

Miniature Aluminum Electrolytic Capacitors

NRWS Series

RADIAL LEADS, POLARIZED, NEW FURTHER REDUCED CASE SIZING,
FROM NRWA WIDE TEMPERATURE RANGE



LEADED

EXTENDED TEMPERATURE
NRWA → NRWS
(today's standard) (reduced sizes)

CHARACTERISTICS

Rated Voltage Range		6.3 ~ 100 VDC								
Capacitance Range		0.1 ~ 15,000μF								
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	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08
		C = 2,200μF	0.30	0.26	0.22	0.18	0.16	0.14		
		C = 3,300μF	0.32	0.28	0.24	0.20	0.18	0.16		
		C = 4,700μF	0.34	0.30	0.26	0.22	0.20			
		C = 6,800μF	0.36	0.32	0.28	0.24				
		C = 10,000μF	0.38	0.34	0.30					
Low Temperature Stability Impedance Ratio @ 120Hz		Z-25°C/Z+20°C	5	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	12	10	8	5	4	4	4	4
Load Life Test at105°C Rated W.V. 2,000 Hours: 16V~100V D ≥ 10Ø 1,000 Hours: All others		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							

Note: Capacitors shall conform to JIS-C-5141, unless otherwise specified here.

*1. Add 0.5 every 1000μF for more than 1000μF

*2. Add 1.0 every 1000μF for more than 1000μF

MAXIMUM PERMISSIBLE RIPPLE CURRENT (mA rms) AT 105°C AND 100KHz

Cap (μF)	Working Voltage (Vdc)							
	6.3	10	16	25	35	50	63	100
0.10	-	-	-	-	-	10	-	-
0.22	-	-	-	-	-	10	-	-
0.33	-	-	-	-	-	10	-	-
0.47	-	-	-	-	-	20	15	-
1.0	-	-	-	-	-	30	30	-
2.2	-	-	-	-	-	40	42	-
3.3	-	-	-	-	-	50	58	-
4.7	-	-	-	-	-	80	64	-
10	-	-	-	-	-	90	90	-
22	-	-	-	-	-	110	140	235
33	-	-	-	-	120	120	200	300
47	-	-	-	150	140	180	240	330
100	-	150	150	240	180	310	300	450
220	160	240	240	370	360	500	520	700
330	240	250	370	400	580	650	765	950
470	250	370	450	560	650	800	960	1100
1,000	450	560	760	900	900	1100	1100	
2,200	760	900	1100	1320	1400	1650		
3,300	900	1100	1320	1600	1800	2000		
4,700	11000	1420	1600	1900	2000			
6,800	1420	1700	1900	2200				
10,000	1700	1950	2300					
15,000	2100	2400						

MAXIMUM Impedance (Ω) AT 20°C AND 100KHz

Cap (μF)	Working Voltage (Vdc)							
	6.3	10	16	25	35	50	63	100
0.10	-	-	-	-	-	30	-	-
0.22	-	-	-	-	-	20	-	-
0.33	-	-	-	-	-	15	-	-
0.47	-	-	-	-	-	10	15	-
1.0	-	-	-	-	-	7.0	10.5	-
2.2	-	-	-	-	-	5.5	8.3	-
3.3	-	-	-	-	-	4.0	6.0	-
4.7	-	-	-	-	-	2.80	4.20	-
10	-	-	-	-	-	2.30	2.80	-
22	-	-	-	-	-	2.20	2.40	0.83
33	-	-	-	-	2.10	2.10	1.40	0.60
47	-	-	-	1.40	2.10	1.10	1.30	0.39
100	-	1.40	1.40	0.60	1.10	0.55	0.60	0.24
220	1.40	0.58	0.55	0.39	0.46	0.30	0.22	0.15
330	0.58	0.55	0.35	0.34	0.26	0.20	0.17	0.09
470	0.55	0.39	0.28	0.17	0.18	0.13	0.14	0.085
1,000	0.26	0.16	0.13	0.10	0.11	0.10	0.065	-
2,200	0.12	0.10	0.075	0.062	0.056	0.055	-	-
3,300	0.10	0.074	0.054	0.043	0.038	0.035	-	-
4,700	0.072	0.054	0.043	0.035	0.035	-	-	-
6,800	0.054	0.043	0.035	0.028	-	-	-	-
10,000	0.043	0.035	0.028	-	-	-	-	-
15,000	0.032	0.028	-	-	-	-	-	-

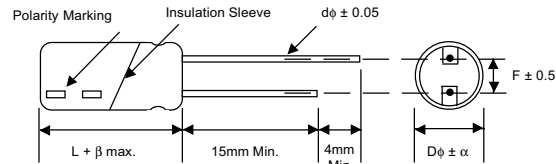


STANDARD PRODUCTS AND CASE SIZE TABLE D ϕ x L (mm)

Cap (μ F)	Code	Working Voltage (Vdc)							
		6.3	10	16	25	35	50	63	100
0.10	R10	-	-	-	-	-	5 x 11	-	-
0.22	R22	-	-	-	-	-	5 x 11	-	-
0.33	R33	-	-	-	-	-	5 x 11	-	-
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	-
4.7	4R7	-	-	-	-	-	5 x 11	5 x 11	-
10	100	-	-	-	-	-	5 x 11	5 x 11	-
22	220	-	-	-	-	-	5 x 11	5 x 11	8 x 11.5
33	330	-	-	-	-	5 x 11	5 x 11	6.3 x 11	8 x 12.5
47	470	-	-	-	5 x 11	5 x 11	6.3 x 11	6.3 x 11	10 x 12.5
100	101	-	5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	8 x 12.5	10 x 20
220	221	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	12.5 x 25
330	331	6.3 x 11	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
470	471	6.3 x 11	6.3 x 11	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 20	16 x 31
1,000	102	8 x 11.5	10 x 12.5	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 25	-
2,200	222	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 31	-	-
3,300	332	10 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 36	18 x 36	-	-
4,700	472	12.5 x 20	12.5 x 25	16 x 25	16 x 31	18 x 36	-	-	-
6,800	682	12.5 x 25	16 x 25	16 x 31	18 x 36	-	-	-	-
10,000	103	16 x 25	16 x 31	18 x 36	-	-	-	-	-
15,000	153	16 x 36	18 x 36	-	-	-	-	-	-

LEAD SPACING AND DIAMETER (mm)

Case Dia. (D ϕ)	5	6.3	8	10	12.5	16	18
Leads Dia. (d ϕ)	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



$\beta = L < 20\text{mm} = 1.5\text{mm}, L \geq 20\text{mm} = 2.0\text{mm}$
SLEEVE COLOR: DARK BROWN

PART NUMBERING SYSTEM

NRWS 101 M 35V 6.3X11 E

Series: NRWS
Capacitance Code: First 2 characters significant, third character is multiplier: 101
Tolerance Code (M=20%): M
Working Voltage (Vdc): 35V
Case Size (D ϕ x L): 6.3X11
Lead Free: E

RIPPLE CURRENT CORRECTION FACTORS

Ambient Temperature ($^{\circ}$ C)	$\leq +65$	+75	+85	+105
Correction Rate	1.60	1.40	1.40	1.00

Frequency (Hz)	50	120	300	1K	10K~
~ 47 μ F	0.75	1.00	1.35	1.55	2.00
100 ~ 470 μ F	0.80	1.00	1.20	1.35	1.50
1000 μ F ~	0.85	1.00	1.10	1.13	1.15