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

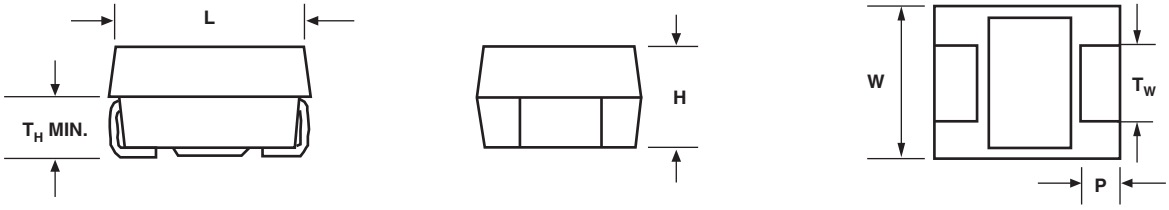
ORDERING INFORMATION

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]

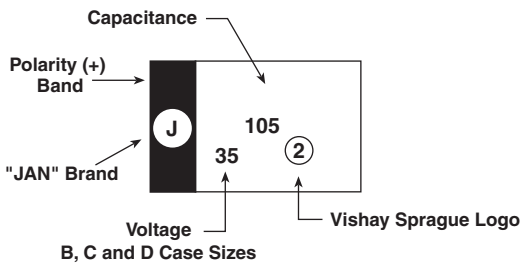


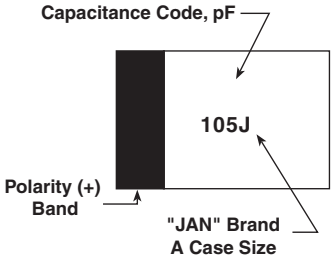
CASE CODE	EIA SIZE	L	W	H	P	T_W	T_H MIN.
A	3216-18	0.126 ± 0.008 [3.2 ± 0.20]	0.063 ± 0.008 [1.6 ± 0.20]	0.063 ± 0.008 [1.6 ± 0.20]	0.031 ± 0.012 [0.80 ± 0.30]	0.047 ± 0.004 [1.2 ± 0.10]	0.028 [0.70]
B	3528-21	0.138 ± 0.008 [3.5 ± 0.20]	0.110 ± 0.008 [2.8 ± 0.20]	0.075 ± 0.008 [1.9 ± 0.20]	0.031 ± 0.012 [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							

MARKING





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:
  (1) Capacitance tolerance: J, K, M
  (2) 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
  (3) Surge current (optional): A, B, C
  (4) Packaging: Blank, /HR, /PR, /PT
  (5) Termination: K - solder plated, H - solder fused

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	
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

- Part number definitions:
  (1) Capacitance tolerance: J, K, M
  (2) 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
  (3) Surge current (optional): A, B, C
  (4) Packaging: Blank, /HR, /PR, /PT
  (5) Termination: K - solder plated, H - solder fused

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	
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

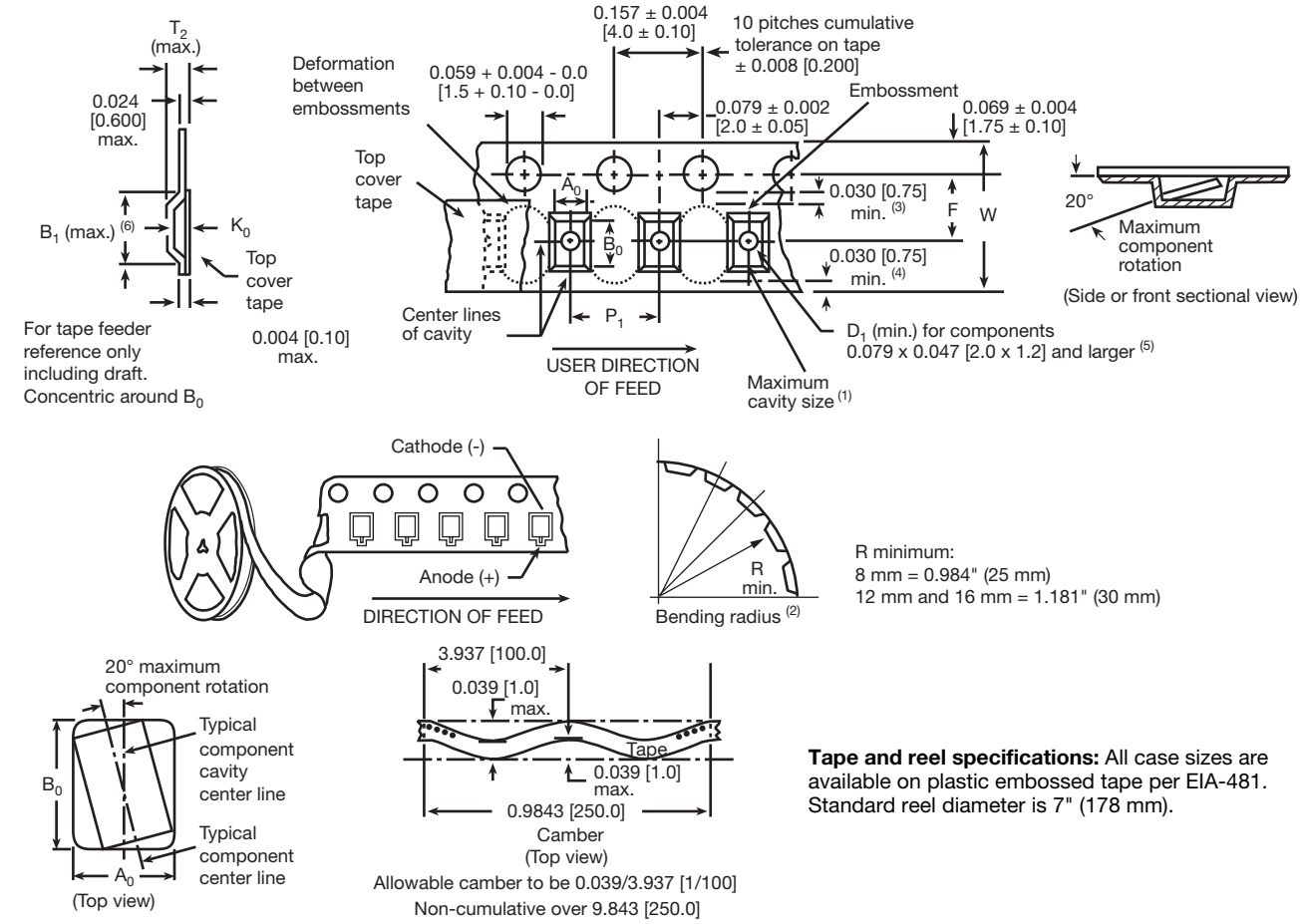
Note

- Part number definitions:
  (1) Capacitance tolerance: J, K, M
  (2) 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
  (3) Surge current (optional): A, B, C
  (4) Packaging: Blank, /HR, /PR, /PT
  (5) 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

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.

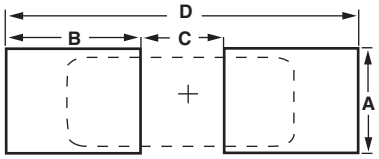
(5) The embossed hole location shall be measured from the sprocket hole controlling the location of the embossement. Dimensions of embossement location shall be applied independent of each other.

(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, 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?40091
FAQ	
Frequently Asked Questions	www.vishay.com/doc?40110

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