Disc Ceramic Capacitors

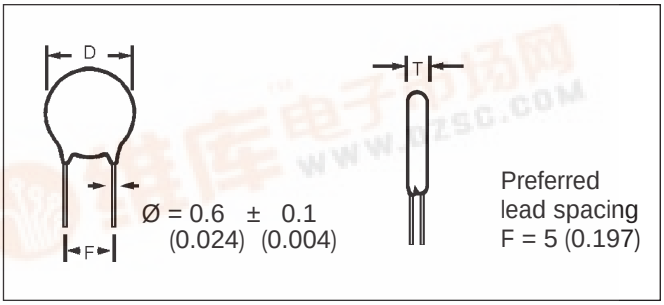
General Specifications - Class II General Purpose

DIELECTRIC - CLASS II

These ceramic capacitors have a high dielectric constant, what makes possible a high capacitance values in reduced dimensions, however temperature coefficient and loss factor are greater than Class I.

Typical applications are decoupling and by pass.

Meets IEC 384-9 (1988).



DIMENSIONS

millimeters (inches)

Digit 9 (ø)	D ± 2 (0.079)	T max.	Available Lead Spacing				
			Vn = 100V/500V	Vn = 1000V	Vn = 2000V	Vn = 3000V	Vn = 4000/5000V
A	4.0 (0.157)	3.0 (0.118)	A,B,D,E,O,R	A,B,E,N,R	A,B,E,N,R	B,E	
B	5.0 (0.197)	4.0 (0.157)	A,B,D,E,O,R,X	A,B,E,N,R,X	A,B,E,N,R	B,E	
C	6.0 (0.236)	4.0 (0.157)	A,B,C,D,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R,	B,C,E	C
D	7.0 (0.276)	4.0 (0.157)	A,B,C,D,E,O,R,X	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
E	8.0 (0.315)	4.0 (0.157)	A,B,C,D,E,O,R,X	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
F	9.0 (0.354)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
G	10.0 (0.394)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
H	11.0 (0.433)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,P,R,W	A,B,C,E,N,P,R,W	B,C,E,P,W	C,P
J	13.0 (0.512)	6.0 (0.236)	B,C,R,W	B,C,N,P,R,W	B,C,P,W	B,C,P,W	C,P
K	15.0 (0.591)	6.0 (0.236)	B,C,R,W	B,C,N,P,R,W	B,C,P,W	B,C,P,W	C,P
M	19.0 (0.748)	7.0 (0.276)	B,C	B,C,P	B,C,P	B,C,P	C,P

(E), (X), (W): upon request

LEAD SPACING – DIGIT 8 OF P.N.

millimeters (inches)

	100V/500V		1kV...5kV/100Vac...150Vac		
F					
2.5 (0.100)	D	—	—	—	—
5 (0.200)	A	O	A	—	N
6 (0.250)	E	X	E	X	—
7.5 (0.300)	B	R	B	R	Q
10 (0.400)	C	W	C	W	—
12.5 (0.500)	P	—	P	—	—

Disc Ceramic Capacitors

General Specifications - Class II General Purpose

100V / 500V PERFORMANCE CHARACTERISTICS CLASS II

Voltage Rating	100V and 500V
Measured at	1.0 kHz / 0.3 Vrms / 25ºC
Dissipation Factor	Y5E / Y5F / Y5P ≤ 2.5% Y5U / Y5V / Z5V ≤ 3.0%
Capacitance Tolerance	Y5E / Y5F / Y5P → ±10% Y5E / Y5E / Y5P / Y5U → ±20% Y5U / Y5V / Z5V → -20% +50%
Insulation Resistance	@ V_R → ≥ 10 GΩ
Dielectric Strength NOTE: Charging current limited to 50 mA	V_R = 100V → Vt = 250V (DC) V_R = 500V → Vt = 1250V (DC)
Operating Temperature Range (ºC)	-30... +85
Climatic Category	30 / 085 / 21 Phenolic Coated

Note: Damp Heat Steady State: 90... 95% R.H. 40ºC / 21 days. No voltage to be applied.

1kV ... 5kV PERFORMANCE CHARACTERISTICS CLASS II

Voltage Rating	1kV ... 5kV
Measured at	1.0 kHz / 0.3 Vrms / 25ºC
Dissipation Factor	Y5F → ≤ 2.5% Y5U / Y5V ≤ 3.0%
Capacitance Tolerance	Y5F → ±10% / ±20% Y5U → ±20% / -20 +50% Y5V → -20 +50%
Insulation Resistance	@ 500V → ≥ 10 GΩ
Dielectric Strength NOTE: Charging current limited to 50 mA	1.5 x V_R + 500 (DC)
Operating Temperature Range (ºC)	-30... +85 Phenolic Coated -30... +125 Epoxy Coated
Climatic Category	30 / 085 / 21 Phenolic Coated 30 / 085 / 56 Epoxy Coated

Note: Damp Heat Steady State: 90... 95% R.H. 40ºC / 21 days. No voltage to be applied.

Disc Ceramic Capacitors
Dimension Table - Class II
Low and Medium Voltage General Purpose

100V / 500V CLASS II – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	Y5E		Y5F		Y5P		Y5U		Y5V		Z5V
Digits 1,2,3 of P.N.	5MK	5MQ	5NK	5NQ	5OK	5OQ	5SK	5SQ	5TK	5TQ	5UK
Rated Voltage (V_R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC
C_R (pF)											
56	4.0 (0.157)	4.0 (0.157)	Use Y5E	Use Y5E	Use Y5E	Use Y5E	Use Y5E	Use Y5E	Use Y5E	Use Y5E	Use Y5E
68											
82											
100											
120											
150											
180											
220											
270											
330											
390	5.0 (0.197)	5.0 (0.197)	4.0 (0.157)	4.0 (0.157)	Use Y5F	Use Y5F	Use Y5F	Use Y5F	Use Y5F	Use Y5F	Use Y5F
470			5.0 (0.197)	5.0 (0.197)	4.0 (0.157)	4.0 (0.157)	Use Y5P	Use Y5P	Use Y5P	Use Y5P	Use Y5P
560		6.0 (0.236)									
680				6.0 (0.236)	5.0 (0.197)	5.0 (0.197)	4.0 (0.157)	4.0 (0.157)	Use Y5U	Use Y5U	Use Y5U
820	6.0 (0.236)	7.0 (0.276)		7.0 (0.276)		6.0 (0.236)					
1,000	7.0 (0.276)			8.0 (0.315)		7.0 (0.276)	5.0 (0.197)	5.0 (0.197)	4.0 (0.157)	4.0 (0.157)	Use Y5V
1,200	8.0 (0.315)	8.0 (0.315)	6.0 (0.236)		6.0 (0.236)			6.0 (0.236)			
1,500		9.0 (0.354)	7.0 (0.276)	9.0 (0.354)	7.0 (0.276)	8.0 (0.315)	6.0 (0.236)	7.0 (0.276)	5.0 (0.197)	5.0 (0.197)	
1,800	9.0 (0.354)			11.0 (0.433)	8.0 (0.315)	9.0 (0.354)	7.0 (0.276)	8.0 (0.315)		6.0 (0.236)	
2,200		11.0 (0.433)	8.0 (0.315)	13.0 (0.512)	9.0 (0.354)		8.0 (0.315)		6.0 (0.236)	7.0 (0.276)	4.0 (0.157)
2,700	11.0 (0.433)	15.0 (0.591)	9.0 (0.354)			11.0 (0.433)	9.0 (0.354)	9.0 (0.354)	7.0 (0.276)	8.0 (0.315)	
3,300				15.0 (0.591)	11.0 (0.433)	13.0 (0.512)			8.0 (0.315)	9.0 (0.354)	5.0 (0.197)
3,900			11.0 (0.433)		13.0 (0.512)	15.0 (0.591)	11.0 (0.433)	11.0 (0.433)	9.0 (0.354)	11.0 (0.433)	8.0 (0.315)
4,700					15.0 (0.591)		13.0 (0.512)	13.0 (0.512)	11.0 (0.433)	13.0 (0.512)	
5,600									13.0 (0.512)	15.0 (0.591)	
6,800											
8,200											
10,000											
12,000											
15,000											
22,000											

Diameter (ϕ) = 9th Part Number Digit

Disc Ceramic Capacitors
Dimension Table
High Voltage - Class II General Purpose

1kV / 5kV CLASS II – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	Y5F			Y5U					Y5V		
Digits 1,2,3 of P.N.	5NR	5NS	5NT	5SR	5SS	5ST	5SU	5SW	5TR	5TS	5TT
Rated Voltage (V_R)	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC	4000 VDC 150 VAC	5000 VDC 150 VAC	1000 VDC 150 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC
C_R (pF)											
100	4.0 (0.157)	4.0 (0.157)		Use Y5F	Use Y5F	Use Y5F	8.0 (0.315)	11.0 (0.433)	Use Y5F	Use Y5F	Use Y5F
120											
150											
180		5.0 (0.197)	6.0 (0.236)								
220			7.0 (0.276)								
270											
330	5.0 (0.197)	6.0 (0.236)		4.0 (0.157)	5.0 (0.197)	7.0 (0.276)			Use Y5U	Use Y5U	Use Y5U
390		7.0 (0.276)	8.0 (0.315)								
470											
560	6.0 (0.236)				6.0 (0.236)						
680	7.0 (0.276)	8.0 (0.315)	9.0 (0.354)						4.0 (0.157)	6.0 (0.236)	7.0 (0.276)
820			10.0 (0.394)	5.0 (0.197)			10.0 (0.394)				
1,000		9.0 (0.354)			7.0 (0.276)	8.0 (0.315)					
1,200			11.0 (0.433)						5.0 (0.197)	7.0 (0.276)	8.0 (0.315)
1,500	8.0 (0.315)	10.0 (0.394)	13.0 (0.512)	6.0 (0.236)		9.0 (0.354)	11.0 (0.433)	13.0 (0.512)	6.0 (0.236)		
1,800	9.0 (0.354)	11.0 (0.433)		7.0 (0.276)	8.0 (0.315)	10.0 (0.394)			7.0 (0.276)	8.0 (0.315)	9.0 (0.354)
2,200	11.0 (0.433)	13.0 (0.512)	15.0 (0.591)		9.0 (0.354)	11.0 (0.433)	13.0 (0.512)	15.0 (0.591)		9.0 (0.354)	11.0 (0.433)
2,700											
3,300	13.0 (0.512)	15.0 (0.591)	19.0 (0.748)	8.0 (0.315)	10.0 (0.394)	13.0 (0.512)	15.0 (0.591)	19.0 (0.748)	9.0 (0.354)	11.0 (0.433)	13.0 (0.512)
3,900	15.0 (0.591)			9.0 (0.354)	11.0 (0.433)		19.0 (0.748)				
4,700				10.0 (0.394)	13.0 (0.512)	15.0 (0.591)			10.0 (0.394)	13.0 (0.512)	15.0 (0.591)
5,600				11.0 (0.433)							
6,800				13.0 (0.512)	15.0 (0.591)	19.0 (0.748)			13.0 (0.512)	15.0 (0.591)	19.0 (0.748)
8,200											
10,000				15.0 (0.591)					15.0 (0.591)		
12,000											
15,000											
22,000											

Diameter (ϕ) = 9th Part Number Digit

Disc Ceramic Capacitors

Ordering Code

HOW TO ORDER

5 **O** **Q** **222**

General Purpose
5A = NP0 / I
*5B = P100 / I
*5C = N150 / I
*5D = N220 / I
*5E = N330 / I
*5F = N470 / I
5G = N750 / I
5H = N1500 / I
*5I = N2200 / I
*5J = N4700 / I
5K = SL
5M = Y5E / II
5N = Y5F / II
5O = Y5P / II
*5P = Y5R / II
*5Q = Y5T / II
5S = Y5U / II
5T = Y5V / II
5U = Z5V / II
*5V = Z4V / III
5W = Y5P / III
5Y = Y5U / III
5Z = Y5V / III

Professional Switch Mode Safety
6A = NP0 / I
*6B = P100 / I
*6C = N150 / I
*6D = N220 / I
*6E = N330 / I
*6F = N470 / I
6G = N750 / I
*6H = N1500 / I
*6I = N2200 / I
6J = N4700 / I
61 = SAFETY
62 = SAFETY
65 = SAFETY
67 = Y5U / SM
68 = Y5V / SM
6L = Y5P / SM
6M = X5E / II
6N = X5F / II
6O = X5P / II
*6P = X5R / II
*6Q = X5T / II
6S = X5U / II
6T = X5V / II
6U = Z5V / II
*6V = Z4V / III
6W = Y5P / III
6Y = Y5U / III
6Z = Y5V / III

Rated Voltage (dc)
D = 16V
F = 25V
H = 50V
K = 100V
N = SAFETY
O = SAFETY
Q = 500V
R = 1000V
S = 2000V
T = 3000V
U = 4000V
V = SAFETY
W = 5000V
*X = 6000V
*Y = 7500V

Capacitance
222 = 2.2 nF

Capacitance = TPC code
1 pF = 1R0
1.2pF = 1R2
1.5pF = 1R5
1.8pF = 1R8
2.2pF = 2R2
2.7pF = 2R7
3.9pF = 3R9
4.7pF = 4R7
5.6pF = 5R6
6.8pF = 6R8
8.2pF = 8R2
10pF = 100
12pF = 120
15pF = 150
18pF = 180
22pF = 220
27pF = 270
33pF = 330
39pF = 390
47pF = 470
56pF = 560
68pF = 680
82pF = 820

Capacitance = TPC code
100pF = 101
120pF = 121
150pF = 151
180pF = 181
220pF = 221
270pF = 271
330pF = 331
390pF = 391
470pF = 471
560pF = 561
680pF = 681
820pF = 821
1nF = 102
1.2nF = 122
1.8nF = 182
2.2nF = 222
2.7nF = 272
3.3nF = 332
3.9nF = 392
4.7nF = 472
5.6nF = 562
6.8nF = 682
8.2nF = 822
10nF = 103
15nF = 153
22nF = 223
33nF = 333
47nF = 473
100nF = 104
200nF = 204

*Upon Request

Disc Ceramic Capacitors

Ordering Code

M **A** **E** **A** **A**

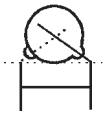
Tolerance
C = ±0.25 pF
D = ±0.50 pF
J = ±5%
K = ±10%
M = ±20%
S = -20+50%
Z = -20+80%
P = 0+100%

Capacitor Diameter
± 2 (0.079)
A = 4 (0.157)
B = 5 (0.197)
C = 6 (0.236)
D = 7 (0.276)
E = 8 (0.315)
F = 9 (0.354)
G = 10 (0.394)
H = 11 (0.433)
J = 13 (0.512)
K = 15 (0.591)
M* = 19 (0.748)
*Wire 0.8 (0.031) recommended

Lead Forming				
mm	inches			
2.5 ±0.5	.1 ± .025	D	–	–
5 +0.6 -0.2	.2 ± .025	A	O	N
6 +0.6 -0.2	.25 ± .025	E	X	–
7.5 +1 -0.5	.3 ± .05	B	R	Q
10 +0.5 -1.0	.4 ± .05	C	W	–
12.5 +1 -0.5	.5 ± .05	P	–	–

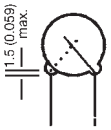
Finishing

Diam ≤9 (0.354) and F = 5.00 (0.197)



Coating does not surpass the bend

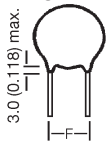
For every other:



Low Voltage

A = Phenolic (General Purpose) Q = Waxed phenolic
S = Epoxy (Professional) cap. diameter ≤ 8 (0.315)
D = Epoxy (Professional) cap. diameter > 8 (0.315)

High Voltage

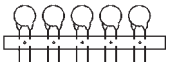


F = Measured from the center of leads

C = Epoxy wire diameter 0.6 (0.024) ± 0.1 (0.004)
I = Epoxy wire diameter 0.8 (0.031) ± 0.1 (0.004)
L = Phenolic wire diameter 0.6 (0.024) ± 0.1 (0.004)

Packaging

Cardboard Strips

A = 

Bulk

E = 5 (0.197) ± 1 (0.039) free wire length
C = 10 (0.394) ± 1 (0.039) free wire length
D = 25 (0.984) ± 1 (0.039) free wire length

Taping

Reel

Avisert			Panasert		
H	L	L	J	L	L

Ammo Pack

Avisert			Panasert		
I	M	M	K	M	M

Please note that not all code combinations are either possible or available.

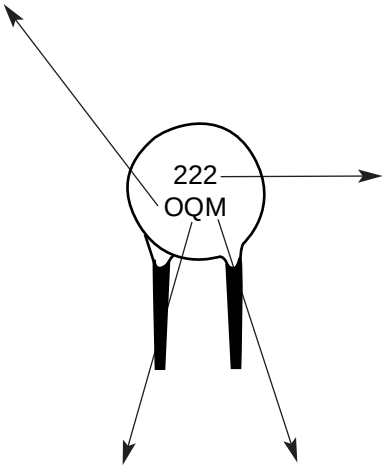
Disc Ceramic Capacitors

Marking

DIG. 2	
O	
TC / Class	
General Purpose	Professional
A = NP0 / I	A = NP0 / I
*B = P100 / I	B = P100 / I
*C = N150 / I	C = N150 / I
*D = N220 / I	D = N220 / I
*E = N330 / I	E = N330 / I
*F = N470 / I	F = N470 / I
G = N750 / I	G = N750 / I
H = N1500 / I	H = N1500 / I
*I = N2200 / I	I = N2200 / I
*J = N4700 / I	J = N4700 / I
K = SL	7 = Y5U / SM
M = Y5E / II	8 = Y5V / SM
N = Y5F / II	L = Y5P / SM
O = Y5P / II	M = X5E / II
P = Y5R / II	N = X5F / II
Q = Y5T / II	O = X5P / II
S = Y5U / II	P = X5R / II
T = Y5V / II	Q = X5T / II
U = Z5V / II	S = X5U / II
V = Z4V / III	T = X5V / II
*W = Y5P / II	U = Z5V / II
*X = Y5R / II	V = Z4V / III
Y = Y5U / II	W = Y5P / III
Z = Y5V / II	X = Y5R / III
	Y = Y5U / III
	Z = Y5V / III

*Upon Request

Logo: Only in diam. ≥ 6mm



DIG. 3
Q
Rated Voltage
D = 16V
F = 25V
H = 50V
K = 100V
Q = 500V
R = 1000V
S = 2000V
T = 3000V
U = 4000V
W = 5000V
X = 6000V
Y = 7500V

DIG. 7
M
Tolerance
C = ±0.25pF
D = ±0.5pF
J = ±5%
K = ±10%
M = ±20%
S = -20 +50%
Z = -20 +80%
P = 0 +100%

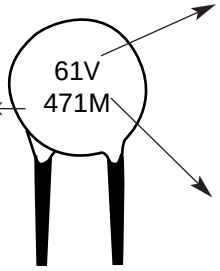
Capacitance	EIA
1pF = 109	100pF = 101
1.2pF = 129	120pF = 121
1.5pF = 159	150pF = 151
1.8pF = 189	180pF = 181
2.2pF = 229	220pF = 221
2.7pF = 279	270pF = 271
3.9pF = 399	390pF = 391
4.7pF = 479	470pF = 471
5.6pF = 569	560pF = 561
6.8pF = 689	680pF = 681
8.2pF = 829	820pF = 821
10pF = 100	1nF = 102
12pF = 120	1.2nF = 122
15pF = 150	1.8nF = 182
18pF = 180	2.2nF = 222
22pF = 220	2.7nF = 272
27pF = 270	3.9nF = 392
39pF = 390	4.7nF = 472
47pF = 470	5.6nF = 562
56pF = 560	6.8nF = 682
68pF = 680	8.2nF = 822
82pF = 820	10nF = 103
	15nF = 153
	22nF = 223
	33nF = 333
	47nF = 473
	100nF = 104
	200nF = 204

TC – Temperature coefficient.

DIG – for better understanding, check pages 3 and 4.

Safety Front

Capacitance
As above



Type
61V
620
65N

Tolerance
As above

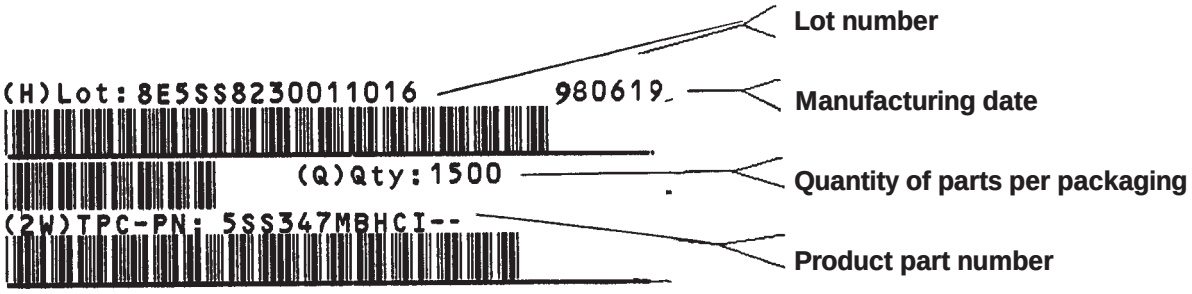
Back: (Approval marks)

Disc Ceramic Capacitors

Packaging

IDENTIFICATION AND TRACEABILITY

On all TPC ceramic capacitors packages, you will find a bar code label with the following information:



TAPED PARTS QUANTITY TABLE

millimeters (inches)

Rated Voltage	Diameter	Quantities	
(Vr)	D	Ammopack	Reel
Vr <= 500V	D ≦ 7 (0.276)	2000	2500
	7 < D ≦ 11 (0.433)	2000	2000
500V<Vr<=2KV	D ≦ 11 (0.433)	1500	2000
2KV<Vr=5KV	D ≦ 11 (0.433)	1000	1500

CARDBOARD STRIPS QUANTITY TABLE

millimeters (inches)

Rated Voltage	Diameter	Lead Space	
(Vr)	D	< = 5 (0.197)	> 5 (0.197)
Vr <= 500V	D ≦ 8 (0.315)	2500	1500
	8 (0.315) ≦ D≦ 11 (0.433)	1500	-
	8 (0.315) ≦ D≦ 13 (0.512)	-	1000
	11 (0.433) ≦ D≦ 15 (0.591)	1000	-
	13 (0.512) ≦ D≦ 19 (0.748)	-	500
	D ≦ 19 (0.748)	500	-
500V<Vr<=2KV	D ≦ 9 (0.354)	1500	1000
	9 (0.354) ≦ D ≦ 11 (0.433)	-	1000
	9 (0.354) ≦ D ≦ 13 (0.512)	1000	-
	11 (0.433) ≦ D ≦ 19 (0.748)	-	500
	13 (0.512) ≦ D ≦ 19 (0.748)	500	-
2KV<Vr<=5KV	D ≦ 9 (0.354)	1500	-
Safety 65N 62O	D ≦ 11 (0.433)	-	1000
	D ≦ 13 (0.512)	500	500
Safety	D ≦ 6 (0.236)	1500	1500
61V	7 (0.275) ≦ D ≦ 9 (0.354)	1000	1000
	9 (0.354) ≦ D	500	500

Quantities for other package alternative, upon request.

Disc Ceramic Capacitors

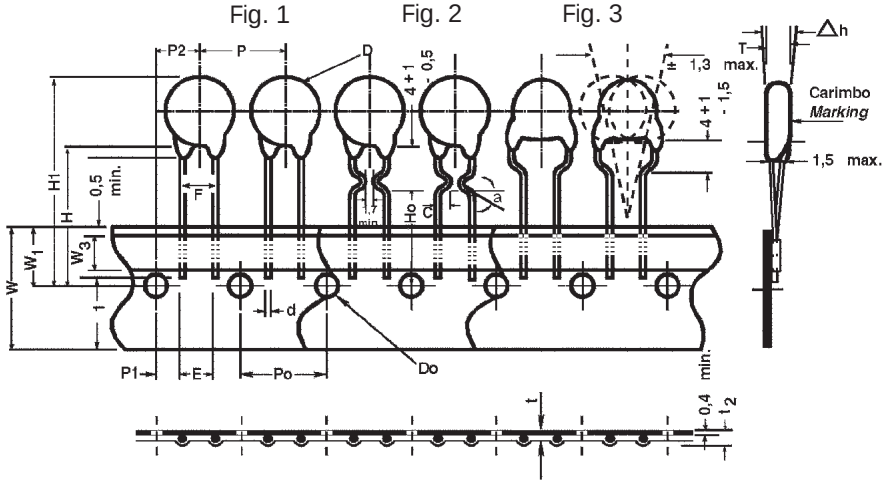
Tape and Reel Specifications

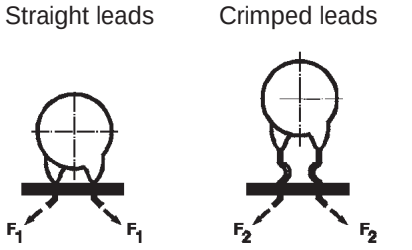
There are two types of taped disc ceramic capacitors:
Straight or crimped leads.

Both types can be shipped on reels or ammopack.
The standard packaging quantities are shown bellow:

millimeters (inches)

Fig. 1 Fig. 2 Fig. 3





Maximum pull force during insertion and lead cut

	F_1	F_2
4 (0.157) ≤ D < 6 (0.236)	12N	20N
D ≥ 6 (0.236)	20N	25N

Digit 11		Available Tapings		Digit 9
L M	→	Sizes	4 (0.157) ≤ D ≤ 11 (0.433)	A... H
J H K I	→	Sizes	6 (0.236) ≤ D ≤ 11 (0.433)	C... H

TPC Code Digit 11

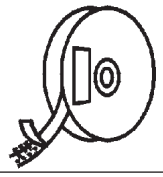
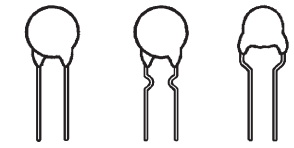
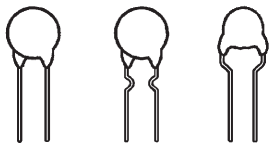
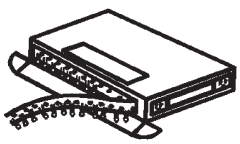
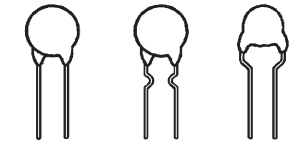
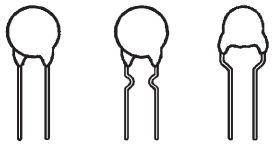
Packaging	Avisert	Panasert
Reel 	 H FIGURE 1 L FIGURE 2 L FIGURE 3	 J FIGURE 1 L FIGURE 2 L FIGURE 3
Ammopack 	 I FIGURE 1 M FIGURE 2 M FIGURE 3	 K FIGURE 1 M FIGURE 2 M FIGURE 3

Figure 2: Inside Crimp 100V... 1000V
Figure 3: Outside Crimp 1000V

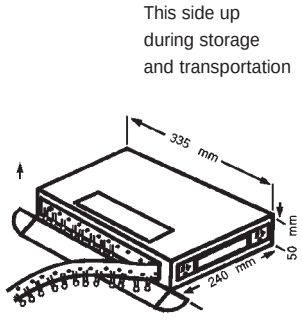
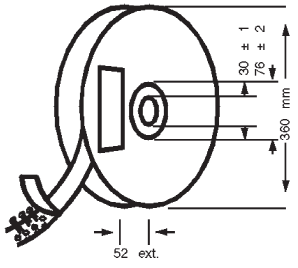
Disc Ceramic Capacitors

Tape and Reel Specifications

millimeters (inches)

Description of Symbols		Straight Leads		Crimped
		Figure 1		Figure 2 & 3
		A (Avisert)	P (Panasert)	Avisert & Panasert
Crimp angle	∝	—	—	20º...45º
Crimp length	C	—	—	1.7 min.
Lead diameter	d	0.60 ± 0.1		
Disc diameter	D	11 max.		
Lead hole diameter	Do	4.0 ± 0.2		
Disc thickness	T	See Catalog		
Lead spacing	F	$5.0^{+0.6}_{-0.2}$		
Component alignment, front-rear	Δ h	0 ± 1		
Height of component from tape center	H	19.5 ± 0.5	16.5 ± 0.5 - 0	—
Height from tape center to crimp	Ho	—	—	16 + 0.5 - 0
Component height	H1	32.25 max.	>23.5 <32.25	32.25 max.
Distance from component leads to tape bottom	ℓ_1	12 max.		
Tape width	W	$18^{+1}_{-0.5}$		
Bonding tape width	W_3	5.5 min.		
Feed hole position	W_1	9.0 ± 0.5		
Pitch between discs	P	12.7 ± 1		
Feed hole pitch	Po	12.7 ± 0.3		
Hole center to lead	P1	3.85 ± 0.7		
Feed hole center to component center	P2	6.35 ± 1		
Tape + bonding tape thickness	t	0.7 ± 0.2		
Total tape thickness. including lead	t_2	1.5 max.		

PACKAGING

Ammopack	Reel
This side up during storage and transportation 	
max. stacking: 10 boxes	max. stacking: 10 reels

SHIPPING CONTAINER

8 Ammopack	5 Reel