

# Disc Ceramic Capacitors



## Safety Ceramic Capacitors

### DEFINITIONS (IEC 384-14 1993)

**X FUNCTION:** applications where the capacitor failure does not lead to danger of electrical shock. There are three subclasses related to the peak voltage of the impulses superimposed to the mains voltage:

Subclass X1: impulses up to 4000V

Subclass X2: impulses up to 2500V

Subclass X3: impulses up to 1200V

**Y FUNCTION:** applications where the capacitor failure may lead to danger of electrical shock. There are four subclasses related to the peak voltage of the impulses applied before the life test:

Subclass Y1: impulses up to 8000V

Subclass Y2: impulses up to 5000V

Subclass Y3: rated 250Vac without impulses

Subclass Y4: impulses up to 2500V

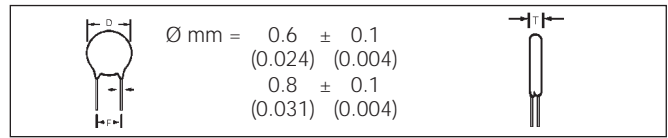
**ANTENNA:** the capacitors are used to decouple the antenna leads of video and audio equipment, whose failure may lead to danger of electrical shock.

#### TPC Safety Capacitors:

61V (GZO): meets subclasses X1, Y1 Test voltage 4000 VAC

620 (GKO): meets subclasses X1, Y2 Test voltage 2500 VAC

65N (GAY): meets subclasses X2, Y3 Test voltage 1800 VAC



### DIMENSIONS

millimeters (inches)

Digit 9 (ø)	D ± 1 (0.039)	T max.	Available Lead Spacing		
			65N	620	61V
C	6.0 (0.236)	4.0 (0.157)	B,C,E	B,C	C
D	7.0 (0.276)	4.0 (0.157)	B,C,E	B,C	C
E	8.0 (0.315)	4.0 (0.157)	B,C,E,Q	B,C,Q	C
F	9.0 (0.354)	5.0 (0.197)	B,C,E	B,C	C
G	10.0 (0.394)	5.0 (0.197)	B,C,E	B,C	C
H	11.0 (0.433)	5.0 (0.197)	B,C,E,P,W	B,C,P	C,P
J	13.0 (0.512)	6.0 (0.236)	B,C,P,W	B,C,P	C,P
K	15.0 (0.591)	6.0 (0.236)	B,C,P,W	B,C,P	C,P
M	19.0 (0.748)	7.0 (0.276)	B,C,P	B,C,P	C,P

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

millimeters (inches)

Lead Spacing	Digit 8		
F			
6 (0.250)	E	—	—
7.5 (0.300)	B	—	Q
10 (0.400)	C	W	—
12.5 (0.500)	P	—	—

### PERFORMANCE CHARACTERISTICS

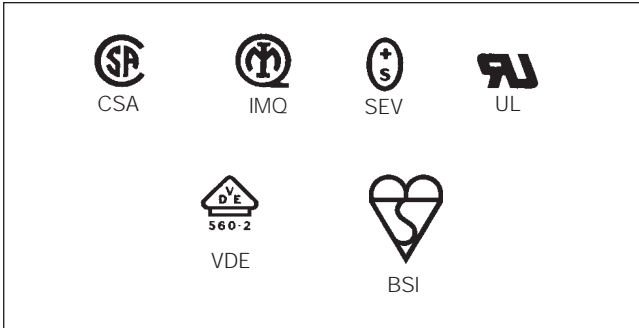
	61V	620	65N
Measured at	1.0 kHz / 0.3 Vrms / 25°C	1.0 kHz / 0.3 Vrms / 25°C	1.0 kHz / 0.3 Vrms / 25°C
Capacitance Tolerance	±20% / -20 +50%	±20% / -20 +50%	±20% / -20 +50%
D.F max. @ 25°C	1.5%	1.5%	1.5%
Insulation Resistance	≥ 10 GΩ	≥ 10 GΩ	≥ 10 GΩ
Test Voltage Between Leads	4.000 VAC	2.500 VAC	1.800 VAC
Test Voltage Leads to Body	4.000 VAC	2.300 VAC	2.000 VAC
Operating Temperature Range (°C)	-40 +125	-40 +125	-40 +125

# Disc Ceramic Capacitors



## Safety Ceramic Capacitors

### APPROVED LOGOS



### CERTIFICATION BODY APPROVALS

	61V				62O			
	Standard	Certificate Number	Rated Voltage	Climatic Category	Standard	Certificate Number	Rated Voltage	Climatic Category
UL	UL 1414	E 147842 (N)	250 VAC		UL 1414	E 147842 (N)	250 VAC	
CSA	CAN/CSA - C22.2 No 1-94	LR 100430-2	250 VAC		CAN/CSA - C22.2 No 1-94	LR 100430-1	250 VAC	
SEV	SEV 1016	93-100959.10	400 VAC	40/085/21	SEV 1016 SEV 1055	93-100959.12	400 VAC	40/125/21
VDE	DIN EN 132400: 1995 IEC 384-14: 1993	94612	X1 : 400 VAC Y1 : 250 VAC	40/085/21/C	DIN VDE 0560 - part 2	76830 76804	400 VAC	25/085/21
		94610 94634			DIN EN 132400: 1995 IEC 384-14: 1993	101384	X1 : 400 VAC Y2 : 250 VAC	40/085/21/C
BSI	BS EN 60065: 1994 IEC 384-14: 1993 BS EN 132400: 1995	228237	X1 : 400 VAC Y1 : 250 VAC	40/125/21/C	BS EN 60065: 1994 IEC 384-14: 1993 BS EN 132400: 1995	228197	X1 : 400 VAC Y2 : 250 VAC	40/125/21/C
IMQ	EN 132400: 1994 IEC 384-14: 1993	V4551	X1 : 400 VAC Y1 : 250 VAC	40/125/21/C	EN 132400: 1994 IEC 384-14: 1993	V4635	X1 : 400 VAC Y2 : 250 VAC	40/125/21/C

# Disc Ceramic Capacitors



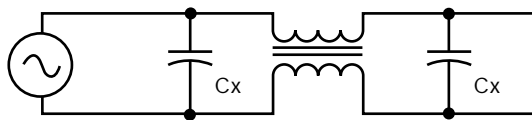
## Safety Ceramic Capacitors Epoxy Coated

### CAPACITANCE VS. DISC DIAMETER

Digits 1, 2, 3 of P.N. $C_R$ (pF)	61V	620	65N
100	6.0 (0.236)	6.0 (0.236)	6.0 (0.236)
120			
150			
220	7.0 (0.276)	7.0 (0.276)	6.0 (0.236)
330			
390			
470			
560	8.0 (0.315)	8.0 (0.315)	7.0 (0.276)
680			
820	9.0 (0.354)	8.0 (0.315)	8.0 (0.315)
1000			
1200			
1500	11.0 (0.433)	9.0 (0.354)	8.0 (0.315)
2200			
3300	13.0 (0.512)	10.0 (0.394)	9.0 (0.354)
3900			
4700	19.0 (0.748)	13.0 (0.512)	11.0 (0.433)
		15.0 (0.591)	13.0 (0.512)

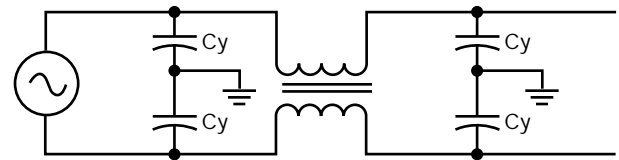
### TYPICAL APPLICATION FOR SAFETY CERAMIC DISCS AND SWITCH MODE

Across the line capacitors for noise suppression



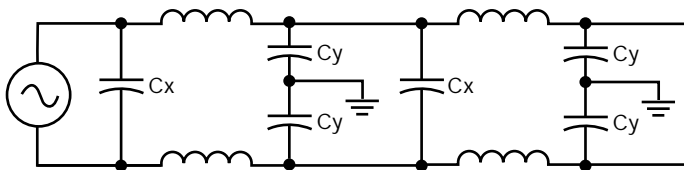
$C_x$ =TPC 61V or 620 series

Line by-pass for noise suppression



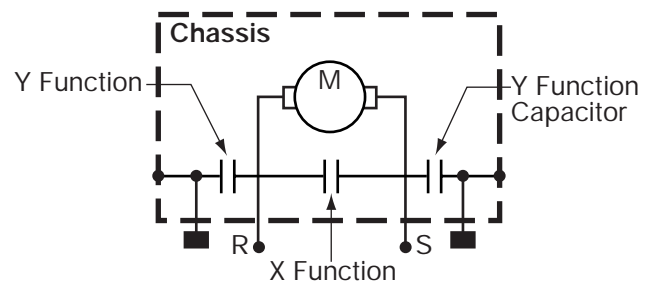
$C_y$ =TPC 61V or 620 series

Typical X and Y function application



Thompson 61V or 620 series

Protection and suppression of a motor (X and Y function)

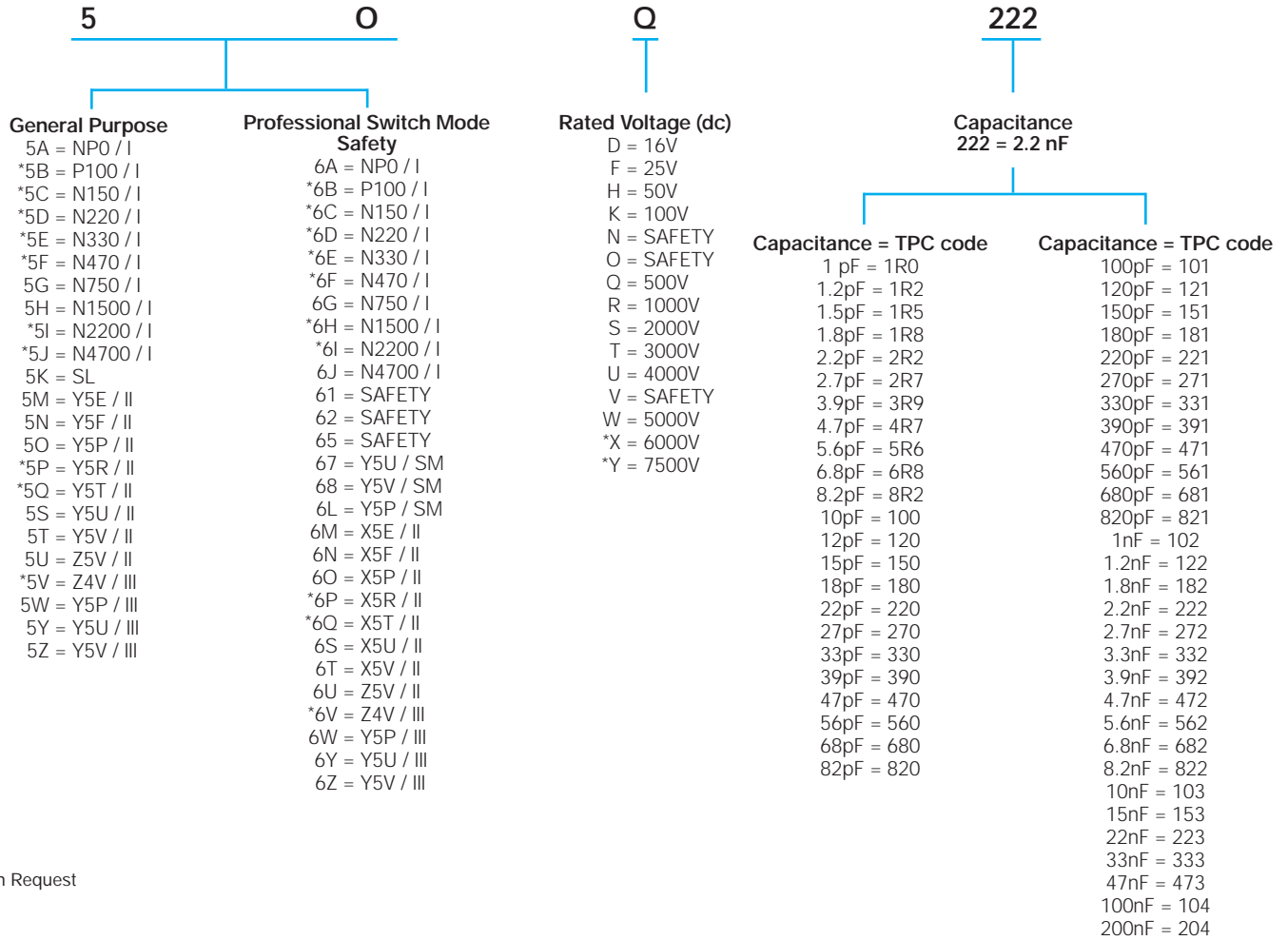


# Disc Ceramic Capacitors



## Ordering Code

### HOW TO ORDER



\*Upon Request

# Disc Ceramic Capacitors



## Ordering Code

**M**

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

**A**

**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)

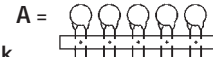
\*Wire 0.8 (0.031) recommended

**A**

**A**

### Packaging

#### Cardboard Strips



#### 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			Panaset		
H	L	L	J	L	L



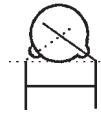
##### Ammo Pack

Avisert			Panaset		
I	M	M	K	M	M

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

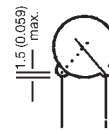
### Finishing

Diam ≤ 9 (0.354) and  
 F = 5.00 (0.197)



Coating does not surpass the bend

For every other:



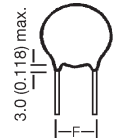
### Low Voltage

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 ± 0.1 (0.024) ± (0.004)

I = Epoxy wire diameter 0.8 ± 0.1 (0.031) ± (0.004)

L = Phenolic wire diameter 0.6 ± 0.1 (0.024) ± (0.004)

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

# Disc Ceramic Capacitors



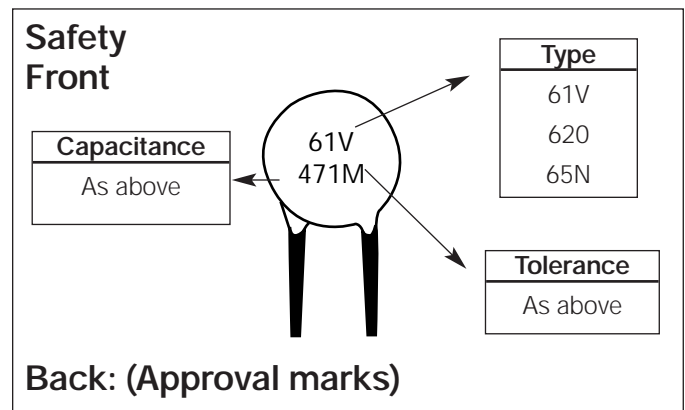
## Marking

DIG. 2		Logo: Only in diam. $\geq$ 6mm	Capacitance		EIA	
O				1pF = 109	100pF = 101	10pF = 100
TC / Class		1.2pF = 129		120pF = 121	12pF = 120	1.2nF = 122
General Purpose	Professional	1.5pF = 159		150pF = 151	15pF = 150	1.8nF = 182
A = NP0 / I	A = NP0 / I	1.8pF = 189		180pF = 181	18pF = 180	2.2nF = 222
*B = P100 / I	B = P100 / I	2.2pF = 229		220pF = 221	22pF = 220	2.7nF = 272
*C = N150 / I	C = N150 / I	2.7pF = 279		270pF = 271	27pF = 270	3.9nF = 392
*D = N220 / I	D = N220 / I	3.9pF = 399		390pF = 391	39pF = 390	4.7nF = 472
*E = N330 / I	E = N330 / I	4.7pF = 479		470pF = 471	47pF = 470	5.6nF = 562
*F = N470 / I	F = N470 / I	5.6pF = 569		560pF = 561	56pF = 560	6.8nF = 682
G = N750 / I	G = N750 / I	6.8pF = 689		680pF = 681	68pF = 680	8.2nF = 822
H = N1500 / I	H = N1500 / I	8.2pF = 829	820pF = 821	82pF = 820	10nF = 103	
*I = N2200 / I	I = N2200 / I				15nF = 153	
*J = N4700 / I	J = N4700 / I				22nF = 223	
K = SL	7 = Y5U / SM				33nF = 333	
M = Y5E / II	8 = Y5V / SM	<b>DIG. 3</b>	<b>DIG. 7</b>		47nF = 473	
N = Y5F / II	L = Y5P / SM	Q	M		100nF = 104	
O = Y5P / II	M = X5E / II	Rated Voltage	Tolerance		200nF = 204	
P = Y5R / II	N = X5F / II	D = 16V	C = $\pm 0.25\text{pF}$			
Q = Y5T / II	O = X5P / II	F = 25V	D = $\pm 0.5\text{pF}$			
S = Y5U / II	P = X5R / II	H = 50V	J = $\pm 5\%$			
T = Y5V / II	Q = X5T / II	K = 100V	K = $\pm 10\%$			
U = Z5V / II	S = X5U / II	Q = 500V	M = $\pm 20\%$			
V = Z4V / III	T = X5V / II	R = 1000V	S = -20 +50%			
*W = Y5P / II	U = Z5V / II	S = 2000V	Z = -20 +80%			
*X = Y5R / II	V = Z4V / III	T = 3000V	P = 0 +100%			
Y = Y5U / II	W = Y5P / III	U = 4000V				
Z = Y5V / II	X = Y5R / III	W = 5000V				
	Y = Y5U / III	X = 6000V				
	Z = Y5V / III	Y = 7500V				

\*Upon Request

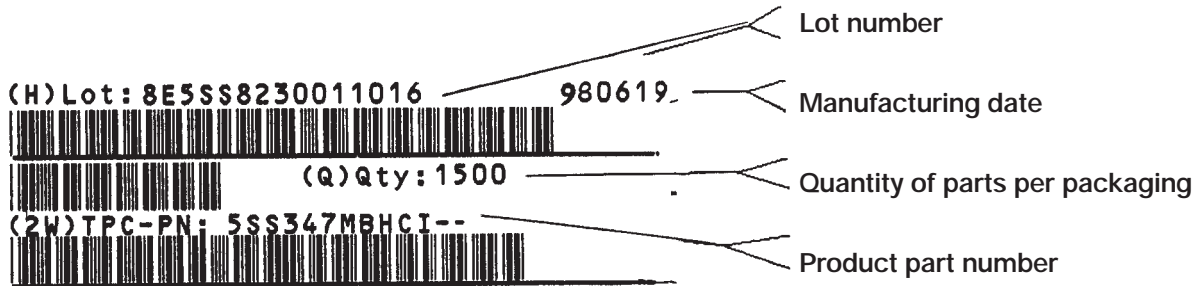
TC – Temperature coefficient.

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



### 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 (Vr)	Diameter D	Quantities	
		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 (Vr)	Diameter D	Lead Space	
		< = 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 Safety 65N 62O	D ≤ 9 (0.354)	1500	-
	D ≤ 11 (0.433)	-	1000
	D ≤ 13 (0.512)	500	500
Safety 61V	D ≤ 6 (0.236)	1500	1500
	7 (0.275) ≤ D ≤ 9 (0.354)	1000	1000
	9 (0.354) ≤ D	500	500

Quantities for other package alternative, upon request.

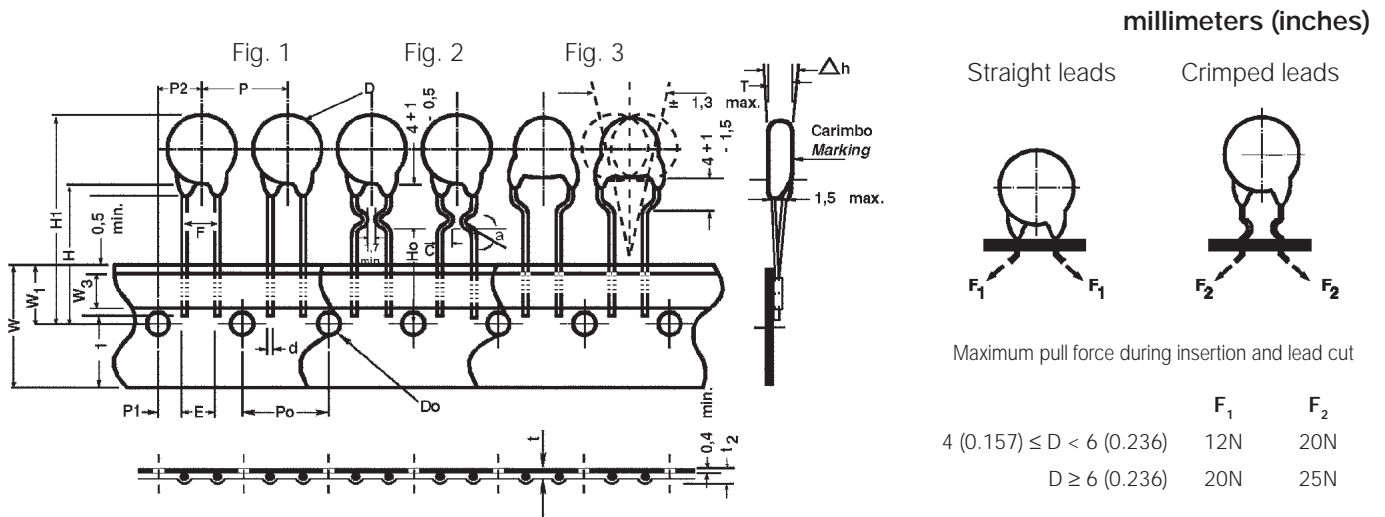
# Disc Ceramic Capacitors



## 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 below:



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

### TPC Code Digit 11

Packaging	Avisert	Panasert
Reel 	 FIGURE 1 FIGURE 2 FIGURE 3	 FIGURE 1 FIGURE 2 FIGURE 3
Ammopack 	 FIGURE 1 FIGURE 2 FIGURE 3	 FIGURE 1 FIGURE 2 FIGURE 3

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

Figure 3: Outside Crimp 1000V



# Disc Ceramic Capacitors

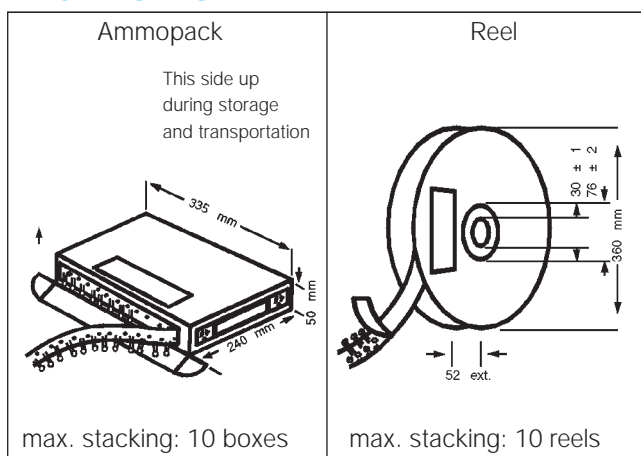


## Tape and Reel Specifications

millimeters (inches)

Description of Symbols		Straight Leads		Crimped
		Figure 1		Figure 2 & 3
		A (Avisert)	P (Panaset)	Avisert & Panaset
Crimp angle	$\infty$	—	—	20°...45°
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	$\Delta h$	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	$\ell_1$	12 max.		
Tape width	W	18 $^{+1}_{-0.5}$		
Bonding tape width	W <sub>3</sub>	5.5 min.		
Feed hole position	W <sub>1</sub>	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 <sub>2</sub>	1.5 max.		

### PACKAGING



### SHIPPING CONTAINER

