

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

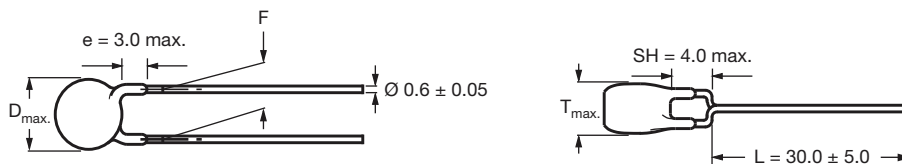
UL 60384-14

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 | | 8.0 | | | VY2152M31Y5US6### | VY2152M31Y5UG6### |
| 2200 | | 9.0 | | | VY2222M35Y5US6### | VY2222M35Y5UG6### |
| 3300 | | 10.5 | | | VY2332M41Y5US6### | VY2332M41Y5UG6### |
| 3900 | | 11.0 | | | 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.

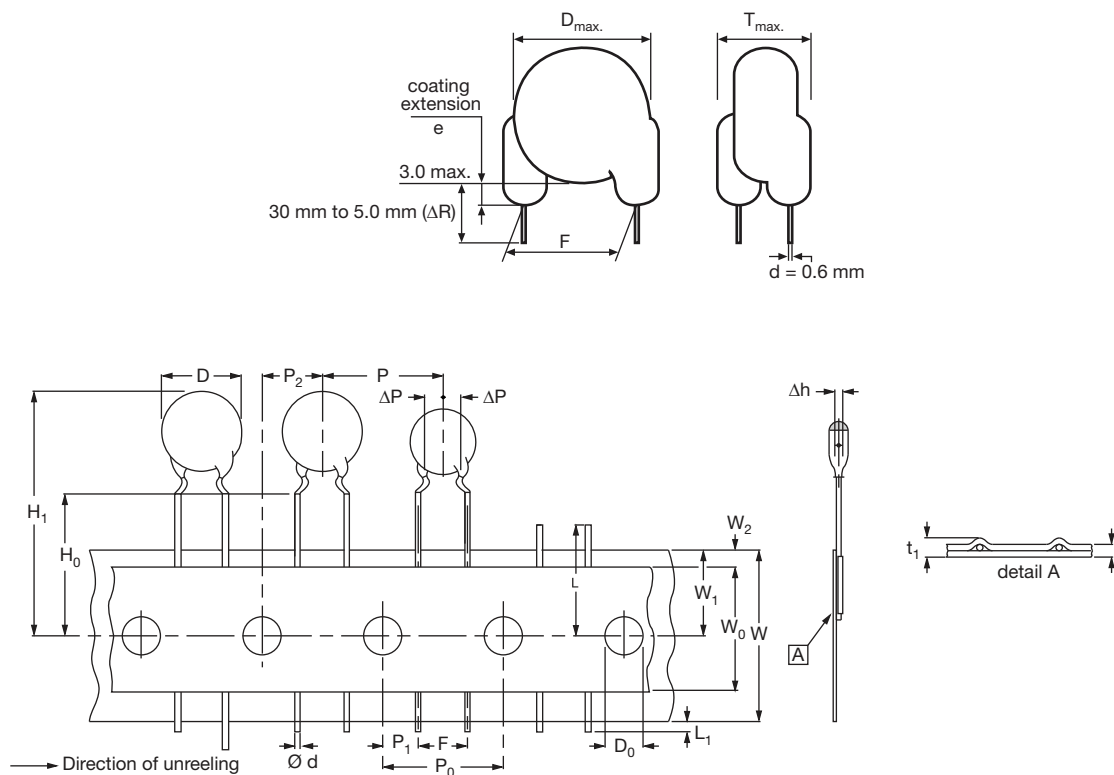
STRAIGHT LEADS


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

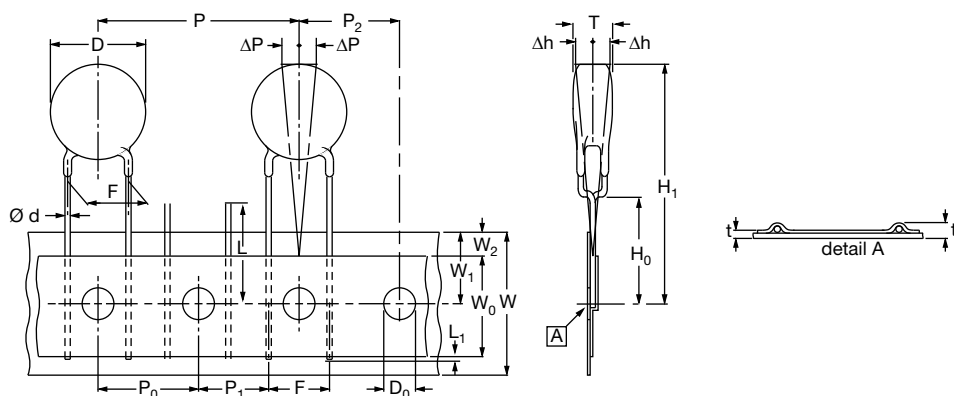


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

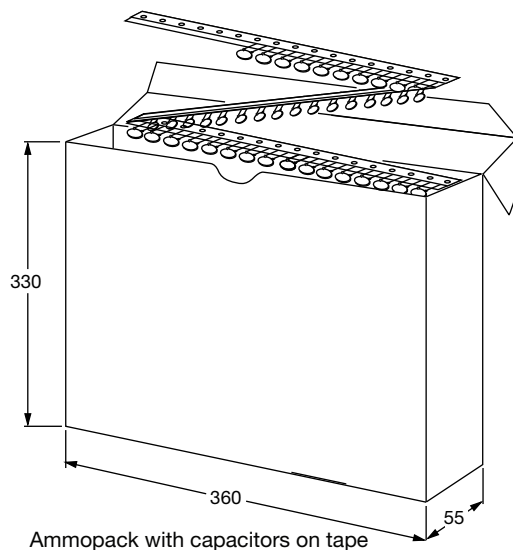
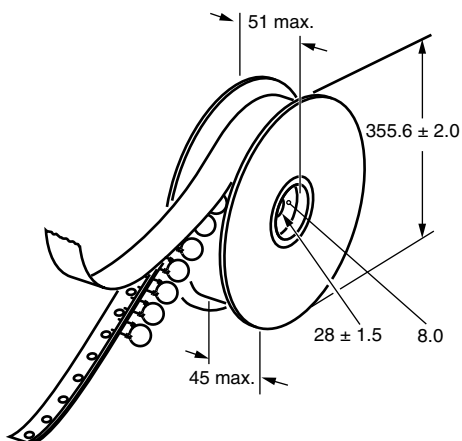
| DIMENSION OF TAPE | | | | |
|-------------------------------|--|-------------------|-------------------|--------------------|
| SYMBOL | PARAMETER | DIMENSIONS (mm) | | |
| | | FIG. 1 (5 mm) | FIG. 1 (7.5 mm) | FIG. 2 (10 mm) |
| D ⁽¹⁾ | Body diameter | 11.0 max. | 14.0 max. | 16.0 max. |
| d | Lead 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 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

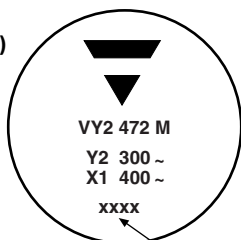
440 V_{AC}





MARKING

Sample
(2 sides)



Front



Back



PN: VY2331K29Y5SS6UV7
QTY: 1000
PO:
SO:

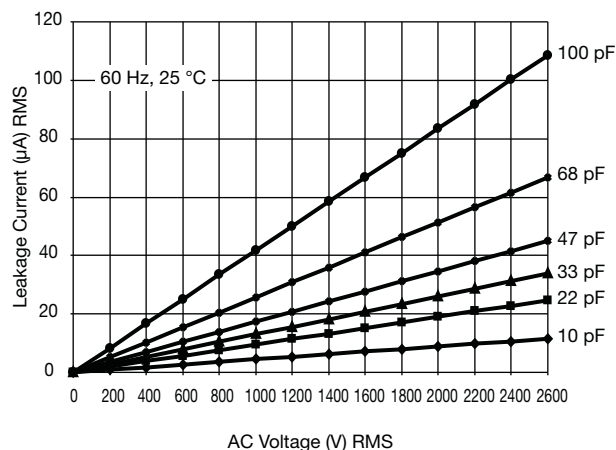
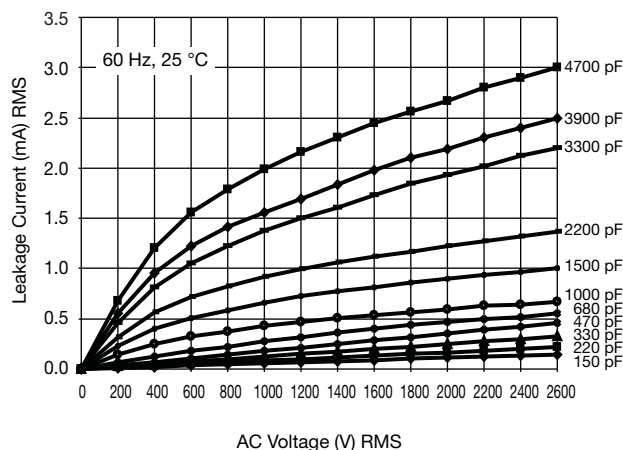
Lot1: 14Z549306
Lot2:
Batch: 200601GN
Region: 9520
Ser.No: 0601H72383

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 |



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