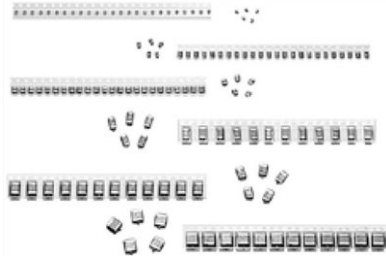


# Solid Tantalum Chip Capacitors, TANTAMOUNT<sup>®</sup>, Conformal Coated, Maximum CV, Low ESR



## FEATURES

- Large capacitance rating range
- Mounting: Surface mount
- Lowest ESR for a surface mount tantalum chip capacitor
- Terminations: 100 % tin (2) standard; tin/lead available
- 8 mm, 12 mm tape and reel packaging available per EIA 481 and reeling per IEC 60286-3. 7" [178 mm] standard. 13" [330 mm] available.
- Case code compatibility with EIA 535BAAC and CECC 30801
- Material categorization: For definitions please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS\***  
COMPLIANT

## Note

\* Lead (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:** 1.0 µF to 1500 µF

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

**Voltage Rating:** 4 V<sub>DC</sub> to 50 V<sub>DC</sub>

**Equivalent Series Resistance:** ESR readings measured at 100 kHz, + 25 °C from 3500 mΩ to 30 mΩ

## ORDERING INFORMATION

594D	477	X0	004	R	2	T
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	TERMINATION	REEL SIZE AND PACKAGING
	This is expressed in pF. The first two digits are the significant figures. The third is the number of zeros to follow.	<b>X0 = ± 20 %</b> X9 = ± 10 %	This is expressed in V. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V).	See Ratings and Case Code table	<b>2 = 100 % tin</b> 4 = Gold plated 8 = Solder plated (60/40) Special order	<b>Tape and reel</b> <b>T = 7" [178 mm] reel</b> W = 13" [330 mm] reel

## Note

- Preferred tolerances and reel sizes are in bold. 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 <sub>MAX.</sub>	W	H	A	B	D <sub>REF.</sub>	J <sub>MAX.</sub>
B	0.157 [4.0]	0.110 + 0.012/- 0.016 [2.8 + 0.3/- 0.4]	0.075 + 0.012/- 0.024 [1.9 + 0.3/- 0.6]	0.031 ± 0.012 [0.8 ± 0.3]	0.098 ± 0.016 [2.5 ± 0.4]	0.138 [3.5]	0.004 [0.1]
C	0.280 [7.1]	0.126 ± 0.012 [3.2 ± 0.3]	0.098 ± 0.012 [2.5 ± 0.3]	0.051 ± 0.012 [1.3 ± 0.3]	0.181 ± 0.024 [4.6 ± 0.6]	0.236 [6.0]	0.004 [0.1]
D	0.295 [7.5]	0.169 + 0.012/- 0.024 [4.3 + 0.3/- 0.6]	0.110 ± 0.012 [2.8 ± 0.3]	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	0.283 [7.2]	0.236 + 0.012/- 0.024 [6.0 + 0.3/- 0.6]	0.138 + 0.012/- 0.016 [3.5 + 0.3/- 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]

## Note

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



RATINGS AND CASE CODES								
μF	4 V	6.3 V	10 V	16 V	20 V	25 V	35 V	50 V
1.0								B
2.2							B	
3.3						B		
4.7					B		B	C
6.8					B		C	C/D
10					B	B		
15			B	B		C	C/D	R
22		B	B	B	B/C	C	D/R	
33	B		B	B/C		D	R	
47			B	B/C	C/D	D/R	R	
68		B	B/C	C/D	D	D/R		
100	B	B	B/C	C/D	D	R		
120		C	C	R	R			
150	B/C		C/D	D				
180			D	R				
220		C/D	C/D/R	R				
270	D							
330	C	C/D	D/R	R				
390		R						
470	C/R	D/R	R					
680	D	R	R					
1000		R						
1500	R							

STANDARD RATINGS						
CAPACITANCE (μF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (μA)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (Ω)	MAX. RIPPLE 100 kHz I <sub>RMS</sub> (A)
<b>4 V<sub>DC</sub> AT + 85 °C, 2.7 V<sub>DC</sub> AT + 125 °C</b>						
33	B	594D336(1)004B(2)(3)	1.30	6	0.380	0.47
100	B	594D107(1)004B(2)(3)	4.00	8	0.300	0.53
150	B	594D157(1)004B(2)(3)	6.00	8	0.250	0.58
150	C	594D157(1)004C(2)(3)	6.00	8	0.080	1.17
270	D	594D277(1)004D(2)(3)	10.80	8	0.060	1.58
330	C	594D337(1)004C(2)(3)	13.20	8	0.080	1.17
470	C	594D477(1)004C(2)(3)	18.80	10	0.075	1.21
470	R	594D477(1)004R(2)(3)	18.80	10	0.045	2.36
680	D	594D687(1)004D(2)(3)	27.20	12	0.060	1.58
1500	R	594D158(1)004R(2)(3)	60.00	20	0.030	2.89
<b>6.3 V<sub>DC</sub> AT + 85 °C, 4 V<sub>DC</sub> AT + 125 °C</b>						
22	B	594D226(1)6R3B(2)(3)	1.40	6	0.380	0.47
68	B	594D686(1)6R3B(2)(3)	4.30	6	0.319	0.52
100	B	594D107(1)6R3B(2)(3)	6.30	8	0.250	0.58

**Note**

- Part number definitions:
  - Tolerance: For 10 % tolerance, specify "X9"; for 20 % tolerance, change to "X0"
  - Termination: For 100 % tin specify "2", for gold plated specify "4", for solder plated 60/40 specify "8"
  - Packaging code: For 7" reels specify "T", for 13" reels specify "W".



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 ( $\Omega$ )	MAX. RIPPLE 100 kHz $I_{RMS}$ (A)
<b>6.3 V<sub>DC</sub> AT + 85 °C, 4 V<sub>DC</sub> AT + 125 °C</b>						
120	C	594D127(1)6R3C(2)(3)	7.60	8	0.085	1.14
220	C	594D227(1)6R3C(2)(3)	13.90	8	0.080	1.17
220	D	594D227(1)6R3D(2)(3)	13.90	8	0.065	1.52
330	C	594D337(1)6R3C(2)(3)	20.80	8	0.080	1.17
330	D	594D337(1)6R3D(2)(3)	20.80	8	0.060	1.58
390	R	594D397(1)6R3R(2)(3)	24.60	8	0.045	2.36
470	D	594D477(1)6R3D(2)(3)	29.60	8	0.060	1.58
470	R	594D477(1)6R3R(2)(3)	29.60	10	0.050	2.24
680	R	594D687(1)6R3R(2)(3)	42.80	10	0.045	2.36
1000	R	594D108(1)6R3R(2)(3)	63.00	16	0.030	2.89
<b>10 V<sub>DC</sub> AT + 85 °C, 7 V<sub>DC</sub> AT + 125 °C</b>						
15	B	594D156(1)010B(2)(3)	1.50	6	0.500	0.41
22	B	594D226(1)010B(2)(3)	2.20	6	0.500	0.41
33	B	594D336(1)010B(2)(3)	3.30	6	0.500	0.41
47	B	594D476(1)010B(2)(3)	4.70	6	0.400	0.46
68	B	594D686(1)010B(2)(3)	6.80	6	0.350	0.49
68	C	594D686(1)010C(2)(3)	6.80	6	0.100	1.05
100	B	594D107(1)010B(2)(3)	10.00	12	0.250	0.58
100	C	594D107(1)010C(2)(3)	10.00	8.0	0.095	1.08
120	C	594D127(1)010C(2)(3)	12.00	7.0	0.095	1.08
150	C	594D157(1)010C(2)(3)	15.00	8.0	0.090	1.11
150	D	594D157(1)010D(2)(3)	15.00	8	0.075	1.41
180	D	594D187(1)010D(2)(3)	18.00	7	0.090	1.29
220	C	594D227(1)010C(2)(3)	22.00	8	0.100	1.05
220	D	594D227(1)010D(2)(3)	22.00	8	0.065	1.52
220	R	594D227(1)010R(2)(3)	22.00	8	0.065	1.96
330	D	594D337(1)010D(2)(3)	33.00	8	0.065	1.52
330	R	594D337(1)010R(2)(3)	33.00	8	0.045	2.36
470	R	594D477(1)010R(2)(3)	47.00	8	0.045	2.36
680	R	594D687(1)010R(2)(3)	68.00	14	0.045	2.36
<b>16 V<sub>DC</sub> AT + 85 °C, 10 V<sub>DC</sub> AT + 125 °C</b>						
15	B	594D156(1)016B(2)(3)	2.40	6	0.550	0.39
22	B	594D226(1)016B(2)(3)	3.50	6	0.500	0.41
33	B	594D336(1)016B(2)(3)	5.30	6	0.500	0.41
33	C	594D336(1)016C(2)(3)	5.30	6	0.150	0.86
47	B	594D476(1)016B(2)(3)	7.50	6	0.720	0.34
47	C	594D476(1)016C(2)(3)	7.50	6	0.110	1.00
68	C	594D686(1)016C(2)(3)	10.90	6	0.123	0.95
68	D	594D686(1)016D(2)(3)	10.90	6	0.095	1.26
100	C	594D107(1)016C(2)(3)	16.00	8	0.080	1.17
100	D	594D107(1)016D(2)(3)	16.00	8	0.075	1.41
120	R	594D127(1)016R(2)(3)	19.20	8	0.080	1.77
150	D	594D157(1)016D(2)(3)	24.00	8	0.085	1.33
180	R	594D187(1)016R(2)(3)	28.80	8	0.055	2.13
220	R	594D227(1)016R(2)(3)	35.20	8	0.055	2.13
330	R	594D337(1)016R(2)(3)	52.80	14	0.055	2.13

**Note**

- Part number definitions:
  - Tolerance: For 10 % tolerance, specify "X9"; for 20 % tolerance, change to "X0"
  - Termination: For 100 % tin specify "2", for gold plated specify "4", for solder plated 60/40 specify "8"
  - Packaging code: For 7" reels specify "T", for 13" reels specify "W".



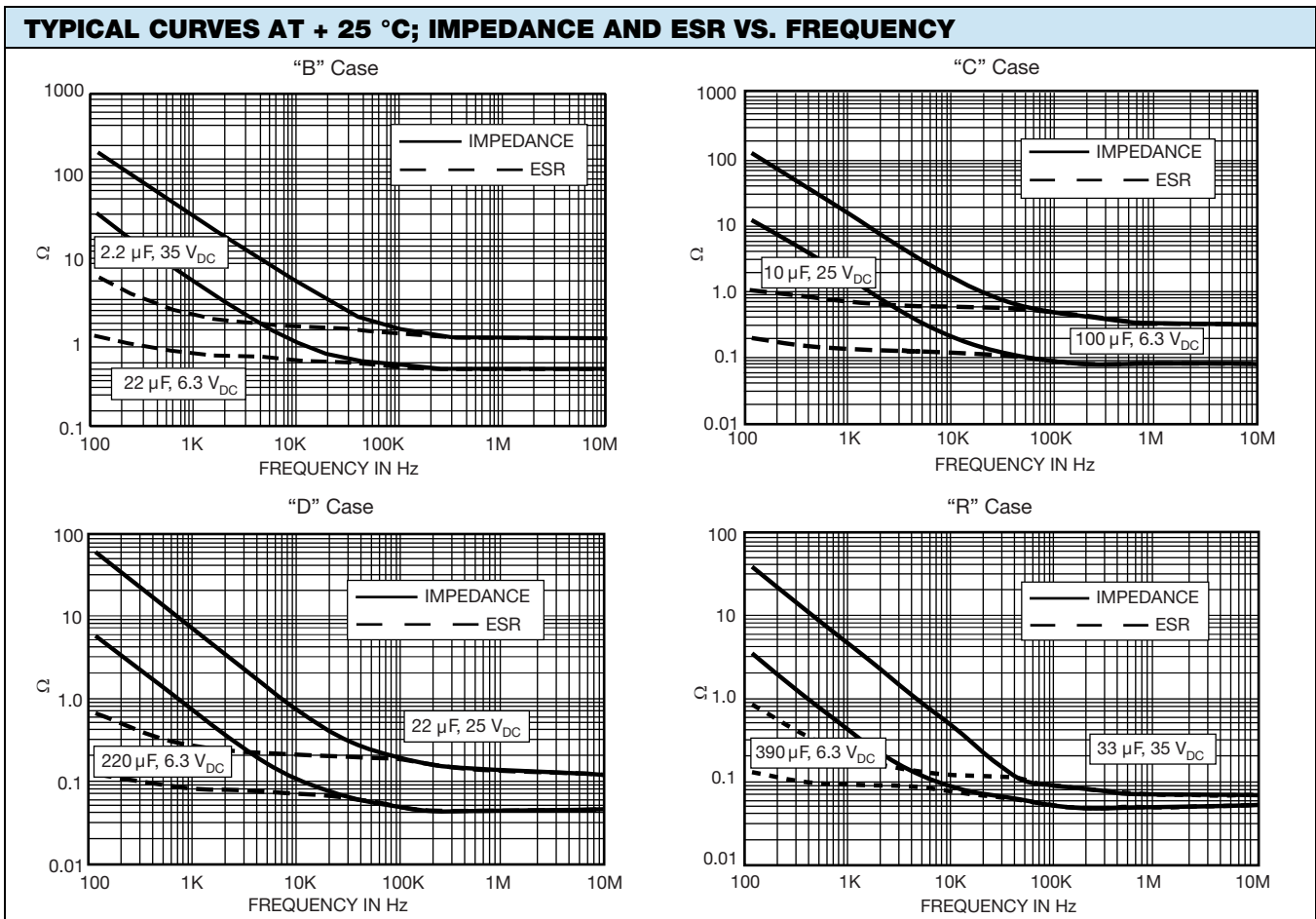
STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C ( $\mu$ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz ( $\Omega$ )	MAX. RIPPLE 100 kHz $I_{RMS}$ (A)
<b>20 V<sub>DC</sub> AT + 85 °C, 13 V<sub>DC</sub> AT + 125 °C</b>						
4.7	B	594D475(1)020B(2)(3)	0.90	6	0.900	0.31
6.8	B	594D685(1)020B(2)(3)	1.40	6	0.900	0.31
10	B	594D106(1)020B(2)(3)	2.00	6	0.850	0.32
22	B	594D226(1)020B(2)(3)	4.40	6	0.600	0.38
22	C	594D226(1)020C(2)(3)	4.40	6	0.150	0.86
47	C	594D476(1)020C(2)(3)	9.40	6	0.140	0.89
47	D	594D476(1)020D(2)(3)	9.40	6	0.095	1.26
68	D	594D686(1)020D(2)(3)	13.60	6	0.132	1.07
100	D	594D107(1)020D(2)(3)	20.00	8	0.085	1.33
120	R	594D127(1)020R(2)(3)	24.00	8	0.080	1.77
<b>25 V<sub>DC</sub> AT + 85 °C, 17 V<sub>DC</sub> AT + 125 °C</b>						
3.3	B	594D335(1)025B(2)(3)	0.80	6	1.500	0.24
10	B	594D106(1)025B(2)(3)	2.50	6	0.900	0.31
15	C	594D156(1)025C(2)(3)	3.80	6	0.220	0.71
22	C	594D226(1)025C(2)(3)	5.50	6	0.200	0.74
33	D	594D336(1)025D(2)(3)	8.30	6	0.130	1.07
47	D	594D476(1)025D(2)(3)	11.80	6	0.130	1.07
47	R	594D476(1)025R(2)(3)	11.80	6	0.099	1.59
68	D	594D686(1)025D(2)(3)	17.00	8	0.200	0.87
68	R	594D686(1)025R(2)(3)	17.00	6	0.095	1.62
100	R	594D107(1)025R(2)(3)	25.00	8	0.090	1.67
<b>35 V<sub>DC</sub> AT + 85 °C, 23 V<sub>DC</sub> AT + 125 °C</b>						
2.2	B	594D225(1)035B(2)(3)	0.80	6	1.700	0.22
4.7	B	594D475(1)035B(2)(3)	1.60	6	1.400	0.25
6.8	C	594D685(1)035C(2)(3)	2.40	6	0.430	0.51
15	C	594D156(1)035C(2)(3)	5.30	6	0.400	0.52
15	D	594D156(1)035D(2)(3)	5.30	6	0.270	0.75
22	D	594D226(1)035D(2)(3)	7.70	6	0.270	0.75
22	R	594D226(1)035R(2)(3)	7.70	6	0.220	1.07
33	R	594D336(1)035R(2)(3)	11.60	6	0.200	1.12
47	R	594D476(1)035R(2)(3)	16.60	6	0.200	1.12
<b>50 V<sub>DC</sub> AT + 85 °C, 33 V<sub>DC</sub> AT + 125 °C</b>						
1.0	B	594D105(1)050B(2)(3)	0.50	4	3.500	0.16
4.7	C	594D475(1)050C(2)(3)	2.40	6	0.800	0.37
6.8	C	594D685(1)050C(2)(3)	3.40	6	0.800	0.37
6.8	D	594D685(1)050D(2)(3)	3.40	6	0.450	0.58
15	R	594D156(1)050R(2)(3)	7.50	6	0.350	0.85

**Note**

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  - Termination: For 100 % tin specify "2", for gold plated specify "4", for solder plated 60/40 specify "8"
  - Packaging code: For 7" reels specify "T", for 13" reels specify "W".



RECOMMENDED VOLTAGE DERATING GUIDELINES (for temperature 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
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





POWER DISSIPATION	
CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR
B	0.085
C	0.110
D	0.150
R	0.250

STANDARD PACKAGING QUANTITY		
CASE CODE	UNITS PER REEL	
	7" REEL	13" REEL
B	2000	8000
C	500	3000
D	500	3000
R	600	n/a

PRODUCT INFORMATION	
Conformal Coated Guide	<a href="http://www.vishay.com/doc?40150">www.vishay.com/doc?40150</a>
Moisture Sensitivity	<a href="http://www.vishay.com/doc?40135">www.vishay.com/doc?40135</a>
SELECTOR GUIDES	
Solid Tantalum Selector Guide	<a href="http://www.vishay.com/doc?49053">www.vishay.com/doc?49053</a>
Solid Tantalum Chip Capacitors	<a href="http://www.vishay.com/doc?40091">www.vishay.com/doc?40091</a>
FAQ	
Frequently Asked Questions	<a href="http://www.vishay.com/doc?40110">www.vishay.com/doc?40110</a>



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## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**