

AC Line Rated Ceramic Disc Capacitors

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



RoHS
COMPLIANT
HALOGEN
FREE
Available
GREEN
[5-2008]
Available

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 μF

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

≥ 10 000 MΩ

CAPACITANCE TOLERANCE

± 20 % (code M); ± 10 % (code K)

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		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

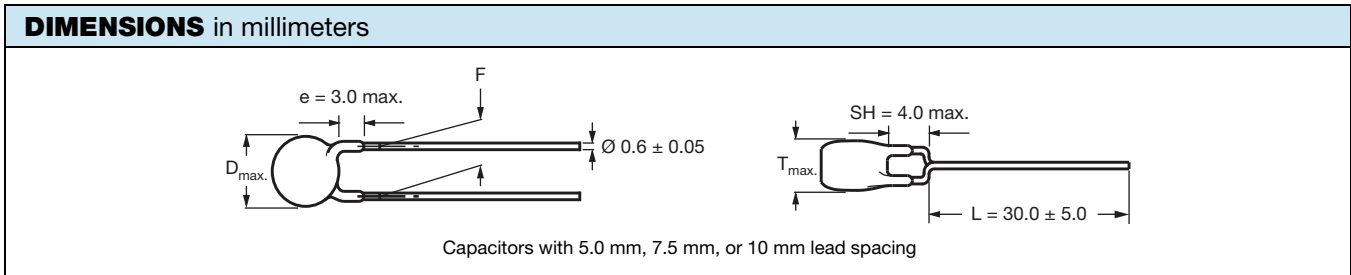
UL 60384-14

DIN EN 60384-14

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

PACKAGING

Bulk, tape and reel, taped ammpack



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		8.0			VY2102M29Y5US6###	VY2102M29Y5UG6###
1500		9.0			VY2152M31Y5US6###	VY2152M31Y5UG6###
2200		10.5			VY2222M35Y5US6###	VY2222M35Y5UG6###
3300		11.0			VY2332M41Y5US6###	VY2332M41Y5UG6###
3900		12.5		VY2392M43Y5US6###	VY2392M43Y5UG6###	
4700		12.5		VY2472M49Y5US6###	VY2472M49Y5UG6###	
6800		14.5		VY2682M59Y5US63##	VY2682M59Y5UG63##	
10 000		16.0		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.

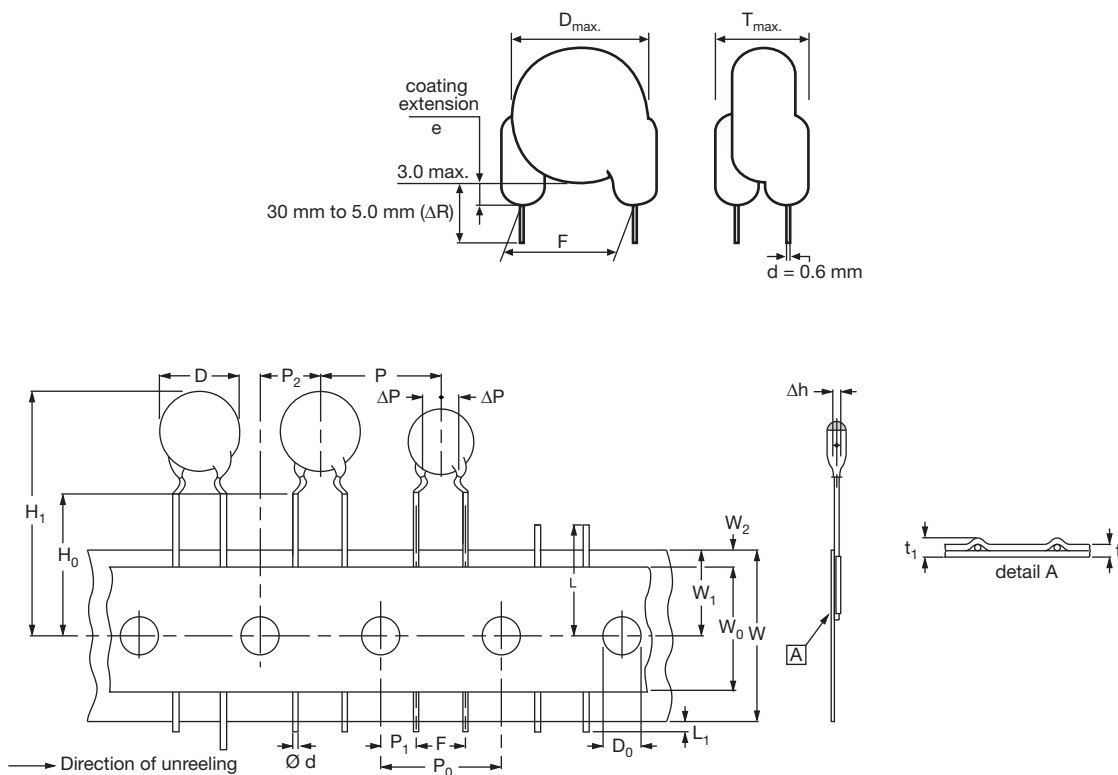
STRAIGHT LEADS


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

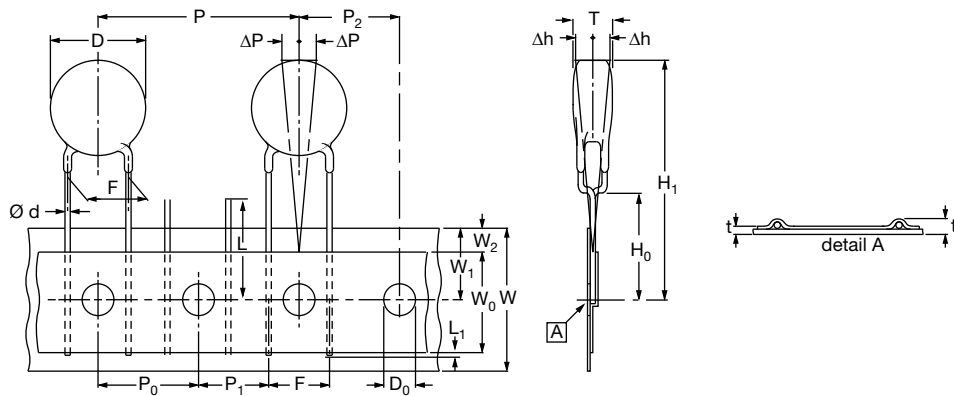
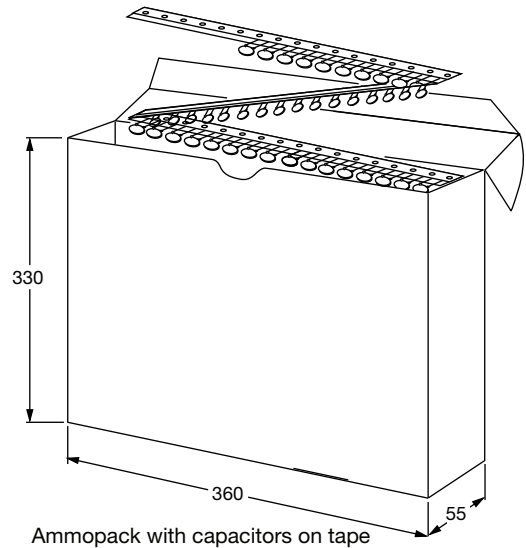
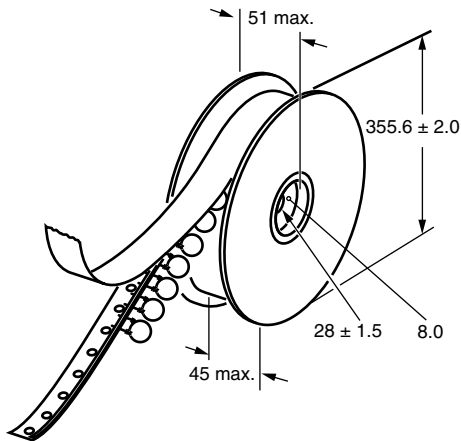


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

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 2 nd edition, CSA E60384-14:09 2 nd 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)

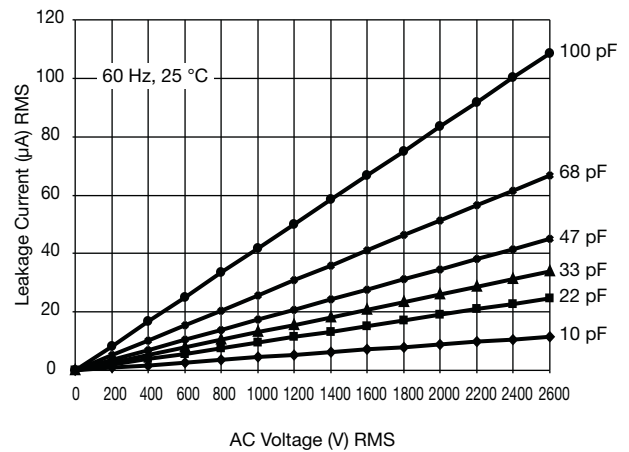
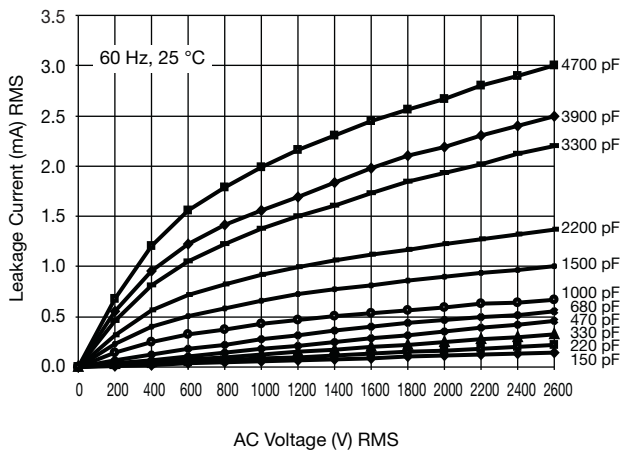
Front

Back

PN: VY2331K29Y5SS6UV7 Lot1: 14Z549306 DC1: 0601
 QTY: 1000 Lot2: DC2:
 PO: Batch: 200601GN
 SO: Region: 9520 SL: 0010
 Ser.No: 0601H72383

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



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