



PWS

- MKP with metal foil current carriers • axial terminals
- snubber • very high pulse applications
- high current • high frequency



Main applications

Snubber and SCR commutating circuits in SMPSs, high voltage, high current and high pulse applications up to very high operation frequencies

Dielectric

Polypropylene

Electrodes

Metal foils (lead free)

Coating

UL 510 / CSA TIL I-26 polyester tape wrapping; UL 94 V-0 resin end fill. Flame retardant execution

Construction

Extended foil with internal series connection and metallized film (refer to General Technical Information)

Terminals

Tinned copper wire (lead free)

Reference standard

IEC 60384/13, IEC 60068, RoHS compliant

Climatic category

55/100/56 (IEC 60068/1), FMD (DIN 40040)

Operating temperature range (case)

-55...+105°C

Nominal Capacitance (Cn) µF

1000pF to 0,56µF, in compliance with IEC 60063, E6 series. Refer to article table

Capacitance tolerance (at 1kHz)

±10% (code=K), ±5% (code=J) and ±20% (code=M). Other tolerances upon request

Capacitance temperature coefficient

Refer to General Technical Information

Long term stability (at 1kHz)

Capacitance variation $\leq \pm 0.5\%$ after a period of 2 years at standard environmental conditions

Rated voltage (Ur) (Vdc) at 85°C

630, 1000, 1500, 2000 Vdc

Permissible AC voltage at 60Hz (Vac)

300, 400, 450, 500 Vac

Category voltage (Uc)

$U_c = U_r$ at +85°C; $U_c = 0,8 \times U_r$ at +100°C

Temperature derated voltage

For $T > +85^\circ\text{C}$, U_r must be decreased 1,25% for every °C exceeding +85°C

Self inductance

$\leq 1\text{nH/mm}$ of capacitor and leads length used for connection

Maximum pulse rise time V/µs

Refer to article table. The pulse characteristic K_0 depends on the voltage waveform. In any case the value given in the article table must not be exceeded

Dissipation factor (DF), max.

$\text{tg}\delta \times 10^{-4}$, measured at $25 \pm 5^\circ\text{C}$

| Freq. | $C_n \leq 1000 \text{ pF}$ | $1000 \text{ pF} < C_n \leq 0.1 \text{ }\mu\text{F}$ | $C_n > 0.1 \text{ }\mu\text{F}$ |
|--------|----------------------------|--|---------------------------------|
| 10kHz | - | 5 | 10 |
| 100kHz | 10 | - | - |

Insulation resistance (R_{INS})

Measured between terminals, at $25 \pm 5^\circ\text{C}$, after 1 minute of electrification at 100Vdc
 $\geq 100 \text{ G}\Omega$ for $C_n \leq 0.1 \text{ }\mu\text{F}$
 $\geq 10000\text{s}$ for $C_n > 0.1 \text{ }\mu\text{F}$

Test voltage between terminals (Ut)

$2 \times U_r$ (DC) applied for 2s, at $25 \pm 5^\circ\text{C}$ (1 minute for type test)

Damp heat test (steady state)

Test conditions:

Temperature = $+40 \pm 2^\circ\text{C}$
 Relative humidity = $93 \pm 2\%$
 Test duration = 56 days

Performance:

Capacitance change $\leq \pm 1\%$
 DF change ≤ 0.0005 at 10kHz for $C_n \leq 0.1 \text{ }\mu\text{F}$
 DF change ≤ 0.0010 at 1kHz for $C_n > 0.1 \text{ }\mu\text{F}$
 $R_{INS} \geq 50\%$ of initial limit value

Endurance test

Test conditions:

Temperature = $+85 \pm 2^\circ\text{C}$
 Test duration = 1000h
 Voltage applied = $1,5 \times U_r$ (DC)

Performance:

Capacitance change $\leq \pm 1\%$
 DF change ≤ 0.0005 at 10kHz for $C_n \leq 0.1 \text{ }\mu\text{F}$
 DF change ≤ 0.0010 at 1kHz for $C_n > 0.1 \text{ }\mu\text{F}$
 $R_{INS} \geq 50\%$ of initial limit value

Resistance to soldering heat test

Test conditions:

Solder bath temperature = $+260 \pm 5^\circ\text{C}$
 Dipping time (with heat screen) = $10 \pm 1\text{s}$

Performance:

Capacitance change $\leq \pm 1\%$
 DF change ≤ 0.0005 at 1kHz
 $R_{INS} \geq 50\%$ of initial limit value

Reliability (MIL HDB 217)

Application conditions:

Applied voltage = $0,5 \times U_r$ (DC)
 Temperature = $+40 \pm 2^\circ\text{C}$

Failure rate: $(1\text{FIT} = 1 \times 10^{-9} \text{ failures/components} \times \text{hours}) \leq 1\text{FIT}$

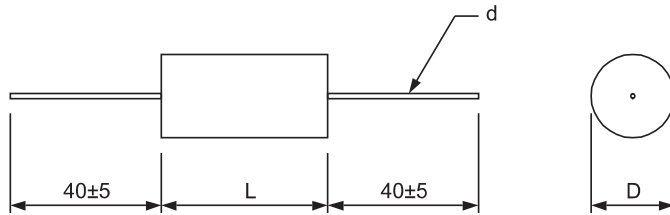
Failure criteria (DIN44122):

Capacitance change $> \pm 10\%$
 DF change $> 2 \times$ initial value
 $R_{INS} < 0,005 \times$ initial limit value
 Short or open circuit



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Dimensional tolerances (mm)

| L | L± | D± |
|------|-----|-----|
| 19.0 | 1.5 | 1.5 |
| 27.0 | 2.0 | 2.0 |
| 32.0 | 2.0 | 2.0 |

PWS article table (different values available upon request)

| Voltage at +85°C | | Cn μF | Dimensions (mm) | | | du/dt V/μs | K ₀ V ² /μs | ICEL CODE ⁽¹⁾ - |
|------------------|---------------------------|----------|-----------------|----|-----|---------------|--------------------------------------|-------------------------------|
| Ur (Vdc) | Urms (Vac) ⁽²⁾ | | D | L | d | | | |
| 630 | 300 | 0,015 | 7 | 19 | 0,8 | 4300 | 5420000 | PWS1632150*D |
| 630 | 300 | 0,022 | 8 | 19 | 0,8 | 4300 | 5420000 | PWS1632220*D |
| 630 | 300 | 0,033 | 10 | 19 | 0,8 | 4300 | 5420000 | PWS1632330*D |
| 630 | 300 | 0,033 | 7,5 | 27 | 0,8 | 2600 | 3270000 | PWS1632330*G |
| 630 | 300 | 0,047 | 8,5 | 27 | 0,8 | 2600 | 3270000 | PWS1632470*G |
| 630 | 300 | 0,068 | 10 | 27 | 0,8 | 2600 | 3270000 | PWS1632680*G |
| 630 | 300 | 0,1 | 12 | 27 | 0,8 | 2600 | 3270000 | PWS1633100*G |
| 630 | 300 | 0,15 | 15 | 27 | 0,8 | 2600 | 3270000 | PWS1633150*G |
| 630 | 300 | 0,15 | 12,5 | 32 | 0,8 | 1800 | 2260000 | PWS1633150*J |
| 630 | 300 | 0,22 | 15 | 32 | 0,8 | 1800 | 2260000 | PWS1633220*J |
| 630 | 300 | 0,33 | 18 | 32 | 1 | 1800 | 2260000 | PWS1633330*J |
| 630 | 300 | 0,47 | 22 | 32 | 1 | 1800 | 2260000 | PWS1633470*J |
| 630 | 300 | 0,56 | 25 | 32 | 1 | 1800 | 2260000 | PWS1633560*J |
| 1000 | 400 | 0,0033 | 7 | 19 | 0,8 | 14000 | 28000000 | PWS2101330*D |
| 1000 | 400 | 0,0047 | 8 | 19 | 0,8 | 14000 | 28000000 | PWS2101470*D |
| 1000 | 400 | 0,0068 | 10 | 19 | 0,8 | 14000 | 28000000 | PWS2101680*D |
| 1000 | 400 | 0,0068 | 6,5 | 27 | 0,8 | 5000 | 10000000 | PWS2101680*G |
| 1000 | 400 | 0,01 | 7 | 27 | 0,8 | 5000 | 10000000 | PWS2102100*G |
| 1000 | 400 | 0,015 | 8,5 | 27 | 0,8 | 5000 | 10000000 | PWS2102150*G |
| 1000 | 400 | 0,022 | 10 | 27 | 0,8 | 5000 | 10000000 | PWS2102220*G |
| 1000 | 400 | 0,033 | 12 | 27 | 0,8 | 5000 | 10000000 | PWS2102330*G |
| 1000 | 400 | 0,047 | 15 | 27 | 0,8 | 5000 | 10000000 | PWS2102470*G |
| 1000 | 400 | 0,047 | 12,5 | 32 | 0,8 | 3700 | 7400000 | PWS2102470*J |
| 1000 | 400 | 0,068 | 15 | 32 | 0,8 | 3700 | 7400000 | PWS2102680*J |
| 1000 | 400 | 0,1 | 17,5 | 32 | 1 | 3700 | 7400000 | PWS2103100*J |
| 1000 | 400 | 0,15 | 21,5 | 32 | 1 | 3700 | 7400000 | PWS2103150*J |
| 1000 | 400 | 0,22 | 26 | 32 | 1 | 3700 | 7400000 | PWS2103220*J |
| 1500 | 450 | 0,0022 | 7,5 | 19 | 0,8 | 17000 | 51000000 | PWS2151220*D |
| 1500 | 450 | 0,0033 | 8,5 | 19 | 0,8 | 17000 | 51000000 | PWS2151330*D |
| 1500 | 450 | 0,0047 | 10,5 | 19 | 0,8 | 17000 | 51000000 | PWS2151470*D |
| 1500 | 450 | 0,0047 | 7 | 27 | 0,8 | 6000 | 18000000 | PWS2151470*G |
| 1500 | 450 | 0,0068 | 7,5 | 27 | 0,8 | 6000 | 18000000 | PWS2151680*G |
| 1500 | 450 | 0,01 | 8,5 | 27 | 0,8 | 6000 | 18000000 | PWS2152100*G |
| 1500 | 450 | 0,015 | 10,5 | 27 | 0,8 | 6000 | 18000000 | PWS2152150*G |
| 1500 | 450 | 0,022 | 12,5 | 27 | 0,8 | 6000 | 18000000 | PWS2152220*G |
| 1500 | 450 | 0,033 | 16 | 27 | 0,8 | 6000 | 18000000 | PWS2152330*G |
| 1500 | 450 | 0,033 | 13 | 32 | 0,8 | 4500 | 13500000 | PWS2152330*J |
| 1500 | 450 | 0,047 | 15,5 | 32 | 0,8 | 4500 | 13500000 | PWS2152470*J |
| 1500 | 450 | 0,068 | 18,5 | 32 | 1 | 4500 | 13500000 | PWS2152680*J |
| 1500 | 450 | 0,1 | 22 | 32 | 1 | 4500 | 13500000 | PWS2153100*J |
| 1500 | 450 | 0,12 | 25 | 32 | 1 | 4500 | 13500000 | PWS2153120*J |

⁽¹⁾ Change the * symbol with the needed capacitance tolerance code: J=±5%, K=±10%, M=±20%

⁽²⁾ Not suitable for across the line application



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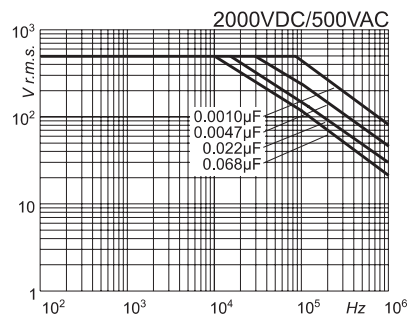
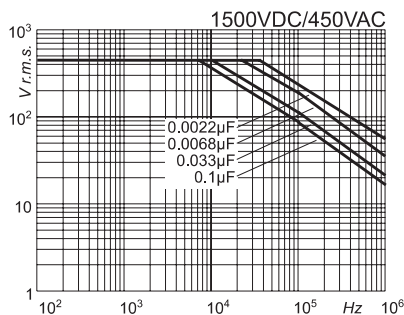
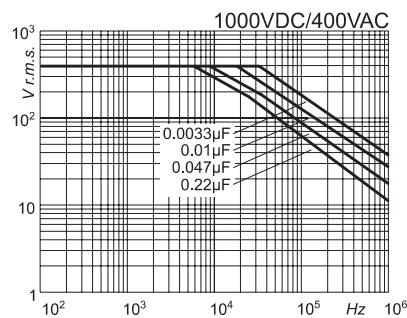
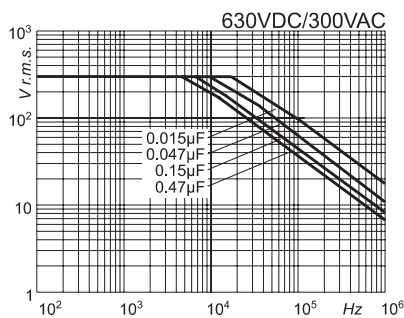


| Voltage at +85°C | | Cn μF | Dimensions (mm) | | | du/dt V/μs | K ₀ V ² /μs | ICEL CODE ⁽¹⁾ - |
|------------------|---------------------------|----------|-----------------|----|-----|---------------|--------------------------------------|-------------------------------|
| Ur (Vdc) | Urms (Vac) ⁽²⁾ | | D | L | d | | | |
| 2000 | 500 | 0,001 | 7,5 | 19 | 0,8 | 27000 | 108000000 | PWS2201100*D |
| 2000 | 500 | 0,0015 | 8,5 | 19 | 0,8 | 27000 | 108000000 | PWS2201150*D |
| 2000 | 500 | 0,0022 | 10,5 | 19 | 0,8 | 27000 | 108000000 | PWS2201220*D |
| 2000 | 500 | 0,0033 | 7,5 | 27 | 0,8 | 9800 | 39200000 | PWS2201330*G |
| 2000 | 500 | 0,0047 | 8,5 | 27 | 0,8 | 9800 | 39200000 | PWS2201470*G |
| 2000 | 500 | 0,0068 | 10 | 27 | 0,8 | 9800 | 39200000 | PWS2201680*G |
| 2000 | 500 | 0,01 | 12 | 27 | 0,8 | 9800 | 39200000 | PWS2202100*G |
| 2000 | 500 | 0,015 | 14,5 | 27 | 0,8 | 9800 | 39200000 | PWS2202150*G |
| 2000 | 500 | 0,022 | 14,5 | 32 | 0,8 | 7000 | 28000000 | PWS2202220*J |
| 2000 | 500 | 0,033 | 18 | 32 | 1 | 7000 | 28000000 | PWS2202330*J |
| 2000 | 500 | 0,047 | 20,5 | 32 | 1 | 7000 | 28000000 | PWS2202470*J |
| 2000 | 500 | 0,068 | 25 | 32 | 1 | 7000 | 28000000 | PWS2202680*J |

⁽¹⁾ Change the * symbol with the needed capacitance tolerance code: J=±5%, K=±10%, M=±20%

⁽²⁾ Not suitable for across the line application

Permissible AC voltage versus frequency (sinusoidal waveform) for ΔT=+10°C Referred to the largest length execution among available ones



Warning: this specification must be completed with the data given in the "General technical information" chapter