Ceramic Singlelayer DC Disc Capacitors for General Purpose Class 1, Class 2 and Class 3, 50 V_{DC}, 100 V_{DC}, 500 V_{DC}

FEATURES

- High capacitance with small size
- High reliability
- Crimp and straight lead styles
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb e3 RoHS COMPLIANT

APPLICATIONS

- Temperature compensation
- Coupling and decoupling
- Bypassing

QUICK REFERENCE DATA								
DESCRIPTION	VALUE							
Ceramic Class	1		2				3	
Ceramic Dielectric	SL0	N750	Y5P	Z5U	X7R	X5F	Y5V	Z5V
Voltage (V_{DC})	50, 100, 500	100, 500	50, 100, 500		500		50, 100, 500	50, 100
Min. Capacitance (pF)	56	6.8	100	1000	100	100	1000	4700
Max. Capacitance (pF)	100	330	10 000	22 000	4700	4700	22 000	47 000
Mounting	Radial							

MARKING

Marking indicates capacitance value and tolerance in accordance with “EIA 198” and voltage marks.

OPERATING TEMPERATURE RANGE

SL0, N750, X7R, X5F: -55 °C to +125 °C

Y5P, Z5U, Z5V, Y5V: -30 °C to +125 °C

TEMPERATURE CHARACTERISTICS

Class 1: SL0, N750

Class 2: Y5P, Z5U, X7R, X5F

Class 3: Y5V, Z5V

SECTIONAL SPECIFICATIONS

Climatic category (acc. to EN 60058-1)

Class 1 and 2: 55/125/21

Class 3: 30/85/21

APPROVALS

EIA 198

IEC 60384-8

IEC 60384-9

CAPACITANCE RANGE

6.8 pF to 47 nF

TOLERANCE ON CAPACITANCE

± 0.25 pF, ± 2 %, ± 5 %, ± 10 %, ± 20 %, + 80 % / - 20 %

RATED VOLTAGE

50 V_{DC}, 100 V_{DC}, 500 V_{DC}

TEST VOLTAGE

250 % of rated voltage

INSULATION RESISTANCE AT RATED VOLTAGE

10 GΩ min.

DISSIPATION FACTOR

Class 1	0.1 % max. when C ≥ 30 pF (at 1 MHz; 1 V where C ≤ 1000 pF, and at 1 kHz; 1 V where C > 1000 pF)
	For C < 30 pF: DF = 100/(400 + 20 x C) DF = dissipation factor in %; C = capacitance value in pF
Class 2	2.5 % max. (at 1 kHz; 1 V)
Class 3	5 % max. (at 1 kHz; 1 V)

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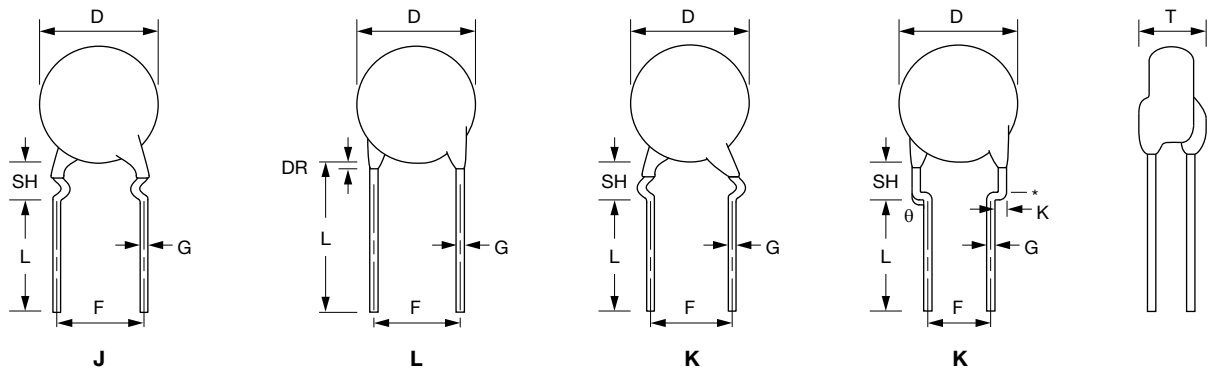
LEAD CONFIGURATION (in millimeters)

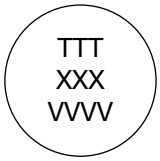


Note

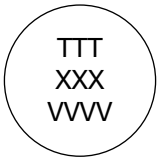
- Lead-spacing 2.5 mm is available for L lead configuration only.

MARKING

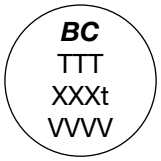
Size 20



Size 25



Size 29 and above



Note

- Refer to specified part for detail marking.

ORDERING CODE INFORMATION

D	102	K	25	Y5P	L	6	3	J	5	R
1	2 3 4	5	6 7	8 9 10	11	12	13	14	15	16
Product Type	**Capacitance (pF)**	**Capacitance Tolerance**	**Size Code**	**T.C. Code**	**Rated Voltage**	**Lead Diameter**	**Packaging / Lead Length**	**Lead Style**	**Lead Spacing**	**RoHS Compliant**
D series	The first two digits are the significant figures of capacitance and the last digit is a multiplier as follows: 0 = * 1 1 = * 10 2 = * 100 3 = * 1000	C = ± 0.25 pF G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Z = +80 % / -20 %	Please refer to relevant datasheet	Please refer to relevant datasheet	F = 50 V_{DC} H = 100 V_{DC} L = 500 V_{DC}	6 = 0.60 mm ± 0.05 mm	3 = bulk T = tape and reel U = ammo	Please refer to relevant datasheet	2 = 2.5 mm 5 = 5.0 mm 6 = 6.4 mm 7 = 7.5 mm	

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ORDERING CODES

DIELECTRIC SL0 (50 V_{DC} / 100 V_{DC})						
CAP. (pF)	50 V_{DC}			100 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
56	D560#20SL0F6###R	5	3.5	D560#20SL0H6###R	5	3.5
68	D680#20SL0F6###R	5	3.5	D680#20SL0H6###R	5	3.5
82	D820#20SL0F6###R	5	3.5	D820#20SL0H6###R	5	3.5
100	D101#20SL0F6###R	5	3.5	D101#20SL0H6###R	5	3.5

DIELECTRIC SL0 (500 V_{DC})			
CAP. (pF)	500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
33	D330#20SL0L6###R	5	3.5
39	D390#20SL0L6###R	5	3.5
47	D470#20SL0L6###R	5	3.5
56	D560#20SL0L6###R	5	3.5
68	D680#20SL0L6###R	6.5	3.5
82	D820#20SL0L6###R	6.5	3.5

Notes

- Lead diameter is 0.6 mm
- # 5th digit is capacitance tolerance code: ± 5 % = J; ± 10 % = K
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

DIELECTRIC N750						
CAP. (pF)	100 V_{DC}			500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
6.8	D689C20U2JH6###R	5	3.5	D689C20U2JL6###R	5	3.5
8.2	D829C20U2JH6###R	5	3.5	D829C20U2JL6###R	5	3.5
10	D100#20U2JH6###R	5	3.5	D100#20U2JL6###R	5	3.5
12	D120#20U2JH6###R	5	3.5	D120#20U2JL6###R	5	3.5
15	D150#20U2JH6###R	5	3.5	D150#20U2JL6###R	5	3.5
18	D180#20U2JH6###R	5	3.5	D180#20U2JL6###R	5	3.5
22	D220#20U2JH6###R	5	3.5	D220#20U2JL6###R	5	3.5
27	D270#20U2JH6###R	5	3.5	D270#25U2JL6###R	6.5	3.5
33	D330#20U2JH6###R	5	3.5	D330#25U2JL6###R	6.5	3.5
39	D390#20U2JH6###R	5	3.5	D390#29U2JL6###R	7.5	3.5
47	D470#20U2JH6###R	5	3.5	D470#29U2JL6###R	7.5	3.5
56	D560#25U2JH6###R	6.5	3.5	D560#33U2JL6###R	8.5	3.5
68	D680#25U2JH6###R	6.5	3.5	D680#33U2JL6###R	8.5	3.5
82	D820#25U2JH6###R	6.5	3.5	D820#39U2JL6###R	10	3.5
100	D101#29U2JH6###R	7.5	3.5	D101#39U2JL6###R	10	3.5
120	D121#33U2JH6###R	8.5	3.5	D121#47U2JL6###R	12	3.5
150	D151#33U2JH6###R	8.5	3.5	D151#47U2JL6###R	12	3.5
180	D181#39U2JH6###R	10	3.5	/	/	/
220	D221#39U2JH6###R	10	3.5	/	/	/
270	D271#39U2JH6###R	10	3.5	/	/	/
330	D331#47U2JH6###R	12	3.5	/	/	/

Notes

- Lead diameter is 0.5 mm
- # 5th digit is capacitance tolerance code: ± 2 % = G; ± 5 % = J (which C < 10 pF, the tolerance code is C = ± 0.25 pF)
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

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DIELECTRIC Y5P (50 V_{DC} / 100 V_{DC})						
CAP. (pF)	50 V_{DC}			100 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
100	D101#20Y5PF6###R	5.0	3.5	D101#20Y5PH6###R	5.0	3.5
150	D151#20Y5PF6###R	5.0	3.5	D151#20Y5PH6###R	5.0	3.5
180	D181#20Y5PF6###R	5.0	3.5	D181#20Y5PH6###R	5.0	3.5
220	D221#20Y5PF6###R	5.0	3.5	D221#20Y5PH6###R	5.0	3.5
330	D331#20Y5PF6###R	5.0	3.5	D331#20Y5PH6###R	5.0	3.5
470	D471#20Y5PF6###R	5.0	3.5	D471#20Y5PH6###R	5.0	3.5
680	D681#20Y5PF6###R	5.0	3.5	D681#20Y5PH6###R	5.0	3.5
1000	D102#20Y5PF6###R	5.0	3.5	D102#20Y5PH6###R	5.0	3.5
1500	D152#20Y5PF6###R	5.0	3.5	D152#25Y5PH6###R	6.5	3.5
1800	D182#25Y5PF6###R	6.5	3.5	D182#25Y5PH6###R	6.5	3.5
2200	D222#25Y5PF6###R	6.5	3.5	D222#25Y5PH6###R	6.5	3.5
3300	D332#25Y5PF6###R	6.5	3.5	D332#29Y5PH6###R	7.5	3.5
4700	D472#29Y5PF6###R	7.5	3.5	D472#33Y5PH6###R	8.5	3.5
6800	D682#33Y5PF6###R	8.5	3.5	D682#39Y5PH6###R	10.0	3.5
10 000	D103#39Y5PF6###R	10.0	3.5	D103#43Y5PH6###R	11.0	3.5

DIELECTRIC Y5P (500 V_{DC})			
CAP. (pF)	500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
100	D101#20Y5PL6###R	5.0	3.5
150	D151#20Y5PL6###R	5.0	3.5
180	D181#20Y5PL6###R	5.0	3.5
220	D221#20Y5PL6###R	5.0	3.5
330	D331#20Y5PL6###R	5.0	3.5
470	D471#20Y5PL6###R	5.0	3.5
680	D681#25Y5PL6###R	6.5	3.5
1000	D102#25Y5PL6###R	6.5	3.5
1500	D152#29Y5PL6###R	7.5	3.5
1800	D182#29Y5PL6###R	7.5	3.5
2200	D222#33Y5PL6###R	8.5	3.5
3300	D332#39Y5PL6###R	10.0	3.5
4700	D472#43Y5PL6###R	11.0	3.5
6800	D682#53Y5PL6###R	13.5	3.5
10 000	D103#69Y5PL6###R	17.5	3.5

Notes

- Lead diameter is 0.6 mm
- # 5th digit is capacitance tolerance code: ± 10 % = K; ± 20 % = M
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

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DIELECTRIC Z5U (50 V_{DC} / 100 V_{DC})						
CAP. (pF)	**50 V_{DC}**			**100 V_{DC}**		
	ORDERING CODE	**DIAMETER (mm max.)**	**THICKNESS (mm max.)**	**ORDERING CODE**	**DIAMETER (mm max.)**	**THICKNESS (mm max.)**
1000	D102M20Z5UF6###R	5.0	3.5	D102M20Z5UH6###R	5.0	3.5
1500	D152M20Z5UF6###R	5.0	3.5	D152M20Z5UH6###R	5.0	3.5
2200	D222M20Z5UF6###R	5.0	3.5	D222M20Z5UH6###R	5.0	3.5
3300	D332M20Z5UF6###R	5.0	3.5	D332M20Z5UH6###R	5.0	3.5
4700	D472M20Z5UF6###R	5.0	3.5	D472M25Z5UH6###R	6.5	3.5
6800	D682M25Z5UF6###R	8.5	3.5	D682M25Z5UH6###R	6.5	3.5
10 000	D103M29Z5UF6###R	10.0	3.5	D103M29Z5UH6###R	7.5	3.5
15 000	D153M33Z5UF6###R	8.5	3.5	D153M33Z5UH6###R	8.5	3.5
22 000	D223M39Z5UF6###R	10.0	3.5	D223M39Z5UH6###R	10.0	3.5

DIELECTRIC Z5U (500 V_{DC})			
CAP. (pF)	**500 V_{DC}**		
	ORDERING CODE	**DIAMETER (mm max.)**	**THICKNESS (mm max.)**
1000	D102M20Z5UL6###R	5.0	3.5
1500	D152M25Z5UL6###R	6.5	3.5
2200	D222M25Z5UL6###R	6.5	3.5
3300	D332M29Z5UL6###R	7.5	3.5
4700	D472M33Z5UL6###R	8.5	3.5
6800	D682M39Z5UL6###R	10.0	3.5
10 000	D103M43Z5UL6###R	11.0	3.5
15 000	D153M53Z5UL6###R	13.5	3.5
22 000	D223M59Z5UL6###R	15.0	3.5

Notes

- Lead diameter is 0.6 mm
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

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DIELECTRIC Y5V (50 V_{DC} / 100 V_{DC})						
CAP. (pF)	50 V_{DC}			100 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
1000	D102Z20Y5VF6###R	5.0	3.5	D102Z20Y5VH6###R	5.0	3.5
1500	D152Z20Y5VF6###R	5.0	3.5	D152Z20Y5VH6###R	5.0	3.5
2200	D222Z20Y5VF6###R	5.0	3.5	D222Z20Y5VH6###R	5.0	3.5
3300	D332Z20Y5VF6###R	5.0	3.5	D332Z20Y5VH6###R	5.0	3.5
4700	D472Z20Y5VF6###R	5.0	3.5	D472Z25Y5VH6###R	6.5	3.5
6800	D682Z25Y5VF6###R	6.5	3.5	D682Z25Y5VH6###R	6.5	3.5
10 000	D103Z29Y5VF6###R	7.5	3.5	D103Z29Y5VH6###R	7.5	3.5
15 000	D153Z33Y5VF6###R	8.5	3.5	D153Z33Y5VH6###R	8.5	3.5
22 000	D223Z39Y5VF6###R	10.0	3.5	D223Z39Y5VH6###R	10.0	3.5

DIELECTRIC Y5V (500 V_{DC})			
CAP. (pF)	500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
1000	D102Z20Y5VL6###R	5.0	3.5
1500	D152Z20Y5VL6###R	5.0	3.5
2200	D222Z25Y5VL6###R	6.5	3.5
3300	D332Z25Y5VL6###R	6.5	3.5
4700	D472Z29Y5VL6###R	7.5	3.5
6800	D682Z33Y5VL6###R	8.5	3.5
10 000	D103Z39Y5VL6###R	10.0	3.5
15 000	D153Z43Y5VL6###R	11.0	3.5
22 000	D223Z53Y5VL6###R	13.5	3.5

Notes

- Lead diameter is 0.6 mm
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

DIELECTRIC Z5V						
CAP. (pF)	50 V_{DC}			100 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
4700	D472Z20Z5VF6###R	5.0	3.5	D472Z20Z5VH6###R	6.5	3.5
10 000	D103Z25Z5VF6###R	6.5	3.5	D103Z25Z5VH6###R	7.5	3.5
22 000	D223Z29Z5VF6###R	7.5	3.5	D223Z33Z5VH6###R	8.5	3.5
33 000	D333Z39Z5VF6###R	10.0	3.5	D333Z39Z5VH6###R	10.0	3.5
47 000	D473Z39Z5VF6###R	10.0	3.5	D473Z43Z5VH6###R	11.0	3.5

Notes

- Lead diameter is 0.6 mm
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6, 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

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DIELECTRIC X5F			
CAP. (pF)	500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
100	D101#20X5FL6###R	5.0	3.5
150	D151#20X5FL6###R	5.0	3.5
220	D221#20X5FL6###R	5.0	3.5
330	D331#20X5FL6###R	5.0	3.5
470	D471#25X5FL6###R	6.5	3.5
680	D681#25X5FL6###R	6.5	3.5
1,000	D102#29X5FL6###R	7.5	3.5
1,500	D152#33X5FL6###R	8.5	3.5
2,200	D222#39X5FL6###R	10.0	3.5
3,300	D332#47X5FL6###R	12.0	3.5
4,700	D472#53X5FL6###R	13.5	3.5

Notes
- Lead diameter is 0.6 mm
- # 5th digit is capacitance tolerance code: ± 10 % = K; ± 20 % = M
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

DIELECTRIC X7R			
CAP. (pF)	500 V_{DC}		
	ORDERING CODE	DIAMETER (mm max.)	THICKNESS (mm max.)
100	D101#20X7RL6###R	5.0	3.5
150	D151#20X7RL6###R	5.0	3.5
220	D221#20X7RL6###R	5.0	3.5
330	D331#20X7RL6###R	5.0	3.5
470	D471#20X7RL6###R	5.0	3.5
560	D561#25X7RL6###R	6.5	3.5
680	D681#25X7RL6###R	6.5	3.5
1,000	D102#29X7RL6###R	7.5	3.5
1,500	D152#29X7RL6###R	8.5	3.5
2,200	D222#39X7RL6###R	10.0	3.5
3,300	D332#43X7RL6###R	12.0	3.5
4,700	D472#53X7RL6###R	13.5	3.5

Notes
- Lead diameter is 0.6 mm
- # 5th digit is capacitance tolerance code: ± 10 % = K; ± 20 % = M
- # 13th digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14th digit is lead style code: L; J; K (L and J are preferred lead configuration)
- # 15th digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7 (rated voltage 500 V is not available on 2.5 mm lead-spacing)

TAPING AND PACKAGING

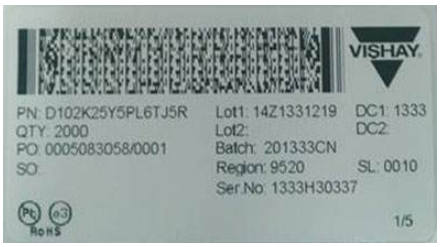
LABELLING

Each reel is provided with a label showing the following details:

manufacturer, D style, capacitance, tolerance, batch number, quantity of components, rated voltage, dielectric.

On special request other designations can be shown.

For example:



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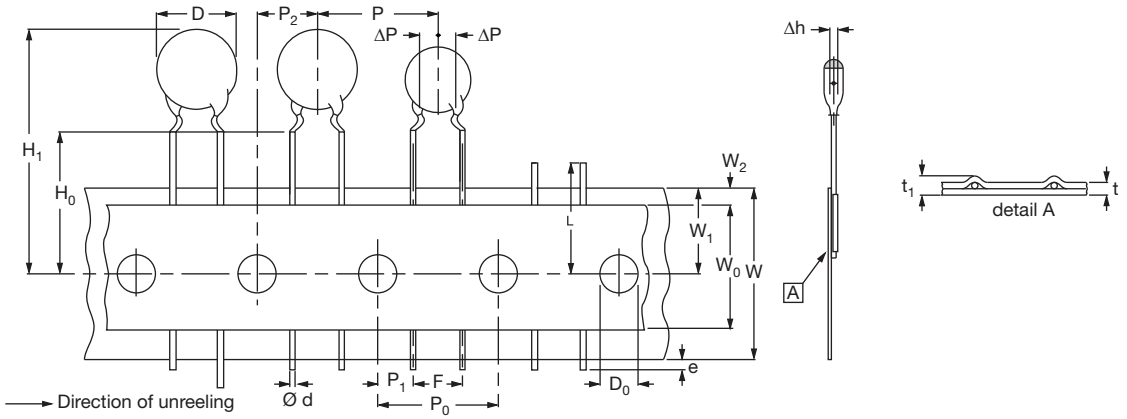
PACKAGING QUANTITIES AND BOX DIMENSIONS

PACKAGING	SIZE CODE	LEAD SPACING (mm)	RATED VOLTAGE	SMALLEST PACKAGING QUANTITY (SPQ)	BOX DIMENSIONS L x W x H (mm)
Tape on reel	≤ 47	≤ 6.4	< 500	2500	370 x 370 x 60
		> 6.4	500	2000	
	> 47	All	All	1000	
Ammopack	≤ 47	≤ 6.4	≤ 500	2000	335 x 240 x 50
		> 6.4		1500	335 x 290 x 50
	> 47	> 6.4		1000	
Bulk (1)	< 49	All	All	1000	245 x 120 x 65
	≥ 49	All	All	500	

Note

(1) SPQ contains one or a multiple of poly-bags, 1000 units per bag.

CAPACITORS ON TAPE



PARAMETER	SYMBOL	DIMENSIONS (mm)		
Body diameter	D	11.0 Max.	11.0 Max.	14.0 Max.
Lead diameter	d	0.6 ± 0.05	0.6 ± 0.05	0.6 ± 0.05
Pitch of component	p	12.7 ± 1.0	12.7 ± 1.0	15.0 ± 1.0
Pitch of sprocket hole	P_0	12.7 ± 0.3	12.7 ± 0.3	15.0 ± 0.3
Distance, hole center to lead	P_1	5.1 ± 0.7	3.85 ± 0.7	3.75 ± 0.7
Distance, hole to center of component	P_2	6.35 ± 1.3	6.35 ± 1.3	7.5 ± 1.5
Lead spacing	F	2.5 + 0.60 / - 0.40	5.0 + 0.60 / - 0.40	7.5 + 0.6 / - 0.4
Average deviation across tape	Δh	± 1.0 max.	± 1.0 max.	± 1.0 max.
Average deviation in direction of reeling	ΔP	± 1.0 max.	± 1.0 max.	± 1.0 max.
Carrier tape width	W	18.0 + 1.0 / - 0.5	18.0 + 1.0 / - 0.5	18.0 + 1.0 / - 0.5
Hold-down tape width	W_0	5.0 min.	5.0 min.	5.0 min.
Position of sprocket hole	W_1	9.0 + 0.75 / - 0.5	9.0 + 0.75 / - 0.5	9.0 + 0.75 / - 0.5
Distance of hold-down tape	W_2	3.0 max.	3.0 max.	3.0 max.
Maximum component height	H_1	32 max.	32 max.	40 max.
Height to seating plane (for kinked leads)	H_0	16.0 ± 0.5	16.0 ± 0.5	16.0 ± 0.5
Height to seating plane (for straight leads)	H_0	20.0 ± 0.5	20.0 ± 0.5	20.0 ± 0.5
Length of cut leads	L	11.0 max.	11.0 max.	11.0 max.
Length of lead protrusion	e	1.0 max.	1.0 max.	1.0 max.
Dimeter of sprocket hole	D_0	4.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2
Total tape thickness	t	0.9 max.	0.9 max.	0.9 max.
Maximum thickness of taping and wires	t_1	1.5 max.	1.5 max.	1.5 max.

RELATED DOCUMENTS

General Information	www.vishay.com/doc?28536

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