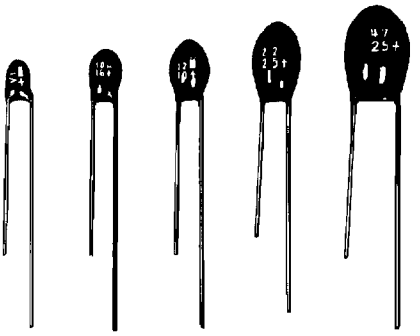
EF Series

Resin Dipped Tantalum



FEATURES

- **Endurance : 1 000h at +85°C with Voltage rating / at +105°C with voltage derating**
- **Operating Temperature : −40 to +105°C with voltage derating**
- **Taping for automatic insertion**

SPECIFICATIONS

Item	Performance Characteristics
Operating Temperature Range	
Rated Working Voltage Range	4V to 50V DC
Nominal Capacitance Range	0.047μF to 470μF (120Hz, +20°C)
Capacitance Tolerance	±20% or ±10% (120Hz, +20°C)
DC Leakage Current	I = 0.008C·V or 0.05 [μA] whichever is greater measured after a 2 minute application of rated working voltage at +20°C. (C = nominal capacitance in micro-farads, V = rated working voltage in volts)
Tangent of Loss Angle	Tan δ (120Hz, +20°C)
Rated and Derated Voltage	
Surge Voltage	
Characteristics at High and Low Temperature	

Operating Temperature	Conditions
-55°C to +105°C	Voltage derating for ratings ≥ 10V DC
-55°C to +85°C	Voltage rating

4V rating	≤ 0.1		
≥ 6.3V rating	≤ 1μF	>1μF - <100μF	≥ 100μF
	≤ 0.04	≤ 0.06	≤ 0.08

Working voltage [V]						
Rated	10	16	25	35	50	
Derated	8.1	13	20.5	28.5	41	

Rated Working Voltage [V]	4	6.3	10	16	25	35	50
Surge Voltage [V]	5	8	13	20	32	44	63

−55°C	Capacitance change	≤ ±10% of initial measured value at +20°C
+85°C	Leakage Current	≤ 10 times of initial specified value
	Capacitance change	≤ ±10% of initial measured value at +20°C

SPECIFICATIONS (continued)

Item	Performance Characteristics
Moisture Resistance	Test Conditions Relative humidity: 90% to 95% Temperature: +40°C Duration: 500 h Post test requirements at +20°C Leakage current: ≤ 0.012CV or 0.75 [μA] whichever is greater Capacitance change: < ±10% of initial measured value tan δ: < 150% of initial specified value
Endurance	Test conditions : either derating or rating

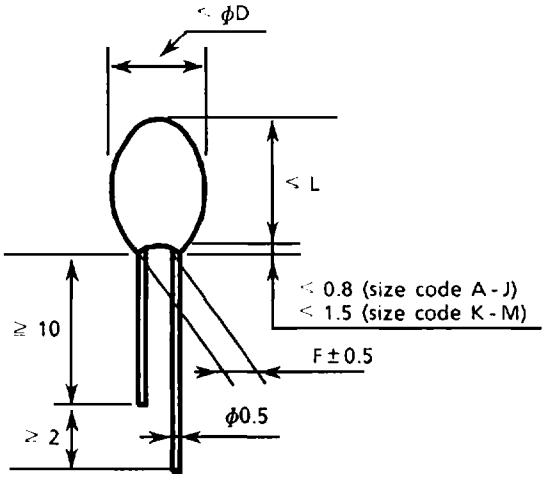
Item \ Conditions	Derating	Rating
Duration	1 000 h +48, −0 h	2 000 h +48, −0 h
Ambient temperature	+105°C ±2°C	+85°C ±2°C
Applied voltage	Derated working voltage	Rated working voltage
Source impedance	1Ω/V	1Ω/V

Post test requirements at +20°C

Leakage current	≤ 0.01C·V or 0.625 [μA]
Capacitance change	≤ ±10% of initial measured value
tan δ	≤ Initial specified value

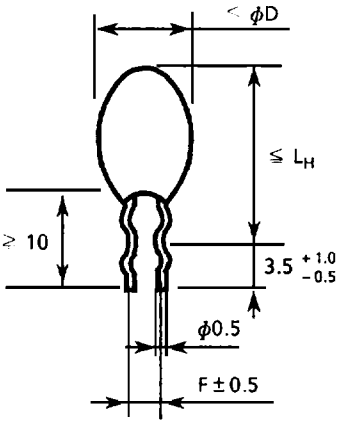
Dimensions

■Straight Leads



Size Code	ϕD	L	F
A	3.3	5.0	2.5 ± 0.5
B	3.3	5.5	2.5 ± 0.5
C	3.5	5.5	2.5 ± 0.5
D	3.7	6.5	2.5 ± 0.5
E	4.0	7.0	2.5 + 1.0, − 0.5
F	4.5	7.0	2.5 + 1.0, − 0.5
G	4.7	8.0	2.5 + 1.0, − 0.5
H	5.2	8.5	2.5 + 1.0, − 0.5
I	5.5	9.5	2.5 + 1.0, − 0.5
J	6.0	11.0	2.5 + 1.0, − 0.5
K	7.5	12.5	5.0 ± 0.5
L	9.0	14.5	5.0 ± 0.5
M	10.0	15.5	5.0 ± 0.5

■Snap-in Leads (Not standard)



Size Code	φD	L_H	F
A	4.5	10.0	5.0±0.5
B	4.5	10.5	5.0±0.5
C	4.5	10.5	5.0±0.5
D	5.0	11.5	5.0±0.5
E	5.5	12.0	5.0±0.5
F	5.5	12.0	5.0±0.5
G	6.0	13.0	5.0±0.5
H	6.0	13.5	5.0±0.5
I	7.0	14.5	5.0±0.5
J	7.5	16.0	5.0±0.5

PART NUMBER SYSTEM

E C S F □ □ E □ □ □ □ □

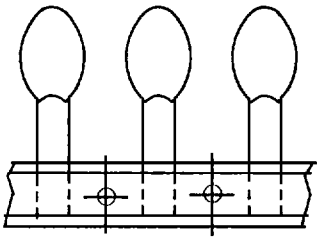
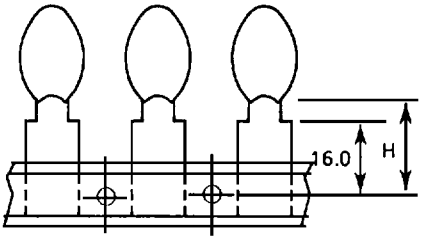
W.V. Code			
Code	W. V.	Code	W. V.
0G	4V	1E	25V
0J	6.3V	1V	35V
1A	10V	1H	50V
1C	16V	–	–

Capacitance Code in pF	
First two digits	Significant figures
Third digit	Number of zeros to follow

Cap. Tol. Code	
(None)	±20%
K	±10%

※ Not standard

Suffix for Configuration

Suffix	Configuration	Packaging
(none)	Long lead	Bulk
※E	Snap-in leads	Bulk
※B1	Taping  Lead spacing: 2.5mm; Size code: A-I	Fan fold box Quantity: 2 000 pcs/box
※BB	Taping  **For new design,** it is recommended to select suffix BB.	Fan fold box Quantity: 2 000 pcs/box
※B		

Suffix	Lead spacing	Dim. H	Size code
BB	5mm	18.5mm	A-I
B	5mm	21.5mm	A-I

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz, +20°C) [μF]	Part Number	Size Code	Leakage Current : ≦ (+20°C) [μF]
4	6.8	ECSF0GE685K	C	0.3
	10	ECSF0GE106K	C	0.4
	15	ECSF0GE156K	D	0.5
	22	ECSF0GE226K	E	0.8
	33	ECSF0GE336K	F	1.1
	47	ECSF0GE476K	G	1.6
	68	ECSF0GE686	H	2.2
	100	ECSF0GE107	I	3.2
	150	ECSF0GE157	J	4.8
	220	ECSF0GE227	K	7.1
	330	ECSF0GE337	L	10.6
	470	ECSF0GE477	M	15.1
6.3	4.7	ECSF0JE475K	C	0.3
	6.8	ECSF0JE685K	C	0.4
	10	ECSF0JE106K	D	0.6
	15	ECSF0JE156K	E	0.8
	22	ECSF0JE226K	F	1.2
	33	ECSF0JE336K	G	1.7
	47	ECSF0JE476	H	2.4
	68	ECSF0JE686	I	3.5
	100	ECSF0JE107	J	5.1
	150	ECSF0JE157	K	7.6
	220	ECSF0JE227	L	11.1
	330	ECSF0JE337	M	16.7
10	2.2	ECSF1AE225K	B	0.2
	3.3	ECSF1AE335K	C	0.3
	4.7	ECSF1AE475K	C	0.4
	6.8	ECSF1AE685K	D	0.6
	10	ECSF1AE106K	E	0.8
	15	ECSF1AE156K	F	1.2
	22	ECSF1AE226K	G	1.8
	33	ECSF1AE336K	H	2.7
	47	ECSF1AE476K	I	3.8
	68	ECSF1AE686	J	5.5
	100	ECSF1AE107	K	8.0
	150	ECSF1AE157	L	12.0
	220	ECSF1AE227	M	17.6

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz, +20°C) [μF]	Part Number	Size Code	Leakage Current : ≦ (+20°C) [μA]
16	1	ECSF1CE105K	A	0.2
	1.5	ECSF1CE155K	B	0.2
	2.2	ECSF1CE225K	C	0.3
	3.3	ECSF1CE335K	C	0.5
	4.7	ECSF1CE475K	D	0.7
	6.8	ECSF1CE685K	E	0.9
	10	ECSF1CE106K	F	1.3
	15	ECSF1CE156K	G	2.0
	22	ECSF1CE226K	H	2.9
	33	ECSF1CE336K	I	4.3
	47	ECSF1CE476	J	6.1
	68	ECSF1CE686	K	8.8
	100	ECSF1CE107	L	12.8
	150	ECSF1CE157	M	19.2
25	1.5	ECSF1EE155K	C	0.3
	2.2	ECSF1EE225K	C	0.5
	3.3	ECSF1EE335K	D	0.7
	4.7	ECSF1EE475K	E	1.0
	6.8	ECSF1EE685K	F	1.4
	10	ECSF1EE106K	H	2.0
	15	ECSF1EE156K	I	3.0
	22	ECSF1EE226	J	4.4
	33	ECSF1EE336	K	6.6
	47	ECSF1EE476	L	9.4
	68	ECSF1EE686	M	13.6

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz, +20°C) [μF]	Part Number	Size Code	Leakage Current : ≤ (+20°C) [μA]
35	0.047	ECSF1VE473	A	0.05
	0.068	ECSF1VE683	A	0.05
	0.1	ECSF1VE104	A	0.05
	0.15	ECSF1VE154	A	0.05
	0.22	ECSF1VE224	A	0.07
	0.33	ECSF1VE334	A	0.1
	0.47	ECSF1VE474	B	0.2
	0.68	ECSF1VE684	B	0.2
	1	ECSF1VE105K	C	0.3
	1.5	ECSF1VE155K	C	0.5
	2.2	ECSF1VE225K	D	0.7
	3.3	ECSF1VE335K	E	1.0
	4.7	ECSF1VE475K	F	1.4
	6.8	ECSF1VE685K	H	2.0
	10	ECSF1VE106K	I	2.8
	15	ECSF1VE156	J	4.2
	22	ECSF1VE226	K	6.2
	33	ECSF1VE336	L	9.3
	47	ECSF1VE476	M	13.2
50	0.1	ECSF1HE104	A	0.05
	0.15	ECSF1HE154	A	0.06
	0.22	ECSF1HE224	B	0.09
	0.33	ECSF1HE334	C	0.2
	0.47	ECSF1HE474	D	0.2
	0.68	ECSF1HE684	D	0.3
	1	ECSF1HE105K	E	0.4
	1.5	ECSF1HE155K	F	0.6
	2.2	ECSF1HE225K	G	0.9
	3.3	ECSF1HE335K	H	1.4
	4.7	ECSF1HE475K	I	1.9
	6.8	ECSF1HE685	K	2.8
	10	ECSF1HE106	L	4.0
	15	ECSF1HE156	M	6.0