



# TANTALUM --- CAPACITORS ---

## S U M M A R Y

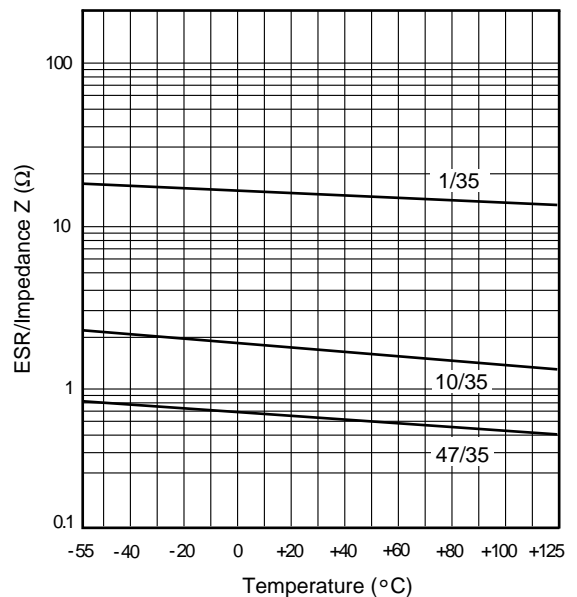
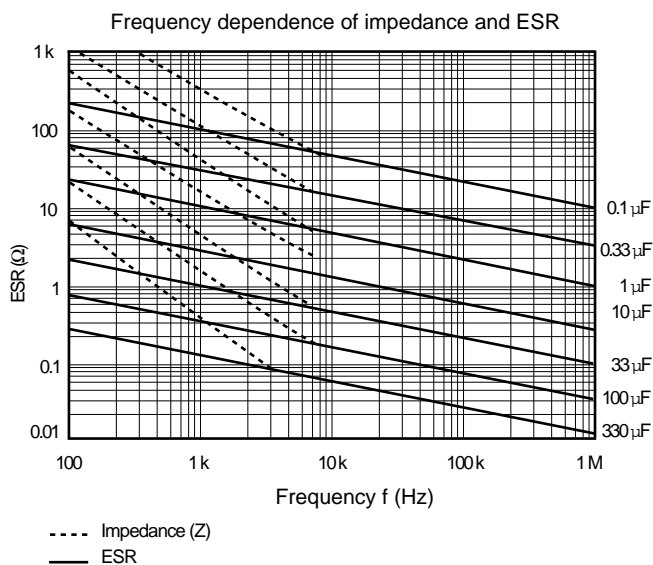
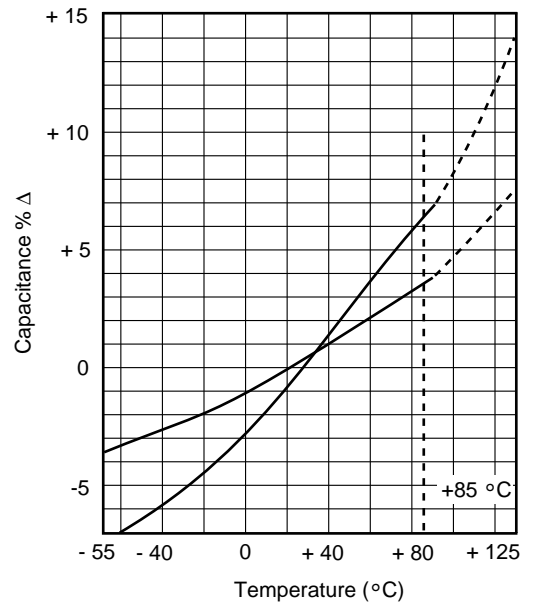
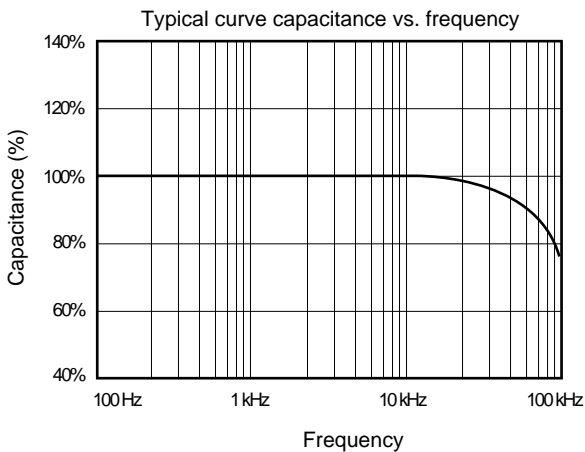
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# TANTALUM CAPACITORS

Tantalum capacitors are manufactured from a powder of pure tantalum metal pressed to form a slug around a tantalum wire and subsequently vacuum sintered at high temperature.

The resulting slug, although of high mechanical strength and density, is also highly porous giving a large internal surface area. This forms the positive "plate" of the capacitor.

A dielectric layer of tantalum pentoxide is anodized on the surface of the tantalum anode, the cathode is formed by layers of manganese dioxide. Electrical contact is established by the deposition of carbon onto the surface of the "slug". The cathode connection is then made by means of conductive contact to a lead frame. Packaging is carried out to meet individual specification and customer requirements.



# SOLID TANTALUM CHIP CAPACITOR - FT Series

## ● DESCRIPTION

The FT series is specifically designed for surface mount applications in accordance with EIA specifications. The four chip sizes offer capacitance values from. 1  $\mu\text{F}$  to 330  $\mu\text{F}$  with rated voltages from 6.3 V to 35 V.

## ● TECHNICAL CHARACTERISTICS

Operational temperature	- 55°C to 85°C ; to 125°C with voltage derating								
Capacitance range $C_R$	0.1 $\mu\text{F}$ to 330 $\mu\text{F}$								
Tolerance on $C_R$	$\pm 10\%$ $\pm 20\%$								
Nominal voltage $U_R$	$U_R$	85°C	6.3	10.0	16	20	25	35	
		125°C	4.0	6.3	10	13	16	23	
Surge voltage $V_s$	$U_R$	85°C	8.0	13.0	20	26	33	46	
		125°C	5.0	9.0	12	16	21	28	
Reverse voltage max.	25°C (1 V - 0.10 $U_R$ ) / 125°C (0.1 V - 0.01 $U_R$ ) 85°C (0.5 V - 0.03 $U_R$ )								
Dissipation factor $\text{tg}\delta$ (120 Hz, 20°C)	4 % $C_R$ 1 $\mu\text{F}$ 6 % $C_R$ > 1 $\mu\text{F}$ 8 % $C_R$ > 150 $\mu\text{F}$								
Environmental classification	55 / 125 / 56 (IEC 68-2)								
Soldering	Compatible with wave soldering, IR or vapor phase reflow, withstand immersion in 260°C solder for 10 seconds.								
Tape information	Plastic reeled, 7" and 13"								

# SOLID TANTALUM CHIP CAPACITOR - FT Series

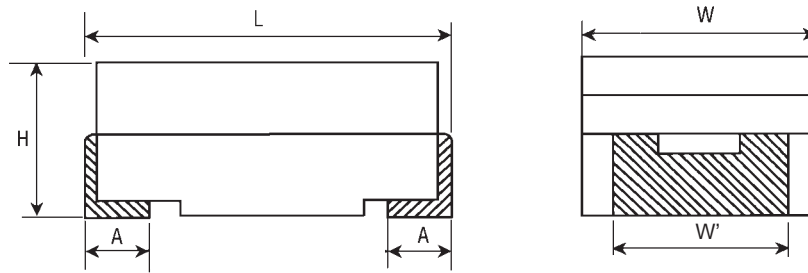
## ● CAP VS VOLTAGE CASE CODES

$C_n$ ( $\mu\text{F}$ ) \ $U_n$ (V)	6.3 V	10 V	16 V	20 V	25 V	35 V
0.10 0.15 0.22						A A A
0.33 0.47 0.68				A	A A	A A/B A/B
1.00 1.50 2.20	A	A A	A A A/B	A A B	A A/B B	B B/C B/C
3.30 4.70 6.80	A A A/B	A A/B B	A/B B B/C	B B/C C	B/C C C/D	C C/D D
10 15 22	A/B B/C B/C	B/C B/C C	B/C C C/D	C C/D D	C/D D D	D D E
33 47 68	C C/D D	C/D D D	D D D	D E E	E	
100 150 220 330	D D E E	D E E	E			

## ● LEAKAGE CURRENT ( $\mu\text{A}$ )

$C_R$ ( $\mu\text{F}$ ) \ $U_R$ (V)	6.3 V	10 V	16 V	20 V	25 V	35 V
0.10 0.15 0.22						0.5 0.5 0.5
0.33 0.47 0.68				0.5	0.5 0.5	0.5 0.5 0.5
1.00 1.50 2.20	0.5	0.5 0.5	0.5 0.5 0.5	0.5 0.5 0.5	0.5 0.5 0.6	0.5 0.5 0.8
3.30 4.70 6.80	0.5 0.5 0.5	0.5 0.5 0.7	0.5 0.8 1.1	0.7 1.0 1.4	0.9 1.2 1.7	1.2 1.6 2.4
10 15 22	0.6 1.0 1.4	1.0 1.5 2.2	1.6 2.4 3.5	2.0 3.0 4.4	2.5 3.8 5.5	3.5 5.3 7.7
33 47 68	2.1 3.0 4.3	3.3 4.7 6.8	5.3 7.5 10.8	6.6 9.4 13.6	8.3	
100 150 220 330	6.3 9.0 13.2 19.8	10.0 15.0 22.0	16.0			

# SOLID TANTALUM CHIP CAPACITOR - FT Series



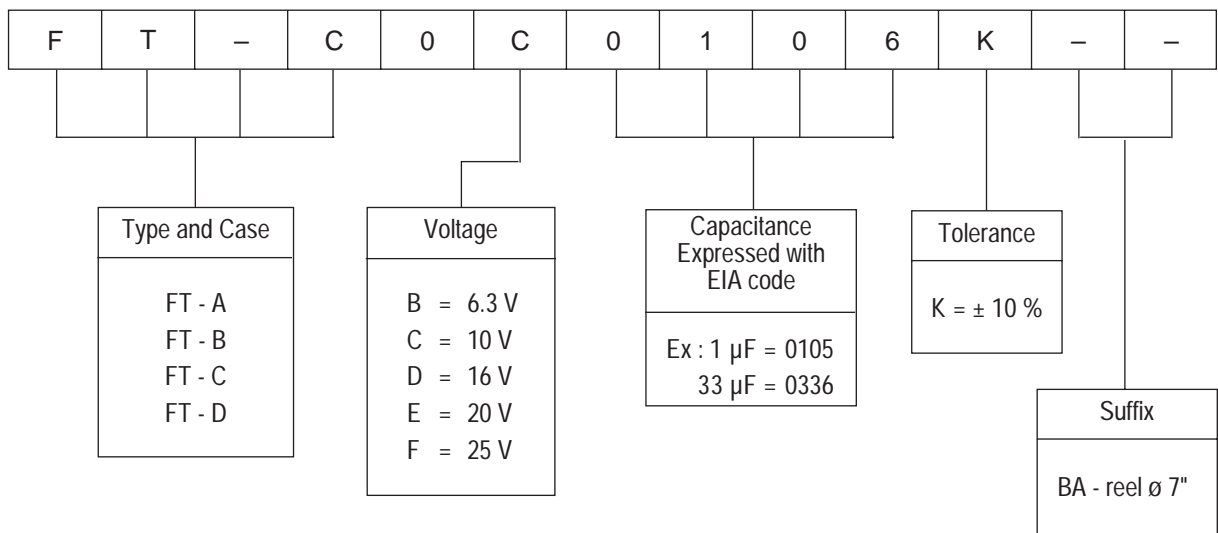
## • DIMENSIONS

Format/size	$L \pm 0.2$	$W + 0.2$ $- 0.1$	$H + 0.2$ $- 0.1$	$W' \pm 0.1$	$A + 0.3$ $- 0.2$	S min
A	3.2	1.6	1.6	1.2	0.8	1.1
B	3.5	2.8	1.9	2.2	0.8	1.4
C	6.0	3.2	2.6	2.2	1.3	2.9
D	7.3	4.3	2.9	2.4	1.3	4.4
E	7.3	4.3	4.1	2.4	1.3	4.4

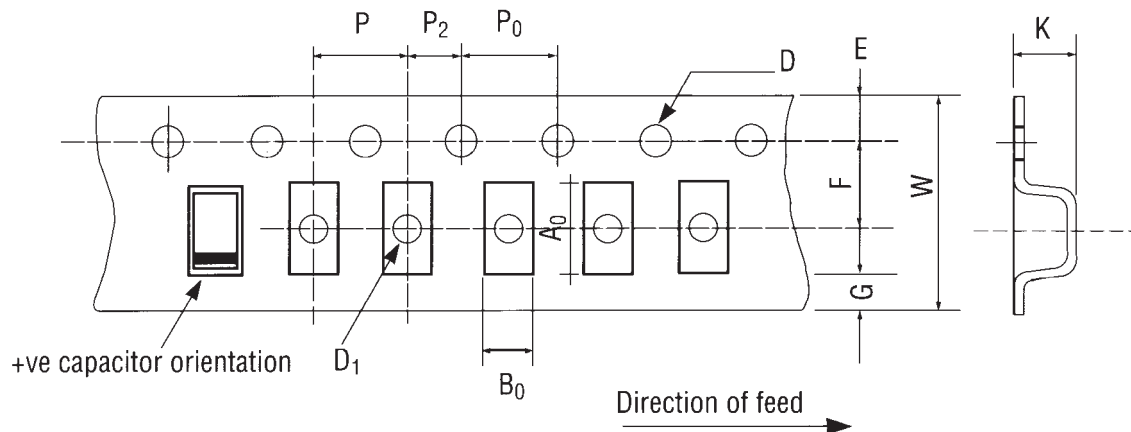
## • MARKING



## • HOW TO ORDER



# SOLID TANTALUM CHIP CAPACITOR - FT Series



## ● TAPE SPECIFICATION

Dimensions  $A_0$  and  $B_0$  of the pocket and the tape thickness,  $K$ , are dependent on the component size.

Tape materials do not affect component solderability during storage.

Carrier Tape Thickness < 0.4 mm

code	8mm tape	12mm tape
$P^*$	$(4\pm 0.1)$ or $(8\pm 0.1)$	$(4\pm 0.1)$ or $(8\pm 0.1)$
G	1.75 min.	1.75 min.
F	$3.5\pm 0.05$	$5.5\pm 0.005$
E	$1.75\pm 0.1$	$1.75\pm 0.1$
W	$8\pm 0.3$	$12\pm 0.3$
$P_2$	$2\pm 0.05$	$2\pm 0.05$
$P_0$	$4\pm 0.1$	$4\pm 0.1$
D	$1.5\pm 0.1 - 0$	$1.5\pm 0.1 - 0$
$D_1$	1.0 min	1.5 min

\* See taping suffix tables for actual P dimension (component pitch)

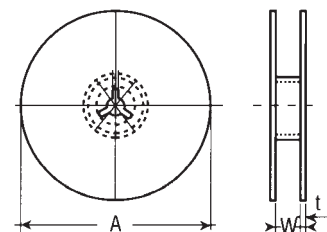
## ● PACKAGING FOR AUTOMATIC INSERTION

Packaging for specifications and reel dimensions are in accordance with IEC 286 and EIA 481.

## ● TAPING SUFFIX TABLE

Case size Reference	Tape width mm	P mm	Thickness K max	7" (178 mm) reel		13" (330 mm) reel	
				Suffix	Qty	Suffix	Qty
A	8	4	2.3	BA	2000	BC	8000
B	8	4	2.6	BA	2000	BC	8000
C	12	8	3.3	BA	500	BC	3000
D	12	8	3.6	BA	500	BC	2500
E	12	8	4.8	BA	400	BC	1500

## ● REEL DIMENSIONS



Suffix	A max	W max	t ± 0.5
BA	178 mm / 7"	10	2
BC	330 mm / 13"	14	2

# DIPPED TANTALUM CAPACITORS - FB Series

## ● DESCRIPTION

The electrical characteristics and environment performance of the FB product makes it suitable for general, professional and industrial uses.

These capacitors are dipped radial leaded capacitors, encapsulated with flame retardant epoxy resin. The product is available in 2.5 mm and 5 mm lead spacing, in both bulk and tape format.

## ● TECHNICAL CHARACTERISTICS

Operational temperature	55°C to 85°C; to 125°C with voltage derating									
Capacitance range	$C_R$	0.1 $\mu$ F to 330 $\mu$ F								
Tolerances on $C_R$	$\pm 10\%$ $\pm 20\%$									
Nominal voltage	$U_R -$	$U_R -$	$\leq 85^\circ\text{C}$	6.3	10	16	20	25	35	50
			$\leq 125^\circ\text{C}$	4.0	6.3	10	13	16	23	33
Electrical characteristics	(25°C / 120 Hz / 0.5 Urms unless otherwise stated).									
Dissipation factor (tg $\delta$ %)	$C_R$ ( $\mu$ F)	0.1 to 1.5	2.2 to 68		10 to 68		$\geq 100$			
	tg $\delta$ %	4	6		8		10			
Leakage current ( $I_L$ )	$I_L \leq 0.01 C_R \cdot U_R$ or 0.5 $\mu$ A whichever is the greatest.									
Surge voltage	$V -$	$1.30 U_R$								
Leads	Tinned radial leads - Diameter 0.5 mm									
Solderability	Recommended soldering bath 260°C with an immersion time of 3 seconds. The tin should cover 95% of wire surface.									
Permissive pull test	10 N									
Packaging	Refer to detailed information									

## ● PACKAGING

	Availability	Case size	Package Quant.
BULK	Format A / C	01 to 07	1000
		08 to 11	1000
		12 and 13	500
		14 and 15	100
REEL	Format A / B / C* *C : cases 01 to 13 only	01 to 03	1500
		04 to 07	1250
		08 to 11	1000
		12 and 13	750
		14	500
AMMOPACK	Format A / B / C	01 to 07	3000
		08 to 11	2500
		12	2000



# DIPPED TANTALUM CAPACITORS - FB Series

## ● SELECTION CHART FOR CAPACITANCE/VOLTAGE/SIZE COMBINATIONS

$C_R$ ( $\mu$ F) \ $U_R$ (V-)	6.3 (B)	10 (C)	16 (D)	20 (E)	25 (F)	35 (G)	50 (H)
0.10	-	-	-	-	-	01	01
0.15	-	-	-	-	-	01	01
0.22	-	-	-	-	-	02	02
0.33	-	-	-	-	-	02	02
0.47	-	-	-	-	-	02	03
0.68	-	-	-	-	-	02	03
1.00	-	-	-	02	02	03	04
1.50	-	-	02	02	02	04	05
2.20	-	02	02	03	03	05	07
3.30	02	02	03	04	04	07	09
4.70	02	03	04	05	05	08	11
6.80	03	04	05	06	07	09	11
10	04	05	07	08	09	10	12
15	05	06	09	10	10	12	13
22	06	08	10	11	12	13	13
33	08	09	11	12	13	14	-
47	09	11	12	13	14	15	-
68	11	12	13	14	15	-	-
100	12	13	14	15	-	-	-
150	13	14	15	-	-	-	-
220	14	15	15	-	-	-	-
330	15	15	-	-	-	-	-

Value/Voltage combinations not shown may be available. Contact factory.

## ● MAX. E.S.R. ( ) MEASURED AT 100 kHz @ 25°C

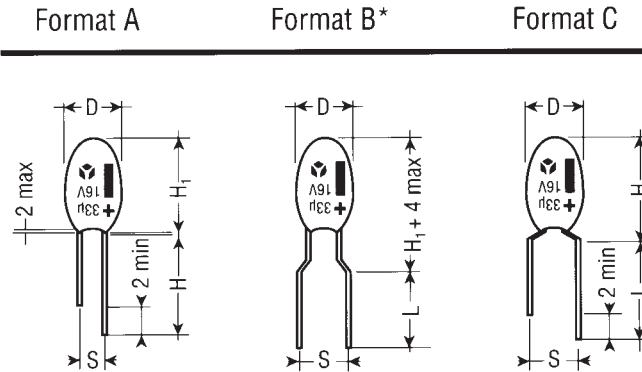
$C_R$ ( $\mu$ F) \ $U_R$ (V-)	6.3	10	16	20	25	35	50
0.10	-	-	-	-	-	26.0	26.0
0.15	-	-	-	-	-	21.0	21.0
0.22	-	-	-	-	-	17.0	17.0
0.33	-	-	-	-	-	15.0	15.0
0.47	-	-	-	-	-	13.0	13.0
0.68	-	-	-	-	-	10.0	10.0
1.00	-	-	-	10.0	10.0	8.0	8.0
1.50	-	-	10.0	9.0	8.0	6.0	5.0
2.20	-	13.0	8.0	7.0	6.0	5.0	3.5
3.30	13.0	10.0	6.0	5.5	5.0	4.0	3.0
4.70	10.0	8.0	5.0	4.5	4.0	3.0	2.5
6.80	8.0	6.0	4.0	3.6	3.1	2.5	2.0
10	6.0	5.0	3.2	2.9	2.5	2.0	1.6
15	5.0	3.7	2.5	2.3	2.0	1.6	1.2
22	3.7	2.7	2.0	1.8	1.5	1.3	1.0
33	3.0	2.1	1.6	1.4	1.2	1.0	-
47	2.0	1.7	1.3	1.2	1.0	0.8	-
68	1.8	1.3	1.0	0.9	0.8	-	-
100	1.6	1.0	0.8	0.6	-	-	-
150	0.9	0.8	0.6	-	-	-	-
220	0.9	0.6	0.5	-	-	-	-
330	0.7	0.5	-	-	-	-	-

# DIPPED TANTALUM CAPACITORS - FB Series

## ● CASE DIMENSIONS (mm)

Case size	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
D max	4.5	4.5	4.5	5.0	5.0	5.0	5.5	5.5	6.0	6.0	7.0	8.0	9.0	9.0	10.0
H1 max	7.0	7.0	7.5	8.5	9.0	9.0	9.0	9.0	10.0	10.0	10.5	10.5 (1)	-	-	-
H max	8.5	8.5	9.0	10.0	10.5	10.5	10.5	10.5	11.0	11.5	12.0	13.0	14.0	16.0	18.5

## ● LEAD WIRE CONFIGURATIONS (mm)



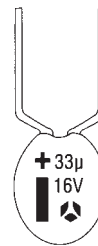
Format A	Cases 01 to 12 (1)	$L = 16 \pm 4$	$S = 2.5 \pm 0.5$	$d = 0.5 \pm 0.05$
Format B	Cases 01 to 12 (1)	$L = 16 \pm 4$	$S = 5.0 \pm 1.0$	$d = 0.5 \pm 0.05$
Format C	Cases 01 to 15	$L = 16 \pm 4$	$S = 5.0 \pm 1.0$	$d = 0.5 \pm 0.05$

\* supplied in tape format only (1) 12 Case size : 47  $\mu$ F 16 V, 33  $\mu$ F 20 V, 10  $\mu$ F 50 V are not available in Format A and B.

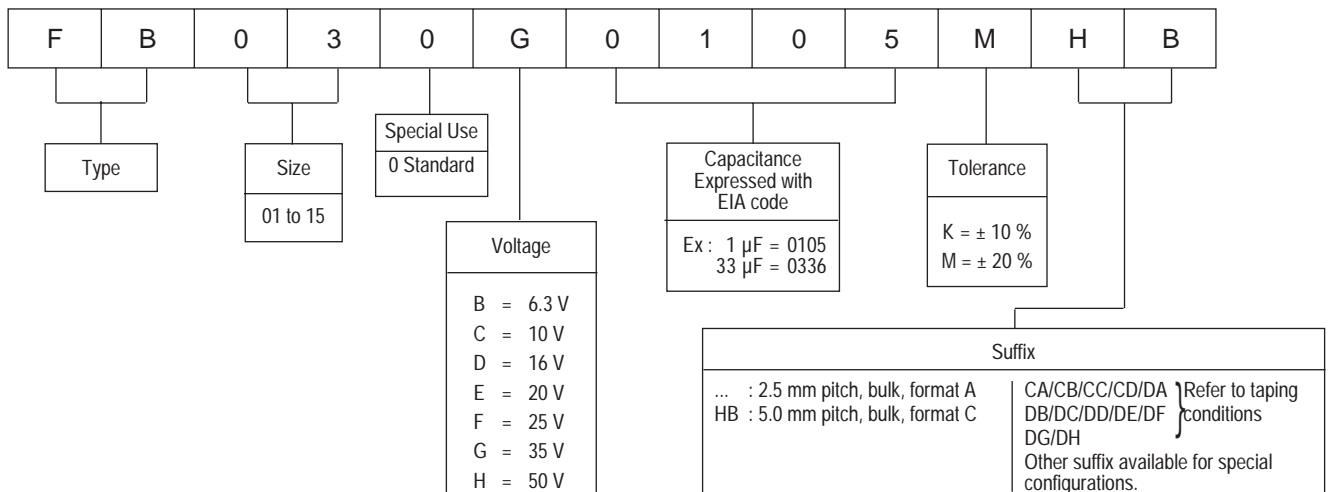
## ● MARKING

Capacitance, D.C. voltage, polarity and the THOMSON logo are laser marked on the capacitor body which is made of flame retardant orange coloured epoxy resin.

- Polarity
- Capacitance
- $\pm 10\%$  tolerance coded with "K" on reverse side of unit
- Voltage
- Thomson Logo

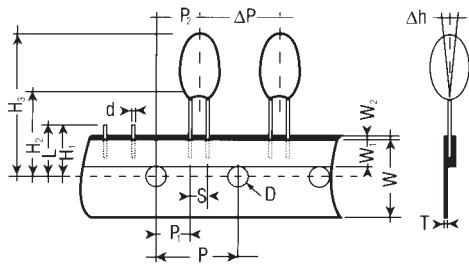


## ● HOW TO ORDER

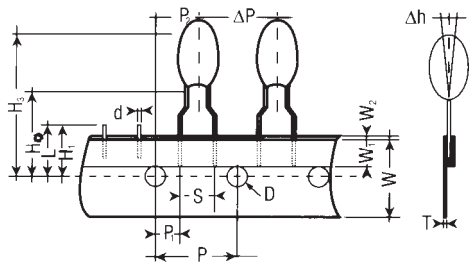


# DIPPED TANTALUM CAPACITORS - FB Series

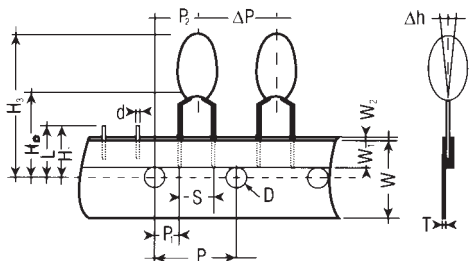
## ● PACKING FOR AUTOMATIC INSERTION



- **Format A** - Automatic insertion on 2.5 pitch
  - CA** suffix : AMMOPACK Panasert
  - CB** suffix : Reel Panasert
  - CC** suffix : AMMOPACK Avisert
  - CD** suffix : Reel Avisert



- **Format B** - Automatic insertion on 5.0 pitch
  - DE** suffix : AMMOPACK Panasert
  - DF** suffix : Reel Panasert
  - DG** suffix : AMMOPACK Avisert
  - DH** suffix : Reel Avisert

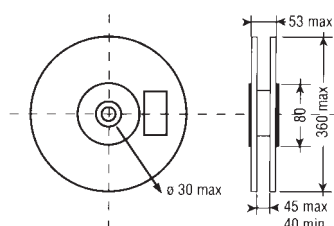


- **Format C** - Automatic insertion on 5.0 pitch
  - DA** suffix : AMMOPACK Panasert
  - DB** suffix : Reel Panasert
  - DC** suffix : AMMOPACK Avisert
  - DD** suffix : Reel Avisert

## ● DIMENSIONS (mm)

Description	Code	Dimensions	Description	Code	Dimensions
Feed hole pitch	P	12.7 ± 0.3	Feed hole diameter	D	4.0 ± 0.2
Hole center to lead	P <sub>1</sub>	3.85 ± 0.7 to be measured at bottom of clench	Tape width	W	18.0 + 1.0 - 0.5
		5.05 ± 1 for format A	Hold down tape width	W <sub>1</sub>	6.0 min.
Hole center to component center	P <sub>2</sub>	6.35 ± 0.4	Hold down tape position	W <sub>2</sub>	1.0 max.
Change in pitch	<sup>3</sup> P	± 1.0	Lead wire chench height	H <sub>0</sub>	16 ± 0.5 Panasert 19 ± 1.0 Avisert
Lead diameter	d	0.5 ± 0.05	Hole position	H <sub>1</sub>	9.0 ± 0.5
Lead spacing	S	5.0 ± 0.8 - 0.2	Base of component height	H <sub>2</sub>	18 min.
		2.5 + 0.4 for format A - 0.1	Component height	H <sub>3</sub>	32.25 max.
Component alignment	<sup>3</sup> h	0 ± 2.0	Length of snapped lead	L	11.0 max.
			0.7 ± 0.2 Carrying card 0.5 ± 0.1	Total tape thickness	T

## ● REEL CONFIGURATION AND DIMENSIONS (mm)



Holding tape outside. Positive terminal leading.  
(negative terminal by special request).

# WORLDWIDE SALES OFFICES

## AMERICAS

### BRAZIL

**THOMSON COMPONENTES DO BRASIL**  
Av. Prof. Vicente Rao, 1620  
CEP 0436-001  
SAO PAULO - BRASIL  
Tel. : (5511) 5247713  
Fax : (5511) 2473059

### USA

**THOMSON PASSIVE COMPONENTS CORPORATION**  
2211 - H Distribution Center Drive  
CHARLOTTE NC 28269  
Tel. : (704) 597 0766  
Fax : (704) 597 0553

## EUROPE

### BENELUX

**THOMSON SA - NV**  
Avenue Louise 363 - B 10  
B-1050 BRUXELLES  
Tel. : (32) 2 627 03 45  
Fax : (32) 2 627 03 33

### INT'L SALES HEADQUARTER

**France & other countries**  
29, avenue Carnot  
91349 MASSY Cedex France  
Tel. : (33) 1 69 93 41 41  
Fax : (33) 1 69 93 42 90

### GERMANY

**THOMSON BAUELEMENTE GmbH**  
Perchtinger Strasse 3  
D-81379 MUNCHEN 70  
Tel. : (49) 89 78 790  
Tlx : 522 916 CSFD  
Fax : (49) 89 78 79 145

### ITALY

**THOMSON COMPONENTI SpA**  
Viale Fulvio Testi, 117  
20092 CINISELLO BALSAMO (MILANO)  
Tel. : (39) 2 660 15 510  
Tlx : 330 301  
Fax : (39) 2 660 15 677

### SPAIN AND PORTUGAL

**THOMSON TUBOS Y COMPONENTES SA**  
C/Príncipe de Vergara, 204 - 1° B  
28002 MADRID  
Tel. : (34) 1 564 02 72  
Tlx : 46033 TCCE-E  
Fax : (34) 1 564 19 40

### U.K. AND IRELAND

**THOMSON ELECTRONIC COMPONENTS**  
Unit 4 Cartel Business Centre  
Stroudley Road  
Basingstoke, Hants RG 24 OUG  
Tel. : (44) 1256 84 33 23  
Tlx : 858 121 TECLIK G  
Fax : (44) 1256 23 172

## ASIA

### HONG KONG

**THOMSON COMPONENTS ASIA Ltd**  
81F Rays Industrial Building  
71 Hung to Road  
Kwn Tong  
KOWLOON - HONG KONG  
Tel. : (852) 2389 00 22  
Tlx : 67437 TCA HX  
Fax : (852) 2797 80 81

### INDIA

**THOMSON COMPONENTS ASIA Ltd**  
India Representative Office  
C 310 blue cross chambers  
Infantry road cross  
BANGALORE - 560001 INDIA  
Tel. : (91 80) 555 0566  
Fax : (91 80) 555-0566

### SINGAPORE

**THOMSON-CSF SE ASIA Pte Ltd**  
171 Kallang Way n° 03-08  
Kolam Ayer Industrial Park  
SINGAPORE 349250  
Tel. : (65) 741 90 88  
Tlx : RS 35898 TCSEA  
Fax : (65) 741 92 88

### TAIWAN

**THOMSON ELECTRONIC PARTS COMPONENTS Lts**  
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TAIWAN ROC  
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