

Hermetic Axial Capacitors



TAA Series

SOLID TANTALUM HERMETICALLY SEALED AXIAL LEADED CAPACITORS



TAA: Fully hermetically sealed, of rugged construction and high reliability for use in military and professional equipment.

1. Extremely low leakage current.
2. Excellent capacitance to size ratio.
3. Available taped and reeled for automatic insertion.
4. Marked with AVX logo, capacitor type, capacitance, capacitance tolerance, rated voltage, polarity indication and date of manufacture.
5. Approved to CECC 30-201-801 and IECQ QC300 201 GB0002 supplied conforming to the limits of MIL-C-39003 style CSR, CTS 13 and CTS 32.

CASE DIMENSIONS: millimeters (inches)

	Case Size	L ₁ max.	L ₂ max.	D max.	Lead Length min.	d nom.	Weight max. g
	A	7.20 (0.280)	10.7 (0.420)	3.60 (0.140)	28.0 (1.100)	0.50	0.7
	B	12.0 (0.470)	15.5 (0.610)	4.90 (0.190)	28.0 (1.100)	0.50	1.3
	C	17.3 (0.680)	20.9 (0.820)	7.50 (0.290)	23.0 (0.900)	0.60	4.7
	D	19.9 (0.780)	23.4 (0.920)	9.00 (0.350)	22.0 (0.800)	0.60	7.4

Note: The tabulated dimensions are for non-insulated capacitors. Insulated capacitors are standard, dimension L₁ will increase by 0.8mm maximum, and dimension D by 0.2mm maximum.

HOW TO ORDER

TAA



Type

A



Case Size

105



Capacitance Code
pF code:
1st two digits represent significant figures,
3rd digit represents multiplier (number of zeros to follow)

M



Capacitance Tolerance
K = ±10%
M = ±20%

035



Rated DC Voltage

G



TAA Packaging Suffixes
(see page 144)

*Not recommended for new designs



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TECHNICAL SPECIFICATIONS

Construction:	Hermetically sealed; axial terminations							Temperature Range:	-55°C to +125°C
Capacitance Range:	0.1 μ F to 330 μ F							Environmental Classification:	55/125/56 (IEC 68-2)
Capacitance Tolerance:	$\pm 20\%$; $\pm 10\%$							Dissipation Factor: (tan δ)	≤ 0.04 for C=0.1 to 4.7 μ F
Measuring Conditions:	120 Hz, 20°C								≤ 0.06 for C= 6.8 to 100 μ F
Rated Voltage VDC $\leq +85^\circ\text{C}$:	6.3	10	16	20	25	35	50	Approvals:	BS CECC 30 201-801
Category Voltage VDC $\leq +125^\circ\text{C}$:	4	6.3	10	13	17	23	33		
Surge Voltage VDC $\leq +85^\circ\text{C}$:	8	13	20	26	33	46	65		
$\leq +125^\circ\text{C}$:	5	9	12	16	21	28	40		

Capacitance Range (letter denotes case size)								
Capacitance μ F	Cap Code	Rated voltage DC						
		6.3V	10V	16V	20V	25V	35V	50V
0.1	104						A	A
0.15	154						A	A
0.22	224						A	A
0.33	334						A	A
0.47	474						A	A
0.68	684					A	A	A
1.0	105						A	A
1.5	155				A	A	B	B
2.2	225	A			A		B	B
3.3	335	A		A			B	B
4.7	475	A	A		B	B	B	B
6.8	685	A		B	B		B	C
10	106		B		B	B	C	C
15	156	B		B	B		C	C
22	226			B	C		C	D
33	336	B	B	C	C	C	D	
47	476	B	C	C	C		D	
68	686	C		C	D	D		
100	107		C	D	D			
150	157	C	D	D				
220	227	D	D					
330	337	D						

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RATINGS AND PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance μ F	DCL (μ A) Max.	DF % Max.	ESR Max. (Ω) @ 100 kHz
6.3 volt @ 85°C (4 volt @ 125°C)					
TAAA225(+006	A	2.2	0.5	4	N/A
TAAA335(+006	A	3.3	0.5	4	N/A
TAAA475(+006	A	4.7	0.5	4	N/A
TAAA685(+006	A	6.8	0.5	6	5.0
TAAB156(+006	B	15	1.0	6	2.3
TAAB336(+006	B	3.3	1.0	6	2.0
TAAB476(+006	B	47	3.0	6	1.6
TAAC686(+006	C	68	4.5	6	1.0
TAAC157(+006	C	150	9.5	8	0.8
TAAD227(+006	D	220	14.0	8	0.6
TAAD337(+006	D	330	20.0	8	0.5
10 volt @ 85°C (6.3 volt @ 125°C)					
TAAA475(+010	A	4.7	0.5	6	5.0
TAAB106(+010	B	10	1.0	6	2.6
TAAB336(+010	B	33	3.5	6	1.6
TAAC476(+010	C	47	3.0	6	1.1
TAAC107(+010	C	100	10.0	6	1.0
TAAD157(+010	D	150	15.0	8	0.8
TAAD227(+010	D	220	20.0	8	0.5
16 volt @ 85°C (10 volt @ 125°C)					
TAAA335(+016	A	3.3	0.5	6	6.0
TAAB685(+016	B	6.8	0.8	6	2.5
TAAB156(+016	B	15	2.4	6	2.0
TAAB226(+016	B	22	3.5	6	1.6
TAAC336(+016	C	33	5.8	6	1.2
TAAC476(+016	C	47	7.3	6	1.0
TAAC686(+016	C	68	10.0	6	0.8
TAAD107(+016	D	100	15.0	6	0.7
TAAD157(+016	D	150	20.0	8	0.5
20 volt @ 85°C (13 volt @ 125°C)					
TAAA155(+020	A	1.5	0.5	4	9.0
TAAA225(+020	A	2.2	0.5	4	6.5
TAAB475(+020	B	4.7	0.8	4	3.0
TAAB685(+020	B	6.8	1.0	6	2.5
TAAB106(+020	B	10	2.0	6	2.6
TAAB156(+020	B	15	3.0	6	1.8
TAAC226(+020	C	22	4.5	6	1.3
TAAC336(+020	C	33	7.0	6	1.2
TAAC476(+020	C	47	9.5	6	0.9
TAAD686(+020	D	68	13.5	6	0.8
TAAD107(+020	D	100	20.0	6	0.5

AVX Part No.	Case Size	Capacitance μ F	DCL (μ A) Max.	DF % Max.	ESR Max. (Ω) @ 100 kHz
25 volt @ 85°C (17 volt @ 125°C)					
TAAA684(+025	A	6.8	0.5	4	9.5
TAAA155(+025	A	1.5	0.5	4	7.5
TAAB475(+025	B	4.7	1.2	4	2.8
TAAB106(+025	B	10	2.5	6	2.0
TAAC336(+025	C	33	8.5	6	1.0
TAAD686(+025	D	68	15.0	6	0.6
35 volt @ 85°C (23 volt @ 125°C)					
TAAA104(+035	A	0.10	0.5	4	N/A
TAAA154(+035	A	0.15	0.5	4	N/A
TAAA224(+035	A	0.22	0.5	4	N/A
TAAA334(+035	A	0.33	0.5	4	N/A
TAAA474(+035	A	0.47	0.5	4	N/A
TAAA684(+035	A	0.68	0.5	4	10.0
TAAA105(+035	A	1.0	0.5	4	8.0
TAAB155(+035	B	1.5	0.5	4	6.0
TAAB225(+035	B	2.2	1.0	4	6.0
TAAB335(+035	B	3.3	1.0	4	3.5
TAAB475(+035	B	4.7	1.5	4	2.5
TAAB685(+035	B	6.8	2.5	6	2.0
TAAC106(+035	C	10	3.5	6	1.6
TAAC156(+035	C	15	5.0	6	1.2
TAAC226(+035	C	22	7.5	6	1.0
TAAD336(+035	D	33	10.0	6	0.8
TAAD476(+035	D	47	10.0	6	0.6
50 volt @ 85°C (33 volt @ 125°C)					
TAAA104(+050	A	0.10	0.5	4	N/A
TAAA154(+050	A	0.15	0.5	4	N/A
TAAA224(+050	A	0.22	0.5	4	N/A
TAAA334(+050	A	0.33	0.5	4	N/A
TAAA474(+050	A	0.47	0.5	4	N/A
TAAA684(+050	A	0.68	0.5	4	10.0
TAAA105(+050	A	1.0	0.5	4	8.0
TAAB155(+050	B	1.5	0.8	4	6.0
TAAB225(+050	B	2.2	1.1	6	6.0
TAAB335(+050	B	3.3	1.7	6	3.5
TAAB475(+050	B	4.7	2.4	6	2.5
TAAC685(+050	C	6.8	3.4	6	2.0
TAAC106(+050	C	10	5.0	6	1.6
TAAC156(+050	C	15	7.5	6	1.2
TAAD226(+050	D	22	11.0	6	1.0

(*) Insert capacitance tolerance code; M for $\pm 20\%$ and K for $\pm 10\%$

NOTE: Voltage ratings are minimum values. AVX reserves the right to supply higher voltage ratings in the same case size.

Axial Capacitors

Tape and Reel Packaging



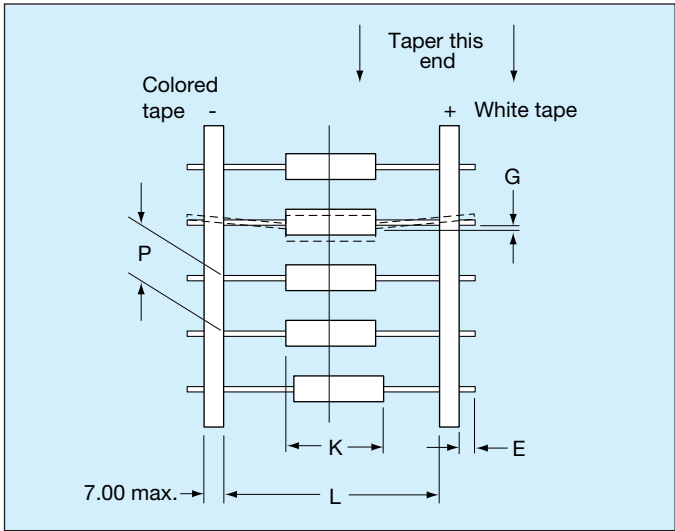
SOLID TANTALUM AXIAL TAR AND TAA

TAPE AND REEL PACKAGING FOR AUTOMATIC COMPONENT INSERTION

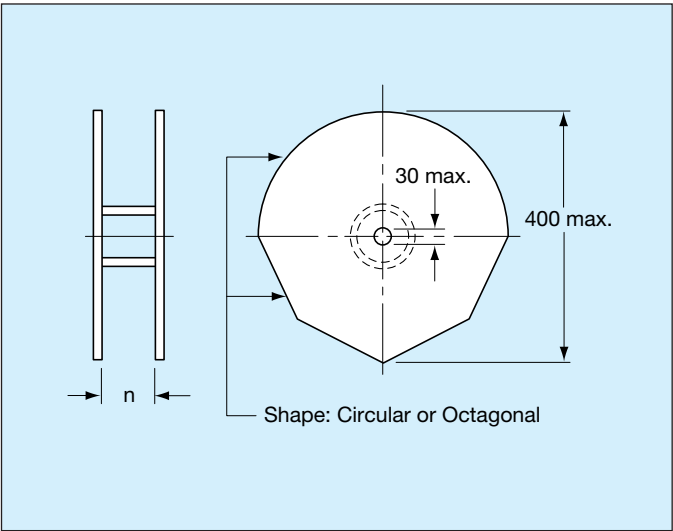
TAR and TAA series are supplied as standard on axial bandolier, in reel format or 'ammo' pack for use on high speed axial automatic insertion equipment, or preforming machines.

The tape format is compatible with standards for component taping set out by major manufacturers of axial automatic insertion equipment.

TAPE SPECIFICATION



REEL CONFIGURATION



PACKAGING QUANTITIES TAR

For reels

Case Size	Number of Pieces
Q	4500
R	4000
S	2500
W	2500

PACKAGING QUANTITIES TAA

For reels, Standard Suffix G

Case Size	Number of Pieces
A	1000
B	1000
C	500
D	500

DIMENSIONS:

millimeters (inches)

E max	1.60 (0.063)
G max	1.20 (0.047)
K	Component body shall be located centrally within a window, width K, where K is 1.40 (0.060) greater than the primary body length
L	52.4 ± 1.50 (2.060 ± 0.060)
P	5.00 ± 0.50 (0.200 ± 0.020)
leader max	400 (15.75)
trailer max	30.0 (1.200)
n	Will allow for unhindered reeling and unreeling of the taped components. Preferred dimensions 73.0 (2.870) spacing.



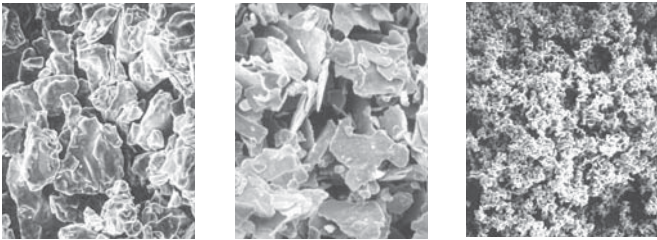
Section 5: Technical Summary and Application Guidelines



INTRODUCTION

Tantalum capacitors are manufactured from a powder of pure tantalum metal. OxiCap® - niobium oxide capacitor is made from niobium oxide NbO powder. The typical particle size is between 2 and 10 µm.

Figure below shows typical powders. Note the very great difference in particle size between the powder CVs/g.



4000µFV

20000µFV

50000µFV

Figure 1a. Tantalum powder

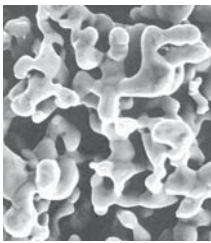


Figure 1b. Niobium Oxide powder

The powder is compressed under high pressure around a Tantalum or Niobium (known as the Riser Wire) to form a “pellet”. The riser wire is the anode connection to the capacitor.

This is subsequently vacuum sintered at high temperature (typically 1200 - 1800°C) which produces a mechanically strong pellet and drives off any impurities within the powder.

During sintering the powder becomes a sponge like structure with all the particles interconnected in a huge lattice.

This structure is of high mechanical strength and density, but is also highly porous giving a large internal surface area (see Figure 2).

The larger the surface area the larger the capacitance. Thus high CV/g (capacitance voltage product per gram) powders, which have a low average particle size, are used for low voltage, high capacitance parts.

By choosing which powder and sinter temperature is used to produce each capacitance/voltage rating the surface area can be controlled.

The following example uses a 220µF 6V capacitor to illustrate the point.

$$C = \frac{\epsilon_o \epsilon_r A}{d}$$

where ϵ_o is the dielectric constant of free space
(8.855×10^{-12} Farads/m)

ϵ_r is the relative dielectric constant

= 27 for Tantalum Pentoxide

= 41 for Niobium Pentoxide

d is the dielectric thickness in meters

C is the capacitance in Farads

and A is the surface area in meters

Rearranging this equation gives:

$$A = \frac{C d}{\epsilon_o \epsilon_r}$$

thus for a 220µF/6V capacitor the surface area is 346 square centimeters, or nearly a half times the size of this page.

The dielectric is then formed over all the Tantalum or niobium oxide surfaces by the electrochemical process of anodization. To activate this, the “pellet” is dipped into a very weak solution of phosphoric acid.

The dielectric thickness is controlled by the voltage applied during the forming process. Initially the power supply is kept in a constant current mode until the correct thickness of dielectric has been reached (that is the voltage reaches the ‘forming voltage’), it then switches to constant voltage mode and the current decays to close to zero.

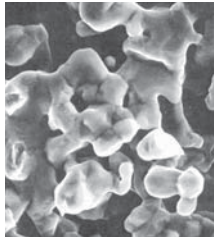


Figure 2. Sintered Anode