EMI Suppression Capacitor, Ceramic Disc, Class X1, 760 V_{AC}, Class Y1, 500 V_{AC}



FEATURES

- Complying with IEC 60384-14
- High reliability
- Wide range of different leadstyles
- Small dimensions
- Singlelayer AC disc safety capacitors
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

APPLICATIONS

- X1, Y1 according to IEC 60384-14
- Line-to-line filtering (Class X)
- Line-to-ground filtering (Class Y)
- EMI / RFI suppression and filtering
- Primary and secondary coupling (SMPS)

LINKS TO ADDITIONAL RESOURCES

3D Models

QUICK REFERENCE DATA		
DESCRIPTION	VALUE	
Ceramic Class	2	
Ceramic Dielectric	Y5U	
Voltage (V_{AC})	760	500
Min. Capacitance (pF)	470	
Max. Capacitance (pF)	4700	
Mounting	Radial	

OPERATING TEMPERATURE RANGE

-40 °C to +125 °C (1)

Note

(1) For explanation about the difference of operating temperature range and temperature characteristic of capacitance please see www.vishay.com/doc?48299

TEMPERATURE CHARACTERISTICS

Class 2: Y5U

SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)

Class 2: 40 / 125 / 21

APPROVALS

IEC 60384-14

UL 60384-14

CSA E60384-14

DESIGN

The capacitors consist of ceramic disc both sides of which are silver plated. Connection leads are made of tinned copper having diameters of 0.6 mm or 0.8 mm.

The capacitors may be supplied with straight or kinked leads having a lead spacing of 10.0 mm or 12.5 mm.

Coating is made of blue colored flame retardant epoxy resin in accordance with UL 94 V-0.

CAPACITANCE RANGE

470 pF to 4.7 nF

TOLERANCE ON CAPACITANCE

± 10 %, ± 20 %

RATED VOLTAGE

- X1: 760 V_{AC}, 50 Hz (IEC 60384-14)
  760 V_{AC}, 50 Hz / 60 Hz (US/UL/CSA 60384-14)
- Y1: 500 V_{AC}, 50 Hz (IEC 60384-14)
  500 V_{AC}, 50 Hz / 60 Hz (US/UL/CSA 60384-14)

TEST VOLTAGE

- 4000 V_{AC}, 50 Hz, 2 s Component test (100 %)
- 4000 V_{AC}, 50 Hz, 60 s Random sampling test (destructive)
- 4000 V_{AC}, 50 Hz, 60 s Voltage proof of coating (destructive)

INSULATION RESISTANCE AT 500 V_{DC}

≥ 10 000 MΩ (60 s)

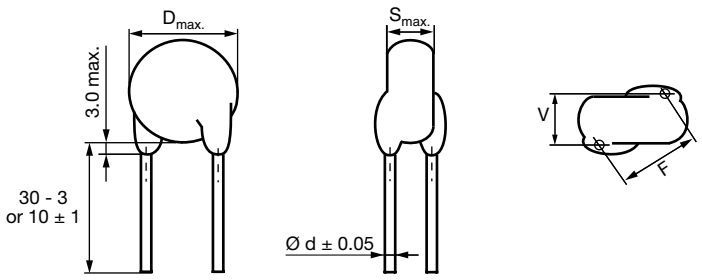
DISSIPATION FACTOR

Class 2: max. 2.5 % (1 kHz)

For technical questions, contact: slcap@vishay.com

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DIMENSIONS in millimeters



TECHNICAL DATA

CAPACITANCE (2) C (pF)	CAPACITANCE TOLERANCE (%)	BODY DIAMETER $D_{MAX.}$ (mm)	BODY THICKNESS $S_{MAX.}$ (mm)	LEAD SPACING (1) F (mm) ± 1 mm	LEAD DIAMETER (1) d (mm) ± 0.05 mm	WIDTH (1) V (mm) ± 0.5 mm	PART NUMBER MISSING DIGITS SEE ORDERING CODE BELOW
Y5U							
470	± 10, ± 20	8.0	5.0	12.5	0.6	2.1	VKP471#CQ###KR
680		8.0					VKP681#CQ###KR
1000		9.0			0.8		VKP102#CQ###KR
1500		10.0					VKP152#CQ###KR
2200		12.0					VKP222#CQ###KR
2700		13.0					VKP272#CQ###KR
3300		15.0					VKP332#CQ###KR
3900		15.0					VKP392#CQ###KR
4700		17.0					VKP472#CQ###KR

Notes

(1) Standard lead configuration, other lead spacing and diameter available on request

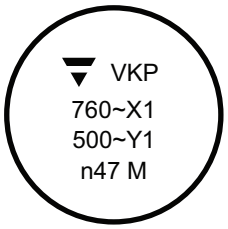
(2) When capacitance values less than 470 pF are required, the usage of WKP series is recommended

ORDERING CODE

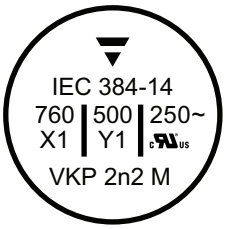
#	7th digit	Capacitance tolerance	± 10 % = K, ± 20 % = M
###	10th to 12th digit	Lead configuration	See “General Information” www.vishay.com/doc?22001

Example	VKP	222	M	CQ	ED0	K	R
	Series	Capacitance value	Tolerance code	Voltage code	Lead configuration	Internal code	RoHS compliant

MARKING



VKP 470 pF to 1.5 nF



VKP 2.2 nF to 4.7 nF



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APPROVALS

IEC 60384-14 - Safety tests
This approval together with CB test certificate substitutes all national approvals.

CB Test Certificate (www.vishay.com/doc?22211)

Y1 Capacitor: CB-test certificate:	US-26551-UL	470 pF to 4.7 nF	500 V_{AC}
X1 Capacitor: CB-test certificate:	US-26551-UL	470 pF to 4.7 nF	760 V_{AC}

Minimum thickness of insulation: 0.4 mm

VDE (www.vishay.com/doc?22212)

Y1 Capacitor: VDE marks approval:	136494	470 pF to 4.7 nF	500 V_{AC}
X1 Capacitor: VDE marks approval:	136494	470 pF to 4.7 nF	760 V_{AC}

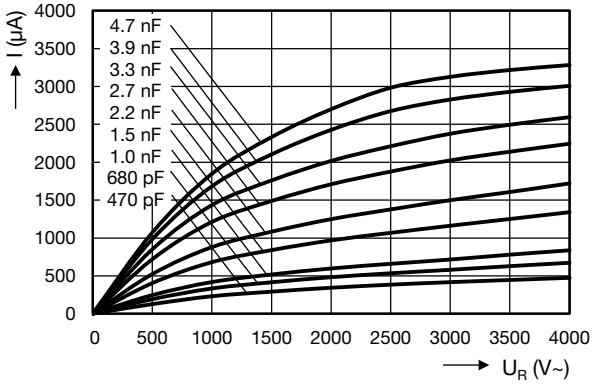
DIN EN 60384-14 (VDE 0565-1-1)
Minimum thickness of insulation: 0.4 mm

Underwriters Laboratories Inc. / Canadian Standards Association (www.vishay.com/doc?22213)

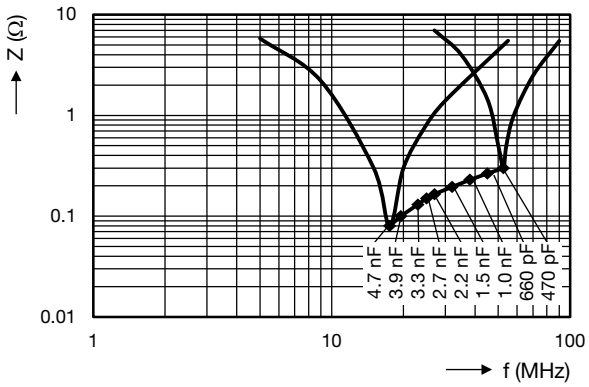
Y1 Capacitor: UL-test certificate:	E183844	470 pF to 4.7 nF	500 V_{AC}
X1 Capacitor: UL-test certificate:	E183844	470 pF to 4.7 nF	760 V_{AC}

UL 60384-14, CSA E60384-14
Minimum thickness of insulation: 0.4 mm

AC CURRENT VS. VOLTAGE (typical)



IMPEDANCE VS. FREQUENCY (typical)



STORAGE

The capacitors must not be stored in a corrosive atmosphere, where sulphide or chloride gas, acid, alkali or salt are present. Exposure of the components to moisture, should be avoided. The solderability of the leads is not affected by storage of up to 24 months (temperature +10 °C to +35 °C, relative humidity up to 60 %). Class 2 ceramic dielectric capacitors are also subject to aging, see www.vishay.com/doc?22001.

SOLDERING

SOLDERING SPECIFICATIONS

Soldering test for capacitors with wire leads: (according to IEC 60068-2-20, solder bath method)

	SOLDERABILITY	RESISTANCE TO SOLDERING HEAT
Soldering temperature	235 °C ± 5 °C	260 °C ± 5 °C
Soldering duration	2 s ± 0.5 s	10 s ± 1 s
Distance from component body	≥ 2 mm	≥ 5 mm

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SOLDERING RECOMMENDATIONS

Soldering of the component should be achieved using a Sn60/40 type or a silver-bearing Sn62/36/2Ag type solder. Ceramic capacitors are very sensitive to rapid changes in temperature (thermal shock) therefore the solder heat resistance specification (see Soldering Specifications table) should not be exceeded. Subjecting the capacitor to excessive heating may result in thermal shocks that can crack the ceramic body. Similarly, excessive heating can cause the internal solder junction to melt.

CLEANING

The components should be cleaned immediately following the soldering operation with vapor degreasers.

SOLVENT RESISTANCE

The coating and marking of the capacitors are resistant to the following test method: IEC 60068-2-45 (method XA).

MOUNTING

If a defined product stop is required for mounting on a PCB, a mechanically formed product stop (kinked or inline wire) or a mounting tool should be used.

We do not recommend modifying the lead terminals, e.g. bending or cropping. This action could break the coating or crack the ceramic insert. If however, the lead must be modified in any way, we recommend support of the lead with a clamping fixture next to the coating.

OPERATING VOLTAGE

In case the voltage is applied to the circuit, starting as well as stopping, may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

OPERATING TEMPERATURE AND SELF-GENERATED HEAT

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency, pulse, or similar application, it may have self-generated heat due to dielectric dissipation.

Temperature increase due to self-generated heating should not exceed 20 °C while operating at an atmosphere temperature of 25 °C.

When measuring, the surface temperature, make sure that the capacitor is not affected by radiant, conductive and convective heat by its surroundings. Excessive heat may lead to thermo-mechanical deterioration of the capacitor's characteristics and reliability.

RELATED DOCUMENTS	
General Information	www.vishay.com/doc?22001
CB-Test Certificate	www.vishay.com/doc?22211
VDE Marks Approval	www.vishay.com/doc?22212
UL-Test Certificate	www.vishay.com/doc?22213

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