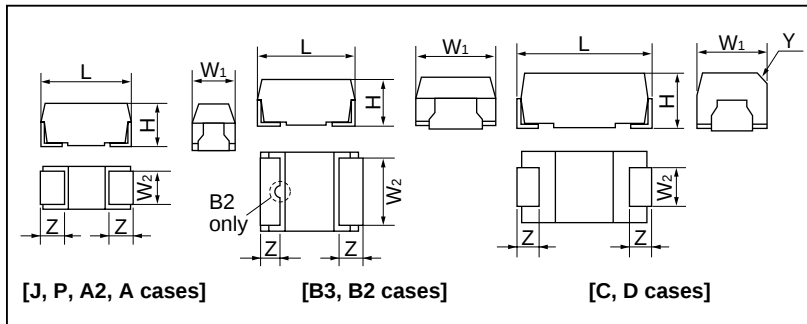


E/S V Series Tantalum Chip Capacitors

DIMENSIONS [mm]



(Unit: mm)

Case Code	EIA code	L	W ₁	W ₂	H	Z	Y
J	—	1.6 ± 0.1	0.8 ± 0.1	0.6 ± 0.1	0.8 ± 0.1	0.3 ± 0.15	
P	2012	2.0 ± 0.1	1.25 ± 0.2	0.9 ± 0.2	1.1 ± 0.1	0.5 ± 0.1	
A2 (U)	3216L	3.2 ± 0.2	1.6 ± 0.2	1.2 ± 0.1	1.1 ± 0.1	0.8 ± 0.2	
A	3216H	3.2 ± 0.2	1.6 ± 0.2	1.2 ± 0.1	1.6 ± 0.2	0.8 ± 0.2	
B3 (W)	—	3.5 ± 0.2	2.8 ± 0.2	2.2 ± 0.1	1.1 ± 0.1	0.8 ± 0.2	
B2 (S)	3528	3.5 ± 0.2	2.8 ± 0.2	2.3 ± 0.1	1.9 ± 0.2	0.8 ± 0.2	
C	6032	6.0 ± 0.2	3.2 ± 0.2	2.2 ± 0.1	2.5 ± 0.2	1.3 ± 0.2	0.4 C
D	7343	7.3 ± 0.2	4.3 ± 0.2	2.4 ± 0.1	2.8 ± 0.2	1.3 ± 0.2	0.5 C

(STANDARD C-V VALUE REFERENCE BY CASE CODE)

DC Rated Voltage (Vdc)	2.5	4	6.3	10	16	20	25	35
0.47					P	A2	A	A
0.68					P	A2	A	A
1.0				P	J, P	A2	A	A
1.5			P	J, P	A	A2		A
2.2			J	J, P	A2, A	A	A	B2
3.3		P	J	P, A2	A	A		B2
4.7			J, P, A	P, A2, A	A	A, B2	B2	C
6.8		J	P, A2	A	A, B3	B2		C
10	J	J, P	P, A2, A	A2, A, B2	A, B3, B2	B2	C	D
15		P	A2, A	B3	B2	C		D
22	P	P, A2, A	A, B3, B2	A, B3, B2	B2, C	C, D	D	
33	P	A	A, B3	B2	C	D		
47	A	A, B3	A, B3, B2, C	B2, C	C, D	D		
68	A	B3	B2	C	D			
100	B3, B2	B3, B2	B2, C	C, D	D			
150	B2	B2	C	D				
220	B2	C	C, D	D				
330	C	C	D					
470	C, D	D	D					
680		D						

PERFORMANCE CHARACTERISTICS

Operating temperature range

–55 to +125°C with proper voltage

derating as shown in the following table.

DC working voltage and surge voltage

Rated voltage	2.5	4	6.3	10	16	20	25	35	V
Working	at 85°C	2.5	4	6.3	10	16	20	25	35
	at 125°C	1.6	2.5	4	6.3	10	13	16	22
Surge	at 85°C	3.3	5.2	8	13	20	26	33	46

Capacitance (at 20°C, 120 Hz)

Range: 0.47 μF to 680 μF

Tolerance: ± 20%, (±10%)

Capacitance change with temperature

Not to exceed –12% at –55°C, +12% at 85°C, and +15% at 125°C

Tangent of loss angle (at 20°C, 120 Hz)

(Standard)

0.047 μF to 4.7 μF: less than 0.04

6.8 μF to 68 μF: less than 0.06

(Extended) (1)

2.5 Vdc to 10 Vdc: less than 0.08

16 Vdc to 35 Vdc: less than 0.06

DC leakage current (at 20°C)

0.01 C·V⁽²⁾ μA or 0.5 μA, whichever is greater

Damp heat (90 to 95% RH at 40°C, 56 days (1344 h))

Capacitance change: ±5% (±12%) (3)

Tangent of loss angle: 150% of initial requirements

DC leakage current: initial requirements

Endurance (at 85°C, DC rated voltage, 2000 h)

Capacitance change: ±10% (±12%) (3)

Tangent of loss angle: initial requirements

DC leakage current: 125% of initial requirements

Resistance to soldering heat

(solder reflow at 260°C, 10 s.

or solder dip at 260°C, 5 s.)

Capacitance change: +5% (+12%) (3)

Leakage current: initial requirements

Tangent of loss angle: initial requirements

NEC obtained IEC Qualification Approval on R

Series Standard Ratings in September 1987.

1. Refer to standard ratings for tangent of loss angle of the following items:

4 V/22 μF, 6.3 V/15 μF products in A2 case.

2.5 V/47 μF, 68 μF, 4 V/33 μF, 47 μF, 6.3 V/22 μF, 33 μF, 47 μF, 10 V/22 μF, 16 V/10 μF products in A case.

2.5 V/100 μF, 4 V/47 μF, 68 μF, 100 μF, 6.3 V/22 μF, 33 μF, 47 μF, 10 V/15 μF, 22 μF, 16 V/10 μF products in B3 case.

2.5 V/150 μF, 220 μF, 4 V/100 μF, 150 μF, 6.3 V/68 μF, 100 μF products in B2 case.

2.5 V/470 μF, 4 V/470 μF, 680 μF, 6.3 V/220 μF, 330 μF, 470 μF, 10 V/150 μF, 220 μF, 16 V/100 μF products in D case.

2. Product of capacitance in μF and voltage in V.

3. Capacitance change of ± 12% applies to

4 V/22 μF, 6.3 V/6.8 μF to 15 μF, 10 V/3.3 μF to 10 μF, 16 V/2.2 μF products in A2 case;

2.5 V/47 μF, 68 μF, 4 V/22 μF to 47 μF, 6.3 V/10 μF to 47 μF, 10 V/4.7 μF to 22 μF, 16 V/3.3 μF to 6.8 μF, 20 V/2.2 μF to 4.7 μF, 25 V/2.2 μF, 35 V/1 μF, 1.5 μF products in A case;

2.5 V/100 μF to 150 μF, 4 V/100 μF, 6.3 V/68 μF, 100 μF products in B2 case;

2.5 V/470 μF, 4 V/220 μF to 330 μF, 6.3 V/100 μF, 10 V/68 μF, 16 V/47 μF products in C case;

2.5 V/470 μF, 4 V/470 μF, 680 μF, 6.3 V/220 μF, 330 μF, 470 μF, 10 V/150 μF, 220 μF, 16 V/100 μF products in D case.

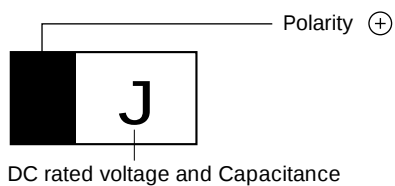
Capacitance change of ±15% applies to all products with the B3 case.

See pages 25 and 26 for taping specifications.

Markings

The standard marking shows capacitance, DC rated voltage, and polarity.

[J case]

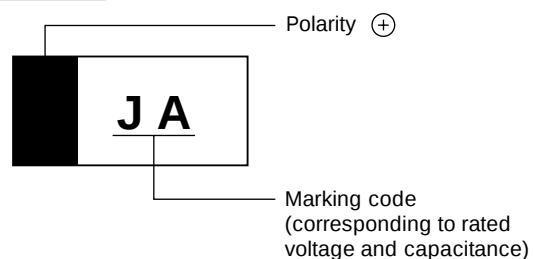


[J case Marking Code]

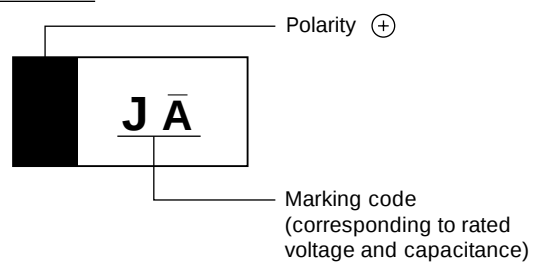
μF \ U _R	2.5 V	4 V	6.3 V	10 V	16 V
1					3
1.5				V	
2.2			7	<	
3.3			7		
4.7		0	J		
6.8		G			
10	e				

[P case]

up to 6.8 μF



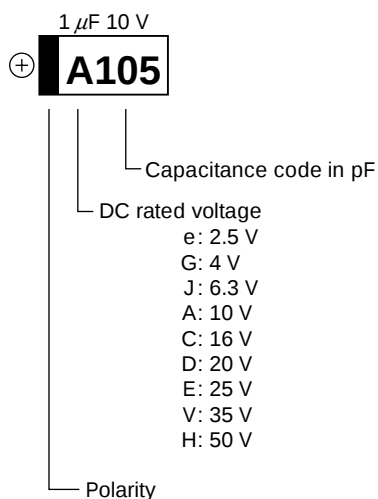
over 10 μF



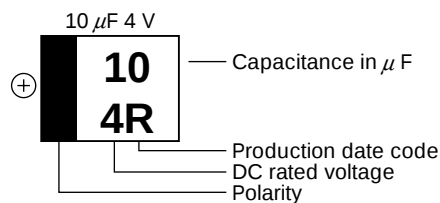
[P case Marking Code]

DC Rated Voltage (Vdc) \ μF	2.5	4	6.3	10	16
0.47					CS
0.68					CW
1				AA	CA
1.5			JE	AE	
2.2				AJ	
3.3		GN		AN	
4.7			JS	AS	
6.8			JW		
10		GA	JA		
15		GE			
22	eJ	GJ			
33	eN				

[A2, A case]



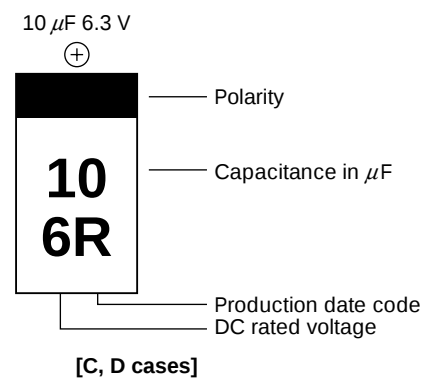
[B3, B2 case]



[Marking of production date code]

Y \ M	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2001	A	B	C	D	E	F	G	H	J	K	L	M
2002	N	P	Q	R	S	T	U	V	W	X	Y	Z
2003	a	b	c	d	e	f	g	h	j	k	l	m
2004	n	p	q	r	s	t	u	v	w	x	y	z

Note: Production date code will repeat beginning in 2005.



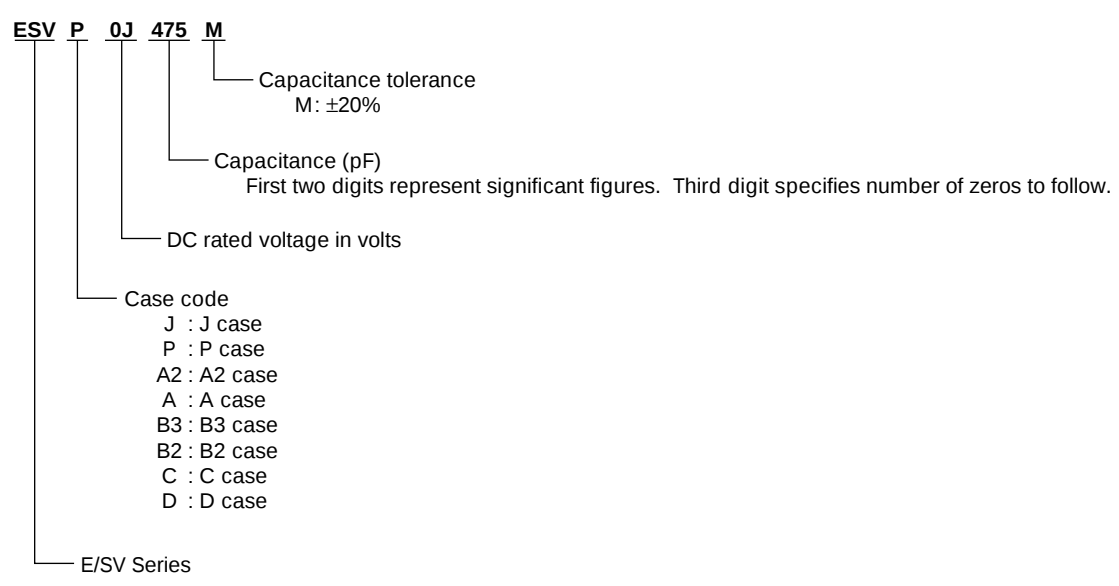
[Marking of production date code]

Y \ M	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2001	A	B	C	D	E	F	G	H	J	K	L	M
2002	N	P	Q	R	S	T	U	V	W	X	Y	Z
2003	a	b	c	d	e	f	g	h	j	k	l	m
2004	n	p	q	r	s	t	u	v	w	x	y	z

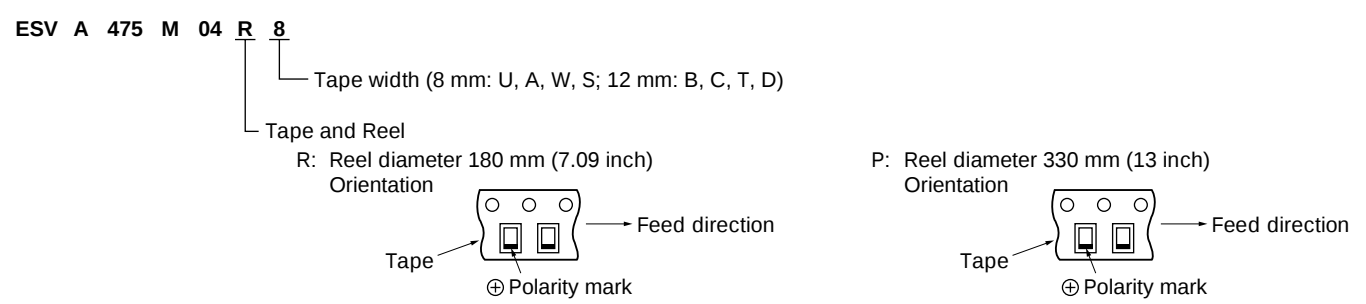
Note: Production date code will repeat beginning in 2005.

PART NUMBER SYSTEM

Bulk



Tape and Reel



STANDARD RATINGS

Part Number	Capacitance (μF)	Case Code	DC Leakage Current (μA)	Tangent of Loss Angle
2.5 V Rating				
ESVJ0E106M	10	J	0.5	0.2
ESVP0E226M	22	P	0.5	0.2
ESVP0E336M	33	P	0.8	0.2
ESVA0E476M	47	A	1.1	0.12
ESVA0E686M	68	A	1.7	0.18
ESVB30E107M	100	B3	2.5	0.18
ESVB20E107M	100	B2	2.5	0.08
ESVB20E157M	150	B2	3.7	0.16
ESVB20E227M	220	B2	5.5	0.18
ESVC0E337M	330	C	8.2	0.16
ESVC0E477M	470	C	11.7	0.18
ESVD0E477M	470	D	11.7	0.14
4 V Rating				
ESVP0G335M	3.3	P	0.5	0.2
ESVJ0G685M	6.8	J	0.5	0.2
ESVJ0G106M	10	J	0.5	0.2
ESVP0G106M	10	P	0.5	0.2
ESVP0G156M	15	P	0.6	0.2
ESVP0G226M	22	P	0.8	0.2
ESVP0G226M	22	P	0.8	0.12
ESVA20G226M	22	A2	0.8	0.08
ESVA0G336M	33	A	1.3	0.1
ESVA0G476M	47	A	1.8	0.12
ESVA0G476M	47	A	1.8	0.12
ESVB30G686M	68	B3	2.7	0.15
ESVB30G107M	100	B3	4	0.2
ESVB20G107M	100	B2	4	0.12
ESVB20G157M	150	B2	6	0.18
ESVC0G227M	220	C	8.8	0.12
ESVC0G337M	330	C	13.2	0.14
ESVD0G477M	470	D	18.8	0.16
ESVD0G687M	680	D	27.2	0.24
6.3 V Rating				
ESVP0J155M	1.5	P	0.5	0.1
ESVJ0J225M	2.2	J	0.5	0.2
ESVJ0J335M	3.3	J	0.5	0.2
ESVJ0J475M	4.7	J	0.5	0.2
ESVP0J475M	4.7	P	0.5	0.2
ESVA0J475M	4.7	A	0.5	0.08
ESVP0J685M	6.8	P	0.5	0.2
ESVA20J685M	6.8	A2	0.5	0.08
ESVP0J106M	10	P	0.6	0.2
ESVA20J106M	10	A2	0.6	0.08
ESVA0J106M	10	A	0.6	0.08
ESVA20J156M	15	A2	0.9	0.12
ESVA0J156M	15	A	0.9	0.08
ESVA0J226M	22	A	1.3	0.1
ESVB30J226M	22	B3	1.3	0.08
ESVB20J226M	22	B2	1.3	0.08
ESVA0J336M	33	A	2	0.12
ESVB30J336M	33	B3	2	0.12
ESVA0J476M	47	A	3	0.12
ESVB30J476M	47	B3	2.9	0.12
ESVB20J476M	47	B2	3	0.08
ESVC0J476M	47	C	3	0.08
ESVB20J676M	67	B2	4.2	0.1
ESVB20J107M	100	B2	6.3	0.12
ESVC0J107M	100	C	6.3	0.1
ESVC0J157M	150	C	9.4	0.1
ESVC0J227M	220	C	13.8	0.14
ESVD0J227M	220	D	13.8	0.12
ESVD0J337M	330	D	20.7	0.14
ESVD0J477M	470	D	29.7	0.2
10 V Rating				
ESVP1A105M	1	P	0.5	0.1
ESVJ1A155M	1.5	J	0.5	0.2
ESVP1A155M	1.5	P	0.5	0.2
ESVJ1A225M	2.2	J	0.5	0.2
ESVP1A225M	2.2	P	0.5	0.2
ESVP1A335M	3.3	P	0.5	0.2
ESVA21A335M	3.3	A2	0.5	0.08
ESVP1A475M	4.7	P	0.5	0.2
ESVA21A475M	4.7	A2	0.5	0.08
ESVA1A475M	4.7	A	0.5	0.08
ESVA1A685M	6.8	A	0.6	0.08
ESVA21A106M	10	A2	1	0.08
ESVA1A106M	10	A	1	0.08
ESVB21A106M	10	B2	1	0.08

Part Number	Capacitance (μF)	Case Code	DC Leakage Current (μA)	Tangent of Loss Angle
10 V Rating				
ESVB31A156M	15	B3	1.5	0.12
ESVA1A226M	22	A	2.2	0.12
ESVB21A226M	22	B2	2.2	0.12
ESVB21A226M	22	B2	2.2	0.08
ESVB21A336M	33	B2	3.3	0.08
ESVB21A476M	47	B2	4.7	0.08
ESVC1A476M	47	C	4.7	0.08
ESVC1A686M	68	C	6.8	0.08
ESVC1A107M	100	C	10	0.1
ESVD1A107M	100	D	10	0.08
ESVD1A157M	150	D	15	0.1
ESVD1A227M	220	D	22	0.12
16 V Rating				
ESVP1C474M	0.47	P	0.5	0.1
ESVP1C684M	0.68	P	0.5	0.1
ESVJ1C105M	1	J	0.5	0.1
ESVP1C105M	1	P	0.5	0.1
ESVA1C155M	1.5	A	0.5	0.04
ESVA21C225M	2.2	A2	0.5	0.06
ESVA1C225M	2.2	A	0.5	0.06
ESVA1C335M	3.3	A	0.5	0.06
ESVA1C475M	4.7	A	0.7	0.06
ESVA1C685M	6.8	A	1	0.06
ESVB31C685M	6.8	B3	1	0.06
ESVA1C106M	10	A	1.6	0.08
ESVB31C106M	10	B3	1.6	0.08
ESVB21C106M	10	B2	1.6	0.08
ESVB21C156M	15	B2	2.4	0.06
ESVB21C226M	22	B2	3.5	0.08
ESVC1C226M	22	C	3.5	0.06
ESVC1C336M	33	C	5.2	0.06
ESVC1C476M	47	C	7.5	0.06
ESVD1C476M	47	D	7.5	0.08
ESVD1C686M	68	D	10.8	0.06
ESVD1C107M	100	D	16	0.1
20 V Rating				
ESVA21D474M	0.47	A2	0.5	0.06
ESVA21D684M	0.68	A2	0.5	0.06
ESVA21D105M	1	A2	0.5	0.06
ESVA21D155M	1.5	A2	0.5	0.06
ESVA1D225M	2.2	A	0.5	0.06
ESVA1D335M	3.3	A	0.6	0.06
ESVA1D475M	4.7	A	0.9	0.06
ESVB21D475M	4.7	B2	0.9	0.06
ESVB21D685M	6.8	B2	1.3	0.06
ESVB21D106M	10	B2	2	0.06
ESVC1D156M	15	C	3	0.06
ESVC1D226M	22	C	4.4	0.06
ESVD1D226M	22	D	4.4	0.06
ESVD1D336M	33	D	6.6	0.06
ESVD1D476M	47	D	9.4	0.06
25 V Rating				
ESVA1E474M	0.47	A	0.5	0.04
ESVA1E684M	0.68	A	0.5	0.06
ESVA1E105M	1	A	0.5	0.06
ESVA1E225M	2.2	A	0.5	0.06
ESVB21E475M	4.7	B2	1.1	0.06
ESVC1E106M	10	C	2.5	0.06
ESVD1E226M	22	D	5.5	0.06
35 V Rating				
ESVA1V474M	0.47	A	0.5	0.06
ESVA1V684M	0.68	A	0.5	0.06
ESVA1V105M	1	A	0.5	0.06
ESVA1V155M	1.5	A	0.5	0.06
ESVB21V225M	2.2	B2	0.7	0.06
ESVB21V335M	3.3	B2	1.1	0.06
ESVC1V475M	4.7	C	1.6	0.06
ESVC1V685M	6.8	C	2.3	0.06
ESVD1V106M	10	D	3.5	0.06
ESVD1V156M	15	D	5.2	0.06

Notes:

Part numbers are for ±20% capacitance tolerance.