

---

# Contents

---

	Page
• <i>Selection Guide</i>	02
• <i>Manufacturing process</i>	03/04
• <i>General specifications</i>	05
• <i>Temperature Coefficient curves</i>	06
• <i>Packaging</i>	07
• <i>Marking</i>	08
• <i>Taping specifications</i>	09/10
• <i>How to order</i>	11/12
• <i>Class I and SL specifications</i>	13/17
• <i>Class II specifications</i>	18/20
• <i>Class III specifications</i>	21/22
• <i>Safety ceramic capacitors/applications</i>	23/25
• <i>AC and Switch Mode</i>	26/27
• <i>Professional Capacitors</i>	28/33
• <i>Sales Subsidiaries</i>	34

# Selection Guide

General Purpose			Professional Application			Class	(DC) Voltage	Capacitance		Tolerance	R <sub>isol</sub> Min.
Ref	TC	Pag	Ref	TC	Pag			C <sub>R</sub> (min. ~ máx.)			
5WF 5YF	Y5P Y5U	21	6WF 6YF	Y5P Y5U	32	III	25V	4,7nF 4,7nF	100nF 200nF	± 20% / - 20 + 50% - 20 + 80%	1... 12 M Ω
5WH 5YH	Y5P Y5U	21	6WH 6YH	Y5P Y5U	32	III	50V	4,7nF 4,7nF	100nF 100nF	± 20% / - 20 + 50% - 20 + 80%	1... 12 M Ω
5ZH	Y5V	21	6ZH	Y5V	32	III	50V	4,7nF	100nF	- 20 + 80%	100 M Ω
5AK 5GK 5HK	NPO N750 N1500	13	6AK 6GK 6HK	NPO N750 N1500	28	I	100V	1,0pF 1,5pF 6,0pF	180pF 270pF 330pF	C <sub>R</sub> < 10pF → ± 0,25pF / ± 0,5pF C <sub>R</sub> ≥ 10pF → ± 5% / ± 10%	10 G Ω
5MK 5NK 5OK 5SK 5TK 5UK	Y5E Y5F Y5P Y5U Y5V Z5V	18	6MK 6NK 6OK 6SK 6TK 6UK	X5E X5F X5P X5U X5V Z5V	28	II	100V	56pF 390pF 470pF 680pF 1,2nF 4,7nF	3,3nF 4,7nF 6,8nF 12nF 22nF 22nF	± 10% / ± 20% ± 10% / ± 20% ± 10% / ± 20% ± 20% / - 20 + 50% - 20 + 50% - 20 + 50%	10 G Ω
5AQ 5GQ 5HQ	NPO N750 N1500	13	6AQ 6GQ 6HQ	NPO N750 N1500	28	I	500V	1,0pF 1,5pF 6,0pF	330pF 330pF 330pF	C <sub>R</sub> < 10pF → ± 0,25pF / ± 0,5pF C <sub>R</sub> ≥ 10pF → ± 5% / ± 10%	10 G Ω
5MQ 5NQ 5OQ 5SQ 5TQ	Y5E Y5F Y5P Y5U Y5V	18	6MQ 6NQ 6OQ 6SQ 6TQ	X5E X5F X5P X5U X5V	28	II	500V	56pF 390pF 470pF 680pF 1,2nF	3,3nF 4,7nF 6,8nF 12nF 22nF	± 10% / ± 20% ± 10% / ± 20% ± 10% / ± 20% ± 20% / - 20 + 50% - 20 + 50%	10 G Ω
5AR 5AS 5AT 5AU 5GR 5GS 5GT 5GU 5GW	NPO NPO NPO NPO N750 N750 N750 N750 N750	13				I	1kV 2kV 3kV 4kV 1kV 2kV 3kV 4kV 5kV	3,9pF 3,9pF 3,9pF 4,7pF 6,8pF 6,8pF 6,8pF 12pF 12pF	180pF 150pF 120pF 100pF 270pF 270pF 220pF 120pF 100pF	C <sub>R</sub> < 10pF → ± 0,25pF / ± 0,5pF C <sub>R</sub> ≥ 10pF → ± 5% / ± 10%	10 G Ω
5NR 5NS 5NT 5SR 5SS 5ST 5SU 5SW 5TR 5TS 5TT	Y5F Y5F Y5F Y5U Y5U Y5U Y5U Y5U Y5V Y5V Y5V	18				II	1kV 2kV 3kV 1kV 2kV 3kV 4kV 5kV 1kV 2kV 3kV	100pF 100pF 100pF 330pF 330pF 390pF 100pF 100pF 820pF 1,0nF 1,2nF	3,9nF 3,9nF 3,9nF 15nF 10nF 10nF 6,8nF 4,7nF 22nF 15nF 10nF	± 10% / ± 20% ± 10% / ± 20% ± 10% / ± 20% ± 20% / - 20 + 50% ± 20% / - 20 + 50% ± 20% / - 20 + 50% ± 20% / - 20 + 50% ± 20% / - 20 + 50% - 20 + 50% - 20 + 50% - 20 + 50%	10 G Ω
61V 62O 65N	—	23				II	SAFETY	33pF 33pF 220pF	4,7nF 4,7nF 4,7nF	± 20% / - 20 + 50%	10 G Ω
6LR 6LS 6LT	Y5P Y5P Y5P	26				II	1kV 2kV 3kV	220pF 220pF 220pF	3,9nF 3,9nF 3,9nF	± 10% / ± 20% / 20 + 50%	10 G Ω
67S 68S	Y5U Y5V	26				II	2kV	1000pF 4,7nF	4,7nF 10nF	± 20% / - 20 + 50% - 20 + 50%	10 G Ω
5KK 5KQ	P350... ...N1500	16				SL	100V 500V	1,0pF	1000pF	C <sub>R</sub> < 10pF → ± 0,25pF / ± 0,5pF C <sub>R</sub> ≥ 10pF → ± 5% / ± 10% / ± 20%	10 G Ω

TAPING

pag 7

# Manufacturing Process



TPCAM0198

# General Specifications

## Temperature coefficient - Class I and SL

## General purpose and professional

DIG. 1e2		T.C. (ppm) = $10^{-6} \text{ } ^\circ\text{C}^{-1}$	Tolerance (ppm)				Ageing $\Delta C/C / \log(10\text{hours})$
			$\leq 2\text{pF}$	$2\text{pF} < \dots \leq 3\text{pF}$	$3\text{pF} < \dots \leq 10\text{pF}$	$\geq 10\text{pF}$	
5B	* P100	+ 100 ppm	$\pm 250$	$\pm 120$	$\pm 60$	$\pm 30$	0 <i>typical</i>
5A	NPO	0 ppm	$\pm 250$	$\pm 120$	$\pm 60$	$\pm 30$	0 <i>typical</i>
5C	* N150	- 150 ppm	$\pm 250$	$\pm 120$	$\pm 60$	$\pm 30$	0 <i>typical</i>
5D	* N220	- 220 ppm	$\pm 250$	$\pm 120$	$\pm 60$	$\pm 30$	0 <i>typical</i>
5E	* N330	- 330 ppm	$\pm 250$	$\pm 120$	$\pm 60$	$\pm 60$	0 <i>typical</i>
5F	* N470	- 470 ppm	$\pm 250$	$\pm 120$	$\pm 80$	$\pm 80$	0 <i>typical</i>
5G	N750	- 750 ppm	$\pm 250$	$\pm 120$	$\pm 120$	$\pm 120$	-0,1% <i>typical</i>
5H	N1500	- 1500 ppm	$\pm 250$	$\pm 250$	$\pm 250$	$\pm 250$	-0.2% <i>typical</i>
5K	SL	+ 350... - 1500 ppm	$\pm 250$	$\pm 250$	$\pm 250$	$\pm 250$	-0.5% <i>typical</i>

## Temperature coefficient - Class II and III

## General purpose

DIG. 1 e 2		Temperature range		Capacitance deviation typical	Reference Curve	Ageing $\Delta C/C / \log(10\text{hours})$
Class II	Class III	Class II	Class III			
5M		- 30... + 85° C		$\pm 5\%$	Y5E	-1,5% <i>typical</i>
5N		- 30... + 85° C		$\pm 8\%$	Y5F	-1,5% <i>typical</i>
5O	5W	- 30... + 85° C	- 30... + 85° C	$\pm 12\%$	Y5P	-2,0% <i>typical</i>
5S	5Y	- 30... + 85° C	- 30... + 85° C	+ 30 - 65%	Y5U	-3,5% <i>typical</i>
5T	5Z	- 30... + 85° C	- 30... + 85° C	+ 30 - 85%	Y5V	-5% <i>typical</i>
5U		+ 10... + 85° C		+ 22 - 85%	Z5V	-5% <i>typical</i>

## Temperature coefficient - Class II and III

## Professional

DIG. 1 e 2		Temperature range		Capacitance deviation	Reference curve		Ageing $\Delta C/C / \log(10\text{hours})$
Class II	Class III	Class II	Class III		Class II	Class III	
6M		- 55... + 85° C		$\pm 5\%$	X5E		-1,5% <i>typical</i>
6N		- 55... + 85° C		$\pm 8\%$	X5F		-1,5% <i>typical</i>
6O	6W	- 55... + 85° C	- 30... + 85° C	$\pm 12\%$	X5P	Y5P	-2,0% <i>typical</i>
6S	6Y	- 55... + 85° C	- 30... + 85° C	+ 30 - 65%	X5U	Y5U	-3,5% <i>typical</i>
6T	6Z	- 55... + 85° C	- 30... + 85° C	+ 30 - 85%	X5V	Y5V	-5% <i>typical</i>
6U		+ 10... + 85° C		+ 22 - 85%	Z5V		-5% <i>typical</i>

### Recommended Shelf Conditions

45° C	(max)
10° C	(min)
60 % relative humidity	(max)
2 years	(max)

### Inspection level : II

Electrical	NQA AQL : 0,1%
Visual	NQA AQL : 1%

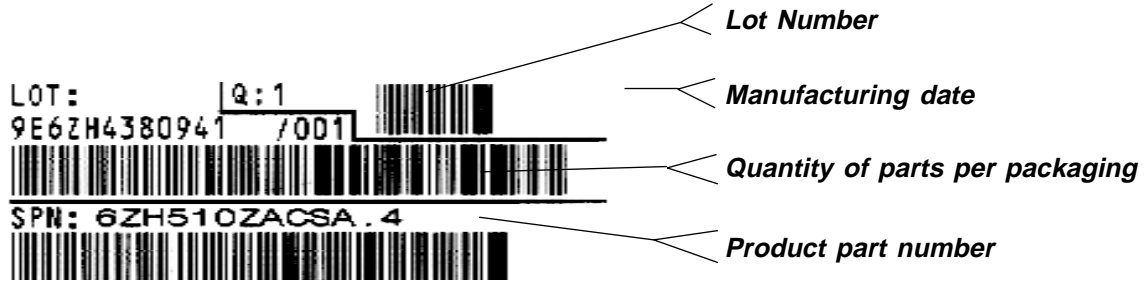
### For Safety Parts:

AQL	Electrical	Visual
Level II	0,065%	0,065%

# Packaging

## Identification and traceability:

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



## Taped parts quantity table:

Rated Voltage (Ur)	Diameter D (mm)	Quantities	
		Ammopack	Reel
Ur <= 500V	D<=7	2000	2500
	7<D<=11	1500	2000
500V<Ur<=2KV	D<=11	1000	2000
2KV<Ur<=5KV	D<=11		1500

## Cardboard strips quantity table:

Rated Voltage (Ur)	Diameter D (mm)	Lead Space	
		< = 5 mm	> 5 mm
Ur <= 500V	D<=8	2500	1500
	8<D<=11	1500	-
	8<D<=13	-	1000
	11<D<=15	1000	-
	13<D<=19	-	500
	D=19	500	-
500V<Ur<=2KV	D<=9	1500	1000
	9<D<=11	-	1000
	9<D<=13	1000	-
	11<D<=19	-	500
	13<D<=19	500	-
2KV<Ur<=5KV Safety 65N 62O	D<=9	1500	-
	D<=11	-	1000
	D>=13	500	500
Safety 61V	D<=6	1500	1500
	7<=D<=9	1000	1000
	9<D	500	500

TPCAM0198

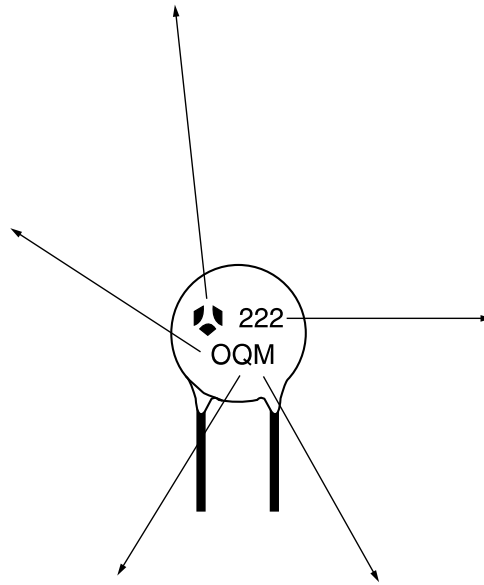
Quantities for other package alternative, upon request.

# Marking

## EX: 50Q322MAEAA

<b>DIG. 2</b>	
O	
TC / Class	
<b>General Purpose</b>	<b>Professional</b>
A = NPO / I	A = NPO / 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 8 = Y5V / SM L = Y5P / SM
M = Y5E / II N = Y5F / II O = Y5P / II P = Y5R / II Q = Y5T / II S = Y5U / II T = Y5V / II U = Z5V / II V = Z4V / II	M = X5E / II N = X5F / II O = X5P / II P = X5R / II Q = X5T / II S = X5U / II T = X5V / II U = Z5V / II V = Z4V / II
* W = Y5P / III * X = Y5R / III Y = Y5U / III Z = Y5V / III	W = Y5P / III X = Y5R / III Y = Y5U / III Z = Y5V / III
*	

logo: only in diam. ≥ 6mm



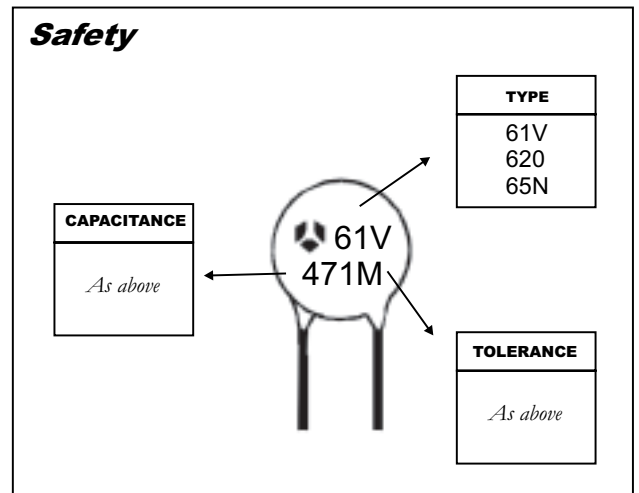
Capacitance	EIA
1pF = 109	100pF = 101
1,2pF = 129	120pF = 121
1,5pF = 159	150pF = 151
1,8pF = 189	180pF = 181
2,2pF = 229	220pF = 221
2,7pF = 279	270pF = 271
3,9pF = 399	390pF = 391
4,7pF = 479	470pF = 471
5,6pF = 569	560pF = 561
6,8pF = 689	680pF = 681
8,2pF = 829	820pF = 821
10pF = 100	1nF = 102
12pF = 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

<b>DIG. 3</b>
Q

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

<b>DIG. 7</b>
M

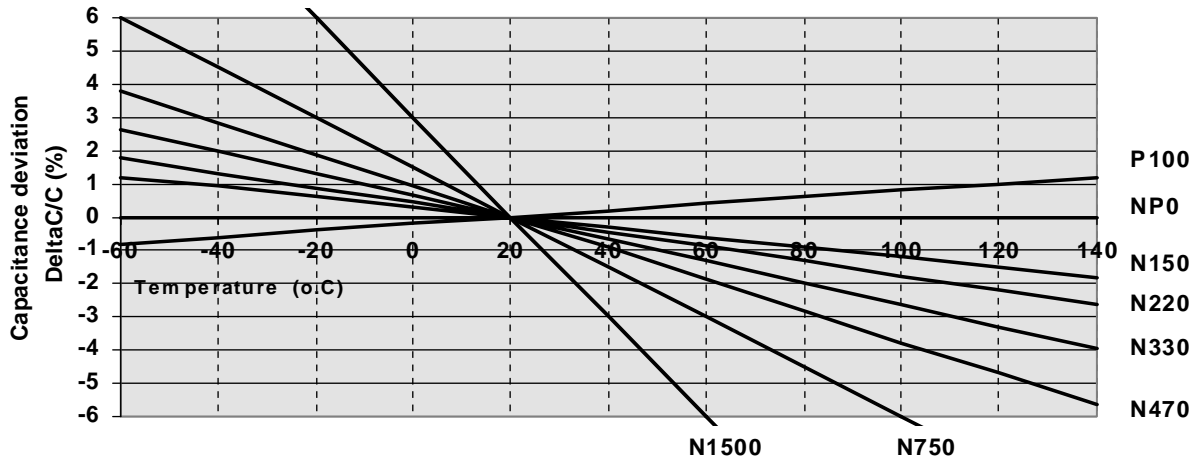
<b>Tolerance</b>
C = ± 0,25 pF
D = ± 0,5 pF
J = ± 5%
K = ± 10%
M = ± 20%
S = -20 + 50%
Z = -20 + 80%
P = 0 + 100%



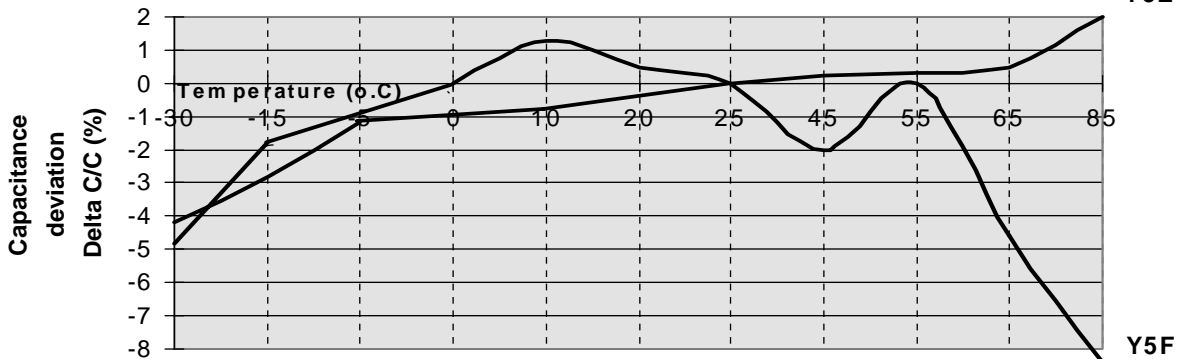
TC — Temperature coefficient.  
DIG — for better understanding, check pages 9 and 10.

# Temperature Coefficient . Typical Curves

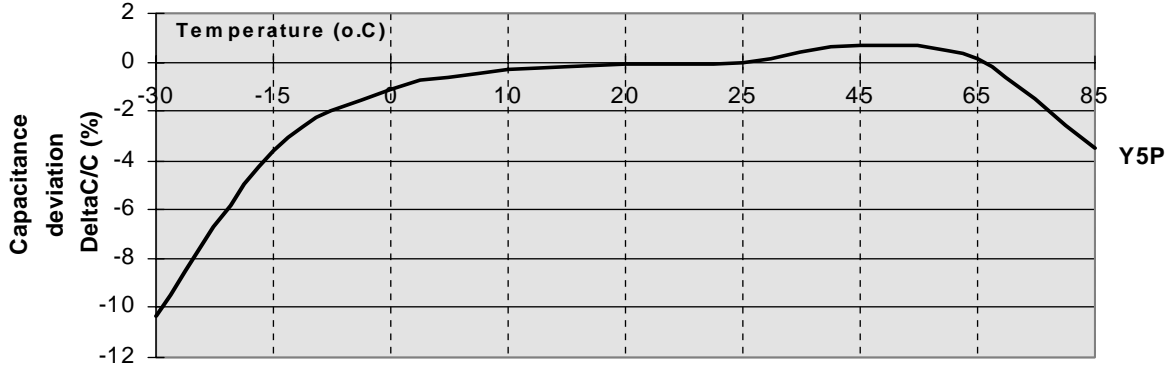
## Class I



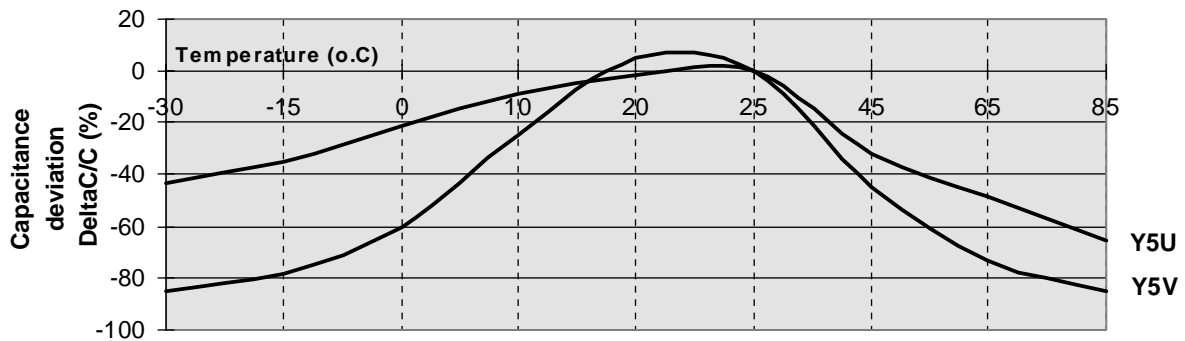
## Class II



## Class II / III



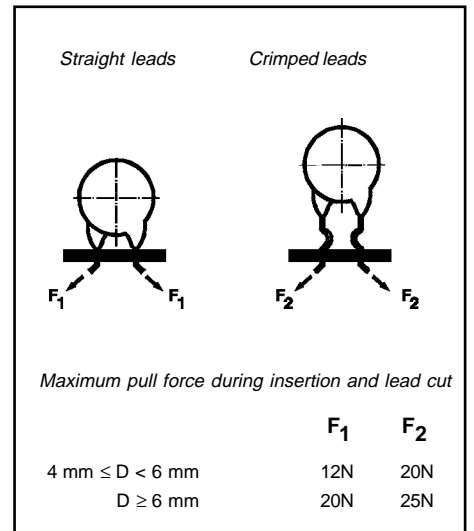
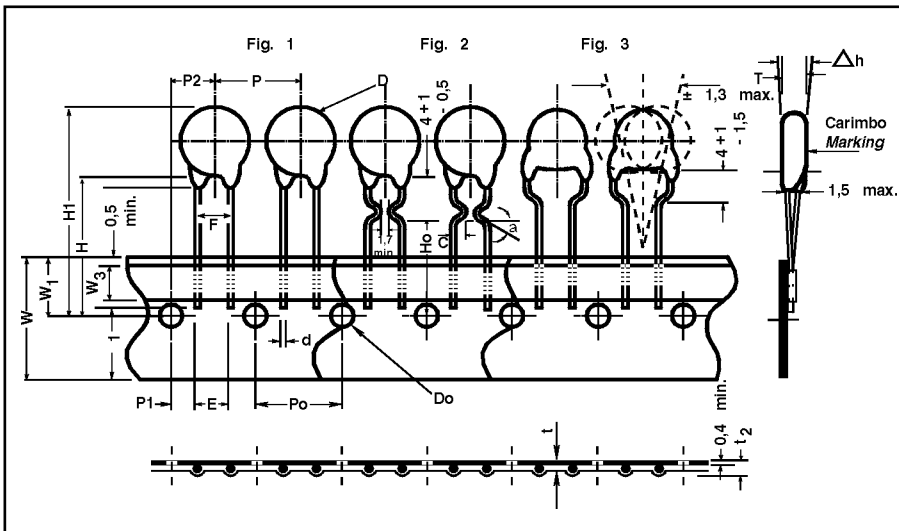
## Class II / III



# 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 ammpack.  
 The standard packaging quantities are shown below:

IEC-286(1985)



Digit 11	Available Tapings	Digit 9
L M	➔ Sizes	4 mm ≤ D ≤ 11 mm A... H
J H K I	➔ Sizes	6 mm ≤ D ≤ 11 mm C... H

	Digit 11					
	Thomson Code					
<b>Packaging</b>	AVISERT			PANASERT		
<b>Reel</b>	 H Fig. 1	 L Fig. 2	 L Fig. 3	 J Fig. 1	 L Fig. 2	 L Fig. 3
<b>Ampmpack</b>	 I Fig. 1	 M Fig. 2	 M Fig. 3	 K Fig. 1	 M Fig. 2	 M Fig. 3

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

Fig. 3: Outside Crimp 1000V...

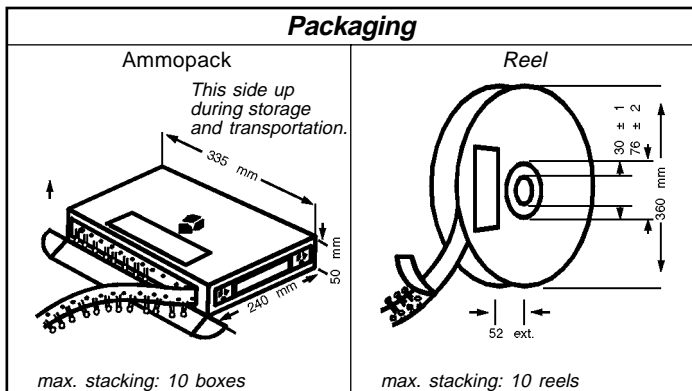
TPCAM0198

# Tape and Reel Specifications

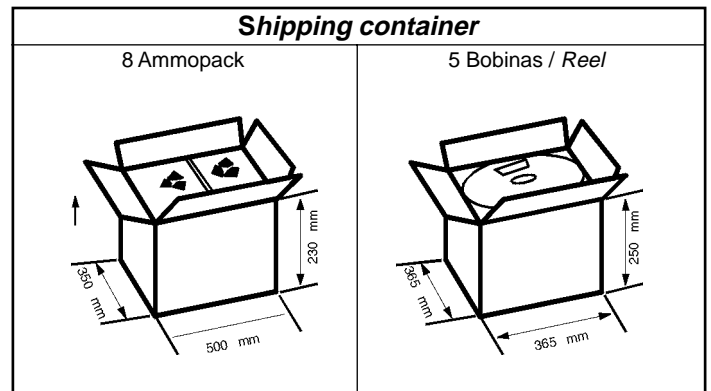
(Measurements in mm)

Description of symbols		Straight leads		Crimped
		Fig 1		Fig 2 e/and 3
		A (Avisert)	P (Panaset)	Avisert e 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 Catalogue		
Lead spacing	F	5,0 <sup>+ 0,6</sup> - 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 <sup>+ 1</sup> - 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		
Passo entre furos	Po	12,7 ± 0,3		
Centralização dos furos em relação ao fio	P1	3,85 ± 0,7		
Centralização dos furos em relação aos discos	P2	6,35 ± 1		
Espessura fita suporte + fita adesiva	t	0,7 ± 0,2		
Espessura total da fita, terminal incluso	t <sub>2</sub>	1,5 max.		

## Packaging



## Shipping container



# How to Order

## EX: 5OQ322MAEAA

DIG. 1		DIG. 2		DIG. 3		DIG. 4		DIG. 5		DIG. 6			
5		O		Q		3		2		2			
<b>General Purpose</b>		<b>Professional Switch Mode Safety</b>		<b>Rated Voltage</b>		<b>Capacitance</b> <span style="float: right;"><b>322 = 2,2 X 10<sup>3</sup> pF</b></span>							
5A = NPO / 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		6A = NPO / 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		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 = TPC code 1 pF = 010 1,2pF = 012 1,5pF = 015 1,8pF = 018 2,2pF = 022 2,7pF = 027 3,9pF = 039 4,7pF = 047 5,6pF = 056 6,8pF = 068 8,2pF = 082		Capacitance = TPC code 100pF = 210 120pF = 212 150pF = 215 180pF = 218 220pF = 222 270pF = 227 330pF = 233 390pF = 239 470pF = 247 560pF = 256 680pF = 268 820pF = 282		10pF = 110 12pF = 112 15pF = 115 18pF = 118 22pF = 122 27pF = 127 33pF = 133 39pF = 139 47pF = 147 46pF = 156 68pF = 168 82pF = 182		1nF = 310 1,2nF = 312 1,8nF = 318 2,2nF = 322 2,7nF = 327 3,3nF = 333 3,9nF = 339 4,7nF = 347 5,6nF = 356 6,8nF = 368 8,2nF = 382	
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 / II		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 / II		* Upon Request									
5W = Y5P / III 5Y = Y5U / III 5Z = Y5V / III		6W = Y5P / III 6Y = Y5U / III 6Z = Y5V / III								10nF = 510 200nF = 520			

TPCAM0198

# How to Order

<b>DIG. 7</b>	<b>DIG. 8</b>	<b>DIG. 9</b>	<b>DIG. 10</b>	<b>DIG. 11</b>
<b>M</b>	<b>A</b>	<b>E</b>	<b>A</b>	<b>A</b>

Tolerance
C = ± 0,25 pF D = ± 0,5 pF
J = ± 5% K = ± 10% M = ± 20% S = -20+50% Z = -20+80% P = 0+100%

Lead Forming				
mm	Inches	Code		
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	—	—

Capacitor Diameter ± 2 mm
A = 4 mm B = 5 mm C = 6 mm D = 7 mm E = 8 mm F = 9 mm G = 10 mm H = 11 mm J = 13 mm K = 15 mm M* = 19 mm

\* Recomendado fio 0,3mm / Wire 0,3mm recommended

## Finishing

**Low Voltage**

Diam < 9mm e / and  
F = 5.00 mm

Para qualquer outro tipo:  
For every other:

RESINA NÃO ULTRAPASSA A DOBRA  
COATING DOES NOT SURPASS THE BEND

1,5 mm max.

A = (General Phenolic) Purpose Q = Waxed phenolic

S = Epoxy (Professional) cap. diameter ≤ 8mm

D = Epoxy (Professional) cap. diameter > 8mm

**High Voltage**

3,0 mm max.

F = Measured from the center of leads

C = Epoxy wire diameter 0,6mm ± 0,1mm

I = Epoxy wire diameter 0,8mm ± 0,1mm

L = Fenólica diâmetro fio 0,6mm ± 0,1mm  
Phenolic wire diameter

A = Cardboard strips

**Taping**

	AVISERT			PANASERT		
<b>Bulk</b>	H	L	L	J	L	L
free wire lead length (mm)	I	M	M	K	M	M
E 5 ± 1						
C 10 ± 1						

PLEASE NOTE THAT NOT ALL CODE COMBINATIONS ARE EITHER POSSIBLE OR AVAILABLE.

TPCAM0198

## General Specifications - Class I

## General Purpose

≤ 1 KV PHENOLIC COATED  
≥ 2 KV EPOXY COATED

### 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.

### 100V ... 500V

#### Technical characteristics Class I

IEC 384-8/1988

	1,0 MHz / 1,0 Vef / 25° C		Measured at
	$C_R \leq 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10 \times \left( \frac{10}{C_R} + 0,7 \right)$ $C_R > 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10$		Dissipation Factor (x 10 <sup>-4</sup> )
	$C_R < 10 \text{ pF} \rightarrow \pm 0,25 \text{ pF} / \pm 0,5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\% / \pm 10\%$		Tolerance
	@ U <sub>R</sub> → ≥ 10 G Ω		Insulation resistance
	Entre terminais e entre o corpo e os terminais	$U_R = 100V \rightarrow U_t = 250V \text{ (DC)}$ $U_R = 500V \rightarrow U_t = 1,25kV \text{ (DC)}$	Between leads and body insulation
	- 30... + 85		Operating temperature range(°C)
	30 / 085 / 21 Phenolic coated		Climatic category

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

### 1kV ... 5kV

#### Technical characteristics Class I

IEC - 384-8/1988

	1,0 MHz / 1,0 Vef / 25° C		Measured at
	$C_R \leq 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10 \times \left( \frac{10}{C_R} + 0,7 \right)$ $C_R > 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10$		Dissipation Factor (x 10 <sup>-4</sup> )
	$C_R < 10 \text{ pF} \rightarrow \pm 0,25 \text{ pF} / \pm 0,5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\% / \pm 10\%$		Tolerance
	@ 500V → ≥ 10 G Ω		Insulation resistance
	Entre terminais e entre o corpo e os terminais	1,5 x U <sub>R</sub> +500 (DC)	Between leads and body insulation
	- 30... + 85 Phenolic Coated - 30... + 125 Epoxy Coated		Operating temperature range(°C)
	30 / 085 / 21 Phenolic Coated - 30 / 085 / 56 Epoxy Coated		Climatic category

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

**Dimension Table - Class I  
Low and medium voltage**

PHENOLIC COATED

**Class I**

Temp. Coefficient Digits 1,2,3	NPO		N750		N1500	
	5AK	5AQ	5GK	5GQ	5HK	5HQ
Rated voltage Marking	(U <sub>R</sub> )	100	500	100	500	100
	C <sub>R</sub> (pF)					
109	1,0	A	A	A	A	A
129	1,2					
159	1,5					
189	1,8					
209	2,0					
229	2,2					
279	2,7					
309	3,0					
339	3,3					
399	3,9					
409	4,0					
479	4,7					
509	5,0					
569	5,6					
609	6,0					
689	6,8					
709	7,0					
809	8,0					
829	8,2					
909	9,0					
100	10	A	A	A	A	A
120	12					
150	15					
180	18					
200	20					
220	22					
270	27					
330	33					
390	39					
470	47					
500	50					
560	56					
680	68					
820	82					
101	100					
121	120					
151	150					
181	180					
221	220					
271	270					
331	330					



TPCAM0198

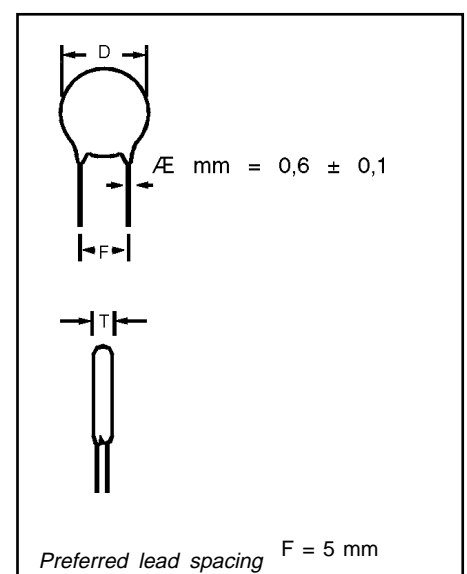
=Diameter (φ) - 9th Part Number Digit

**Dimensions**

Digit 9 (φ)	D ± 2 (mm)	T máx. (mm)	Available Lead Spacing
A <sup>NPO</sup> <sub>1pF...2,7 pF</sub>	4,0	3,0	A,B,D,E,O,R
A <sup>N1500</sup> <sub>5,6 pF...8,2 pF</sub>	4,0	3,0	A,B,D,E,O,R
A <sup>Outros</sup> <sub>Others</sub>	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X
F	9,0	3,0	A,B,C,E,O,R,X
G	10,0	3,0	A,B,C,E,O,R,X
H	11,0	3,0	A,B,C,E,O,R,W
J	13,0	3,5	B,C,R,W
K	15,0	3,5	B,C,R,W
M	19,0	4,0	B,C

(E), (X), (W): sob consulta / upon request

Lead Spacing		Digit 8	
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W



1 KV PHENOLIC COATED  
≥ 2 KV EPOXY COATED

Class I

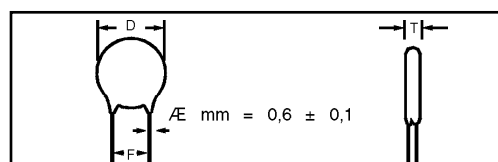
Temperature coefficient		NPO				N750				
Digits 1, 2, 3		5AR	5AS	5AT	5AU	5GR	5GS	5GT	5GU	5GW
Rated voltage (U <sub>R</sub> )	DC AC	1000 130	2000 250	3000 380	4000 440	1000 130	2000 250	3000 380	4000 440	5000 500
Carimbo / Marking										
	C <sub>R</sub> (pF)									
399	3,9	A				Use NPO				
409	4,0									
479	4,7									
509	5,0									
569	5,6									
609	6,0	B		C						
689	6,8									
709	7,0									
809	8,0									
829	8,2									
909	9,0	C		D	E					
100	10									
120	12									
150	15									
180	18									
200	20	D		E	G			E		
220	22									
270	27									
330	33									
390	39									
470	47	E		F	H	C	D		H	
500	50									
560	56									
680	68									
820	82									
101	100	F		H	J	D			K	
121	120									
151	150									
181	180									
221	220									
271	270	H	J	M		F	H		M	
		J	K			H	J			
		M				J	K			

Dimensions

= Diametro (ϕ) - 9th Part Number Digit

Digit 9 (ϕ)	D±2 (mm)	T max (mm)	Disponível / Available Lead Spacing			
			Un = 1000V	Un = 2000V	Un = 3000V	Un=4000/5000V
A	4,0	3,0	A,B,E,N,R	A,B,E,N,R	B,E	
B	5,0	3,0	A,B,E,N,R,X	A,B,E,N,R	B,E	
C	6,0	3,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
D	7,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
E	8,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
F	9,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
G	10,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
H	11,0	5,0	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	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W	C,P
K	15,0	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W	C,P
M	19,0	7,0	B,C,P	B,C,P	B,C,P	C,P

Lead Spacing		Digit 8		
F				
mm	Inches			
5	.2	A	—	N
6	.25	E	X	—
7,5	.3	B	R	Q
10	.4	C	W	—
12,5	.5	P	—	—



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

**Capacitors - Class SL**

*These capacitors have low loss factor and smaller sizes than standard Class I capacitors.*

*They are specially designed to be smaller alternative to standard Class I capacitors of linear temperature coefficient.*

*Typical application is RF tuning and decoupling.*

**Technical characteristics**

IEC 384-8/1988

$C_R \leq 100 \text{ pF} \rightarrow 1 \text{ Mhz} / 1,0 \text{ Vef} / 25^\circ \text{C}$ $C_R > 100 \text{ pF} \rightarrow 1 \text{ KHz} / 0,3 \text{ Vef} / 25^\circ \text{C}$		Measured at	
$C_R \leq 100 \text{ pF} \dots 1 \text{ Mhz} / 1 \text{ Vef} / 25^\circ \text{C} \rightarrow \text{tg } \delta < 25 \times 10^{-4}$ $C_R > 100 \text{ pF} \dots 100 \text{ KHz} / 0,3 \text{ Vef} / 25^\circ \text{C} \rightarrow \text{tg } \delta < 100 \times 10^{-4}$ $C_R > 100 \text{ pF} \dots 1 \text{ KHz} / 0,3 \text{ Vef} / 25^\circ \text{C} \rightarrow \text{tg } \delta < 25 \times 10^{-4}$		tan $\delta$	
$C_R < 10 \text{ pF} \rightarrow \pm 0,25 \text{ pF} / \pm 0,5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\% / \pm 10\% / \pm 20\%$		Tolerance	
+ 350 ppm ... - 1500 ppm (P350 ... N1500)		Temperature coefficient	
@ $U_R \rightarrow \geq 10 \text{ G } \Omega$		Insulation resistance	
	$U_R = 100 \text{ V} \rightarrow U_t = 250 \text{ V (DC)}$ $U_R = 500 \text{ V} \rightarrow U_t = 1,25 \text{ kV (DC)}$	Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
- 30... + 85		Operating temperature range ( $^\circ \text{C}$ )	
30 / 085 / 21		Climatic category	

TPCAM0198

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



**Dimension Table - SL**

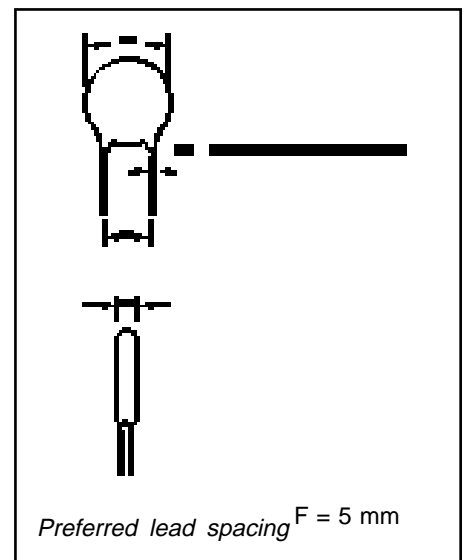
**PHENOLIC COATED**

<b>Temperature Coefficient</b>			
<i>Digits 1,2,3</i>		<b>5KK</b>	
<i>Rated Voltage</i>		<b>5KQ</b>	
AC		(U <sub>R</sub> ) DC	100
C <sub>R</sub> (pF)		50	100
<i>Marking</i>			
109	1,0	A	A
159	1,5		
229	2,2		
339	3,3		
479	4,7		
569	5,6		
829	8,2		
100	10		
120	12		
150	15		
180	18		
220	22		
330	33		
470	47		
560	56		
680	68		
820	82		
101	100		
151	150		
181	180		
221	220		
271	270		
331	330		
471	470	C	D
561	560		
681	680		
821	820		
102	1000	D	E

**Dimensions**

<i>Dig 9 (£)</i>	<b>D ± 2 (mm)</b>	<b>T máx. (mm)</b>	<b>Available Lead Spacing</b>
A	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X <sup>500</sup>
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X

<b>Lead Spacing</b>		<b>Digit 8</b>	
F			
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W



= Diametro (£) - 9th Part Number Digit

TPCAM0198

## General Specifications - Class II

## General Purpose

≤ 1 kV PHENOLIC COATED  
≥ 2 kV EPOXY COATED

### 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.

### 100V e / and 500V

#### Características técnicas Tipo II / Technical characteristics Class II

IEC 384-9/1988

1,0 KHz / 0,3 Vef / 25° C			Measured at
Y5E / Y5F / Y5P ≤ 250 Y5U / Y5V / Z5V ≤ 300			Dissipation Factor (x 10 <sup>-4</sup> )
Y5E / Y5F / Y5P → ± 10%      Y5E / Y5E / Y5P / Y5U → ± 20% Y5U / Y5V / Z5V → - 20%+ 50% (sob consulta / upon request)			Capacitance tolerance
@ U <sub>R</sub> → ≥ 10 G Ω			Insulation resistance
U <sub>R</sub> = 100V → Ut = 250V (DC) U <sub>R</sub> = 500V → Ut = 1250V (DC)		Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
- 30... + 85			Operating temperature range(°C)
30 / 085 / 21 Phenolic coated			Climatic category

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

### 1kV ... 5kV

#### Technical characteristics Class II

IEC 384-9/1988

1,0 KHz / 0,3 Vef / 25° C			Measured at
Y5F → ≤ 250 Y5U / Y5V ≤ 300			Dissipation Factor (x 10 <sup>-4</sup> )
Y5F → ± 10%/± 20%      Y5U → ± 20%/- 20+ 50% Y5V → - 20 + 50%			Capacitance tolerance
@ 500V → ≥ 10 G Ω			Insulation resistance
Entre terminais e entre o corpo e os terminais	1,5 x U <sub>R</sub> +500 (DC)	Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
- 30... + 85 Phenolic Coated - 30... + 125 Epoxy Coated			Operating temperature range(°C)
30 / 085 / 21 Phenolic coated - 30 / 085 / 56 Epoxy coated			Climatic category

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



1KVPHENOLICCOATED  
≥2KVEPOXYCOATED

Class II

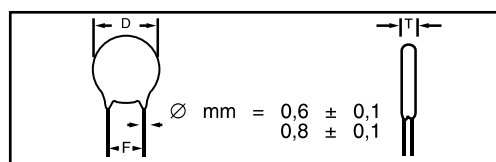
Temperature coefficient			Y5F			Y5U					Y5V		
Digits 1, 2, 3			5NR	5NS	5NT	5SR	5SS	5ST	5SU	5SW	5TR	5TS	5TT
Rated voltage (U <sub>R</sub> )	DC AC	C <sub>R</sub> (pF)	1000	2000	3000	1000	2000	3000	4000	5000	1000	2000	3000
			100	150	150	100	150	150	150	150	100	150	150
Marking													
101		100	A		B	Use Y5F					Use Y5F		
121		120	A		B	Use Y5F					Use Y5F		
151		150	A		B	Use Y5F					Use Y5F		
181		180	A		C	Use Y5F					Use Y5F		
221		220	B		D	Use Y5F					Use Y5F		
271		270	B		D	Use Y5F					Use Y5F		
331		330	B		C	Use Y5F					Use Y5F		
391		390	B	D	E	A	B	E		H	Use Y5U		
471		470	B	D	E	A	B	E		H	Use Y5U		
561		560	C	D	E	A	C	D		Use Y5U			
681		680	C	D	F	A	C	D		Use Y5U			
821		820	D	E	G	B	C		E		H	Use Y5U	
102		1.000	D	F	H	B	C		E		G	A	C
122		1.200	D	F	H	B	C		E		G	A	C
152		1.500	E	G	J	C	E		F	H	J	B	D
182		1.800	F	H	J	C	E		F	H	J	B	D
222		2.200	F	H	J	C	E		F	H	J	B	D
272		2.700	H	J	K	D	F		G	H	J	E	
332		3.300	H	J	K	D	F		G	H	J	E	
392		3.900	J	K	M	E	G		H	J	K	F	
472		4.700	J	K	M	E	G		H	J	K	F	
562		5.600				F	H		K		M	F	H
682		6.800				F	H		K		M	F	H
822		8.200				G	J		M		Use Y5U		
103		10.000				H	K		M		Use Y5U		
123		12.000				H	K		M		Use Y5U		
153		15.000				K	M		M		Use Y5U		
223		22.000				K	M		M		Use Y5U		

Dimensions

= Diametro (φ) - 9th Part Number Digit

Digit 9 (φ)	D±2 (mm)	T max (mm)	Available Lead Spacing			
			Un = 1000V	Un = 2000V	Un = 3000V	Un = 4000/5000V
A	4,0	3,0	A,B,E,N,R	A,B,E,N,R	B,E	
B	5,0	4,0	A,B,E,N,R,X	A,B,E,N,R	B,E	
C	6,0	4,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
D	7,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
E	8,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
F	9,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
G	10,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
H	11,0	5,0	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	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W	C,P
K	15,0	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W	C,P
M	19,0	7,0	B,C,P	B,C,P	B,C,P	C,P

Lead Spacing		Digit 8		
F				
mm	Inches			
5	.2	A	—	N
6	.25	E	X	—
7,5	.3	B	R	Q
10	.4	C	W	—
12,5	.5	P	—	—



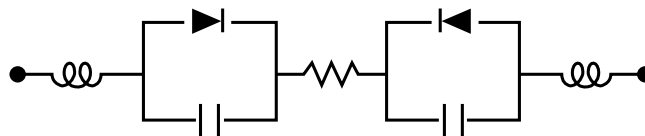
(E), (X), (W): sob consulta / upon request

TPCAM0198

**PHENOLICCOATED**

**Dielectric - Class III**

A thin dielectric layer is grown on a disc of conductive ceramic. Very large capacitances can be obtained due to reduced thickness of this barrier layer and its inherently high dielectric constant. Due its small dimensions, they are a less expensive replacement of multilayer ceramic or poliester capacitors. An equivalent circuit is shown below:



**Technical characteristics Class III**

IEC324/1970

1,0 KHz / 0,1 Vef / 25° C			Mesured at
$C_R \leq 22 \text{ nF} \rightarrow Y5V, Y5U \leq 750$ $C_R > 22 \text{ nF} \rightarrow Y5V, Y5P \leq 500$			D.F. (x 10 <sup>-4</sup> )
Y5P → ± 20% / - 20 + 50% (Sob consulta / upon request) Y5U → - 20 + 80% Y5V → - 20 + 80%			Capacitance tolerance
30 / 085 / 21			Climatic category
Y5P	≥ 12 M Ω		Insulation resistance @ U <sub>R</sub>
Y5U	4.7 nF...100 nF → ≥ 10 M Ω 200 nF → ≥ 1 M Ω		
Y5V	≥ 100 M Ω		
Entre terminais	Ut = 1,25. U <sub>R</sub>	Between leads	Dielectric strength  Note: Charging current limited to 50 mA
Entre os terminais e o corpo	U <sub>R</sub> = 25 v → Ut = 100 v (DC) U <sub>R</sub> = 50 v → Ut = 150 v (DC)	Body insulation	
- 30... + 85			Operating temperature range(°C)

TPCAM0198

**PHENOLICCOATED**



Tipo III / Class III	$\Delta$ C/C (máx.) Range		$\Delta$ C/C (máx.) Range		$\Delta$ C/C (máx.) Range	
	$\pm 12\%$	-30...+ 85°C	+30 - 65%	-30...+ 85°C	+22 - 85%	-30...+ 85°C
Temperature coefficient	<b>Y5P</b>		<b>Y5U</b>		<b>Y5V</b>	
Digits 1, 2, 3	5WF	5WH	5YF	5YH	5ZH	
Rated voltage (U <sub>R</sub> )	25	50	25	50	50	
Marking						
	C <sub>R</sub> (pF)					
472	4.700	A		A		A
103	10.000	C				
223	22.000	D	E	B	C	
333	33.000	E	F	C	D	
473	47.000	G	H	D	E	B
503	50.000		—		F	
683	68.000	H	J			
104	100.000	J	K	E		C
204	200.000	—	—	J	—	

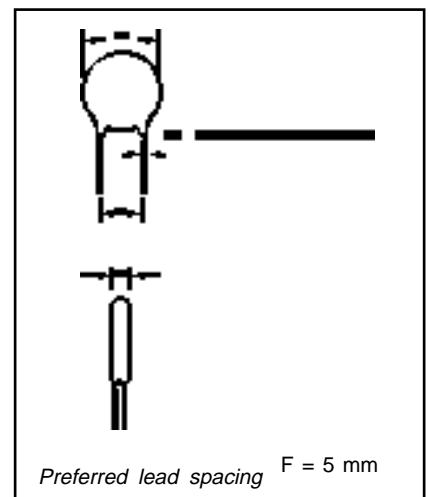
Y5U, Y5V -

= Diametro (¢) - 9th Part Number Digit

**Dimensions**

Digit 9 (¢)	D $\pm$ 2 (mm)	T máx. (mm)	Available Lead Spacing
A	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X
F	9,0	3,0	A,B,C,E,O,R,X
G	10,0	3,0	A,B,C,E,O,R,X
H	11,0	3,0	A,B,C,E,O,R,W
J	13,0	3,5	B,C,R,W
K	15,0	4,0	B,C,R,W

Lead Spacing		Digit 8	
F			
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W



TPCAM0198

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

**EPOXY COATED (UL94-VO)**

**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 4000Vdc*

*Subclass X2: impulses up to 2500Vdc*

*Subclass X3: impulses up to 1200Vdc*

*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 8000Vdc*

*Subclass Y2: impulses up to 5000Vdc*

*Subclass Y3: rated 250Vac without impulses*

*Subclass Y4: impulses up to 2500Vdc*

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

*There are two classes related to the test voltage:*

*– 4000Vac during 2 sec (61V)*

*– 2500Vac during 2 sec (65N)*

**Thomson Safety Capacitors:**

*61V (GZO) meets subclasses X1, Y1*

*62O (GKO) meets subclasses X1, Y2*

*65N (GAY): meets subclasses X2, Y3*

**Certification body approvals:**

Cert.	Standard	Safety certification numbers		
		61V	62O	65N
UL	UL-1414	E147842	E147842	-
VDE	VDE 0560-2	-	76803,76804	-
CSA	C22.2 N.1 M9	LR100430-2	LR100430-1	-
SEV	SEV 1016	100959.11	100959.12	-

\*

**New standard approvals:**

Cert.	Standard	Safety certification numbers		
		61V	62O	65N
VDE	VDE 0565-1 (EN132400)	94610, 94612 94634	101384	-
IMQ	EN132400	V4551	V4635	-
BSI	BS EN60065	228237	228197	-

TPCAM0198

# Safety Recognized Ceramic Capacitors

61V (GZO)  
62O (GKO)  
65N (GAY)

EPOXY COATED

## Capacitance range

Digits 1, 2, 3	61V	62O	65N
$C_R$ (pF)			
100			
120		C	
150			
220			
330			
390			
470		D	
560	E		
680			
820	F	E	
1000			
1200			
1500	H	F	E
2200		G	F
3300		J	H
3900	K		
4700	M	K	

## Approved Logos

C22.2 CEI 12-13 BSI 1016 UL1414 565-1  
1055 SEV

For more details, see page 23

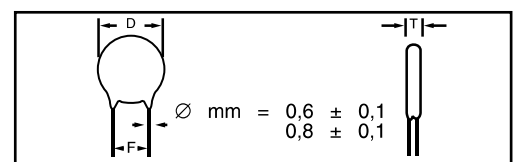
## Technical characteristics

	61V	62O	65N	
	1.0 KHz / 0.3 $V_{ef}$ / 25 °C			Measured at
	+ - 20% / - 20+50%			Capacitance tolerance
	150 x 10 <sup>-4</sup>			D.F max. @25° C
	≥ 10 G Ω			Insulation resistance
	4.000 Vac	2.500 Vac	1.800 Vac	Test voltage (Ut)
	1.500 Vac			Test voltage leads to body
	40 / 085 / 21			Climatic category
	- 40 + 125			Operating temperature range (°C)

## Dimensions

Digit 9 (¢)	D ± 1 (mm)	T max (mm)	Disponível / Available Lead Spacing		
			65N	62O	61V
C	6,0	4,0	B,C,E	B,C	C
E	8,0	4,0	B,C,E,Q	B,C,Q	C
G	10,0	5,0	B,C,E	B,C	C
H	11,0	5,0	B,C,E,P,W	B,C,P	C,P
J	13,0	6,0	B,C,P,W	B,C,P	C,P
K	15,0	6,0	B,C,P,W	B,C,P	C,P
M	19,0	7,0	B,C,P	B,C,P	C,P

Lead Spacing		Digit 8		
F				
mm	Inches			
6	.25	E	—	—
7,5	.3	B	—	Q
10	.4	C	W	—
12,5	.5	P	—	—



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

TPCAM0198

**Typical application for safety ceramic discs and switch mode:**

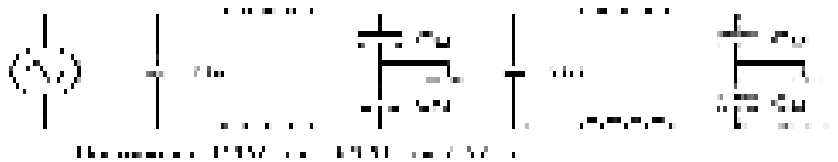
**Across the line capacitors for noise suppression**



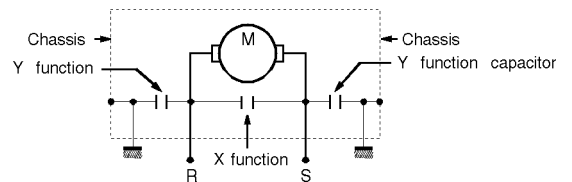
**Line by-pass for noise suppression**



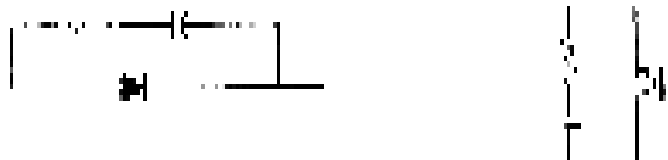
**Typical X and Y function application**



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



**Power transistors and diodes protection (spike noise suppression)**



TPCAM0198

**EPOXYCOATED**

**Capacitors for AC and switch mode applications**

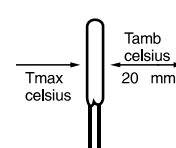
These capacitors are made of a new dielectric compound specially developed for ac or switch mode circuits that can generate dielectric heat which is limiting factor on other ceramic disc capacitors.

This new series adds the advantages of class I (low loss factor) with the advantages of class II capacitors (small sizes and lower costs).

The capacitors are epoxy coated, flame retardant class UL 94 - V0. They meet the standards of the telecom and data processing industry. They are particularly suited for TV deflection and power supply circuits.

**Technical characteristics**

**IEC-384-9/1988**

	1,0 KHz / 0,3 V <sub>ef</sub> / 25° C				Measured at
	6LR / 6LS / 6LT ≤ 30 67S / 68S ≤ 80				Dissipation Factor (x 10 <sup>-4</sup> )
	± 10%	± 20%	- 20 + 50%	6LR x x x	6LS x x x
				6LT x x x	67S x x x
				68S x x x	Capacitance tolerance
	@ 500 VDC → ≥ 10 G Ω				Insulation resistance
	Entre terminais e entre o corpo e os terminais	1,5 x U <sub>R</sub> +500 (DC)		Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
	- 40... + 125				Operating temperature range(°C)
	30 / 085 / 56				Climatic category
		T <sub>máx.</sub> = T <sub>amb</sub> + 20°C			Measured at 20mm from the capacitor
					Max. temp. rise on the external surface of the capacitor related to ambient

Note: Damp Heat Steady State: 90... 95% R.H.  
40° C / 56 days. No voltage to be applied.

TPCAM0198




EPOXY COATED

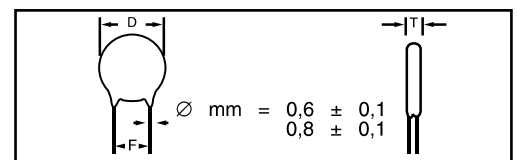
Temperature coefficient		Y5P			Y5U	Y5V
Digits 1, 2, 3		6LR	6LS	6LT	67S	68S
Rated voltage	(U <sub>R</sub> )	1000	2000	3000	2000	2000
	DC AC	130	250	380	250	250
Marking						
	C <sub>R</sub> (pF)					
221	220	D				
271	270	D				
331	330	D				
391	390	D				
471	470	D				
561	560	D				
681	680	E	F	G		
821	820		G	H		
102	1000	F	H	J	E	
122	1200		H	J		
152	1500	H	J			
182	1800		J			
222	2200	J	K		F	
272	2700		K			
332	3300	M			G	
392	3900	M			G	
472	4700	M			H	E
103	10000	M			H	H

= Diametro (ϕ) - 9th Part Number Digit

Dimensions

Digit 9 (ϕ)	D±2 (mm)	T max (mm)	Available Lead Spacing		
			Un = 1000V	Un = 2000V	Un = 3000V
A	4,0	3,0	A,B,E,N,R	A,B,E,N,R	B,E
B	5,0	3,0	A,B,E,N,R,X	A,B,E,N,R	B,E
C	6,0	3,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E
D	7,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E
E	8,0	4,0	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E
F	9,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E
G	10,0	5,0	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E
H	11,0	5,0	A,B,C,E,N,P,R,W	A,B,C,E,N,P,R,W	B,C,E,P,W
J	13,0	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W
K	15,0	6,0	B,C,N,P,R,W	B,C,N,P,R,W	B,C,P,W
M	19,0	7,0	B,C,P	B,C,P	B,C,P

Lead Spacing		Digit 8		
F				
m m	Inches			
5	.2	A	—	N
6	.25	E	X	—
7,5	.3	B	R	Q
10	.4	C	W	—
12,5	.5	P	—	—



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

# Professional Ceramic Capacitors - Class I, II and III

## EPOXYCOATED

### MIL-STD-202F

The professional ceramic disc capacitors were specially developed for applications in severe environmental conditions, high humidity, temperature, gas, vapor and solvents.

The capacitors are flame retardant epoxy coated, meeting UL 94-VO flamability specifications.

The capacitors are 100% screened on following electrical parameters:

Capacitance, loss factor, test voltage. After the 100% test, the capacitors are audited on its electrical and mechanical parameters with following AQL:

Electrical parameters: 0,065% level II

Mechanical parameters: 0,65% level II

The capacitors withstand the following reliability essays:

Terminal strength: method 211 – condition A

Resistance to solvents: method 215

Resistance to soldering heat: method 210 – condition B

Solderability: method 208

Thermal shock: method 107 – condition A

Humidity (steady state): method 103 – condition D

Life (at elevated ambient temperature): method 108 – condition D

Operating temperature and storage: - 55... + 125°C

**The Thomson professional disc capacitors below mentioned are listed on Telebrás directory of qualified components.**

COD. THOMSON	DESCRIÇÃO	COD. TELEBRÁS
6AQ	NP0 / 500 V	TB . 06 . CC . CDH ... ... CHH ...
6GQ	N750 / 500 V	TB . 06 . CC . MDH ... ... MHH ...
6AQ	NP0 / 100 V	TB . 06 . CC . CIE ... ... CDH ... ... CDE ... ... CEE ... ... CHE ...
6OQ	X5P / 500 V	TB . 06 . CC . LJH ... ... LIH ...
6NQ	X5F / 500 V	TB . 06 . CC . UIH ...
6MQ	X5E / 500 V	TB . 06 . CC . KKH ... ... KIH ...
6SK	X5U / 100 V	TB . 06 . CC . KME ...
6MK	X5E / 100 V	TB . 06 . CC . KIE ... ... KJE ...
6YF	Y5U / 25 V	TB . 06 . CC . DKM ...
6ZH	Y5V / 50 V	TB . 06 . CC . DKN ...
6WF	Y5P / 25 V	TB . 06 . CC . EJM ...

**EPOXYCOATED**

**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.

**100V ... 500V**

**Technical characteristics Class I**

IEC 384-8/1988

	1,0 MHz / 1,0 Vef / 25° C		Measured at
	$C_R \leq 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10 \times \left( \frac{10}{C_R} + 0,7 \right)$ $C_R > 30 \text{ pF} \rightarrow \text{tg } \delta \leq 10$		Dissipation Factor (x 10 <sup>-4</sup> )
	$C_R < 10 \text{ pF} \rightarrow \pm 0,25 \text{ pF} / \pm 0,5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\% / \pm 10\%$		Tolerance
	@ U <sub>R</sub> → ≥ 10 G Ω		Insulation resistance
	$U_R = 100\text{V} \rightarrow U_t = 250\text{V (DC)}$ $U_R = 500\text{V} \rightarrow U_t = 1,25\text{kV (DC)}$	Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
	- 55... + 125 Epoxy coated		Operating temperature range(°C)
	55 / 085 / 56		Climatic category

**Dielectric - Class II**

These ceramic capacitors have a high dielectric constant, making possible high capacitance values in reduced dimensions, however temperature coefficient and loss factor are greater than Class I. Typical applications are decoupling and by pass.

**100V e / and 500V**

**Technical characteristics Class II**

IEC 384-9/1988

	1,0 KHz / 0,3 Vef / 25° C		Measured at
	$X5E / X5F / X5P \leq 250$ $X5U / X5V / Z5V \leq 300$		Dissipation Factor (x 10 <sup>-4</sup> )
	$X5E / X5F / X5P \rightarrow \pm 10\%$ $X5U / X5V / Z5V \rightarrow - 20 + 50\%$ $X5E / X5F / X5P / X5U \rightarrow \pm 20\%$		Capacitance tolerance
	@ U <sub>R</sub> → ≥ 10 G Ω		Insulation resistance
	$U_R = 100\text{V} \rightarrow U_t = 250\text{V (DC)}$ $U_R = 500\text{V} \rightarrow U_t = 1250\text{V (DC)}$	Between leads and body insulation	Dielectric strength NOTE: Charging current limited to 50 mA
	- 55... + 125 Epoxy coated		Operating temperature range(°C)
	55 / 085 / 56		Climatic category

TPCAM0198

**Dimension Table - Class I**  
**Low and medium voltage**

EPOXYCOATED

**Class I**



Temp. Coefficient	NPO		N750		N1500	
	6AK	6AQ	6GK	6GQ	6HK	6HQ
Digits 1,2,3	100	500	100	500	100	500
(U <sub>r</sub> ) Rated voltage	100	500	100	500	100	500
Marking						
	C <sub>R</sub> (pF)					
109	1,0	A	A	A	A	A
129	1,2					
159	1,5					
189	1,8					
209	2,0					
229	2,2					
279	2,7					
309	3,0					
339	3,3					
399	3,9					
409	4,0					
479	4,7					
509	5,0					
569	5,6					
609	6,0					
689	6,8					
709	7,0					
809	8,0					
829	8,2					
909	9,0					
100	10	B	B	B	B	A
120	12					
150	15					
180	18					
200	20					
220	22					
270	27					
330	33					
390	39					
470	47					
500	50					
560	56					
680	68					
820	82					
101	100					
121	120					
151	150					
181	180					
221	220					
271	270					
331	330					

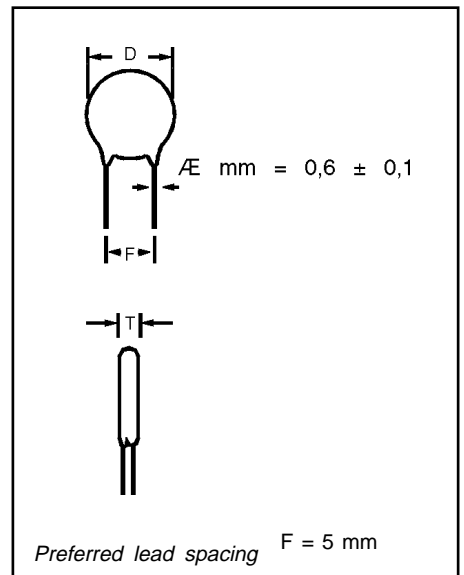
= Diametro (ε) - 9th Part Number Digit

**Dimensions**

Digit 9 (ε)	D ± 2 (mm)	T máx. (mm)	Available Lead Spacing
A <sup>NPO</sup> 1pF...2,7 pF	4,0	3,0	A,B,D,E,O,R
A <sup>N1500</sup> 56pF...82pF	4,0	3,0	A,B,D,E,O,R
A <sup>Others</sup>	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X
F	9,0	3,0	A,B,C,E,O,R,X
G	10,0	3,0	A,B,C,E,O,R,X
H	11,0	3,0	A,B,C,E,O,R,W
J	13,0	3,5	B,C,R,W
K	15,0	3,5	B,C,R,W
M	19,0	4,0	B,C

(E), (X), (W): sob consulta / upon request

Lead Spacing		Digit 8	
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W



TPCAM0198

**Dimension Table - Class II**  
**Low and medium voltage**

EPOXYCOATED

**Class II**

Temperature Coefficient	X5E		X5F		X5P		X5U		X5V		Z5V
Digits 1,2,3	6MK	6MQ	6NK	6NQ	6OK	6OQ	6SK	6SQ	6TK	6TQ	6UK
Rated voltage (U <sub>R</sub> )	100	500	100	500	100	500	100	500	100	500	100
Marking	C <sub>R</sub> (pF)										
			Use Y5E								
560	56	A									
680	68										
820	82										
101	100										
121	120										
151	150										
181	180										
221	220										
271	270										
331	330										
391	390	A		Use Y5F							
471	470	B	B		A		Use Y5P				
561	560	C	C	C		B		A		Use Y5U	
681	680			D		C		A		Use Y5V	
821	820	D	E	C	D	B		A			
102	1.000					E	F	D	E	C	D
122	1.200	F	H	E	F						
152	1.500					H	K	F	J	D	F
182	1.800	H	K	H	J						
222	2.200					H	K	H	J	D	F
272	2.700	H	K	H	J						
332	3.300					H	K	H	J	D	F
392	3.900	H	K	H	J						
472	4.700					H	K	H	J	D	F
562	5.600	H	K	H	J						
682	6.800					H	K	H	J	D	F
822	8.200	H	K	H	J						
103	10.000					H	K	H	J	D	F
123	12.000	H	K	H	J						
153	15.000					H	K	H	J	D	F
223	22.000	H	K	H	J						

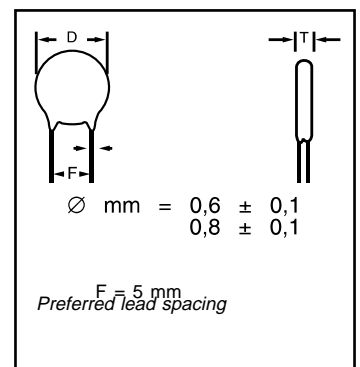
= Diametro (ϕ) - 9th Part Number Digit

TPCAM0198

**Dimensions**

Digit 9 (ϕ)	D ± 2 (mm)	T máx. (mm)	Available Lead Spacing
A	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X
F	9,0	3,0	A,B,C,E,O,R,X
G	10,0	3,0	A,B,C,E,O,R,X
H	11,0	3,0	A,B,C,E,O,R,W
J	13,0	3,5	B,C,R,W
K	15,0	4,0	B,C,R,W
M	19,0	4,0	B,C

Lead Spacing		Digit 8	
F			
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W

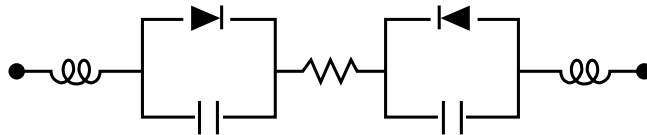


(E), (X), (W): upon request

EPOXY COATED

**Dielectric - Class III**

A thin dielectric layer is grown on a disc of conductive ceramic. Very large capacitances can be obtained due to reduced thickness of this barrier layer and its inherently high dielectric constant. Due its small dimensions, they are a less expensive replacement of multilayer ceramic or poliester capacitors. An equivalent circuit is shown below:



Technical characteristics Class III

IEC324/1970

	1,0 KHz / 0,1 Vef / 25° C		Measured at	
	$C_R \leq 22 \text{ nF} \rightarrow Y5V, Y5U \leq 750$ $C_R > 22 \text{ nF} \rightarrow Y5V, Y5P \leq 500$		D.F. ( $\times 10^{-4}$ )	
	Y5P $\rightarrow \pm 20\% / - 20 + 50\%$ Y5U $\rightarrow - 20 + 80\%$ Y5V $\rightarrow - 20 + 80\%$		Capacitance tolerance	
	55 / 085 / 56		Climatic category	
TPCAM0198	Y5P	$\geq 12 \text{ M } \Omega$	Insulation resistance @ $U_R$	
	Y5U	$4.7 \text{ nF} \dots 100 \text{ nF} \rightarrow \geq 10 \text{ M } \Omega$ $200 \text{ nF} \rightarrow \geq 1 \text{ M } \Omega$		
	Y5V	$\geq 100 \text{ M } \Omega$		
		$U_t = 1,25 \cdot U_R$	Between leads	Dielectric strength  Note: Charging current limited to 50 mA
		$U_R = 25 \text{ v} \rightarrow U_t = 100 \text{ v (DC)}$ $U_R = 50 \text{ v} \rightarrow U_t = 150 \text{ v (DC)}$	Body insulation	
	- 55... + 125 Epoxy coated		Operating temperature range(°C)	

**EPOXYCOATED**



Class III	$\Delta$ C/C (máx.) Range		$\Delta$ C/C (máx.) Range		$\Delta$ C/C (máx.) Range	
	$\pm 12\%$	-30...+ 85°C	+30 - 65%	-30...+ 85°C	+22 - 85%	-30...+ 85°C
Temperature coefficient - Typical	<b>Y5P</b>		<b>Y5U</b>		<b>Y5V</b>	
Digits 1, 2, 3	6WF	6WH	6YF	6YH	6ZH	
Rated voltage (U <sub>R</sub> )	25	50	25	50	50	
Marking						
	C <sub>R</sub> (pF)					
472	4.700	A		A		A
103	10.000	C				
223	22.000	D	E	B	C	
333	33.000	E	F	C	D	
473	47.000	G	H	D	E	B
503	50.000		—		F	
683	68.000	H	J			
104	100.000	J	K			C
204	200.000	—	—	J	—	

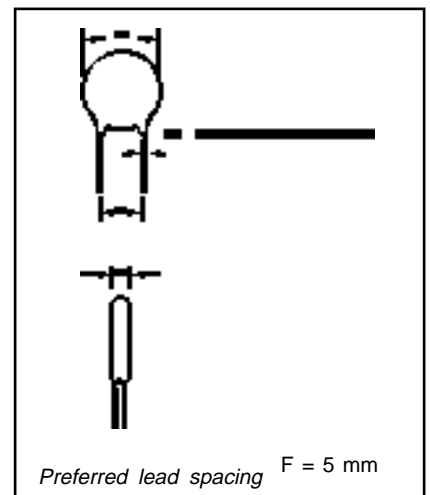
Y5U, Y5V - Preferenciais

= Diámetro (ϕ) - 9th Part Number Digit

**Dimensions**

Digit 9 (ϕ)	D ± 2 (mm)	T máx. (mm)	Available Lead Spacing
A	4,0	3,0	A,B,D,E,O,R
B	5,0	3,0	A,B,D,E,O,R,X
C	6,0	3,0	A,B,C,D,E,O,R,X
D	7,0	3,0	A,B,C,D,E,O,R,X
E	8,0	3,0	A,B,C,D,E,O,R,X
F	9,0	3,0	A,B,C,E,O,R,X
G	10,0	3,0	A,B,C,E,O,R,X
H	11,0	3,0	A,B,C,E,O,R,W
J	13,0	3,5	B,C,R,W
K	15,0	4,0	B,C,R,W

Lead Spacing		Digit 8	
F			
mm	Inches		
2,5	.1	D	—
5	.2	A	O
6	.25	E	X
7,5	.3	B	R
10	.4	C	W



TPCAM0198

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

As we are anxious that our customers should benefit from the latest development in technology and standards THOMSON-CSF Passive Components reserves the right to modify the characteristics published in this brochure.

## FOREIGN REPRESENTATIVES AND SUBSIDIARIES

### AMERICAS

#### BRAZIL / South America Sales Office

**THOMSON COMPONENTES DO BRASIL Ltda.**  
Av. Prof. Vicente Rao, 1620 - Brooklin Novo  
São Paulo  
CEP 04636-001 - SP  
Tel.: (55) 11 524 77 13  
Fax: (55) 11 247 30 59

#### USA, CANADA AND MEXICO

**THOMSON PASSIVE COMPONENTS CORPORATION**  
2211-H Distribution Center Drive  
CHARLOTTE, North Carolina 28269  
Tel.: (704) 597 07 66  
Fax: (704) 597 05 53

### EUROPE

#### FRANCE / Int'l Sales Headquarter

**THOMSON CSF PASSIVE COMPONENTS**  
29 Avenue Carnot - 91349  
MASSY CEDEX  
Tel.: (33 1) 69 93 41 41  
Fax: (33 1) 69 93 40 92

#### GERMANY

**THOMSON BAUELEMENTE GmbH**  
Perchtinger Strasse 3  
D-81379 MÜNCHEN 70  
Tel.: (49) 89 78 790  
Fax: (49) 89 78 79 145

#### ITALY

**THOMSON COMPONENTI - SpA**  
Viale Fulvio Testi, 117  
20092 CINISELLO BALSAMO (MILANO)  
Tel.: (39) 2 660 15 510  
Fax: (39) 2 660 15 677

#### SPAIN AND PORTUGAL

**THOMSON TUBOS Y COMPONENTES SA**  
C/ Principe de Vergara, 204 - 1º B  
28002 MADRID  
Tel.: (34) 1 564 02 72  
Fax: (34) 1 564 19 40

#### U.K. AND IRELAND

**THOMSON ELECTRONIC COMPONENTS Ltd.**  
PO BOX 6254  
Moubatten House / Basing View  
Basingstoke, Hants RG 21 4XZ  
Tel.: (44) 1256 38 78 00  
Fax: (44) 1256 38 78 40

#### BENELUX

**THOMSON CSF PASSIVE COMPONENTS BENELUX**  
Avenue, Louise 363 - B10  
B-1050 BRUXELLES  
Tel.: (32 2) 627 03 45  
Fax: (32 2) 627 03 33

### ASIA

#### HONG KONG

**THOMSON CSF PASSIVE COMPONENTS ASIA Ltd.**  
8 F Rays Industrial Building  
71 HUNG TO ROAD / Kwun Tong  
KOWLOON HONG KONG  
Tel.: (852) 23 890 022  
Fax: (852) 27 978 081

#### SINGAPORE

**THOMSON CSF PASSIVE COMPONENTS SINGAPORE PTE Ltd.**  
171 Kallang Way # 03-08  
Kolan Ayer Ind. Park  
SINGAPORE 349250  
Tel.: (65) 741 90 88  
Fax: (65) 741 92 88

#### TAIWAN

**THOMSON CSF PASSIVE COMPONENTS TAIWAN Ltd.**  
12F #149-16 sec 2  
Keelung Road, Taipei 110  
TAIWAN R.O.C.  
Tel.: (8862) 378 67 92  
Fax: (8862) 736 21 42

#### INDIA

**THOMSON CSF PASSIVE COMPONENTS ASIA Ltd.**  
India Representative Office  
C 310 Blue Cross Chambers, Infantry road  
cross  
BANGALORE 560001 INDIA  
Tel.: (9180) 555 0566  
Fax: (9180) 555 0566

#### SHANGAI


**THOMSON CSF PASSIVE COMPONENTS ASIA Ltd.**  
Representative Office  
Room 6011 Hua Ting Guest House  
2525 Zhong Shan Xi Lu  
Shangai 200030 / CHINA  
Tel.: (8621) 6481 4564  
Fax: (8621) 6481 4544

#### AUSTRALIA

**THOMSON CSF PASSIVE COMPONENTS ASIA Ltd.**  
P.O. BOX 269 ERMINGTON  
SYDNEY NSW 2115  
AUSTRALIA  
Tel.: (61 2) 874 04 74  
Fax: (61 2) 874 04 74

OTHER COUNTRIES: please consult us

 **THOMSON-CSF PASSIVE COMPONENTS**  
Headoffice: Avenue du Colonel Prat 21850 SAINT-APOLLINAIRE - Phone (33) 380 71 74 00 - Fax (33) 380 74 87 28

 **THOMSON COMPONENTES DA AMAZÔNIA LTDA.**  
Plant: Av. Quaruba, 200 - Distrito Industrial - Manaus - CEP 69075-080 - Tel.: (55) (92) 615-1030 - Telex 921026 - Fax (55) (92) 615-2825  
Sales Office: Av. Prof. Vicente Rao, 1620 - São Paulo - CEP 04636-001 - Tel.: (55) (11) 524-7713 - Fax: (55) (11) 247-3059