

AC Line Rated Ceramic Disc Capacitors Class X1, 440 V_{AC}, Class Y2, 300 V_{AC}



ADDITIONAL RESOURCES





QUICK REFERENCE DATA						
DESCRIPTION		VALUE				
Ceramic Class		1 2				
Ceramic Dielectric	N750 Y5S, Y5U, Y5\		N750		5U, Y5V	
Voltage (V _{AC})	300 440		300	440		
Min. Capacitance (pF)	10 68		8			
Max. Capacitance (pF)	47 10 000		000			
Mounting	Radial					

OPERATING TEMPERATURE RANGE

-40 °C to +125 °C

TEMPERATURE CHARACTERISTICS

Class 1: N750 (U2J) Class 2: Y5S, Y5U, Y5V

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 CQC11-471112

PACKAGING

Bulk, tape and reel, taped ammopack

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.vishav.com/doc?99912

Py



ROHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

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 tin plated copper-clad steel 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, 10.0 mm, or 12.5 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 UR

IEC 60384-14 and UL 60384-14: (X1): 440 V_{AC} , 50 Hz (Y2): 300 V_{AC} , 50 Hz 1000 V_{DC}

TEST VOLTAGE

Component test (100 %): 2600 V_{AC} , 50 Hz, 2 s (2600 V_{AC} for LS 7.5 mm and above) (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

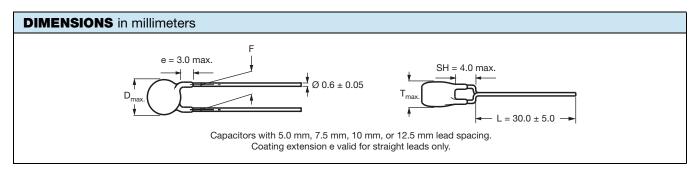
 \geq 10 000 M Ω

CAPACITANCE TOLERANCE

± 20 % (code M); ± 10 % (code K)

DISSIPATION FACTOR

Class 1: max. 0.5 % (1 MHz) Class 2: max. 2.5 % (1 kHz)



TECHNICAL D	DATA				
CAPACITANCE	CAPACITANCE	BODY	BODY	LEAD SPACING (1)	PART NUMBER
C (pF)	TOLERANCE (%)	DIAMETER D _{max.} (mm)	THICKNESS T _{max.} (mm)	F (mm) ± 1 mm	MISSING DIGITS SEE ORDERING CODE BELOW
U2J (N750)					
10					VY2100K29U2JS6###
15					VY2150K29U2JS6###
22	± 10	7.5	5.0	5.0, 7.5, 10.0, or 12.5	VY2220K29U2JS6###
33					VY2330K29U2JS6###
47					VY2470K29U2JS6###
Y5S (2C3)					
68					VY2680K29Y5SS6###
100					VY2101K29Y5SS6###
150	± 10	7.5	5.0	5.0, 7.5, 10.0, or 12.5	VY2151K29Y5SS6###
220	± 10	7.5	5.0	5.0, 7.5, 10.0, 01 12.5	VY2221K29Y5SS6###
330]		VY2331K29Y5SS6###		
470					VY2471K29Y5SS6###
Y5U (2E3)					
680		7.5			VY2681M29Y5US6###
1000		7.5			VY2102M29Y5US6###
1500		8.0		5 0 7 5 10 0 or 10 5	VY2152M31Y5US6###
2200		9.0		7.5, 10.0, or 12.5	VY2222M35Y5US6###
3300	± 20	10.5	5.0		VY2332M41Y5US6###
3900		11.0			VY2392M43Y5US6###
4700		12.5			VY2472M49Y5US6###
6800		14.5			VY2682M59Y5US63##
10 000		16.0			VY2103M63Y5US63##
Y5V (2F3) MINI SIZ	E SERIES				
1000		7.5			VY2102M29Y5VS6###
1500		7.5			VY2152M29Y5VS6###
2200		8.0			VY2222M31Y5VS6###
3300	± 20	9.0	5.0	5.0, 7.5, 10.0,	VY2332M35Y5VS6###
3900	± 20	10.0	3.0	or 12.5	VY2392M39Y5VS6###
4700		10.5			VY2472M41Y5VS6###
6800		12.0			VY2682M47Y5VS6###
10 000		15.0			VY2103M59Y5VS6###

Note

⁽¹⁾ Straight leads are available on request



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ORDER	ORDERING CODE									
###	15 th to 1	7 th digit	Lead configuration			Available configurations see below				
Example	VY2	221	K	29	Y5S	s	6	U	٧	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 X = 12.5

LEADSPACING 5.0 mm AND 7.5 mm

PACKAGING						
SIZE CODE	BODY DIAMETER		PACKAGING QUANTITIES			
SIZE CODE	D _{max.} (mm)	BULK	REEL	АММО		
29 to 49	12.5	1000	1000	1000		
59 to 63	16.0	500	-	-		

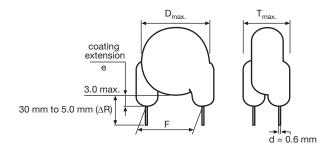
LEADSPACING 10.0 mm AND 12.5 mm

PACKAGING						
CAPACITANCE	SIZE CODE	BODY DIAMETER D _{max.} (mm)	PACKAGING QUANTITIES			
VALUE	SIZE CODE		BULK	REEL	АММО	
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



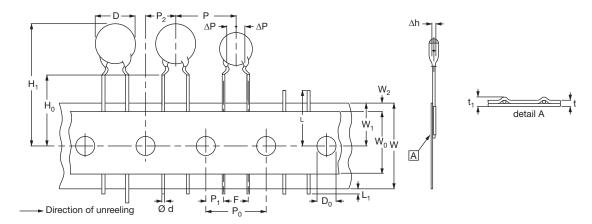


Fig. 1 - Kinked capacitors on tape, lead spacing 5.0 mm (0.2") and 7.5 mm (0.3")

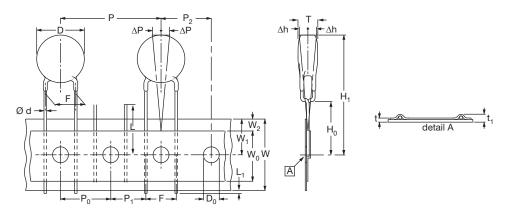


Fig. 2 - Inline kink (V) leaded capacitors on tape, lead spacing 10 mm (0.40")

DIMENSION OF TAPE						
SYMBOL	DADAMETED		DIMENSIONS (mm)			
STINIBUL	PARAMETER	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		
Р	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.		
ΔΡ	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.		

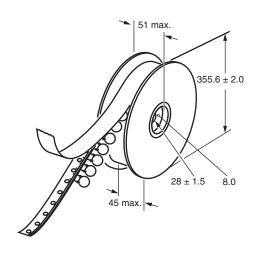
Notes

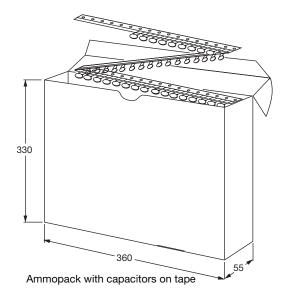
- (1) See "Technical Data" table (2) Cumulative pitch error: ± ≤ 1 mm/20 pitches (3) Obliquity maximum 3°

Revision: 04-Sep-2019



REEL AND TAPE DATA in millimeters





tes all national approvals.			
US-26163-UL	10 pF to 10 nF	300 V _{AC}	(Ui)
US-26163-UL	10 pF to 10 nF	440 V _{AC}	
			^
40009669	10 pF to 10 nF	$300 V_{AC}$	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
40009669	10 pF to 10 nF	$440 V_{AC}$	
s			
ds Association			
E183844	10 pF to 10 nF	300 V _{AC}	F 1 ®
E183844	10 pF to 10 nF	440 V _{AC}	c FL us
0384-14:09 2 nd edition			0 2 2 00
omponent			
CQC05001012316	10 pF to 10 nF	300 V _{AC}	
CQC05001012316	10 pF to 10 nF	440 V _{AC}	
	US-26163-UL US-26163-UL 40009669 40009669 s ds Association E183844 E183844 0384-14:09 2 nd edition omponent CQC05001012316	US-26163-UL 10 pF to 10 nF 40009669 10 pF to 10 nF 40009669 10 pF to 10 nF s ds Association E183844 10 pF to 10 nF E183844 10 pF to 10 nF 0384-14:09 2 nd edition cmponent CQC05001012316 10 pF to 10 nF	US-26163-UL 10 pF to 10 nF 300 V _{AC} US-26163-UL 10 pF to 10 nF 440 V _{AC} 40009669 10 pF to 10 nF 300 V _{AC} 40009669 10 pF to 10 nF 440 V _{AC} S ds Association E183844 10 pF to 10 nF 300 V _{AC} E183844 10 pF to 10 nF 440 V _{AC} 0384-14:09 2 nd edition cmponent CQC05001012316 10 pF to 10 nF 300 V _{AC}





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MARKING

Sample (2 sides)





4 digit date code (year/week; add suffix "V" for mini size series)

Front Back



QTY: 1000

PO: SO: Lot2: Batch: 200601CN DC1: 0601 DC2:

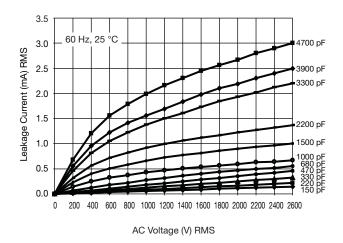
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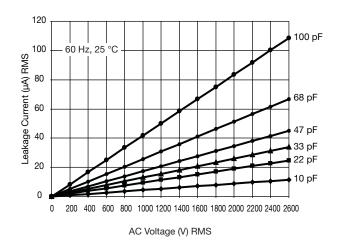
Ser.No: 0601H72383

2/5

TEST	TEST CONDITION	TEST LIMITS
Visual and mechanical inspection	Optical inspection, dimensions measured with caliper	No visible damage, marking legible
Capacitance (C)	25 °C \pm 3 °C, relative humidity (RH) \leq 75 %,	Capacitance within specified tolerance
Dissipation factor (DF)	1.0 V_{RMS} ± 0.2 V_{RMS} at 1 kHz for Y5U and Y5S, and 1 MHz for U2J	DF \leq 0.3 % for U2J and DF \leq 2.5 % for Y5S and Y5U
Insulation resistance (IR)	Measured within 60 s \pm 5 s after charging at 500 V_{DC}	10 000 MΩ min.
Dielectric strength	$2600\ V_{AC}$ at $50\ Hz$ / $60\ Hz$ for 1 min, $50\ mA$ max.	No failure
Temperature characteristic	RH $\leq 75~\%, 1.0~V_{RMS} \pm 0.2~V_{RMS}$ at 1 kHz for Y5U and Y5S, and 1 MHz for U2J	U2J: -750 ppm ± 120 ppm Y5S: ± 22 % Y5U: +22 % / -56 %
Impulse voltage	3 pulses of 5 kV	No failure
Life test	1000 h at 125 °C \pm 2 °C, 550 V_{AC} /50 Hz; once every hour 1000 V_{AC} for 0.1 s	External appearance: no visible damage $\Delta C/C \le \pm 15~\%$ DF $\le 0.5~\%$ for U2J and $\le 5~\%$ for Y5S and Y5U IR $\ge 3000~\text{M}\Omega$ Dielectric strength: no failure
Humidity test	500 h at 440 V_{AC} , 50 Hz and 500 h unloaded 40 °C, RH = 90 % to 95 %	External appearance: no visible damage $\Delta C/C \le \pm 10$ % for U2J and $\le \pm 15$ % for Y5S and Y5U DF ≤ 0.5 % for U2J and ≤ 5 % for Y5S and Y5U IR ≥ 3000 M Ω Dielectric strength: no failure
Robustness of termination	Pull test: 0.5 kg tensile weight in radial direction for 10 s ± 1 s Bending strength: capacitor body rotated by 90° in both directions	No damage to capacitor body and lead wire
Soldering effect	Immersion of lead wires into 260 °C \pm 5 °C solder for 10 s \pm 2 s; min. distance from body: 1.5 mm Hand soldering at 400 °C \pm 10 °C for 3 s to 4 s; min. distance from body: 1.5 mm	External appearance: no visible damage $\Delta C/C \le \pm 5$ % for U2J and $\le \pm 10$ % for Y5S and Y5U Dielectric strength: no failure
Vibration test	Resin (adhesive) Solder the capacitor onto test jig (glass epoxy body) and use resin (adhesive) to stick the body to the test jig. The capacitor must be soldered firmly to the supporting lead wire. Vibration change from 10 Hz to 2000 Hz and back to 10 Hz; Total amplitude: 1.5 mm; Acceleration: 100 m/s²; Sweep rate: 1 oct/min, each axis 2 h (6 h in total)	External appearance: no visible damage Capacitance within specified tolerance DF \leq 0.3 % for U2J and \leq 2.5 % for Y5S and Y5U IR \geq 10 000 $G\Omega$

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				
LTspice® Models	www.vishay.com/doc?28568				

SAMPLE KITS				
Part Number (VY2 Sample Kit)	VY21-KIT-HF			
Link (VY2 Sample Kit)	www.vishay.com/doc?28554			
Part Number (VY2Y5V Sample Kit)	VY2-KIT-MS			
Link (VY2Y5V Sample Kit)	www.vishay.com/doc?28562			



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YP102271K050B20C6P YP102391K050BAND5P YP501101K040BAND5P YP102681K060B20C6P YP501121K040B20C6P

YP501471K040B20C6P YP501102K050HAND5P YP500101K040B20C2P GX4097C GX4201C LS1808N102K302NX080TM

46KN322000M1M 46KN347000N0M MKX21W14702C00MSSD MKY22W12203D00KSSD MPX21W1330FA00MSSD

MPX21W3330FJ00MSSD MPY20W1150FA00MSSD MPY20W1220FA00MSSD MKY22W11003D00KSSD MPX21W2100FC00MSSD

MPX21W3220F100MSSD 46KR415000M1K 46KI333000H2M 46KI2220CK01K C971U472MUWDCA7317 46KI310050M1M

46KI347000M1M 46KN4100JPN2M 46KW510000M1M R49AI24705001K R49AN31005001K BFC233915104 DE1E3RA102MA4BQ01F

DE6E3KJ332MB3B MPX21W1100FA00MSSD VY2103M59Y5VS63V0