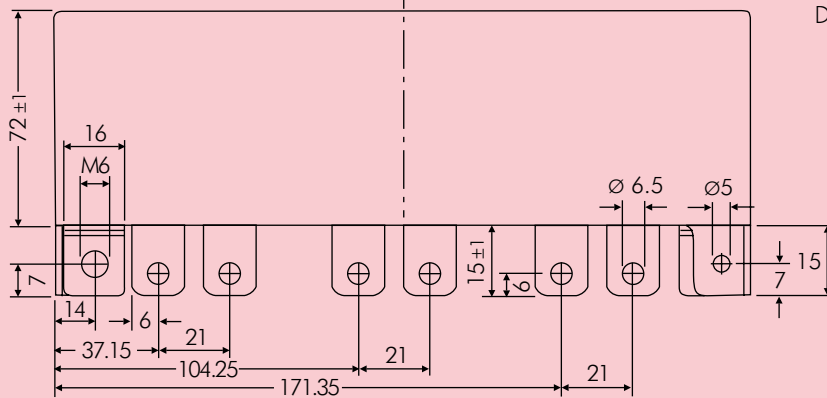
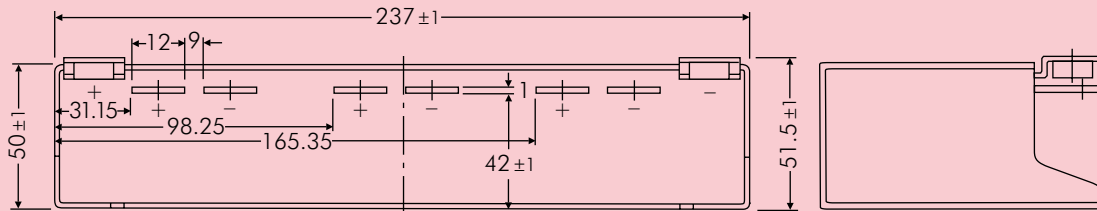
* $f = 1\text{ kHz}$

Customized solutions can be realized on request

** General guide

Part number completion:

Tolerance: 20 % = M
 10 % = K
 5 % = J
 Packing: bulk = S
 Pin length: none = 00



Dims. in mm.

Rights reserved to amend design data without prior notification.

WIMA Customized Capacitors for Intermediate Circuit Applikations



WIMA DC-LINK HC
WIMA DC-LINK HY

- ▷ Size
- ▷ Capacitance
- ▷ Voltage
- ▷ Connection
- ▷ Casing

WIMA Double-Layer Capacitors and Modules with Capacitances in the Farad Range



inductivity. Beyond that this series offers options to conveniently substitute brands of other manufacturers.

WIMA SuperCap R in rectangular case make space-saving serial and parallel arrays possible. Undesired cavities can be avoided, and the energy density can almost be doubled depending on the construction. The WIMA SuperCap R has a laser welded sealing withstanding the permissible temperature range from -30°C to $+65^{\circ}\text{C}$ without problems. Due to the large case surfaces of the cells heat being generated by the continuous current flow can better be drawn off.

All WIMA SuperCap cells will be offered with plastic-sheathed insulation of high electric strength up to 300 V. Additional insulation is to be provided for applications with higher voltages.

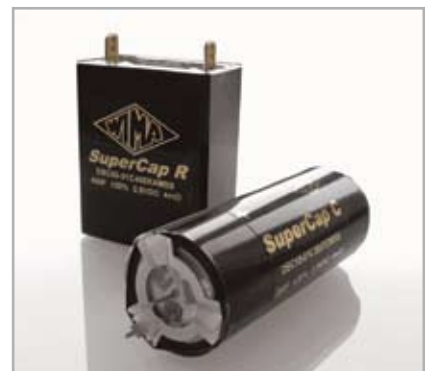
Cascaded and balanced WIMA SuperCap Modules are available in different versions, e.g. with capacitance values up to 840 F or with rated voltages up to 112 VDC as standard packages. Customized solutions can be realized on demand.

WIMA SuperCap Modules replace, protect or support batteries in the context of new traction technologies e.g. in automotive, railway systems, wind power mills or in uninterruptible power supplies (UPS).

- WIMA SuperCap C**
- WIMA SuperCap C60**
- WIMA SuperCap MC**
- WIMA SuperCap R**
- WIMA SuperCap MR**

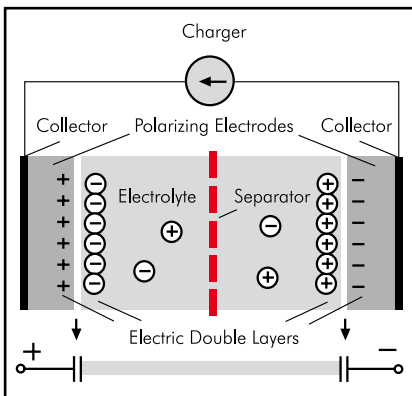
The Double-Layer Capacitors developed by WIMA are storage capacitors with highest capacitance values in the Farad range. They are among others suited to serve as batteries, can deliver considerably higher currents for a short time, and are maintenance-free.

WIMA SuperCap C and C60 with cylindrical construction can be manufactured more efficiently since there are technically mature production processes of well established products, e.g. electrolytic capacitors, which can be used as a guidance. Moreover, round cells in constructive terms permit an improved symmetrical arrangement of the current path in the cell playing an important role in the high current field (several 1000 A as a peak) because of electromagnetic phenomena e.g. the proximity effect and path



Construction Principle

The construction principle of a Double-Layer Capacitor can be described as a plate capacitor where the most important aim is to obtain electrodes with an extremely large surface. For this purpose activated carbon is ideally suited, as it allows to achieve capacitance values of up to 100 F/g of active mass of the electrode. The electrolyte, the conductive liquid between the electrodes is a conducting salt dissolved in an organic solvent which permits to apply voltages of 2.5V up to 2.7V.



Construction principle of the WIMA Double-Layer Capacitor

The actual double-layer consists of ions which, when voltage is applied, attach to the positive or negative electrode corresponding to their opposite poles and thus create a dielectric gauge of a few Angstrom only. This results in a very high capacitance yield caused by the very huge surface of the electrode in accordance with the formula

$$C = \epsilon \times \frac{\text{Surface}}{\text{Distance}}$$

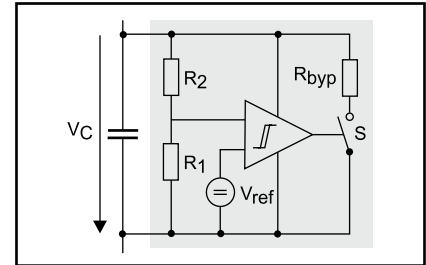
To visualise this, the internal surface of a Double-Layer Capacitor would cover several football pitches.

A permeable diaphragm acting as a separating layer and called separator avoids short-circuit between the two electrodes and considerably influences the characteristics of the capacitor. Charge or discharge of the Double-Layer Capacitor is combined with the transformation of the layers in the electrical field and thus with the movement of the charge carriers in the solvent - even through the separator film.

This phenomenon represents the main reason for the modest AC voltage capability and the steep decrease of capacitance versus frequency exhibited by Double-Layer Capacitors.

Cascaded SuperCap Modules

Several SuperCap cells can be built up to enormous capacitances of the desired voltage by means of series or parallel connection (cascade). When cascading SuperCaps, the voltage of single cells must not exceed permanently 2.5V (decomposition of the electrolyte!) Hence, series connections need in any case to be balanced since a possibly slightly different aging of the individual cells due to temperature may over time cause deviating capacitances and thus different voltage drops at the cell. The balancing will be factory-mounted into a module. This can be made passively and in a cost-efficient way by simple resistors in those cases where additional losses as bypass current through the balancing resistors can be tolerated by the application. Alternatively, an active balancing can be made by keeping each cell at a certain voltage by means of a reference source. That means if the comparator circuit detects a commencing overload of any cell individual discharge is initiated by a bypass resistor. Except the current needed for the voltage divider and the minimal leakage current of the cells there are no considerable losses created during active balancing.

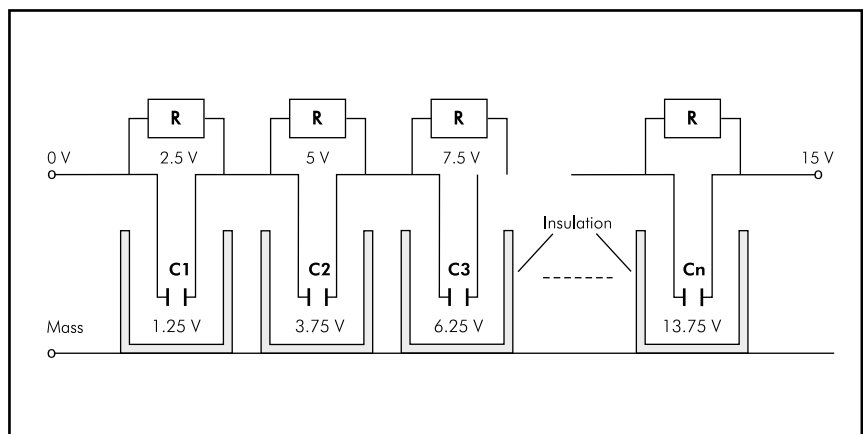


Active balancing.

Comparator compares voltage at the capacitor by a reference voltage and switches in order to discharge through a bypassing resistor until overvoltage has declined.

Operational Life

For physical reasons it is unavoidable that Double-Layer Capacitors are subjected to aging which follows the logarithmic dependence of voltage applied and ambient temperature (Arrhenius behaviour) that can be observed with other components, too. However, continuous studies have shown that WIMA products exhibit a significantly improved behaviour in terms of life time being achieved by a laser-welded, hermetically sealed construction of the cells in metal cases which makes penetration from outside impossible; they cannot dry up and can withstand a certain thermal expansion movement. Only by this innovation one can consider the component being suitable for long-year maintenance-free application.



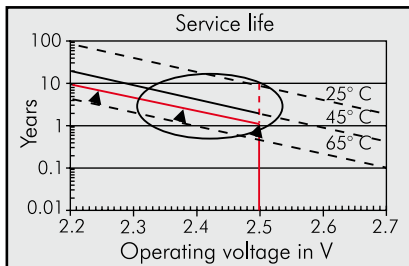
Passive balancing.

Without resistors: U reciprocal-effect to C - thus locale overvoltage easily can occur

With resistors: U proportional-effect to R - thus voltage is fixed

Technical Data and Applications of WIMA Double-Layer Capacitors (Continuation)

When properly treated WIMA SuperCaps have a service life beyond 10 years and can easily sustain more than 500.000 charge/discharge cycles. The efficiency is far higher than 90%.



Life time expectancy for WIMA SuperCaps

Advantages in Comparison with other Energy Storage Solutions

WIMA SuperCaps are showing following advantages in comparison with other energy storage solutions:

- **Low internal resistance (less than 1/10 of what a usual battery exhibits)**
- **Release of high currents (10 to 100 times more than batteries)**
- **Maintenance-free operation**
- **No risk of damage due to complete discharge of the component**
- **High life expectancy**
- **Usage in isolated systems, e.g. inaccessible areas, is unproblematic**
- **Comparatively low weight**

WIMA Double-Layer Capacitors are particularly suitable in applications where high and even highest currents - not in pure AC operation - occur. By combining the advantage of conventional capacitors as fast suppliers of electricity with that of batteries as notable energy reservoirs the SuperCap represents the link between battery and conventional capacitor.

	Standard Capacitor	SuperCap	Battery
Capacitance per Surface	<1 $\mu\text{F}/\text{cm}^2$	1000 000 μF (1 F/cm ²)	
Energy-density	<0.01 Wh/kg	<10 Wh/kg	100 Wh/kg
Power-density	<0.1 kW/kg	>1 kW/kg	0.1 kW/kg

Application Examples

In general Double-Layer Capacitors are applied for voltage support, for saving or for replacing conventional battery or charger solutions. The typical application is the quick supply of several 100A to 1000A in the direct current field.

Slip Control in Wind Power

In large-scale wind turbine systems, slip controllers are used to control the rotation speed by altering the angle of the rotor blades. The drives are mains-independent and if electrically controlled use the energy stored in batteries or double-layer capacitors. These storage devices have to meet stringent requirements. During winter time the temperatures in the wind tower top housing often reach around -40°C , and during summer time they may easily go up to more than $+60^\circ\text{C}$ during operation. The current of 200A necessary for the breakaway torque of e.g. a 3 kW motor presents big problems to batteries due to the ambient conditions described. Their short life time and frequently necessary maintenance renders them unsatisfactory. However, when properly dimensioned, modern SuperCap solutions enable a maintenance-free usage of the electrical storage device of minimum 10 years.

Start of Micro-Turbines, Fuel Cells or Diesel-Electric Generator working as Power Set

For micro-turbines driven with natural gas for generation of electrical energy on oil platforms, in part also for gas pumping stations, in sensible areas like hospitals and huge factories the use of SuperCap modules to replace conventional starter batteries (by experience needing replacement every 2 to 3 years) is the optimum choice. Usually about 300 kJ of electrical energy at a system voltage of 240V are needed for a turbine start-up time of 10 to 20 s.

When starting special micro-turbines or for bridging during start of a fuel cell working as emergency power supply, generally a few 100 kJ of electrical energy are required for a system start time of approx. 10 to 20 sec. The stored energy time is approximately 20 s. Due to the system voltage of 48 V, 22 cells of 1200 F are cascaded in a

module to achieve the setpoint voltage in order to replace a battery block.

For start-up of generators for energy supply of autonomous telecommunication stations which are located decentrally in a tight network but supplied with fuel the new double-layer capacitors would provide a solution. Right now tests are run with 14V series connections (70 to 100 F) which should render a maintenance-free service. After three starting processes in a sequence their energy with 300 to 500 A each flowing (depending on the size of the motor) is used up. The now running generator, however, immediately supplies them with electrical energy again.

Starting huge Railway, Naval or Truck Motors

The start of V16 or V24 cylinder motors (6000 kW), e.g. for generator drives of diesel-electric trains or start of a naval diesel engine requires considerably high currents. 1300A are quite usual which can be covered by capacitor units of 450 to 600 F at 28V. Frequently the crankshaft is turned by two starters on both sides (e.g. 7 kW each with a positive switch off after 9 s for 2 min), in order to avoid torsion of the huge mass. The low total internal resistance of less than $3\text{ m}\Omega$ which is beyond reach for batteries the capacitor solution is outstanding.

Recuperation of Braking Energy

In times of resource shortage of fuel the highest possible recuperation of braking energy is a challenging aim. While recuperation in electric train drives or in hybrid busses is already practiced since long, for non-mains connected vehicles the energy recuperation to the on-board battery has only be realized to the extent of few per cent. The basic reason is the charge current limitation of batteries where the recuperable energy is obtained at very high currents in a scope of milliseconds. If for example 1 ton shall be decelerated from 100 km/h to 0 km/h 400 kJ are released, for 10 tons it is ten times as much. So far no suitable high-energy storage devices were available (guideline values: 500 A to 1000 A). This is the domain of the new SuperCaps since in the foreseeable future even most modern battery systems will not be in a position to cope with such energy.

Double-Layer Capacitors in Cylindrical Metal Case with very High Capacitances in the Farad Range

Special Features

- Storage capacitors with very high capacitance values from 110 F to 6500 F and a rated voltage of 2.5 VDC
- Discharge current up to 5000 A
- Maintenance-free
- With cylindrical metal case
- Series connection possible
- According to RoHS 2011/65/EC

Construction

Encapsulation:

Cylindrical aluminium case

Terminations: Lug terminals (solder pin/4: 110 F - 200 F), metal plates (600 F - 1200 F) or weld terminals (2700 F - 6500 F)

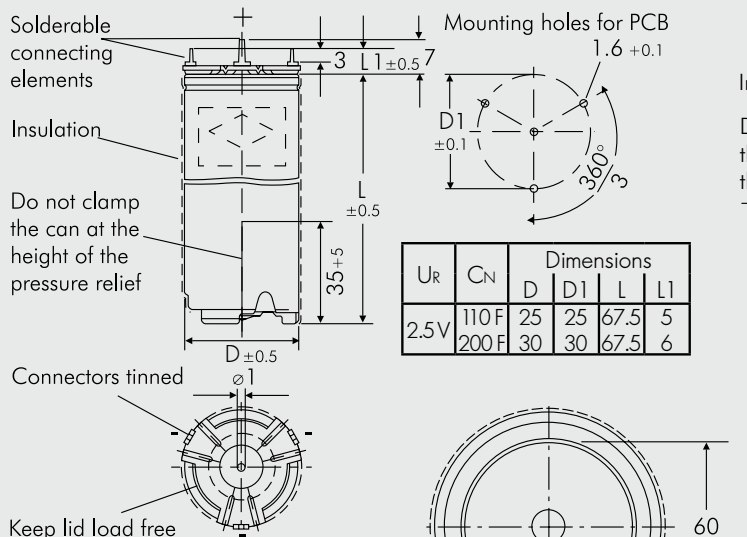
Marking:

Colour: Black. Marking: Gold

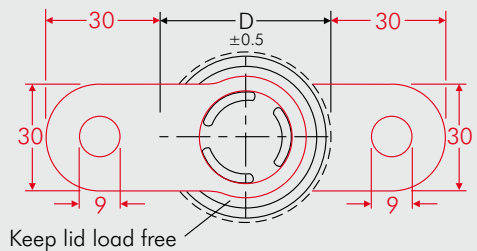
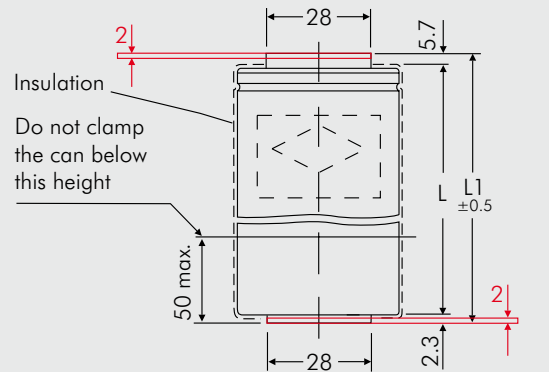
General Data

U _R	C _N	Dimensions		Part number	Typical applications
		D	L		
2.5 V	110 F	25	67.5	SCSCA1B110ZA00MV00	- Automotive - Railway technology - Wind power systems - Uninterruptible power systems (UPS) - Industry
	200 F	30	67.5	SCSCA1B200ZB00MV00	
	600 F	50	75	SCSCA1B600ZD00MV__	
	1200 F	50	101	SCSCA1C120ZC00MV__	
	2700 F	75	105	SCSCA1C270ZE00MV00	
	5000 F	100	105	SCSCA1C500ZG00MV00	
	6500 F	100	130	SCSCA1C650ZH00MV00	

The extension of the SuperCap C range offer the possibility of achieving nearly every capacitance or voltage value by cascading of the cells. The cost-effective manufacturing of the components in cylindrical cases enables convenient substitution of other brands.



U _R	C _N	Dimensions			
		D	D1	L	L1
2.5V	110 F	25	25	67.5	5
	200 F	30	30	67.5	6



U _R	C _N	D	L	L1
2.5V	600 F	50	67	75
	1200 F	50	93	101

- Laser welded aluminium plates for series or parallel connection (cascading) of the single cells (optional).

Part number completion:	
Standard:	= 00
Aluminium plates:	= 0L

U _R	C _N	Dimensions	
		D	L
2.5V	2700 F	75	105
	5000 F	100	105
	6500 F	100	130

Rights reserved to amend design data without prior notification.

Continuation

Technical Data

Capacitance:	C _N	110 F	200 F	600 F	1200 F
Capacitance tolerance:	-	±20%		±20%	
Rated voltage:	U _R	2.5 V		2.5 V	
Rated current:	I _C	30 A	45 A	400 A	650 A
Pulse current:	I _P	up to 220 A	up to 400 A	up to 1400 A	up to 2400 A
Internal resistance:	R _{DC}	9 mΩ	6 mΩ	1.2 mΩ	0.5 mΩ
Max. stored energy: ±20%	E _{max.}	0.344 kJ	0.625 kJ	1.875 kJ	3.750 kJ
Operating temperature:	T _{op}	-30° C ... +65° C		-30° C ... +65° C	
Storage temperature:	T _{st}	-40° C ... +70° C		-40° C ... +70° C	
Weight:	m	40 g	65 g	170 g	235 g
Volume:	V	0.034 l	0.056 l	0.13 l	0.18 l

Additional Data

Case:	-	Al _{99.5}	Al _{99.5}
Terminations:	-	Solder pin/4 lug terminals	Screw terminals M8 x 2

Comparative Data

Lifetime:					
in hours ¹⁾	h	90 000		90 000	
in cycles ²⁾	Cycles	500 000		500 000	
Energy density:					
gravimetric	E _d	2.4 Wh/kg	2.7 Wh/kg	3 Wh/kg	4.6 Wh/kg
volumetric	E _v	2.8 Wh/l	3.1 Wh/l	3.7 Wh/l	9.5 Wh/l

¹⁾ Requirements:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

²⁾ Test conditions:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value

(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Continuation page 131

Continuation

Technical Data

Capacitance:	C _N	2700 F	5000 F	6500 F
Capacitance tolerance:	–	±20%		
Rated voltage:	U _R	2.5 V		
Rated current:	I _C	900 A	1000 A	1000 A
Pulse current:	I _P	up to 4000 A	up to 5000 A	up to 5000 A
Internal resistance:	R _{DC}	0.3 mΩ	0.2 mΩ	0.18 mΩ
Max. stored energy: ±20%	E _{max.}	7.5 kJ	15 kJ	18 kJ
Operating temperature:	T _{op}	–30° C ... +65° C		
Storage temperature:	T _{st}	–40° C ... +70° C		
Weight:	m	620 g	1000 g	1250 g
Volume:	V	0.46 l	0.83 l	1.0 l

Additional Data

Case:	–	Al _{99.5}
Weld terminations:	–	∅ 60

Comparative Data

Lifetime:				
in hours ¹⁾	h	90 000		
in cycles ²⁾	Cycles	500 000		
Energy density:				
gravimetric	E _d	3.6 Wh/kg	4.2 Wh/kg	4.3 Wh/kg
volumetric	E _v	4.8 Wh/l	5 Wh/l	5.2 Wh/l

1) Requirements:
 $|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

2) Test conditions:
 $|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value
 (cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Double-Layer Capacitor Modules Based on SuperCap C Cylindrical Cells

Special Features

- Storage capacitor modules with very high capacitance values of 300 F and 600 F and a rated voltage of 5 VDC
- Discharge current up to 2000 A
- Maintenance-free
- Series connected
- Actively or passively balanced
- According to RoHS 2011/65/EC

Construction

Encapsulation: Aluminium case

Terminations: Metal plates

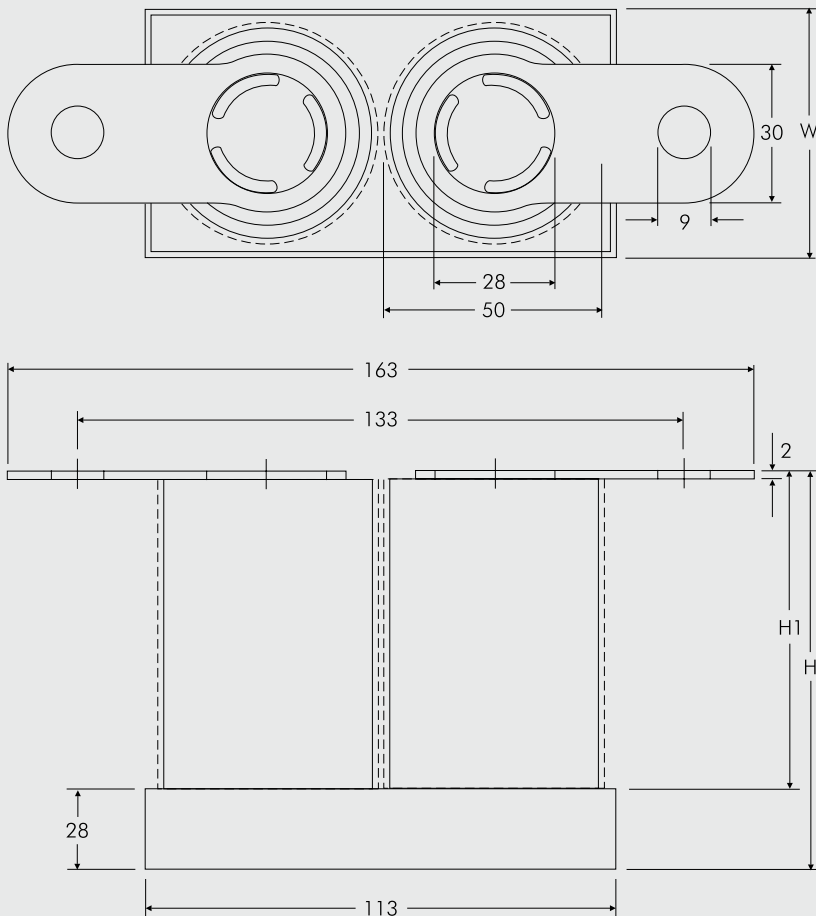
Marking: Colour: Black.

Marking: Gold

General Data

U _R	C _N	Dimensions			Part number	Typical applications
		W	H	L		
5 V	300 F	60	84	113	MCTCA6B300MH00MV00	- Automotive - Railway technology - Wind power systems - Uninterruptible power supply (UPS) - Industry
	600 F	60	110	113	MCTCA6B600MH00MV00	

The new range of SuperCap modules offers the possibility to achieve higher capacitances and/or voltages by simple cascading. Customized solutions can be realized on request.



Dims in mm.

U _R	C _N	Dimensions			
		W	H	H1	L
5 V	300 F	60	84	56	113
	600 F	60	110	81	113

Rights reserved to amend design data without prior notification.

Continuation

Technical Data

Capacitance:	C _N	300 F	600 F
Capacitance tolerance:	–	±20%	
Rated voltage:	U _R	5 V	
Rated current:	I _C	400 A	650 A
Pulse current:	I _P	up to 1000 A	up to 2000 A
Internal resistance:	R _{DC}	1.5 mΩ	1 mΩ
Max. stored energy: ±20%	E _{max.}	3600 J	7500 J
Operating temperature:	T _{op}	–30° C ... +65° C	
Storage temperature:	T _{st}	–40° C ... +70° C	
Weight:	m	525 g	620 g
Volume:	V	0.41 l	0.51 l

Additional Data

Case:	–	Aluminium
Terminations:	–	Metal plates

Comparative Data

Lifetime:			
in hours ¹⁾	h	90 000	
in cycles ²⁾	Cycles	> 800 000	
Energy density:			
gravimetric	E _d	1.9 Wh/kg	3.4 Wh/kg
volumetric	E _v	2.4 Wh/l	4.1 Wh/l

1) Requirements:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

2) Test conditions:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value
(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Double-Layer Capacitor Modules Based on SuperCap C Cylindrical Cells

Special Features

- Storage capacitor modules with very high capacitance values from 55 F to 200 F and rated voltages of 14 VDC and 28 VDC
- Discharge current up to 2400 A
- Maintenance-free
- Series connected
- Actively balanced
- According to RoHS 2011/65/EC

Construction

Encapsulation: PU plastic case

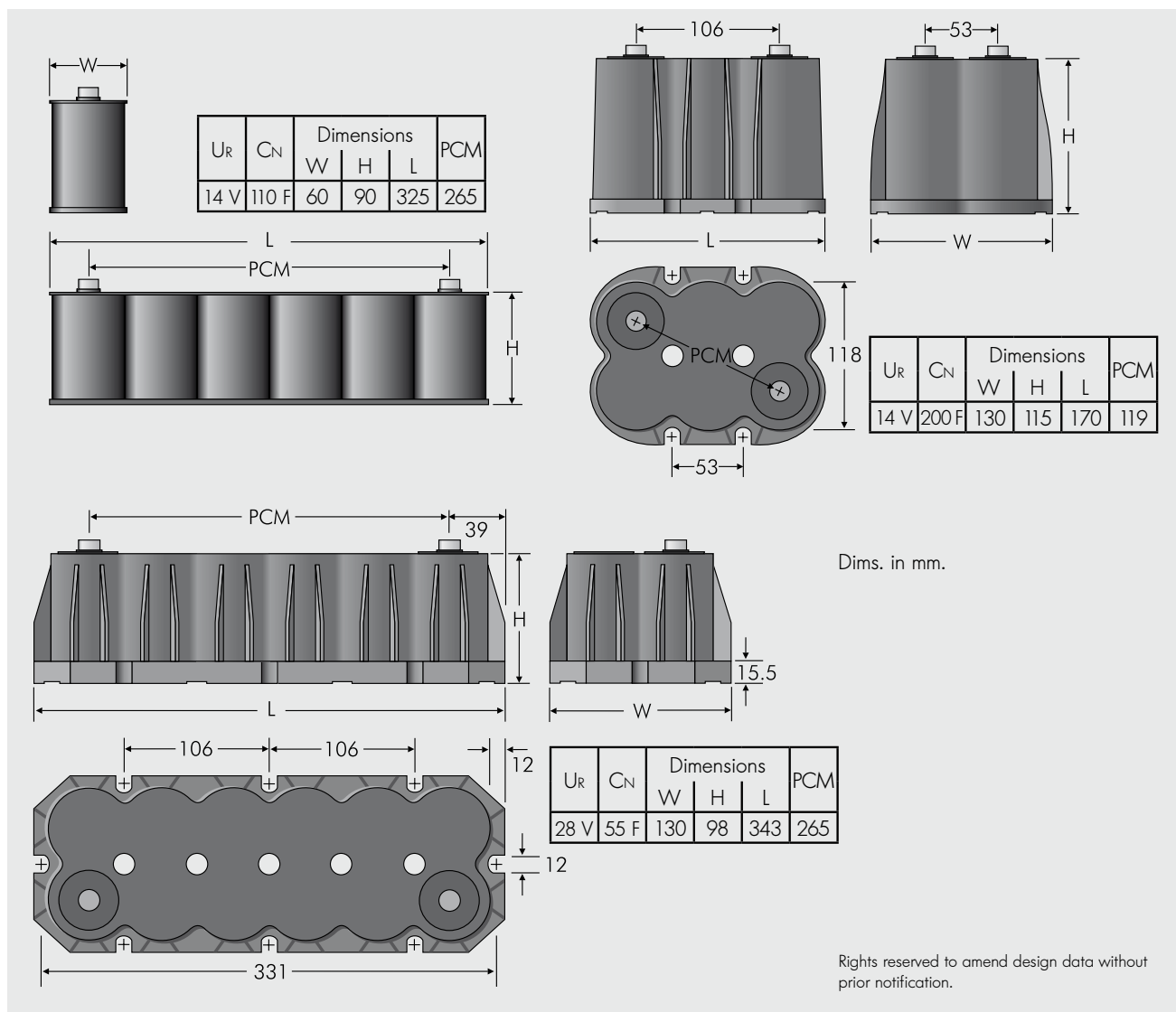
Terminations: Screw terminals M8 x 12

Marking: Colour: Black. Marking: Gold

General Data

U _R	C _N	Dimensions			PCM	Part number	Typical applications
		W	H	L			
14 V	110 F	60	90	325	265	MCMPA3B110MP00MV00	- Automotive - Railway technology - Wind power systems - Uninterruptible power supply (UPS) - Industry
	200 F	130	115	170	119	MCMPA3B200MP00MV00	
28 V	55 F	130	98	343	265	MCMPA4A550MP00MV00	

SuperCap modules of the „Multipurpose“ range are standard devices which can be used for support, protection or replacement of conventional batteries in a large number of applications.



Continuation

Technical Data

Capacitance:	C _N	110 F	200 F	55 F
Capacitance tolerance:	–	±20%	±20%	±20%
Rated voltage:	U _R	14 V	14 V	28 V
Rated current:	I _C	400 A	650 A	400 A
Pulse current:	I _P	up to 1400 A	up to 2400 A	up to 1400 A
Internal resistance:	R _{DC}	7 mΩ	3 mΩ	14 mΩ
Max. stored energy: ±20%	E _{max.}	11 kJ	20 kJ	22 kJ
Operating temperature:	T _{op}	–30° C ... +65° C	–30° C ... +65° C	–30° C ... +65° C
Storage temperature:	T _{st}	–40° C ... +70° C	–40° C ... +70° C	–40° C ... +70° C
Weight:	m	1700 g	2200 g	3400 g
Volume:	V	1.5 l	2.2 l	3 l

Additional Data

Case:	–	PU	PU	PU
Screw terminals:	–	M8 x 12	M8 x 12	M8 x 12
Tightening torque:	–	10 Nm	10 Nm	10 Nm

Comparative Data

Lifetime:				
in hours ¹⁾	h	90 000	90 000	90 000
in cycles ²⁾	Cycles	500 000	500 000	500 000
Energy density:				
gravimetric	E _d	1.5 Wh/kg	2.5 Wh/kg	1.5 Wh/kg
volumetric	E _v	1.85 Wh/l	2.5 Wh/l	1.85 Wh/l

1) Requirements:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

2) Test conditions:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value
(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Double-Layer Capacitor Modules Based on SuperCap C Cylindrical Cells

Special Features

- Storage capacitor modules with very high capacitance values from 12 F to 840 F and rated voltages from 14 VDC to 112 VDC
- Discharge current up to 5000 A
- Maintenance-free
- Series connected
- Actively or passively balanced
- According to RoHS 2011/65/EC

Construction

Encapsulation: Metal case IP65

Terminations:

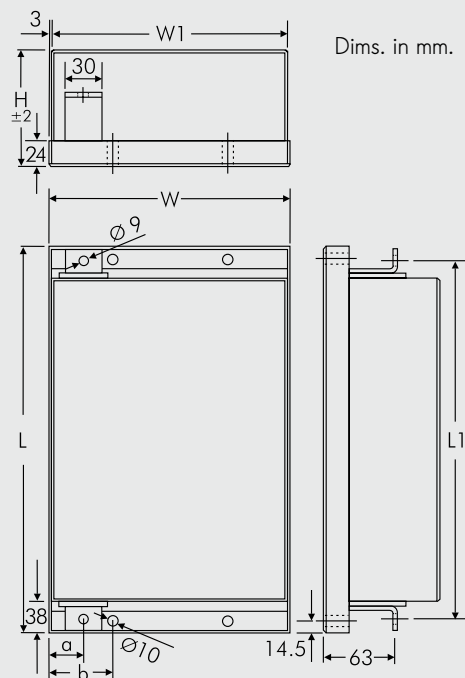
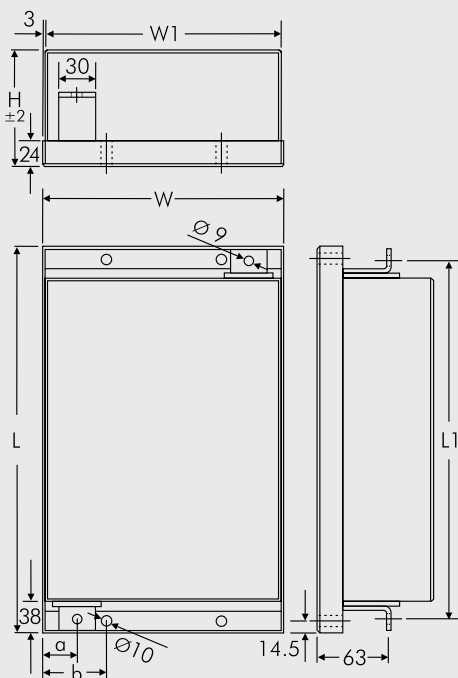
Aluminium lug terminals

Marking: Colour: Black. Marking: Gold

SuperCap modules of the „Powerblock“ range have a modular design. Customized solutions can be realized on request.

General Data

U _R	C _N	Dimensions			Part number	Typical applications
		W	H	L		
14 V	110 F	119	88	242	MCPBA3B110MC00MV00	- Motor start - Boardnet stabilisation
	200 F	119	111	242	MCPBA3B200MC00MV00	
	420 F	169	116	317	MCPBA3B420MC00MV00	
	840 F	219	116	390	MCPBA3B840MC00MV00	
28 V	55 F	172	88	295	MCPBA4A550MC00MV00	- Motor start - Boardnet stabilisation - Railway technology - Telecommunication
	100 F	172	111	295	MCPBA4B100MC00MV00	
	230 F	255	116	400	MCPBA4B230MC00MV00	
	420 F	329	116	500	MCPBA4B420MC00MV00	
56 V	28 F	228	88	404	MCPBB1A280MC00MV00	- Recuperation - DC intermediate circuits - UPS - Wind power systems - Industry
	50 F	228	111	404	MCPBB1A500MC00MV00	
	115 F	324	116	500	MCPBB1B115MC00MV00	
	210 F	435	116	706	MCPBB1B210MC00MV00	
112 V	12 F	335	88	500	MCPBD4A120MC00MV00	- Industry - DC intermediate circuits
	24 F	335	111	500	MCPBD4A240MC00MV00	



U _R	C _N	W1	L1	a	b
14 V	110 F	113	203	33	60
	200 F	113	203	33	60
	420 F	163	204	45.5	85
	840 F	213	254	58	110
28 V	55 F	169	269	33	60
	100 F	169	269	33	60
	230 F	247	371	45.5	85
	420 F	321	471	58	110

U _R	C _N	W1	L1	a	b
56 V	28 F	222	375	33	60
	50 F	222	375	33	60
	115 F	321	471	45.5	85
	210 F	429	677	58	110
112 V	12 F	327	265	33	60
	24 F	327	265	33	60

Rights reserved to amend design data without prior notification.

Continuation

Technical Data

Capacitance:	C _N	110 F	200 F	420 F	840 F	55 F	100 F	230 F	420 F
Capacitance tolerance:	-	±20%				±20%			
Rated voltage:	U _R	14 V				28 V			
Rated current:	I _C	400 A	650 A	900 A	1000 A	400 A	650 A	900 A	1000 A
Pulse current:	I _P	up to 1400 A	up to 2400 A	up to 4000 A	up to 5000 A	up to 1400 A	up to 2400 A	up to 4000 A	up to 5000 A
Internal resistance:	R _{DC}	7 mΩ	6 mΩ	1.8 mΩ	1.2 mΩ	16 mΩ	12 mΩ	7.5 mΩ	6 mΩ
Max. stored energy: ±20%	E _{max}	7.5 kJ	12 kJ	41 kJ	82 kJ	21.5 kJ	39 kJ	90 kJ	165 kJ
Operating temperature:	T _{op}	-30° C ... +65° C				-30° C ... +65° C			
Storage temperature:	T _{st}	-40° C ... +70° C				-40° C ... +70° C			
Weight:	m	1.9 kg	2.2 kg	5.5 kg	8 kg	4.8 kg	5.8 kg	11.5 kg	15.8 kg
Volume:	V	1.9 l	2.4 l	4.5 l	7.6 l	3.3 l	4.2 l	9.3 l	15.8 l

Additional Data

Case:	-	AlMg3	AlMg3
Lug terminals:	-	M8 x 2	M8 x 2

Comparative Data

Lifetime:									
in hours ¹⁾	h	90 000				90 000			
in cycles ²⁾	Cycles	500 000				500 000			
Energy density:									
gravimetric	E _d	1.6 Wh/kg	2.5 Wh/kg	2.1 Wh/kg	2.9 Wh/kg	1.2 Wh/kg	1.9 Wh/kg	2.2 Wh/kg	2.9 Wh/kg
volumetric	E _v	1.6 Wh/l	2.3 Wh/l	2.5 Wh/l	3.0 Wh/l	1.8 Wh/l	2.6 Wh/l	2.7 Wh/l	2.9 Wh/l

¹⁾ Requirements:

$|\Delta C/C_N| \leq 30\%$, ESR ≤ 2 times specified limit, I_{leak} ≤ 2 times of initial value.

²⁾ Test conditions:

$|\Delta C/C_N| \leq 30\%$, ESR ≤ 2 times specified limit, I_{leak} ≤ 2 times of initial value
(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

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Continuation

Technical Data

Capacitance:	C _N	28 F	50 F	115 F	210 F	12 F	24 F
Capacitance tolerance:	-	±20%				±20%	
Rated voltage:	U _R	56 V				112 V	
Rated current:	I _C	400 A	650 A	900 A	1000 A	400 A	650 A
Pulse current:	I _P	up to 1400 A	up to 2400 A	up to 4000 A	up to 5000 A	up to 1400 A	up to 2400 A
Internal resistance:	R _{DC}	32 mΩ	12 mΩ	7.2 mΩ	4.8 mΩ	58 mΩ	24 mΩ
Max. stored energy: ±20%	E _{max.}	44 kJ	78.4 kJ	180.2 kJ	330 kJ	88 kJ	157 kJ
Operating temperature:	T _{op}	-30° C ... +65° C				-30° C ... +65° C	
Storage temperature:	T _{st}	-40° C ... +70° C				-40° C ... +70° C	
Weight:	m	9.5 kg	10.8 kg	14.5 kg	18.7 kg	19 kg	22 kg
Volume:	V	6.4 l	8.2 l	15.8 l	31.2 l	15.1 l	18.5 l

Additional Data

Case:	-	AlMg3	AlMg3
Lug terminals:	-	M8 x 2	M8 x 2

Comparative Data

Lifetime:							
in hours ¹⁾	h	90 000				90 000	
in cycles ²⁾	Cycles	500 000				500 000	
Energy density:							
gravimetric	E _d	1.3 Wh/kg	2.0 Wh/kg	3.5 Wh/kg	4.9 Wh/kg	1.3 Wh/kg	2.0 Wh/kg
volumetric	E _v	1.9 Wh/l	2.7 Wh/l	3.2 Wh/l	2.9 Wh/l	1.6 Wh/l	2.4 Wh/l

¹⁾ Requirements:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

²⁾ Test conditions:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value

(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Double-Layer Capacitors in Cylindrical Metal Case with very High Capacitances in the Farad Range

Special Features

- Storage capacitors with very high capacitance values up to 3000 F and a rated voltage of 2.7 VDC
- Discharge current up to 2200 A
- Maintenance-free
- With cylindrical metal case
- Series connection possible
- According to RoHS 2011/65/EC

Construction

Encapsulation:

Cylindrical aluminium case

Terminations:

Aluminium plates (optional)

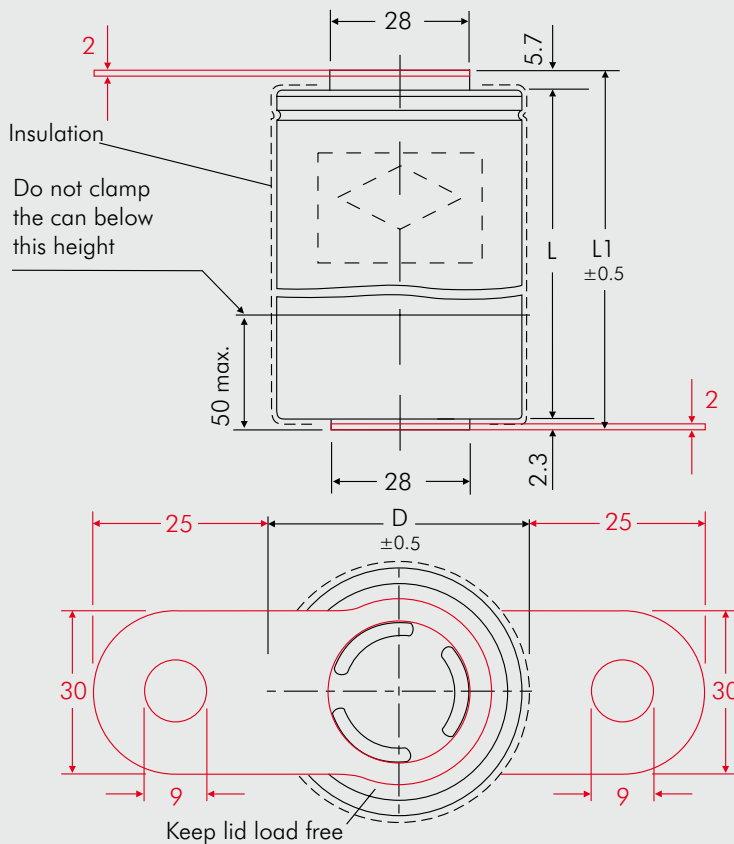
Marking:

Colour: Black. Marking: Gold

General Data

U _R	C _N	Dimensions		Part number	Typical applications
		D	L		
2.7 V	1500 F	60	73	SCSCAIC100Z000MV__	- Automotive - Railway technology - Wind power systems - Uninterruptible power supply (UPS) - Industry
	2000 F	60	100	SCSCAIC200Z100MV__	
	3000 F	60	136	SCSCAIC300Z200MV__	

The new SuperCap C60 range offer the possibility of achieving nearly every capacitance or voltage value by cascading of the cells. The cost-effective manufacturing of the components in cylindrical cases enables convenient substitution of other brands.



Part number completion:	
Standard:	= 00
Aluminium plates:	= 0L

- Laser welded aluminium plates for series or parallel connection (cascading) of the single cells (optional)

U _R	C _N	D	L	L1
2.7V	1500 F	60	73	81
	2000 F	60	100	108
	3000 F	60	136	144

Dims. in mm.

When connected in series cases should be kept isolated.

Rights reserved to amend design data without prior notification.

Continuation

Technical Data

Capacitance:	C _N	1500 F	2000 F	3000 F
Capacitance tolerance:	–	±20%		
Rated voltage:	U _R	2.7 V		
Rated current:	I _C	150 A	180 A	240 A
Pulse current:	I _P	up to 1200 A	up to 1600 A	up to 2200 A
Internal resistance:	R _{DC}	0.47 mΩ	0.35 mΩ	0.29 mΩ
Max. stored energy: ±20%	E _{max.}	5.5 kJ	7.5 kJ	11 kJ
Operating temperature:	T _{op}	–30° C ... +65° C		
Storage temperature:	T _{st}	–40° C ... +70° C		
Weight:	m	275 g	355 g	500 g
Volume:	V	0.21 l	0.28 l	0.39 l

Additional Data

Case:	–	Al _{99.5}
Screw terminations:	–	M8 x 2

Vergleichsangaben

Lebensdauer:				
in Stunden ¹⁾	h	90 000		
in Zyklen ²⁾	Cycles	500 000		
Energiedichte:				
gravimetrisch	E _d	5.5 Wh/kg	5.7 Wh/kg	6.1 Wh/kg
volumetrisch	E _v	7.3 Wh/l	7.4 Wh/l	7.8 Wh/l

¹⁾ Requirements:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value.

²⁾ Test conditions:

$|\Delta C/C_N| \leq 30\%$, $ESR \leq 2$ times specified limit, $I_{leak} \leq 2$ times of initial value

(cycles: charging to U_R, 30 sec rest, discharging to U_R/2, 30 sec rest).

Double-Layer Capacitors in Rectangular Metal Case with very High Capacitances in the Farad Range

Special Features

- Storage capacitors with very high capacitance values from 100 F to 3000 F and a rated voltage of 2.5 VDC
- Discharge current up to 3000 A
- Maintenance-free
- With rectangular metal case
- Series connection possible
- According to RoHS 2011/65/EC

Construction

Encapsulation:

Rectangular aluminium case, sealed by laser welding

Terminations:

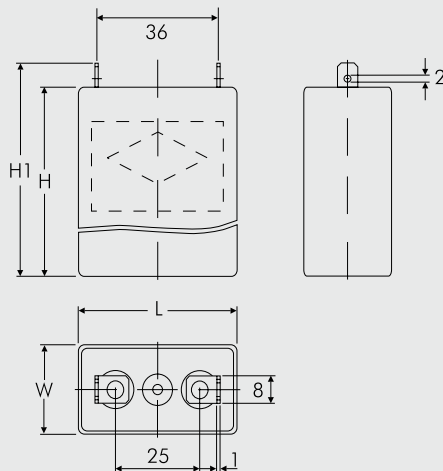
FS 6.3 slip-on terminations according to DIN 46244 (100 F - 600 F) or screw terminations (3000 F).

Marking: Colour: Black. Marking: Gold

General Data

U _R	C _N	Dimensions			Part number	Typical applications
		W	H	L		
2.5 V	100 F	16.5	36	48	SCSRA1B100RA00MV00	- Automotive - Railway technology - Wind power systems - Uninterruptible power systems (UPS) - Industry
	200 F	16.5	59	48	SCSRA1B200RB00MV00	
	300 F	26.5	59	48	SCSRA1B300RC00MV00	
	400 F	26.5	59	48	SCSRA1B400RC00MV00	
	600 F	26.5	80	48	SCSRA1B600RD00MV00	
	3000 F	40	140	80	SCSRA1C300RE00MV00	

Components of the SuperCap R range in rectangular construction enable connection in series and/or parallel in a space-efficient way to achieve nearly any capacitance or voltage required. Undesired cavities are avoided, and the energy density can almost be doubled depending on the construction. Due to the large case surfaces of the cells heat being generated by the continuous current flow can better be drawn off.

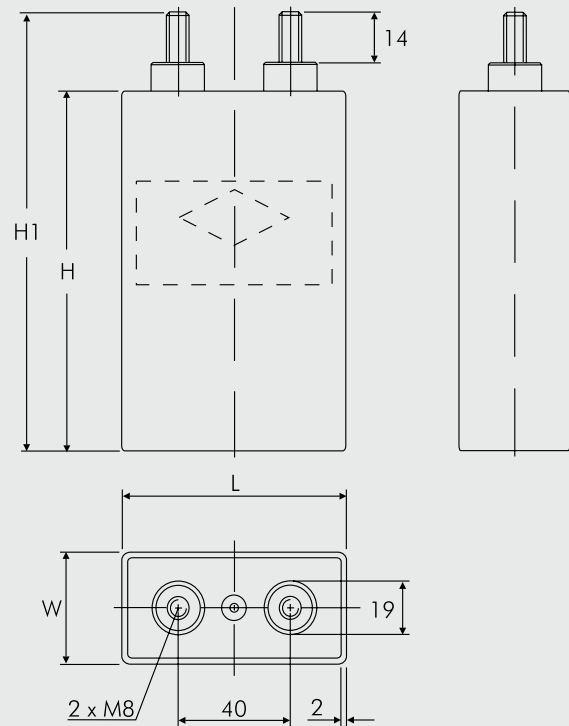


U _R	C _N	Dimensions			
		W	H	H1	L
2.5 V	100 F	16.5	36	45	48
	200 F	16.5	59	66	48
	300 F	26.5	59	66	48
	400 F	26.5	59	66	48
	600 F	26.5	80	87	48

Dims. in mm.

When connected in series cases should be kept isolated.

Rights reserved to amend design data without prior notification.



U _R	C _N	Dimensions			
		W	H	H1	L
2.5 V	3000 F	40	140	164	80

Continuation

Technical Data

Capacitance:	C _N	100 F	200 F	300 F	400 F	600 F	3000 F
Capacitance tolerance:	-	±20%					±20%
Rated voltage:	U _R	2.5 V					2.5 V
Rated current:	I _C	30 A	45 A	50 A	80 A	100 A	800 A
Pulse current:	I _P	up to 200 A	up to 350 A	up to 400 A	up to 600 A	up to 800 A	up to 3000 A
Internal resistance:	R _{DC}	12 mΩ	7 mΩ	6 mΩ	4 mΩ	3 mΩ	0.7 mΩ
Max. stored energy: ±20%	E _{max.}	0.313 kJ	0.625 kJ	0.938 kJ	1.25 kJ	1.875 kJ	10 kJ
Operating temperature:	T _{op}	-30° C ... +65° C					-30° C ... +65° C
Storage temperature:	T _{st}	-40° C ... +70° C					-40° C ... +70° C
Weight:	m	40 g	62 g	90 g	95 g	120 g	615 g
Volume:	V	0.028 l	0.047 l	0.075 l	0.075 l	0.1 l	0.45 l

Additional Data

Case:	-	Al _{99.5}	Al _{99.5}
Terminations:	-	Brass slip-on terminations FS 6.3	Screw terminations M8 x 2

Comparative Data

Capacitance density:							
gravimetric	C _d	2500 F/kg	3200 F/kg	3400 F/kg	4300 F/kg	6400 F/kg	5300 F/kg
volumetric	C _v	3600 F/l	4600 F/l	4400 F/l	5900 F/l	6660 F/l	7360 F/l
Energy density:							
gravimetric	E _d	2.2 Wh/kg	2.8 Wh/kg	3.0 Wh/kg	3.8 Wh/kg	4.5 Wh/kg	7.0 Wh/kg
volumetric	E _v	3.2 Wh/l	3.7 Wh/l	4.0 Wh/l	5.4 Wh/l	6.0 Wh/l	6.3 Wh/l

Double-Layer Capacitor Modules Based on SuperCap R Rectangular Cells

Special Features

- Storage capacitor modules with very high capacitance values of 100 F and 450 F and rated voltages from 5 VDC to 16 VDC
- Discharge current up to 3000 A
- Maintenance-free
- Series connected
- Actively or passively balanced
- According to RoHS 2011/65/EC

General Data

U _R	C _N	Dimensions			Part number	Typical applications
		W	H	L		
5 V	100 F	110	59	51	MRPPA6B100M100MV00	- Automotive - Railway technology - Wind power systems
14 V	100 F	58	97	204.5	MRPPA3B100M100MV00	- Uninterruptible power systems (UPS) - Industry
16 V	450 F	85	172	323	MRPPA0B450M100MV00	

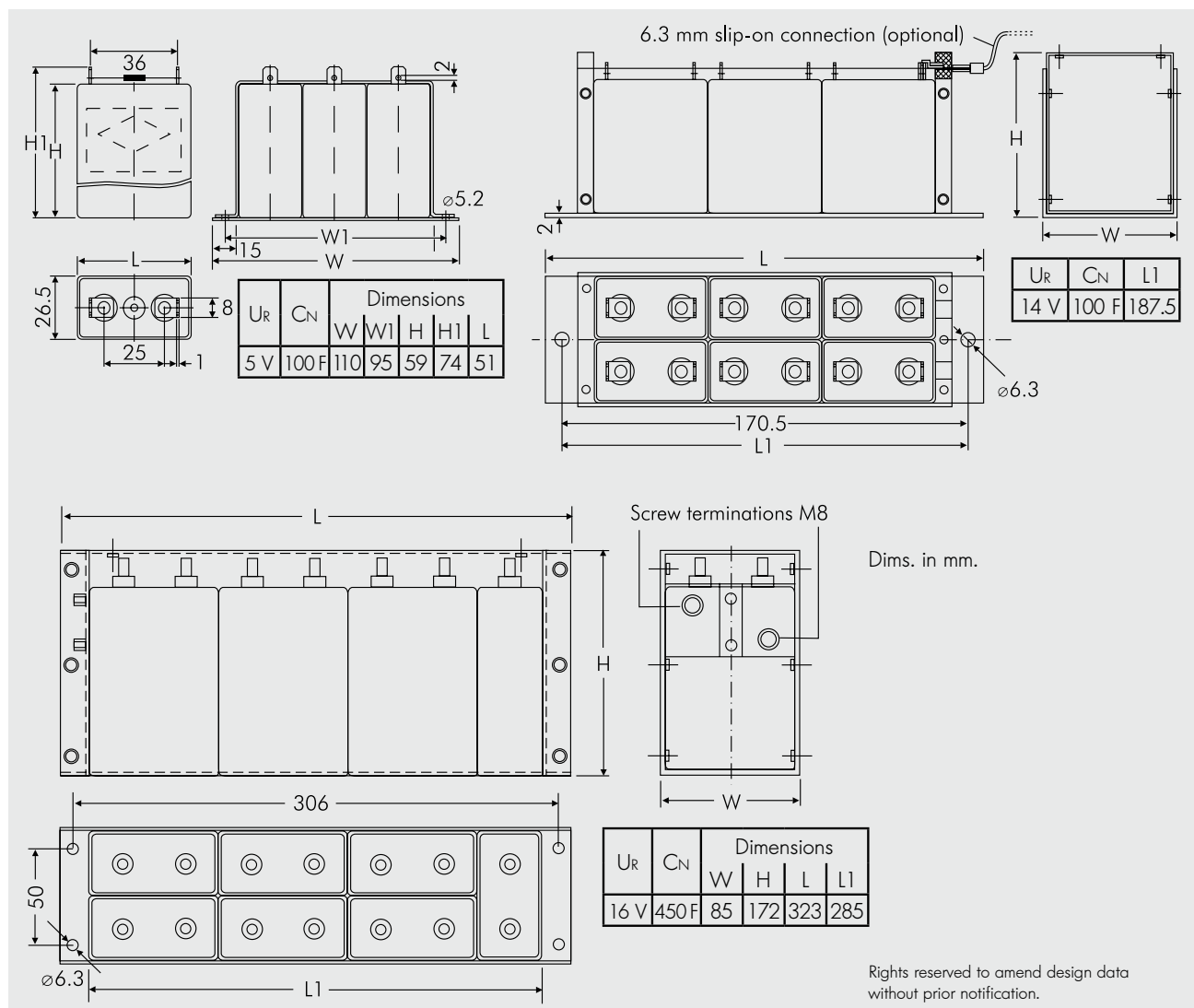
Construction

Encapsulation: Metal case

Terminations: Lug terminals or screw terminations M8

Marking: Colour: Black. Marking: Gold

SuperCap modules of the „Powerpack“ range have a modular design and are suited especially for applications with limited space. Customized solutions can be realized upon request.



Continuation

Technical Data

Capacitance:	C _N	100 F	100 F	450 F
Capacitance tolerance:	–	±20%	±20%	±20%
Rated voltage:	U _R	5 V	14 V	16 V
Rated current:	I _C	50 A	100 A	800 A
Pulse current:	I _P	up to 400 A	up to 800 A	up to 3000 A
Internal resistance:	R _{DC}	18 mΩ	18 mΩ	3.5 mΩ
Max. stored energy: ±20%	E _{max.}	3 kJ	11.5 kJ	70 kJ
Operating temperature:	T _{op}	–30° C ... +65° C	–30° C ... +65° C	–30° C ... +65° C
Storage temperature:	T _{st}	–40° C ... +70° C	–40° C ... +70° C	–40° C ... +70° C
Weight:	m	360 g	1100 g	5500 g
Volume:	V	0.25 l	0.93 l	4.7 l

Additional Data

Case:	–	Al _{99.5}	Al _{99.5}	Al _{99.5}
Terminations:	–	Brass lug terminals	Brass lug terminals	Screw terminations M8 x 2
Number of single cells:	–	3 x 300 F	6 x 600 F	7 x 3000 F

Comparative Data

Capacitance density:				
gravimetric	C _d	300 F/kg	91 F/kg	82 F/kg
volumetric	C _v	400 F/l	108 F/l	96 F/l
Energy density:				
gravimetric	E _d	1.6 Wh/kg	2.6 Wh/kg	3.1 Wh/kg
volumetric	E _v	2.8 Wh/l	3.1 Wh/l	3.6 Wh/l

WIMA Customized SuperCap Modules



This could be your SuperCap module.

- ▷ Size
- ▷ Capacitance
- ▷ Voltage
- ▷ Casing
- ▷ Balancing

WIMA SuperCap MC
WIMA SuperCap MR



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: Special features (e.g. Snubber versions)
- Field 15: Capacitance tolerance
- Field 16: Packing
- Field 17 - 18: Lead 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		

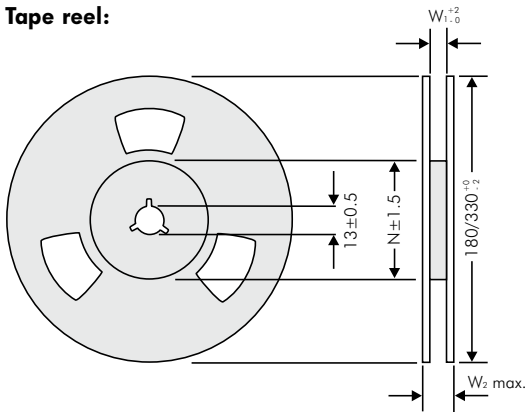
<p>Type description:</p> <p>SMD-PET = SMDT SMD-PPS = SMDI FKP 02 = FKP0 MKS 02 = MKS0 FKS 2 = FKS2 FKP 2 = FKP2 MKS 2 = MKS2 MKP 2 = MKP2 FKS 3 = FKS3 FKP 3 = FKP3 MKS 4 = MKS4 MKP 4 = MKP4 MKP 10 = MKP1 FKP 4 = FKP4 FKP 1 = FKP1 MKP-X2 = MKX2 MKP-X2 R = MKXR MKP-Y2 = MKY2 MP 3-X2 = MPX2 MP 3-X1 = MPX1 MP 3-Y2 = MPY2 MP 3R-Y2 = MPRY Snubber MKP = SNMP Snubber FKP = SNFP GTO MKP = GTOM DC-LINK MKP 3 = DCP3 DC-LINK MKP 4 = DCP4 DC-LINK MKP 4S = DCPS DC-LINK MKP 5 = DCP5 DC-LINK MKP 6 = DCP6 DC-LINK HC = DCH_ DC-LINK HY = DCH_ SuperCap C = SCSC SuperCap MC = MC_ SuperCap C60 = SCSC SuperCap R = SCSR SuperCap MR = MRPP</p>	<p>Rated voltage:</p> <p>2.5 VDC = A1 4 VDC = A2 14 VDC = A3 28 VDC = A4 40 VDC = A5 5 VDC = A6 50 VDC = B0 63 VDC = C0 100 VDC = D0 160 VDC = E0 250 VDC = F0 400 VDC = G0 450 VDC = H0 600 VDC = I0 630 VDC = J0 700 VDC = K0 800 VDC = L0 850 VDC = M0 900 VDC = N0 1000 VDC = O1 1100 VDC = P0 1200 VDC = Q0 1250 VDC = R0 1500 VDC = S0 1600 VDC = T0 2000 VDC = U0 2500 VDC = V0 3000 VDC = W0 4000 VDC = X0 6000 VDC = Y0 250 VAC = 0W 275 VAC = 1W 300 VAC = 2W 400 VAC = 3W 440 VAC = 4W 500 VAC = 5W</p>	<p>Capacitance:</p> <p>22 pF = 0022 47 pF = 0047 100 pF = 0100 150 pF = 0150 220 pF = 0220 330 pF = 0330 470 pF = 0470 680 pF = 0680 1000 pF = 1100 1500 pF = 1150 2200 pF = 1220 3300 pF = 1330 4700 pF = 1470 6800 pF = 1680 0.01 µF = 2100 0.022 µF = 2220 0.047 µF = 2470 0.1 µF = 3100 0.22 µF = 3220 0.47 µF = 3470 1 µF = 4100 2.2 µF = 4220 4.7 µF = 4470 10 µF = 5100 22 µF = 5220 47 µF = 5470 100 µF = 6100 220 µF = 6220 1 F = A010 2.5 F = A025 50 F = A500 100 F = B100 110 F = B110 600 F = B600 1200 F = C120 ...</p>	<p>Size:</p> <p>4.8x3.3x3 Size 1812 = KA 4.8x3.3x4 Size 1812 = KB 5.7x5.1x3.5 Size 2220 = QA 5.7x5.1x4.5 Size 2220 = QB 7.2x6.1x3 Size 2824 = TA 7.2x6.1x5 Size 2824 = TB 10.2x7.6x5 Size 4030 = VA 12.7x10.2x6 Size 5040 = XA 15.3x13.7x7 Size 6054 = YA 2.5x7x4.6 PCM 2.5 = 0B 3x7.5x4.6 PCM 2.5 = 0C 2.5x6.5x7.2 PCM 5 = 1A 3x7.5x7.2 PCM 5 = 1B 2.5x7x10 PCM 7.5 = 2A 3x8.5x10 PCM 7.5 = 2B 3x9x13 PCM 10 = 3A 4x9x13 PCM 10 = 3C 5x11x18 PCM 15 = 4B 6x12.5x18 PCM 15 = 4C 5x14x26.5 PCM 22.5 = 5A 6x15x26.5 PCM 22.5 = 5B 9x19x31.5 PCM 27.5 = 6A 11x21x31.5 PCM 27.5 = 6B 9x19x41.5 PCM 37.5 = 7A 11x22x41.5 PCM 37.5 = 7B 94x49x182 DCH_ = H0 94x77x182 DCH_ = H1 ...</p>	<p>Tolerance:</p> <p>20% = M 10% = K 5% = J 2.5% = H 1% = E ...</p> <p>Packing:</p> <p>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 ...</p>	
				<p>Special features:</p> <p>Standard = 00 Version A1 = 1A Version A1.1.1 = 1B Version A2 = 2A ...</p>	<p>Lead length (untaped)</p> <p>3.5 ±0.5 = C9 6-2 = SD 16 ±1 = P1 ...</p>

The data on this page is not complete and serves only to explain the part number system. Part number information is listed on the pages of the respective WIMA range.

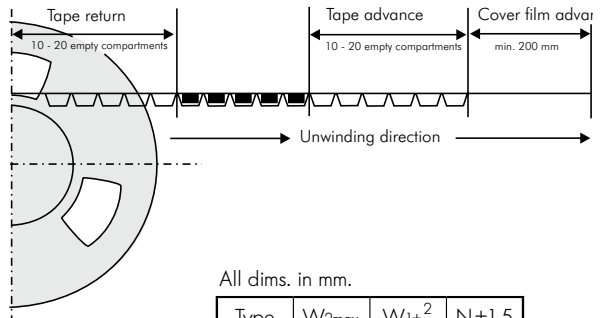
Blister Tape Packaging and Packing Units of the WIMA SMD Capacitors



Tape reel:

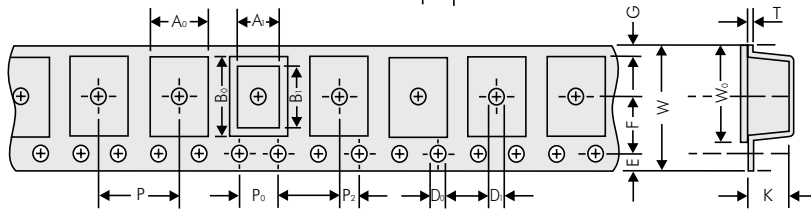


Tape advance and return:



All dims. in mm.

Type	W _{2max}	W _{1±0.2}	N±1.5
1812	19	12.4	62
2220	19	12.4	62
2824	19	12.4	62
4030	22.4	16.4	60
5040	30.4	24.4	90
6054	30.4	24.4	90



Packing units

Size Code 1812		A ₀ ±0.1	A ₁	B ₀ ±0.1	B ₁	D ₀ +0.1 -0	D ₁ +0.1 -0	P ±0.1	P ₀ * ±0.1	P ₂ ±0.05	E ±0.1	F ±0.05	G	W ±0.3	W ₀ ±0.2	K ±0.1	T ±0.1
Box size	Code																
4.8x3.3x3	KA	3.55	3.3	5.1	4.8	ø1.5	ø1.5	8	4	2	1.75	5.5	2.2	12	9.5	3.4	0.3
4.8x3.3x4	KB	3.55	3.3	5.1	4.8	ø1.5	ø1.5	8	4	2	1.75	5.5	2.2	12	9.5	4.4	0.3

taped Reel	taped Reel	bulk	
180 mm ø	330 mm ø	Mini	Standard
750	2500	1000	3000
500	2000	1000	3000

Size Code 2220		A ₀ ±0.1	A ₁	B ₀ ±0.1	B ₁	D ₀ +0.1 -0	D ₁ +0.1 -0	P ±0.1	P ₀ * ±0.1	P ₂ ±0.05	E ±0.1	F ±0.05	G	W ±0.3	W ₀ ±0.2	K ±0.1	T ±0.1
Box size	Code																
5.7x5.1x3.5	QA	6.3	5.7	5.6	5.1	ø1.5	ø1.5	8	4	2	1.75	5.5	1.95	12	9.5	3.7	0.3
5.7x5.1x4.5	QB	6.3	5.7	5.6	5.1	ø1.5	ø1.5	8	4	2	1.75	5.5	1.95	12	9.5	4.7	0.3

taped Reel	taped Reel	bulk	
180 mm ø	330 mm ø	Mini	Standard
500	1800	1000	3000
400	1500	1000	3000

Size Code 2824		A ₀ ±0.1	A ₁	B ₀ ±0.1	B ₁	D ₀ +0.1 -0	D ₁ +0.1 -0	P ±0.1	P ₀ * ±0.1	P ₂ ±0.05	E ±0.1	F ±0.05	G	W ±0.3	W ₀ ±0.2	K ±0.1	T ±0.1
Box size	Code																
7.2x6.1x3	TA	6.6	6.1	7.7	7.2	ø1.5	ø1.5	12	4	2	1.75	5.5	0.9	12	9.5	3.4	0.3
7.2x6.1x5	TB	6.6	6.1	7.7	7.2	ø1.5	ø1.5	12	4	2	1.75	5.5	0.9	12	9.5	5.4	0.4

taped Reel	bulk	
330 mm ø	Mini	Standard
1500	500	2000
750	500	2000

	Code	A ₀ ±0.1	A ₁	B ₀ ±0.1	B ₁	D ₀ +0.1 -0	D ₁ +0.1 -0	P ±0.1	P ₀ * ±0.1	P ₂ ±0.05	E ±0.1	F ±0.05	G	W ±0.3	W ₀ ±0.2	K ±0.1	T ±0.1
Size Code 4030	VA	10.7	10.2	8.1	9.1	ø1.5	ø1.5	16	4	2	1.75	7.5	1.9	16	13.3	5.5	0.3
Size Code 5040	XA	13.5	12.7	11	11.5	ø1.5	ø1.5	16	4	2	1.75	11.5	4.7	24	21.3	6.5	0.3
Size Code 6054	YA	17.0	16.5	15.6	15.0	ø1.5	ø1.5	20	4	2	1.75	11.5	2.95	24	21.3	7.5	0.3

taped Reel	bulk	
330 mm ø	Mini	Standard
775	500	2000
600	200	1000
450	100	500

* cumulative after 10 steps ± 0.2 mm max.
Samples and pre-production needs on request or 1 Reel minimum.

Part number codes for SMD packing

W (Blister)	ø in mm	Code
12	180	P
12	330	Q
16	330	R
24	330	T

Bulk Standard	S
---------------	----------

Typical Dimensions for Taping Configuration

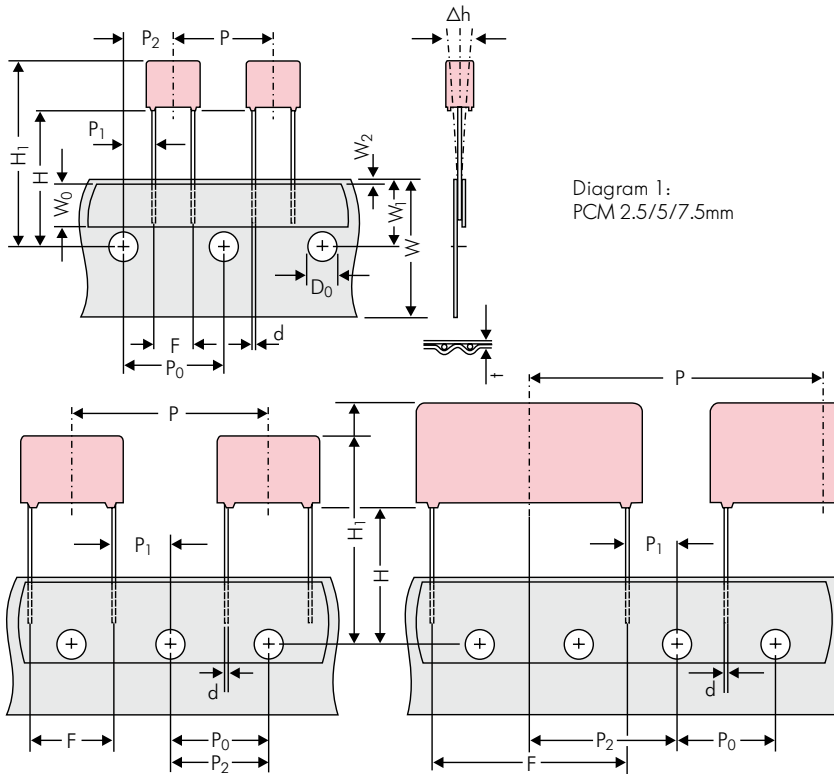


Diagram 2: PCM 10/15 mm

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 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.

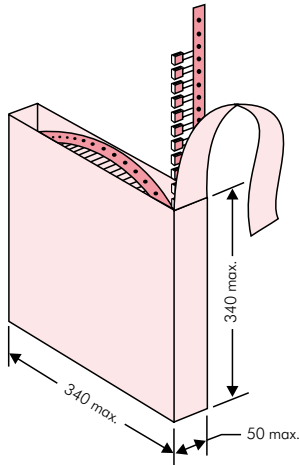
* PCM 10 and PCM 15 can be crimped to PCM 7.5.

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

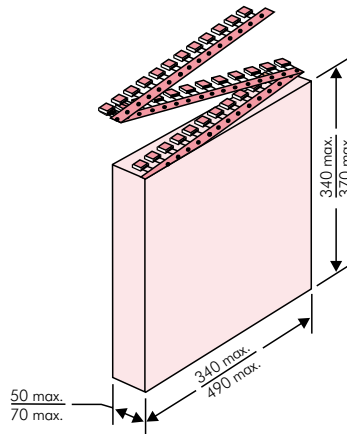
Please clarify customer-specific deviations with the manufacturer.

Types of Tape Packaging of Capacitors for Automatic Radial Insertion

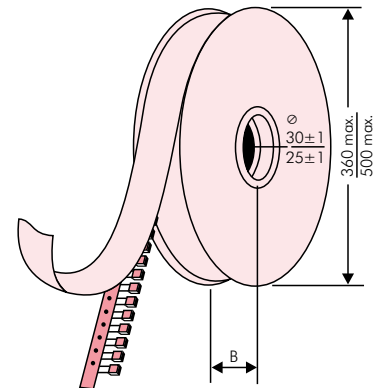
■ ROLL Packaging



■ 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/EC	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	Drühte 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		
	B	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		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)
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	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
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*										
	19	30	31.5	6L	50*										
	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)

Samples and pre-production needs on request.

■ Moulded versions.

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