

## AC Line Rated Ceramic Disc Capacitors Class X1, 440 V<sub>AC</sub>, Class Y2, 300 V<sub>AC</sub>



QUICK REFERENCE DATA				
DESCRIPTION	VALUE			
Ceramic Class	1		2	
Ceramic Dielectric	N750	N750	Y5S, Y5T, Y5U	Y5S, Y5T, 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

### 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)



**RoHS**  
COMPLIANT

### 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)

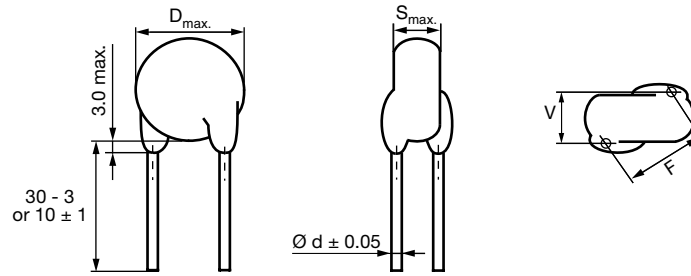
### INSULATION RESISTANCE AT 500 V<sub>DC</sub>

≥ 6000 MΩ (60 s)

### DISSIPATION FACTOR

Class 1: max. 0.5 % (1 MHz)

Class 2: max. 2.5 % (1 kHz)

**DIMENSIONS** in millimeters

**TECHNICAL DATA**

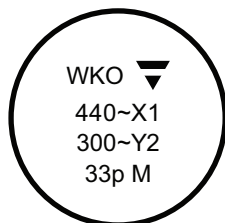
CAPACITANCE C (pF) <sup>(2)</sup>	CAPACITANCE TOLERANCE	BODY DIAMETER D <sub>MAX.</sub> (mm)	BODY THICKNESS S <sub>MAX.</sub> (mm)	LEAD SPACING <sup>(1)</sup> F (mm) ± 1 mm	LEAD DIAMETER <sup>(1)</sup> d (mm) ± 0.05 mm	WIDTH <sup>(1)</sup> V (mm) ± 0.5 mm	PART NUMBER MISSING DIGITS SEE ORDERING CODE BELOW
<b>N750 (U2J)</b>							
33	± 10 %, ± 20 %	8.0	5.0	7.5	0.6	1.6	WKO330#CP###KR
47							WKO470#CP###KR
<b>Y5S (2C3)</b>							
68	± 10 %, ± 20 %	8.0	5.0	7.5	0.6	1.9	WKO680#CP###KR
100							WKO101#CP###KR
<b>Y5T (2D3)</b>							
150	± 10 %, ± 20 %	8.0	5.0	7.5	0.6	1.9	WKO151#CP###KR
220							WKO221#CP###KR
330							WKO331#CP###KR
<b>Y5U (2E3)</b>							
470	± 10 %, ± 20 %	8.0	5.0	7.5	0.6	2.0	WKO471#CP###KR
680		9.0					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	0.8	1.6	WKO472#CP###KR

**Notes**

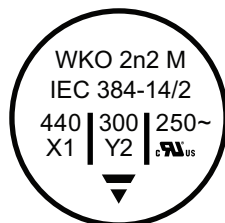
- (1) Standard lead configuration, other lead spacing and diameter available on request  
 (2) Capacitance values from 1 nF to 4.7 nF: the alternative usage of VKO series is recommended for new application

**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

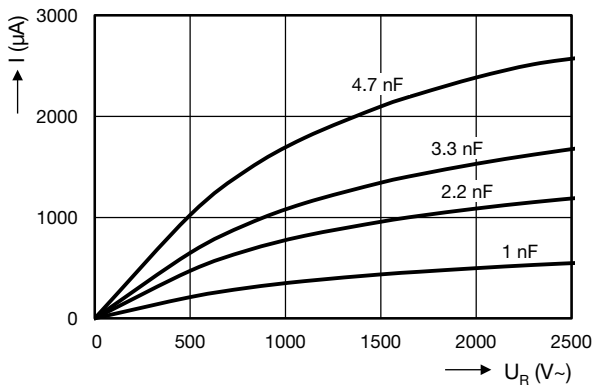


WKO 1.5 nF to 4.7 nF

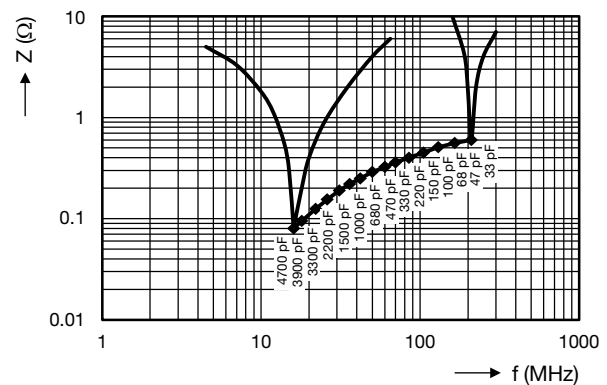
Type: WKO101MCPBRAKR  
 Cap.: 100pF ±20%  
 Ur.: 300/440VAC  
 Qty.: 1500  
 IEC 60 384-14/2: Y2(300~), X1(440~)  
 EN132400:125°C c 15us  
 H=18+2, F=5.0  
 PN: WKO101MCPBRAKR  
 LOT1: 033145 DC1: 1134  
 LOT2: DC2:  
 BATCH NO.: 201134CZ  
 REGION: 7032 S.L.: 0010  
 RoHS

<b>APPROVALS</b>				
IEC 60384-14.4 - Safety tests This approval together with CB test certificate substitutes all national approvals.				
<b>CB Certificate</b>				
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				
<b>VDE</b>				
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				
<b>Underwriters Laboratories Inc. / Canadian Standards Association</b>				
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)



<b>RELATED DOCUMENTS</b>	
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?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>



## 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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**