

## AC Line Rated Ceramic Disc Capacitors

### Class X1, 440 V<sub>AC</sub>, Class Y2, 300 V<sub>AC</sub>


**RoHS**  
COMPLIANT

#### FEATURES

- Complying with IEC 60384-14 4<sup>th</sup> edition
- High reliability
- Wide range of different leadstyles
- Singlelayer AC disc safety capacitors
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

#### APPLICATIONS

- X1, Y2 according to IEC 60384-14.4
- Line-by-pass

#### 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 7.5 mm or 12.5 mm.

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

#### CAPACITANCE RANGE

33 pF to 4.7 nF

#### TOLERANCE ON CAPACITANCE

± 10 %, ± 20 %

#### RATED VOLTAGE

- X1: 440 V<sub>AC</sub>, 50 Hz (IEC 60384-14.4)  
440 V<sub>AC</sub>, 50 Hz / 60 Hz (US/UL/CSA 60384-14)
- Y2: 300 V<sub>AC</sub>, 50 Hz (IEC 60384-14.4)  
300 V<sub>AC</sub>, 50 Hz / 60 Hz (US/UL/CSA 60384-14)

#### TEST VOLTAGE

- 2600 V<sub>AC</sub>, 50 Hz, 2 s Component test (100 %)
- 2600 V<sub>AC</sub>, 50 Hz, 60 s Random sampling test (destructive)
- 2600 V<sub>AC</sub>, 50 Hz, 60 s Voltage proof of coating (destructive)

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

≥ 6000 MΩ (60 s)

#### DISSIPATION FACTOR

- Class 1: max. 0.5 % (1 MHz)
- Class 2: max. 2.5 % (1 kHz)

#### QUICK REFERENCE DATA

| DESCRIPTION                | VALUE  |      |                     |                     |
|----------------------------|--------|------|---------------------|---------------------|
| Ceramic Class              | 1      |      | 2                   |                     |
| Ceramic Dielectric         | N750   | N750 | Y5S,<br>Y5T,<br>Y5U | Y5S,<br>Y5T,<br>Y5U |
| Voltage (V <sub>AC</sub> ) | 300    | 440  | 300                 | 440                 |
| Min. Capacitance (pF)      | 33     |      | 68                  |                     |
| Max. Capacitance (pF)      | 47     |      | 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 1 N750 (U2J)

Class 2 Y5S, Y5T, Y5U

#### SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)

Class 1 40/125/21

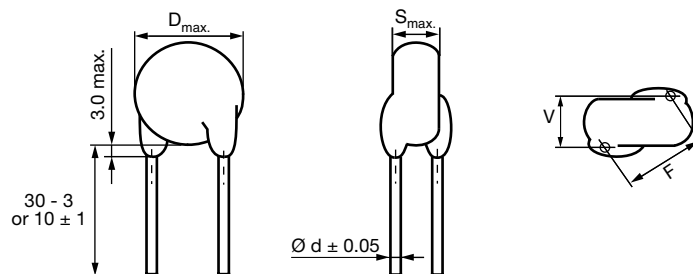
Class 2 40/125/21

#### 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

**DIMENSIONS** in millimeters

**TECHNICAL DATA**

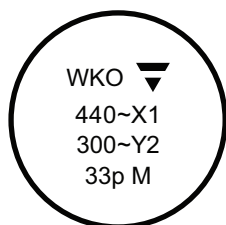
| CAPACITANCE <sup>(2)</sup><br>C (pF) | CAPACITANCE<br>TOLERANCE | BODY<br>DIAMETER<br>D <sub>MAX.</sub> (mm) | BODY<br>THICKNESS<br>S <sub>MAX.</sub> (mm) | LEAD<br>SPACING <sup>(1)</sup><br>F (mm)<br>± 1 mm | LEAD<br>DIAMETER <sup>(1)</sup><br>d (mm)<br>± 0.05 mm | WIDTH <sup>(1)</sup><br>V (mm)<br>± 0.5 mm | PART NUMBER                                  |
|--------------------------------------|--------------------------|--|---|--|--|--|--|
|                                      |                          |  |   |  |  |  | MISSING DIGITS<br>SEE ORDERING<br>CODE BELOW |
| N750 (U2J)                           |                          |  |   |  |  |  |  |
| 33                                   | ± 10 %,<br>± 20 %        | 8.0  | 5.0   | 7.5  | 0.6  | 1.6  | WKO330#CP###KR                               |
| 47                                   |                          |  |   |  |  |  | WKO470#CP###KR                               |
| Y5S (2C3)                            |                          |  |   |  |  |  |  |
| 68                                   | ± 10 %,<br>± 20 %        | 8.0  | 5.0   | 7.5  | 0.6  | 1.9  | WKO680#CP###KR                               |
| 100                                  |                          |  |   |  |  |  | WKO101#CP###KR                               |
| Y5T (2D3)                            |                          |  |   |  |  |  |  |
| 150                                  | ± 10 %,<br>± 20 %        | 8.0  | 5.0   | 7.5  | 0.6  | 1.9  | WKO151#CP###KR                               |
| 220                                  |                          |  |   |  |  |  | WKO221#CP###KR                               |
| 330                                  |                          |  |   |  |  |  | WKO331#CP###KR                               |
| Y5U (2E3)                            |                          |  |   |  |  |  |  |
| 470                                  | ± 10 %,<br>± 20 %        | 8.0  | 5.0   | 7.5  | 0.6  | 2.0  | WKO471#CP###KR                               |
| 680                                  |                          | 9.0  |   |  | 0.8  | 1.6  | WKO681#CP###KR                               |
| 1000                                 |                          | 10.0                                       |   |  |  |  | WKO102#CP###KR                               |
| 1500                                 |                          | 12.0                                       |   |  |  |  | WKO152#CP###KR                               |
| 2200                                 |                          | 13.0                                       |   | WKO222#CP###KR                                     |  |  |  |
| 3300                                 |                          | 15.0                                       |   | WKO332#CP###KR                                     |  |  |  |
| 3900                                 |                          | 16.0                                       |   | WKO392#CP###KR                                     |  |  |  |
| 4700                                 |                          | 18.0                                       |   | 12.5   |  |  | WKO472#CP###KR                               |

**Notes**

- (1) Standard lead configuration, other lead spacing and diameter available on request  
(2) Capacitance values from 1 nF to 4.7 nF: the alternative usage of VKO series is recommended for new application

**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" |
| <b>Example</b> | <b>WKO</b>                                 | <b>222</b>            | <b>M</b>                  |
|                | Series                                     | Capacitance value     | Tolerance code            |
|                |  |                       | <b>CP</b>                 |
|                |  |                       | Voltage code              |
|                |  |                       | <b>CJ0</b>                |
|                |  |                       | Lead configuration        |
|                |  |                       | <b>K</b>                  |
|                |  |                       | Internal code             |
|                |  |                       | <b>R</b>                  |
|                |  |                       | RoHS compliant            |

**MARKING**


WKO 33 pF to 1.0 nF



WKO 1.5 nF to 4.7 nF



## APPROVALS

IEC 60384-14.4 - Safety tests

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

### CB Certificate

Y2-capacitor: CB test certificate:

US-26157-UL

33 pF to 4.7 nF

300 V<sub>AC</sub>

X1-capacitor: CB test certificate:

US-26157-UL

33 pF to 4.7 nF

440 V<sub>AC</sub>

Minimum thickness of insulation: 0.4 mm



### VDE

Y2-capacitor: VDE marks approval:

136820

33 pF to 4.7 nF

300 V<sub>AC</sub>

X1-capacitor: VDE marks approval:

136820

33 pF to 4.7 nF

440 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

Y2-capacitor: UL-test certificate:

E183844

33 pF to 4.7 nF

300 V<sub>AC</sub>

X1-capacitor: UL-test certificate:

E183844

33 pF to 4.7 nF

440 V<sub>AC</sub>

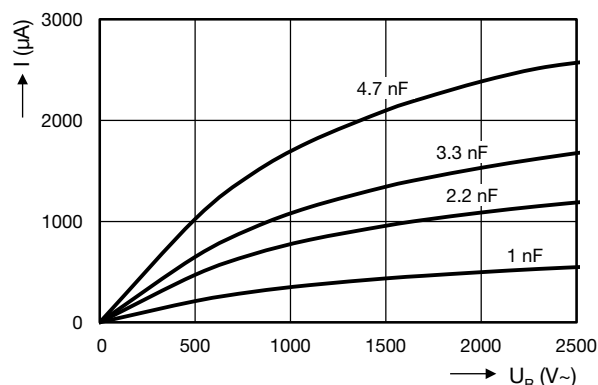
UL 60384-14.1, CSA E60384-1:03 2<sup>nd</sup> edition, CSA E60384-14:09 2<sup>nd</sup> edition

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

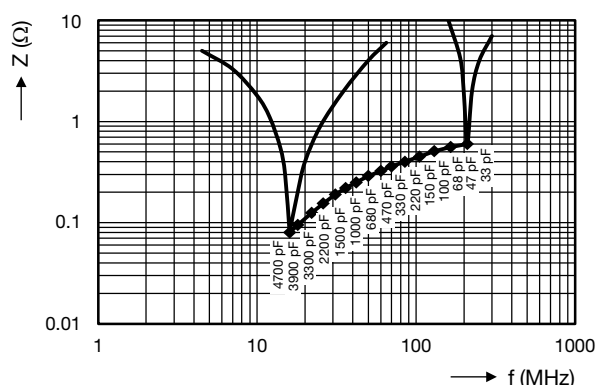
Minimum thickness of insulation: 0.4 mm



## LEAKAGE CURRENT VS. VOLTAGE (typical)



## IMPEDANCE VS. FREQUENCY (typical)



## RELATED DOCUMENTS

|                     |  |
|---------------------|--|
| General Information | <a href="http://www.vishay.com/doc?222001">www.vishay.com/doc?222001</a> |
| CB Test Certificate | <a href="http://www.vishay.com/doc?22217">www.vishay.com/doc?22217</a>   |
| VDE Marks Approval  | <a href="http://www.vishay.com/doc?22219">www.vishay.com/doc?22219</a>   |
| UL Test Certificate | <a href="http://www.vishay.com/doc?22218">www.vishay.com/doc?22218</a>   |



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