

# Miniature Aluminum Electrolytic Capacitors

NRSH Series

HIGH TEMPERATURE, EXTENDED LOAD LIFE, RADIAL LEADS, POLARIZED

## FEATURES

- IMPROVED ENDURANCE AT HIGH TEMPERATURE (up to 10,000HRS @ 105°C)
- LOW IMPEDANCE & HIGH RIPPLE CURRENT RATINGS
- NEW REDUCED SIZES

**RoHS  
Compliant**  
includes all homogeneous materials

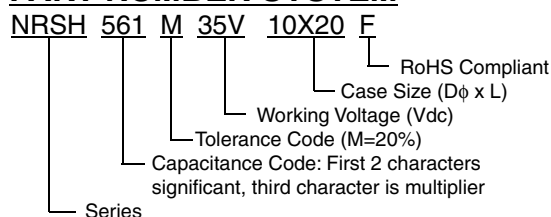
\*See Part Number System for Details



## CHARACTERISTICS

Rated Voltage Range	6.3 ~ 50VDC						
Capacitance Range	27 ~ 8,200 $\mu$ F						
Operating Temperature Range	-40°C ~ +105°C						
Capacitance Tolerance	$\pm$ 20% (M)						
Maximum Leakage Current After 2 minutes	0.01CV or 3 $\mu$ A whichever is greater						
Max. Tan $\delta$ at 120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50
	S.V. (Vdc)	8	13	20	32	44	63
	C $\leq$ 1,000 $\mu$ F	0.22	0.19	0.16	0.14	0.12	0.10
	C = 1,200 $\mu$ F	0.22	0.19	0.16	0.14	0.12	-
	C = 1,500 $\mu$ F	0.22	0.19	0.16	0.14	0.12	-
	C = 2,200 $\mu$ F	0.24	0.21	0.18	0.16	0.14	-
	C = 2,700 $\mu$ F	0.24	0.21	0.18	0.16	-	-
	C = 3,300 $\mu$ F	0.26	0.23	0.20	0.18	-	-
	C = 3,900 $\mu$ F	0.26	0.23	0.20	-	-	-
	C = 4,700 $\mu$ F	0.28	0.25	0.22	-	-	-
	C = 5,600 $\mu$ F	0.30	0.27	-	-	-	-
Low Temperature Stability Impedance Ratio @ 120Hz	Z-25°C/Z+20°C	2	2	2	2	2	2
	Z-40°C/Z+20°C	3	3	3	3	3	3
Load Life Test @ 105°C	Duration	$\phi$ D = 6.3: 6,000 hours, $\phi$ D = 8: 8,000 hours, $\phi$ D = 10 $\geq$ : 10,000 hours					
	$\Delta$ Capacitance	Within $\pm$ 25% of initial measured value					
	$\Delta$ Tan $\delta$	Less than 200% of specified value					
	$\Delta$ LC	Less than specified value					

## PART NUMBER SYSTEM



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## MAXIMUM RIPPLE CURRENT (mA rms AT 100KHz & 105°C)

Capacitance (μF)	Working Voltage (Vdc)					
	6.3	10	16	25	35	50
27	-	-	-	-	-	238
47	-	-	-	-	345	-
56	-	-	-	-	-	385
68	-	-	-	345	-	-
100	-	-	345	-	540	724
120	-	-	-	-	-	950
150	-	345	-	540	-	979
180	-	-	-	-	-	1190
220	345	-	540	-	945	1370
270	-	-	-	-	1250	1580
330	-	540	-	945	1330	1870
390	-	-	-	1250	1500	-
470	540	-	945	1330	1760	2050
560	-	-	-	1500	1960	2410
680	-	945	1250 1330	1760	2250	2860
820	945	-	-	1960	-	2960 2730
1,000	-	1250 1330	1500 1760	2250	2480	3010
1,200	1250 1330	-	-	-	2900	-
1,500	1500	1500 1760	1960	2480	3450 3250	-
1,800	1760	1960	2250	2900	3570	-
2,200	1960	2250	2480	3450 3250	3630	-
2,700	2250	-	2900	3570	-	-
3,300	-	2480	3450 3250	3630	-	-
3,900	2480	2900	3570	-	-	-
4,700	2900	3450 3250	3630	-	-	-
5,600	3450	3570	-	-	-	-
6,800	3250 3570	3630	-	-	-	-
8,200	3630	-	-	-	-	-

## MAXIMUM IMPEDANCE (Ω AT 100KHz & 20°C)

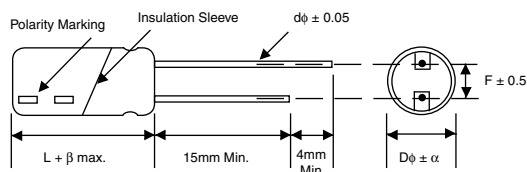
Capacitance (μF)	Working Voltage (Vdc)					
	6.3	10	16	25	35	50
27	-	-	-	-	-	0.340
47	-	-	-	-	0.220	-
56	-	-	-	-	-	0.140
68	-	-	-	0.220	-	-
100	-	-	0.220	-	0.094	0.074
120	-	-	-	-	-	0.061
150	-	0.220	-	0.094	-	0.061
180	-	-	-	-	-	0.046
220	0.220	-	0.094	-	0.056	0.042
270	-	-	-	-	0.045	0.030
330	-	0.094	-	0.056	0.039	0.028
390	-	-	-	0.045	0.029	-
470	0.094	-	0.056	0.039	0.028	0.027
560	-	-	-	0.029	0.020	0.023
680	-	0.056	0.045 0.039	0.028	0.018	0.021
820	0.056	-	-	0.020	-	0.019 0.023
1,000	-	0.045 0.039	0.029 0.028	0.018	0.017	0.021
1,200	0.045 0.039	-	-	-	0.015	-
1,500	0.029	0.029 0.028	0.020	0.017	0.013 0.015	-
1,800	0.028	0.020	0.018	0.015	0.012	-
2,200	0.020	0.018	0.017	0.013 0.015	0.013	-
2,700	0.018	-	0.015	0.012	-	-
3,300	-	0.017	0.013 0.015	0.013	-	-
3,900	0.017	0.015	0.012	-	-	-
4,700	0.015	0.013 0.015	0.013	-	-	-
5,600	0.013	0.012	-	-	-	-
6,800	0.015 0.012	0.013	-	-	-	-
8,200	0.013	-	-	-	-	-

## RIPPLE CURRENT FREQUENCY CORRECTION FACTORS

Frequency (Hz)	120	1K	10K	<100K
27μF	0.42	0.70	0.90	1.00
47 ~ 270μF	0.50	0.73	0.92	1.00
330 ~ 680μF	0.55	0.77	0.94	1.00
820 ~ 1800μF	0.60	0.80	0.96	1.00
2200 ~ 8200μF	0.70	0.85	0.98	1.00

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

Capacitance ( $\mu$ F)	Code	Working Voltage (Vdc)					
		6.3	10	16	25	35	50
27	270	-	-	-	-	-	5 x 11
47	470	-	-	-	-	5 x 11	-
56	560	-	-	-	-	-	6.3 x 11
68	680	-	-	-	5 x 11	-	-
100	101	-	-	5 x 11	-	6.3 x 11	8 x 11.5
120	121	-	-	-	-	-	8 x 16
150	151	-	5 x 11	-	6.3 x 11	-	10 x 12.5
180	181	-	-	-	-	-	8 x 20
220	221	5 x 11	-	6.3 x 11	-	8 x 11.5	10 x 16
270	271	-	-	-	-	8 x 16	10 x 20
330	331	-	6.3 x 11	-	8 x 11.5	10 x 12.5	10 x 23
390	391	-	-	-	8 x 16	8 x 20	-
470	471	6.3 x 11	-	8 x 11.5	10 x 12.5	10 x 16	12.5 x 20
560	561	-	-	-	8 x 20	10 x 20	12.5 x 25
680	681	-	8 x 11.5	8 x 16 10 x 12.5	10 x 16	10 x 23	12.5 x 30
820	821	8 x 11.5	-	-	10 x 20	-	12.5 x 35 16 x 20
1,000	102		8 x 16 10 x 12.5	8 x 20 10 x 16	10 x 23	12.5 x 20	16 x 25
1,200	122	8 x 16 10 x 12.5	-	-	-	12.5 x 25	-
1,500	152	8 x 20	8 x 20 10 x 16	10 x 20	12.5 x 20	12.5 x 30 16 x 20	-
1,800	182	10 x 16	10 x 20	10 x 23	12.5 x 25	12.5 x 35	-
2,200	222	10 x 20	10 x 23	12.5 x 20	12.5 x 30 16 x 20	16 x 25	-
2,700	272	10 x 23	-	12.5 x 25	12.5 x 35	-	-
3,300	332	-	12.5 x 20	12.5 x 30 16 x 20	16 x 25	-	-
3,900	392	12.5 x 20	12.5 x 25	12.5 x 35	-	-	-
4,700	472	12.5 x 25	12.5 x 30 16 x 20	16 x 25	-	-	-
5,600	562	12.5 x 30	12.5 x 35	-	-	-	-
6,800	682	16 x 20 12.5 x 35	16 x 25	-	-	-	-
8,200	822	16 x 25	-	-	-	-	-



### LEAD SPACING AND DIAMETER (mm)

Case Dia. (D $\phi$ )	5	6.3	8	10	12.5	16	18
Leads Dia. (d $\phi$ )	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. $\alpha$	0.5	0.5	0.5	0.5	0.5	0.5	0.5

$\beta = L \leq 16\text{mm} = 1.5\text{mm}, L \geq 20\text{mm} = 2.0\text{mm}$