

Solid Tantalum Surface Mount Chip Capacitors

TANTAMOUNT[®] Molded Case, Military MIL-PRF-55365/8 Qualified



FEATURES

- Weibull failure rate codes B, C, D and T
- Surge current options A, B and C
- Termination: H = Solder plated, K = Solder fused
- Molded case available in four case codes
- Compatible with “High Volume” automatic pick and place equipment

PERFORMANCE/ELECTRICAL CHARACTERISTICS

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 100 µF

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

Voltage Rating: 4 V_{DC} to 50 V_{DC}

APPLICATIONS

- Military/aerospace
- General purpose
- High reliability

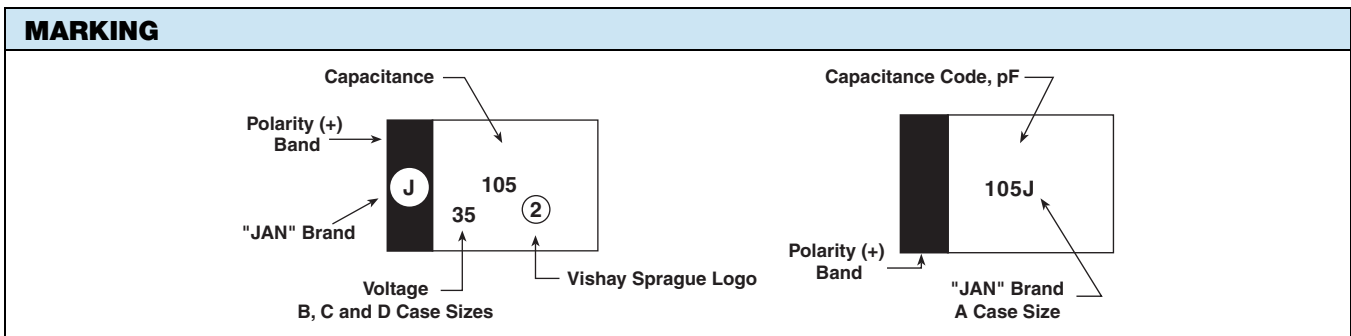
ORDERING INFORMATION							
CWR11	D	H	155	K	B	A	/HR
TYPE	VOLTAGE	TERMINATION FINISH	CAPACITANCE	CAPACITANCE TOLERANCE	FAILURE RATE %/1000 h	SURGE CURRENT (OPTIONAL)	PACKAGING OPTION
C = 4 V D = 6 V F = 10 V H = 15 V J = 20 V K = 25 V M = 35 V N = 50 V	H = Solder plated K = Solder fused	This is expressed 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 %	M = 1.0 P = 0.1 R = 0.01 S = 0.001 B = 0.1 C = 0.01 D = 0.001 T = 0.01 ⁽¹⁾	A = 3 cycles at + 25 °C B = 3 cycles at - 55 °C/+ 85 °C C = 3 cycles at - 55 °C/+ 85 °C (before Weibull grading)	Blank = Full reel /PR = 100 pcs reel /HR = half reel /PT = Bulk, plastic tray /FA = Waffle pack	

Note

⁽¹⁾ T level capacitors are recommended for “Space applications”. Shipped in tape and reel/or waffle packaging only.

DIMENSIONS in inches [millimeters]							
CASE CODE	EIA SIZE	L	W	H	P	T _w	T _H 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]	0.170 ± 0.012 [4.3 ± 0.30]	0.110 ± 0.012 [2.8 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.095 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]

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	B
0.22							A	B
0.33						A	A	B
0.47					A	A	B	C
0.68				A	A	B	B	C
1.0			A	A	A	B	B	C
1.5		A	A	A	B	B	C	D
2.2	A	A	A	B	B	C	C	D
3.3		A	B	B	B	C	C	D
4.7	A	B	B	B	C	C	D	D
6.8	B	B	B		C	D	D	
10	B	B		C		D		
15	B	C	C		D	D		
22		C		D	D			
33	C		D	D				
47		D	D					
68	D	D						
100	D							



STANDARD RATINGS									
CAPACITANCE (μF)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE (μA) AT			MAX. DF 120 Hz (%) 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									
2.2	A	CWR11C(5)225(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0
4.7	A	CWR11C(5)475(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0
6.8	B	CWR11C(5)685(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	5.5
10	B	CWR11C(5)106(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	4.0
15	B	CWR11C(5)156(1)(2)(3)(4)	0.6	6.0	7.2	6	9	9	3.5
33	C	CWR11C(5)336(1)(2)(3)(4)	1.3	13.0	15.6	6	9	9	2.2
68	D	CWR11C(5)686(1)(2)(3)(4)	2.7	27.0	32.4	6	9	9	1.1
100	D	CWR11C(5)107(1)(2)(3)(4)	4.0	40.0	48.0	8	12	12	0.9
6 V_{DC} AT + 85 °C; 4 V_{DC} AT + 125 °C									
1.5	A	CWR11D(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0
2.2	A	CWR11D(5)225(1)(2)(3)(4)	0.5	5.0	6.0	6	6	9	8.0
3.3	A	CWR11D(5)335(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0

Note

- Part number definitions:
 - Capacitance tolerance: J, K, M
 - Failure rate: B, C, D, M, P, R, S, T
Exponential failure rate levels M, P, R, and S are inactive for new design per MIL-PRF-55365
Capacitors qualified to Weibull failure rate levels are substitutable for exponential failure rate levels
 - Surge current (optional): A, B, C
 - Packaging: Blank, /HR, /PR, /PT
 - Termination: K - solder plated, H - solder fused



STANDARD RATINGS									
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE (μ A) AT			MAX. DF 120 Hz (%) 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									
4.7	B	CWR11D(5)475(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	5.5
6.8	B	CWR11D(5)685(1)(2)(3)(4)	0.5	5.0	6.0	6	6	9	4.5
10	B	CWR11D(5)106(1)(2)(3)(4)	0.6	6.0	7.2	6	9	9	3.5
15	C	CWR11D(5)156(1)(2)(3)(4)	0.9	9.0	10.8	6	6	9	3.0
22	C	CWR11D(5)226(1)(2)(3)(4)	1.4	14.0	16.8	6	9	9	2.2
47	D	CWR11D(5)476(1)(2)(3)(4)	2.8	28.0	33.6	6	6	9	1.1
68	D	CWR11D(5)686(1)(2)(3)(4)	4.3	43.0	51.6	6	9	9	0.9
10 V_{DC} AT + 85 °C; 7 V_{DC} AT + 125 °C									
1.0	A	CWR11F(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	10.0
1.5	A	CWR11F(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	6	9	8.0
2.2	A	CWR11F(5)225(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0
3.3	B	CWR11F(5)335(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	5.5
4.7	B	CWR11F(5)475(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	4.5
6.8	B	CWR11F(5)685(1)(2)(3)(4)	0.7	7.0	8.4	6	9	9	3.5
15	C	CWR11F(5)156(1)(2)(3)(4)	1.5	15.0	18.0	6	6	9	2.5
33	D	CWR11F(5)336(1)(2)(3)(4)	3.3	33.0	39.6	6	9	9	1.1
47	D	CWR11F(5)476(1)(2)(3)(4)	4.7	47.0	56.4	6	9	9	0.9
15 V_{DC} AT + 85 °C; 10 V_{DC} AT + 125 °C									
0.68	A	CWR11H(5)684(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	12.0
1.0	A	CWR11H(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	10.0
1.5	A	CWR11H(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	8.0
2.2	B	CWR11H(5)225(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	5.5
3.3	B	CWR11H(5)335(1)(2)(3)(4)	0.5	5.0	6.0	6	8	9	5.0
4.7	B	CWR11H(5)475(1)(2)(3)(4)	0.7	7.0	8.4	6	9	9	4.0
10	C	CWR11H(5)106(1)(2)(3)(4)	1.6	16.0	19.2	6	8	9	2.5
22	D	CWR11H(5)226(1)(2)(3)(4)	3.3	33.0	39.6	6	8	9	1.1
33	D	CWR11H(5)336(1)(2)(3)(4)	5.3	53.0	63.6	6	9	9	0.9
20 V_{DC} AT + 85 °C; 13 V_{DC} AT + 125 °C									
0.47	A	CWR11J(5)474(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	14.0
0.68	A	CWR11J(5)684(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	12.0
1.0	A	CWR11J(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	10.0
1.5	B	CWR11J(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	9	9	6.0
2.2	B	CWR11J(5)225(1)(2)(3)(4)	0.5	5.0	6.0	6	8	9	5.0
3.3	B	CWR11J(5)335(1)(2)(3)(4)	0.7	7.0	8.4	6	9	9	4.0
4.7	C	CWR11J(5)475(1)(2)(3)(4)	1.0	10.0	12.0	6	8	9	3.0
6.8	C	CWR11J(5)685(1)(2)(3)(4)	1.4	14.0	16.8	6	9	9	2.4
15	D	CWR11J(5)156(1)(2)(3)(4)	3.0	30.0	36.0	6	8	9	1.1
22	D	CWR11J(5)226(1)(2)(3)(4)	4.4	44.0	52.8	6	9	9	0.9
25 V_{DC} AT + 85 °C; 17 V_{DC} AT + 125 °C									
0.33	A	CWR11K(5)334(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	15.0
0.47	A	CWR11K(5)474(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	14.0
0.68	B	CWR11K(5)684(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	7.5
1.0	B	CWR11K(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	6.5
1.5	B	CWR11K(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	8	9	6.5
2.2	C	CWR11K(5)225(1)(2)(3)(4)	0.6	6.0	7.2	6	9	9	3.5
3.3	C	CWR11K(5)335(1)(2)(3)(4)	0.9	9.0	10.8	6	8	9	3.5
4.7	C	CWR11K(5)475(1)(2)(3)(4)	1.2	12.0	14.4	6	9	9	2.5
6.8	D	CWR11K(5)685(1)(2)(3)(4)	1.7	17.0	20.4	6	9	9	1.4
10	D	CWR11K(5)106(1)(2)(3)(4)	2.5	25.0	30.0	6	8	9	1.2
15	D	CWR11K(5)156(1)(2)(3)(4)	3.8	38.0	45.6	6	9	9	1.0

Note

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Exponential failure rate levels M, P, R, and S are inactive for new design per MIL-PRF-55365
Capacitors qualified to Weibull failure rate levels are substitutable for exponential failure rate levels
 - Surge current (optional): A, B, C
 - Packaging: Blank, /HR, /PR, /PT
 - Termination: K - solder plated, H - solder fused

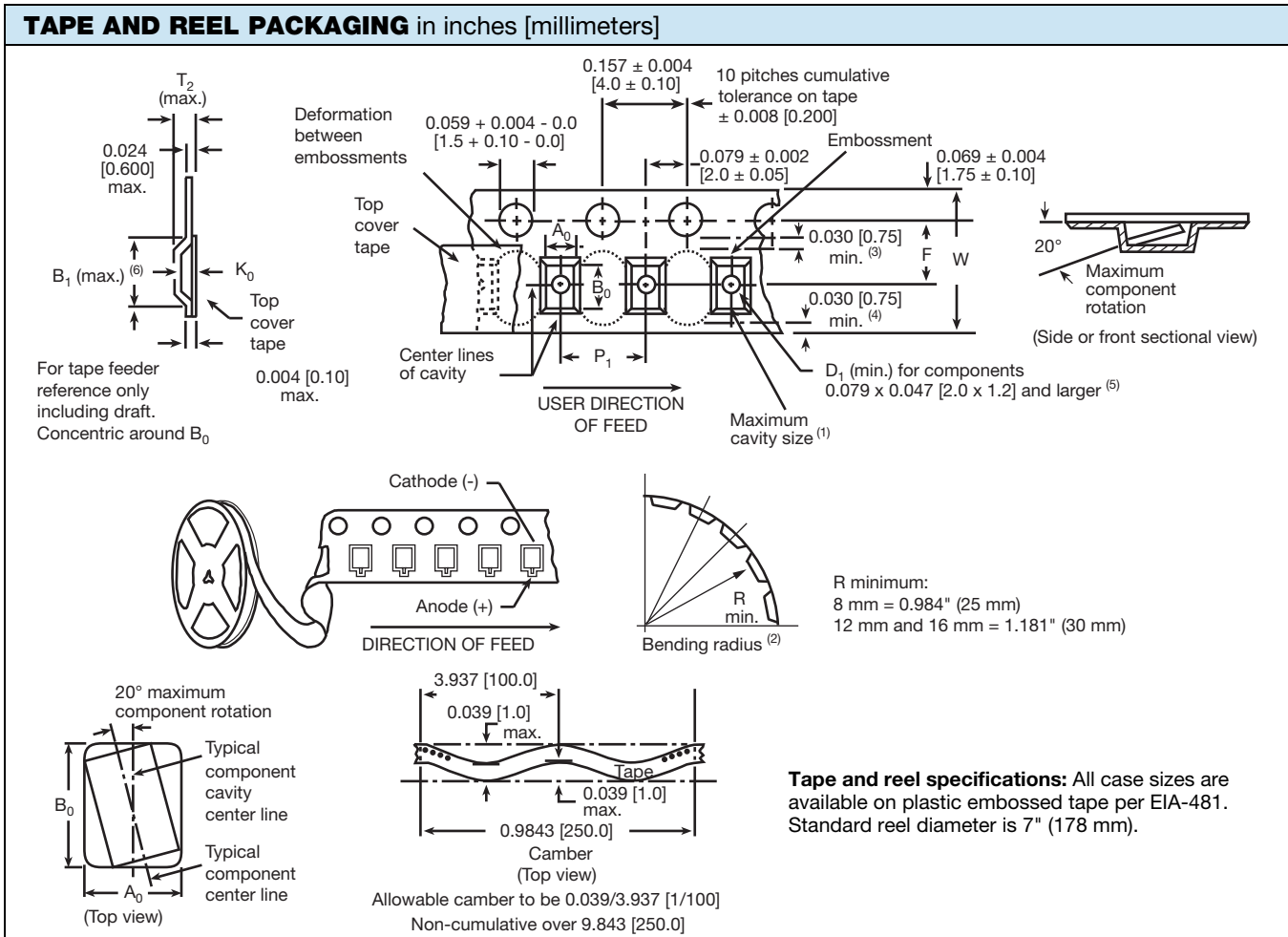


STANDARD RATINGS									
CAPACITANCE (μ F)	CASE CODE	PART NUMBER	MAX. DC LEAKAGE (μ A) AT			MAX. DF 120 Hz (%) AT			MAX. ESR AT + 25 °C 100 kHz (Ω)
			+ 25 °C	+ 85 °C	+ 125 °C	+ 25 °C	+ 85 °C + 125 °C	- 55 °C	
35 V_{DC} AT + 85 °C; 23 V_{DC} AT + 125 °C									
0.10	A	CWR11M(5)104(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	24.0
0.15	A	CWR11M(5)154(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	21.0
0.22	A	CWR11M(5)224(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	18.0
0.33	A	CWR11M(5)334(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	15.0
0.47	B	CWR11M(5)474(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	10.0
0.68	B	CWR11M(5)684(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	8.0
1.0	B	CWR11M(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	6.5
1.5	C	CWR11M(5)155(1)(2)(3)(4)	0.5	5.0	6.0	6	8	9	4.5
2.2	C	CWR11M(5)225(1)(2)(3)(4)	0.8	8.0	9.6	6	8	9	3.5
3.3	C	CWR11M(5)335(1)(2)(3)(4)	1.2	12.0	14.4	6	8	9	2.5
4.7	D	CWR11M(5)475(1)(2)(3)(4)	1.7	17.0	20.4	6	8	9	1.5
6.8	D	CWR11M(5)685(1)(2)(3)(4)	2.4	24.0	28.8	6	9	9	1.3
50 V_{DC} AT + 85 °C; 33 V_{DC} AT + 125 °C									
0.10	A	CWR11N(5)104(1)(2)(3)(4)	0.5	5.0	12.0	6	8	8	22.0
0.15	B	CWR11N(5)154(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	17.0
0.22	B	CWR11N(5)224(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	14.0
0.33	B	CWR11N(5)334(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	12.0
0.47	C	CWR11N(5)474(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	8.0
0.68	C	CWR11N(5)684(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	7.0
1.0	C	CWR11N(5)105(1)(2)(3)(4)	0.5	5.0	6.0	4	6	6	6.0
1.5	D	CWR11N(5)155(1)(2)(3)(4)	0.8	8.0	9.6	6	8	9	4.0
2.2	D	CWR11N(5)225(1)(2)(3)(4)	1.1	11.0	13.2	6	8	9	2.5
3.3	D	CWR11N(5)335(1)(2)(3)(4)	1.7	17.0	20.4	6	9	9	2.0
4.7	D	CWR11N(5)475(1)(2)(3)(4)	2.4	24.0	28.8	6	9	9	1.5

Note

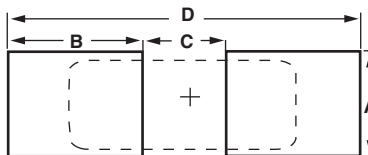
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 - Failure rate: B, C, D, M, P, R, S, T
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Capacitors qualified to Weibull failure rate levels are substitutable for exponential failure rate levels
 - Surge current (optional): A, B, C
 - Packaging: Blank, /HR, /PR, /PT
 - Termination: K - solder plated, H - solder fused

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	3.6
10	6.0
15	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	3.0
10	5.0
15	7.5
20	10
25	12
35	15
50	24


Notes

- Metric dimensions will govern. Dimensions in inches are rounded and for reference only.
- 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°.
- 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.
- 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.
- 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.
- 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.
- 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, B	8 mm	0.165 [4.2]	0.039 [1.0]	0.138 ± 0.002 [3.5 ± 0.05]	0.157 ± 0.004 [4.0 ± 0.1]	0.094 [2.4]	0.315 ± 0.012 [8.0 ± 0.30]
C, D	12 mm	0.323 [8.2]	0.059 [1.5]	0.217 ± 0.002 [5.5 ± 0.05]	0.315 ± 0.004 [8.0 ± 1.0]	0.177 [4.5]	0.472 ± 0.012 [12.0 ± 0.30]

PAD DIMENSIONS in inches [millimeters]


CASE CODE	A (min.)	B (nom.)	C (nom.)	D (nom.)
A	0.071 [1.80]	0.067 [1.70]	0.053 [1.35]	0.187 [4.75]
B	0.118 [3.00]	0.071 [1.80]	0.065 [1.65]	0.207 [5.25]
C	0.118 [3.00]	0.094 [2.40]	0.118 [3.00]	0.307 [7.80]
D	0.157 [4.00]	0.098 [2.50]	0.150 [3.80]	0.346 [8.80]

POWER DISSIPATION

CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR
A	0.075
B	0.085
C	0.110
D	0.150

STANDARD PACKAGING QUANTITY

CASE CODE	UNITS PER REEL			BULK, PLASTIC TRAY QUANTITIES
	7" REEL	HALF 7" REEL (/HR)	PARTIAL 7" REEL (/PR)	
A	2000	1000	100	50
B	2000	1000	100	50
C	500	250	100	50
D	500	250	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

PRODUCT INFORMATION

COTS Guide	www.vishay.com/doc?40083
Pad Dimensions	
Packaging 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?440091
FAQ	
Frequently Asked Questions	www.vishay.com/doc?40110



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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.