

## 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**

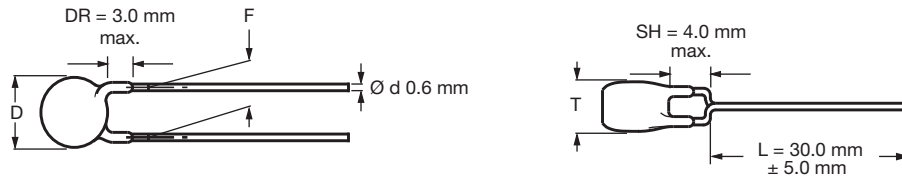
According to UL 94 V-0  
Epoxy resin, isolating, flame retardant

**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**

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> (2) (mm)	CLEAR TEXT CODE	
							15 <sup>TH</sup> DIGIT: T = REEL; U = AMMO; 3 = BULK (1)	
							RoHS COMPLIANT	RoHS AND HALOGEN-FREE
<b>VY2 for leadspacing 5.0 mm</b>							<b>2200 V<sub>AC</sub>, 50 Hz, 2 s</b>	
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							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	± 20	Y5U (2E3)	8.0	5.0	5.0	3.0	VY2102M29Y5US6*V5	VY2102M29Y5UG6*V5
1500							VY2152M31Y5US6*V5	VY2152M31Y5UG6*V5
2200							VY2222M35Y5US6*V5	VY2222M35Y5UG6*V5
3300							VY2332M41Y5US6*V5	VY2332M41Y5UG6*V5
3900							VY2392M43Y5US6*V5	VY2392M43Y5UG6*V5

**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> (2) (mm)	CLEAR TEXT CODE	
							15 <sup>TH</sup> DIGIT: T = REEL; U = AMMO; 3 = BULK (1)	
							RoHS COMPLIANT	RoHS AND HALOGEN-FREE
<b>VY2 for leadspacing 7.5 mm</b>							<b>2600 V<sub>AC</sub>, 50 Hz, 2 s</b>	
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							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	VY2471K29Y5SS6*V7	VY2471K29Y5SG6*V7						
680	VY2681M29Y5US6*V7	VY2681M29Y5UG6*V7						
1000	± 20	Y5U (2E3)	8.0	5.0	7.5	3.0	VY2102M29Y5US6*V7	VY2102M29Y5UG6*V7
1500							VY2152M31Y5US6*V7	VY2152M31Y5UG6*V7
2200							VY2222M35Y5US6*V7	VY2222M35Y5UG6*V7
3300							VY2332M41Y5US6*V7	VY2332M41Y5UG6*V7
3900							VY2392M43Y5US6*V7	VY2392M43Y5UG6*V7
4700							VY2472M49Y5US6*V7	VY2472M49Y5UG6*V7
6800							VY2682M59Y5US63V7	VY2682M59Y5UG63V7
0.01 µF			16.0				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> (2) (mm)	CLEAR TEXT CODE	
							15 <sup>TH</sup> DIGIT: T = REEL; U = AMMO; 3 = BULK (1)	
							RoHS COMPLIANT	RoHS AND HALOGEN-FREE
<b>VY2 for leadspacing 10.0 mm</b>							<b>2600 V<sub>AC</sub>, 50 Hz, 2 s</b>	
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							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	± 20	Y5S (2C3)	7.5	5.0	10.0	3.0	VY2681M29Y5US6*V0	VY2681M29Y5UG6*V0
1000							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**

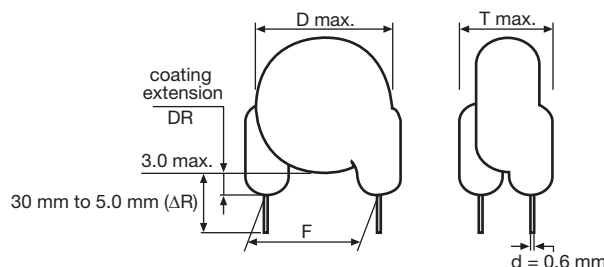
PACKAGING					
CAPACITANCE VALUE	SIZE CODE	BODY DIAMETER D <sub>MAX.</sub> (mm)	PACKAGING QUANTITIES		
			BULK	REEL	AMMO
10 pF to 4700 pF	29 to 49	12.5	1000	1000	1000
6800 pF to 0.01 μF	59 to 63	16.0	500	-	-

**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**


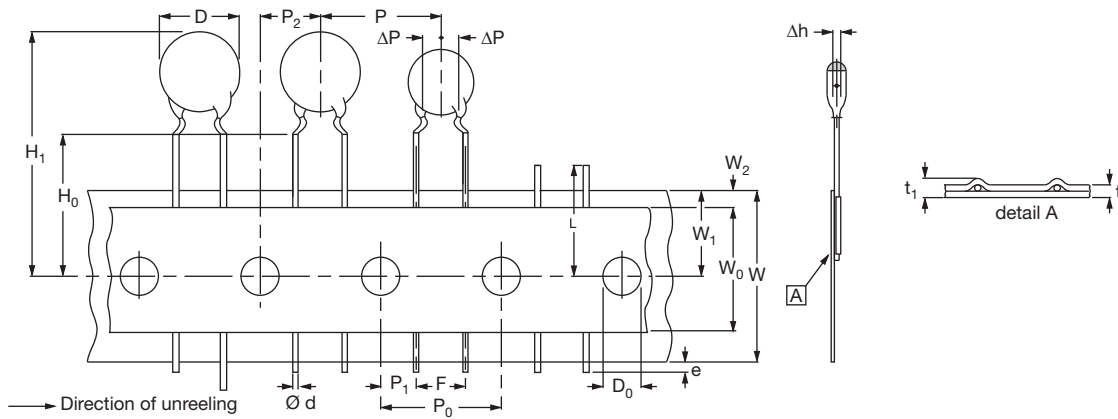


Fig. 1 - Kinked capacitors on tape, lead spacing 5.0 mm (0.2") and 7.5 mm (0.3")

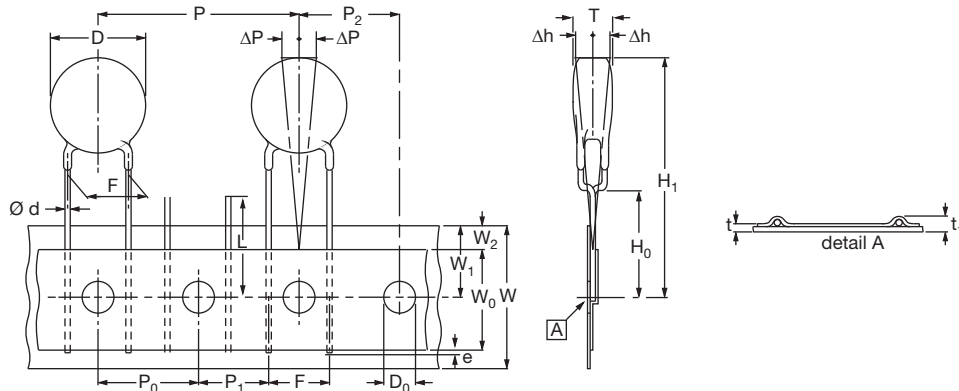


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

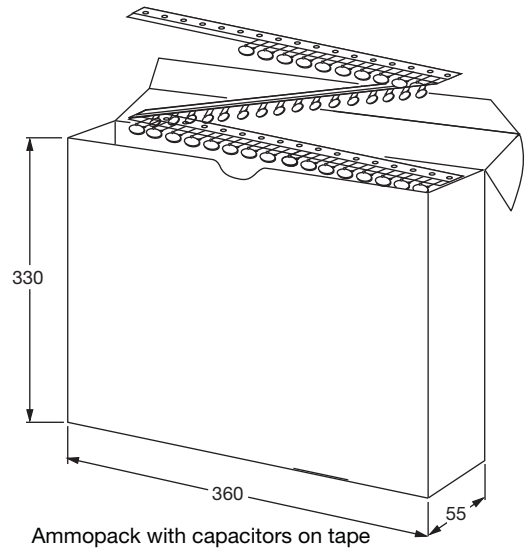
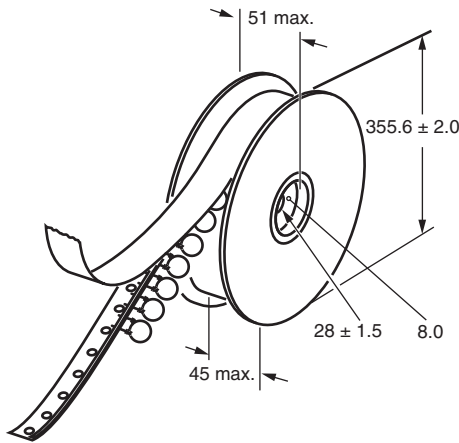
DIMENSION OF TAPE				
SYMBOL	PARAMETER	DIMENSIONS (mm)		
		FIG. 1 (5 mm)	FIG. 1 (7.5 mm)	FIG. 2 (10 mm)
D <sup>(1)</sup>	Body diameter	11.0 max.	14.0 max.	16.0 max.
d	Lead diameter	0.6 ± 0.05	0.6 ± 0.05	0.6 ± 0.05
P	Pitch of component	12.7 ± 1	15.0 ± 1	25.4 ± 1
P <sub>0</sub> <sup>(2)</sup>	Pitch of 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**

- (1) See ordering information table
- (2) Cumulative pitch error: ± 1 mm/20 pitches
- (3) Obliquity maximum 3°



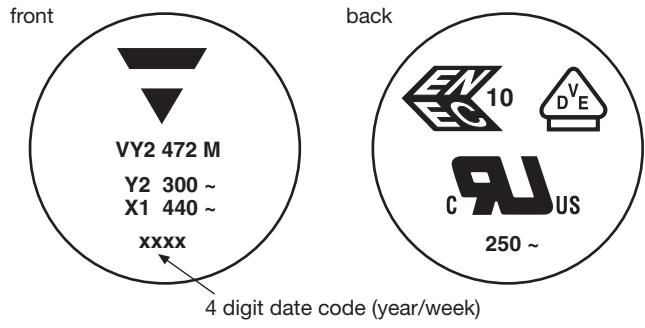
REEL AND TAPE DATA in millimeters





STANDARD RECOGNITION

IEC 60384 - 14/3rd 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)



LABEL  
(EXAMPLE)

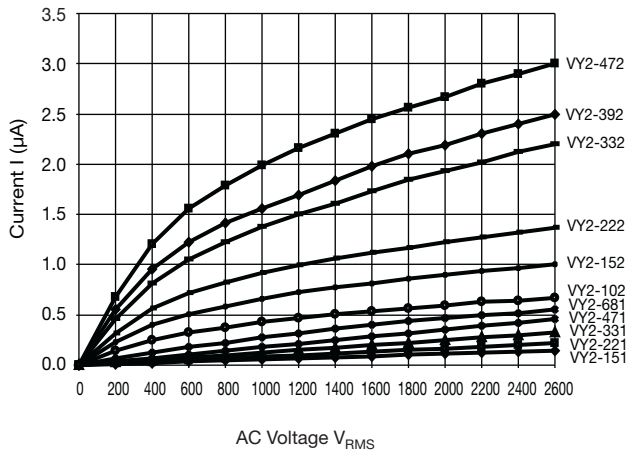
PN: VY2331K29Y5SS6UV7    Lot1: 14Z549306    DC1: 0601  
 QTY: 1000    Lot2:    DC2:  
 PO:    Batch: 200601CN  
 SO:    Region: 9520    SL: 0010  
 Ser.No: 0601H72383



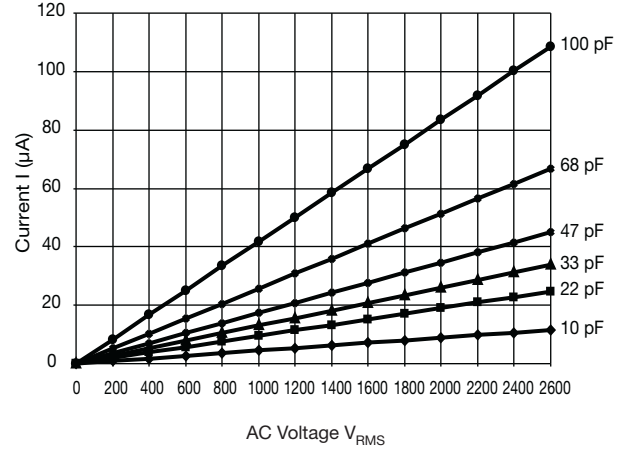
2/5



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.



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