

## AC Line Rated Disc Capacitors

### Class X1, 440 V<sub>AC</sub>, Class Y2, 300 V<sub>AC</sub>



#### FEATURES

- Complying with IEC 60384-14, 3<sup>rd</sup> edition
- High reliability
- Vertical (inline) kinked or straight leads
- Material categorization:  
For definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

#### APPLICATIONS

- Across-the-line
- Line by-pass
- Antenna coupling

#### DESIGN

The capacitors consist of a ceramic disc both sides of which are silver-plated. 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 flammable resistant epoxy resin in accordance with "UL 94 V-0"

#### CAPACITANCE RANGE

10 pF to 0.01 µF

#### RATED VOLTAGE U<sub>R</sub>

IEC 60384-14 and UL60384-14:

(X1): 440 V<sub>AC</sub>, 50 Hz

(Y2): 300 V<sub>AC</sub>, 50 Hz

#### TEST VOLTAGE

Component test (100 %)

2600 V<sub>AC</sub>, 50 Hz, 2 s

(2600 V<sub>AC</sub> for LS 7.5 mm and 10 mm)

(2200 V<sub>AC</sub> for LS 5.0 mm)

Random sampling test (destructive test)

2600 V<sub>AC</sub>, 50 Hz, 60 s

Voltage proof of coating (destructive test)

2600 V<sub>AC</sub>, 50 Hz, 60 s

#### INSULATION RESISTANCE

10 000 MΩ minimum

#### TOLERANCE OF CAPACITANCE

± 20 % (code M); ± 10 % (code K)

#### DISSIPATION FACTOR

2.5 % maximum

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

| QUICK REFERENCE DATA       |                |                |                |                |                |                |
|----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| DESCRIPTION                | CLASS X1 (U2J) | CLASS X1 (Y5S) | CLASS X1 (Y5U) | CLASS Y2 (U2J) | CLASS Y2 (Y5S) | CLASS Y2 (Y5U) |
| Voltage (V <sub>AC</sub> ) | 440            |                |                | 300            |                |                |
| Min. Capacitance (pF)      | 10             | 68             | 680            | 10             | 68             | 680            |
| Max. Capacitance (pF)      | 47             | 680            | 10 000         | 47             | 680            | 10 000         |
| Mounting                   | Through hole   |                |                |                |                |                |

#### OPERATING TEMPERATURE RANGE

- 40 °C to + 125 °C

#### TEMPERATURE CHARACTERISTICS

See Ordering Information Tables

#### CLIMATIC CATEGORY

40/125/21 according to EN 60068-1

#### COATING

According to UL 94 V-0

Epoxy resin, isolating, flame retardant

#### APPROVALS

ENEC - VDE DE 1-30691

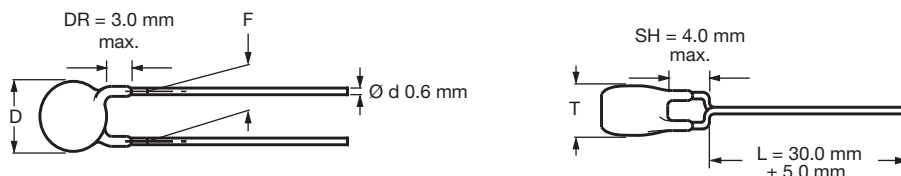
UL60384-14 file E183844

CSA 22.2

#### PACKAGING

Bulk; tape and reel; taped ammpack

## DIMENSIONS



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

## ORDERING INFORMATION

|                            |          |                   |                                      |                                       |                     |                                                          | CLEAR TEXT CODE                                                        |                       |
|----------------------------|----------|-------------------|--------------------------------------|---------------------------------------|---------------------|----------------------------------------------------------|------------------------------------------------------------------------|-----------------------|
| C (pF)                     | TOL. (%) | TEMP. COEFFICIENT | BODY DIAMETER D <sub>MAX.</sub> (mm) | BODY THICKNESS T <sub>MAX.</sub> (mm) | LEAD SPACING F (mm) | COATING EXTENSION DR <sub>MAX.</sub> <sup>(2)</sup> (mm) | 15 <sup>TH</sup> DIGIT:<br>T = REEL; U = AMMO; 3 = BULK <sup>(1)</sup> |                       |
|                            |          |                   |                                      |                                       |                     |                                                          | RoHS COMPLIANT                                                         | RoHS AND HALOGEN-FREE |
| VY2 for leadspacing 5.0 mm |          |                   |                                      |                                       |                     |                                                          | 2200 V <sub>AC</sub> , 50 Hz, 2 s                                      |                       |
| 10                         | ± 10     | U2J (N750)        | 7.5                                  | 5.0                                   | 5.0                 | 3.0                                                      | VY2100K29U2JS6*V5                                                      | VY2100K29U2JG6*V5     |
| 15                         |          |                   |                                      |                                       |                     |                                                          | VY2150K29U2JS6*V5                                                      | VY2150K29U2JG6*V5     |
| 22                         |          |                   |                                      |                                       |                     |                                                          | VY2220K29U2JS6*V5                                                      | VY2220K29U2JG6*V5     |
| 33                         |          |                   |                                      |                                       |                     |                                                          | VY2330K29U2JS6*V5                                                      | VY2330K29U2JG6*V5     |
| 47                         |          |                   |                                      |                                       |                     |                                                          | VY2470K29U2JS6*V5                                                      | VY2470K29U2JG6*V5     |
| 68                         |          |                   |                                      |                                       |                     |                                                          | VY2680K29Y5SS6*V5                                                      | VY2680K29Y5SG6*V5     |
| 100                        |          |                   |                                      |                                       |                     |                                                          | VY2101K29Y5SS6*V5                                                      | VY2101K29Y5SG6*V5     |
| 150                        | ± 20     | Y5S (2C3)         | 7.5                                  | 5.0                                   | 5.0                 | 3.0                                                      | VY2151K29Y5SS6*V5                                                      | VY2151K29Y5SG6*V5     |
| 220                        |          |                   |                                      |                                       |                     |                                                          | VY2221K29Y5SS6*V5                                                      | VY2221K29Y5SG6*V5     |
| 330                        |          |                   |                                      |                                       |                     |                                                          | VY2331K29Y5SS6*V5                                                      | VY2331K29Y5SG6*V5     |
| 470                        |          |                   |                                      |                                       |                     |                                                          | VY2471K29Y5SS6*V5                                                      | VY2471K29Y5SG6*V5     |
| 680                        |          |                   |                                      |                                       |                     |                                                          | VY2681M29Y5US6*V5                                                      | VY2681M29Y5UG6*V5     |
| 1000                       |          |                   |                                      |                                       |                     |                                                          | VY2102M29Y5US6*V5                                                      | VY2102M29Y5UG6*V5     |
| 1500                       |          |                   |                                      |                                       |                     |                                                          | VY2152M31Y5US6*V5                                                      | VY2152M31Y5UG6*V5     |
| 2200                       | ± 20     | Y5U (2E3)         | 8.0                                  | 5.0                                   | 5.0                 | 3.0                                                      | VY2222M35Y5US6*V5                                                      | VY2222M35Y5UG6*V5     |
| 3300                       |          |                   | 9.0                                  |                                       |                     |                                                          | VY2332M41Y5US6*V5                                                      | VY2332M41Y5UG6*V5     |
| 3900                       |          |                   | 10.5                                 |                                       |                     |                                                          | VY2392M43Y5US6*V5                                                      | VY2392M43Y5UG6*V5     |
|                            |          |                   | 11.0                                 |                                       |                     |                                                          |                                                                        |                       |

## ORDERING INFORMATION

|                            |             |                      |                                               |                                                |                              |                                                                   | CLEAR TEXT CODE                                                        |                          |
|----------------------------|-------------|----------------------|-----------------------------------------------|------------------------------------------------|------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------|
| C (pF)                     | TOL.<br>(%) | TEMP.<br>COEFFICIENT | BODY<br>DIAMETER<br>D <sub>MAX.</sub><br>(mm) | BODY<br>THICKNESS<br>T <sub>MAX.</sub><br>(mm) | LEAD<br>SPACING<br>F<br>(mm) | COATING<br>EXTENSION<br>DR <sub>MAX.</sub> <sup>(2)</sup><br>(mm) | 15 <sup>TH</sup> DIGIT:<br>T = REEL; U = AMMO; 3 = BULK <sup>(1)</sup> |                          |
|                            |             |                      |                                               |                                                |                              |                                                                   | RoHS COMPLIANT                                                         | RoHS AND<br>HALOGEN-FREE |
|                            |             |                      |                                               |                                                |                              |                                                                   |                                                                        |                          |
| VY2 for leadspacing 7.5 mm |             |                      |                                               |                                                |                              |                                                                   | 2600 V <sub>AC</sub> , 50 Hz, 2 s                                      |                          |
| 10                         | ± 10        | U2J (N750)           | 7.5                                           | 5.0                                            | 7.5                          | 3.0                                                               | VY2100K29U2JS6*V7                                                      | VY2100K29U2JG6*V7        |
| 15                         |             |                      |                                               |                                                |                              |                                                                   | VY2150K29U2JS6*V7                                                      | VY2150K29U2JG6*V7        |
| 22                         |             |                      |                                               |                                                |                              |                                                                   | VY2220K29U2JS6*V7                                                      | VY2220K29U2JG6*V7        |
| 33                         |             |                      |                                               |                                                |                              |                                                                   | VY2330K29U2JS6*V7                                                      | VY2330K29U2JG6*V7        |
| 47                         |             |                      |                                               |                                                |                              |                                                                   | VY2470K29U2JS6*V7                                                      | VY2470K29U2JG6*V7        |
| 68                         | ± 10        | Y5S (2C3)            |                                               |                                                |                              |                                                                   | VY2680K29Y5SS6*V7                                                      | VY2680K29Y5SG6*V7        |
| 100                        |             |                      |                                               |                                                |                              |                                                                   | VY2101K29Y5SS6*V7                                                      | VY2101K29Y5SG6*V7        |
| 150                        |             |                      |                                               |                                                |                              |                                                                   | VY2151K29Y5SS6*V7                                                      | VY2151K29Y5SG6*V7        |
| 220                        |             |                      |                                               |                                                |                              |                                                                   | VY2221K29Y5SS6*V7                                                      | VY2221K29Y5SG6*V7        |
| 330                        |             |                      |                                               |                                                |                              |                                                                   | VY2331K29Y5SS6*V7                                                      | VY2331K29Y5SG6*V7        |
| 470                        | ± 20        | Y5U (2E3)            |                                               |                                                |                              |                                                                   | VY2471K29Y5SS6*V7                                                      | VY2471K29Y5SG6*V7        |
| 680                        |             |                      |                                               |                                                |                              |                                                                   | VY2681M29Y5US6*V7                                                      | VY2681M29Y5UG6*V7        |
| 1000                       |             |                      |                                               |                                                |                              |                                                                   | VY2102M29Y5US6*V7                                                      | VY2102M29Y5UG6*V7        |
| 1500                       |             |                      |                                               |                                                |                              |                                                                   | VY2152M31Y5US6*V7                                                      | VY2152M31Y5UG6*V7        |
| 2200                       |             |                      |                                               |                                                |                              |                                                                   | VY2222M35Y5US6*V7                                                      | VY2222M35Y5UG6*V7        |
| 3300                       | ± 20        | Y5U (2E3)            | VY2332M41Y5US6*V7                             | VY2332M41Y5UG6*V7                              |                              |                                                                   |                                                                        |                          |
| 3900                       |             |                      | VY2392M43Y5US6*V7                             | VY2392M43Y5UG6*V7                              |                              |                                                                   |                                                                        |                          |
| 4700                       |             |                      | VY2472M49Y5US6*V7                             | VY2472M49Y5UG6*V7                              |                              |                                                                   |                                                                        |                          |
| 6800                       |             |                      | VY2682M59Y5US63V7                             | VY2682M59Y5UG63V7                              |                              |                                                                   |                                                                        |                          |
| 0.01 µF                    |             |                      | VY2103M63Y5US63V7                             | VY2103M63Y5UG63V7                              |                              |                                                                   |                                                                        |                          |

| ORDERING INFORMATION        |           |                   |                                      |                                       |                     |                                                          |                                                                        |                       |  |  |  |  |  |
|-----------------------------|-----------|-------------------|--------------------------------------|---------------------------------------|---------------------|----------------------------------------------------------|------------------------------------------------------------------------|-----------------------|--|--|--|--|--|
| C (pF)                      | TOL. (%)  | TEMP. COEFFICIENT | BODY DIAMETER D <sub>MAX.</sub> (mm) | BODY THICKNESS T <sub>MAX.</sub> (mm) | LEAD SPACING F (mm) | COATING EXTENSION DR <sub>MAX.</sub> <sup>(2)</sup> (mm) | CLEAR TEXT CODE                                                        |                       |  |  |  |  |  |
|                             |           |                   |                                      |                                       |                     |                                                          | 15 <sup>TH</sup> DIGIT:<br>T = REEL; U = AMMO; 3 = BULK <sup>(1)</sup> |                       |  |  |  |  |  |
|                             |           |                   |                                      |                                       |                     |                                                          | RoHS COMPLIANT                                                         | RoHS AND HALOGEN-FREE |  |  |  |  |  |
| VY2 for leadspacing 10.0 mm |           |                   |                                      |                                       |                     |                                                          | 2600 V <sub>AC</sub> , 50 Hz, 2 s                                      |                       |  |  |  |  |  |
| 10                          | ± 10      | U2J (N750)        | 7.5                                  | 5.0                                   | 10.0                | 3.0                                                      | VY2100K29U2JS6*V0                                                      | VY2100K29U2JG6*V0     |  |  |  |  |  |
| 15                          |           |                   |                                      |                                       |                     |                                                          | VY2150K29U2JS6*V0                                                      | VY2150K29U2JG6*V0     |  |  |  |  |  |
| 22                          |           |                   |                                      |                                       |                     |                                                          | VY2220K29U2JS6*V0                                                      | VY2220K29U2JG6*V0     |  |  |  |  |  |
| 33                          |           |                   |                                      |                                       |                     |                                                          | VY2330K29U2JS6*V0                                                      | VY2330K29U2JG6*V0     |  |  |  |  |  |
| 47                          |           |                   |                                      |                                       |                     |                                                          | VY2470K29U2JS6*V0                                                      | VY2470K29U2JG6*V0     |  |  |  |  |  |
| 68                          |           | VY2680K29Y5SS6*V0 |                                      |                                       |                     |                                                          | VY2680K29Y5SG6*V0                                                      |                       |  |  |  |  |  |
| 100                         | Y5S (2C3) | VY2101K29Y5SS6*V0 |                                      |                                       |                     |                                                          | VY2101K29Y5SG6*V0                                                      |                       |  |  |  |  |  |
| 150                         |           | VY2151K29Y5SS6*V0 |                                      |                                       |                     |                                                          | VY2151K29Y5SG6*V0                                                      |                       |  |  |  |  |  |
| 220                         |           | VY2221K29Y5SS6*V0 |                                      |                                       |                     |                                                          | VY2221K29Y5SG6*V0                                                      |                       |  |  |  |  |  |
| 330                         |           | VY2331K29Y5SS6*V0 |                                      |                                       |                     |                                                          | VY2331K29Y5SG6*V0                                                      |                       |  |  |  |  |  |
| 470                         |           | VY2471K29Y5SS6*V0 | VY2471K29Y5SG6*V0                    |                                       |                     |                                                          |                                                                        |                       |  |  |  |  |  |
| 680                         |           | VY2681M29Y5US6*V0 | VY2681M29Y5UG6*V0                    |                                       |                     |                                                          |                                                                        |                       |  |  |  |  |  |
| 1000                        | ± 20      | Y5U (2E3)         | 8.0                                  | 5.0                                   | 10.0                | 3.0                                                      | VY2102M29Y5US6*V0                                                      | VY2102M29Y5UG6*V0     |  |  |  |  |  |
| 1500                        |           |                   |                                      |                                       |                     |                                                          | VY2152M31Y5US6*V0                                                      | VY2152M31Y5UG6*V0     |  |  |  |  |  |
| 2200                        |           |                   |                                      |                                       |                     |                                                          | VY2222M35Y5US6*V0                                                      | VY2222M35Y5UG6*V0     |  |  |  |  |  |
| 3300                        |           |                   |                                      |                                       |                     |                                                          | VY2332M41Y5US6*V0                                                      | VY2332M41Y5UG6*V0     |  |  |  |  |  |
| 3900                        |           |                   |                                      |                                       |                     |                                                          | VY2392M43Y5US6*V0                                                      | VY2392M43Y5UG6*V0     |  |  |  |  |  |
| 4700                        |           |                   |                                      |                                       |                     |                                                          | VY2472M49Y5US6*V0                                                      | VY2472M49Y5UG6*V0     |  |  |  |  |  |
| 6800                        |           |                   |                                      |                                       |                     |                                                          | VY2682M59Y5US63V0                                                      | VY2682M59Y5UG63V0     |  |  |  |  |  |
| 0.01 µF                     |           |                   |                                      |                                       |                     |                                                          | VY2103M63Y5US63V0                                                      | VY2103M63Y5UG63V0     |  |  |  |  |  |
|                             |           |                   |                                      |                                       |                     |                                                          |                                                                        |                       |  |  |  |  |  |

**Notes**

(1) 15<sup>th</sup> digit of the clear text code number to be completed with the packaging code.

(2) Coating extension DR valid for straight leads only.

- Straight leads are available on request.

**LEADSPACING 5.0 mm and 7.5 mm**

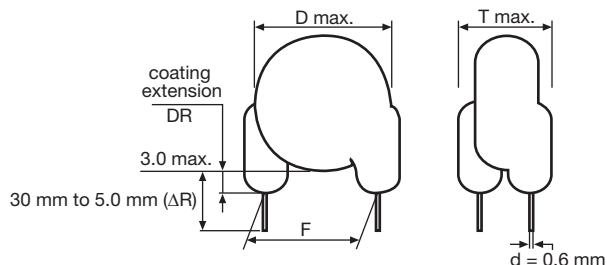
| PACKAGING          |           |                                      |                      |      |      |
|--------------------|-----------|--------------------------------------|----------------------|------|------|
| CAPACITANCE VALUE  | SIZE CODE | BODY DIAMETER D <sub>MAX.</sub> (mm) | PACKAGING QUANTITIES |      |      |
|                    |           |                                      | BULK                 | REEL | AMMO |
| 10 pF to 4700 pF   | 29 to 49  | 12.5                                 | 1000                 | 1000 | 1000 |
| 6800 pF to 0.01 µF | 59 to 63  | 16.0                                 | 500                  | -    | -    |

**LEADSPACING 10.0 mm**

| PACKAGING          |           |                                      |                      |      |      |
|--------------------|-----------|--------------------------------------|----------------------|------|------|
| CAPACITANCE VALUE  | SIZE CODE | BODY DIAMETER D <sub>MAX.</sub> (mm) | PACKAGING QUANTITIES |      |      |
|                    |           |                                      | BULK                 | REEL | AMMO |
| 10 pF to 4700 pF   | 29 to 49  | 12.5                                 | 1000                 | 500  | 750  |
| 6800 pF to 0.01 µF | 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**


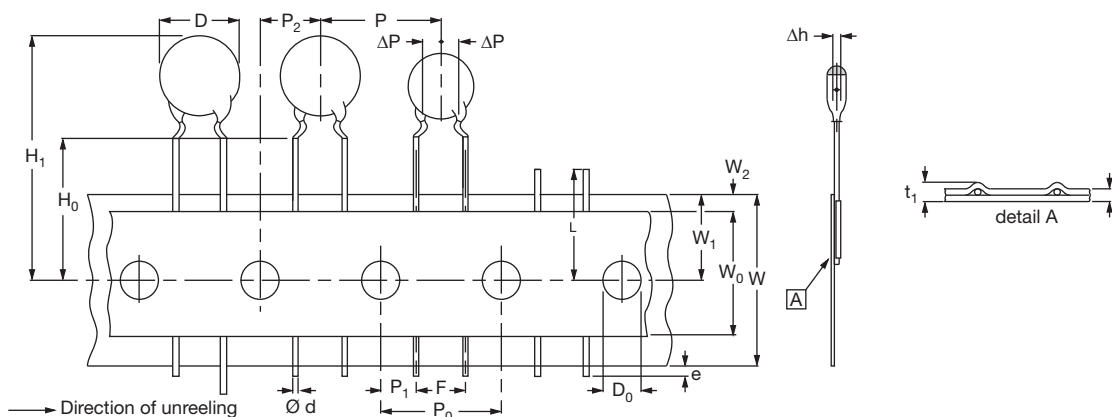


Fig. 1 - Kinked capacitors on tape, lead spacing 5.0 mm (0.2") and 7.5 mm (0.3")

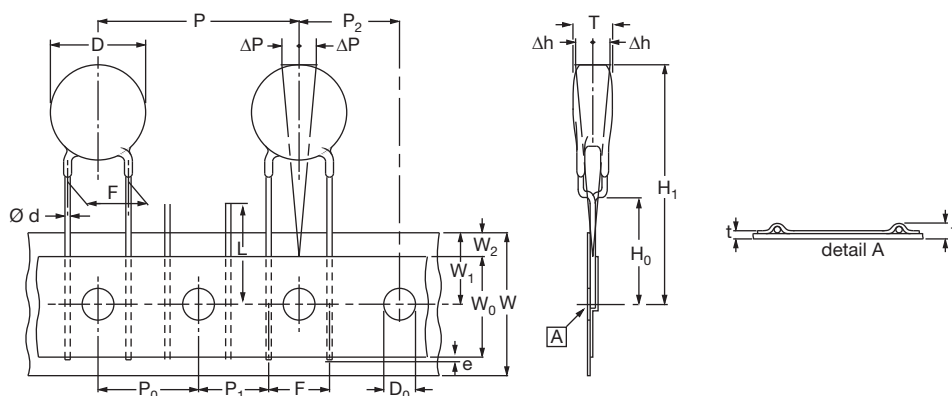


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

| DIMENSION OF TAPE             |                                              |                   |                   |                    |
|-------------------------------|----------------------------------------------|-------------------|-------------------|--------------------|
| SYMBOL                        | PARAMETER                                    | DIMENSIONS (mm)   |                   |                    |
|                               |                                              | FIG. 1 (5 mm)     | FIG. 1 (7.5 mm)   | FIG. 2 (10 mm)     |
| D <sup>(1)</sup>              | 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 <sub>0</sub> <sup>(2)</sup> | Pitch of sprocket hole                       | 12.7 ± 0.3        | 15.0 ± 0.3        | 12.7 ± 0.3         |
| P <sub>1</sub> <sup>(3)</sup> | Distance, hole center to lead                | 3.85 ± 0.7        | 3.75 ± 0.7        | 7.7 ± 1.0          |
| P <sub>2</sub> <sup>(3)</sup> | 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 <sub>0</sub>                | Hold-down tape width                         | 5.0 min.          | 5.0 min.          | 5.0 min.           |
| W <sub>1</sub>                | Position of sprocket hole                    | 9.0 + 0.75/- 0.5  | 9.0 + 0.75/- 0.5  | 9.0 + 0.75/- 0.5   |
| W <sub>2</sub>                | Distance of hold-down tape                   | 3.0 max.          | 3.0 max.          | 3.0 max.           |
| H <sub>1</sub>                | Maximum component height                     | 32                | 40                | 40                 |
| H <sub>0</sub>                | Height to seating plane (for kinked leads)   | 16.0 ± 0.5        | 16.0 ± 0.5        | 16.0 ± 0.5         |
| H <sub>0</sub>                | 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.          |
| e                             | Length of lead protrusion                    | 1.0 max.          | 1.0 max.          | 1.0 max.           |
| D <sub>0</sub>                | 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 <sub>1</sub>                | Maximum thickness of tape and wires          | 1.5 max.          | 1.5 max.          | 1.5 max.           |

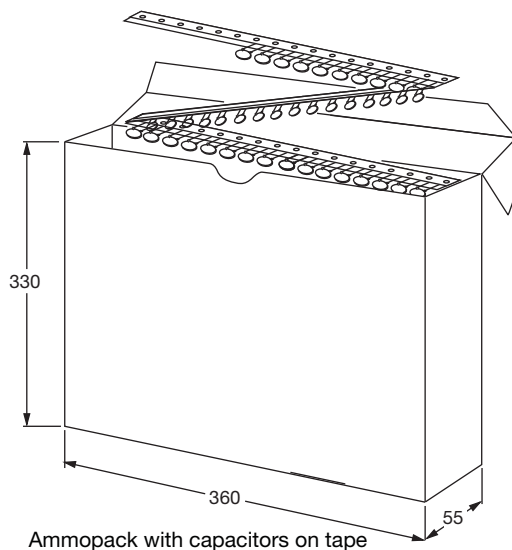
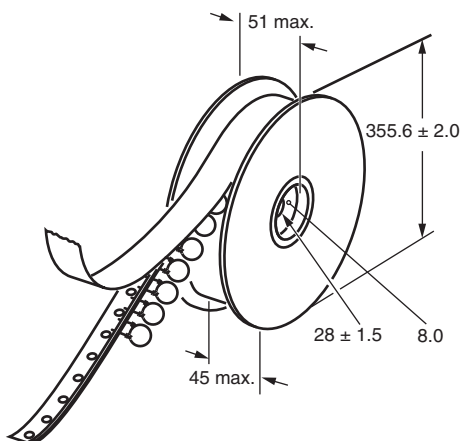
**Notes**
<sup>(1)</sup> See ordering information table

<sup>(2)</sup> Cumulative pitch error: ± ≤ 1 mm/20 pitches

<sup>(3)</sup> Obliquity maximum 3°



**REEL AND TAPE DATA** in millimeters



**STANDARD RECOGNITION**

IEC 60384 - 14/3<sup>rd</sup> issue (2005)- Safety Tests

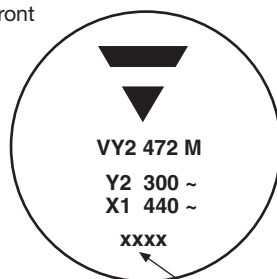
UL60384-14 - Across-the-line, antenna-coupling and line-by-pass component

CQC - China Quality Certification Center-Safety Tests

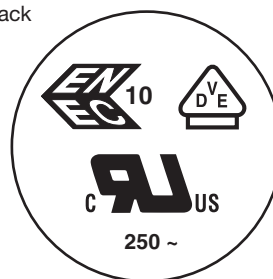
**MARKING: 2 SIDES**

**(EXAMPLE)**

front



back



4 digit date code (year/week)

**LABEL**

**(EXAMPLE)**



PN: VY2331K29Y5SS6UV7  
QTY: 1000  
PO:  
SQ:

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

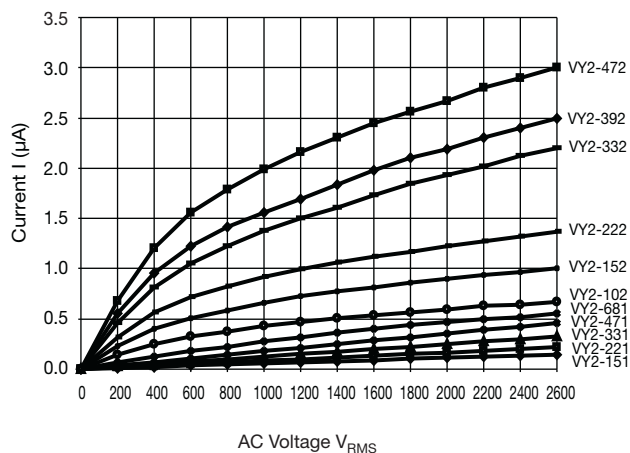
DC1: 0601  
DC2:  
SL: 0010



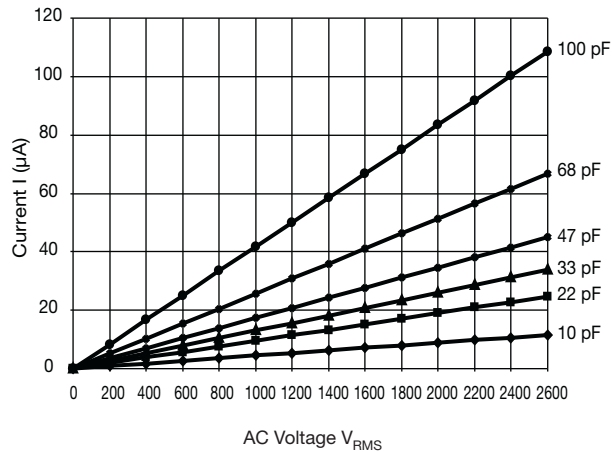
2/5



Typical Current vs. Voltage (Leakage Current) at 60 Hz 25 °C



Typical Current vs. Voltage (Leakage Current) at 60 Hz 25 °C



### 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.



## 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.**