

## AC Line Rated Ceramic Disc Capacitors

### Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub>



#### ADDITIONAL RESOURCES



| QUICK REFERENCE DATA       |         |
|----------------------------|---------|
| DESCRIPTION                | VALUE   |
| Ceramic Class              | 2       |
| Ceramic Dielectric         | Y5U     |
| Voltage (V <sub>AC</sub> ) | 760 500 |
| Min. Capacitance (pF)      | 470     |
| Max. Capacitance (pF)      | 4700    |
| Mounting                   | Radial  |

#### MARKING

Marking indicates series, AC rating, capacitance, tolerance code, and approvals.

#### OPERATING TEMPERATURE RANGE

-40 °C to +125 °C

#### TEMPERATURE CHARACTERISTICS

Class 2 Y5U

#### SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)

Class 2 40/125/21

#### APPROVALS

IEC 60384-14.4

UL 60384-14.1

CSA E60384-1:03 2<sup>nd</sup> edition, CSA E60384-14:09 2<sup>nd</sup> edition

#### FEATURES

- Complying with IEC 60384-14 4<sup>th</sup> edition
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

#### APPLICATIONS

- X1, Y1 according to IEC 60384-14.4
- Across-the-line
- Line-by-pass
- Antenna coupling

#### 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<sub>AC</sub>, 50 Hz (IEC 60384-14.4)  
760 V<sub>AC</sub>, 50 Hz / 60 Hz (US/UL/CSA 60384-14)
- Y1: 500 V<sub>AC</sub>, 50 Hz (IEC 60384-14.4)  
500 V<sub>AC</sub>, 50 Hz / 60 Hz (US/UL/CSA 60384-14)

#### TEST VOLTAGE

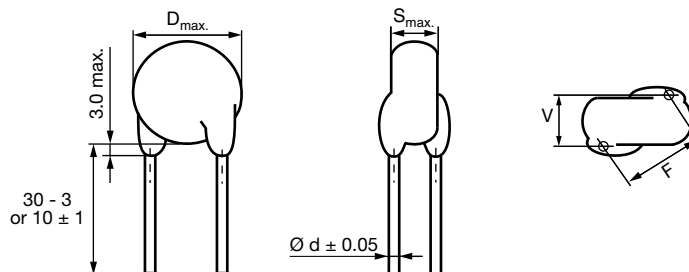
- 4000 V<sub>AC</sub>, 50 Hz, 2 s Component test (100 %)
- 4000 V<sub>AC</sub>, 50 Hz, 60 s Random sampling test (destructive)
- 4000 V<sub>AC</sub>, 50 Hz, 60 s Voltage proof of coating (destructive)

#### INSULATION RESISTANCE AT 500 V<sub>DC</sub>

≥ 10 000 MΩ (60 s)

#### DISSIPATION FACTOR

Class 2: max. 2.5 % (1 kHz)

**DIMENSIONS** in millimeters

**TECHNICAL DATA**

| CAPACITANCE <sup>(2)</sup><br>C (pF) | CAPACITANCE<br>TOLERANCE<br>(%) | BODY<br>DIAMETER<br>D <sub>MAX.</sub> (mm) | BODY<br>THICKNESS<br>S <sub>MAX.</sub> (mm) | LEAD<br>SPACING <sup>(1)</sup><br>F (mm)<br>± 1 mm | LEAD<br>DIAMETER <sup>(1)</sup><br>d (mm)<br>± 0.05 mm | WIDTH <sup>(1)</sup><br>V (mm)<br>± 0.5 mm | PART NUMBER                                  |
|--------------------------------------|---------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------------------|--------------------------------------------------------|--------------------------------------------|----------------------------------------------|
|                                      |                                 |                                            |                                             |                                                    |                                                        |                                            | MISSING DIGITS<br>SEE ORDERING CODE<br>BELOW |
| Y5U (2E3)                            |                                 |                                            |                                             |                                                    |                                                        |                                            |                                              |
| 470                                  | ± 10,<br>± 20                   | 8.0                                        | 5.0                                         | 12.5                                               | 0.6                                                    | 2.1                                        | VKP471#CQ###KR                               |
| 680                                  |                                 | 8.0                                        |                                             |                                                    |                                                        |                                            | VKP681#CQ###KR                               |
| 1000                                 |                                 | 9.0                                        |                                             |                                                    |                                                        |                                            | 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**

| #       | 7 <sup>th</sup> digit                      | Capacitance tolerance | ± 10 % = K, ± 20 % = M    |              |                    |               |                |
|---------|--------------------------------------------|-----------------------|---------------------------|--------------|--------------------|---------------|----------------|
| ###     | 10 <sup>th</sup> to 12 <sup>th</sup> digit | Lead configuration    | see “General Information” |              |                    |               |                |
| 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

RoHS

## APPROVALS

IEC 60384-14.4 - Safety tests

This approval together with CB test certificate substitutes all national approvals.

### CB Test Certificate

Y1 Capacitor: CB-test certificate:

US-26551-UL

470 pF to 4.7 nF

500 V<sub>AC</sub>

X1 Capacitor: CB-test certificate:

US-26551-UL

470 pF to 4.7 nF

760 V<sub>AC</sub>

Minimum thickness of insulation: 0.4 mm



### VDE

Y1 Capacitor: VDE marks approval:

136494

470 pF to 4.7 nF

500 V<sub>AC</sub>

X1 Capacitor: VDE marks approval:

136494

470 pF to 4.7 nF

760 V<sub>AC</sub>

DIN EN 60384-14 VDE 0565-1-1:2006-04 - Safety tests

Minimum thickness of insulation: 0.4 mm



### Underwriters Laboratories Inc. / Canadian Standards Association

Y1 Capacitor: UL-test certificate:

E183844

470 pF to 4.7 nF

500 V<sub>AC</sub>

X1 Capacitor: UL-test certificate:

E183844

470 pF to 4.7 nF

760 V<sub>AC</sub>

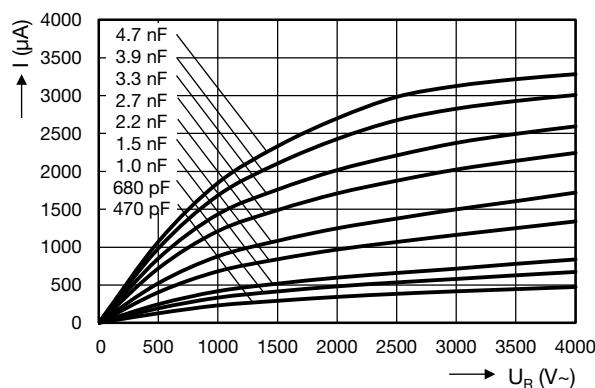
UL 60384-14.1, CSA E60384-1:03 2<sup>nd</sup> edition, CSA E60384-14:09 2<sup>nd</sup> edition

Across-the-line, antenna-coupling and line-by-pass component

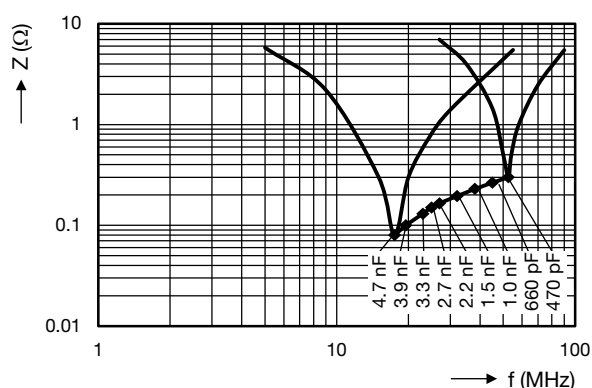
Minimum thickness of insulation: 0.4 mm



## LEAKAGE CURRENT VS. VOLTAGE (typical)



## IMPEDANCE VS. FREQUENCY (typical)



## RELATED DOCUMENTS

|                     |                                                                        |
|---------------------|------------------------------------------------------------------------|
| General Information | <a href="http://www.vishay.com/doc?22001">www.vishay.com/doc?22001</a> |
| CB-Test Certificate | <a href="http://www.vishay.com/doc?22211">www.vishay.com/doc?22211</a> |
| VDE Marks Approval  | <a href="http://www.vishay.com/doc?22212">www.vishay.com/doc?22212</a> |
| UL-Test Certificate | <a href="http://www.vishay.com/doc?22213">www.vishay.com/doc?22213</a> |



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.