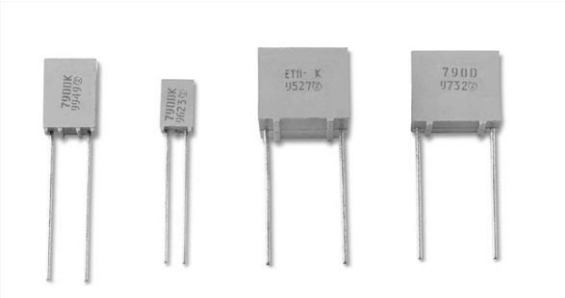
Resin-Molded, Radial-Lead Solid Tantalum Capacitors



FEATURES

- Terminations: Tin/lead (SnPb), 100 % tin (Sn)
- Four case sizes precisely molded with a flame retardant epoxy resin
- Stand off on all case sizes
- Available on tape for automatic insertion equipment
  (only A- and B-case, C- and D-case on request)
- Low leakage current
- Low impedance
- Extended value ranges available
- Compliant to RoHS directive 2002/95/EC

Pb-free Available

RoHS* COMPLIANT

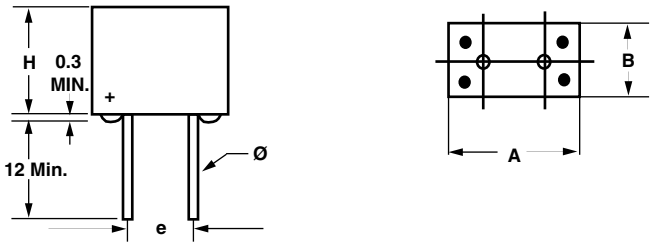
PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C

ORDERING INFORMATION

790D	157	X0	006	R	2	P	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING	CASE CODE	STYLE NUMBER	PACKAGING	ROHS COMPLIANT
790D = Standard and extended range	Expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros following.	X0 = ± 20 % X9 = ± 10 %	Expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See ratings and case codes table	Insulated case (standard)	See taping specification B : Bulk G : Ammopack H = 16.5 mm H : Ammopack H = 18.5 mm I : Ammopack shouldered Leads (A case) X : Reel Pack H = 16.5 mm Y : Reel Pack H = 18.5 mm Z : Reel pack shouldered Leads (A case)	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination

DIMENSIONS in millimeters



CASE CODE	H MAX. (mm)	A MAX. (mm)	B MAX. (mm)	E ± 0.15 (mm)	Ø 0.05 (+ 10 %) (mm)
A	7.3	4.7	4.2	2.54	0.5
B	10.5	7.3	4.8	5.08	0.5
C	10.5	12.3	7.3	10.16	0.6
D	10.5	12.3	12.3	10.16	0.6

PACKAGING QUANTITIES

CASE CODE	REEL X/Y	AMMO G/H	BULK B
A	1000	1000	500
B	1000	1000	250
C	300 (1)	300 (1)	100
D	200 (1)	200 (1)	50

Note

(1) Non preferred configuration on request only

* Pb containing terminations are not RoHS compliant, exemptions may apply

For technical questions, contact: tantalum@vishay.com

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RATINGS AND CASE CODES

C_R µF	RATED VOLTAGE U_R AT + 85 °C															
	6.3 V		10 V		16 V		20 V		25 V		35 V		40 V		50 V	
	CATEGORY VOLTAGE U_C AT + 125 °C															
	4.0 V		6.3 V		10 V		13 V		16 V		23 V		25 V		32 V	
	Std.	Ext.	Std.	Ext.	Std.	Ext.	Std.	Ext.	Std.	Ext.	Std.	Ext.	Std.	Ext.	Std.	Ext.
0.10													A		A	
0.15															A	
0.22															A	
0.33													A			
0.47													A			
0.68															A	
1.0													A			
1.5									A				B		A	
2.2					A		A						B		B	
3.3					A							A	B		B	
4.7			A							A			B		B	
6.8	A							A					B		B	
10						A			B			B	C		C	
15				A	B		B			B			C		C	
22		A			B			B		B			C		C	
33			B			B			C			C				
47	B			B	C		C									
68		B		B	C			C								
100			C		D	C	D									
150	C			C												
220		C	D													
330	D															

STANDARD/EXTENDED RATINGS

CAPACITANCE C_R (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF 120 Hz, AT + 25 °C (%)	MAX. IMPEDANCE 100 kHz, AT + 25 °C (Ω)
U_R = 6.3 V AT + 85 °C, SURGE = 8 V . . . U_C = 4 V AT + 125 °C, SURGE = 5 V					
6.8	A	790D685X(*)6R3A2(#)	1.0	6	4.0
22	**A**	**790D226X(*)6R3A2(#)**	**1.3**	**6**	**2.1**
47	B	790D476X(*)6R3B2(#)	2.9	6	1.3
68	**B**	**790D686X(*)6R3B2(#)**	**4.2**	**6**	**1.3**
150	C	790D157X(*)6R3C2(#)	9.4	6	0.6
220	**C**	**790D227X(*)6R3C2(#)**	**13.8**	**6**	**0.6**
330	D	790D337X(*)6R3D2(#)	20.7	8	0.4
U_R = 10 V AT + 85 °C, SURGE = 13 V . . . U_C = 6.3 V AT + 125 °C, SURGE = 8 V					
4.7	A	790D475X(*)010A2(#)	1.0	6	4.0
15	**A**	**790D156X(*)010A2(#)**	**1.5**	**6**	**2.5**
33	B	790D336X(*)010B2(#)	3.3	6	1.3
47	**B**	**790D476X(*)010B2(#)**	**4.7**	**6**	**1.4**
68	**B**	**790D686X(*)010B2(#)**	**6.8**	**6**	**1.3**
100	C	790D107X(*)010C2(#)	10.0	6	0.6
150	**C**	**790D157X(*)010C2(#)**	**15.0**	**6**	**0.6**
220	D	790D227X(*)010D2(#)	22.0	8	0.4
U_R = 16 V AT + 85 °C, SURGE = 20 V . . . U_C = 10 V AT + 125 °C, SURGE = 13 V					
2.2	A	790D225X(*)016A2(#)	1.0	6	5.5
3.3	A	790D335X(*)016A2(#)	1.0	6	4.4
10	**A**	**790D106X(*)016A2(#)**	**1.6**	**6**	**2.7**
15	B	790D156X(*)016B2(#)	2.4	6	1.6
22	B	790D226X(*)016B2(#)	3.5	6	1.3
33	**B**	**790D336X(*)016B2(#)**	**5.2**	**6**	**1.6**
47	C	790D476X(*)016C2(#)	7.5	6	0.8
68	C	790D686X(*)016C2(#)	10.8	6	0.6
100	**C**	**790D107X(*)016C2(#)**	**16.0**	**6**	**0.7**
100	D	790D107X(*)016D2(#)	16.0	6	0.5
U_R = 20 V AT + 85 °C, SURGE = 26 V . . . U_C = 13 V AT + 125 °C, SURGE = 16 V					
2.2	A	790D225X(*)020A2(#)	1.0	6	5.5
6.8	**A**	**790D685X(*)020A2(#)**	**1.3**	**6**	**3.5**
15	B	790D156X(*)020B2(#)	3.0	6	1.5
22	**B**	**790D226X(*)020B2(#)**	**4.4**	**6**	**2.1**
47	C	790D476X(*)020C2(#)	9.4	6	0.7
68	**C**	**790D686X(*)020C2(#)**	**13.6**	**6**	**0.8**
100	D	790D107X(*)020C2(#)	20.0	6	0.7

Note

- Extended Ratings in bold print
  (*) Insert 0 for ± 20 % tolerance or 9 for ± 10 %
  (#) See order information, packaging code

STANDARD/EXTENDED RATINGS

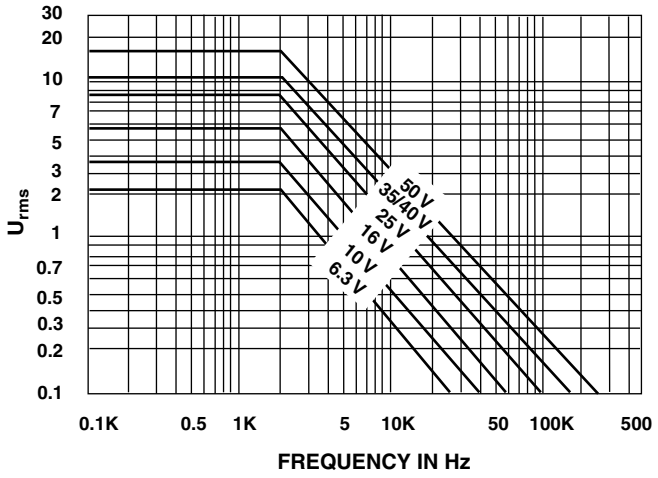
CAPACITANCE C_R (µF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (µA)	MAX. DF 120 Hz, AT + 25 °C (%)	MAX. IMPEDANCE 100 kHz, AT + 25 °C (Ω)
U_R = 25 V AT + 85 °C, SURGE = 32 V . . . U_C = 16 V AT + 125 °C, SURGE = 20 V					
1.5	A	790D155X(*)025A2(#)	1.0	6	6.0
4.7	**A**	**790D475X(*)025A2(#)**	**1.1**	**6**	**4.5**
10	B	790D106X(*)025B2(#)	2.5	6	1.6
15	**B**	**790D156X(*)025B2(#)**	**3.7**	**6**	**2.4**
22	**B**	**790D226X(*)025B2(#)**	**5.5**	**6**	**2.1**
33	C	790D336X(*)025C2(#)	8.2	6	0.8
U_R = 35 V AT + 85 °C, SURGE = 45 V . . . U_C= 23 V AT + 125×C, SURGE = 29 V					
3.3	**A**	**790D335X(*)035A2(#)**	**1.2**	**6**	**6.0**
10	**B**	**790D106X(*)035B2(#)**	**3.5**	**6**	**2.6**
33	**C**	**790D336X(*)035C2(#)**	**11.6**	**6**	**1.3**
U_R = 40 V AT + 85 °C, SURGE = 52 V . . . U_C = 25 V AT + 125 °C, SURGE = 32 V					
0.10	A	790D104X(*)040A2(#)	1.0	6	30
0.33	A	790D334X(*)040A2(#)	1.0	6	14
0.47	A	790D474X(*)040A2(#)	1.0	6	11
1.0	A	790D105X(*)040A2(#)	1.0	6	6.5
1.5	B	790D155X(*)040B2(#)	1.0	6	5.2
2.2	B	790D225X(*)040B2(#)	1.0	6	4.0
3.3	B	790D335X(*)040B2(#)	1.3	6	2.8
4.7	B	790D475X(*)040B2(#)	1.8	6	2.0
6.8	B	790D685X(*)040B2(#)	2.7	6	1.6
10	C	790D106X(*)040C2(#)	4.0	6	1.3
15	C	790D156X(*)040C2(#)	6.0	6	1.0
22	C	790D226X(*)040C2(#)	8.8	6	0.8
U_R = 50 V AT + 85 °C, SURGE = 65 V . . . U_C = 32 V AT + 125 °C, SURGE = 41 V					
0.10	A	790D104X(*)050A2(#)	1.0	6	30
0.15	A	790D154X(*)050A2(#)	1.0	6	24
0.22	A	790D224X(*)050A2(#)	1.0	6	18
0.68	A	790D684X(*)050A2(#)	1.0	6	8.0
1.0	A	790D105X(*)050A2(#)	1.0	6	6.5
1.5	B	790D155X(*)050B2(#)	1.0	6	5.2
2.2	B	790D225X(*)050B2(#)	1.1	6	4.0
3.3	B	790D335X(*)050B2(#)	1.6	6	2.8
4.7	B	790D475X(*)050B2(#)	2.3	6	2.0
6.8	C	790D685X(*)050C2(#)	3.4	6	1.6
10	C	790D106X(*)050C2(#)	5.0	6	1.3
15	C	790D156X(*)050C2(#)	7.5	6	1.0

Note

- Extended Ratings in bold print
  (*) Insert 0 for ± 20 % tolerance or 9 for ± 10 %
  (#) See order information, packaging code

MAXIMUM PERMISSIBLE RIPPLE VOLTAGE AT + 25 °C

CASE SIZE "A"



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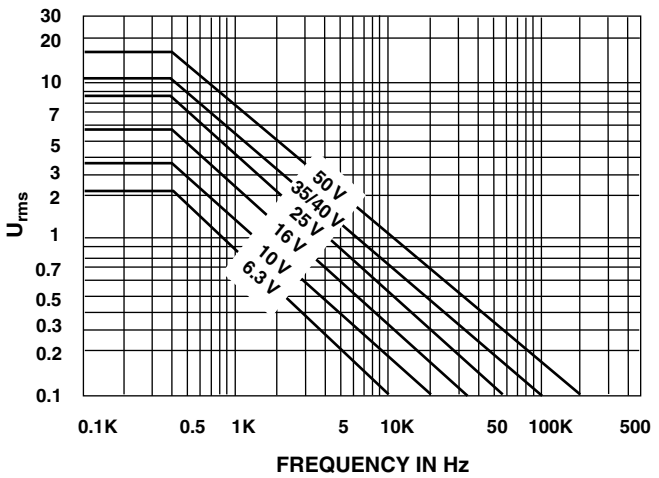
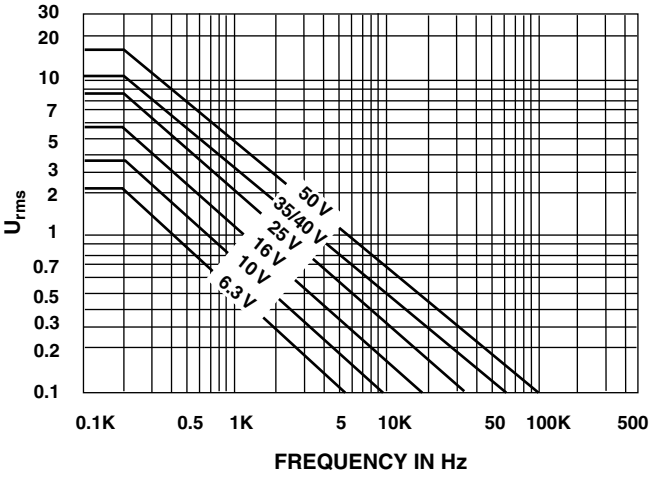


CASE SIZE "C"



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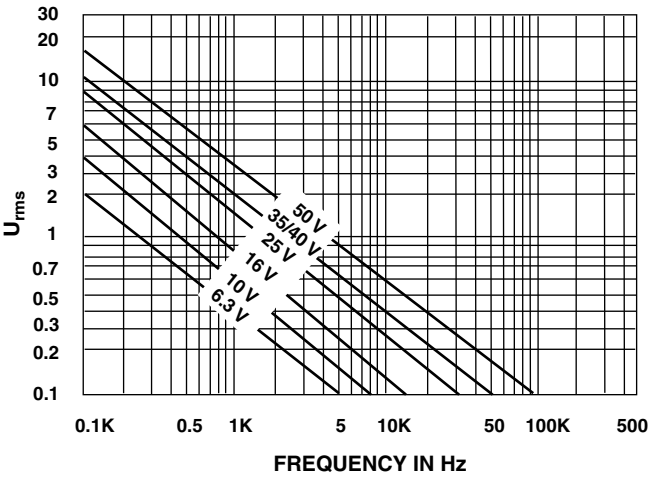
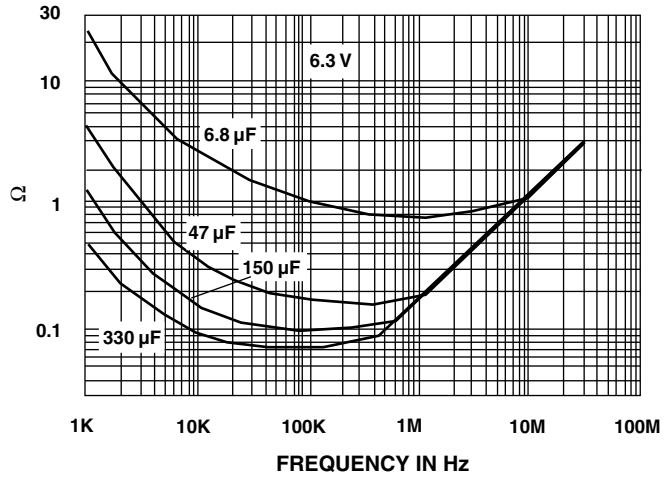
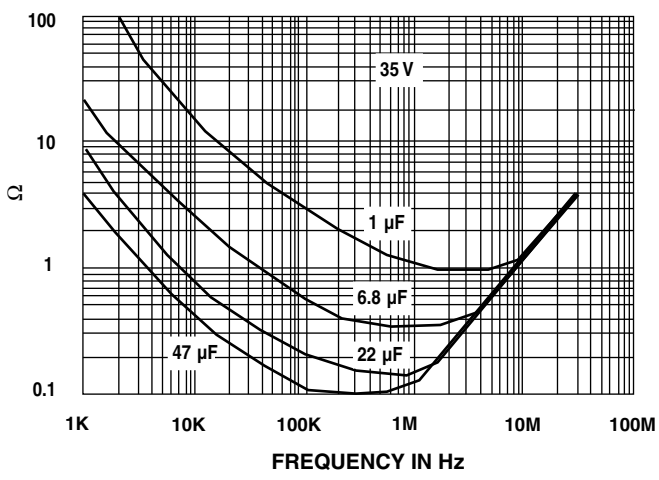


TYPICAL CURVES OF IMPEDANCE VS FREQUENCY





PERFORMANCE CHARACTERISTICS

1. **Operating Temperature:** - 55 °C to + 85 °C with rated voltage U_R applied. + 85 °C to 125 °C with linear voltage derating to category voltage U_C (see general information) applied.
2. **Capacitance and Tolerance:**
   Capacitance measured at 100 Hz and + 25 °C shall be within the specified tolerance limits of the nominal rating
3. **Reverse Voltage:** 15 % of rated voltage at + 25 °C
   5 % of rated voltage at + 85 °C
4. **Surge Voltage:** 130 % of U_R at + 85 °C
   130 % of U_C at + 125 °C
5. **Impedance at 100 kHz:** Measured at + 20 °C ± 5 °C, impedance shall not exceed the values listed in data sheet.
6. **Stability at low and high temperatures**
   Capacitance change with temperature, dissipation factor and DC leakage current shall not exceed the limits of the following table.

TEMP.	CAPACITANCE CHANGE $C_RU_R \leq 1900$ $C_RU_R > 1900$	DISSIPATION FACTOR I_L	LEAKAGE CURRENT
- 55 °C	- 10 %	9 %	-
		11 %	
+ 25 °C	-	6 %	0.01 C_R x U_R or 1 µA whichever is greater
		8 %	
+ 85 °C	+ 12 %	9 %	0.1 C_R x U_R or 10 µA whichever is greater
		11 %	
+ 125 °C	+ 15 %	12 %	0.125 C_R x U_R or 12.5 µA whichever is greater
		14 %	

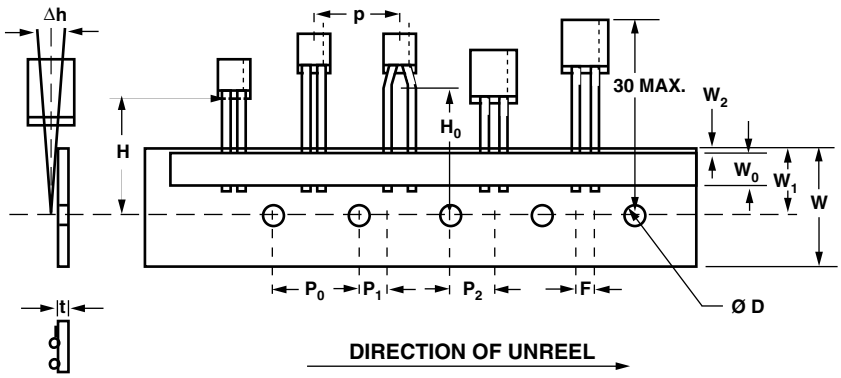
7. **Life Test:** 2000 h at + 85 °C with rated voltage applied
   2000 h at + 125 °C. with category voltage applied
   ΔC/C ≤ 10 % of initial value
   IL ≤ 1.25 initial limit
   DF ≤ initial limit
8. **Humidity Test:** 56 days at + 40 °C, 90 % relative humidity
   ΔC/C ≤ 8 % of initial value
   IL ≤ initial limit
   DF ≤ initial limit

- **Charge and Discharge Test:**
  1 million cycles at + 85 °C,
  0.5 s charge at UR
  0.5 s discharge
  Series resistance < 0.5 Ω
  ΔC/C ≤ 5 % of initial value
  IL ≤ initial limit
  DF ≤ initial limit

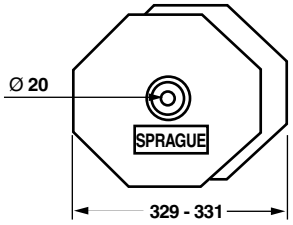
10. **Marking:**
    Top: Rating and polarity
    Front: Type, date code, Sprague trademark

TAPE AND REEL PACKING

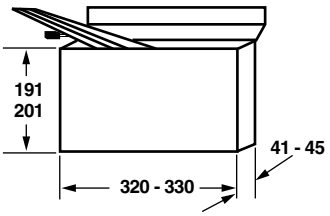
"A" AND "B" CASES ONLY (MEETS IEC 286-2)



REEL PACKING



AMMOPACKING



CASE CODE	TAPE WIDTH [mm]	DIMENSIONS (mm)/UNITS PER REEL		
Pitch of component	P	12.7 ± 1.0		
Feed hole pitch	P_0	12.7 ± 0.3		
Tape width	W	18 (+ 1/- 0.5)		
Hold down tape width	W_0	5.0		
Hole position	W_1	9 (+ 0.75/-0.5)		
Hold down tape position	W_2	0 (+ 3/-0)		
Feed hole diameter	D_0	4.0 ± 0.3		
Tape thickness	T	0.5 ± 0.2		
Component alignment	Δh	0 ± 2		
Lead clinch height	H_0	16.0 ± 0.5		
Hole center to component center	P_2	6.35 ± 1.3		
Lead wire spacing Feed hole center to wire center	F P_1	**CASE A** 2.5 + 0.6, - 0.1 5.1 ± 0.7	**CASE B** 5 + 0.6, - 0.1 3.85 ± 0.7	**CASE B** 5 + 0.6, - 0.1 3.85 ± 0.7
Reel pack options	H = 16.5 H = 18.5	X Y	Z	X Y
Ammopack options	H = 16.5 H = 18.5	G H	I	G H
Quantity per reel/box		1000	1000	1000

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