



**THE DATASHEET OF  
NOSB476M006R0500**



# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor



### FEATURES

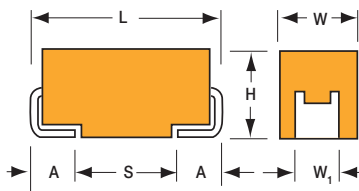
- Low ESR NbO Capacitors
- Non-Burn Safe Technology
- Reliability Level: 0.2%/1000 hrs.
- 100% Surge Current Tested
- CV Range: 10-470µF / 1.8-8V
- 5 Case Sizes Available
- IBM Global Approval Received in 2004
- Elektra Award Received in 2005
- Meets Requirements of AEC-Q200
- -55 to +125°C Operation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



Elektra Award  
2005

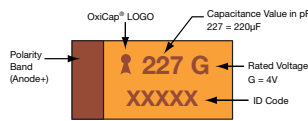
### APPLICATIONS

- Medium Power DC/DC for Transportation and Automotive Industry



### 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.
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)
Y	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<sub>1</sub> dimension applies to the termination width for A dimensional area only.

### HOW TO ORDER

**NOS**

Type

**D**

Case Size  
See table above

**107**

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

**M**

Tolerance  
M = ±20%

**006**

Rated DC Voltage  
001 = 1.8Vdc  
002 = 2.5Vdc  
004 = 4Vdc  
006 = 6.3Vdc  
008 = 8Vdc

**R**

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

**0100**

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 technical data relate to an ambient temperature 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 1000 hours at 85°C, V <sub>R</sub> , 0.1Ω/V series impedance, 60% confidence level Meets requirements of AEC-Q200						

# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor



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

Capacitance		Rated Voltage DC (V <sub>R</sub> ) to 85°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.

# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor



### RATINGS & PART NUMBER REFERENCE

Part Number	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (A)			MSL
										25°C	85°C	125°C	
<b>1.8 Volt @ 85°C</b>													
NOSC227M001#0125	C	220	1.8	85	0.9	125	8.0	8	125	1.028	0.925	0.411	1
NOSC227M001#0400	C	220	1.8	85	0.9	125	8.0	8	400	0.574	0.517	0.230	1
<b>2.5 Volt @ 85°C</b>													
NOSC227M002#0080	C	220	2.5	85	1.3	125	11.0	8	80	1.285	1.156	0.514	1
NOSC227M002#0125	C	220	2.5	85	1.3	125	11.0	8	125	1.028	0.925	0.411	1
NOSC227M002#0400	C	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	3
NOSD337M002#0300	D	330	2.5	85	1.3	125	16.5	10	300	0.775	0.697	0.310	3
NOSD477M002#0055	D	470	2.5	85	1.3	125	23.5	12	55	1.809	1.628	0.724	3
NOSD477M002#0100	D	470	2.5	85	1.3	125	23.5	12	100	1.342	1.207	0.537	3
NOSD477M002#0300	D	470	2.5	85	1.3	125	23.5	12	300	0.775	0.697	0.310	3
<b>4 Volt @ 85°C</b>													
NOSA156M004#1500	A	15	4	85	2	125	1.2	6	1500	0.245	0.220	0.098	1
NOSA156M004#2000	A	15	4	85	2	125	1.2	6	2000	0.212	0.191	0.085	1
NOSB226M004#1900	B	22	4	85	2	125	1.8	6	1900	0.232	0.209	0.093	1
NOSB476M004#0500	B	47	4	85	2	125	3.8	6	500	0.452	0.406	0.181	1
NOSB476M004#1600	B	47	4	85	2	125	3.8	6	1600	0.252	0.227	0.101	1
NOSC107M004#0070	C	100	4	85	2	125	8.0	6	70	1.373	1.236	0.549	1
NOSC107M004#0150	C	100	4	85	2	125	8.0	6	150	0.938	0.844	0.375	1
NOSC107M004#0400	C	100	4	85	2	125	8.0	6	400	0.574	0.517	0.230	1
NOSC157M004#0090	C	150	4	85	2	125	12.0	6	90	1.211	1.090	0.484	1
NOSC157M004#0150	C	150	4	85	2	125	12.0	6	150	0.938	0.844	0.375	1
NOSC157M004#0400	C	150	4	85	2	125	12.0	6	400	0.574	0.517	0.230	1
NOSY157M004#0400	Y	150	4	85	2	125	12.0	6	400	0.612	0.551	0.245	3
NOSD227M004#0060	D	220	4	85	2	125	17.6	8	60	1.732	1.559	0.693	3
NOSD227M004#0100	D	220	4	85	2	125	17.6	8	100	1.342	1.207	0.537	3
NOSD227M004#0400	D	220	4	85	2	125	17.6	8	400	0.671	0.604	0.268	3
NOSD337M004#0100	D	330	4	85	2	125	26.4	8	100	1.342	1.207	0.537	3
NOSD337M004#0300	D	330	4	85	2	125	26.4	8	300	0.775	0.697	0.310	3
NOSD477M004#0100	D	470	4	85	2	125	37.6	12	100	1.342	1.207	0.537	3
NOSD477M004#0300	D	470	4	85	2	125	37.6	12	300	0.775	0.697	0.310	3
<b>6.3 Volt @ 85°C</b>													
NOSA106M006#0800	A	10	6.3	85	3	125	1.2	6	800	0.335	0.302	0.134	1
NOSA106M006#1000	A	10	6.3	85	3	125	1.2	6	1000	0.300	0.270	0.120	1
NOSA106M006#2000	A	10	6.3	85	3	125	1.2	6	2000	0.212	0.191	0.085	1
NOSA106M006#2200	A	10	6.3	85	3	125	1.2	6	2200	0.202	0.182	0.081	1
NOSB156M006#2000	B	15	6.3	85	3	125	1.8	6	2000	0.226	0.203	0.090	1
NOSB226M006#0600	B	22	6.3	85	3	125	2.6	6	600	0.412	0.371	0.165	1
NOSB226M006#1900	B	22	6.3	85	3	125	2.6	6	1900	0.232	0.209	0.093	1
NOSB336M006#0600	B	33	6.3	85	3	125	4.0	6	600	0.412	0.371	0.165	1
NOSB336M006#1700	B	33	6.3	85	3	125	4.0	6	1700	0.245	0.220	0.098	1
NOSC336M006#0500	C	33	6.3	85	3	125	4.0	6	500	0.514	0.462	0.206	1
NOSB476M006#0500	B	47	6.3	85	3	125	5.6	6	500	0.452	0.406	0.181	1
NOSB476M006#0800	B	47	6.3	85	3	125	5.6	6	800	0.357	0.321	0.143	1
NOSC476M006#0300	C	47	6.3	85	3	125	5.7	6	300	0.663	0.597	0.265	1
NOSC476M006#0500	C	47	6.3	85	3	125	5.7	6	500	0.514	0.462	0.206	1
NOSC686M006#0075	C	68	6.3	85	3	125	8.2	6	75	1.327	1.194	0.531	1
NOSC686M006#0200	C	68	6.3	85	3	125	8.2	6	200	0.812	0.731	0.325	1
NOSC686M006#0500	C	68	6.3	85	3	125	8.2	6	500	0.514	0.462	0.206	1
NOSC107M006#0150	C	100	6.3	85	3	125	12.0	8	150	0.938	0.844	0.375	1
NOSC107M006#0400	C	100	6.3	85	3	125	12.0	8	400	0.574	0.517	0.230	1
NOSD107M006#0080	D	100	6.3	85	3	125	12.0	6	80	1.500	1.350	0.600	3
NOSD107M006#0100	D	100	6.3	85	3	125	12.0	6	100	1.342	1.207	0.537	3
NOSD107M006#0400	D	100	6.3	85	3	125	12.0	6	400	0.671	0.604	0.268	3
NOSY107M006#0100	Y	100	6.3	85	3	125	12.0	6	100	1.225	1.102	0.490	3
NOSY107M006#0400	Y	100	6.3	85	3	125	12.0	6	400	0.612	0.551	0.245	3
NOSD157M006#0070	D	150	6.3	85	3	125	18.0	6	70	1.604	1.443	0.641	3
NOSD157M006#0100	D	150	6.3	85	3	125	18.0	6	100	1.342	1.207	0.537	3
NOSD157M006#0400	D	150	6.3	85	3	125	18.0	6	400	0.671	0.604	0.268	3
NOSY157M006#0100	Y	150	6.3	85	3	125	18.0	6	100	1.225	1.102	0.490	3
NOSY157M006#0400	Y	150	6.3	85	3	125	18.0	6	400	0.612	0.551	0.245	3

# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor



### RATINGS & PART NUMBER REFERENCE

Part Number	Case Size	Capacitance (μF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (μA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (A)			MSL
										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
<b>8 Volt @ 85°C</b>													
NOSA106M008#2200	A	10	8	85	4	125	1.6	10	2200	0.202	0.182	0.081	1
NOSB106M008#1000	B	10	8	85	4	125	1.6	10	1000	0.319	0.287	0.128	1
NOSB226M008#0700	B	22	8	85	4	125	3.5	10	700	0.382	0.344	0.153	1
NOSB226M008#1800	B	22	8	85	4	125	3.5	10	1800	0.238	0.214	0.095	1
NOSC476M008#0400	C	47	8	85	4	125	7.5	10	400	0.574	0.517	0.230	1
NOSC686M008#0500	C	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, refer to the *Product Safety Information Datasheet* at the end of the Polymer, Tantalum and Niobium Oxide Capacitors catalog.

**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.**

# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor



### QUALIFICATION TABLE

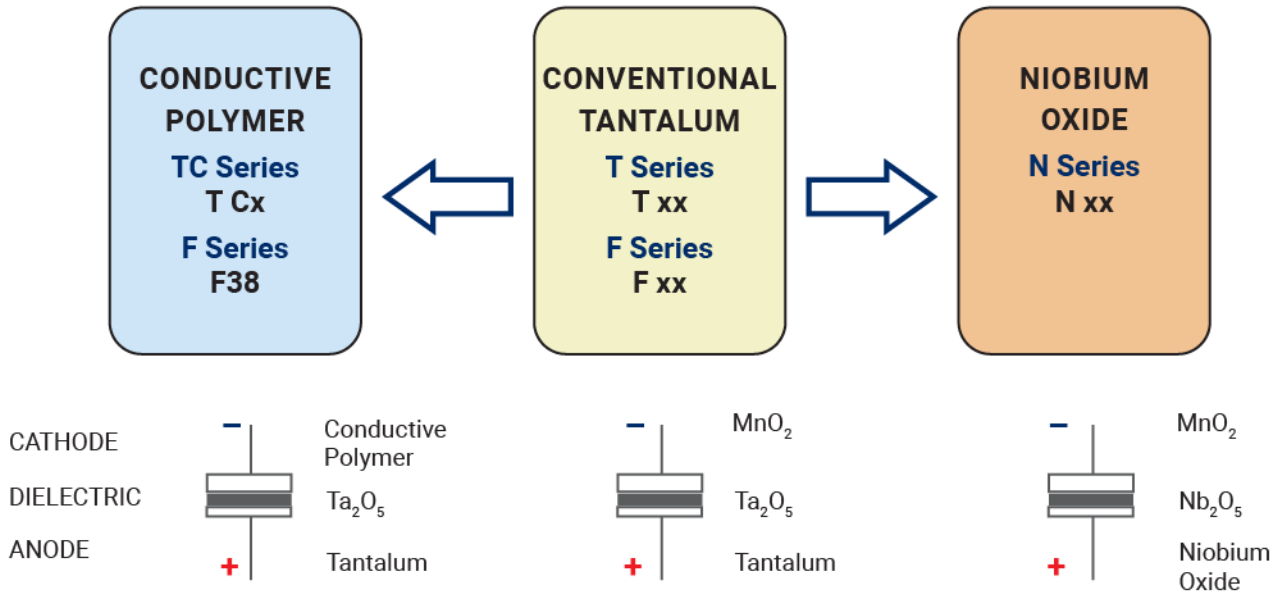
TEST	NOS series (Temperature range -55°C to +125°C)									
	Condition			Characteristics						
<b>Endurance</b>	Apply rated voltage (Ur) at 85°C and / or category voltage (Uc) at 125°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$ . Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 10\%$ of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
<b>Storage Life</b>	Store at 125°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 10\%$ of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
<b>Biased Humidity</b>	Apply rated voltage (Ur) at 85°C, 85% relative humidity for 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	2 x initial limit					
				$\Delta C/C$	within $\pm 10\%$ of initial value					
				DF	1.2 x initial limit					
				ESR	1.25 x initial limit					
<b>Temperature Stability</b>	Step	Temperature°C	Duration(min)		+20°C	-55°C	+20°C	+85°C	+125°C	+20°C
	1	+20	15							
	2	-55	15	DCL	IL*	n/a	IL*	12 x IL*	15 x IL*	IL*
	3	+20	15	$\Delta C/C$	n/a	+0/-10%	$\pm 5\%$	+10/-0%	+12/-0%	$\pm 5\%$
	4	+85	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*
	5	+125	15							
	6	+20	15	ESR	125xIL*	25xIL*	125xIL*	125xIL*	125xIL*	125xIL*
<b>Surge Voltage</b>	Apply 1.3x category voltage (Uc) at 125°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 $\Omega$			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 5\%$ of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Condition F			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 5\%$ of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
<b>Vibration</b>	MIL-STD-202, Method 204, Condition D			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 5\%$ of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					

\*Initial Limit

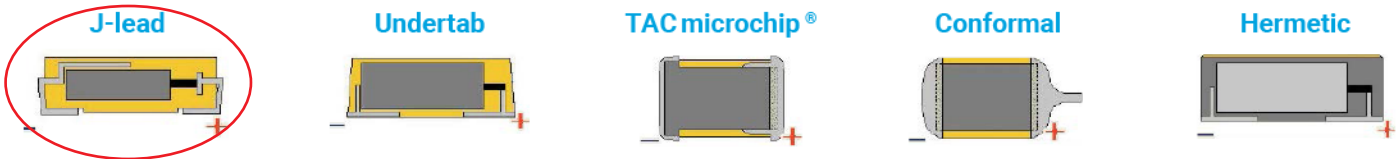
# OxiCap® NOS Low ESR Series

## Niobium Oxide Capacitor

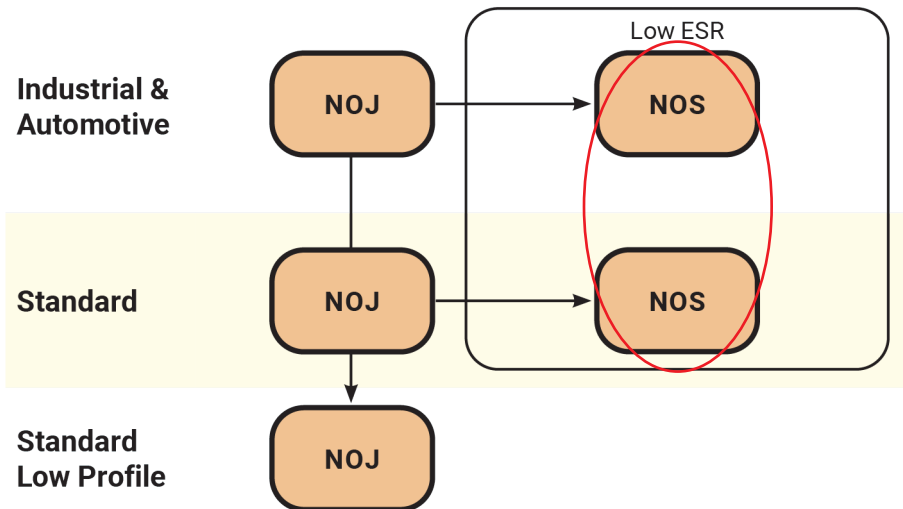
### SOLID ELECTROLYTIC CAPACITOR ROADMAP



### FIVE CAPACITOR CONSTRUCTION STYLES





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



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