

# Solid Tantalum Chip Capacitors TANTAMOUNT<sup>®</sup>, Hi-Rel COTS, Ultra-Low ESR, Conformal Coated Case



## FEATURES

- High reliability; Weibull failure rate grading available
- Surge current testing per MIL-PRF-55365 options available
- Ultra-low ESR
- Tin/lead (SnPb) termination available
- Mounting: Surface mount
- Compliant to RoHS Directive 2002/95/EC


**RoHS\***  
COMPLIANT

## Note

\* Pb containing terminations are not RoHS compliant, exemptions may apply

## PERFORMANCE CHARACTERISTICS

[www.vishay.com/doc?40088](http://www.vishay.com/doc?40088)

**Operating Temperature:** - 55 °C to + 85 °C  
(To + 125 °C with voltage derating)

**Capacitance Range:** 10 µF to 1500 µF

**Capacitance Tolerance:** ± 10 %, ± 20 % standard

**Voltage Rating:** 4 V<sub>DC</sub> to 75 V<sub>DC</sub>

## ORDERING INFORMATION

T97	R	227	K	020	E	S	A
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	TERMINATION/ PACKAGING (available options are series dependent)	RELIABILITY LEVEL	SURGE CURRENT
	See Ratings and Case Code table	This is expressed in pF. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 %	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V).	E = Sn/Pb solder/ 7" (178 mm) reel L = Sn/Pb solder/ 7" (178 mm), 1/2 reel C = 100 % tin/ 7" (178 mm), reel H = 100 % tin/ 7" (178 mm), 1/2 reel	A = 1.0 % Weibull B = 0.1 % Weibull <sup>(1)</sup> S = 40 h burn-in Z = Non-established reliability	A = 10 cycles at + 25 °C B = 10 cycles at - 55 °C/ + 85 °C S = 3 cycles at 25 °C

## Notes

- <sup>(1)</sup> Available on select ratings. See "Standard Ratings" table.
- We reserve the right to supply higher voltage ratings and tighter capacitance tolerance capacitors in the same case size.

## DIMENSIONS in inches [millimeters]

CASE CODE	L (MAX.)	W	H	A	B	D (REF.)	J (MAX.)
V	0.299 [7.6]	0.173 ± 0.016 [4.4 ± 0.4]	0.079 [2.0 max.]	0.051 ± 0.012 [1.3 ± 0.3]	0.181 ± 0.024 [4.6 ± 0.6]	0.252 [6.4]	0.004 [0.1]
D	0.299 [7.6]	0.173 ± 0.016 [4.4 ± 0.4]	0.138 [3.5 max.]	0.051 ± 0.012 [1.3 ± 0.3]	0.181 ± 0.024 [4.6 ± 0.6]	0.252 [6.4]	0.004 [0.1]
E	0.299 [7.6]	0.173 ± 0.016 [4.4 ± 0.4]	0.157 ± 0.016 [4.0 ± 0.4]	0.051 ± 0.012 [1.3 ± 0.3]	0.181 ± 0.024 [4.6 ± 0.6]	0.252 [6.4]	0.004 [0.1]
R	0.299 [7.6]	0.238 ± 0.016 [6.0 ± 0.4]	0.142 ± 0.016 [3.6 ± 0.4]	0.051 ± 0.012 [1.3 ± 0.3]	0.181 ± 0.024 [4.6 ± 0.6]	0.244 [6.2]	0.004 [0.1]
F	0.299 [7.6]	0.238 ± 0.016 [6.0 ± 0.4]	0.185 ± 0.016 [4.7 ± 0.4]	0.055 ± 0.016 [1.4 ± 0.4]	0.181 ± 0.024 [4.6 ± 0.6]	0.244 [6.2]	0.004 [0.1]
Z	0.299 [7.6]	0.238 ± 0.016 [6.0 ± 0.4]	0.236 ± 0.016 [6.0 ± 0.4]	0.055 ± 0.016 [1.4 ± 0.4]	0.181 ± 0.024 [4.6 ± 0.6]	0.244 [6.2]	0.004 [0.1]
M	0.315 [8]	0.260 ± 0.016/- 0.024 [6.6 ± 0.4/- 0.6]	0.142 ± 0.016 [3.6 ± 0.4]	0.051 ± 0.012 [1.3 ± 0.3]	0.197 ± 0.024 [5.0 ± 0.6]	0.260 [6.6]	0.004 [0.1]
H	0.315 [8]	0.260 ± 0.016/- 0.024 [6.6 ± 0.4/- 0.6]	0.205 ± 0.016 [5.2 ± 0.4]	0.055 ± 0.016 [1.4 ± 0.4]	0.197 ± 0.024 [5.0 ± 0.6]	0.260 [6.6]	0.004 [0.1]
N	0.315 [8.0]	0.259 ± 0.016/- 0.024 [6.6 ± 0.4/- 0.6]	0.252 ± 0.016 [6.4 ± 0.4]	0.056 ± 0.017 [1.4 ± 0.4]	0.196 ± 0.025 [5.0 ± 0.6]	0.259 [6.6]	0.004 [0.1]

## Note

- The anode termination (D less B) will be a minimum of 0.012" [0.3 mm]

**RATINGS AND CASE CODES**

$\mu\text{F}$	4 V	6.3 V	10 V	16 V	20 V	25 V	35 V	50 V	63 V	75 V
10									D	R
15								E/R	R	
22								R	F	
33								F		
47							R	Z/N		
68						R	F			
100						F	F			
150						F				
220				E	R	M				
330		V	E	F	H/F					
470	V	E	E	H						
680	E	E	R							
1000	E/R	R	F							
1500	R									

**STANDARD RATINGS**

CAPACITANCE ( $\mu\text{F}$ )	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C ( $\mu\text{A}$ )	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (m $\Omega$ )	MAX. RIPPLE 100 kHz $I_{\text{RMS}}$ (A)	AVAILABLE RELIABILITY LEVELS
<b>4 V<sub>DC</sub> AT + 85 °C; 2.7 V<sub>DC</sub> AT + 125 °C</b>							
470	V	T97V477(1)004(2)(4)(5)	18.8	8	60	2.2	A, B, S, Z
680	E	T97E687(1)004(2)(4)(5)	27.2	6	25	2.9	A, B, S, Z
1000	E	T97E108(1)004(2)(4)(5)	40.0	8	20	3.3	A, B, S, Z
1000	R	T97R108(1)004(2)(4)(5)	40.0	8	18	3.7	A, B, S, Z
1500	R	T97R158(1)004(2)(4)(5)	60.0	8	24	2.9	A, B, S, Z
<b>6.3 V<sub>DC</sub> AT + 85 °C; 4 V<sub>DC</sub> AT + 125 °C</b>							
330	V	T97V337(1)6R3(2)(4)(5)	20.8	8	56	2.0	A, B, S, Z
470	E	T97E477(1)6R3(2)(4)(5)	29.6	6	30	2.7	A, B, S, Z
680	E	T97E687(1)6R3(2)(4)(5)	42.8	6	25	2.9	A, B, S, Z
1000	R	T97R108(1)6R3(2)(4)(5)	63.0	8	31	2.8	A, B, S, Z
<b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b>							
330	E	T97E337(1)010(2)(4)(5)	33.0	6	35	2.5	A, B, S, Z
470	E	T97E477(1)010(2)(4)(5)	47.0	6	28	2.8	A, B, S, Z
680	R	T97R687(1)010(2)(6)(5)	68.0	6	28	3.0	S, Z
1000	F	T97F108(1)010(2)(3)(5)	100.0	20	120	1.4	A, S, Z
<b>16 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b>							
220	E	T97E227(1)016(2)(4)(5)	35.2	8	60	2.3	A, B, S, Z
330	F	T97F337(1)016(2)(4)(5)	52.8	10	100	1.6	A, B, S, Z
470	H	T97H477(1)016(2)(4)(5)	75.2	14	100	1.4	A, B, S, Z
<b>20 V<sub>DC</sub> AT + 85 °C; 13 V<sub>DC</sub> AT + 125 °C</b>							
220	R	T97R227(1)020(2)(4)(5)	44.0	8	80	1.8	A, B, S, Z
330	F	T97F337(1)020(2)(6)(5)	66.0	10	100	1.6	S, Z
330	H	T97H337(1)020(2)(4)(5)	66.0	10	100	1.6	A, B, S, Z
<b>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b>							
68	R	T97R686(1)025(2)(4)(5)	17.0	6	100	1.6	A, B, S, Z
100	F	T97F107(1)025(2)(4)(5)	25.0	8	100	1.6	A, B, S, Z

**Note**

- Part number definitions:
  - (1) Capacitance tolerance: K, M
  - (2) Termination and packaging: C, E, H, L
  - (3) Reliability level: A, S, Z
  - (4) Reliability level: A, B, S, Z
  - (5) Surge current: A, B, S
  - (6) Reliability level: S, Z

**STANDARD RATINGS**

CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C ( $\mu$ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (m $\Omega$ )	MAX. RIPPLE 100 kHz I <sub>RMS</sub> (A)	AVAILABLE RELIABILITY LEVELS
<b>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b>							
150	F	T97F157(1)025(2)(4)(5)	37.5	8	80	1.8	A, B, S, Z
220	M	T97M227(1)025(2)(3)(5)	55.0	8	100	1.6	A, S, Z
<b>35 V<sub>DC</sub> AT + 85 °C; 23 V<sub>DC</sub> AT + 125 °C</b>							
47	R	T97R476(1)035(2)(4)(5)	16.5	6	100	1.6	A, B, S, Z
68	F	T97F686(1)035(2)(3)(5)	23.8	6	100	1.6	A, S, Z
100	F	T97F107M035(2)(3)(5)	35.0	8	100	1.6	A, S, Z
<b>50 V<sub>DC</sub> AT + 85 °C; 33 V<sub>DC</sub> AT + 125 °C</b>							
15	E	T97E156(1)050(2)(4)(5)	7.5	6	350	0.9	A, B, S, Z
15	R	T97R156(1)050(2)(4)(5)	7.5	6	250	1.0	A, B, S, Z
22	R	T97R226(1)050(2)(4)(5)	11.0	6	220	1.1	A, B, S, Z
33	F	T97F336(1)050(2)(3)(5)	16.5	6	150	1.3	A, S, Z
47	Z	T97Z476(1)050(2)(6)(5)	23.5	6	240	1.1	S, Z
47	N	T97N476(1)050(2)(4)(5)	23.5	6	150	1.4	A, B, S, Z
<b>63 V<sub>DC</sub> AT + 85 °C; 42 V<sub>DC</sub> AT + 125 °C</b>							
10	D	T97D106(1)063(2)(3)(5)	6.3	6	400	0.6	A, S, Z
15	R	T97R156(1)063(2)(3)(5)	9.5	6	400	0.8	A, S, Z
22	F	T97F226(1)063(2)(3)(5)	13.9	6	250	1.0	A, S, Z
<b>75 V<sub>DC</sub> AT + 85 °C; 50 V<sub>DC</sub> AT + 125 °C</b>							
10	R	T97R106(1)075(2)(6)(5)	7.5	6	500	0.7	S, Z

**Note**

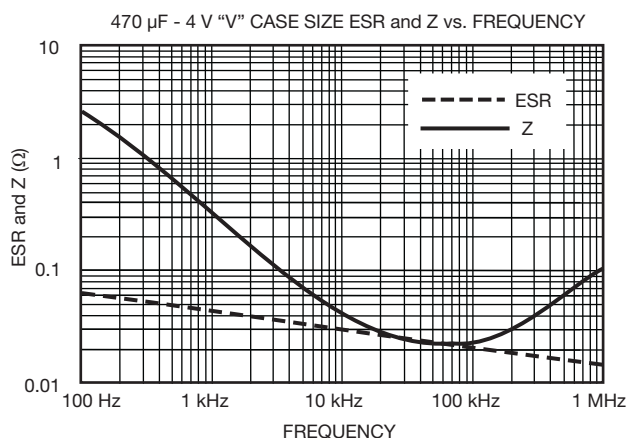
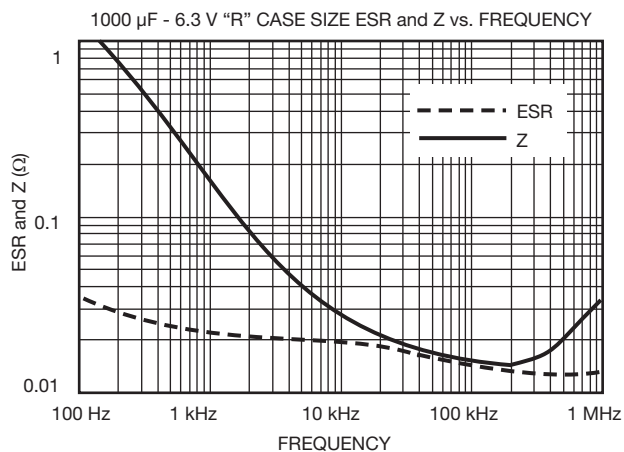
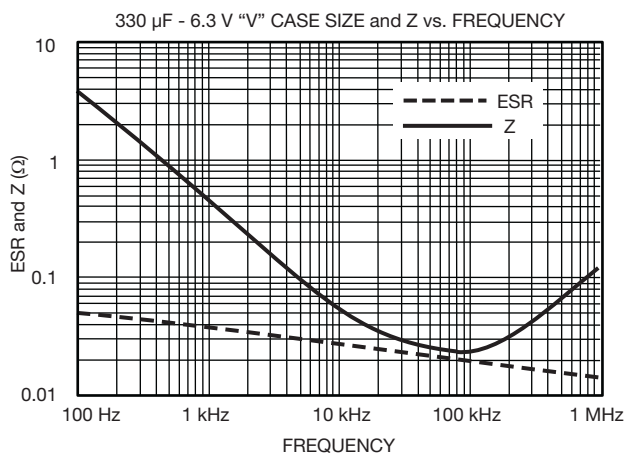
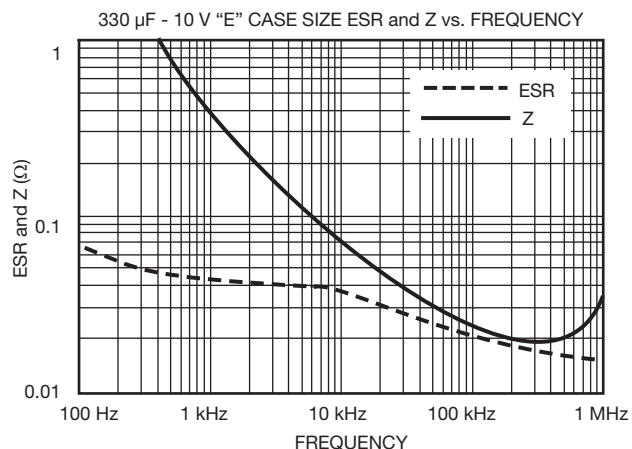
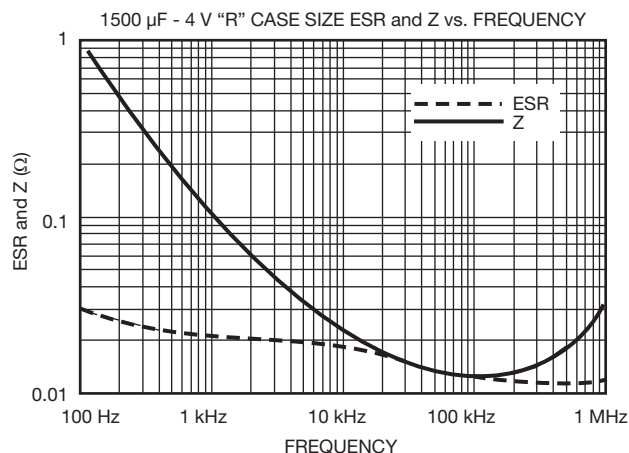
- Part number definitions:
  - (1) Capacitance tolerance: K, M
  - (2) Termination and packaging: C, E, H, L
  - (3) Reliability level: A, S, Z
  - (4) Reliability level: A, B, S, Z
  - (5) Surge current: A, B, S
  - (6) Reliability level: S, Z

**RECOMMENDED VOLTAGE DERATING GUIDELINES** (for temperatures below + 85 °C)**STANDARD CONDITIONS. FOR EXAMPLE: OUTPUT FILTERS**

Capacitor Voltage Rating	Operating Voltage
4.0	2.5
6.3	3.6
10	6.0
16	10
20	12
25	15
35	24
50	28
63	37.8
75	45

**SEVERE CONDITIONS. FOR EXAMPLE: INPUT FILTERS**

Capacitor Voltage Rating	Operating Voltage
4.0	2.5
6.3	3.3
10	5.0
16	8.0
20	10
25	12
35	15
50	24
63	32
75	37

**TYPICAL CURVES**


**POWER DISSIPATION**

CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR
V	0.141
D	0.215
E	0.240
R, F, M	0.250
Z	0.265
H	0.265
N	0.280

**STANDARD PACKAGING QUANTITY**

CASE CODE	UNITS PER REEL	
	7" FULL REEL	7" HALF REEL
V	1000	500
D	400	200
E	500	250
R	300	150
F	250	125
Z	250	125
M	200	100
H	200	100
N	200	100

**PRODUCT INFORMATION**

Conformal Coated Guide	<a href="http://www.vishay.com/doc?40150">www.vishay.com/doc?40150</a>
Pad Dimensions	
Packaging Dimensions	
Moisture Sensitivity	<a href="http://www.vishay.com/doc?40135">www.vishay.com/doc?40135</a>
<b>SELECTOR GUIDES</b>	
Solid Tantalum Selector Guide	<a href="http://www.vishay.com/doc?49053">www.vishay.com/doc?49053</a>
<b>FAQ</b>	
Frequently Asked Questions	<a href="http://www.vishay.com/doc?40110">www.vishay.com/doc?40110</a>



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