Miniature Aluminum Electrolytic Capacitors

NRWA Series

RADIAL LEADS, POLARIZED, STANDARD SIZE, EXTENDED TEMPERATURE

FEATURES

- REDUCED CASE SIZING
- -55°C ~ +105°C OPERATING TEMPERATURE
- HIGH STABILITY OVER LONG LIFE

EXTENDED TEMPERATURE

NRWA ➡ NRWS

(today's standard) (reduced sizes)

RoHS Compliant

includes all homogeneous materials

*See Part Number System for Details

CHARACTERISTICS

Rated Voltage Range		6.3 ~ 100 VDC							
Capacitance Range		0.47 ~ 10,000µF							
Operating Temperature Range		-55 ~ +105˚C							
Capacitance Tolerance		± 20% (M)							
Max. Leakage Current @ (20°C)	After 1 min.	0.03CV or 4µA , whichever is greater							
	After 2 min.	0.01CV or 3µA , whichever is greater							
Max. Tan δ @ 120Hz/20˚C	W.V. (Vdc)	6.3	10	16	25	35	50	63	100
	S.V. (Vdc)	8	13	20	32	44	63	79	125
	C ≤ 1,000µF	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
	C = 2,200µF	0.24	0.21	0.18	0.16	0.14	0.12		
	C = 3,300µF	0.26	0.23	0.20	0.18	0.16			
	C = 4,700µF	0.28	0.25	0.22	0.20				
	C = 6,800µF	0.32	0.29	0.26					
	C = 10,000µF	0.40	0.37						
Low Temperature Stability Impedance Ratio @ 120Hz	Z-25˚C/Z+20˚C	4	3	2	2	2	2	2	2
	Z-40˚C/Z+20˚C	8	6	4	3	3	3	3	3
Load Life Test at Rated W.V. 105˚C 1,000 Hours: 5 ~ 12.5∅ 2,000 Hours: 16 ∅	Capacitance Change	Within ±20% of initial measured value							
	Tan δ	Less than 200% of specified maximum value							
	Leakage Current	Less than specified maximum value							
Shelf Life Test 105˚C 1,000 Hours No Load	Capacitance Change	Within ±20% of initial measured value							
	Tan δ	Less than 200% of specified maximum value							
	Leakage Current	Less than specified maximum value							

MAXIMUM E.S.R.
(Ω AT 120Hz AND 20°C)

Cap (µF)	Working Voltage (Vdc)							
	6.3V	10V	16V	25V	35V	50V	63V	100V
0.47	-	-	-	-	-	353	-	282
1.0	-	-	-	-	-	168	-	133
2.2	-	-	-	-	-	75	-	60
3.3	-	-	-	-	-	50	40	40
4.7	-	-	-	49	42	35	32	28
10	-	-	26.5	23	19.9	16.6	15.0	13.3
22	-	14.3	12.1	10.8	9.0	7.5	6.8	6.0
33	11.1	9.6	8.0	7.0	6.0	5.0	4.5	4.0
47	7.8	6.7	5.8	4.9	4.2	3.5	3.2	2.8
100	3.7	3.2	2.7	2.3	2.0	1.66	1.49	1.33
220	-	1.43	1.21	1.1	0.90	0.75	0.68	0.60
330	1.11	-	0.80	0.70	0.60	0.50	0.45	0.40
470	0.78	0.67	0.66	0.49	0.42	0.35	0.32	0.28
1000	0.36	0.32	0.27	0.23	0.20	0.166	0.149	-
2200	0.181	0.158	0.136	0.121	0.106	0.091	-	-
3300	0.131	0.116	0.101	0.090	0.081	-	-	-
4700	0.099	0.088	0.078	0.071	-	-	-	-
6800	0.078	0.071	0.063	-	-	-	-	-
10000	0.063	0.058	-	-	-	-	-	-

MAXIMUM RIPPLE CURRENT
(mA rms AT 120Hz AND 105°C)

Cap (µF)	Working Voltage (Vdc)							
	6.3V	10V	16V	25V	35V	50V	63V	100V
0.47	-	-	-	-	-	8.3	-	8.8
1.0	-	-	-	-	-	12	-	13
2.2	-	-	-	-	-	18	-	19
3.3	-	-	-	-	-	22	23	23
4.7	-	-	-	22	24	26	28	30
10	-	-	31	33	35	38	41	49
22	-	42	45	49	52	57	69	84
33	47	51	55	59	64	80	85	120
47	57	61	68	71	87	96	120	160
100	82	89	110	120	150	160	200	280
220	-	150	190	200	260	310	350	500
330	170	-	230	290	350	410	480	610
470	230	250	320	380	450	540	620	780
1000	400	470	560	670	780	950	1080	-
2200	760	790	950	1110	1280	1480	-	-
3300	890	1000	1220	1380	1570	-	-	-
4700	1230	1270	1490	1670	-	-	-	-
6800	1340	1540	1770	-	-	-	-	-
10000	1610	1770	-	-	-	-	-	-

PRECAUTIONS

Please review the notes on correct use, safety and precautions found on **pages T10 & T11** of NIC's **Electrolytic Capacitor catalog**.
Also found at **www.niccomp.com/precautions**
If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: **tpmg@niccomp.com**

RIPPLE CURRENT CORRECTION FACTOR

1. Temperature Factor

Ambient Temperature (°C)	≤+65	+75	+85	+105
Correction Rate	1.60	1.40	1.40	1.00

2. Frequency Factor

Frequency (Hz)	50	120	300	1K	10K	100K
0.47 ~ 3.3µF	0.65	1.00	1.35	1.75	2.30	2.50
4.7 ~ 33µF	0.75	1.00	1.25	1.50	1.75	1.80
47 ~ 1000µF	0.80	1.00	1.15	1.30	1.40	1.50
2200 ~ 10000µF	0.85	1.00	1.03	1.05	1.08	1.08

PART NUMBERING SYSTEM

NRWA 221 M 50V 10x16 TR F

- F — RoHS Compliant
- TR — Tape and Reel*
- 10x16 — Size (DØ x L)
- 50V — Rated Voltage
- M — Tolerance Code
- 221 — Capacitance Code
- NRWA — Series

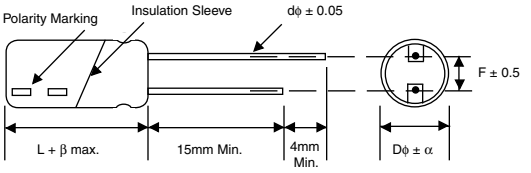
*see tape specification for details

STANDARD PRODUCT AND CASE SIZE TABLE D ϕ x L (mm)

Cap (µF)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
0.47	R47	-	-	-	-	-	5 x 11	-	5 x 11
1.0	1R0	-	-	-	-	-	5 x 11	-	5 x 11
2.2	2R2	-	-	-	-	-	5 x 11	-	5 x 11
3.3	3R3	-	-	-	-	-	5 x 11	5 x 11	5 x 11
4.7	4R7	-	-	-	5 x 11	5 x 11	5 x 11	5 x 11	5 x 11
10	100	-	-	5 x 11	5 x 11	5 x 11	5 x 11	5 x 11	6.3 x 11
22	220	-	5 x 11	5 x 11	5 x 11	5 x 11	5 x 11	6.3 x 11	8 x 11.5
33	330	5 x 11	5 x 11	5 x 11	5 x 11	5 x 11	6.3 x 11	6.3 x 11	10 x 12.5
47	470	5 x 11	5 x 11	5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	10 x 16
100	101	5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	12.5 x 20
220	221	-	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	16 x 25
330	331	6.3 x 11	-	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 20	16 x 25
470	471	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 31
1000	102	10 x 12.5	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 31	-
2200	222	12.5 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 31	18 x 36	-	-
3300	332	12.5 x 20	12.5 x 25	16 x 25	16 x 31	18 x 36	-	-	-
4700	472	16 x 25	16 x 25	16 x 31	18 x 36	-	-	-	-
6800	682	16 x 25	16 x 31	18 x 36	-	-	-	-	-
10,000	103	16 x 31	18 x 36	-	-	-	-	-	-

LEAD SPACING AND DIAMETER (mm)

Case Dia. (DØ)	5	6.3	8	10	12.5	16	18
Leads Dia. (dØ)	0.5	0.5	0.6	0.6	0.6	0.8	0.8
Lead Spacing (F)	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Dim. α	0.5	0.5	0.5	0.5	0.5	0.5	0.5



β = L < 20mm = 1.5mm, L ≥ 20mm = 2.0mm