Solid Tantalum Surface Mount Capacitors
TANTAMOUNT® Conformal Coated, Extended Range, Military, MIL-PRF-55365/13 Qualified

FEATURES

- Weibull failure rates B, C, T
- Tape and reel available per EIA 481
- Termination finishes available: Gold plate, solder plated, solder fused, and hot solder dipped
- 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

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

Capacitance Range: 0.33 µF to 330 µF

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

Voltage Rating: 4 V_{DC} to 35 V_{DC}

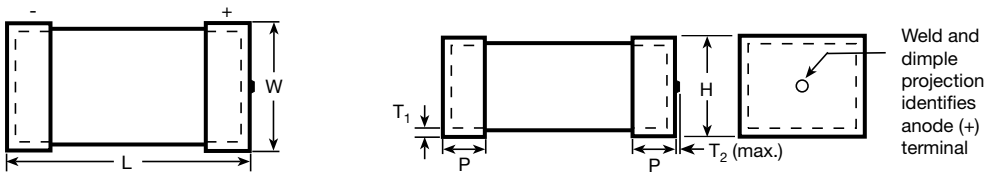
ORDERING INFORMATION

CWR16	D	B	335	K	B	A	A	/TR
TYPE	VOLTAGE	TERMINATION FINISH	CAPACITANCE	CAPACITANCE TOLERANCE	FAILURE RATE %/1000 h	CASE CODE	SURGE CURRENT	PACKAGING
	C = 4 V D = 6 V F = 10 V H = 15 V J = 20 V K = 25 V M = 35 V	B = Gold C = Hot solder dipped H = Solder plated K = Solder fused	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	J = ± 5 % K = ± 10 % M = ± 20 %	B = 0.1 C = 0.01 T = 0.01 (1)	A B C D E F G H	A = 10 cycles at + 25 °C B = 10 cycles at - 55 °C and + 85 °C C = 10 cycles at - 55 °C and + 85 °C (before Weibull grading) Z = No surge current	Blank = Bulk, plastic tray /FA = Waffle pack /PR = 100 pcs reel /HR = Half reel /TR = Full reel

Note

(1) T level requires surge current option “C”. Capacitors are recommended for “space applications”.

DIMENSIONS in inches [millimeters]



CASE CODE	L	W	H	P	T_1	T_2 (max.)
A	0.100 ± 0.015 [2.54 ± 0.38]	0.050 ± 0.015 [1.27 ± 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	0.150 ± 0.015 [3.81 ± 0.38]	0.050 ± 0.015 [1.27 ± 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	0.200 ± 0.015 [5.08 ± 0.38]	0.050 ± 0.015 [1.27 ± 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	0.150 ± 0.015 [3.81 ± 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]
E	0.200 ± 0.015 [5.08 ± 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]
F	0.220 ± 0.015 [5.59 ± 0.38]	0.135 ± 0.015 [3.43 ± 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	0.265 ± 0.015 [6.73 ± 0.38]	0.110 ± 0.015 [2.79 ± 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	0.285 ± 0.015 [7.24 ± 0.38]	0.150 ± 0.015 [3.81 ± 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" [0.38 mm] to termination dimension tolerance.

RATINGS AND CASE CODES

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

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL (µA) AT			MAX. DF (%) AT			MAX. ESR AT + 25 °C 100 kHz (Ω)
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
4 V_{DC} AT + 85 °C; 2.7 V_{DC} AT + 125 °C									
3.3	A	CWR16C(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
4.7	A	CWR16C(1)475(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
6.8	A	CWR16C(1)685(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
10	B	CWR16C(1)106(2)(3)B(4)(5)	1	10	12	8	10	10	8.0
15	B	CWR16C(1)156(2)(3)B(4)(5)	1	10	12	8	10	10	8.0
22	B	CWR16C(1)226(2)(3)B(4)(5)	1	10	12	8	10	10	8.0
22	D	CWR16C(1)226(2)(3)D(4)(5)	1	10	12	8	10	12	4.0
33	D	CWR16C(1)336(2)(3)D(4)(5)	2	20	24	8	10	12	4.0
33	E	CWR16C(1)336(2)(3)E(4)(5)	2	20	24	8	10	12	3.0
47	E	CWR16C(1)476(2)(3)E(4)(5)	2	20	24	8	10	12	3.0
68	E	CWR16C(1)686(2)(3)E(4)(5)	3	30	36	8	10	12	3.0
100	F	CWR16C(1)107(2)(3)F(4)(5)	4	40	48	10	12	12	2.0
150	G	CWR16C(1)157(2)(3)G(4)(5)	6	60	72	10	12	12	1.0
220	H	CWR16C(1)227(2)(3)H(4)(5)	8	80	96	10	12	12	1.0
330	H	CWR16C(1)337(2)(3)H(4)(5)	10	100	120	10	12	12	0.9

Note

- Part number definitions:
  (1) Termination finish: B, C, H, K
  (2) Capacitance tolerance: J, K, M
  (3) Failure rate: B, C, T
  (4) Surge current: A, B, C, Z
  (5) Packaging: Blank, /FA, /HR, /PR, /TR

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL (µA) AT			MAX. DF (%) AT			MAX. ESR AT + 25 °C 100 kHz (Ω)
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C									
3.3	A	CWR16D(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
4.7	A	CWR16D(1)475(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
6.8	B	CWR16D(1)685(2)(3)B(4)(5)	1	10	12	6	8	8	8.0
10	B	CWR16D(1)106(2)(3)B(4)(5)	1	10	12	6	8	8	8.0
15	B	CWR16D(1)156(2)(3)B(4)(5)	1	10	12	8	10	10	8.0
15	D	CWR16D(1)156(2)(3)D(4)(5)	1	10	12	8	10	12	5.0
15	E	CWR16D(1)156(2)(3)E(4)(5)	1	10	12	8	10	12	3.0
22	D	CWR16D(1)226(2)(3)D(4)(5)	1	10	12	6	8	8	5.0
22	E	CWR16D(1)226(2)(3)E(4)(5)	2	20	24	8	10	12	3.5
33	E	CWR16D(1)336(2)(3)E(4)(5)	2	20	24	6	8	8	3.5
47	F	CWR16D(1)476(2)(3)F(4)(5)	3	30	36	8	10	12	3.5
68	F	CWR16D(1)686(2)(3)F(4)(5)	4	40	48	10	12	12	1.5
68	G	CWR16D(1)686(2)(3)G(4)(5)	4	40	48	10	12	12	1.0
100	G	CWR16D(1)107(2)(3)G(4)(5)	6	60	72	10	12	12	1.1
150	G	CWR16D(1)157(2)(3)G(4)(5)	10	100	120	10	12	12	1.1
220	H	CWR16D(1)227(2)(3)H(4)(5)	10	100	120	10	12	12	0.9
330	H	CWR16D(1)337(2)(3)H(4)(5)	20	200	240	10	12	12	0.9
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C									
2.2	A	CWR16F(1)225(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
3.3	A	CWR16F(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12.0
4.7	B	CWR16F(1)475(2)(3)B(4)(5)	1	10	12	6	8	8	8.0
4.7	C	CWR16F(1)475(2)(3)C(4)(5)	1	10	12	6	8	8	5.5
6.8	B	CWR16F(1)685(2)(3)B(4)(5)	1	10	12	6	8	8	8.0
6.8	C	CWR16F(1)685(2)(3)C(4)(5)	1	10	12	6	8	8	5.5
6.8	D	CWR16F(1)685(2)(3)D(4)(5)	1	10	12	6	8	8	5.0
10	B	CWR16F(1)106(2)(3)B(4)(5)	1	10	12	8	10	10	8.0
10	C	CWR16F(1)106(2)(3)C(4)(5)	1	10	12	6	8	8	5.5
10	D	CWR16F(1)106(2)(3)D(4)(5)	1	10	12	6	8	8	4.0
10	E	CWR16F(1)106(2)(3)E(4)(5)	1	10	12	6	8	8	3.5
15	D	CWR16F(1)156(2)(3)D(4)(5)	1	10	12	6	8	8	5.0
15	E	CWR16F(1)156(2)(3)E(4)(5)	2	20	24	8	10	10	3.0
22	E	CWR16F(1)226(2)(3)E(4)(5)	3	30	36	8	10	10	2.0
33	F	CWR16F(1)336(2)(3)F(4)(5)	3	30	36	8	10	10	1.5
47	F	CWR16F(1)476(2)(3)F(4)(5)	4	40	48	10	12	12	1.5
47	G	CWR16F(1)476(2)(3)G(4)(5)	4	40	48	10	12	12	1.0
68	G	CWR16F(1)686(2)(3)G(4)(5)	6	60	72	10	12	12	1.1
100	G	CWR16F(1)107(2)(3)G(4)(5)	10	100	120	10	12	12	1.1
100	H	CWR16F(1)107(2)(3)H(4)(5)	10	100	120	10	12	12	0.9
150	H	CWR16F(1)157(2)(3)H(4)(5)	15	150	180	10	12	12	0.9
220	H	CWR16F(1)227(2)(3)H(4)(5)	20	200	240	10	12	12	0.9

Note

- Part number definitions:
  (1) Termination finish: B, C, H, K
  (2) Capacitance tolerance: J, K, M
  (3) Failure rate: B, C, T
  (4) Surge current: A, B, C, Z
  (5) Packaging: Blank, /FA, /HR, /PR, /TR

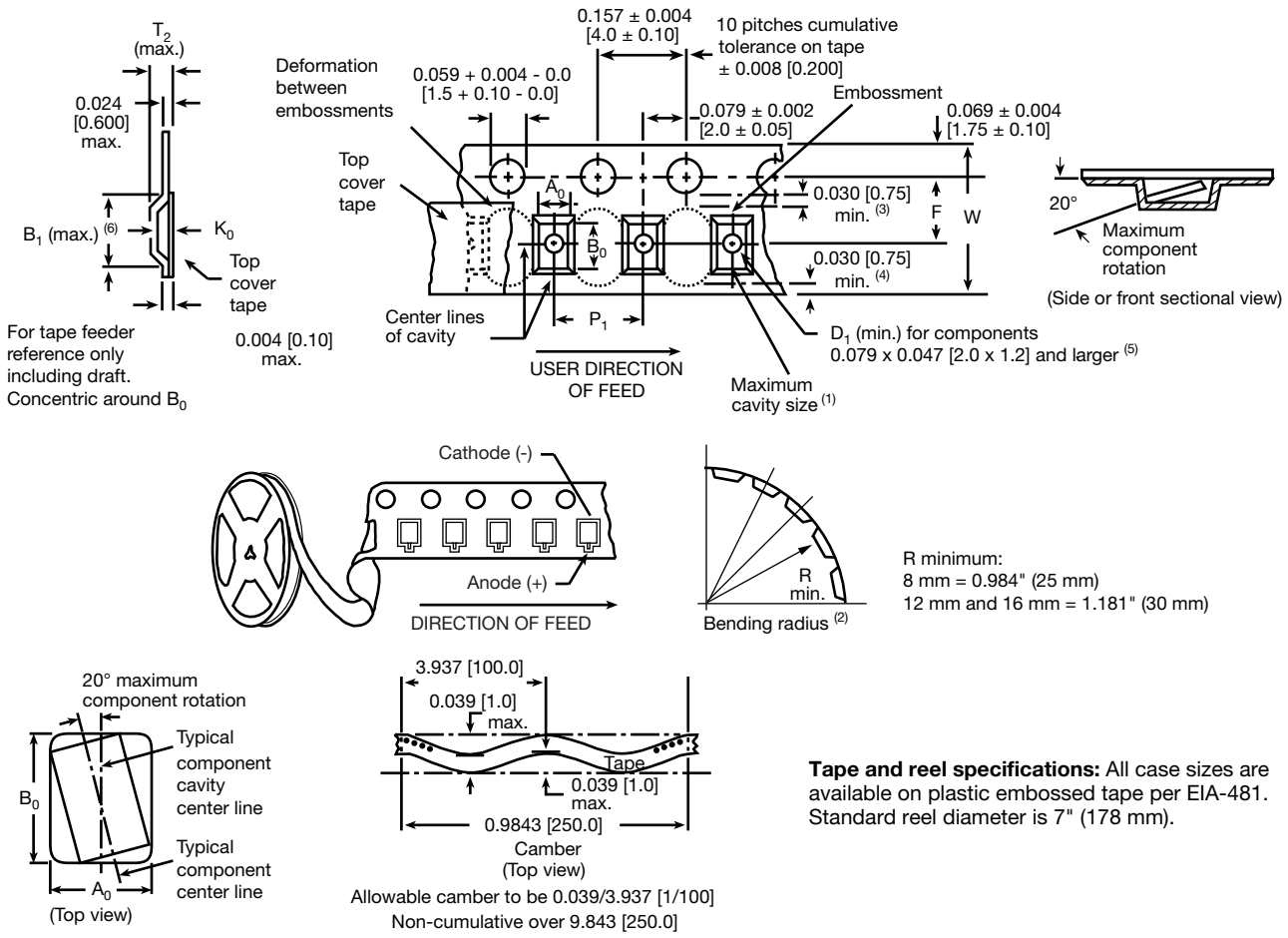
STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL (µA) AT			MAX. DF (%) AT			MAX. ESR AT + 25 °C 100 kHz (Ω)
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C									
1.0	A	CWR16H(1)105(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
1.5	A	CWR16H(1)155(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
2.2	A	CWR16H(1)225(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
3.3	B	CWR16H(1)335(2)(3)B(4)(5)	1	10	12	6	8	8	9.0
4.7	B	CWR16H(1)475(2)(3)B(4)(5)	1	10	12	6	8	8	5.0
4.7	C	CWR16H(1)475(2)(3)C(4)(5)	1	10	12	6	8	8	5.5
4.7	D	CWR16H(1)475(2)(3)D(4)(5)	1	10	12	6	8	8	6.0
6.8	D	CWR16H(1)685(2)(3)D(4)(5)	1	10	12	6	8	8	6.0
6.8	E	CWR16H(1)685(2)(3)E(4)(5)	1	10	12	8	10	12	3.0
10	D	CWR16H(1)106(2)(3)D(4)(5)	2	20	24	6	8	8	6.0
10	E	CWR16H(1)106(2)(3)E(4)(5)	2	20	24	6	8	8	4.0
15	E	CWR16H(1)156(2)(3)E(4)(5)	2	20	24	6	8	8	4.0
15	F	CWR16H(1)156(2)(3)F(4)(5)	2	20	24	8	10	10	3.0
22	F	CWR16H(1)226(2)(3)F(4)(5)	3	30	36	8	10	10	3.0
33	F	CWR16H(1)336(2)(3)F(4)(5)	5	50	60	6	8	8	3.0
33	G	CWR16H(1)336(2)(3)G(4)(5)	6	60	72	8	10	10	1.1
47	G	CWR16H(1)476(2)(3)G(4)(5)	10	100	120	8	10	10	1.1
47	H	CWR16H(1)476(2)(3)H(4)(5)	10	100	120	8	10	10	0.9
68	G	CWR16H(1)686(2)(3)G(4)(5)	10	100	120	8	10	10	1.1
68	H	CWR16H(1)686(2)(3)H(4)(5)	10	100	120	8	10	10	0.9
100	H	CWR16H(1)107(2)(3)H(4)(5)	15	150	180	10	12	12	0.9
20 V_{DC} AT + 85 °C; 13 V_{DC} AT + 125 °C									
0.68	A	CWR16J(1)684(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
1.0	A	CWR16J(1)105(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
1.5	B	CWR16J(1)155(2)(3)B(4)(5)	1	10	12	6	8	8	9.0
2.2	B	CWR16J(1)225(2)(3)B(4)(5)	1	10	12	6	8	8	9.0
3.3	D	CWR16J(1)335(2)(3)D(4)(5)	1	10	12	6	8	8	6.0
4.7	E	CWR16J(1)475(2)(3)E(4)(5)	1	10	12	6	8	8	6.0
6.8	E	CWR16J(1)685(2)(3)E(4)(5)	2	20	24	6	8	8	5.0
10	E	CWR16J(1)106(2)(3)E(4)(5)	2	20	24	6	8	8	5.0
10	F	CWR16J(1)106(2)(3)F(4)(5)	2	20	24	6	8	8	3.0
15	F	CWR16J(1)156(2)(3)F(4)(5)	3	30	36	6	8	8	3.0
22	G	CWR16J(1)226(2)(3)G(4)(5)	4	40	48	8	10	10	2.5
33	H	CWR16J(1)336(2)(3)H(4)(5)	6	60	72	8	10	10	0.9
47	H	CWR16J(1)476(2)(3)H(4)(5)	10	100	120	8	10	10	0.9
25 V_{DC} AT + 85 °C; 17 V_{DC} AT + 125 °C									
0.47	A	CWR16K(1)474(2)(3)A(4)(5)	1	10	12	6	8	8	15.0
1.0	B	CWR16K(1)105(2)(3)B(4)(5)	1	10	12	6	8	8	10.0
2.2	D	CWR16K(1)225(2)(3)D(4)(5)	1	10	12	6	8	8	6.0
3.3	E	CWR16K(1)335(2)(3)E(4)(5)	1	10	12	6	8	8	4.0
6.8	F	CWR16K(1)685(2)(3)F(4)(5)	2	20	24	6	8	8	3.0
15	G	CWR16K(1)156(2)(3)G(4)(5)	4	40	48	6	8	8	1.4
22	G	CWR16K(1)226(2)(3)G(4)(5)	6	60	72	6	8	8	1.4
22	H	CWR16K(1)226(2)(3)H(4)(5)	6	60	72	6	8	8	0.9
33	H	CWR16K(1)336(2)(3)H(4)(5)	10	100	120	8	10	10	0.9
35 V_{DC} AT + 85 °C, 23 V_{DC} AT + 125 °C									
0.33	A	CWR16M(1)334(2)(3)A(4)(5)	1	10	12	6	8	8	22.0
6.8	G	CWR16M(1)685(2)(3)G(4)(5)	3	30	36	6	8	8	1.5
10	H	CWR16M(1)106(2)(3)H(4)(5)	4	40	48	8	10	10	0.9
15	H	CWR16M(1)156(2)(3)H(4)(5)	6	60	72	6	8	8	0.9

Note

- Part number definitions:
  (1) Termination finish: B, C, H, K
  (2) Capacitance tolerance: J, K, M
  (3) Failure rate: B, C, T
  (4) Surge current: A, B, C, Z
  (5) Packaging: Blank, /FA, /HR, /PR, /TR

TAPE AND REEL PACKAGING in inches [millimeters]



Tape and reel specifications: All case sizes are available on plastic embossed tape per EIA-481. Standard reel diameter is 7" (178 mm).

Notes

- Metric dimensions will govern. Dimensions in inches are rounded and for reference only.

(1) A_0, B_0, K_0, are determined by the maximum dimensions to the ends of the terminals extending from the component body and/or the body dimensions of the component. The clearance between the ends of the terminals or body of the component to the sides and depth of the cavity (A_0, B_0, K_0) must be within 0.002" (0.05 mm) minimum and 0.020" (0.50 mm) maximum. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20°.

(2) Tape with components shall pass around radius "R" without damage. The minimum trailer length may require additional length to provide "R" minimum for 12 mm embossed tape for reels with hub diameters approaching N minimum.

(3) This dimension is the flat area from the edge of the sprocket hole to either outward deformation of the carrier tape between the embossed cavities or to the edge of the cavity whichever is less.

(4) This dimension is the flat area from the edge of the carrier tape opposite the sprocket holes to either the outward deformation of the carrier tape between the embossed cavity or to the edge of the cavity whichever is less.

(5) The embossed hole location shall be measured from the sprocket hole controlling the location of the embossement. Dimensions of embossement location shall be applied independent of each other.

(6) B_1 dimension is a reference dimension tape feeder clearance only.

CARRIER TAPE DIMENSIONS in inches [millimeters]

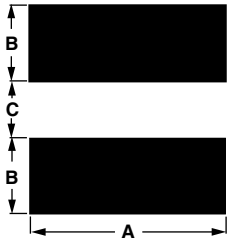
CASE CODE	TAPE SIZE	B_1 (max.)	D_1 (min.)	F	P_1	T_2 (max.)	W
A	8 mm	0.179 [4.55]	0.039 [1.0]	0.138 ± 0.002 [3.5 ± 0.05]	0.157 ± 0.004 [4.0 ± 0.1]	0.098 [2.5]	0.315 ± 0.004 [8.0 ± 0.10]
B, C, D, E	12 mm	0.323 [8.2]	0.059 [1.5]	0.217 ± 0.002 [5.5 ± 0.05]	0.157 ± 0.004 [4.0 ± 0.1]	0.256 [6.5]	0.472 ± 0.012 [12.0 ± 0.30]
F	12 mm double pitch	0.323 [8.2]	0.059 [1.5]	0.217 ± 0.002 [5.5 ± 0.05]	0.315 ± 0.004 [8.0 ± 0.10]	0.256 [6.5]	0.472 ± 0.012 [12.0 ± 0.30]
G, H	16 mm	0.476 [12.1]	0.059 [1.5]	0.295 ± 0.004 [7.5 ± 0.1]	0.315 ± 0.004 [8.0 ± 0.10]	0.315 [8.0]	0.642 max. [16.3] max.

STANDARD PACKAGING QUANTITY

CASE CODE	QUANTITY (PCS/REEL)			BULK, PLASTIC TRAY QUANTITY (PCS)
	7", FULL REEL (/TR)	7", HALF REEL (/HR)	7", PARTIAL REEL (/PR)	
A, B, C, D, E	2500	1250	100	75
F	1000	500	100	75
G	600	300	100	60
H	600	300	100	50

Notes
- Bulk capacitors are shipped in plastic trays
- T level capacitors are only shipped in tape and reel/or waffle packaging. Contact factory for waffle pack quantities.

PAD DIMENSIONS in inches [millimeters]



CASE CODE	WIDTH (A)	PAD METALLIZATION (B)	SEPARATION (C)
A	0.065 [1.6]	0.50 [1.3]	0.040 [1.0]
B	0.065 [1.6]	0.70 [1.8]	0.055 [1.4]
C	0.065 [1.6]	0.70 [1.8]	0.120 [3.0]
D	0.115 [2.9]	0.70 [1.8]	0.070 [1.8]
E	0.115 [2.9]	0.70 [1.8]	0.120 [3.0]
F	0.150 [3.8]	0.70 [1.8]	0.140 [3.6]
G	0.125 [3.2]	0.70 [1.8]	0.170 [4.3]
H	0.165 [4.2]	0.90 [2.3]	0.170 [4.3]

POWER DISSIPATION

CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR
A	0.060
B, C	0.075
D, E	0.085
F	0.110
G	0.120
H	0.150

PRODUCT INFORMATION	
Conformal Coated Guide	www.vishay.com/doc?40150
Pad Dimensions	
Package Dimensions	
Moisture Sensitivity	www.vishay.com/doc?40135
SELECTOR GUIDES	
Solid Tantalum Selector Guide	www.vishay.com/doc?49053
Solid Tantalum Chip Capacitors	www.vishay.com/doc?40091
FAQ	
Frequently Asked Questions	www.vishay.com/doc?40110

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