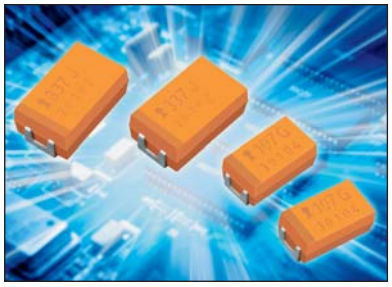
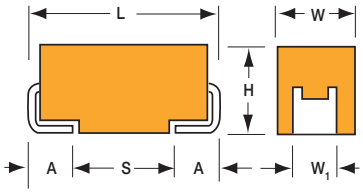
OxiCap® NOJ Series

Niobium Oxide Capacitor





FEATURES

- Non-burn safe technology
- Reliability level: 0.5%/1000 hrs.
- 6 case sizes available
- Environmentally friendly
- IBM global approval received in 2004
- Elektra Award received in 2005
- CV range: 4.7-1000µF / 1.8-10V

LEAD-FREE

LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

NON-BURN NON-SMOKE

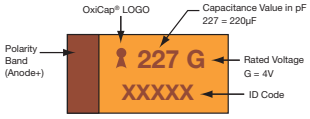
Elektra Award 2005

APPLICATIONS

- Automotive
- NB PCs
- Civil aircraft
- Industrial low voltage control circuits

MARKING

A, B, C, D, E, V CASE



CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) –0.10 (0.004)	H+0.20 (0.008) –0.10 (0.004)	W_1 ±0.20 (0.008)	A+0.30 (0.012) –0.20 (0.008)	S Min.
A	1206	3216-18	3.20 (0.126)	1.60 (0.063)	1.60 (0.063)	1.20 (0.047)	0.80 (0.031)	1.10 (0.043)
B	1210	3528-21	3.50 (0.138)	2.80 (0.110)	1.90 (0.075)	2.20 (0.087)	0.80 (0.031)	1.40 (0.055)
C	2312	6032-28	6.00 (0.236)	3.20 (0.126)	2.60 (0.102)	2.20 (0.087)	1.30 (0.051)	2.90 (0.114)
D	2917	7343-31	7.30 (0.287)	4.30 (0.169)	2.90 (0.114)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
E	2917	7343-43	7.30 (0.287)	4.30 (0.169)	4.10 (0.162)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
V	2924	7361-38	7.30 (0.287)	6.10 (0.240)	3.55 (0.140)	3.10 (0.120)	1.30 (0.051)	4.40 (0.173)

W_1 dimension applies to the termination width for A dimensional area only.

HOW TO ORDER

NOJ	D	107	M	006	R	WJ	–
Type	**Case Size** See table above	**Capacitance Code** 1st two digits represent significant figures, 3rd digit represents multiplier in pF	**Tolerance** M=±20%	**Rated DC Voltage** 001 = 1.8Vdc 002 = 2.5Vdc 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc	**Packaging** R = Pure Tin 7" Reel S = Pure Tin 13" Reel	**Standard Suffix** OR **WB** **Low ESR Suffix**	**Additional characters may be added for special requirements** V = Dry pack Option (selected codes only) with exception of D, E, V cases

TECHNICAL SPECIFICATIONS

Technical Data:		All technical data relate to an ambient temperature of +25°C is not stated					
Capacitance Range:		4.7 µF to 1000 µF					
Capacitance Tolerance:		±20%					
Leakage Current DCL:		0.02CV					
Rated Voltage DC (V_R)	≤ +85°C:	1.8	2.5	4	6.3	10	
Category Voltage (V_C)	≤ +105°C:	1.2	1.7	2.7	4	7	
Surge Voltage (V_S)	≤ +85°C:	2.3	3.3	5.2	8	13	
Surge Voltage (V_S)	≤ +105°C:	1.6	2.2	3.4	5	8	
Temperature Range:		-55°C to +105°C					
Reliability:		0.5% per 1000 hours at 85°C, V_R, 0.1Ω/V series impedance, 60% confidence level					
		Meets requirements of AEC-Q200					

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Niobium Oxide Capacitor

CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V_R) to 85°C				
µF	Code	1.8V (x)	2.5V (e)	4V (G)	6.3V (J)	10V (A)
4.7	475				A	A
6.8	685				A	A
10	106				A	A/B
15	156			A	A/B	A/B
22	226		A	A/B	A/B	B/C/B(700)
33	336		A/B	A/B	B/C/B(700)	C
47	476	A	A/B	A/B/C	B/C	C
68	686	B	B/C	B/C	B/C	C
100	107	B/C	B/C	B/C/B(250)	B/C/D/B(400)	D/D(150)
150	157	C	C	C/D	C/D	
220	227	C	C	C/D	C/D/E	
330	337	C	C/D	D	D/E	
470	477		D/E	D/E	E/V/E(75)	
680	687		E	E/V		
1000	108		V	V		

Released ratings (ESR ratings in mOhms in parenthesis)

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher ratings in the same case size, to the same reliability standards.

OxiCap® NOJ Series

Niobium Oxide Capacitor

RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (Ω)	MSL	100kHz RMS Current (A)		
											25°C	85°C	105°C
1.8 Volt @ 85°C													
NOJA476M001#WJ	A	47	1.8	85	1.2	105	1.7	8	1.6	1	0.237	0.213	0.095
NOJB476M001#WJ	B	47	1.8	85	1.2	105	1.7	6	1.6	1	0.252	0.227	0.101
NOJB686M001#WJ	B	68	1.8	85	1.2	105	2.5	6	1.5	1	0.261	0.235	0.104
NOJB107M001#WJ	B	100	1.8	85	1.2	105	3.6	6	1.4	1	0.270	0.243	0.108
NOJC107M001#WJ	C	100	1.8	85	1.2	105	3.6	6	0.4	1	0.574	0.517	0.230
NOJC157M001#WJ	C	150	1.8	85	1.2	105	5.4	8	0.4	1	0.574	0.517	0.230
NOJC227M001#WJ	C	220	1.8	85	1.2	105	8.0	8	0.4	1	0.574	0.517	0.230
NOJC337M001#WJ	C	330	1.8	85	1.2	105	11.9	8	0.3	1	0.663	0.597	0.265
2.5 Volt @ 85°C													
NOJA226M002#WJ	A	22	2.5	85	1.7	105	1.1	6	1.9	1	0.218	0.196	0.087
NOJA336M002#WJ	A	33	2.5	85	1.7	105	1.7	6	1.7	1	0.230	0.207	0.092
NOJB336M002#WJ	B	33	2.5	85	1.7	105	1.7	6	1.7	1	0.245	0.220	0.098
NOJA476M002#WJ	A	47	2.5	85	1.7	105	2.4	8	1.6	1	0.237	0.213	0.095
NOJB476M002#WJ	B	47	2.5	85	1.7	105	2.4	6	1.6	1	0.252	0.227	0.101
NOJB686M002#WJ	B	68	2.5	85	1.7	105	3.4	6	1.5	1	0.261	0.235	0.104
NOJC686M002#WJ	C	68	2.5	85	1.7	105	3.4	6	0.5	1	0.514	0.462	0.206
NOJB107M002#WJ	B	100	2.5	85	1.7	105	5.0	6	1.4	1	0.270	0.243	0.108
NOJC107M002#WJ	C	100	2.5	85	1.7	105	5.0	6	0.4	1	0.574	0.517	0.230
NOJC157M002#WJ	C	150	2.5	85	1.7	105	7.5	6	0.4	1	0.574	0.517	0.230
NOJC227M002#WJ	C	220	2.5	85	1.7	105	11.0	8	0.4	1	0.574	0.517	0.230
NOJC337M002#WJ	C	330	2.5	85	1.7	105	16.5	10	0.3	1	0.663	0.597	0.265
NOJD337M002#WJ	D	330	2.5	85	1.7	105	16.5	10	0.3	3	0.775	0.697	0.310
NOJD477M002#WJ	D	470	2.5	85	1.7	105	23.5	12	0.3	3	0.775	0.697	0.310
NOJE477M002#WJ	E	470	2.5	85	1.7	105	23.5	10	0.3	3	0.812	0.731	0.325
NOJE687M002#WJ	E	680	2.5	85	1.7	105	34.0	14	0.3	3	0.812	0.731	0.325
NOJV108M002#WJ	V	1000	2.5	85	1.7	105	50.0	16	0.3	3	1.000	0.900	0.400
4 Volt @ 85°C													
NOJA156M004#WJ	A	15	4	85	2.7	105	1.2	6	2	1	0.212	0.191	0.085
NOJA226M004#WJ	A	22	4	85	2.7	105	1.8	6	1.9	1	0.218	0.196	0.087
NOJB226M004#WJ	B	22	4	85	2.7	105	1.8	6	1.9	1	0.232	0.209	0.093
NOJA336M004#WJ	A	33	4	85	2.7	105	2.6	10	1.7	1	0.230	0.207	0.092
NOJB336M004#WJ	B	33	4	85	2.7	105	2.6	6	1.7	1	0.245	0.220	0.098
NOJA476M004#WJ	A	47	4	85	2.7	105	3.8	18	2.2	1	0.202	0.182	0.081
NOJB476M004#WJ	B	47	4	85	2.7	105	3.8	6	1.6	1	0.252	0.227	0.101
NOJC476M004#WJ	C	47	4	85	2.7	105	3.8	6	0.5	1	0.514	0.462	0.206
NOJB686M004#WJ	B	68	4	85	2.7	105	5.4	6	1.5	1	0.261	0.235	0.104
NOJC686M004#WJ	C	68	4	85	2.7	105	5.4	6	0.5	1	0.514	0.462	0.206
NOJB107M004#WJ	B	100	4	85	2.7	105	8.0	16	1.4	1	0.270	0.243	0.108
NOJB107M004#WB	B	100	4	85	2.7	105	8.0	16	0.25	3	0.639	0.575	0.255
NOJC107M004#WJ	C	100	4	85	2.7	105	8.0	6	0.4	1	0.574	0.517	0.230
NOJC157M004#WJ	C	150	4	85	2.7	105	12.0	6	0.4	1	0.574	0.517	0.230
NOJD157M004#WJ	D	150	4	85	2.7	105	12.0	6	0.3	3	0.775	0.697	0.310
NOJC227M004#WJ	C	220	4	85	2.7	105	17.6	8	0.4	1	0.574	0.517	0.230
NOJD227M004#WJ	D	220	4	85	2.7	105	17.6	8	0.4	3	0.671	0.604	0.268
NOJD337M004#WJ	D	330	4	85	2.7	105	26.4	8	0.3	3	0.775	0.697	0.310
NOJD477M004#WJ	D	470	4	85	2.7	105	37.6	12	0.3	3	0.775	0.697	0.310
NOJE477M004#WJ	E	470	4	85	2.7	105	37.6	12	0.3	3	0.812	0.731	0.325
NOJE687M004#WJ	E	680	4	85	2.7	105	54.4	14	0.3	3	0.812	0.731	0.325
NOJV687M004#WJ	V	680	4	85	2.7	105	54.4	14	0.3	3	1.000	0.900	0.400
NOJV108M004#WJ	V	1000	4	85	2.7	105	80.0	18	0.3	3	1.000	0.900	0.400
6.3 Volt @ 85°C													
NOJA475M006#WJ	A	4.7	6.3	85	4	105	1.1	6	3.2	1	0168	0.151	0.067
NOJA685M006#WJ	A	6.8	6.3	85	4	105	1.1	6	2.6	1	0.186	0.167	0.074
NOJA106M006#WJ	A	10	6.3	85	4	105	1.2	6	2.2	1	0.202	0.182	0.081
NOJA156M006#WJ	A	15	6.3	85	4	105	1.8	8	2	1	0.212	0.191	0.085
NOJB156M006#WJ	B	15	6.3	85	4	105	1.8	6	2	1	0.226	0.203	0.090
NOJA226M006#WJ	A	22	6.3	85	4	105	2.6	8	1.8	1	0.224	0.201	0.089
NOJB226M006#WJ	B	22	6.3	85	4	105	2.6	6	1.9	1	0.232	0.209	0.093
NOJB336M006#WJ	B	33	6.3	85	4	105	4.0	6	1.7	1	0.245	0.220	0.098
NOJB336M006#WB	B	33	6.3	85	4	105	4.0	6	0.7	3	0.382	0.344	0.153
NOJC336M006#WJ	C	33	6.3	85	4	105	4.0	6	0.5	1	0.514	0.462	0.206
NOJB476M006#WJ	B	47	6.3	85	4	105	5.6	6	0.8	1	0.357	0.321	0.143
NOJC476M006#WJ	C	47	6.3	85	4	105	5.7	6	0.5	1	0.514	0.462	0.206
NOJB686M006#WJ	B	68	6.3	85	4	105	8.2	20	1.5	1	0.261	0.235	0.104
NOJC686M006#WJ	C	68	6.3	85	4	105	8.2	6	0.5	1	0.514	0.462	0.206
NOJB107M006#WJ	B	100	6.3	85	4	105	60.0	20	1.7	1	0.245	0.220	0.098
NOJB107M006#WB	B	100	6.3	85	4	105	60.0	20	0.4	3	0.505	0.454	0.202
NOJC107M006#WJ	C	100	6.3	85	4	105	12.0	8	0.4	1	0.574	0.517	0.230
NOJD107M006#WJ	D	100	6.3	85	4	105	12.0	6	0.4	3	0.671	0.604	0.268
NOJC157M006#WJ	C	150	6.3	85	4	105	18.0	6	0.4	1	0.574	0.517	0.230

OxiCap® NOJ Series

Niobium Oxide Capacitor

RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (Ω)	MSL	100kHz RMS Current (A)		
											25°C	85°C	105°C
NOJD157M006#WJ	D	150	6.3	85	4	105	18.0	6	0.4	3	0.671	0.604	0.268
NOJC227M006#WJ	C	220	6.3	85	4	105	26.4	14	0.4	1	0.574	0.517	0.230
NOJD227M006#WJ	D	220	6.3	85	4	105	26.4	8	0.4	3	0.671	0.604	0.268
NOJE227M006#WJ	E	220	6.3	85	4	105	26.4	12	0.4	3	0.704	0.633	0.281
NOJD337M006#WJ	D	330	6.3	85	4	105	39.6	10	0.3	3	0.775	0.697	0.310
NOJE337M006#WJ	E	330	6.3	85	4	105	39.6	12	0.3	3	0.812	0.731	0.325
NOJE477M006#WJ	E	470	6.3	85	4	105	56.4	16	0.3	3	0.812	0.731	0.325
NOJE477M006#WB	E	470	6.3	85	4	105	56.4	16	0.075	3	1.625	1.462	0.650
NOJV477M006#WJ	V	470	6.3	85	4	105	56.4	14	0.3	3	1.000	0.900	0.400
10 Volt @ 85°C													
NOJA475M010#WJ	A	4.7	10	85	7	105	1.0	6	3.1	1	0.170	0.153	0.068
NOJA685M010#WJ	A	6.8	10	85	7	105	1.4	6	2.6	1	0.186	0.167	0.074
NOJA106M010#WJ	A	10	10	85	7	105	2.0	6	2.2	1	0.202	0.182	0.081
NOJB106M010#WJ	B	10	10	85	7	105	2.0	6	1	1	0.319	0.287	0.128
NOJA156M010#WJ	A	15	10	85	7	105	3.0	6	2	1	0.212	0.191	0.085
NOJB156M010#WJ	B	15	10	85	7	105	3.0	6	2	1	0.226	0.203	0.090
NOJB226M010#WJ	B	22	10	85	7	105	4.4	6	1.8	1	0.238	0.214	0.095
NOJB226M010#WB	B	22	10	85	7	105	4.4	6	0.7	3	0.382	0.344	0.153
NOJC226M010#WJ	C	22	10	85	7	105	4.4	6	0.5	1	0.514	0.462	0.206
NOJC336M010#WJ	C	33	10	85	7	105	6.6	6	0.5	1	0.514	0.462	0.206
NOJC476M010#WJ	C	47	10	85	7	105	9.4	6	0.4	1	0.574	0.517	0.230
NOJC686M010#WJ	C	68	10	85	7	105	13.6	12	0.5	1	0.514	0.462	0.206
NOJD107M010#WJ	D	100	10	85	7	105	20.0	12	0.4	3	0.671	0.604	0.268
NOJD107M010#WB	D	100	10	85	7	105	20.0	12	0.15	3	1.095	0.986	0.438

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5V RMS with a maximum DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

The EIA & CECC standards for capacitors allow an ESR movement to 1.25 times catalog limit post mounting.

For typical weight and composition see page 227.

NOTE: AVX reserves the right to supply a higher voltage rating or tighter tolerance part in the same case size, to the same reliability standards.

OxiCap® NOJ Series

Niobium Oxide Capacitor

QUALIFICATION TABLE

<table>
<tr><th rowspan="2">TEST</th><th colspan="9">NOJ series (Temperature range -55ºC to +105ºC)</th></tr>
<tr><th colspan="3">Condition</th><th colspan="6">Characteristics</th></tr>
<tr><td rowspan="5">Endurance</td><td colspan="3" rowspan="5">Determine after application of rated voltage for 2000 +48/-0 hours at 85±2ºC and then leaving 1-2 hours at room temperature. Also determine of 105ºC temperature, category voltage for 2000 +48/-0 hours and then leaving 1-2 hours at room temperature. Power supply impedance to be ≤0.1Ω/V.</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="5">Storage Life</td><td colspan="3" rowspan="5">105ºC, 0V, 2000h</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="5">Humidity</td><td colspan="3" rowspan="5">Determine after storage without applied voltage at 65±2ºC and 95±2% relative humidity for 500 hrs and then recovery 1-2 hours at room temperature.</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">1.5 x initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">1.2 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="5">Biased Humidity</td><td colspan="3" rowspan="5">Determine after leaving for 1000 hours at 85±2ºC, 85% relative humidity and rated voltage and then recovery 1-2 hours at room temperature.</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">2 x initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">1.2 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="8">Temperature Stability</td><td>Step</td><td>Temperature°C</td><td>Duration(min)</td><td></td><td>+20ºC</td><td>-55ºC</td><td>+20ºC</td><td>+85ºC</td><td>+105ºC</td><td>+20ºC</td></tr>
<tr><td>1</td><td>+20±2</td><td>15</td><td>DCL</td><td>IL*</td><td>n/a</td><td>IL*</td><td>10 x IL*</td><td>12.5 x IL*</td><td>IL*</td></tr>
<tr><td>2</td><td>-55+0/-3</td><td>15</td><td>ΔC/C</td><td>n/a</td><td>+0/-10%</td><td>±5%</td><td>+10/-0%</td><td>+12/-0%</td><td>±5%</td></tr>
<tr><td>3</td><td>+20±2</td><td>15</td><td>DF</td><td>IL*</td><td>1.5 x IL*</td><td>IL*</td><td>1.5 x IL*</td><td>2 x IL*</td><td>IL*</td></tr>
<tr><td>4</td><td>+85+3/-0</td><td>15</td><td rowspan="3">ESR</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">2.5 x IL*</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.25 x IL*</td></tr>
<tr><td>5</td><td>+105+3/-0</td><td>15</td></tr>
<tr><td>6</td><td>+20±2</td><td>15</td></tr>
<tr><td rowspan="5">Surge Voltage</td><td colspan="3" rowspan="5">Test temperature: 105ºC+3/0ºC
Test voltage: 1.3 x category voltage at 105ºC
Series protection resistance 1000±100Ω
Discharge resistance: 1000Ω
Number of cycles: 1000x
Cycle duration: 6 min; 30 sec charge,
5 min 30 sec discharge</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±5% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="5">Mechanical Shock</td><td colspan="3" rowspan="5">MIL-STD-202, Method 213, Condition F</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
<tr><td rowspan="5">Vibration</td><td colspan="3" rowspan="5">MIL-STD-202, Method 204, Condition D</td><td>Visual examination</td><td colspan="5">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="5">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="5">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="5">initial limit</td></tr>
<tr><td>ESR</td><td colspan="5">1.25 x initial limit</td></tr>
</table>

*Initial Limit