

# Solid Tantalum Surface Mount Chip Capacitors

## TANTAMOUNT<sup>®</sup>, Molded Case, Standard Industrial Grade



### PERFORMANCE/ELECTRICAL CHARACTERISTICS

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

**Operating Temperature:** - 55 °C to + 125 °C  
(above 85 °C, voltage derating is required)

**Capacitance Range:** 0.10 µF to 1000 µF

**Capacitance Tolerance:** ± 5 %, ± 10 %, ± 20 %

**100 % Surge Current Tested (D and E Case Codes)**

**Voltage Rating:** 4 V<sub>DC</sub> to 63 V<sub>DC</sub>

### FEATURES

- Molded case available in six case codes
- Terminations: 100 % matte tin, standard, tin/lead available
- Compatible with “High Volume” automatic pick and place equipment
- Meets IEC specification QC300801/US0001 and EIA535BAAC mechanical and performance requirements
- Moisture sensitivity level 1
- Optical character recognition qualified
- Compliant terminations
- Material categorization: For definitions of compliance 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.

### APPLICATIONS

- Industrial
- Telecom infrastructure
- General purpose

ORDERING INFORMATION					
293D	107	X9	010	D	2WE3
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	TERMINATION AND PACKAGING
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	X0 = ± 20 % X9 = ± 10 % X5 = ± 5 % (special order)	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 Codes table	2TE3: Matte tin, 7" (178 mm) reel 2WE3: Matte tin, 13" (330 mm) reel 8T: Tin/lead, 7" (178 mm) reel 8W: Tin/lead, 13" (330 mm) reel

### Notes

- We reserve the right to supply higher voltage ratings and tighter capacitance tolerance capacitors in the same case size. Voltage substitutions will be marked with the higher voltage rating.
- We reserve the right to supply better series with more extensive screening.
- Dry pack is available per request, contact regional marketing.

DIMENSIONS in inches [millimeters]							
CASE CODE	EIA SIZE	L	W	H	P	T <sub>W</sub>	T <sub>H</sub> (MIN.)
A	3216-18	0.126 ± 0.008 [3.2 ± 0.20]	0.063 ± 0.008 [1.6 ± 0.20]	0.063 ± 0.008 [1.6 ± 0.20]	0.031 ± 0.012 [0.80 ± 0.30]	0.047 ± 0.004 [1.2 ± 0.10]	0.028 [0.70]
B	3528-21	0.138 ± 0.008 [3.5 ± 0.20]	0.110 ± 0.008 [2.8 ± 0.20]	0.075 ± 0.008 [1.9 ± 0.20]	0.031 ± 0.012 [0.80 ± 0.30]	0.087 ± 0.004 [2.2 ± 0.10]	0.028 [0.70]
C	6032-28	0.236 ± 0.012 [6.0 ± 0.30]	0.126 ± 0.012 [3.2 ± 0.30]	0.098 ± 0.012 [2.5 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.087 ± 0.004 [2.2 ± 0.10]	0.039 [1.0]
D	7343-31	0.287 ± 0.012 [7.3 ± 0.30]	0.169 ± 0.012 [4.3 ± 0.30]	0.110 ± 0.012 [2.8 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.094 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]
E	7343-43	0.287 ± 0.012 [7.3 ± 0.30]	0.169 ± 0.012 [4.3 ± 0.30]	0.157 ± 0.012 [4.0 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.094 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]
V	7343-20	0.287 ± 0.012 [7.3 ± 0.30]	0.169 ± 0.012 [4.3 ± 0.30]	0.079 max [2.0 max]	0.051 ± 0.012 [1.3 ± 0.30]	0.094 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]

RATINGS AND CASE CODES									
μF	4 V	6.3 V	10 V	16 V	20 V	25 V	35 V	50 V	63 V
0.10						A	A	A	
0.15							A	A/B	
0.22							A	A/B	
0.33						A	A	A/B	
0.47			A		A	A	A/B	A/B/C	
0.68				A	A	A	A/B	B/C	
1.0			A	A	A/B	A/B	A/B	B/C	
1.5		A	A	A/B	A/B	A/B	B/C	B/C/D	
2.2	A	A	A/B	A/B	A/B	A/B/C	B/C	B/C/D	
3.3	A	A/B	A/B	A/B	A/B/C	A/B/C	B/C/D	C/D	
4.7	A/B	A/B	A/B/C	A/B/C	A/B/C	A/B/C/D	B/C/D	C/D/E	D
6.8	A/B	A/B	A/B/C	A/B/C	A/B/C	B/C/D	C/D	D/E	
10	A/B	A/B/C	A/B/C	A/B/C/D	B/C/D	B/C/D	C/D	D/E	E
15	A/B/C	A/B/C	A/B/C	B/C	B/C/D	B/C/D	D/E	E	
22	A/B/C	A/B/C	A/B/C/D	B/C/D	B/C/D	C/D/E/V	D/E		
33	A/B/C	A/B/C	B/C/D	B/C/D	C/D	D/E			
47	A/B/C	A/B/C/D	B/C/D	C/D/E	D/E	D/E			
68	B/C/D	B/C/D	B/C/D/E/V	D/E	D/E	E			
100	A/B/C/D	B/C/D/E	B/C/D/E/V	D/E/V	D/E				
120	D	D	E						
150	B/C/D	C/D/E	C/D/E	D/E					
220	B/C/D/E	C/D/E	D/E/V	E					
330	D/E	D/E	D/E						
470	D/E	D/E	E						
680	D/E	E							
1000	E	E							

MARKING																				
<p><b>A Case</b></p>	<p><b>“A” CASE VOLTAGE CODE</b></p> <table border="1"> <thead> <tr> <th>VOLTS</th> <th>CODE</th> </tr> </thead> <tbody> <tr><td>4.0</td><td>G</td></tr> <tr><td>6.3</td><td>J</td></tr> <tr><td>10</td><td>A</td></tr> <tr><td>16</td><td>C</td></tr> <tr><td>20</td><td>D</td></tr> <tr><td>25</td><td>E</td></tr> <tr><td>35</td><td>V</td></tr> <tr><td>50</td><td>T</td></tr> </tbody> </table>	VOLTS	CODE	4.0	G	6.3	J	10	A	16	C	20	D	25	E	35	V	50	T	<p><b>B, C, D, E, V Cases</b></p>
	VOLTS	CODE																		
4.0	G																			
6.3	J																			
10	A																			
16	C																			
20	D																			
25	E																			
35	V																			
50	T																			

**Marking**

Capacitor marking includes an anode (+) polarity band, capacitance in microfarads and the voltage rating. “A” Case capacitors use a letter code for the voltage and EIA capacitance code.

The Vishay Sprague® trademark is included if space permits. Capacitors rated at 6.3 V are marked 6 V.

A manufacturing date code is marked on all capacitors.

Capacitors may bear a different marking scheme if a part with more extensive screening is substituted. These would include “R” for low ESR series (TR3) or “P” for professional series (TP3).

Call the factory for further explanation.



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>4 V<sub>DC</sub> AT + 85 °C; 2.7 V<sub>DC</sub> AT + 125 °C</b>						
2.2	A	293D225(1)004A(2)	0.5	6	7.60	0.10
3.3	A	293D335(1)004A(2)	0.5	6	7.60	0.10
4.7	A	293D475(1)004A(2)	0.5	6	6.30	0.11
4.7	B	293D475(1)004B(2)	0.5	6	7.00	0.11
6.8	A	293D685(1)004A(2)	0.5	6	5.50	0.12
6.8	B	293D685(1)004B(2)	0.5	6	3.40	0.16
10	A	293D106(1)004A(2)	0.5	6	5.10	0.12
10	B	293D106(1)004B(2)	0.5	6	3.50	0.16
15	A	293D156(1)004A(2)	0.6	6	3.40	0.15
15	B	293D156(1)004B(2)	0.6	6	2.90	0.17
15	C	293D156(1)004C(2)	0.6	6	2.80	0.20
22	A	293D226(1)004A(2)	0.9	6	2.90	0.16
22	B	293D226(1)004B(2)	0.9	6	2.50	0.18
22	C	293D226(1)004C(2)	0.9	6	1.80	0.25
33	A	293D336(1)004A(2)	1.3	6	2.90	0.16
33	B	293D336(1)004B(2)	1.3	6	2.00	0.21
33	C	293D336(1)004C(2)	1.3	6	1.80	0.25
47	A	293D476(1)004A(2)	1.9	14	2.50	0.17
47	B	293D476(1)004B(2)	1.9	6	1.90	0.21
47	C	293D476(1)004C(2)	1.9	6	1.80	0.25
68	B	293D686(1)004B(2)	2.7	6	1.90	0.21
68	C	293D686(1)004C(2)	2.7	6	1.40	0.28
68	D	293D686(1)004D(2)	2.7	6	0.80	0.43
100	A	293D107X0004A(2)	10.0	30	2.50	0.22
100	B	293D107(1)004B(2)	4.0	8	1.80	0.22
100	C	293D107(1)004C(2)	4.0	6	0.80	0.37
100	D	293D107(1)004D(2)	4.0	6	0.70	0.46
120	D	293D127(1)004D(2)	4.8	6	0.60	0.51
150	B	293D157(1)004B(2)	6.0	14	1.60	0.23
150	C	293D157(1)004C(2)	6.0	12	0.70	0.40
150	D	293D157(1)004D(2)	6.0	8	0.60	0.50
220	B	293D227X0004B(2)	8.8	18	1.50	0.24
220	C	293D227(1)004C(2)	8.8	8	0.70	0.40
220	D	293D227(1)004D(2)	8.8	8	0.60	0.50
220	E	293D227(1)004E(2)	8.8	8	0.50	0.57
330	D	293D337(1)004D(2)	13.2	8	0.60	0.50
330	E	293D337(1)004E(2)	13.2	8	0.50	0.57
470	D	293D477(1)004D(2)	18.8	10	0.60	0.50
470	E	293D477(1)004E(2)	18.8	10	0.50	0.57
680	D	293D687X0004D(2)	27.2	25	0.20	0.87
680	E	293D687(1)004E(2)	27.2	12	0.50	0.57
1000	E	293D108X0004E(2)	40.0	20	0.50	0.57

**Note**

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>						
1.5	A	293D155(1)6R3A(2)	0.5	6	2.90	0.16
2.2	A	293D225(1)6R3A(2)	0.5	6	7.60	0.10
3.3	A	293D335(1)6R3A(2)	0.5	6	6.30	0.11
3.3	B	293D335(1)6R3B(2)	0.5	6	5.50	0.12
4.7	A	293D475(1)6R3A(2)	0.5	6	5.50	0.12
4.7	B	293D475(1)6R3B(2)	0.5	6	4.40	0.14
6.8	A	293D685(1)6R3A(2)	0.5	6	5.00	0.12
6.8	B	293D685(1)6R3B(2)	0.5	6	3.40	0.16
10	A	293D106(1)6R3A(2)	0.6	6	3.40	0.15
10	B	293D106(1)6R3B(2)	0.6	6	2.90	0.17
10	C	293D106(1)6R3C(2)	0.6	6	3.00	0.19
15	A	293D156(1)6R3A(2)	0.9	6	2.90	0.16
15	B	293D156(1)6R3B(2)	0.9	6	2.50	0.18
15	C	293D156(1)6R3C(2)	0.9	6	1.80	0.25
22	A	293D226(1)6R3A(2)	1.3	6	2.90	0.16
22	B	293D226(1)6R3B(2)	1.3	6	2.00	0.21
22	C	293D226(1)6R3C(2)	1.3	6	1.80	0.25
33	A	293D336(1)6R3A(2)	2.0	14	2.50	0.17
33	B	293D336(1)6R3B(2)	2.0	6	1.90	0.21
33	C	293D336(1)6R3C(2)	2.0	6	1.50	0.27
47	A	293D476(1)6R3A(2)	2.8	12	1.60	0.22
47	B	293D476(1)6R3B(2)	2.8	6	1.90	0.21
47	C	293D476(1)6R3C(2)	2.8	6	1.40	0.28
47	D	293D476(1)6R3D(2)	2.8	6	0.80	0.43
68	B	293D686(1)6R3B(2)	4.1	6	1.80	0.22
68	C	293D686(1)6R3C(2)	4.1	6	0.80	0.37
68	D	293D686(1)6R3D(2)	4.1	6	0.70	0.46
100	B	293D107(1)6R3B(2)	6.0	15	1.70	0.22
100	C	293D107(1)6R3C(2)	6.0	6	0.80	0.37
100	D	293D107(1)6R3D(2)	6.0	6	0.70	0.46
100	E	293D107(1)6R3E(2)	6.0	8	0.70	0.49
120	D	293D127(1)6R3D(2)	6.3	8	0.70	0.46
150	C	293D157(1)6R3C(2)	9.0	8	0.70	0.40
150	D	293D157(1)6R3D(2)	9.0	8	0.60	0.50
150	E	293D157(1)6R3E(2)	9.0	8	0.50	0.57
220	C	293D227(1)6R3C(2)	13.9	14	0.70	0.39
220	D	293D227(1)6R3D(2)	13.2	8	0.60	0.50
220	E	293D227(1)6R3E(2)	13.2	8	0.50	0.57
330	D	293D337(1)6R3D(2)	19.8	8	0.60	0.50
330	E	293D337(1)6R3E(2)	19.8	8	0.50	0.57
470	D	293D477(1)6R3D(2)	28.2	14	0.50	0.55
470	E	293E477(1)6R3E(2)	28.2	10	1.50	0.57
680	E	293D687(1)6R3E(2)	42.8	20	0.50	0.57
1000	E	293D108X06R3E(2)	63.0	30	0.40	0.64

Note

- Part number definitions:
  - (1) Tolerance: X0, X9
  - (2) Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - (3) Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT 125 °C</b>						
0.47	A	293D474(1)010A(2)	0.5	4	14.00	0.07
1.0	A	293D105(1)010A(2)	0.5	4	9.60	0.09
1.5	A	293D155(1)010A(2)	0.5	6	8.00	0.10
2.2	A	293D225(1)010A(2)	0.5	6	6.30	0.11
2.2	B	293D225(1)010B(2)	0.5	6	4.60	0.14
3.3	A	293D335(1)010A(2)	0.5	6	5.50	0.12
3.3	B	293D335(1)010B(2)	0.5	6	5.50	0.12
4.7	A	293D475(1)010A(2)	0.5	6	5.00	0.12
4.7	B	293D475(1)010B(2)	0.5	6	3.40	0.16
4.7	C	293D475(1)010C(2)	0.5	6	2.30	0.22
6.8	A	293D685(1)010A(2)	0.7	6	4.20	0.13
6.8	B	293D685(1)010B(2)	0.7	6	2.90	0.17
6.8	C	293D685(1)010C(2)	0.7	6	1.90	0.24
10	A	293D106(1)010A(2)	1.0	6	3.40	0.15
10	B	293D106(1)010B(2)	1.0	6	2.50	0.18
10	C	293D106(1)010C(2)	1.0	6	1.80	0.25
15	A	293D156(1)010A(2)	1.5	6	2.90	0.16
15	B	293D156(1)010B(2)	1.5	6	2.00	0.21
15	C	293D156(1)010C(2)	1.5	6	1.80	0.25
22	A	293D226(1)010A(2)	2.2	8	2.50	0.17
22	B	293D226(1)010B(2)	2.2	6	1.90	0.21
22	C	293D226(1)010C(2)	2.2	6	1.50	0.27
22	D	293D226(1)010D(2)	2.2	6	1.50	0.32
33	B	293D336(1)010B(2)	3.3	6	1.90	0.21
33	C	293D336(1)010C(2)	3.3	6	1.40	0.28
33	D	293D336(1)010D(2)	3.3	6	0.80	0.43
47	B	293D476(1)010B(2)	4.7	6	1.80	0.22
47	C	293D476(1)010C(2)	4.7	6	1.10	0.32
47	D	293D476(1)010D(2)	4.7	6	0.70	0.46
68	B	293D686(1)010B(2)	6.8	14	1.80	0.22
68	C	293D686(1)010C(2)	6.8	6	1.00	0.33
68	D	293D686(1)010D(2)	6.8	6	0.70	0.46
68	E	293D686(1)010E(2)	6.8	6	0.80	0.45
68	V	293D686(1)010V(3)	6.8	6	0.70	0.42
100	B	293D107X0010B(2)	10.0	25	2.50	0.18
100	C	293D107(1)010C(2)	10.0	8	0.90	0.35
100	D	293D107(1)010D(2)	10.0	8	0.60	0.50
100	E	293D107(1)010E(2)	10.0	8	0.70	0.49
100	V	293D107(1)010V(3)	10.0	8	0.70	0.42
120	E	293D127(1)010E(2)	12.0	6	1.00	0.41
150	C	293D157X0010C(2)	15.0	20	0.90	0.35
150	D	293D157(1)010D(2)	15.0	8	0.60	0.50
150	E	293D157(1)010E(2)	15.0	8	0.50	0.57
220	D	293D227(1)010D(2)	22.0	8	0.60	0.50

Note

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT 125 °C</b>						
220	E	293D227(1)010E(2)	22.0	8	0.50	0.57
220	V	293D227(1)010V(3)	30.0	12	0.50	0.50
330	D	293D337(1)010D(2)	33.0	15	0.50	0.57
330	E	293D337(1)010E(2)	33.0	10	0.50	0.57
470	E	293D477(1)010E(2)	47.0	15	0.50	0.57
<b>16 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b>						
0.68	A	293D684(1)016A(2)	0.5	4	10.40	0.08
1.0	A	293D105(1)016A(2)	0.5	4	9.30	0.09
1.5	A	293D155(1)016A(2)	0.5	6	6.70	0.11
1.5	B	293D155(1)016B(2)	0.5	6	6.40	0.12
2.2	A	293D225(1)016A(2)	0.5	6	5.90	0.11
2.2	B	293D225(1)016B(2)	0.5	6	4.60	0.14
3.3	A	293D335(1)016A(2)	0.5	6	5.00	0.12
3.3	B	293D335(1)016B(2)	0.5	6	3.50	0.16
4.7	A	293D475(1)016A(2)	0.8	6	5.00	0.12
4.7	B	293D475(1)016B(2)	0.8	6	2.90	0.17
4.7	C	293D475(1)016C(2)	0.8	6	2.90	0.19
6.8	A	293D685(1)016A(2)	1.1	6	4.20	0.13
6.8	B	293D685(1)016B(2)	1.1	6	2.50	0.18
6.8	C	293D685(1)016C(2)	1.1	6	1.90	0.24
10	A	293D106(1)016A(2)	1.6	6	3.00	0.16
10	B	293D106(1)016B(2)	1.6	6	2.00	0.21
10	C	293D106(1)016C(2)	1.6	6	1.80	0.25
10	D	293D106(1)016D(2)	2.5	6	1.20	0.35
15	B	293D156(1)016B(2)	2.4	6	2.00	0.21
15	C	293D156(1)016C(2)	2.4	6	1.50	0.27
22	B	293D226(1)016B(2)	3.5	6	1.90	0.21
22	C	293D226(1)016C(2)	3.5	6	1.40	0.28
22	D	293D226(1)016D(2)	3.5	6	0.80	0.43
33	B	293D336(1)016B(2)	5.3	6	1.80	0.22
33	C	293D336(1)016C(2)	5.3	6	1.10	0.32
33	D	293D336(1)016D(2)	5.3	6	0.70	0.46
47	C	293D476(1)016C(2)	7.5	6	1.00	0.33
47	D	293D476(1)016D(2)	7.5	6	0.70	0.46
47	E	293D476(1)016E(2)	7.5	6	0.80	0.45
68	D	293D686(1)016D(2)	10.9	6	0.60	0.50
68	E	293D686(1)016E(2)	10.9	6	0.80	0.45
100	D	293D107(1)016D(2)	16.0	8	0.60	0.50
100	E	293D107(1)016E(2)	16.0	8	0.60	0.52
100	V	293D107(1)16V(3)	16.0	10	0.40	0.56
150	D	293D157(1)016D(2)	24.0	8	0.60	0.50
150	E	293D157(1)016E(2)	24.0	8	0.50	0.57
220	E	293D227(1)016E(2)	35.2	14	0.50	0.57

**Note**

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>						
0.47	A	293D474(1)020A(2)	0.5	4	14.00	0.07
0.68	A	293D684(1)020A(2)	0.5	4	10.00	0.09
1.0	A	293D105(1)020A(2)	0.5	4	8.40	0.09
1.0	B	293D105(1)020B(2)	0.5	4	9.00	0.10
1.5	A	293D155(1)020A(2)	0.5	6	6.30	0.11
1.5	B	293D155(1)020B(2)	0.5	4.8	5.60	0.12
2.2	A	293D225(1)020A(2)	0.5	6	5.90	0.11
2.2	B	293D225(1)020B(2)	0.5	6	3.50	0.16
3.3	A	293D335(1)020A(2)	0.7	6	5.90	0.11
3.3	B	293D335(1)020B(2)	0.7	6	3.00	0.17
3.3	C	293D335(1)020C(2)	0.8	6	2.30	0.22
4.7	A	293D475(1)020A(2)	0.9	6	5.00	0.12
4.7	B	293D475(1)020B(2)	0.9	6	2.90	0.17
4.7	C	293D475(1)020C(2)	0.9	6	2.30	0.22
6.8	A	293D685(1)020A(2)	1.4	6	4.50	0.13
6.8	B	293D685(1)020B(2)	1.4	6	2.50	0.18
6.8	C	293D685(1)020C(2)	1.4	6	1.90	0.24
10	B	293D106(1)020B(2)	2.0	6	2.10	0.20
10	C	293D106(1)020C(2)	2.0	6	1.70	0.25
10	D	293D106(1)020D(2)	2.0	6	1.00	0.38
15	B	293D156(1)020B(2)	3.0	6	2.30	0.19
15	C	293D156(1)020C(2)	3.0	6	1.50	0.27
15	D	293D156(1)020D(2)	3.0	6	0.90	0.41
22	B	293D226(1)020B(2)	4.4	6	2.10	0.20
22	C	293D226(1)020C(2)	4.4	6	1.10	0.32
22	D	293D226(1)020D(2)	4.4	6	0.70	0.46
33	C	293D336(1)020C(2)	6.6	6	1.00	0.33
33	D	293D336(1)020D(2)	6.6	6	0.70	0.46
47	D	293D476(1)020D(2)	9.4	6	0.70	0.46
47	E	293D476(1)020E(2)	9.4	6	0.60	0.52
68	D	293D686(1)020D(2)	13.6	6	0.70	0.46
68	E	293D686(1)020E(2)	13.6	6	0.60	0.52
100	D	293D107(1)020D(2)	20.0	8	0.60	0.50
100	E	293D107(1)020E(2)	20.0	8	0.50	0.57
<b>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b>						
0.10	A	293D104(1)025A(2)	0.5	4	20.00	0.06
0.33	A	293D334(1)025A(2)	0.5	4	13.00	0.08
0.47	A	293D474(1)025A(2)	0.5	4	12.00	0.08
0.68	A	293D684(1)025A(2)	0.5	4	8.40	0.09
1.0	A	293D105(1)025A(2)	0.5	4	7.60	0.10
1.0	B	293D105(1)025B(2)	0.5	4	5.00	0.13
1.5	A	293D155(1)025A(2)	0.5	6	6.70	0.11
1.5	B	293D155(1)025B(2)	0.5	6	4.60	0.14
2.2	A	293D225(1)025A(2)	0.6	6	6.30	0.11

**Note**

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b>						
2.2	B	293D225(1)025B(2)	0.6	6	3.80	0.15
2.2	C	293D225(1)025C(2)	0.6	6	3.20	0.19
3.3	A	293D335(1)025A(2)	0.8	6	6.00	0.14
3.3	B	293D335(1)025B(2)	0.8	6	3.10	0.17
3.3	C	293D335(1)025C(2)	0.8	6	2.30	0.22
4.7	A	293D475(1)025A(2)	1.2	6	5.50	0.12
4.7	B	293D475(1)025B(2)	1.2	6	2.80	0.17
4.7	C	293D475(1)025C(2)	1.2	6	2.00	0.24
4.7	D	293D475(1)025D(2)	1.2	6	1.30	0.34
6.8	B	293D685(1)025B(2)	1.7	6	2.40	0.19
6.8	C	293D685(1)025C(2)	1.7	6	1.70	0.25
6.8	D	293D685(1)025D(2)	1.7	6	1.10	0.37
10	B	293D106(1)025B(2)	2.5	6	2.30	0.19
10	C	293D106(1)025C(2)	2.5	6	1.50	0.27
10	D	293D106(1)025D(2)	2.5	6	1.00	0.39
15	B	293D156(1)025B(2)	3.8	6	2.20	0.20
15	C	293D156(1)025C(2)	3.8	6	1.20	0.30
15	D	293D156(1)025D(2)	3.8	6	0.80	0.43
22	C	293D226(1)025C(2)	5.5	6	1.20	0.30
22	D	293D226(1)025D(2)	5.5	6	0.70	0.46
22	E	293D226(1)025E(2)	5.5	6	0.80	0.45
22	V	293D226(1)025V(3)	5.5	6	0.70	0.42
33	D	293D336(1)025D(2)	8.3	6	0.70	0.46
33	E	293D336(1)025E(2)	8.3	6	0.60	0.52
47	D	293D476(1)025D(2)	11.8	8	0.70	0.46
47	E	293D476(1)025E(2)	11.8	6	0.60	0.52
68	E	293D686(1)025E(2)	17.0	8	0.60	0.52
<b>35 V<sub>DC</sub> AT + 85 °C; 23 V<sub>DC</sub> AT + 125 °C</b>						
0.10	A	293D104(1)035A(2)	0.5	4	20.00	0.06
0.15	A	293D154(1)035A(2)	0.5	4	18.00	0.07
0.22	A	293D224(1)035A(2)	0.5	4	15.00	0.07
0.33	A	293D334(1)035A(2)	0.5	4	13.00	0.08
0.47	A	293D474(1)035A(2)	0.5	4	10.00	0.09
0.47	B	293D474(1)035B(2)	0.5	4	8.00	0.10
0.68	A	293D684(1)035A(2)	0.5	4	7.60	0.10
0.68	B	293D684(1)035B(2)	0.5	4	6.50	0.11
1.0	A	293D105(1)035A(2)	0.5	4	7.50	0.10
1.0	B	293D105(1)035B(2)	0.5	4	5.00	0.13
1.5	B	293D155(1)035B(2)	0.5	6	4.20	0.14
1.5	C	293D155(1)035C(2)	0.5	6	3.80	0.17
2.2	B	293D225(1)035B(2)	0.8	6	3.80	0.15
2.2	C	293D225(1)035C(2)	0.8	6	2.90	0.20
3.3	B	293D335(1)035B(2)	1.2	6	3.50	0.16
3.3	C	293D335(1)035C(2)	1.2	6	2.10	0.23
3.3	D	293D335(1)035D(2)	1.2	6	1.70	0.30

**Note**

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3





STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE 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>35 V<sub>DC</sub> AT + 85 °C; 23 V<sub>DC</sub> AT + 125 °C</b>						
4.7	B	293D475(1)035B(2)	1.7	6	3.10	0.17
4.7	C	293D475(1)035C(2)	1.6	6	1.90	0.24
4.7	D	293D475(1)035D(2)	1.6	6	1.30	0.34
6.8	C	293D685(1)035C(2)	2.4	6	1.80	0.25
6.8	D	293D685(1)035D(2)	2.4	6	1.10	0.37
10	C	293D106(1)035C(2)	3.5	6	1.60	0.26
10	D	293D106(1)035D(2)	3.5	6	0.80	0.43
15	D	293D156(1)035D(2)	5.3	6	0.70	0.46
15	E	293D156(1)035E(2)	5.3	6	0.70	0.49
22	D	293D226(1)035D(2)	7.7	6	0.60	0.50
22	E	293D226(1)035E(2)	7.7	6	0.60	0.57
<b>50 V<sub>DC</sub> AT + 85 °C; 33 V<sub>DC</sub> AT + 125 °C</b>						
0.10	A	293D104(1)050A(2)	0.5	4	19.00	0.06
0.15	A	293D154(1)050A(2)	0.5	4	17.00	0.07
0.15	B	293D154(1)050B(2)	0.5	4	14.00	0.08
0.22	A	293D224(1)050A(2)	0.5	4	15.00	0.07
0.22	B	293D224(1)050B(2)	0.5	4	12.00	0.08
0.33	A	293D334(1)050A(2)	0.5	4	14.00	0.07
0.33	B	293D334(1)050B(2)	0.5	4	10.00	0.09
0.47	A	293D474(1)050A(2)	0.5	4	12.00	0.08
0.47	B	293D474(1)050B(2)	0.5	4	8.40	0.10
0.47	C	293D474(1)050C(2)	0.5	4	6.70	0.13
0.68	B	293D684(1)050B(2)	0.5	4	7.60	0.11
0.68	C	293D684(1)050C(2)	0.5	4	5.90	0.14
1.0	B	293D105(1)050B(2)	0.5	4	6.70	0.11
1.0	C	293D105(1)050C(2)	0.5	4	4.60	0.16
1.5	B	293D155(1)050B(2)	0.8	6	6.00	0.12
1.5	C	293D155(1)050C(2)	0.8	6	3.40	0.18
1.5	D	293D155(1)050D(2)	0.8	6	2.90	0.23
2.2	B	293D225(1)050B(2)	1.1	6	3.50	0.16
2.2	C	293D225(1)050C(2)	1.1	6	2.90	0.20
2.2	D	293D225(1)050D(2)	1.1	6	2.10	0.27
3.3	C	293D335(1)050C(2)	1.7	6	2.50	0.21
3.3	D	293D335(1)050D(2)	1.7	6	1.70	0.30
4.7	C	293D475(1)050C(2)	2.4	6	1.50	0.27
4.7	D	293D475(1)050D(2)	2.4	6	1.20	0.37
4.7	E	293D475(1)050E(2)	2.4	6	1.10	0.34
6.8	D	293D685(1)050D(2)	3.4	6	0.90	0.41
6.8	E	293D685(1)050E(2)	3.4	6	0.90	0.43
10	D	293D106(1)050D(2)	5.0	6	0.80	0.43
10	E	293D106(1)050E(2)	5.0	6	0.80	0.45
15	E	293D156(1)050E(2)	7.5	6	0.80	0.45
<b>63 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b>						
4.7	D	293D475(1)063D(2)	3.0	6	1.10	0.37
10	E	293D106(1)063E(2)	6.3	6	1.00	0.41

**Note**

- Part number definitions:
  - Tolerance: X0, X9
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W
  - Lead (Pb)-free terminations and packaging codes: 2TE3, 2WE3



**RECOMMENDED VOLTAGE DERATING GUIDELINES** (for temperatures below + 85 °C)

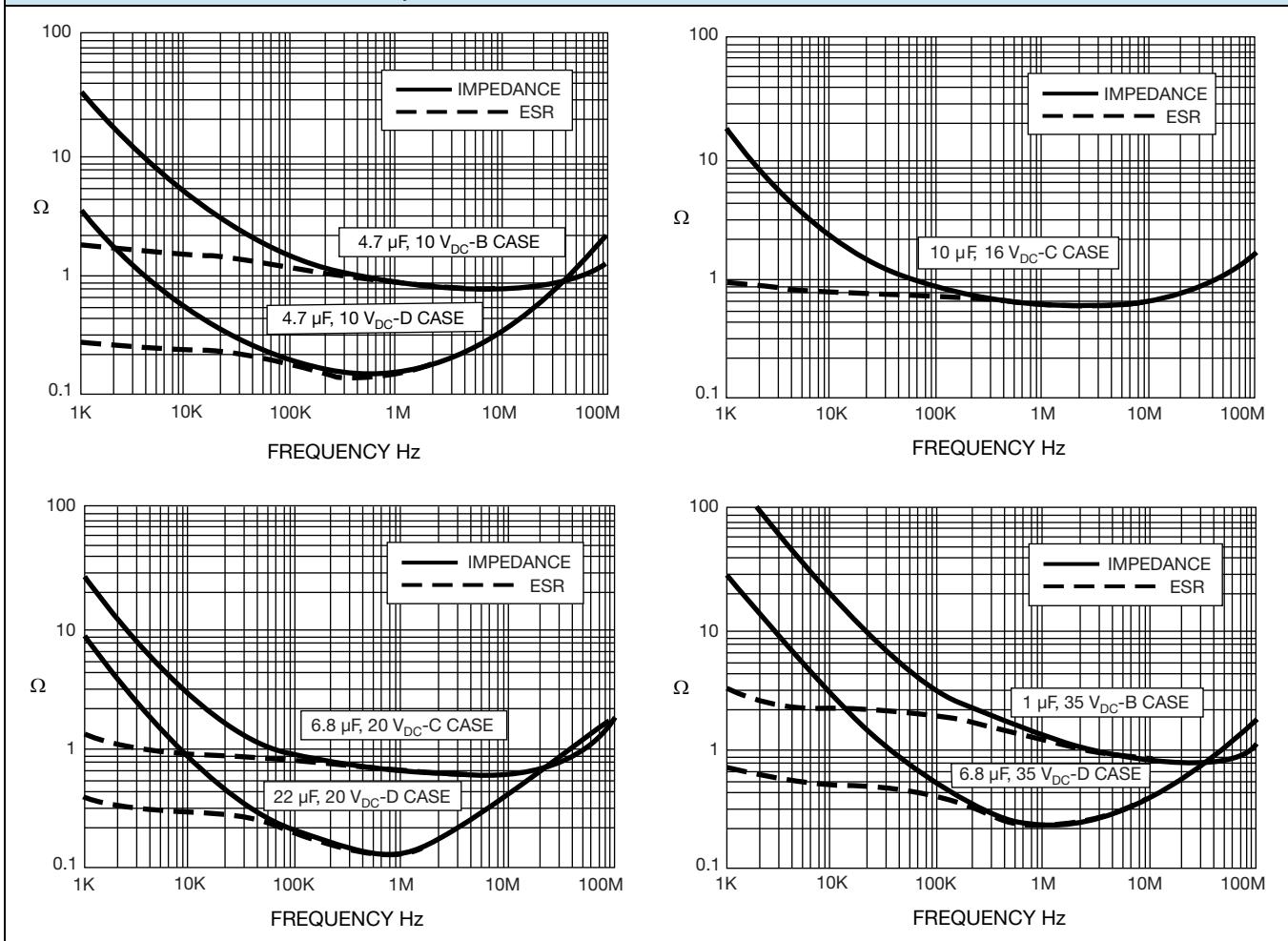
**STANDARD CONDITIONS. FOR EXAMPLE: OUTPUT FILTERS**

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	36

**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	31

**TYPICAL CURVES AT + 25 °C, IMPEDANCE AND ESR VS. FREQUENCY**





<b>POWER DISSIPATION</b>	
<b>CASE CODE</b>	<b>MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR</b>
A	0.075
B	0.085
C	0.110
D	0.150
E	0.165
V	0.125

<b>STANDARD PACKAGING QUANTITY</b>		
<b>CASE CODE</b>	<b>UNITS PER REEL</b>	
	<b>7" REEL</b>	<b>13" REEL</b>
A	2000	9000
B	2000	8000
C	500	3000
D	500	2500
E	400	1500
V	1000	5000

<b>PRODUCT INFORMATION</b>	
Guide for Molded Tantalum Capacitors	<a href="http://www.vishay.com/doc?40074">www.vishay.com/doc?40074</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>
Solid Tantalum Chip Capacitors	<a href="http://www.vishay.com/doc?40091">www.vishay.com/doc?40091</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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## 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.**