

Disc Ceramic Capacitors

General Specifications - Class I Temperature Compensating

DIELECTRIC - CLASS I

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits.

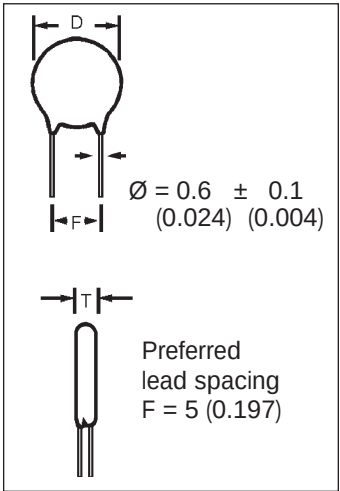
Meets IEC 384-8 (1988).

DIMENSIONS

millimeters (inches)

Digit 9 (ø)	D ± 2 (0.079)	T max.	Available Lead Spacing				
			100V – 500V	1000V	2000V	3000V	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,W	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,N,P,R,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,N,P,R,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



millimeters (inches)

Lead Spacing	Digit 8 of P.N.		
F			
2.5 (0.100)	D	—	—
5 (0.200)	A	O	N
6 (0.250)	E	X	—
7.5 (0.300)	B	R	Q
10 (0.400)	C	W	—
12.5 (0.500)	P	—	—

Disc Ceramic Capacitors



General Specifications - Class I Temperature Compensating

PERFORMANCE CHARACTERISTICS

	100 V → 500 V	1kV → 5kV
Measured at	1.0 MHz @ 1.0 Vrms & 25°C	1.0 MHz @ 1.0 Vrms & 25°C
Dissipation Factor (%)	$C_R \leq 30 \text{ pF} \rightarrow \leq 1/C_R + 0.07$ $C_R > 30 \text{ pF} \rightarrow \leq 0.1\%$	$C_R \leq 30 \text{ pF} \rightarrow \leq 1/C_R + 0.07$ $C_R > 30 \text{ pF} \rightarrow \leq 0.1\%$
Tolerance	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$
Insulation Resistance (IR)	@ $V_R \geq 10 \text{ G}\Omega$	@ 500V $\geq 10 \text{ G}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100\text{V} \rightarrow V_t = 250\text{V (DC)}$ @ $V_R = 500\text{V} \rightarrow V_t = 1.25\text{kV (DC)}$	$1.5 \times V_R + 500 \text{ (DC)}$
Operating Temperature Range (°C)	-30 → +85	-30 → +85 Phenolic Coated -30 → +125 Epoxy Coated
Climatic Category	30 / 085 / 21 Phenolic Coated	30 / 085 / 21 Phenolic Coated 30 / 085 / 56 Epoxy Coated

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

Disc Ceramic Capacitors



Dimension Table - Class I Temperature Compensating

CLASS I - CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	NP0					
Digits 1, 2, 3 of P.N.	5AK	5AQ	5AR	5AS	5AT	5AU
Rated Voltage (V _R)	100 VDC	500 VDC	1000 VDC 130 VAC	2000 VDC 250 VAC	3000 VDC 380 VAC	4000 VDC 440 VAC
C _R (pF)						
1.0	4.0 (0.157)	4.0 (0.157)				
1.2						
1.5						
1.8						
2.0						
2.2						
2.7						
3.0						
3.3						
3.9						
4.0			4.0 (0.157)	4.0 (0.157)	6.0 (0.236)	
4.7						5.0 (0.197)
5.0			7.0 (0.276)	8.0 (0.315)		
5.6					10.0 (0.394)	
6.0			11.0 (0.433)			
6.8				13.0 (0.512)		
7.0			15.0 (0.591)			
8.0				19.0 (0.748)		
8.2						
9.0						
10						
12						
15						
18						
20						
22						
27						
33						
39						
47						
50						
56						
68						
82						
100						
120						
150						
180						
220						
270						
330						

Disc Ceramic Capacitors



Dimension Table - Class I Temperature Compensating

CLASS I - CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

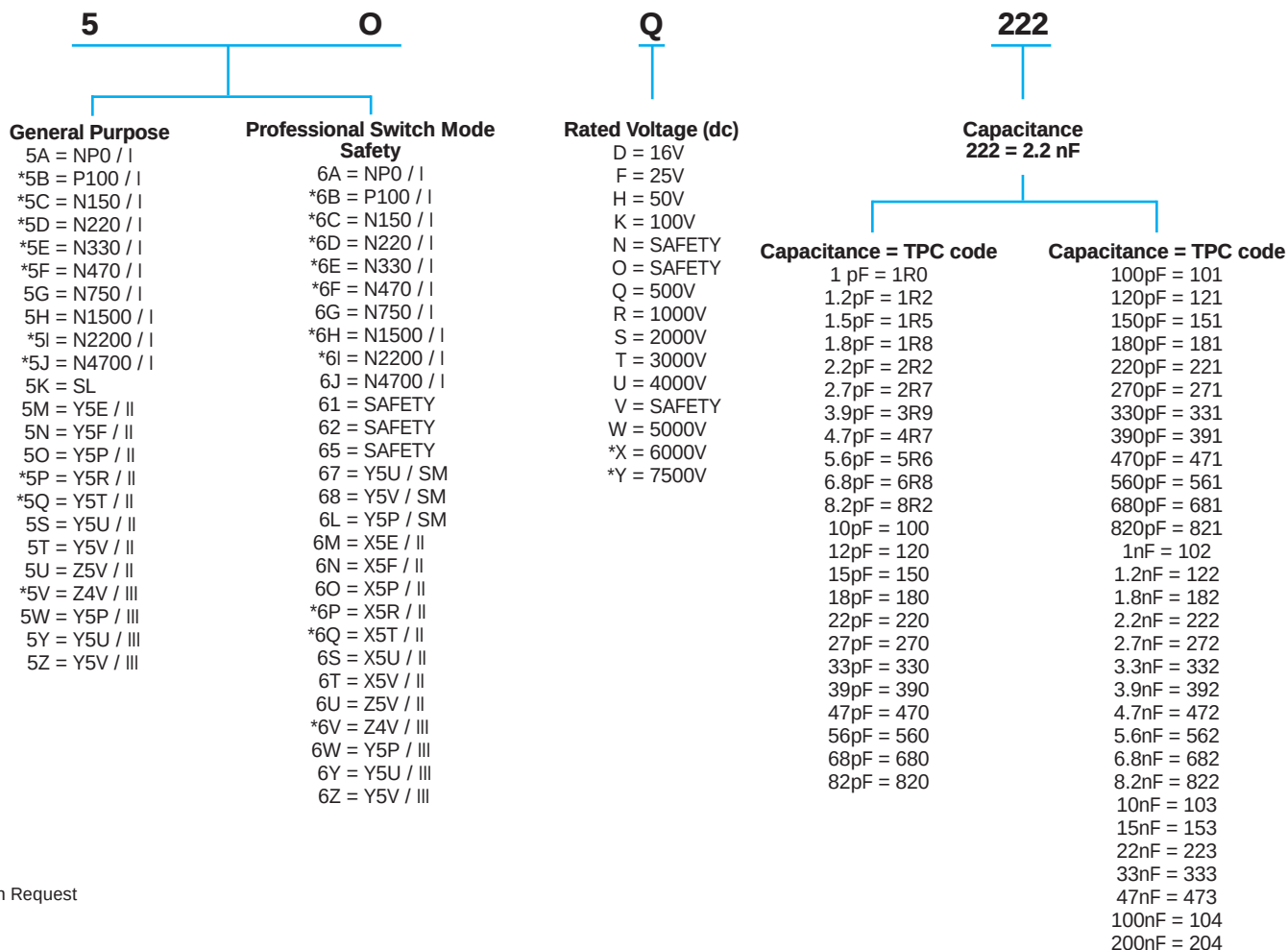
Temp. Coefficient Digits 1, 2, 3 of P.N.	N750							N1500	
Rated Voltage (V _R)	5GK	5GQ	5GR	5GS	5GT	5GU	5GW	5HK	5HQ
C _R (pF)	100 VDC	500 VDC	1000 VDC 130 VAC	2000 VDC 250 VAC	3000 VDC 380 VAC	4000 VDC 440 VAC	5000 VDC 550 VAC	100 VDC	500 VDC
1.0									
1.2									
1.5									
1.8									
2.0									
2.2									
2.7									
3.0									
3.3									
3.9									
4.0									
4.7									
5.0									
5.6									
6.0									
6.8									
7.0									
8.0									
8.2									
9.0									
10									
12									
15									
18									
20									
22									
27									
33									
39									
47									
50									
56									
68									
82									
100									
120									
150									
180									
220									
270									
330									

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 = $\pm 5\%$
K = $\pm 10\%$
M = $\pm 20\%$
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)

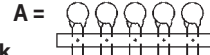
*Wire 0.8 (0.031) recommended

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

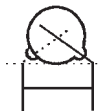


Avisert			Panaset		
I	M	M	K	M	M

Lead Forming				
mm	inches			
2.5 ± 0.5	.1 $\pm .025$	D	—	—
5 $\begin{smallmatrix} +0.6 \\ -0.2 \end{smallmatrix}$	.2 $\pm .025$	A	O	N
6 $\begin{smallmatrix} +0.6 \\ -0.2 \end{smallmatrix}$	.25 $\pm .025$	E	X	—
7.5 $\begin{smallmatrix} +1 \\ -0.5 \end{smallmatrix}$	.3 $\pm .05$	B	R	Q
10 $\begin{smallmatrix} +0.5 \\ -1.0 \end{smallmatrix}$	.4 $\pm .05$	C	W	—
12.5 $\begin{smallmatrix} +1 \\ -0.5 \end{smallmatrix}$	.5 $\pm .05$	P	—	—

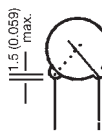
Finishing

Diam ≤ 9 (0.354) and
F = 5.00 (0.197)



Coating does not
surpass the bend

For every other:



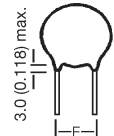
Low Voltage

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 $\begin{smallmatrix} 0.6 \\ (0.024) \end{smallmatrix} \pm \begin{smallmatrix} 0.1 \\ (0.004) \end{smallmatrix}$

I = Epoxy wire diameter $\begin{smallmatrix} 0.8 \\ (0.031) \end{smallmatrix} \pm \begin{smallmatrix} 0.1 \\ (0.004) \end{smallmatrix}$

L = Phenolic wire diameter $\begin{smallmatrix} 0.6 \\ (0.024) \end{smallmatrix} \pm \begin{smallmatrix} 0.1 \\ (0.004) \end{smallmatrix}$

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

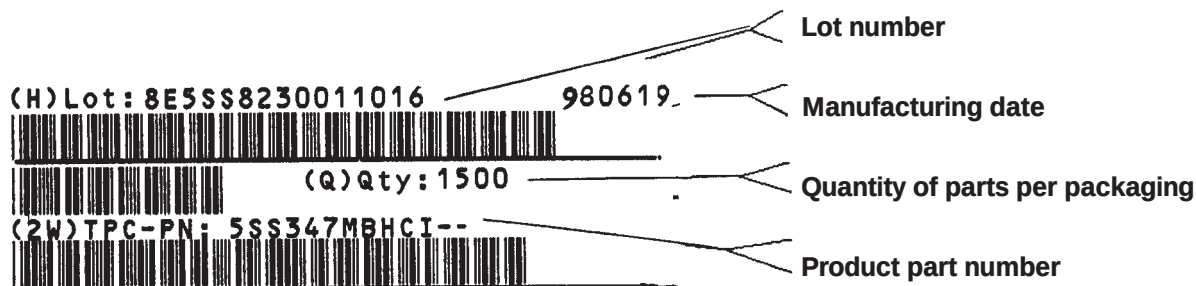
Disc Ceramic Capacitors



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)

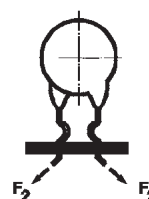
Rated Voltage	Diameter	Lead Space	
(Vr)	D	≤ 5 (0.197)	> 5 (0.197)
Vr ≤ 500V	D ≤ 8 (0.315)	2500	1500
	8 (0.315) ≤ D ≤ 11 (0.433)	1500	-
	8 (0.315) ≤ D ≤ 13 (0.512)	-	1000
	11 (0.433) ≤ D ≤ 15 (0.591)	1000	-
	13 (0.512) ≤ D ≤ 19 (0.748)	-	500
	D ≤ 19 (0.748)	500	-
500V < Vr ≤ 2KV	D ≤ 9 (0.354)	1500	1000
	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.

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



Crimped leads



Maximum pull force during insertion and lead cut

	F_1	F_2
$4 \text{ (0.157)} \leq D < 6 \text{ (0.236)}$	12N	20N
$D \geq 6 \text{ (0.236)}$	20N	25N

TPC Code Digit 11

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

Disc Ceramic Capacitors

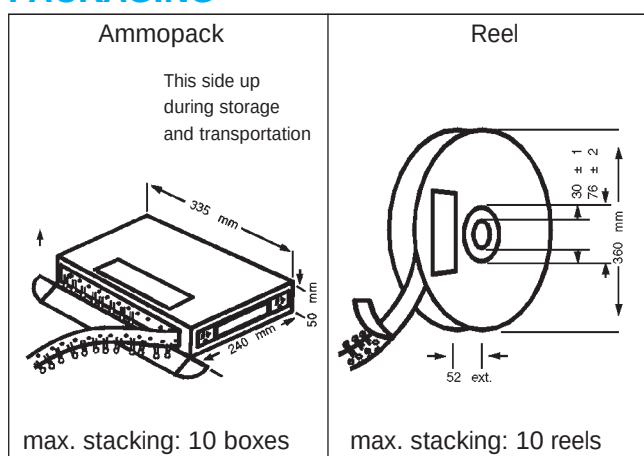


Tape and Reel Specifications

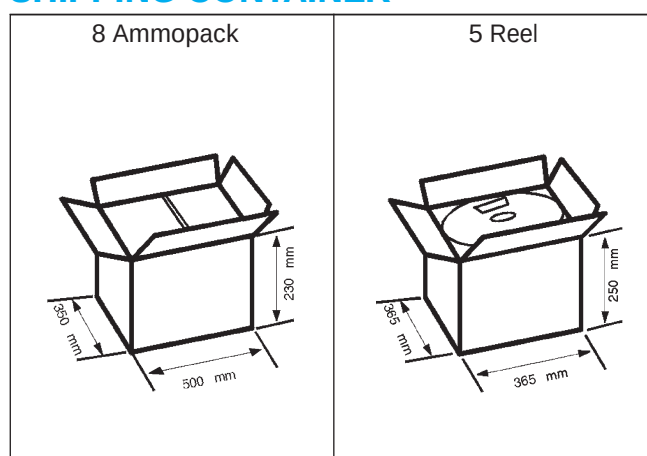
millimeters (inches)

Description of Symbols		Straight Leads		Crimped
		Figure 1		Figure 2 & 3
		A (Avisert)	P (Panaset)	Avisert & Panaset
Crimp angle	∞	—	—	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	Δh	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.	$\begin{matrix} >23.5 \\ <32.25 \end{matrix}$	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



SHIPPING CONTAINER



Disc Ceramic Capacitors



Marking

DIG. 2		Logo: Only in diam. ≥ 6mm	Capacitance		EIA
O					
TC / Class					
General Purpose	Professional				
A = NP0 / I	A = NP0 / I		1pF = 109	100pF = 101	
*B = P100 / I	B = P100 / I		1.2pF = 129	120pF = 121	
*C = N150 / I	C = N150 / I		1.5pF = 159	150pF = 151	
*D = N220 / I	D = N220 / I		1.8pF = 189	180pF = 181	
*E = N330 / I	E = N330 / I		2.2pF = 229	220pF = 221	
*F = N470 / I	F = N470 / I		2.7pF = 279	270pF = 271	
G = N750 / I	G = N750 / I		3.9pF = 399	390pF = 391	
H = N1500 / I	H = N1500 / I		4.7pF = 479	470pF = 471	
*I = N2200 / I	I = N2200 / I		5.6pF = 569	560pF = 561	
*J = N4700 / I	J = N4700 / I		6.8pF = 689	680pF = 681	
K = SL	7 = Y5U / SM	8.2pF = 829	820pF = 821		
M = Y5E / II	8 = Y5V / SM	10pF = 100	1nF = 102		
N = Y5F / II	L = Y5P / SM	12pF = 120	1.2nF = 122		
O = Y5P / II	M = X5E / II	15pF = 150	1.8nF = 182		
P = Y5R / II	N = X5F / II	18pF = 180	2.2nF = 222		
Q = Y5T / II	O = X5P / II	22pF = 220	2.7nF = 272		
S = Y5U / II	P = X5R / II	27pF = 270	3.9nF = 392		
T = Y5V / II	Q = X5T / II	39pF = 390	4.7nF = 472		
U = Z5V / II	S = X5U / II	47pF = 470	5.6nF = 562		
V = Z4V / III	T = X5V / II	56pF = 560	6.8nF = 682		
*W = Y5P / II	U = Z5V / II	68pF = 680	8.2nF = 822		
*X = Y5R / II	V = Z4V / III	82pF = 820	10nF = 103		
Y = Y5U / II	W = Y5P / III		15nF = 153		
Z = Y5V / II	X = Y5R / III		22nF = 223		
	Y = Y5U / III		33nF = 333		
	Z = Y5V / III		47nF = 473		
			100nF = 104		
			200nF = 204		

DIG. 3	DIG. 7
Q	M
Rated Voltage	Tolerance
D = 16V	C = ±0.25pF
F = 25V	D = ±0.5pF
H = 50V	J = ±5%
K = 100V	K = ±10%
Q = 500V	M = ±20%
R = 1000V	S = -20 +50%
S = 2000V	Z = -20 +80%
T = 3000V	P = 0 +100%

*Upon Request

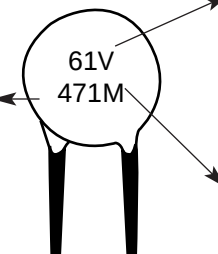
*Upon Request

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)

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Kyocera AVX:

[5AR150JEBCA](#) [5PR103MWMCE](#) [5AR2R7CEACA](#) [5AK101KEFAA](#) [5AR4R7CEBCI](#) [5AT330MEFCA](#) [5HK151JXDAE](#)
[5HK220KEAAA](#) [5HK470KEAAA](#) [5PR103MUMCE](#) [5AQ220KABAA](#) [5AR101JEFCF](#) [5AK2R2CAAAI](#) [5AR200JEDCE](#)
[5AK121KAFJI](#) [5AK220KABJI](#) [5AK270KABJI](#) [5AK330KOBAM](#) [5AK680JAEJH](#) [5AQ470KODAM](#) [5HQ470JAAAI](#)