

AC Line Rated Ceramic Disc Capacitors

Class X1, 760 V_{AC} / Class Y1, 500 V_{AC}



FEATURES

- Complies with IEC 60384-14, 4th edition
- High reliability
- Radial leads
- High capacitance up to 20 nF
- 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 60384-14.4
- Across-the-line
- Line by-pass
- Antenna coupling

DESIGN

The capacitors consist of a ceramic disc of which both sides are silver-plated. Connection leads are made of tinned copper having a diameter of 0.032" (0.81 mm). The capacitors may be supplied with radial kinked or straight leads having a lead spacing of 0.375" (9.5 mm). The standard tolerances are $\pm 10\%$ or $\pm 20\%$. Coating is made of flame-retardant epoxy resin in accordance with "UL 94 V-0."

QUICK REFERENCE DATA				
DESCRIPTION	VALUE			
Ceramic Class	1		2	
Ceramic Dielectric	C0G, U2J, P3K, R3L	C0G, U2J, P3K, R3L	X7R, Y5U	X7R, Y5U
Voltage (V _{AC})	500	760	500	760
Min. Capacitance (pF)	10		68	
Max. Capacitance (pF)	47		20 000	
Mounting	Radial			

INSULATION RESISTANCE

Min. 1000 Ω F

TOLERANCE ON CAPACITANCE

 $\pm 10\%$; $\pm 20\%$

DISSIPATION FACTOR

2.0 % max. at 1 kHz; 1 V

CERAMIC DIELECTRIC

C0G, U2J, P3K, R3L (class 1)
X7R, Y5U (class 2)

OPERATING TEMPERATURE RANGE

-30 °C to +125 °C

CLIMATIC CATEGORY ACC. TO EN 60068-1

25/125/21

CAPACITANCE RANGE

10 pF to 20 nF

RATED VOLTAGE

IEC 60384-14.4:

- X1: 760 V_{AC}, 50 Hz
- Y1: 500 V_{AC}, 50 Hz

DIELECTRIC STRENGTH BETWEEN LEADS

Component test:

4000 V_{AC}, 50 Hz, 2 s

As repeated test admissible only once with:

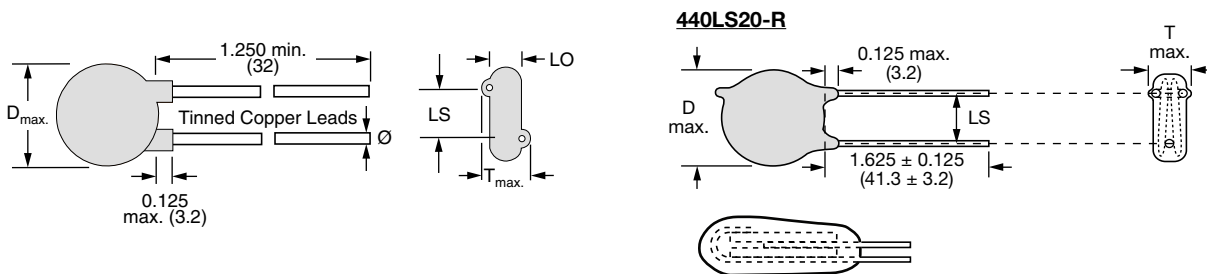
3600 V_{AC}, 50 Hz, 2 s

Random sampling test (destructive test):

4000 V_{AC}, 50 Hz, 60 s

DIELECTRIC STRENGTH OF BODY INSULATION

4000 V_{AC}, 50 Hz, 60 s (destructive test)

DIMENSIONS in inches (millimeters)

ORDERING INFORMATION, CERAMIC X1 / Y1 CAPACITORS 440L

C (pF)	TOL. (%)	D _{max.} DIAMETER INCH (mm)	T _{max.} THICKNESS INCH (mm)	WIRE SIZE		LS LEAD SPACE INCH (mm) ± 1 mm	LO LEAD OFFSET INCH (mm) ± 0.5 mm	ORDERING CODE		
C0G										
10	± 10	0.330 (8.4)	0.195 (5.0)	20	0.032 (0.81)	0.375 (9.5)	0.098 (2.5)	440LQ10-R		
U2J										
15	± 10	0.330 (8.4)	0.210 (5.3)	20	0.032 (0.81)	0.375 (9.5)	0.110 (2.8)	440LQ15-R		
P3K										
22	± 10	0.330 (8.4)	0.190 (4.8)	20	0.032 (0.81)	0.375 (9.5)	0.094 (2.4)	440LQ22-R		
R3L										
33	± 10	0.330 (8.4)	0.200 (5.1)	20	0.032 (0.81)	0.375 (9.5)	0.102 (2.6)	440LQ33-R		
47	± 10	0.330 (8.4)	0.180 (4.6)	20	0.032 (0.81)	0.375 (9.5)	0.083 (2.1)	440LQ47-R		
X7R										
68	± 10	0.330 (8.4)	0.220 (5.6)	20	0.032 (0.81)	0.375 (9.5)	0.122 (3.1)	440LQ68-R		
100			0.220 (5.6)				0.122 (3.1)	440LT10-R		
150			0.235 (6.0)				0.138 (3.5)	440LT15-R		
220			0.235 (6.0)				0.138 (3.5)	440LT22-R		
330			0.225 (5.7)				0.126 (3.2)	440LT33-R		
Y5U										
470	± 20	0.330 (8.4)	0.230 (5.8)	20	0.032 (0.81)	0.375 (9.5)	0.130 (3.3)	440LT47-R		
560		0.330 (8.4)	0.230 (5.8)				0.130 (3.3)	440LT56-R		
680		0.330 (8.4)	0.235 (6.0)				0.138 (3.5)	440LT68-R		
1000		0.365 (9.3)	0.225 (5.7)				0.126 (3.2)	440LD10-R		
1500		0.365 (9.3)	0.220 (5.6)				0.118 (3.0)	440LD15-R		
2000		0.400 (10.2)	0.220 (5.6)				0.118 (3.0)	440LD20-R		
2200		0.430 (10.9)	0.225 (5.7)				0.126 (3.2)	440LD22-R		
2700		0.460 (11.7)	0.225 (5.7)				0.126 (3.2)	440LD27-R		
2800		0.460 (11.7)	0.220 (5.6)				0.122 (3.1)	440LD28-R		
3000		0.490 (12.4)	0.225 (5.7)				0.126 (3.2)	440LD30-R		
3200		0.490 (12.4)	0.220 (5.6)				0.122 (3.1)	440LD32-R		
3300		0.490 (10.9)	0.220 (5.6)				0.122 (3.1)	440LD33-R		
3900		0.530 (13.5)	0.220 (5.6)				0.118 (3.0)	440LD39-R		
4000		0.530 (13.5)	0.220 (5.6)				0.122 (3.1)	440LD40-R		
4700		0.620 (15.7)	0.230 (5.8)				0.130 (3.3)	440LD47-R		
5000		0.620 (15.7)	0.225 (5.7)				0.126 (3.2)	440LD50-R		
5500		0.680 (17.3)	0.230 (5.8)				0.134 (3.4)	440LD55-R		
5600		0.680 (17.3)	0.230 (5.8)				0.134 (3.4)	440LD56-R		
6800		0.720 (18.3)	0.235 (6.0)				0.138 (3.5)	440LD68-R		
8000		0.720 (18.3)	0.220 (5.6)				0.122 (3.1)	440LD80-R		
9000		0.790 (20.1)	0.225 (5.7)				0.126 (3.2)	440LD90-R		
10 000			0.850 (21.6)				0.230 (5.8)		0.134 (3.4)	440LS10-R
20 000			0.850 (21.6)				0.355 (9.0)		0.134 (3.4)	440LS20-R

Notes

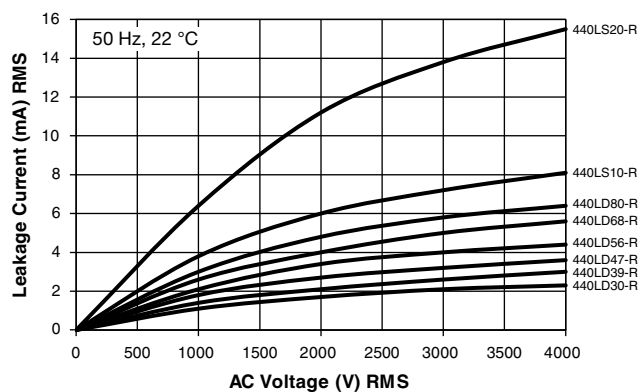
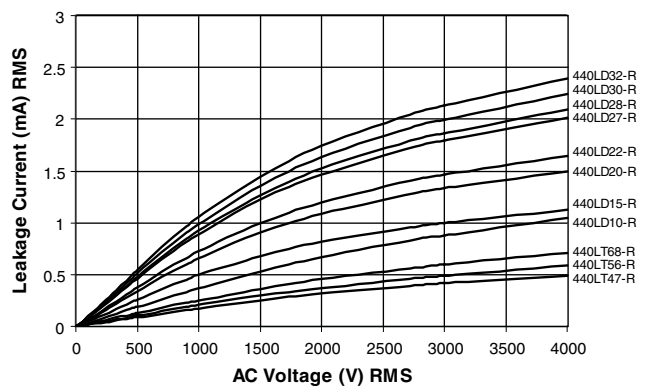
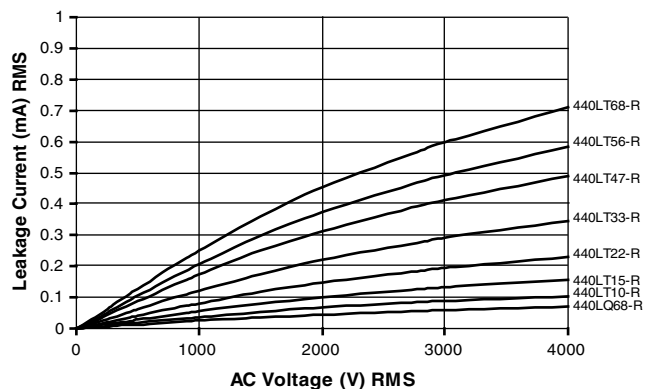
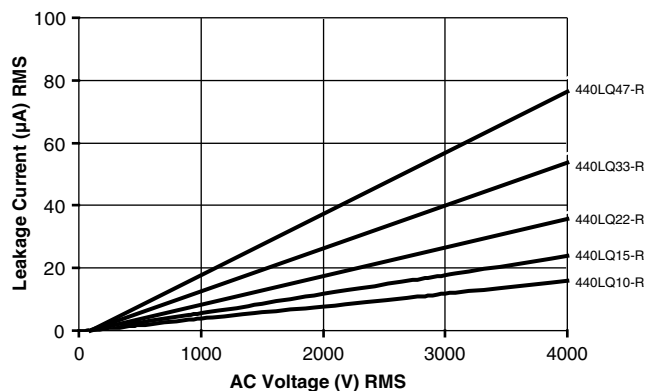
- Alternate lead spacings are available bulk or tape and reel on request.
- Minimum lead clearance according to IEC 60384-14: 0.315" (8 mm)

TAPE AND REEL OPTIONS

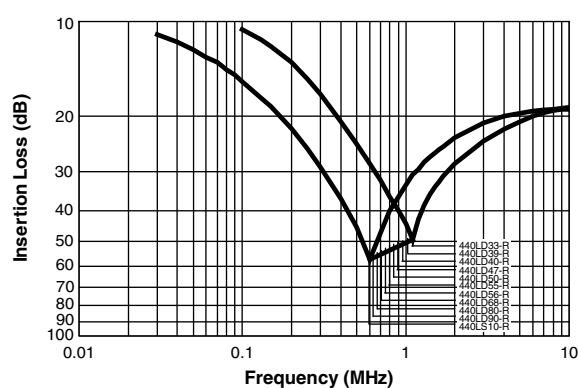
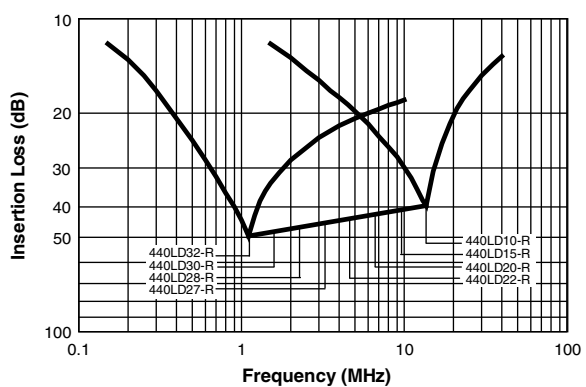
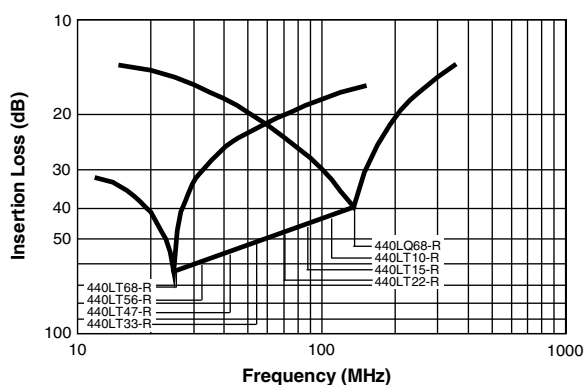
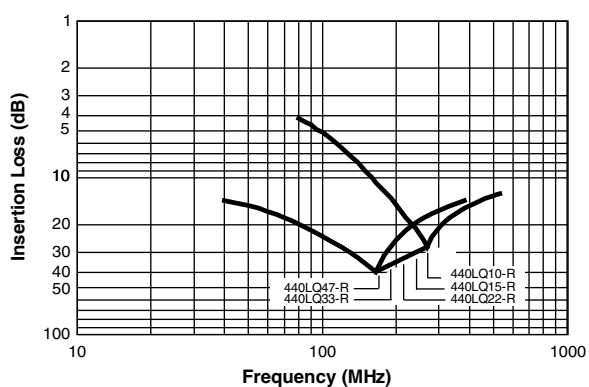
Part number codes and specifications for tape and reel packaging are found in the general information document - find web-link below.



LEAKAGE CURRENT VS. VOLTAGE (Typical)



INSERTION LOSS VS. FREQUENCY (Typical)





APPROVALS

IEC 60384-14.4 - Safety tests

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

CB Certificate

Y1-capacitor: CB test certificate:	DE1-56450/A1	10 pF to 20 nF	500 V _{AC}
X1-capacitor: CB test certificate:	DE1-56450/A1	10 pF to 20 nF	760 V _{AC}



VDE

Y1-capacitor: VDE marks approval:	40003985	10 pF to 20 nF	500 V _{AC}
X1-capacitor: VDE marks approval:	40003985	10 pF to 20 nF	400 V _{AC}



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

Underwriters Laboratories Inc.

Y1-capacitor: UL test certificate:	E99264	10 pF to 20 nF	500 V _{AC}
X1-capacitor: UL test certificate:	E99264	10 pF to 20 nF	760 V _{AC}



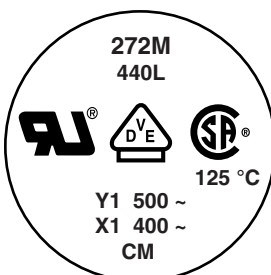
UL 60384-14, CSA E60384-1:03, CSA E60384-14:09

Fixed capacitors for electromagnetic interference suppression and connection to the supply mains.

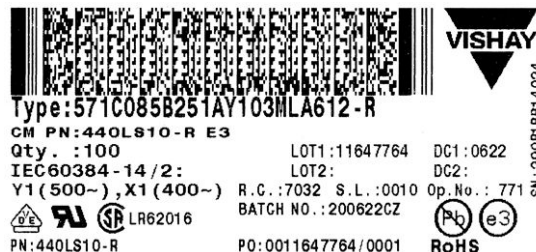
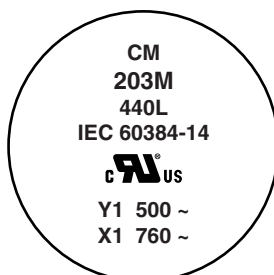
MARKING

Samples

10 pF to 10 nF



20 nF



RELATED DOCUMENTS

General Information	www.vishay.com/doc?23140
CB Test Certificate	www.vishay.com/doc?22237
VDE Marks Approval	www.vishay.com/doc?22238
UL Test Certificate	www.vishay.com/doc?22239



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.