

AC Line Rated Ceramic Disc Capacitors

Class X1, 440 V_{AC}, Class Y2, 300 V_{AC}



FEATURES

- Complying with IEC 60384-14 4th edition
- High reliability
- Vertical (inline) kinked or straight leads
- Singlelayer AC disc safety capacitors
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912

APPLICATIONS

- X1, Y2 according to IEC 60384-14.4
- Across-the-line
- Line by-pass
- Antenna coupling

DESIGN

The capacitor consists of a ceramic disc which is silver plated on both sides. Connection leads are made of tinned copper having a diameter of 0.6 mm.

The capacitors may be supplied with vertical (inline) kinked leads having a lead spacing of 5.0 mm, 7.5 mm, or 10.0 mm. Encapsulation is made of flame retardant epoxy resin in accordance with UL 94 V-0.

CAPACITANCE RANGE

10 pF to 0.01 μ F

RATED VOLTAGE U_R

IEC 60384-14 and UL60384-14:

(X1): 440 V_{AC}, 50 Hz

(Y2): 300 V_{AC}, 50 Hz

TEST VOLTAGE

Component test (100 %):

2600 V_{AC}, 50 Hz, 2 s

(2600 V_{AC} for LS 7.5 mm and 10 mm)

(2200 V_{AC} for LS 5.0 mm)

Random sampling test (destructive test):

2600 V_{AC}, 50 Hz, 60 s

Voltage proof of coating (destructive test):

2600 V_{AC}, 50 Hz, 60 s

INSULATION RESISTANCE

$\geq 10\,000\text{ M}\Omega$

CAPACITANCE TOLERANCE

$\pm 20\%$ (code M); $\pm 10\%$ (code K)

DISSIPATION FACTOR

Class 1: max. 0.5 % (1 MHz)

Class 2: max. 2.5 % (1 kHz)



RoHS
COMPLIANT

HALOGEN
FREE
Available

GREEN
(5-2008)
Available

QUICK REFERENCE DATA

DESCRIPTION	VALUE			
Ceramic Class	1		2	
Ceramic Dielectric	N750		Y5S, Y5U	
Voltage (V _{AC})	300	440	300	440
Min. Capacitance (pF)	10		68	
Max. Capacitance (pF)	47		10 000	
Mounting	Radial			

OPERATING TEMPERATURE RANGE

-40 °C to +125 °C

TEMPERATURE CHARACTERISTICS

Class 1: N750 (U2J)

Class 2: Y5S, Y5U

SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)

Class 1 and class 2: 40/125/21

COATING

According to UL 94 V-0

Epoxy resin, isolating, flame retardant

APPROVALS

IEC 60384-14.4

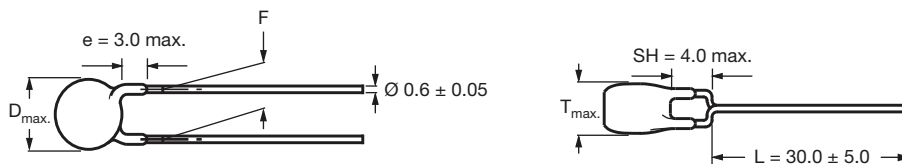
UL 60384-14

DIN EN 60384-14

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

PACKAGING

Bulk, tape and reel, taped ammpack

DIMENSIONS in millimeters


Capacitors with 5.0 mm, 7.5 mm, or 10 mm lead spacing

TECHNICAL DATA

CAPACITANCE C (pF)	CAPACITANCE TOLERANCE (%)	BODY DIAMETER D _{max.} (mm)	BODY THICKNESS T _{max.} (mm)	LEAD SPACING ⁽¹⁾ F (mm) ± 1 mm	PART NUMBER	
					MISSING DIGITS SEE ORDERING CODE BELOW	
					RoHS COMPLIANT	RoHS AND HALOGEN-FREE
U2J (N750)						
10	± 10	7.5	5.0	5.0, 7.5, or 10.0	VY2100K29U2JS6###	VY2100K29U2JG6###
15					VY2150K29U2JS6###	VY2150K29U2JG6###
22					VY2220K29U2JS6###	VY2220K29U2JG6###
33					VY2330K29U2JS6###	VY2330K29U2JG6###
47					VY2470K29U2JS6###	VY2470K29U2JG6###
Y5S (2C3)						
68	± 10	7.5	5.0	5.0, 7.5, or 10.0	VY2680K29Y5SS6###	VY2680K29Y5SG6###
100					VY2101K29Y5SS6###	VY2101K29Y5SG6###
150					VY2151K29Y5SS6###	VY2151K29Y5SG6###
220					VY2221K29Y5SS6###	VY2221K29Y5SG6###
330					VY2331K29Y5SS6###	VY2331K29Y5SG6###
470					VY2471K29Y5SS6###	VY2471K29Y5SG6###
Y5U (2E3)						
680	± 20	7.5	5.0	5.0, 7.5, or 10.0	VY2681M29Y5US6###	VY2681M29Y5UG6###
1000					VY2102M29Y5US6###	VY2102M29Y5UG6###
1500					VY2152M31Y5US6###	VY2152M31Y5UG6###
2200		VY2222M35Y5US6###			VY2222M35Y5UG6###	
3300		VY2332M41Y5US6###			VY2332M41Y5UG6###	
3900		VY2392M43Y5US6###			VY2392M43Y5UG6###	
4700		VY2472M49Y5US6###			VY2472M49Y5UG6###	
6800		14.5		7.5 or 10.0	VY2682M59Y5US63##	VY2682M59Y5UG63##
10 000					VY2103M63Y5US63##	VY2103M63Y5UG63##

Notes

- ⁽¹⁾ Straight leads are available on request
- Coating extension DR valid for straight leads only

ORDERING CODE

###	15 th to 17 th digit		Lead configuration			Available configurations see below				
Example	VY2	221	K	29	Y5S	S	6	U	V	7
	Series	Capacitance value	Tolerance code	Size code	Temperature coefficient	Rated voltage	Lead wire diameter	Packaging / lead length	Lead style	Lead spacing
						S = X1/Y2 300 V (AC)		3 = bulk T = tape and reel U = ammopack	L = straight V = inline kinked	5 = 5.0 7 = 7.5 0 = 10.0
						G = X1/Y2 300 V (AC) halogen-free				

LEADSPACING 5.0 mm and 7.5 mm

PACKAGING					
CAPACITANCE VALUE	SIZE CODE	BODY DIAMETER $D_{max.}$ (mm)	PACKAGING QUANTITIES		
			BULK	REEL	AMMO
10 pF to 4700 pF	29 to 49	12.5	1000	1000	1000
6800 pF to 0.01 μ F	59 to 63	16.0	500	-	-

LEADSPACING 10.0 mm

PACKAGING					
CAPACITANCE VALUE	SIZE CODE	BODY DIAMETER $D_{max.}$ (mm)	PACKAGING QUANTITIES		
			BULK	REEL	AMMO
10 pF to 4700 pF	29 to 49	12.5	1000	500	750
6800 pF to 0.01 μ F	59 to 63	16.0	500	500	750

Note

- The capacitors are supplied in bulk packaging (cardboard boxes), in tape on reel in ammopack.

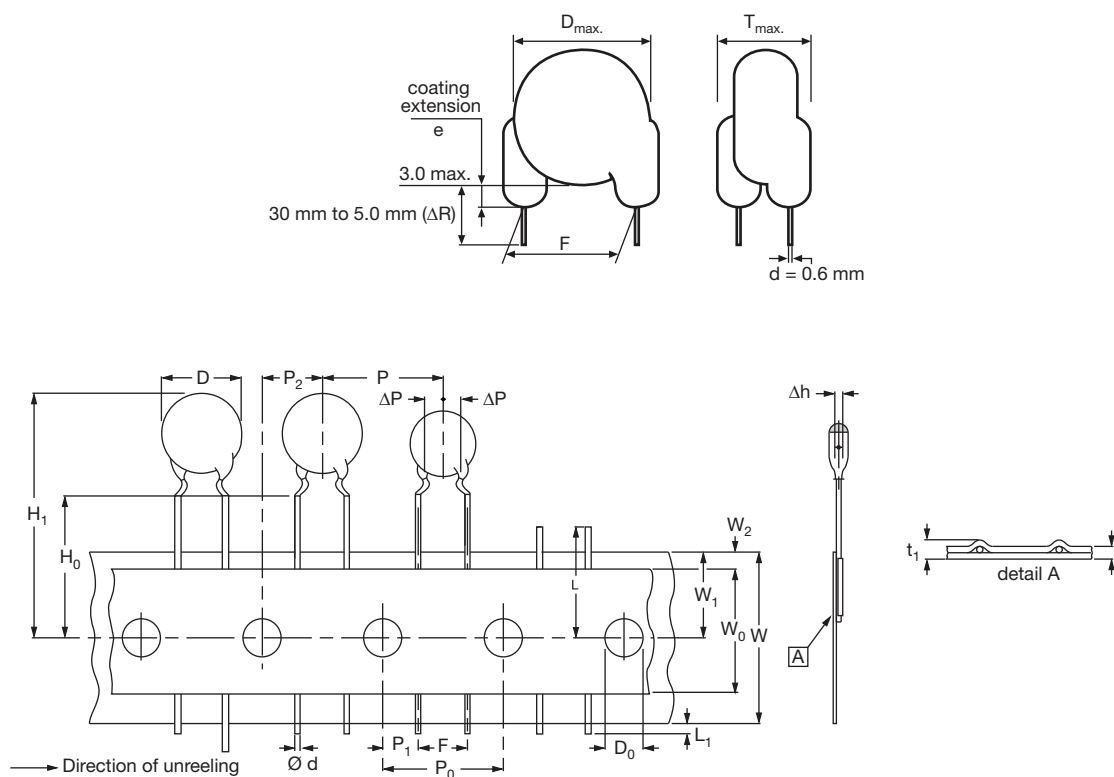
STRAIGHT LEADS


Fig. 1 - Kinked capacitors on tape, lead spacing 5.0 mm (0.2") and 7.5 mm (0.3")

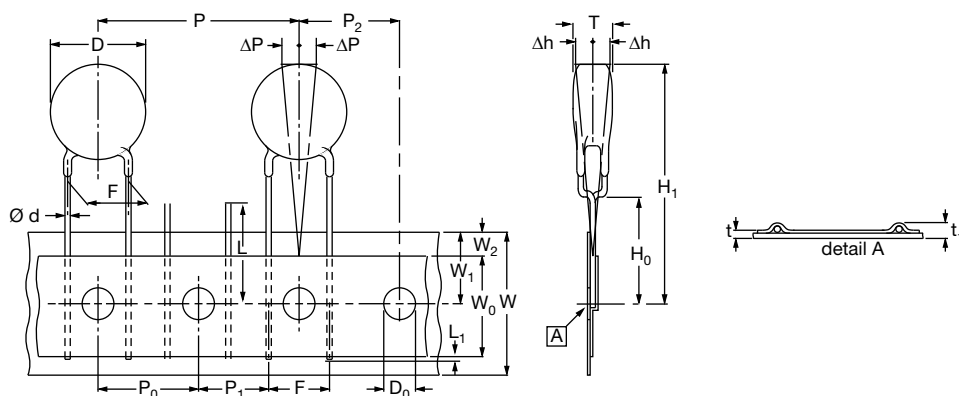
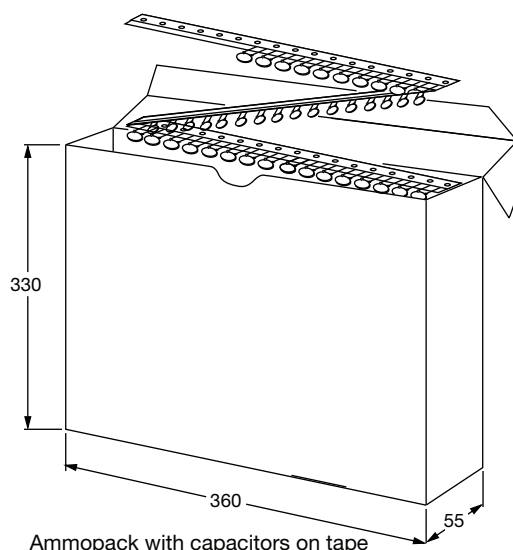
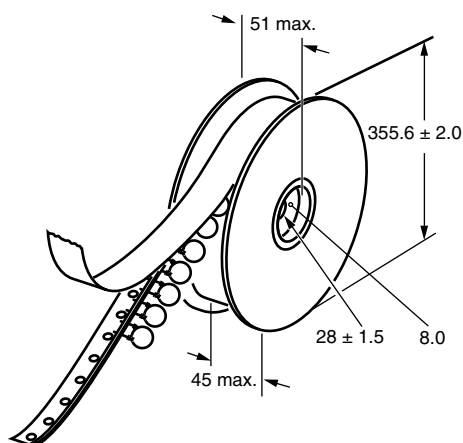


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

DIMENSION OF TAPE				
SYMBOL	PARAMETER	DIMENSIONS (mm)		
		FIG. 1 (5 mm)	FIG. 1 (7.5 mm)	FIG. 2 (10 mm)
D ⁽¹⁾	Body diameter	11.0 max.	14.0 max.	16.0 max.
d	Lead diameter	0.6 ± 0.05	0.6 ± 0.05	0.6 ± 0.05
P	Pitch of component	12.7 ± 1	15.0 ± 1	25.4 ± 1
P ₀ ⁽²⁾	Pitch of sprocket hole	12.7 ± 0.3	15.0 ± 0.3	12.7 ± 0.3
P ₁ ⁽³⁾	Distance, hole center to lead	3.85 ± 0.7	3.75 ± 0.7	7.7 ± 1.0
P ₂ ⁽³⁾	Distance, hole to center of component	6.35 ± 1.3	7.5 ± 1.5	12.7 ± 1.5
F	Lead spacing	5.0 (+ 0.6/- 0.4)	7.5 (+ 0.6/- 0.4)	10.0 (+ 0.6/- 0.4)
Δh	Average deviation across tape	± 1.0 max.	± 1.0 max.	± 1.0 max.
ΔP	Average deviation in direction of reeling	± 1.0 max.	± 1.0 max.	± 1.0 max.
W	Carrier tape width	18.0 + 1/- 0.5	18.0 + 1/- 0.5	18.0 + 1/- 0.5
W ₀	Hold-down tape width	5.0 min.	5.0 min.	5.0 min.
W ₁	Position of sprocket hole	9.0 + 0.75/- 0.5	9.0 + 0.75/- 0.5	9.0 + 0.75/- 0.5
W ₂	Distance of hold-down tape	3.0 max.	3.0 max.	3.0 max.
H ₁	Maximum component height	32	40	40
H ₀	Height to seating plane (for kinked leads)	16.0 ± 0.5	16.0 ± 0.5	16.0 ± 0.5
H ₀	Height to seating plane (for straight leads)	20.0 ± 0.5	20.0 ± 0.5	20.0 ± 0.5
L	Length of cut leads	11.0 max.	11.0 max.	11.0 max.
L ₁	Length of lead protrusion	1.0 max.	1.0 max.	1.0 max.
D ₀	Diameter of sprocket hole	4.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2
t	Total tape thickness	0.9 max.	0.9 max.	0.9 max.
t ₁	Maximum thickness of tape and wires	1.5 max.	1.5 max.	1.5 max.

Notes

- (1) See "Technical Data" table
(2) Cumulative pitch error: ± ≤ 1 mm/20 pitches
(3) Obliquity maximum 3°

REEL AND TAPE DATA in millimeters

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-26163-UL	10 pF to 10 nF	300 V _{AC}
X1-capacitor: CB test certificate:	US-26163-UL	10 pF to 10 nF	440 V _{AC}


VDE

Y2-capacitor: VDE marks approval:	40009669	10 pF to 10 nF	300 V _{AC}
X1-capacitor: VDE marks approval:	40009669	10 pF to 10 nF	440 V _{AC}



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

Underwriters Laboratories Inc. / Canadian Standards Association

Y2-capacitor: UL-test certificate:	E183844	10 pF to 10 nF	300 V _{AC}
X1-capacitor: UL-test certificate:	E183844	10 pF to 10 nF	440 V _{AC}


UL 60384-14.1, CSA E60384-1:03 2nd edition, CSA E60384-14:09 2nd edition

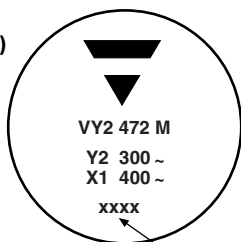
Across-the-line, antenna-coupling, and line-by-pass component

CQC

Y2-capacitor: CQC test certificate:	CQC05001012316	10 pF to 10 nF	300 V _{AC}
X1-capacitor: CQC test certificate:	CQC05001012316	10 pF to 10 nF	440 V _{AC}



MARKING

Sample
(2 sides)


Front



Back

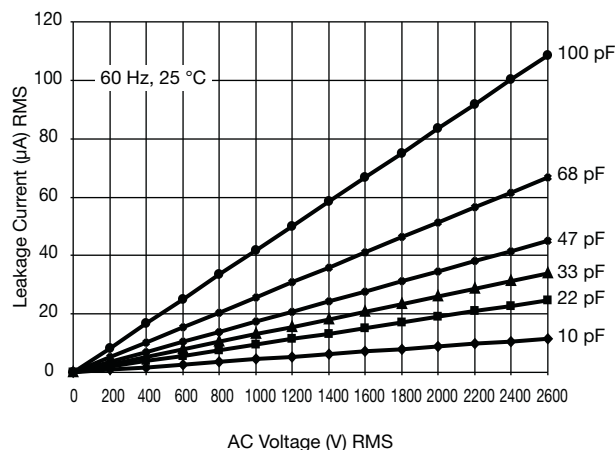
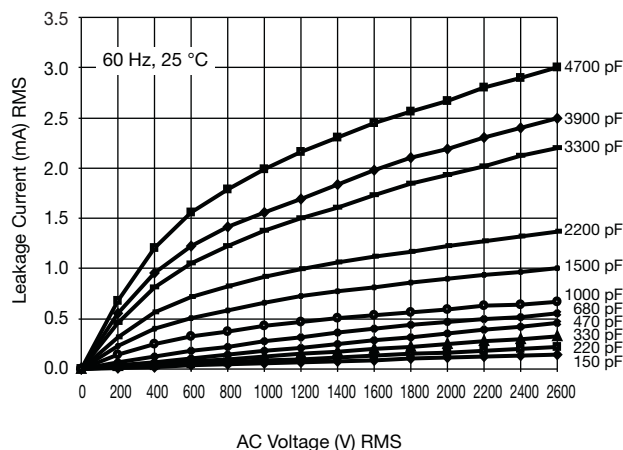
4 digit date code
(year/week)

PN: VY2331K29Y5SS6UV7
QTY: 1000
PO:
SO:

Lot1: 14Z549306
Lot2:
Batch: 200601GN
Region: 9520
Ser.No: 0601H72383

DC1: 0601
DC2:
SL: 0010


2/5

LEAKAGE CURRENT VS. VOLTAGE (Typical)

Note

- The capacitors meet the essential requirements of EIA 198. Unless stated otherwise all electrical values apply at an ambient temperature of 25 °C ± 3 °C, at normal atmospheric conditions.

RELATED DOCUMENTS

General Information	www.vishay.com/doc?28536
CB Test Certificate	www.vishay.com/doc?22254
VDE Marks Approval	www.vishay.com/doc?22256
UL Test Certificate	www.vishay.com/doc?22253
CQC Test Certificate	www.vishay.com/doc?22255

SAMPLE KIT

Part Number	VY21-KIT-HF
Link	www.vishay.com/doc?28554



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.