

# 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, and hot solder dipped
- 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**

**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<sub>DC</sub> to 35 V<sub>DC</sub>

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 H = Solder plated C = Hot solder dipped	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 <sup>(1)</sup>	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 capacitors are recommended for "space applications"

DIMENSIONS in inches [millimeters]						
CASE CODE	L	W	H	P	T <sub>1</sub>	T <sub>2</sub> (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 <sub>DC</sub> AT + 85 °C; 2.7 V <sub>DC</sub> AT + 125 °C									
3.3	A	CWR16C(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12
4.7	A	CWR16C(1)475(2)(3)A(4)(5)	1	10	12	6	8	8	12
6.8	A	CWR16C(1)685(2)(3)A(4)(5)	1	10	12	6	8	8	12
10	B	CWR16C(1)106(2)(3)B(4)(5)	1	10	12	8	10	10	8
15	B	CWR16C(1)156(2)(3)B(4)(5)	1	10	12	8	10	10	8
22	B	CWR16C(1)226(2)(3)B(4)(5)	1	10	12	8	10	10	8
22	D	CWR16C(1)226(2)(3)D(4)(5)	1	10	12	8	10	12	4
33	D	CWR16C(1)336(2)(3)D(4)(5)	2	20	24	8	10	12	4
33	E	CWR16C(1)336(2)(3)E(4)(5)	2	20	24	8	10	12	3
47	E	CWR16C(1)476(2)(3)E(4)(5)	2	20	24	8	10	12	3
68	E	CWR16C(1)686(2)(3)E(4)(5)	3	30	36	8	10	12	3
100	F	CWR16C(1)107(2)(3)F(4)(5)	4	40	48	10	12	12	2
150	G	CWR16C(1)157(2)(3)G(4)(5)	6	60	72	10	12	12	1
220	H	CWR16C(1)227(2)(3)H(4)(5)	8	80	96	10	12	12	1
330	H	CWR16C(1)337(2)(3)H(4)(5)	10	100	120	10	12	12	0.9

**Note**

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



STANDARD RATINGS									
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL ( $\mu$ A) AT			MAX. DF (%) AT			MAX. ESR AT + 25 °C 100 kHz ( $\Omega$ )
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
<b>6 V<sub>DC</sub> AT + 85 °C; 4 V<sub>DC</sub> AT + 125 °C</b>									
3.3	A	CWR16D(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12
4.7	A	CWR16D(1)475(2)(3)A(4)(5)	1	10	12	6	8	8	12
6.8	B	CWR16D(1)685(2)(3)B(4)(5)	1	10	12	6	8	8	8
10	B	CWR16D(1)106(2)(3)B(4)(5)	1	10	12	6	8	8	8
15	B	CWR16D(1)156(2)(3)B(4)(5)	1	10	12	8	10	10	8
15	D	CWR16D(1)156(2)(3)D(4)(5)	1	10	12	8	10	12	5
15	E	CWR16D(1)156(2)(3)E(4)(5)	1	10	12	8	10	12	3
22	D	CWR16D(1)226(2)(3)D(4)(5)	1	10	12	6	8	8	5
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
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
<b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b>									
2.2	A	CWR16F(1)225(2)(3)A(4)(5)	1	10	12	6	8	8	12
3.3	A	CWR16F(1)335(2)(3)A(4)(5)	1	10	12	6	8	8	12
4.7	B	CWR16F(1)475(2)(3)B(4)(5)	1	10	12	6	8	8	8
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
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
10	B	CWR16F(1)106(2)(3)B(4)(5)	1	10	12	8	10	10	8
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
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
15	E	CWR16F(1)156(2)(3)E(4)(5)	2	20	24	8	10	10	3
22	E	CWR16F(1)226(2)(3)E(4)(5)	3	30	36	8	10	10	2
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
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**

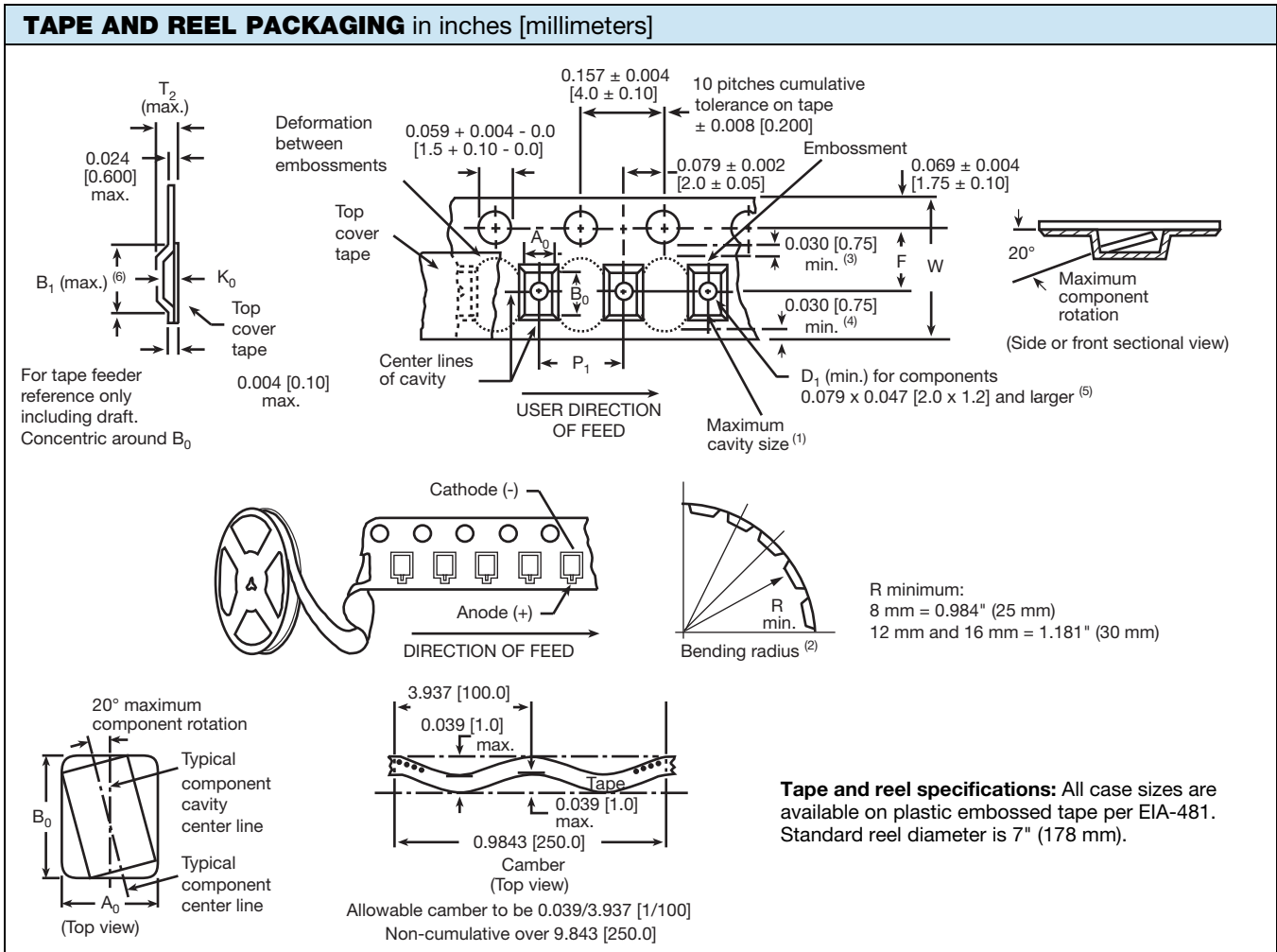
- Part number definitions:
  - (1) Termination finish: B, C, H
  - (2) Capacitance tolerance: J, K, M
  - (3) Failure rate: B, C, T
  - (4) Surge current: A, B, C, Z
  - (5) Packaging: Blank, /FA, /HR, /PR, /TR



STANDARD RATINGS									
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL ( $\mu$ A) AT			MAX. DF (%) AT			MAX. ESR AT + 25 °C 100 kHz ( $\Omega$ )
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
<b>15 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b>									
1.0	A	CWR16H(1)105(2)(3)A(4)(5)	1	10	12	6	8	8	15
1.5	A	CWR16H(1)155(2)(3)A(4)(5)	1	10	12	6	8	8	15
2.2	A	CWR16H(1)225(2)(3)A(4)(5)	1	10	12	6	8	8	15
3.3	B	CWR16H(1)335(2)(3)B(4)(5)	1	10	12	6	8	8	9
4.7	B	CWR16H(1)475(2)(3)B(4)(5)	1	10	12	6	8	8	5
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
6.8	D	CWR16H(1)685(2)(3)D(4)(5)	1	10	12	6	8	8	6
6.8	E	CWR16H(1)685(2)(3)E(4)(5)	1	10	12	8	10	12	3
10	D	CWR16H(1)106(2)(3)D(4)(5)	2	20	24	6	8	8	6
10	E	CWR16H(1)106(2)(3)E(4)(5)	2	20	24	6	8	8	4
15	E	CWR16H(1)156(2)(3)E(4)(5)	2	20	24	6	8	8	4
15	F	CWR16H(1)156(2)(3)F(4)(5)	2	20	24	8	10	10	3
22	F	CWR16H(1)226(2)(3)F(4)(5)	3	30	36	8	10	10	3
33	F	CWR16H(1)336(2)(3)F(4)(5)	5	50	60	6	8	8	3
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
<b>20 V<sub>DC</sub> AT + 85 °C; 13 V<sub>DC</sub> AT + 125 °C</b>									
0.68	A	CWR16J(1)684(2)(3)A(4)(5)	1	10	12	6	8	8	15
1.0	A	CWR16J(1)105(2)(3)A(4)(5)	1	10	12	6	8	8	15
1.5	B	CWR16J(1)155(2)(3)B(4)(5)	1	10	12	6	8	8	9
2.2	B	CWR16J(1)225(2)(3)B(4)(5)	1	10	12	6	8	8	9
3.3	D	CWR16J(1)335(2)(3)D(4)(5)	1	10	12	6	8	8	6
4.7	E	CWR16J(1)475(2)(3)E(4)(5)	1	10	12	6	8	8	6
6.8	E	CWR16J(1)685(2)(3)E(4)(5)	2	20	24	6	8	8	5
10	E	CWR16J(1)106(2)(3)E(4)(5)	2	20	24	6	8	8	5
10	F	CWR16J(1)106(2)(3)F(4)(5)	2	20	24	6	8	8	3
15	F	CWR16J(1)156(2)(3)F(4)(5)	3	30	36	6	8	8	3
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
<b>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b>									
0.47	A	CWR16K(1)474(2)(3)A(4)(5)	1	10	12	6	8	8	15
1.0	B	CWR16K(1)105(2)(3)B(4)(5)	1	10	12	6	8	8	10
2.2	D	CWR16K(1)225(2)(3)D(4)(5)	1	10	12	6	8	8	6
3.3	E	CWR16K(1)335(2)(3)E(4)(5)	1	10	12	6	8	8	4
6.8	F	CWR16K(1)685(2)(3)F(4)(5)	2	20	24	6	8	8	3
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
<b>35 V<sub>DC</sub> AT + 85 °C; 23 V<sub>DC</sub> AT + 125 °C</b>									
0.33	A	CWR16M(1)334(2)(3)A(4)(5)	1	10	12	6	8	8	22
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
  - (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



**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.

<b>CARRIER TAPE DIMENSIONS</b> 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.

<b>STANDARD PACKAGING QUANTITY</b>				
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.

<b>PAD DIMENSIONS</b> 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]

<b>POWER DISSIPATION</b>	
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

<b>PRODUCT INFORMATION</b>	
Conformal Coated Guide	<a href="http://www.vishay.com/doc?40150">www.vishay.com/doc?40150</a>
Pad Dimensions	
Package 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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