

HIGH TEMPERATURE, EXTENDED LOAD LIFE, RADIAL LEADS, POLARIZED

FEATURES

- HIGH VOLTAGE (6.3 ~ 250V)
- LOW IMPEDANCE AT 100KHZ
- LONG LIFE AT HIGH TEMPERATURE (UP TO 10,000 HOURS)

RoHS Compliant
includes all homogeneous materials

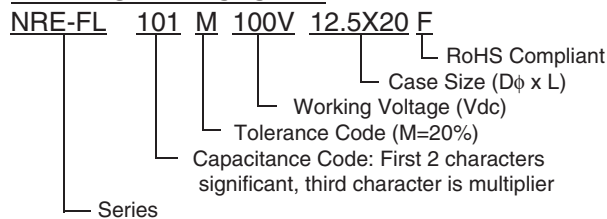
*See Part Number System for Details



CHARACTERISTICS

Rated Voltage Range		6.3 ~ 250VDC												
Capacitance Range		0.47 ~ 15,000 μ F												
Operating Temperature Range		-40°C ~ +105°C												
Capacitance Tolerance		\pm 20% (M)												
Maximum Leakage Current		0.01CV or 3 μ A whichever is greater after 2 minutes										0.04CV+100 μ A (After 1 minute)		
												0.02CV+25 μ A (After 5 minutes)		
Max. Tan δ at 120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50	63	100	160	200	250		
	S.V. (Vdc)	8	13	20	32	44	63	79	125	200	250	300		
	C \leq 1,000 μ F	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.12	0.12	0.12		
	C = 2,200 μ F	0.24	0.21	0.18	0.16	0.14	0.12	-	-	-	-	-		
	C = 3,300 μ F	0.26	0.23	0.20	0.18	0.16	-	-	-	-	-	-		
	C = 4,700 μ F	0.28	0.25	0.22	0.20	-	-	-	-	-	-	-		
	C = 6,800 μ F	0.32	0.29	0.26	-	-	-	-	-	-	-	-		
	C = 10,000 μ F	0.40	0.37	-	-	-	-	-	-	-	-	-		
Low Temperature Stability Impedance Ratio @ 120Hz	Z-20°C/Z+20°C	4	3	2	2	2	2	2	2	3	3	3		
	Z-40°C/Z+20°C	8	6	4	3	3	3	3	3	4	4	4		
Case Size & Voltage	Hours	Load Life Test @ 105°C and Rated Voltage												
D ϕ \leq 6.3mm, 6.3~10V	4000	Change in Characteristics	Δ Capacitance	Within \pm 25% of initial measured value (\pm 20% for 160 ~ 250Vdc parts)										
D ϕ \leq 6.3mm, 16~100V	5000			Δ Tan δ	Less than 200% of specified value									
D ϕ 8mm, 6.3~10V	6000				Δ LC	Less than specified value								
D ϕ 8mm, 16~100V	7000													
D ϕ 10mm, 6.3~10V	6000													
D ϕ 10mm, 16~100V	7000													
D ϕ 10mm, 160~250V	2000													
D ϕ \geq 12.5mm, 6.3~10V	8000													
D ϕ \geq 12.5mm, 16~100V	10000													
D ϕ \geq 12.5mm, 160~250V	2000													

PART NUMBER SYSTEM



PRECAUTIONS

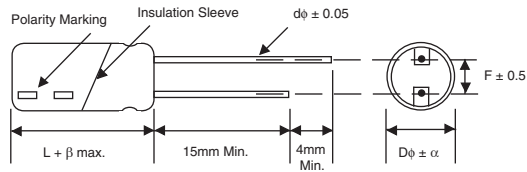
Please review the notes on correct use, safety and precautions found on pages T10 & T11 of NIC's Electrolytic Capacitor catalog.
Also found at www.niccomp.com/precautions
If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: tpmg@niccomp.com

STANDARD PRODUCT AND CASE SIZE TABLE D $\phi \times L$ (mm)

Cap. (μ F)	Code	Working Voltage (Vdc)										
		6.3	10	16	25	35	50	63	100	160	200	250
0.47	R47	-	-	-	-	-	5x11	-	5x11	-	-	-
1.0	1R0	-	-	-	-	-	5x11	-	5x11	-	-	-
2.2	2R2	-	-	-	-	-	5x11	-	5x11	-	-	-
3.3	3R3	-	-	-	-	-	5x11	-	5x11	-	-	-
4.7	4R7	-	-	-	-	-	5x11	-	5x11	-	-	-
10	100	-	-	-	-	-	5x11	5x11	6.3x11	-	-	-
22	220	-	-	-	-	-	5x11	6.3x11	8x11.5	10x20	10x20	10x20
33	330	-	-	-	5x11	5x11	6.3x11	6.3x11	10x12.5	12.5x20	12.5x25	12.5x25
47	470	-	-	5x11	5x11	6.3x11	6.3x11	8x11.5	10x16	12.5x25	12.5x25	16x25
68	680	-	-	-	-	-	-	-	-	12.5x25	16x25	16x31.5
100	101	5x11	5x11	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	12.5x20	16x25	16x31.5	16x35.5
150	151	-	-	-	-	-	-	-	-	16x31.5	16x35.5	-
220	221	6.3x11	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	16x25	18x35.5	18x35.5	-
330	331	6.3x11	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	16x25	-	-	-
470	471	8x11.5	8x11.5	10x12.5	10x16	10x20	12.5x20	12.5x25	-	-	-	-
1000	102	10x12.5	10x16	10x20	12.5x20	12.5x25	16x25	16x31.5	-	-	-	-
2200	222	12.5x20	12.5x20	12.5x25	16x25	16x31.5	18x35.5	-	-	-	-	-
3300	332	12.5x20	12.5x25	16x25	16x31.5	18x35.5	-	-	-	-	-	-
4700	472	16x25	16x25	16x31.5	18x35.5	-	-	-	-	-	-	-
6800	682	16x25	16x31.5	18x35.5	-	-	-	-	-	-	-	-
10000	103	16x31.5	18x35.5	-	-	-	-	-	-	-	-	-
15000	153	18x35.5	-	-	-	-	-	-	-	-	-	-

LEAD SPACING AND DIAMETER (mm)

Case Dia. (D ϕ)	5	6.3	8	10	12.5	16	18
Lead 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
Dim. β	L < 16mm: 1.5mm, L > 20mm: 2.0mm						



STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D $\phi \times L$ (mm)

Part Number	Cap. (μ F)	W.V. (Vdc)	Max. Tan δ	Max. LC 2 minutes (μ A)	Max. Impedance	Max. Ripple Current at 100KHz/105°C (mA rms)	Load Life Hours @ +105°C	
					100KHz/20°C			
NREFL101M6.3V5x11F	100	6.3	0.22	6.3	0.90	150	4,000	
NREFL221M6.3V6.3x11F	220		0.22	13.2	0.40	250	4,000	
NREFL331M6.3V6.3x11F	330		0.22	18.9	0.40	250	4,000	
NREFL471M6.3V8x11.5F	470		0.22	29.61	0.25	400	6000	
NREFL102M6.3V10x12.5F	1000		0.22	63	0.16	580	6000	
NREFL222M6.3V12.5x20F	2200		0.24	138.6	0.062	1300	8000	
NREFL332M6.3V12.5x20F	3300		0.26	207.9	0.062	1300	8000	
NREFL472M6.3V16x25F	4700		0.28	296.1	0.034	1850	8000	
NREFL682M6.3V16x25F	6800		0.32	428.4	0.034	1850	8000	
NREFL103M6.3V16x31.5F	10000		0.40	630	0.029	2000	8000	
NREFL153M6.3V18x35.5F	15000		0.50	945	0.025	2200	8000	
NREFL101M10V5x11F	100		10	0.19	10	0.90	150	4,000
NREFL221M10V6.3x11F	220			0.19	22	0.40	250	4,000
NREFL331M10V8x11.5F	330	0.19		33	0.25	400	6000	
NREFL471M10V8x11.5F	470	0.19		47	0.25	400	6000	
NREFL102M10V10x16F	1000	0.19		100	0.12	770	6000	
NREFL222M10V12.5x20F	2200	0.21		220	0.062	1300	8000	
NREFL332M10V12.5x20F	3300	0.23		330	0.048	1650	8000	
NREFL472M10V16x25F	4700	0.25		470	0.034	1850	8000	
NREFL682M10V16x31.5F	6800	0.29		680	0.029	2000	8000	
NREFL103M10V18x35.5F	10000	0.37		1000	0.025	2200	8000	

STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D ϕ x L (mm)

Part Number	Cap. (μ F)	W.V. (Vdc)	Max. Tan δ	Max. LC 2 minutes (μ A)	Max. Impedance	Max. Ripple Current at 100KHz/105°C (mA rms)	Load Life Hours @ +105°C
					100KHz/20°C		
NREFL470M16V5x11F	47	16	0.16	7.52	0.90	150	5000
NREFL101M16V6.3x11F	100		0.16	16	0.40	250	5000
NREFL221M16V8x11.5F	220		0.16	35.2	0.25	400	7000
NREFL331M16V8x11.5F	330		0.16	52.8	0.25	400	7000
NREFL471M16V10x12.5F	470		0.16	75.2	0.16	580	7000
NREFL102M16V10x20F	1000		0.16	160	0.078	1050	7000
NREFL222M16V12.5x25F	2200		0.18	352	0.048	1650	10000
NREFL332M16V16x25F	3300		0.20	528	0.034	1850	10000
NREFL472M16V16x31.5F	4700		0.22	752	0.029	2000	10000
NREFL682M16V18x35.5F	6800		0.26	1088	0.025	2200	10000
NREFL330M25V5x11F	33	25	0.14	8.25	0.90	150	5000
NREFL470M25V5x11F	47		0.14	11.75	0.90	150	5000
NREFL101M25V6.3x11F	100		0.14	25	0.40	250	5000
NREFL221M25V8x11.5F	220		0.14	55	0.25	400	7000
NREFL331M25V10x12.5F	330		0.14	82.5	0.16	580	7000
NREFL471M25V10x16F	470		0.14	117.5	0.12	770	7000
NREFL102M25V12.5x20F	1000		0.14	250	0.062	1300	10000
NREFL222M25V16x25F	2200		0.16	550	0.034	1850	10000
NREFL332M25V16x31.5F	3300		0.18	825	0.029	2000	10000
NREFL472M25V18x35.5F	4700		0.20	1175	0.025	2200	10000
NREFL330M35V5x11F	33	35	0.12	11.55	0.90	150	5000
NREFL470M35V6.3x11F	47		0.12	16.45	0.40	250	5000
NREFL101M35V8x11.5F	100		0.12	35	0.25	400	7000
NREFL221M35V10x12.5F	220		0.12	77	0.16	580	7000
NREFL331M35V10x16F	330		0.12	115.5	0.12	770	7000
NREFL471M35V10x20F	470		0.12	164.5	0.078	1050	7000
NREFL102M35V12.5x25F	1000		0.12	350	0.048	1650	10000
NREFL222M35V16x31.5F	2200		0.14	770	0.029	2000	10000
NREFL332M35V18x35.5F	3300		0.16	1155	0.025	2200	10000
NREFLR47M50V5x11F	0.47		50	0.10	3	5.5	17
NREFL1R0M50V5x11F	1.0	0.10		3	4.0	30	5000
NREFL2R2M50V5x11F	2.2	0.10		3	2.5	43	5000
NREFL3R3M50V5x11F	3.3	0.10		3	2.2	53	5000
NREFL4R7M50V5x11F	4.7	0.10		3	1.9	88	5000
NREFL100M50V5x11F	10	0.10		5	1.5	100	5000
NREFL220M50V5x11F	22	0.10		11	0.90	150	5000
NREFL330M50V6.3x11F	33	0.10		16.5	0.40	250	5000
NREFL470M50V6.3x11F	47	0.10		23.5	0.40	250	5000
NREFL101M50V8x11.5F	100	0.10		50	0.25	400	7000
NREFL221M50V10x16F	220	0.10	110	0.12	770	7000	
NREFL331M50V10x20F	330	0.10	165	0.078	1050	7000	
NREFL471M50V12.5x20F	470	0.10	235	0.062	1300	10000	
NREFL102M50V16x25F	1000	0.10	500	0.034	1850	10000	
NREFL222M50V18x35.5F	2200	0.12	1100	0.025	2200	10000	
NREFL100M63V5x11F	10	63	0.09	6.3	2.3	87	5000
NREFL220M63V6.3x11F	22		0.09	13.86	1.3	140	5000
NREFL330M63V6.3x11F	33		0.09	20.79	1.2	140	5000
NREFL470M63V8x11.5F	47		0.09	29.61	0.63	210	7000
NREFL101M63V10x12.5F	100		0.09	63	0.43	300	7000
NREFL221M63V10x20F	220		0.09	138.6	0.21	520	7000
NREFL331M63V12.5x20F	330		0.09	207.9	0.16	660	10000
NREFL471M63V12.5x25F	470		0.09	296.1	0.12	750	10000
NREFL102M63V16x31.5F	1000		0.09	630	0.054	1390	10000

STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D ϕ x L (mm)

Part Number	Cap. (μ F)	W.V. (Vdc)	Max. Tan δ	Max. LC 5 minutes (μ A)	Max. Impedance	Max. Ripple Current at 100KHz/105°C (mA rms)	Load Life Hours @ +105°C
					100KHz/20°C		
NREFLR47M100V5x11F	0.47	100	0.08	3.0	6.0	15	5000
NREFL1R0M100V5x11F	1.0		0.08	3.0	4.5	20	5000
NREFL2R2M100V5x11F	2.2		0.08	3.0	3.0	30	5000
NREFL3R3M100V5x11F	3.3		0.08	3.3	2.7	40	5000
NREFL4R7M100V5x11F	4.7		0.08	4.7	2.5	65	5000
NREFL100M100V6.3x11F	10		0.08	10	1.2	140	5000
NREFL220M100V8x11.5F	22		0.08	22	0.63	160	7000
NREFL330M100V10x12.5F	33		0.08	33	0.43	230	7000
NREFL470M100V10x16F	47		0.08	47	0.31	290	7000
NREFL101M100V12.5x20F	100		0.08	100	0.16	430	10000
NREFL221M100V16x25F	220		0.08	220	0.073	900	10000
NREFL331M100V16x25F	330		0.08	330	0.073	900	10000
NREFL220M160V10x20F	22	160	0.12	70.4	1.0	350	2000
NREFL330M160V12.5x20F	33		0.12	105.6	0.70	450	2000
NREFL470M160V12.5x25F	47		0.12	150.4	0.45	600	2000
NREFL680M160V12.5x25F	68		0.12	217.6	0.45	600	2000
NREFL101M160V16x25F	100		0.12	320	0.24	950	2000
NREFL151M160V16x31.5F	150		0.12	480	0.17	1200	2000
NREFL221M160V18x35.5F	220		0.12	704	0.14	1400	2000
NREFL220M200V10x20F	22	200	0.12	88	1.0	350	2000
NREFL330M200V12.5x25F	33		0.12	132	0.55	550	2000
NREFL470M200V12.5x25F	47		0.12	188	0.44	600	2000
NREFL680M200V16x25F	68		0.12	272	0.24	950	2000
NREFL101M200V16x31.5F	100		0.12	400	0.17	1200	2000
NREFL151M200V16x35.5F	150		0.12	600	0.16	1280	2000
NREFL221M200V18x35.5F	220		0.12	880	0.14	1400	2000
NREFL220M250V10x20F	22	250	0.12	110	1.4	300	2000
NREFL330M250V12.5x25F	33		0.12	165	0.70	450	2000
NREFL470M250V16x25F	47		0.12	235	0.31	850	2000
NREFL680M250V16x31.5F	68		0.12	340	0.22	1050	2000
NREFL101M250V16x35.5F	100		0.12	500	0.18	1200	2000

RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

Frequency (Hz)	120	1K	10K	\leq 100K
0.47 ~ 10 μ F	0.42	0.60	0.80	1.00
22 ~ 33 μ F	0.55	0.75	0.90	1.00
47 ~ 330 μ F	0.70	0.85	0.95	1.00
470 ~ 1000 μ F	0.75	0.90	0.98	1.00
2200 ~ 15000 μ F	0.80	0.95	1.00	1.00

All 160 ~ 250V Parts					
Frequency (Hz)	60(50)	120	1K	10K	\leq 100K
Coefficient	0.40	0.50	0.75	0.90	1.00