### **Niobium Oxide Capacitor**







#### **FEATURES**

- · Low ESR Nb0 Capacitors
- Non-Burn Safe Technology
- Reliability Level: 0.2%/1000 hrs.
- 100% Surge Current Tested
- CV Range: 10-470µF / 1.8-8V
- 5 Case Sizes Available
- IBM Global Approval Received in 2004
- Elektra Award Received in 2005
- Meets Requirements of AEC-Q200
- -55 to +125°C Operation Temperature

### **APPLICATIONS**

Medium Power DC/DC for Transportation and Automotive Industry



LEAD-FREE COMPATIBLE COMPONENT



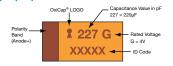


Elektra Award 2005



**MARKING** 

### A, B, C, D, Y CASE



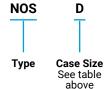
### **CASE DIMENSIONS:**

### 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)	W1 ±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
Α	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)
В	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)
С	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)
Υ	2917	7343-20	7.30 (0.287)	4.30 (0.169)	2.00 (0.079) max	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)

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

#### **HOW TO ORDER**





**Capacitance Code** 1st two digits represent significant figures, 3rd digit represents multiplier in pF





Rated **DC Voltage** 001 = 1.8 Vdc002 = 2.5Vdc 004 = 4Vdc

006 = 6.3 Vdc

008 = 8Vdc



Packaging R = Pure Tin 7" Reel S = Pure Tin 13" Reel



ESR in mΩ

Additional characters may be added for special requirements

V = Dry pack Option (selected codes only) with exception of D & Y cases

### **TECHNICAL SPECIFICATIONS**

Technical Data:		All techr	nical data	relate to	an ambie	nt tempe	rature of +25°C is not stated				
Capacitance Range:		10 μF to	470 μF								
Capacitance Tolerance:		±20%									
Leakage Current DCL:		0.02CV									
Rated Voltage DC (V <sub>R</sub> )	≤ +85°C:	1.8	2.5	4	6.3	8					
Category Voltage (V <sub>c</sub> )	≤ +105°C:	1.2	1.7	2.7	4	7					
Category Voltage (V <sub>c</sub> )	≤ +125°C:	0.9	1.3	2	3	4					
Surge Voltage (V <sub>s</sub> )	≤ +85°C:	2.3	3.3	5.2	8	10					
Surge Voltage (V <sub>s</sub> )	≤ +105°C:	1.6	2.2	3.4	5	8					
Surge Voltage (V <sub>s</sub> )	≤ +125°C:	1.2	1.7	2.6	4	5.3					
Temperature Range:		-55°C to	+125°C								
Reliability:		0.2% per	r 1000 ho	urs at 85°	C, V <sub>R</sub> , 0.1	Ω/V serie	es impedance, 60% confidence level				
ategory Voltage ( $V_c$ ) ≤ +125°C: 0.9 1.3 2 3 4 urge Voltage ( $V_s$ ) ≤ +85°C: 2.3 3.3 5.2 8 10 urge Voltage ( $V_s$ ) ≤ +105°C: 1.6 2.2 3.4 5 8 urge Voltage ( $V_s$ ) ≤ +125°C: 1.2 1.7 2.6 4 5.3 emperature Range: -55°C to +125°C											





### **CAPACITANCE AND RATED VOLTAGE RANGE** (LETTER DENOTES CASE SIZE)

Capac	itance		Rat	ted Voltage DC (V <sub>R</sub> ) to 8	5°C								
μF	Code	1.8V (x)	2.5V (e)	4.0V (G)	6.3V (J)	8V (P)							
10	106				A(800,1000,2000,2200)	A(2200) B(1000)							
15	156			A(1500,2000)	B(2000)								
22	226			B(1900)	B(600,1900)	B(700,1800)							
33	336				B(600,1700) C(500)								
47	476			B(500,1600)	B(500,800) C(300,500)	C(400)							
68	686				C(75,200,500)	C(500)							
100	107			C(70,150,400)	C(150,400) D(80,100,400 Y(100,400)								
150	157			C(90,150,400) Y(400)	D(70,100,400) Y(100,400)								
220	227	C(125,400)	C(80,125,400)	D(60,100,400)	D(60,100,400)								
330	337		D(100,300)	D(100,300)									
470	477		D(55,100,300)	D(100,300)									

Released ratings (ESR ratings in mOhms in parentheses)

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

## **Niobium Oxide Capacitor**



### **RATINGS & PART NUMBER REFERENCE**

Part Number	Case	Capacitance	Rated	Rated	Category	Category	DCL	DF	ESR Max.	100kHz RMS Current (A)		100kHz RMS Current (A)			MSL
Part Number	Size	(μ <b>F</b> )	Voltage (V)	Temperature (°C)	Voltage (V)	Temperature (°C)	Max. (μA)	Max. (%)	@ 100kHz (mΩ)	25°C	85°C	125°C	IVIS		
					1.8 Vo	olt @ 85°C									
NOSC227M001#0125	С	220	1.8	85	0.9	125	8.0	8	125	1.028	0.925	0.411	1		
NOSC227M001#0400	С	220	1.8	85	0.9	125	8.0	8	400	0.574	0.517	0.230	1		
					2.5 Vo	olt @ 85°C									
NOSC227M002#0080	С	220	2.5	85	1.3	125	11.0	8	80	1.285	1.156	0.514	1		
NOSC227M002#0125	С	220	2.5	85	1.3	125	11.0	8	125	1.028	0.925	0.411	1		
NOSC227M002#0400	С	220	2.5	85	1.3	125	11.0	8	400	0.574	0.517	0.230	1		
NOSD337M002#0100	D	330	2.5	85	1.3	125	16.5	10	100	1.342	1.207	0.537	;		
NOSD337M002#0300	D	330	2.5	85	1.3	125	16.5	10	300	0.775	0.697	0.310			
NOSD477M002#0055	D	470	2.5	85	1.3	125	23.5	12	55	1.809	1.628	0.724			
NOSD477M002#0100	D	470	2.5	85	1.3	125	23.5	12	100	1.342	1.207	0.537			
NOSD477M002#0300	D	470	2.5	85	1.3	125	23.5	12	300	0.775	0.697	0.310			
						t @ 85°C						,			
NOSA156M004#1500	Α	15	4	85	2	125	1.2	6	1500	0.245	0.220	0.098			
NOSA156M004#2000	Α	15	4	85	2	125	1.2	6	2000	0.212	0.191	0.085			
NOSB226M004#1900	В	22	4	85	2	125	1.8	6	1900	0.232	0.209	0.093			
NOSB476M004#0500	В	47	4	85	2	125	3.8	6	500	0.452	0.406	0.181			
NOSB476M004#1600	В	47	4	85	2	125	3.8	6	1600	0.252	0.227	0.101			
NOSC107M004#0070	С	100	4	85	2	125	8.0	6	70	1.373	1.236	0.549			
NOSC107M004#0150	С	100	4	85	2	125	8.0	6	150	0.938	0.844	0.375			
NOSC107M004#0400	С	100	4	85	2	125	8.0	6	400	0.574	0.517	0.230			
NOSC157M004#0090	С	150	4	85	2	125	12.0	6	90	1.211	1.090	0.484			
NOSC157M004#0150	С	150	4	85	2	125	12.0	6	150	0.938	0.844	0.375			
NOSC157M004#0400	С	150	4	85	2	125	12.0	6	400	0.574	0.517	0.230			
NOSY157M004#0400	Y	150	4	85	2	125	12.0	6	400	0.612	0.551	0.245			
NOSD227M004#0060	D	220	4	85	2	125	17.6	8	60	1.732	1.559	0.693			
NOSD227M004#0100	D	220	4	85	2	125	17.6	8	100	1.342	1.207	0.537			
NOSD227M004#0400	D	220	4	85	2	125	17.6	8	400	0.671	0.604	0.268	_		
NOSD337M004#0100 NOSD337M004#0300	D D	330	4	85	2	125	26.4	8	100	1.342	1.207	0.537			
	D	330 470	4	85 85	2	125 125	26.4 37.6	8 12	300 100	0.775 1.342	0.697 1.207	0.310 0.537			
NOSD477M004#0100															
NOSD477M004#0300	D	470	4	85	2	125 olt @ <b>85°C</b>	37.6	12	300	0.775	0.697	0.310			
NOSA106M006#0800	I A	10	6.3	85	3	125	1.2	6	800	0.335	0.302	0.134	Т		
NOSA106M006#1000	A	10	6.3	85	3	125	1.2	6	1000	0.300	0.302	0.134			
NOSA106M006#2000	A	10	6.3	85	3	125	1.2	6	2000	0.300	0.270	0.120			
NOSA106M006#2200	A	10	6.3	85	3	125	1.2	6	2200	0.212	0.191	0.083			
NOSB156M006#2200	В	15	6.3	85	3	125	1.8	6	2000	0.202	0.182	0.090			
NOSB226M006#0600	В	22	6.3	85	3	125	2.6	6	600	0.226	0.203	0.090			
NOSB226M006#1900	В	22	6.3	85	3	125	2.6	6	1900	0.412	0.371	0.165			
NOSB336M006#0600	В	33	6.3	85	3	125	4.0	6	600	0.232	0.209	0.093			
NOSB336M006#1700	В	33	6.3	85	3	125	4.0	6	1700	0.412	0.371	0.103			
NOSC336M006#1700	C	33	6.3	85	3	125	4.0	6	500	0.514	0.462	0.098			
NOSB476M006#0500	В	47	6.3	85	3	125	5.6	6	500	0.452	0.406	0.181			
NOSB476M006#0300	В	47	6.3	85	3	125	5.6	6	800	0.452	0.321	0.143			
NOSC476M006#0300	C	47	6.3	85	3	125	5.7	6	300	0.663	0.527	0.265			
NOSC476M006#0500	C	47	6.3	85	3	125	5.7	6	500	0.514	0.462	0.206			
NOSC686M006#0075	C	68	6.3	85	3	125	8.2	6	75	1.327	1.194	0.531			
NOSC686M006#0073	C	68	6.3	85	3	125	8.2	6	200	0.812	0.731	0.325			
NOSC686M006#0500	C	68	6.3	85	3	125	8.2	6	500	0.514	0.462	0.206			
NOSC107M006#0150	C	100	6.3	85	3	125	12.0	8	150	0.938	0.844	0.275			
NOSC107M006#0400	C	100	6.3	85	3	125	12.0	8	400	0.574	0.517	0.230			
NOSD107M006#0080	D	100	6.3	85	3	125	12.0	6	80	1.500	1.350	0.600			
NOSD107M006#0100	D	100	6.3	85	3	125	12.0	6	100	1.342	1.207	0.537			
NOSD107M006#0400	D	100	6.3	85	3	125	12.0	6	400	0.671	0.604	0.268			
NOSY107M006#0100	Y	100	6.3	85	3	125	12.0	6	100	1.225	1.102	0.490			
NOSY107M006#0400	Y	100	6.3	85	3	125	12.0	6	400	0.612	0.551	0.245			
NOSD157M006#0070	D	150	6.3	85	3	125	18.0	6	70	1.604	1.443	0.641			
NOSD157M006#0100	D	150	6.3	85	3	125	18.0	6	100	1.342	1.207	0.537			
NOSD157M006#0400	D	150	6.3	85	3	125	18.0	6	400	0.671	0.604	0.268			
NOSY157M006#0400	Y	150	6.3	85	3	125	18.0	6	100	1.225	1.102	0.490			
	Y	150	6.3	85	3	125	18.0	6	400	0.612	0.551	0.245			





### **RATINGS & PART NUMBER REFERENCE**

Part Number	Case	Capacitance	Rated Voltage	Rated Temperature	Category Voltage	Category Temperature	DCL Max.	DF Max.	ESR Max.	100kH	100kHz RMS Current (A)		MSL
Part Number	Size	(μF)	(V)	(°C)	(V) (°C)	(μ <b>A</b> )	(%)	@ 100kHz (mΩ)	25°C	85°C	125°C		
NOSD227M006#0060	D	220	6.3	85	3	125	26.4	8	60	1.732	1.559	0.693	3
NOSD227M006#0100	D	220	6.3	85	3	125	26.4	8	100	1.342	1.207	0.537	3
NOSD227M006#0400	D	220	6.3	85	3	125	26.4	8	400	0.671	0.604	0.268	3
					8 Vol	t @ 85°C							
NOSA106M008#2200	Α	10	8	85	4	125	1.6	10	2200	0.202	0.182	0.081	1
NOSB106M008#1000	В	10	8	85	4	125	1.6	10	1000	0.319	0.287	0.128	1
NOSB226M008#0700	В	22	8	85	4	125	3.5	10	700	0.382	0.344	0.153	1
NOSB226M008#1800	В	22	8	85	4	125	3.5	10	1800	0.238	0.214	0.095	1
NOSC476M008#0400	С	47	8	85	4	125	7.5	10	400	0.574	0.517	0.230	1
NOSC686M008#0500	С	68	8	85	4	125	11.0	16	500	0.514	0.462	0.206	1

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 259.

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





### **QUALIFICATION TABLE**

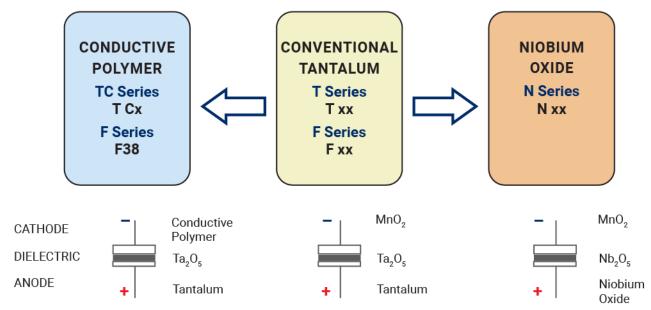
TEST			NOS series	Temperature range -	55°C to +1	25°C)							
1531		Condition			C	haracter	istics						
				Visual examination	no visible	e damage							
		ge (Ur) at 85°C and /		DCL	initial limit								
Endurance		.5°C for 2000 hours 1Ω/V. Stabilize at ro		ΔC/C	within ±1	0% of initia	l value						
	for 1-2 hours befo		om temperature	DF	initial lim	initial limit							
		g.		ESR	1.25 x ini	tial limit							
				Visual examination	no visible	damage							
	Store at 125°C. no	voltage applied, fo	r 2000 hours.	DCL	initial lim	it							
Storage Life		temperature for 1-2		ΔC/C	within ±1	0% of initia	l value						
	measuring.			DF	initial lim	it							
				ESR	1.25 x ini	tial limit							
				Visual examination	no visibl	e damage							
	Apply rated voltage	je (Ur) at 85°C, 85%	relative humidity	DCL 2 x initial limit									
Biased Humidity		tabilize at room tem		ΔC/C	within ±10% of initial value								
	humidity for 1-2 h	ours before measur	ring.	DF	1.2 x initial limit								
				ESR	1.25 x initial limit								
	Step	Temperature°C	Duration(min)		+20°C	-55°C	+20°C	+85°C	+125°C	+20°C			
	1 2	+20 -55	15 15	DCL	IL*	n/a	IL*	12 x IL*	15 x IL*	IL*			
Temperature	3	+20	15	ΔC/C	n/a	+0/-10%	±5%	+10/-0%	+12/-0%	±5%			
Stability	4	+85	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2xIL*	IL*			
	5	+125	15	ESR	1.25xIL*	25xIL*	1.25xIL*	1.25xL*	1.25xIL*	1.25xIL*			
	6	+20	15	Visual examination			1.ZJXIL"	1.23XIL**	1.ZJXIL"	1.23XIL*			
	Apply 1 3x catego	ry voltage (Uc) at 1:	25°C for 1000	DCL Visual examination		no visible damage							
Curre Veltere		6 min (30 sec char		ΔC/C	initial limit								
Surge Voltage		h a charge / discha	rge resistance of	DF	initial lim	within ±5% of initial value							
	1000Ω			ESR									
				Visual examination	1.25 x initial limit  no visible damage								
				DCL	initial lim	<u> </u>							
Mechanical	MIL-STD-202 Mot	thod 213, Condition	_	ΔC/C		5% of initia	ıl valuo						
Shock	WIL-31D-202, Wet	inou 213, Condition	-	DF			ii value						
				ESR		initial limit  1.25 x initial limit							
				Visual examination		e damage							
				DCL	initial lim								
Vibration	MIL-STD-202 Mot	thod 204, Condition	n	ΔC/C		יינ 5% of initia	میرادی ا						
VIDIALIOII	IVIIL-31D-202, IVIEL	anou 204, Conultion	D	DF	initial lin		ii value						
				ESR									
	]			LOR	1.25 x initial limit								

<sup>\*</sup>Initial Limit

### **Niobium Oxide Capacitor**



### SOLID ELECTROLYTIC CAPACITOR ROADMAP



### **FIVE CAPACITOR CONSTRUCTION STYLES**



### **SERIES LINE UP: NIOBIUM OXIDE OxiCap® CAPACITORS**

