Solid Tantalum Chip Capacitors, TANTAMOUNT®, Conformal Coated

FEATURES

- 8 mm, 12 mm, 16 mm tape and reel packaging available per EIA-481 and reeling per IEC 60286-3, 7" [178 mm] standard
- Mounting: Surface mount
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

RoHS* COMPLIANT

Note

* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

PERFORMANCE CHARACTERISTICS

www.vishay.com/doc?40088

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

Capacitance Range: 0.10 µF to 330 µF
Capacitance Tolerance: ± 10 %, ± 20 % standard
Voltage Rating: 4 V_{DC} to 50 V_{DC}

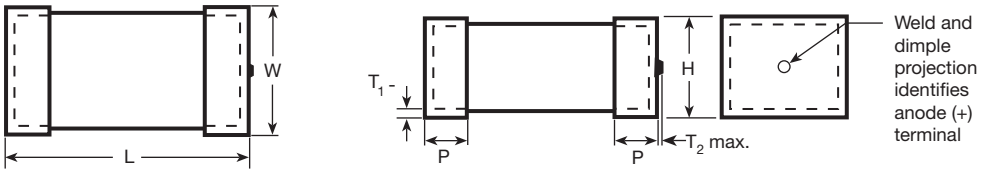
ORDERING INFORMATION

194D	225	X0	004	A	2	T
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	TERMINATION	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 volts. To complete the three-digit block, zeros precede the voltage rating	See Ratings and Case Codes table	**2 = Gold plated (50 µ inch minimum) standard (RoHS compliant)** 8 = 60/40 solder plated 7 = Hot solder dipped	**T = T/R (full reel) 7" [178 mm] reel standard** H = T/R (half reel) 7" [178 mm] B = Bulk

Note

- Preferred tolerance 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	W	L	H	P	T_1	T_2 MAX.
A	0.050 ± 0.015 [1.27 ± 0.38]	0.100 ± 0.015 [2.54 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
B	0.050 ± 0.015 [1.27 ± 0.38]	0.150 ± 0.015 [3.81 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
C	0.050 ± 0.015 [1.27 ± 0.38]	0.200 ± 0.015 [5.08 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
D	0.100 ± 0.015 [2.54 ± 0.38]	0.150 ± 0.015 [3.81 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
E	0.100 ± 0.015 [2.54 ± 0.38]	0.200 ± 0.015 [5.08 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
F	0.135 ± 0.015 [3.43 ± 0.38]	0.220 ± 0.015 [5.59 ± 0.38]	0.070 ± 0.015 [1.78 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
G	0.110 ± 0.015 [2.79 ± 0.38]	0.265 ± 0.015 [6.73 ± 0.38]	0.110 ± 0.015 [2.79 ± 0.38]	0.050 ± 0.005 [1.27 ± 0.13]	0.005 [0.13]	0.015 [0.38]
H	0.150 ± 0.015 [3.81 ± 0.38]	0.285 ± 0.015 [7.24 ± 0.38]	0.110 ± 0.015 [2.79 ± 0.38]	0.050 ± 0.005 [1.27 ± 0.13]	0.005 [0.13]	0.015 [0.38]

Note

- When solder coated terminations are required, add 0.015" [0.381 mm] to termination dimension tolerances

RATINGS AND CASE CODES

µF	4 V	6 V	10 V	15 V	20 V	25 V	35 V	50 V
0.10							A	A
0.15							A	A
0.22							A	B
0.33						A	A/B	B
0.47					A	A/B	B	C
0.68				A	A/B	B	C	D
1.0			A	A/B	A/B	A/B/C	D	E
1.5		A	A/B	A/B	B/C	D	E	F
2.2	A	A/B	A/B	A/B/C	C/D	E	F	F
3.3	A/B	A/B	A/B/C	C/D	D/E	F	F	G
4.7	B	A/B/C	B/C/D	D/E	E/F	F	F/G	H
6.8	B/C	C/D	D/E	E/F	F	F/G	G/H	H
10	C/D	D/E	C/E/F	E/F	E/F/G	F/G	G/H	
15	D/E	E/F	E/F	F/G	F/G	H	H	
22	E/F	F	F/G	F/G	G/H	G/H		
33	F	F/G	F/G	F/G/H	H	H		
47	F/G	F/G	G/H	G/H				
68	F/G	G/H	H	H				
100	H	H	H	H				
120	H	H	H					
150	H	H						
330	H	H						

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF AT + 25 °C 120 Hz (%)
4 V_{DC} AT + 85 °C, SURGE = 5 V; 2.7 V_{DC} AT + 125 °C, SURGE = 3.4 V				
2.2	A	194D225(1)004A(2)(3)	0.5	6
3.3	A	194D335(1)004A(2)(3)	0.5	6
3.3	B	194D335(1)004B(2)(3)	0.5	6
4.7	B	194D475(1)004B(2)(3)	0.5	6
6.8	B	194D685(1)004B(2)(3)	0.5	6
6.8	C	194D685(1)004C(2)(3)	0.5	6
10	C	194D106(1)004C(2)(3)	0.5	6
10	D	194D106(1)004D(2)(3)	0.5	6
15	D	194D156(1)004D(2)(3)	0.6	6
15	E	194D156(1)004E(2)(3)	0.6	6
22	E	194D226(1)004E(2)(3)	0.9	6
22	F	194D226(1)004F(2)(3)	0.9	6
33	F	194D336(1)004F(2)(3)	1.3	6
47	F	194D476(1)004F(2)(3)	1.9	6
47	G	194D476(1)004G(2)(3)	1.9	6
68	F	194D686(1)004F(2)(3)	2.7	6
68	G	194D686(1)004G(2)(3)	2.7	6
100	H	194D107(1)004H(2)(3)	4.0	8
120	H	194D127(1)004H(2)(3)	4.8	8
150	H	194D157(1)004H(2)(3)	6.0	8
330	H	194D337(1)004H(2)(3)	13.2	10

Notes

- Part number definitions:
  (1) Tolerance: For 10 % tolerance, specify “X9”; for 20 % tolerance, change to “X0”, for 5 % tolerance specify “X5” (special order)
  (2) Termination: For gold plated specify “2”, for solder plated 60/40 specify “8”, for hot solder dipped specify “7”
  (3) Packaging code: For 7" reels specify “T”, for half of 7" reels specify “H”, for bulk specify “B”

(1) 5 % tolerance is not available for the 0.33 µF/50 V design

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF AT + 25 °C 120 Hz (%)
6 V_{DC} AT + 85 °C, SURGE = 8 V; 4 V_{DC} AT + 125 °C, SURGE = 5 V				
1.5	A	194D155(1)006A(2)(3)	0.5	6
2.2	A	194D225(1)006A(2)(3)	0.5	6
2.2	B	194D225(1)006B(2)(3)	0.5	6
3.3	A	194D335(1)006A(2)(3)	0.5	6
3.3	B	194D335(1)006B(2)(3)	0.5	6
4.7	A	194D475(1)006A(2)(3)	0.5	6
4.7	B	194D475(1)006B(2)(3)	0.5	6
4.7	C	194D475(1)006C(2)(3)	0.5	6
6.8	C	194D685(1)006C(2)(3)	0.5	6
6.8	D	194D685(1)006D(2)(3)	0.5	6
10	D	194D106(1)006D(2)(3)	0.6	6
10	E	194D106(1)006E(2)(3)	0.6	6
15	E	194D156(1)006E(2)(3)	1.0	6
15	F	194D156(1)006F(2)(3)	1.0	6
22	F	194D226(1)006F(2)(3)	1.4	6
33	F	194D336(1)006F(2)(3)	2.1	6
33	G	194D336(1)006G(2)(3)	2.1	6
47	F	194D476(1)006F(2)(3)	3.0	6
47	G	194D476(1)006G(2)(3)	3.0	6
68	G	194D686(1)006G(2)(3)	4.3	6
68	H	194D686(1)006H(2)(3)	4.3	6
100	H	194D107(1)006H(2)(3)	6.0	8
120	H	194D127(1)006H(2)(3)	7.2	8
150	H	194D157(1)006H(2)(3)	9.0	8
330	H	194D337(1)006H(2)(3)	20.0	10
10 V_{DC} AT + 85 °C, SURGE = 13 V; 7 V_{DC} AT + 125 °C, SURGE = 9 V				
1.0	A	194D105(1)010A(2)(3)	0.5	4
1.5	A	194D155(1)010A(2)(3)	0.5	6
1.5	B	194D155(1)010B(2)(3)	0.5	6
2.2	A	194D225(1)010A(2)(3)	0.5	6
2.2	B	194D225(1)010B(2)(3)	0.5	6
3.3	A	194D335(1)010A(2)(3)	0.5	6
3.3	B	194D335(1)010B(2)(3)	0.5	6
3.3	C	194D335(1)010C(2)(3)	0.5	6
4.7	B	194D475(1)010B(2)(3)	0.5	6
4.7	C	194D475(1)010C(2)(3)	0.5	6
4.7	D	194D475(1)010D(2)(3)	0.5	6
6.8	D	194D685(1)010D(2)(3)	0.7	6
6.8	E	194D685(1)010E(2)(3)	0.7	6
10	C	194D106(1)010C(2)(3)	1.0	6
10	E	194D106(1)010E(2)(3)	1.0	6
10	F	194D106(1)010F(2)(3)	1.0	6
15	E	194D156(1)010E(2)(3)	1.5	6
15	F	194D156(1)010F(2)(3)	1.5	6
22	F	194D226(1)010F(2)(3)	2.2	6
22	G	194D226(1)010G(2)(3)	2.2	6

Notes

- Part number definitions:
  (1) Tolerance: For 10 % tolerance, specify “X9”; for 20 % tolerance, change to “X0”, for 5 % tolerance specify “X5” (special order)
  (2) Termination: For gold plated specify “2”, for solder plated 60/40 specify “8”, for hot solder dipped specify “7”
  (3) Packaging code: For 7" reels specify “T”, for half of 7" reels specify “H”, for bulk specify “B”

(1) 5 % tolerance is not available for the 0.33 µF/50 V design

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF AT + 25 °C 120 Hz (%)
10 V_{DC} AT + 85 °C, SURGE = 13 V; 7 V_{DC} AT + 125 °C, SURGE = 9 V				
33	F	194D336(1)010F(2)(3)	3.3	6
33	G	194D336(1)010G(2)(3)	3.3	6
47	G	194D476(1)010G(2)(3)	4.7	6
47	H	194D476(1)010H(2)(3)	4.7	6
68	H	194D686(1)010H(2)(3)	6.8	6
100	H	194D107(1)010H(2)(3)	10.0	8
120	H	194D127(1)010H(2)(3)	12.0	8
15 V_{DC} AT + 85 °C, SURGE = 20 V; 10 V_{DC} AT + 125 °C, SURGE = 12 V				
0.68	A	194D684(1)015A(2)(3)	0.5	4
1.0	A	194D105(1)015A(2)(3)	0.5	4
1.0	B	194D105(1)015B(2)(3)	0.5	4
1.5	A	194D155(1)015A(2)(3)	0.5	6
1.5	B	194D155(1)015B(2)(3)	0.5	6
2.2	A	194D225(1)015A(2)(3)	0.5	6
2.2	B	194D225(1)015B(2)(3)	0.5	6
2.2	C	194D225(1)015C(2)(3)	0.5	6
3.3	C	194D335(1)015C(2)(3)	0.5	6
3.3	D	194D335(1)015D(2)(3)	0.5	6
4.7	D	194D475(1)015D(2)(3)	0.7	6
4.7	E	194D475(1)015E(2)(3)	0.7	6
6.8	E	194D685(1)015E(2)(3)	1.1	6
6.8	F	194D685(1)015F(2)(3)	1.1	6
10	E	194D106(1)015E(2)(3)	1.6	6
10	F	194D106(1)015F(2)(3)	1.6	6
15	F	194D156(1)015F(2)(3)	2.4	6
15	G	194D156(1)015G(2)(3)	2.4	6
22	F	194D226(1)015F(2)(3)	3.5	6
22	G	194D226(1)015G(2)(3)	3.5	6
33	F	194D336(1)015F(2)(3)	5.3	6
33	G	194D336(1)015G(2)(3)	5.3	6
33	H	194D336(1)015H(2)(3)	5.3	6
47	G	194D476(1)015G(2)(3)	10.0	8
47	H	194D476(1)015H(2)(3)	7.0	6
68	H	194D686(1)015H(2)(3)	10.0	6
100	H	194D107(1)015H(2)(3)	15.0	10
20 V_{DC} AT + 85 °C, SURGE = 26 V; 13 V_{DC} AT + 125 °C, SURGE = 16 V				
0.47	A	194D474(1)020A(2)(3)	0.5	4
0.68	A	194D684(1)020A(2)(3)	0.5	4
0.68	B	194D684(1)020B(2)(3)	0.5	4
1.0	A	194D105(1)020A(2)(3)	0.5	4
1.0	B	194D105(1)020B(2)(3)	0.5	4
1.5	B	194D155(1)020B(2)(3)	0.5	6
1.5	C	194D155(1)020C(2)(3)	0.5	6
2.2	C	194D225(1)020C(2)(3)	0.5	6
2.2	D	194D225(1)020D(2)(3)	0.5	6
3.3	D	194D335(1)020D(2)(3)	0.7	6
3.3	E	194D335(1)020E(2)(3)	0.7	6

Notes

- Part number definitions:
  (1) Tolerance: For 10 % tolerance, specify “X9”; for 20 % tolerance, change to “X0”, for 5 % tolerance specify “X5” (special order)
  (2) Termination: For gold plated specify “2”, for solder plated 60/40 specify “8”, for hot solder dipped specify “7”
  (3) Packaging code: For 7" reels specify “T”, for half of 7" reels specify “H”, for bulk specify “B”

(1) 5 % tolerance is not available for the 0.33 µF/50 V design

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF AT + 25 °C 120 Hz (%)
20 V_{DC} AT + 85 °C, SURGE = 26 V; 13 V_{DC} AT + 125 °C, SURGE = 16 V				
4.7	E	194D475(1)020E(2)(3)	0.9	6
4.7	F	194D475(1)020F(2)(3)	0.9	6
6.8	F	194D685(1)020F(2)(3)	1.4	6
10	E	194D106(1)020E(2)(3)	2.0	6
10	F	194D106(1)020F(2)(3)	2.0	6
10	G	194D106(1)020G(2)(3)	2.0	6
15	F	194D156(1)020F(2)(3)	3.0	6
15	G	194D156(1)020G(2)(3)	3.0	6
22	G	194D226(1)020G(2)(3)	4.0	8
22	H	194D226(1)020H(2)(3)	4.4	6
33	H	194D336(1)020H(2)(3)	6.6	6
25 V_{DC} AT + 85 °C, SURGE = 32 V; 17 V_{DC} AT + 125 °C, SURGE = 20 V				
0.33	A	194D334(1)025A(2)(3)	0.5	4
0.47	A	194D474(1)025A(2)(3)	0.5	4
0.47	B	194D474(1)025B(2)(3)	0.5	4
0.68	B	194D684(1)025B(2)(3)	0.5	4
1.0	A	194D105(1)025A(2)(3)	0.5	6
1.0	B	194D105(1)025B(2)(3)	0.5	6
1.0	C	194D105(1)025C(2)(3)	0.5	4
1.5	D	194D155(1)025D(2)(3)	0.5	6
2.2	E	194D225(1)025E(2)(3)	0.6	6
3.3	F	194D335(1)025F(2)(3)	0.8	6
4.7	F	194D475(1)025F(2)(3)	1.2	6
6.8	F	194D685(1)025F(2)(3)	1.7	6
6.8	G	194D685(1)025G(2)(3)	1.7	6
10	F	194D106(1)025F(2)(3)	2.5	6
10	G	194D106(1)025G(2)(3)	2.5	6
15	H	194D156(1)025H(2)(3)	3.8	6
22	G	194D226(1)025G(2)(3)	5.5	6
22	H	194D226(1)025H(2)(3)	5.5	6
33	H	194D336(1)025H(2)(3)	10.0	8
35 V_{DC} AT + 85 °C, SURGE = 46 V; 23 V_{DC} AT + 125 °C, SURGE = 28 V				
0.10	A	194D104(1)035A(2)(3)	0.5	4
0.15	A	194D154(1)035A(2)(3)	0.5	4
0.22	A	194D224(1)035A(2)(3)	0.5	4
0.33	A	194D334(1)035A(2)(3)	0.5	4
0.33	B	194D334(1)035B(2)(3)	0.5	4
0.47	B	194D474(1)035B(2)(3)	0.5	4
0.68	C	194D684(1)035C(2)(3)	0.5	4
1.0	D	194D105(1)035D(2)(3)	0.5	4
1.5	E	194D155(1)035E(2)(3)	0.5	6
2.2	F	194D225(1)035F(2)(3)	0.8	6
3.3	F	194D335(1)035F(2)(3)	1.2	6
4.7	F	194D475(1)035F(2)(3)	1.6	6
4.7	G	194D475(1)035G(2)(3)	1.6	6
6.8	G	194D685(1)035G(2)(3)	2.4	6
6.8	H	194D685(1)035H(2)(3)	2.4	6
10	G	194D106(1)035G(2)(3)	3.5	6
10	H	194D106(1)035H(2)(3)	3.5	6
15	H	194D156(1)035H(2)(3)	5.3	6

Notes

- Part number definitions:
  (1) Tolerance: For 10 % tolerance, specify “X9”; for 20 % tolerance, change to “X0”, for 5 % tolerance specify “X5” (special order)
  (2) Termination: For gold plated specify “2”, for solder plated 60/40 specify “8”, for hot solder dipped specify “7”
  (3) Packaging code: For 7" reels specify “T”, for half of 7" reels specify “H”, for bulk specify “B”

(1) 5 % tolerance is not available for the 0.33 µF/50 V design

STANDARD RATINGS				
CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF AT + 25 °C 120 Hz (%)
50 V_{DC} AT + 85 °C, SURGE = 65 V; 33 V_{DC} AT + 125 °C, SURGE = 38 V				
0.10	A	194D104(1)050A(2)(3)	0.5	4
0.15	A	194D154(1)050A(2)(3)	0.5	4
0.22	B	194D224(1)050B(2)(3)	0.5	4
0.33 (1)	B	194D334(1)050B(2)(3)	0.5	4
0.47	C	194D474(1)050C(2)(3)	0.5	4
0.68	D	194D684(1)050D(2)(3)	0.5	4
1.0	E	194D105(1)050E(2)(3)	0.5	4
1.5	F	194D155(1)050F(2)(3)	0.8	6
2.2	F	194D225(1)050F(2)(3)	1.1	6
3.3	G	194D335(1)050G(2)(3)	1.7	6
4.7	H	194D475(1)050H(2)(3)	2.4	6
6.8	H	194D685(1)050H(2)(3)	3.4	6

Notes

- Part number definitions:
  (1) Tolerance: For 10 % tolerance, specify “X9”; for 20 % tolerance, change to “X0”, for 5 % tolerance specify “X5” (special order)
  (2) Termination: For gold plated specify “2”, for solder plated 60/40 specify “8”, for hot solder dipped specify “7”
  (3) Packaging code: For 7" reels specify “T”, for half of 7" reels specify “H”, for bulk specify “B”

(1) 5 % tolerance is not available for the 0.33 µF/50 V design

RECOMMENDED VOLTAGE DERATING GUIDELINES (for temperatures below + 85 °C)	
STANDARD CONDITIONS. FOR EXAMPLE: OUTPUT FILTERS	
Capacitor Voltage Rating	Operating Voltage
4.0	2.5
6.0	3.4
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
6.0	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
A	0.060
B	0.075
C	0.075
D	0.085
E	0.095
F	0.110
G	0.120
H	0.150

STANDARD PACKAGING QUANTITY			
CASE CODE	QUANTITY (pcs/reel)		BULK, PLASTIC TRAY QUANTITY
	7" FULL REEL	7" HALF REEL	
A	2500	1250	75
B	2500	1250	75
C	2500	1250	75
D	2500	1250	75
E	2500	1250	75
F	1000	500	75
G	600	300	60
H	600	300	50

PRODUCT INFORMATION	
Conformal Coated Guide	www.vishay.com/doc?40150
Pad Dimensions	
Package Dimensions	
Moisture Sensitivity	www.vishay.com/doc?40135
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